



Kazakhstan's Gas: Export Markets and Export Routes

Shamil Midkhatovich Yenikeyeff

November 2008

NG 25

The contents of this paper are the author's sole responsibility. They do not necessarily represent the views of the Oxford Institute for Energy Studies or any of its members.

Copyright © 2008

Oxford Institute for Energy Studies

(Registered Charity, No. 286084)

This publication may be reproduced in part for educational or non-profit purposes without special permission from the copyright holder, provided acknowledgment of the source is made. No use of this publication may be made for resale or for any other commercial purpose whatsoever without prior permission in writing from the Oxford Institute for Energy Studies.

ISBN

978-1-901795-79-0

Preface

There has been an upsurge of interest in Central Asian oil and gas in the post-Soviet era, but it remains a difficult region for researchers. Data is incomplete and conflicting, projects are technically complex and subject to delays and cost increases, and the impact of internal and external economic and political pressures on these projects continues to be unpredictable. Kazakhstan is already a major oil exporter, but the country also has a substantial gas industry and very considerable resource potential. Because of the lack of clarity surrounding this potential, I asked Shamil Yenikeyeff to write this study focussing on Kazakh gas export potential, also encompassing more general political and energy issues.

Currently all Central Asian gas exports (outside that region) are purchased by Gazprom for onward sale to (mainly) CIS countries. But with a pipeline connection to China planned for completion by the end of 2009, and a number of proposals to bring Central Asian gas to European markets by pipeline, competition is becoming more intense. It is in this context that Kazakh gas has become more important in the 2000s and will become increasingly important as major hydrocarbon developments at Karachaganak and Kashagan progress.

I am grateful to Shamil Yenikeyeff for seeing this difficult project through to a successful conclusion. This is an expanded version of the chapter which he has written for our [forthcoming book on CIS gas markets](#).¹ Given the media hype surrounding Central Asian gas resources, a well-researched study of Kazakhstan could not be more timely.

Jonathan Stern

Oxford

November 2008

¹ Ed. Simon Pirani, *Russian and CIS Gas Markets and Their Impact on Europe*, Oxford University Press/OIES: forthcoming 2009.

Acknowledgments

My first thanks go to my colleagues at the Oxford Institute for Energy Studies for their continued support and especially to the Director of Natural Gas Research Programme, Professor Jonathan Stern, for introducing me to the fascinating subject of natural gas and his encouragement and patience throughout this project. Next I want to thank our Director Christopher Allsopp for his intellectual support. Special thanks go to Simon Pirani for his practical suggestions while reviewing preliminary drafts of this study. Dr Paik provided valuable insight into China's energy issues. I am sincerely grateful to the people who organised interviews in Kazakhstan and Europe with distinguished representatives of the Kazakh political and corporate establishment. I am also indebted to many people who spared their valuable time to share their practical insights into the industry and provided their comments on this study. Grateful thanks go to Kate Teasdale, Judy Mabro and Anita Gardiner for their invaluable contribution.

Shamil Midkhatovich Yenikeyeff,
Oxford, October 2008

ABOUT THE AUTHOR

Dr Shamil Midkhatovich Yenikeyeff is a Research Fellow at the Oxford Institute for Energy Studies and a Senior Associate Member at the Russian and Eurasian Studies Centre, St Antony's College, University of Oxford.

Dr Yenikeyeff holds a first class degree with honours in law from the Bashkir State University, Russia, and an M.Phil and D.Phil. in Politics from the University of Oxford.

His current research focuses on the political economy of the oil and gas sectors of Russia and Kazakhstan with emphasis on economic policies, state-business relations, corporate strategies, political and economic risks.

He runs "[The Geopolitics of Energy](#)" lecture series under the joint auspices of the Oxford Institute for Energy Studies and St Antony's College, University of Oxford.

Dr Yenikeyeff writes and presents on Russian-European energy relations, Russia and OPEC, Caspian and Central Asian energy issues, and the development of Arctic hydrocarbons.

His is the author of *The Battle for Russian Oil: Corporations, Regions, and the State*, a forthcoming book on the politics of the Russian oil sector under Yeltsin and Putin, to be published by Oxford University Press (late 2008 – early 2009).

Contents

INTRODUCTION	1
1. Historical and External Determinants of Kazakhstan’s Gas Sector	3
1.1 <i>Kazakhstan’s Gas Sector: A Historical Outline</i>	3
1.1.1 Soviet Period	3
1.1.2 Post-Soviet Chaos	4
1.1.3 Kazakhstan and International Oil Companies	5
1.2 <i>Kazakhstan’s Energy Sector: Politics and Society</i>	6
1.2.1 Kazakhstan’s Top Elite Groups.....	8
1.2.2 Succession and Stability	11
1.3 <i>Geopolitics of Kazakhstan’s Gas</i>	12
1.3.1 Geopolitics of Pipelines: from Oil to Gas Projects?	13
1.3.2 Diverse Approaches.....	15
1.3.3 Stability of the Region	17
2. The Current Status of Kazakhstan’s Gas Industry.....	19
2.1 <i>Kazakhstan’s Gas Potential</i>	19
2.2 <i>Hydrocarbon Fields</i>	22
2.2.1 Karachaganak	23
2.2.2 Tengiz	25
2.2.3 Kashagan	27
2.2.4 Zhanazhol	30
2.2.5 Imashevskoye	32
2.2.6 Medium to Small Fields	32
2.2.7 Coal-bed Methane.....	33
2.3 <i>Pipelines</i>	33
2.3.1 Kazakhstan’s Main Gas Trunk Pipelines.....	35
2.3.2 Depreciation of Pipelines	36
2.3.4 Gas Storage Facilities.....	37
2.3.5 Current Gas Transit.....	37
2.4 <i>Domestic Market</i>	39
2.4.1 Gas Imports	40
2.4.2 Import Price.....	42
2.5 <i>Gas Exports</i>	43
2.5.1 KazRosGaz	44
2.6 <i>Domestic Tariffs and Prices</i>	45
2.7 <i>Production Costs, Profit Margins and External Markets</i>	46
2.8 <i>Kazakhstan’s LPG Production</i>	48
3. THE FUTURE OF KAZAKHSTAN’S GAS	51
3.1 <i>Future Production, Demand and Exports</i>	51
3.2 <i>Potential Domestic Gas Demand</i>	52
3.2.1 Gas Reinjection.....	52
3.2.2 Domestic Demand and Kazakhstan’s Gasification	52
3.2.3 Gas for Power Generation	54
3.2.4 Gas in Petrochemical Production	56

3.3 External Markets.....	57
3.3.1 Russia	57
3.3.2 Chinese and European Markets	59
3.3.3 Pipeline Competition in 2007	60
3.4 Pipeline Projects.....	61
3.4.1 Central Asia–Centre Pipeline.....	61
3.4.2 Caspian Littoral Gas Pipeline	62
3.4.3 Trans-Asian Gas Pipeline Network.....	63
3.4.3.1 Turkmenistan–China Gas Pipeline	64
3.4.3.2 Western Kazakhstan –Western China Pipeline.....	66
3.4.4 Trans-Caspian Gas Pipeline.....	68
3.4.4.1 Alternative Pipelines.....	70
3.4.4.2 The Legal Status of the Caspian Sea	71
3.5 Non-Pipeline Alternatives: LNG, CNG, GTL.....	72
4. CONCLUSIONS.....	74
4.1 Kazakhstan’s Gas Balance and Production Plans.....	74
4.2 Gas Utilisation and Domestic Demand.....	76
4.3 Gas Exports	76
APPENDIX ONE: SELECTED KAZAKH OIL/NATURAL GAS PROJECTS	78

Tables

Table 1: Kazakhstan’s gas fields (official figures).....	20
Table 2: Associated and non-associated gas production in Kazakhstan (bcm) 2004 –January–June 2008.....	21
Table 3: Kazakhstan’s gas utilisation (bcm), 2005	22
Table 4: Kazakhstan’s gas production balance, 2005–2007 (bcm)	22
Table 5: Kazakhstan’s key hydrocarbon fields	23
Table 6: Karachaganak Petroleum Operating B. V. (KPO).....	24
Table 7: Tengizchevroil	25
Table 8: Agip Kazakhstan North Operating Company B.V. (as of May 2008)	28
Table 9: North Caspian Operating Company (NCOC)	28
Table 10: Gas transport	34
Table 11: Depreciation levels of Kazakhstan’s gas pipelines in 2004	37
Table 12: The main activities of Intergaz Central Asia.....	39
Table 13: Kazakhstan’s natural gas production per province (mcm), 2000–2007.....	40
Table 14: Kazakhstan’s domestic gas demand and imports, 2006–2007	40
Table 15: Kazakhstan’s gas imports (mcm), 2004–2007.....	41
Table 16: Kazakhstan’s gas balance (bcm) in 2001–2007.....	41
Table 17: Kazakhstan’s gas imports (volumes and average prices) in 2007–2008 (first quarter)	42
Table 18: Kazakhstan’s apparent gas exports, 2005–2007.....	43

Table 19: Central Asian gas prices for Gazprom in 2008. (\$/1000 cm).....	45
Table 20: Gas transportation tariffs within Kazakhstan (tenge per one thousand cubic metres), autumn 2007	46
Table 21: Average production costs of gas in Kazakhstan per 1000 cm (tenge/US\$), 2000–2006	46
Table 22: Kazakhstan’s domestic energy market (industrial sector prices), January, July and December 2006 (in tenge) /US\$.....	48
Table 23: LPG producers in Kazakhstan (thousand tonnes), 2006	49
Table 24: Kazakhstan LPG industry in 2005–2007 (thousand tonnes)	50
Table 25: Projected annual gas consumption in Kazakhstan (million cubic metres), 2010–2040.....	53
Table 26: Kazakhstan’s gross electricity and heat production from combustible fuels, 2006	54
Table 27: Kazakhstan’s Natural Gas Consumption for Power Generation (bcm), 2001–2005	55
Table 28: Gas exports to Russia from Turkmenistan, Uzbekistan and Kazakhstan’s Caspian fields (bcm), 2015.	59
Table 29: Potential and future gas routes from Russia and CIS countries to Europe.....	70
Table 30: Export pipeline projects.....	71
Table 31: Kazakhstan’s projected gas production and demand, 2008-2015 (bcm).....	74
Table 32: Kazakhstan’s Gas Balance, 2007 and 2015	76

Maps

Map 1 Major Gas Fields and Pipelines of Kazakhstan	35
Map 2: Caspian Littoral gas pipeline.....	63
Map 3: Turkmenistan–China (30 bcm) and Kazakhstan–China (10 bcm) gas pipelines	66

Figures

Figure 1: Kazakhstan’s gross gas production (bcm) 1994–2008.....	19
--	----

Abbreviations & Acronyms

bcm	billion cubic meters (gas)
bbls	barrels (liquid hydrocarbons)
bpd	barrels per day (oil)
BGA–TBA	Bukhara Gas Area–Tashkent–Bishkek–Almaty gas pipeline
BTE	Baku–Tbilisi–Erzurum gas pipeline
BTC	Baku–Tbilisi–Ceyhan oil pipeline
CAC	Central Asia–Centre gas pipeline
CBM	coal-bed methane
CIS	Commonwealth of Independent States
CNG	compressed natural gas
CNOOC	China National Offshore Oil Corporation
CNPC	Chinese National Petroleum Company
CPC	Caspian Pipeline Consortium
CS	compressor station
GTL	gas-to-liquids
ENI	Ente Nazionale Idrocarburi (ENI S.p.A., Italian multinational oil and gas company)
EU	European Union
GDP	gross domestic product
GRES	thermal power plant
GTI	gas-turbine installations
HIIP	hydrocarbons initially in place
H ₂ S	hydrogen sulphide
IEA	International Energy Agency
IOC	international oil company
JSC	joint stock company
KCTS	Kazakhstan–Caspian Transportation System
km	kilometre
KNOC	Korean National Oil Company
KPC	Karachaganak Processing Complex
KPI	Kazakhstan Petrochemical Industries
KPO	Karachaganak Petroleum Operating B.V.
kW	kilowatt (power)
LNG	liquefied natural gas
LPG	liquefied petroleum gas
MEMR	Ministry of Energy and Mineral Resources
MOL	Magyar Olaj- és Gázipari Nyrt. (Hungarian Oil and Gas Public Limited)
MW	megawatt (power)
mcm	thousand cubic metres
mm	millimetre
MPa	megapascal (pressure)
NCOC	North Caspian Operating Company
NIOC	National Iranian Oil Company
NOC	national oil company
OECD	Organisation for Economic Co-operation and Development

OKIOC	Offshore Kazakhstan International Operating Company
OMV	originally ÖMV for "Österreichische Mineralölverwaltung" (Austrian mineral oil authority)
PJ	petajoule (energy)
POSCO	Pohang Iron and Steel Company
PSA	production sharing agreement
psi	pounds per square inch (pressure)
RWE	until 1990: Rheinisch-Westfälisches Elektrizitätswerk AG (German electric power and natural gas public utility company)
SCO	Shanghai Co-operation Organization
SCP	South Caucasus Pipeline
tcm	trillion cubic meters (gas)
TWh	terawatt hour (electricity)
TCGP	Trans-Caspian Gas Pipeline
TCO	Tengizchevroil
UGP	Uralsk gas pipeline
USSR	Union of the Soviet Socialist Republics
WREP	Western Route Export Pipeline

Introduction

The geographic proximity of Kazakhstan to Russia, China, Central Asia and the Caspian region makes this oil and gas-producing country an important player in energy exports from the CIS.

The method with which Kazakhstan – the second largest oil and gas producer in the former USSR after Russia – chooses to develop its gas resources and relevant export infrastructure will have significant implications for gas exports from other energy-producing countries of the former Soviet Union, as well as for the existing European and Chinese plans for diversification of natural gas supplies.

The aim of this study is to examine the various scenarios under which Kazakhstan could deliver its gas to potential export markets.

In order to assess these issues adequately, this study examines the following three areas:

1. Historical and external determinants of Kazakhstan's gas sector

The first part of the study provides a general understanding of the subject, including the way in which traditional gas exports from Kazakhstan to Russia, Central Asia and the Caucasus have determined the contemporary situation. This section also focuses on the domestic politics and geopolitical issues that shape the evolving gas sector in Kazakhstan.

2. The current state of Kazakhstan's gas industry

The second part of the study highlights the importance of the geographic location of different gas fields and the relevant infrastructure for external markets, as well as the significance of the ownership structure (private/public, foreign/domestic) of relevant companies. This section also assesses the dependency of gas deliveries on oil production.

3. The future of Kazakhstan's gas

The third part of the study examines the potential of Kazakhstan's gas sector in relation to current and projected supply availability and the market for Kazakhstan gas in terms of demand, volumes and prices. The final section also presents an analysis of existing and potential gas export projects from Kazakhstan, providing their description, stage of development and viability.

Kazakhstan's Profile²

Territory: 2,717,300 sq km comprised of land: 2,669,800 sq km and water: 47,500 sq km

Coast line: landlocked; borders the Aral Sea, now split into two bodies of water (1,070 km), and the Caspian Sea (1894 km)

Border countries: China 1,533 km, Kyrgyzstan 1,224 km, Russia 6,846 km, Turkmenistan 379 km, Uzbekistan 2,203 km

Population: 15,340,533 (July 2008 est.)

Population below poverty line: 13.8% (2007)

Life expectancy at birth: *male:* 62.24 years, *female:* 73.16 years (2008 est.)

Ethnic groups: Kazakh 53.4%, Russian 30%, Ukrainian 3.7%, Uzbek 2.5%, German 2.4%, Tatar 1.7%, Uygur 1.4%, other 4.9% (1999 census)

Religions: Muslim 47%, Russian Orthodox 44%, Protestant 2%, other 7%

Languages: Kazakh 64.4%, Russian 95% (2001 est.)

Currency: Tenge (KZT) per US dollar – 122.55 (2007), 126.09 (2006), 132.88 (2005), 136.04 (2004)

GDP – purchasing power parity \$168.2 billion (2007 est.)

GDP – real growth rate: 8.5% (2007 est.)

GDP – per capita (PPP): \$11,000 (2007 est.)

GDP – composition by sector: services 54.4%, industry 39.8%, agriculture 5.7% (2006 estimate)

Exports: \$48.35 billion f.o.b. (2007 est.)

Exports – commodities: oil and oil products 58%, ferrous metals 24%, chemicals 5%, machinery 3%, grain, wool, meat, coal (2001)

Exports – partners: China 15.6%, Germany 11.5%, Russia 11.5%, Italy 7.3%, France 6.8% (2007)

Imports: \$33.21 billion f.o.b. (2007 est.)

Imports – commodities: machinery and equipment 41%, metal products 28%, foodstuffs 8% (2001)

Imports – partners: Russia 34.5%, China 22.5%, Germany 8.1% (2007)

External debt: \$96.36 billion (31 December 2007)

International Reserves and Foreign Currency Liquidity: \$21.74 billion (August 2008)

Corruption perception index: 2.2, Kazakhstan's ranking position 145 out of 180 countries (2008)

² CIA-*The World Fact Book*, 2008; Transparency International CPI, 2008; IMF, September 2008.

1. Historical and External Determinants of Kazakhstan's Gas Sector

1.1 *Kazakhstan's Gas Sector: A Historical Outline*

The contemporary gas industry of Kazakhstan has evolved over three historical periods:

- Soviet (1940–1991), when Kazakhstan was a constituent part of the Union of Soviet Socialist Republics (USSR);
- post-Soviet chaos, associated with the collapse of the USSR and the resultant transitional problems of the newly independent states (1991–1999);
- the emergence and strengthening of an independent Kazakh gas sector (2000–present day).

1.1.1 *Soviet Period*

Initial gas volumes of between 4 and 7 million cubic metres/year were produced in Kazakhstan in the 1940s.³ However, throughout the Soviet period Kazakhstan's gas production remained insignificant in comparison to neighbouring Turkmenistan, where vast new gas resources were discovered. Most Kazakh gas was, and still is, a by-product of oil production and was usually flared. The domestic gas sector emerged in Kazakhstan in the 1970s, when the government of the USSR initiated the construction of Central Asian gas trunk pipelines: Bukhara–Ural, Central Asia–Centre, and Bukhara–Tashkent–Frunze–Almaty. Moscow directly administered the gas pipeline system which transported Turkmen and Uzbek gas through the territory of Kazakhstan to Russia, the Ukraine, the Caucasus and Europe. The autonomous government of the Kazakh Union republic had no influence on decision-making, and development of the local gas sector was run by the centre-controlled organisation, Kazakhgaz. During the Soviet period, Moscow viewed Kazakhstan, which lacked its own economically viable gas resources, purely as a transit region for Turkmen and Uzbek gas.⁴ Hence, the gas trunk pipelines were designed accordingly: they did not cover the entire territory of Kazakhstan and were not technologically linked into one united complex.

Naturally, this imposed considerable technological, political and economic constraints on the fledgling country's gas industry in the post-Soviet period. As a result, at present Kazakhstan is entirely dependent on Russia for access to major gas markets to the north and west. Additionally, Kazakhstan's domestic gas infrastructure is inadequate: its western/northern regions, where the transit pipelines were originally built, are well supplied with gas; whereas gas for the industrialised and densely populated southern part of the country is mainly imported from Uzbekistan.

³ Lydolph, Paul E. and Shabad, Theodore, 'The Oil and Gas Industries in the USSR', *Annals of the Association of American Geographers*, vol. 50, no. 4, December 1960, p. 470.

⁴ Interdependence between the gas sectors of Kazakhstan, Turkmenistan, Uzbekistan and Russia is examined in Part Two of this study.

1.1.2 Post-Soviet Chaos

The break-up of the unified Soviet gas industry in 1991 resulted in serious financial, transit, management and political problems for the former states of the Soviet Union. The emerging relationships between its former constituent parts were initially shaped by unrealistic commercial expectations from the newly independent governments, hungry for extra budget revenues at the time of political and economic turmoil.⁵

The fact that the Soviet gas industry was highly centralised meant that the fledgling states often did not have the administrative capacity or the necessary financial resources to manage the gas trunk pipeline infrastructure inherited from the USSR.

In the early years of independence Kazakhstan attempted to manage domestic gas transit facilities through local companies, Kazakhgaz and Alaugaz. Both failed at their tasks. In 1997 Kazakhstan transferred control over most of its trunk pipelines to the Belgian company, Tractebel, under a 15-year concession agreement that included the option of a further term. It was hoped that this would provide the required investments and technology for maintenance and modernisation. Tractebel worked in Kazakhstan through two newly established companies, the gas pipeline operator Intergaz Central Asia and a utility monopoly, Almaty Power Consolidated. But in 2000 Kazakhstan opted to regain control over the gas infrastructure, due to periodic cutbacks in supply because of non-payment, and Tractebel's unwillingness to subsidise the industry without any commitment to reform by the government.

The discovery of the massive Kashagan oil and gas field in 2000, which coincided with a significant increase in oil and gas prices and growing international gas demand, fuelled the enthusiasm of Kazakhstan's authorities to develop the national gas sector. In 2000, the government established KazTransGaz, a gas subsidiary of the national oil transportation monopoly, KazTransOil. KazTransGaz took over Intergas Central Asia from Tractebel and focused its activities on:

- transportation of natural gas through main gas pipelines: domestic transportation, export transportation, international transit and storage of natural gas in underground gas storages (UGS);
- transportation of natural gas through distribution gas pipelines;
- sales of natural gas on the domestic market;
- gas production and processing.

The formation of KazTransGaz was an important step in the evolution of Kazakhstan's national gas industry, which is closely linked to the domestic oil sector. At the moment, associated gas constitutes over 45% of the gas produced in Kazakhstan. Future gas volumes in Kazakhstan will come from the three hydrocarbon fields: Tengiz, Kashagan and Karachaganak, which are currently being developed by three international consortia under Production Sharing Agreements (PSAs) primarily signed in the 1990s.

⁵ See Stern, Jonathan P. *The Future of Russian Gas and Gazprom* (Oxford: Oxford University Press, 2005), pp. 66–67.

1.1.3 Kazakhstan and International Oil Companies

International oil companies (IOCs) entered the Kazakh hydrocarbon sector on privileged terms, at a time of low oil prices when Kazakhstan, unlike Russia or Azerbaijan, did not have a developed oil and gas sector.

In 1993 Kazakhstan signed its first agreement with a foreign oil company, establishing a joint venture between Chevron and the Kazakh oil company for the development of the Tengiz oil field.⁶ This paved the way for international oil companies to play the main role in Kazakhstan's gas sector, unlike the case in any other gas-producing countries of the former Soviet Union, with the partial exception of Azerbaijan. In 2007–2008, the two international consortia, Tengizchevroil and Karachaganak Petroleum Operating BV, have been responsible for over 70% of Kazakhstan's gas output.

With the institutional development of a strong Kazakh government and the sustained growth of oil prices, Kazakhstan began to seek a greater state role in its hydrocarbon sector. In 2002, President Nursultan Nazarbaev signed a decree establishing the national oil and gas company, Kazmunaigaz (KMG), by merging Kazakhoil with the national company Oil and Gas Transportation.⁷ Subsequently, Kazmunaigaz became a vehicle for establishing the government's influence in an energy sector dominated by foreign companies.⁸ In 2004, a new PSA law was introduced which required Kazmunaigaz to have at least a 50% share in new PSAs. Although this legislative change exempted previously signed PSAs, Kazakhstan has nevertheless taken further steps to ensure its active role in the energy sector. Some of the more significant steps include: legislation on utilisation of hydrocarbon resources (including associated gas flaring) and Kazakhstan's newly established right to review previously signed PSAs to assess whether they contradict its economic and national security interests.

Since 2004, Kazmunaigaz has also been actively expanding its asset base in both the oil and gas sectors. More recently, Kazmunaigaz has managed to secure a larger stake in the international consortium which is developing the Kashagan hydrocarbon field in the Caspian Sea.⁹

The prolonged delay of the development of Kashagan (with the start date moved from 2008 to 2013), as well as the project's escalating costs (from \$57 billion to \$136 billion) was not well received in Kazakhstan, which sought to benefit from high oil prices. Although Kazmunaigaz's share of the Kashagan consortium has grown from 8.33% to 16.81%, this is not an indication of Kazakhstan's intention to reduce considerably the presence of international oil companies in the domestic energy industry.

⁶ Activities of the international consortia developing Tengiz, Karachaganak and Kashagan are examined in Part Two.

⁷ Decree of the President of the Republic of Kazakhstan, no. 811, 20 February 2002.

⁸ Kazmunaigaz is now 61% state-controlled, with the remainder of shares traded on international exchanges.

⁹ 'Kazakhs Seek Active Kashagan Role, Talks With Eni CEO', *CNNMoney*, 6 September 2007.

Today, international oil companies are involved in fierce competition with one another for the development rights to increasingly scarce global hydrocarbon reserves, as much as 80% of which are controlled by national oil companies (NOCs). As a result, resource-rich nations generally enjoy considerable leverage in choosing partners or service companies for their oil and gas projects. The intensified competition between Russia, China and Europe for Central Asian gas also enables some Central Asian producers, such as Kazakhstan, to re-negotiate the initial deals reached with international companies during the times of low oil prices and economic chaos in the post-Soviet era.

However, Kazakhstan's national oil and gas company, Kazmunaigaz, does not have adequate financial resources and technological background to develop the geologically sophisticated Caspian hydrocarbon fields by itself. Therefore, in the case of Kazakhstan, the domestic political establishment will be forced to choose from a handful of companies with the technological expertise and experience necessary to extract oil and gas from the Caspian. In this situation, Kazakhstan is likely to use its growing, yet limited, influence in the domestic hydrocarbon sector to influence the way the industry and export routes are developed. Although Kazmunaigaz is only responsible for about 6–8% of domestic gas output, it controls the key export gas pipelines through its subsidiary KazTransGaz. This could have a potential impact on the way the associated gas is utilised and where it is likely to go – towards domestic projects or to external markets.¹⁰

Since the collapse of the Soviet Union, Kazakhstan's gas industry has gone through several stages of development, from the stagnation and uncertainties of early independence to the contemporary period of accelerated growth. The future of the industry will be determined by the gas volume available from domestic and other Central Asian sources, demand in different markets and their price regimes, and the development of gas transport infrastructure, which, apart from economic considerations, will be driven by geopolitics and domestic politics.

1.2 *Kazakhstan's Energy Sector: Politics and Society*

The evolution of Kazakhstan's political system since the collapse of the USSR is best conceived as a continuous system change, where a variety of interest groups and institutionalised elites have been involved in a competition for resources and political power. Bargaining transactions between actors involved in this competition are the key to understanding the future of the Kazakhstan energy sector.

Kazakhstan's political system is similar to post-independence political regimes in most parts of the former Soviet Union. The weakness and even absence of a multiparty system and developed civil society in the majority of post-Soviet states resulted in a situation where relations between administrative and industrial elites became the main political arena in these countries. A super-presidential system of government has been another key characteristic of these political systems, where the survival and success of political and economic elites are

¹⁰ It is also important to note that Kazakhstan exports most of its gas volumes through a Kazakh–Russian joint venture, KazRosGaz which at present has a *de facto* monopoly on gas exports from Kazakhstan. KazRosGaz is examined in Part Two of this study.

based on privileged personal contacts with the chief executive.¹¹ Consequently, competition between corporate actors is focused on the level of their access to the president. Naturally, such a system lacks an institutionalised mechanism for the succession of political power, thus creating a potential for an inter-elite conflict, where the political and economic fortunes of financial-industrial groups could be turned overnight.

So far, Kazakhstan has managed to avoid violent inter-elite conflicts, unlike Russia where the stand-off between President Boris Yeltsin and the parliament resulted in an open military conflict in the centre of Moscow in October 1993.¹² One of the reasons for a more peaceful development of Kazakhstan after independence could be rooted in the country's social stratification which has traditionally been organised around the three 'hordes',¹³ the senior, middle and junior *zhuz*,¹⁴ each containing a number of clans.¹⁵ In the Soviet Union, most of the non-Russian ethnic communities, Kazakhs included, retained and reinforced traditional patronage networks based around ethnic clans.¹⁶ In the 1990s, the pre-existing social stratifications played an important role in the formation of the political and business elite of Kazakhstan, in terms of access to both key resources and lobbying influence within the political and economic systems. However, after 2000 the influence of the historical *zhuz* system of ethnic Kazakhs became less prominent, especially in the country's business circles.¹⁷ If the early 1990s were dominated by the Soviet party nomenclature forged by personal loyalty and blood ties, by 2000 a new entrepreneurial elite, sharing common business interests, was also formed. As a result, Kazakhstan witnessed the formation of two types of corporate groups – old and new. These are old companies, formerly subordinate to the Soviet industrial ministries, where the directorship took over control during privatisation, and the newly established businesses, which generated enormous profits, either by using state

¹¹ 'Super-presidentialism is an 'apparatus of executive power that dwarfs all other agencies in terms of size and the resources it consumes; a president who enjoys decree powers; a president who *de jure* or *de facto* controls most of the powers of the purse; a relatively toothless legislature that cannot repeal presidential decrees and that enjoys scant authority and/or resources to monitor the chief executive.' See: Fish, M. Steven, 'The Executive Deception: Super-presidentialism and the Degradation of Russian Politics', in Sperling, Valerie (ed.), *Building the Russian State: Institutional Crisis and the Quest for Democratic Governance* (2000), pp. 177–92; Ishiyama, John T. and Kennedy, Ryan, 'Super-presidentialism and Political Party Development in Russia, Ukraine, Armenia and Kyrgyzstan', *Europe-Asia Studies*, vol. 53, no. 8, 2001, pp. 1177–91.

¹² See: Shamil Midkhatovich Yenikeyeff, *The Battle for Russian Oil: Corporations, Regions and the State*, Oxford University Press, forthcoming (fall 2008 – early 2009).

¹³ *Horde* – a term of Turkic origin meaning a clan of nomads, a political subdivision of central Asian nomads or a people or tribe of nomadic life. See: <http://www.merriam-webster.com/dictionary/horde>.

¹⁴ The term *zhuz* appears to derive from the number 100 referring to a multitude or horde.

¹⁵ These are also described as the great, middle and small *zhuz* or the elder, middle and younger *zhuz*. See: Olcott, Martha Brill, *The Kazakhs*, 2nd edition (Stanford: Hoover Institution Press, 2005). These three *zhuzs* represent the traditional division of the Kazakh nation.

¹⁶ See: Collins, Kathleen, *Clan Politics and Regime Transition in Central Asia*, Cambridge: Cambridge University Press, 2006.

¹⁷ Martha Brill Olcott highlights that "although ethnic Kazakhs are now predominant in the country's political elite, virtually all of the country's main political groupings include people from different clans and ethnic communities. Just like any other complex political system, a great many variables go into making a political patronage group. Increasingly shared ideology is becoming an important criteria affecting how political groupings are formed. Obviously personal trust is an important component but the foundation for this can be kinship, but just as important is longterm association, such as shared education, shared assignment abroad, or being longterm employees in the same industry or enterprise". See: Olcott, Martha Brill, *Kazmunaigaz: Kazakhstan's National Oil and Gas Company*, the James A. Baker III Institute for Public Policy, Rice University, March 2007, p. 52.

finances to grant high interest loans or by securing ownership over public property during privatisation. During this period, the Kazakh president, Nursultan Nazarbaev, extended his powers in order to circumvent the emerging confrontation between the old and new elite groups.¹⁸

Between the spring and summer of 2007, Kazakhstan was *de jure* transformed from a presidential to a presidential–parliamentary system with expanded powers for the legislature and greater influence for political parties in the decision-making process. Members of the lower chamber of the legislature are now elected by party lists, whereas in the past only around 7% of members were elected on this principle. The president consults political parties in the parliament before making an appointment of a new prime minister. The presidential term of office was also reduced from seven to five years. However, at the same time, the capping for the current president's number of terms in office was removed. Despite these constitutional amendments, the president's power has only been strengthened further. The parliament elected in August 2007 is controlled by the pro-presidential party, Nur-Otan, with other parties being unable to pass the 7% electoral barrier. The sudden parliamentary elections (originally scheduled for 2009) caught key opposition parties by surprise. Many of these have also been weakened by prolonged internal squabbles within the opposition.

The absence/weakness of mass and non-systemic actors in Kazakhstan's political system makes inter-elite interactions of paramount importance for the economic and political stability of the system, including the domestic energy complex.

1.2.1 Kazakhstan's Top Elite Groups

Until summer 2007, the two most powerful elite groups in Kazakhstan were associated with President Nazarbaev's two sons-in-law, Rakhat Aliev and Timur Kulibaev.

Rakhat Aliev and Dariga Nazarbaeva

Until June 2007, Aliev was married to Nazarbaev's oldest daughter Dariga, and was Kazakhstan's deputy foreign minister and ambassador to Austria. A son of the Soviet health minister for Kazakhstan, Aliev began his career in the mid-1990s as an importer of medical equipment and medicaments, subsequently moving into the sugar business. He then joined public service as a deputy head of the tax police and by the late 1990s had already been responsible for supervising activities of the tax police and customs. By 2001 he was promoted to the post of deputy head of Kazakhstan's state security service, the Committee for National Security. Aliev's pre-occupation with a public career considerably undermined his potential in business. Although he was directly in charge of power ministries, supervising activities of all companies operating in Kazakhstan, he did not extend his business influence to key segments of the national economy, unlike Nazarbaev's other son-in-law, Timur Kulibaev. Apart from some petroleum trading business, Aliev had never managed to get

¹⁸ See: Sagadiev, Alisher, 'Rasklad tekushchego momenta', *Informatsionno-analiticheskii tsentr po izucheniyu obshchestvenno-politicheskikh protsessov na postsovetskom prostranstve Moskovskogo gosudarstvennogo universiteta*, November 2006; *Dosym Satpaev*, 'An Analysis of the Internal Structure of Kazakhstan's Political Elite and an Assessment of Political Risk Levels', in Tomohi, Uyama (ed.), *Empire, Islam, and Politics in Central Eurasia*, Slavic Research Center, Hokkaido University, 2007, pp. 283–300.

seriously involved in the domestic oil and gas sector, though he was more successful in banking and especially the media market, where he controlled key television channels and newspapers. Aliev's presidential ambitions could explain his strong interest in expanding his influence over power ministries and the media. In 2001 he allegedly masterminded a plot to oust Nursultan Nazarbaev and was demoted to the foreign service and posted abroad. However, Aliev's continued aggressive methods of enlarging his business empire and political ambitions openly voiced to the president, in the end, led to his demise. In the summer of 2007, he was removed from all government positions, divorced from his wife and is wanted in Kazakhstan on a number of criminal charges, ranging from kidnapping and murder to corruption and money laundering.¹⁹ Although his former spouse – the president's daughter, Dariga – has retained control over key assets of Rakhat Aliev's group, she no longer possesses access to important administrative resources previously associated with him.

Timur Kulibaev

Rakhat Aliev was often viewed as a political and economic competitor to Timur Kulibaev, who is married to Dinara, the second daughter of the president. Kulibaev himself comes from a powerful Kazakh family from the senior *zhuz*. In the Soviet times, his father, Askar Kulibaev, was a mayor of Almaty (the Kazakh capital before 1997), then worked as the Communist party boss of Gur'ev oblast, now Atyrau oblast. The oblast is home to the key Caspian oil and gas fields of Kazakhstan, such as Tengiz and Kashagan.²⁰ As the oblast head, Kulibaev-senior developed strong personal ties with the top management of the oil and gas industry of Kazakhstan, most of whom come from the junior *zhuz*. Kazakhstan's energy sector has traditionally been dominated by a conglomerate of prominent families from the senior and junior *zhuz*, which is presently headed by Timur Kulibaev. Through his marriage to the president's daughter, Timur Kulibaev became a vital link between the top management of the national energy sector (the junior *zhuz*) and Nursultan Nazarbaev, who himself comes from the senior *zhuz*. Therefore, it is unsurprising that Kulibaev has traditionally occupied top positions in Kazakhstan's oil and gas industry and has often been described as an unofficial Kazakh oil and gas minister.²¹ The influence of the Kulibaev-led conglomerate spreads over a large section of the banking, telecommunications and oil and gas sectors, including the national oil and gas company Kazmunaigaz and most of the regional administrations in the oil and gas provinces. Today, Kazmunaigaz deals with all key energy issues in Kazakhstan, including production, refining, transportation, sales and relations with foreign investors.²² Moreover, the company *de facto* sets up export quotas for domestic and foreign producers of hydrocarbons. At present, the Kulibaev-led conglomerate is the most powerful financial-industrial group in Kazakhstan which is unsurprising, taking into account the importance of the energy sector for the domestic economy.

¹⁹ See: 'RFE/RL Newline,' 4, 6, 13, and 19 June 2007.

²⁰ In 2005, Atyrau oblast's share in the domestic oil and gas production was 43.6% and 51.4% respectively. See: <http://www.oil-gas.kz/en/2006/>.

²¹ Since the mid-1990s, the energy complex of Kazakhstan has gone through various stages of re-organisation. During this period, Timur Kulibaev was always at the forefront of the industry: vice-president of the national oil company, Kazakhoil, president of the national oil transportation monopoly, KazTransOil, president of the national company, Transportation of Oil and Gas, vice-president and president of the national oil and gas company, Kazmunaigaz, and until late August 2007 deputy chairman of the board of the national state holding, Samruk, which controls all the key state assets, including the national oil and gas complex.

²² See: Olcott, *Kazmuniagaz*.

The political departure of Rakhat Aliev further boosted the political profile of Timur Kulibaev and has considerably undermined the existing balance of power between elite groups in Kazakhstan. In the future, Nursultan Nazarbaev could lower the political standing of the Kulibaev group by removing important economic and administrative resources from under the group's control or by promoting other elite groups within the system in order to counterbalance Kulibaev. His resignation (in late August 2007) from the board of the state holding company, Samruk, which manages Kazmunaigaz and other key state assets of the republic, cannot, however, be perceived as Nazarbaev's attempt to undermine the Kulibaev group.²³ The president's second son-in-law remains the chairman of KazEnergy, Kazakhstan's powerful association of oil-gas and energy sector organisations, while his close associate, the prime minister of the country, Karim Massimov, obtained support from the newly elected parliament, fully controlled by the pro-Nazarbaev party Nur Otan.²⁴ Moreover, in late August 2007 another representative of Kulibaev's group, the head of Samruk, Sauat Mynbaev, was appointed as the new energy and mineral resources minister of Kazakhstan. In his new capacity, Mynbaev renegotiated terms of the giant Kashagan oil and gas project which resulted in the increased share (from 8.33% to 16.81%) of Kazmunaigaz in the international consortium developing the field.²⁵

Therefore, the more likely scenario for Nazarbaev is to promote another elite group as a counterweight to the Kulibaev conglomerate, rather than undermining his highly loyal second son-in-law who, unlike Rakhat Aliev, has no political ambitions. There are two more top-tier groups that could fulfil this role:

Kairat Satybaldy and the Eurasian group

Perhaps the most powerful of the groups is represented by an alliance between the president's nephew, Kairat Satybaldy, and the Eurasian Group, headed by a prominent entrepreneur Alexander Mashkevich. For many years, Kairat Satybaldy worked in the security services of the republic and has also occupied top managerial positions in Kazakhoil and Kazmunaigaz. Alexander Mashkevich's Eurasian Group is one of the largest financial-industrial groups in Kazakhstan, with strong interests in banking, metallurgy, coal and mining. Currently the Group's key assets include Eurasian Bank, Eurasian Energy Corporation, KazChrome and Kazakhstan Aluminium.²⁶ The Group can be considered an outsider in relation to the pre-existing *zhuz* system of Kazakhstan. Since 2001, the Eurasian Group and the president's nephew have forged an alliance which could potentially become a powerful counterweight to the growing influence of Timur Kulibaev.

Nurzhan Subkhanberdin and Kazkommertsbank

Nurzhan Subkhanberdin's group controls Kazkommertsbank, the largest and oldest banking conglomerate in the country. Kazkommertsbank was originally built as one of the first

²³ See: 'Kazakh President Sacks Another Son-In-Law', *RFE/RL*, 28 August 2007, <http://www.rferl.org/featuresarticle/2007/8/bfc8c54c-0c66-41cb-831d-a7ba18d823ed.html>

²⁴ 'Kazakh PM put question of confidence in Government before new Parliament', *Kazinform*, 2 September 2007.

²⁵ For a thorough assessment of Kashagan see Part Two of this study.

²⁶ See: *Eurasian Group*, Ignatov and Company Report, August 2007.

commercial banks authorised to handle accounts of leading corporate clients in Kazakhstan. It also advised the Kazakh government during the privatisation of several state enterprises. Today, its influence extends to the energy, trade and media sectors. In the past, the Kazkommertsbank group backed liberal reformers in the government and was often associated with dissident entrepreneurial and political circles in the Kazakh establishment. The group has been a traditional ally of Timur Kulibaev and, for this reason, has been exposed to Kazakhstan's oil and gas sectors.

Apart from the above-mentioned four top political-economic groups, there are other second tier elite groups, but most of them lack the political and economic resources to play any serious role in the political system, let alone the energy sector of the republic.

1.2.2 Succession and Stability

Today the president of Kazakhstan has the final say in potential conflicts within the elite. His institutionalised dominance within the hierarchy of government agencies ensures his control over administrative and political decision-making, and the coercive apparatus. As a result, the power over economic resource allocation and state coercion has made the Kazakh president a primary target for influence by corporate groups and government officials. Since party politics is of no importance, the president is the only force in the political system that could maintain its stability. He can boost or undermine the financial and political standing of different elite groups in order to counter-balance them against each other. Thus, the standing and interactions of these elite groups in the political system of Kazakhstan is of paramount importance for the stable transfer of power in the post-Nazarbaev era.

In this respect, a number of scenarios are possible:²⁷

- succession Russian-style: a consensus candidate acceptable to key elite groups emerges and succeeds Nazarbaev on the same principle as Vladimir Putin succeeded Boris Yeltsin as the Russian president on 31 December 1999;
- succession Azerbaijan-style: a relative of Nazarbaev's inherits his power in the same way Geydar Aliev transferred power to his son, Ilham, in Azerbaijan;
- succession Turkmen-style: unexpected death of the president catches the elite by surprise. A new president is selected by key elite groups as a result of a consensus among them, at least initially;
- succession Ukrainian/Georgian/Kyrgyz style: revolutionary change of the leadership;
- succession as a result of a conflict between leading elite groups: everybody is against everybody else. A dominant actor emerges and takes over the power and redistributes economic resources, or the elite groups reach a pact on redistribution of assets.

²⁷ These scenarios are based on the following theoretical approaches: Gel'man, Vladimir, Sergei Ryzhenkov, Michael Brie, *Making and breaking democratic transitions : the comparative politics of Russia's regions*, Lanham, Md.; Oxford : Rowman & Littlefield, 2003, pp. 22–23; Karl, Terry Lynn and Schmitter, Philippe, 'Models of Transition in Latin America, Southern and Eastern Europe', *International Social Science Journal*, vol. 43, no. 128, 1991, pp. 269–84; Munck, Gerardo L. and Scalnik Leff, Carol, 'Modes of Transition and Democratization: South America and Eastern Europe in Comparative Perspective', *Comparative Politics*, vol. 29, no. 3, 1997, pp. 343–62.

At present, the last two scenarios are highly unlikely in Kazakhstan due to the president's popularity, and the absence/weakness of mass or non-systemic actors and the removal of a key systemic actor, Rakhat Aliev, who constantly destabilised the existing status quo within the elite.

Kazakhstan's geopolitical standing as an important oil and gas producer and the growing international competition for its hydrocarbon resources have evidently been very skilfully used by the country's leadership to consolidate power at home.

1.3 *Geopolitics of Kazakhstan's Gas*

This study does not seek to present an assessment of various geopolitical issues involving Kazakhstan. A considerable number of research papers and book manuscripts have already been written on this subject.²⁸ The geopolitical importance of the country involves its current and potential participation in various international political and economic organisations and military blocs, its role in the fight against international terrorism, radical Islam, drug trafficking and the proliferation of weapons of mass destruction, the prevention of potential inter-ethnic conflicts in the region and its importance for democratisation and economic development in Central Asia.

Kazakhstan's geographic location alone raises the geopolitical profile of this second largest post-Soviet state, equivalent in size to Western Europe or two-thirds of the continental USA. The country is bordered by Russia, China, the Central Asian states of Turkmenistan, Uzbekistan and Kyrgyzstan, and the Caspian Sea. It is also located within geographic proximity to Turkey, Iran, Afghanistan and the Caucasian republics of Azerbaijan and Georgia. Kazakhstan's vast oil and gas resources have maximised its geopolitical importance for Europe, Russia, the USA, Asia and the Middle East.

In relation to the geopolitics of Kazakhstan's hydrocarbons, gas and oil have two different, though inter-related, stories. Although most of the domestic gas is associated with oil, after the collapse of the USSR Kazakhstan managed to secure investment from American, British, Chinese, Russian, French, Italian, Indonesian, and Dutch companies, predominately for the production and refining of its oil. So far, foreign companies have invested over \$30 billion in Kazakhstan's oil sector. The international focus on oil (rather than gas) by Kazakhstan in the 1990s can be explained not only by the domestic issues analysed in the historical section of this study, and differences in the economics, technology, and logistics of oil and gas production, but also by the political-economic aspects of gas demand in international markets.

The 1990s were marked by low hydrocarbon prices, low demand for gas and, as a result, lesser pre-occupation of member-states of the Organisation for Economic Co-operation and

²⁸ See, for example, Legvold, Robert (ed.), *Thinking Strategically: The Major Powers, Kazakhstan, and the Central Asian Nexus*, Cambridge, MA: American Academy of Arts and Sciences, 2003; Akiner, Shirin (ed.), *The Caspian: Politics, Energy, Security*, London–New York: RoutledgeCurzon, 2004; Amineh, Medhi Parvizi, *Globalisation, Geopolitics and Energy Security in Central Eurasia and the Caspian Region*, Clingendael International Energy Programme, 2003.

Development (OECD) with the security of energy supplies. Since 2000, the global energy scene has changed considerably, fuelled by volatile oil and gas prices, the emergence of powerful new consumers in the Asia-Pacific region, reserve depletion within the OECD and instability within the energy-producing and transit countries. After the Russian–Ukrainian gas crisis of January 2006²⁹ there was a shift in the minds of EU policy makers in relation to European dependence on gas supplies from potentially 'unfriendly' foreign countries that could use their supply power to wield political and economic demands on energy-consuming nations.³⁰ As the dependence of industrialised nations on existing energy producers is projected to increase, their governments have been active in trying to diversify their gas imports. This applies not only to European nations but also to China, which is seeking to secure pipeline gas from Central Asia and Russia. Russia's own dependence on Central Asian gas deliveries and slow development of its new upstream projects has considerably boosted Kazakhstan's geopolitical profile as a potential gas supplier and a key transit country for gas produced in Turkmenistan and Uzbekistan.

1.3.1 Geopolitics of Pipelines: from Oil to Gas Projects?

Kazakhstan's success in attracting foreign investors for its oil and associated gas projects has been curtailed by a lack of transport infrastructure, vital for exports of hydrocarbon products to global markets. Since its independence, Kazakhstan has been dependent on Russia for the transit of its oil and gas. The country has been especially frustrated with oil export quotas imposed by the Russian pipeline monopoly, Transneft, and the reluctance on the part of the Russian government to expand the capacity of the CPC pipeline. This factor, coupled with a projected increase in domestic oil output to 150 million tonnes in 2015, has compelled Kazakhstan to diversify its oil exports via alternative routes. Hence, the Kazakhstan–China oil pipeline became the country's first successful new oil export project. The Atyrau–Alashankou 3000 km long oil pipeline is scheduled to be completed in several stages by 2011 and is projected to bring around 200,000 barrels of Caspian oil per day to China (or 20 million tonnes annually, with a potential to reach 50 million tonnes).³¹

For many years, Kazakhstan has been considered by the EU and the United States as one of the main building blocks in the formation of alternative energy routes which bypass the territory of Russia. The first stage of the EU–US backed 'fourth corridor' of energy supplies (the other three include supplies from Africa/the Middle East, Russia and Norway) have already been implemented with the successful construction of the Baku–Tbilisi–Ceyhan (BTC) oil pipeline and the Baku–Tbilisi–Erzurum (BTE) gas pipeline, also known as South Caucasus Pipeline (SCP), and modernisation of Baku–Supsa oil pipeline, also known under the name of Western Route Export Pipeline (WREP).³²

²⁹ For a thorough assessment of this topic see: Stern, Jonathan, *The Russian–Ukrainian gas crisis of January 2006*, Oxford Institute for Energy Studies, 16 January 2006, http://www.oxfordenergy.org/pdfs/comment_0106.pdf

³⁰ See: Stern, Jonathan, *The New Security Environment for European Gas: Worsening Geopolitics and Increasing Global Competition for LNG*, NG 15, Oxford Institute for Energy Studies, October 2006.

³¹ 'Kazakhstan–China oil pipeline opens to operation', *China View*, 12 July 2006, http://news3.xinhuanet.com/english/2006-07/12/content_4819484.htm

³² BTE currently carries 6 billion cubic metres (bcm) of gas which is projected to reach 20 bcm by 2014. Oil volumes are also transported through Azerbaijan and Georgia via Baku–Supsa oil pipeline (with its current

The 1768 km long Baku–Tbilisi–Ceyhan oil pipeline,³³ the construction of which Russia opposed and for which the USA lobbied, represents the second alternative route for Kazakhstan’s oil. The oil pipeline has a total annual capacity of 50 million tonnes (1 million barrels per day) and runs through Azerbaijan, Georgia and Turkey to the Ceyhan Marine Terminal on the Mediterranean Sea. In June 2006, Kazakhstan announced its decision to join the BTC project and to supply around 7.5 million tonnes of oil a year. This figure could subsequently increase to 25 million tonnes. In August 2007, Prime Minister Karim Massimov stressed that the BTC pipeline could become the key alternative to Kazakh oil exports via the CPC pipeline, if the latter is not expanded.³⁴ Between August and September 2007 Kazakhstan reached some provisional agreements with Azerbaijan on the construction of the US\$1.6 billion Kazakhstan–Caspian Transportation System (KCTS), which is scheduled to come into operation by 2012 and will incorporate a new 730 km pipeline from Eskene to the Caspian port of Kuryk, new terminals in Kazakhstan and Azerbaijan and construction of an oil tanker fleet.³⁵ In May 2008, Kazakhstan’s parliament ratified these provisional agreements which came into force on 30 May when President Nazarbaev signed them.³⁶

In the past, the feasibility of both the Chinese and the Caucasus–Mediterranean oil routes was questioned. The fact that both routes have become a reality raises the stakes for alternative export routes for Central Asian gas, which were previously considered rather far-reaching. In the case of Kazakhstan, the success of alternative oil routes could become crucial if one takes into account the fact that future Kazakh gas volumes will come from the Caspian oil fields.³⁷

Brussels and Washington view the successful operation of the BTC and BTE pipelines as a vital step towards future implementation of alternative gas pipelines: the Nabucco pipeline, and the Trans-Caspian project, both depend on gas volumes from Turkmenistan and Kazakhstan.³⁸ However, diverse approaches employed by major external players, China, Russia, the USA and the EU, towards obtaining Central Asian energy supplies, as well as the questionable stability of the region will play a pivotal role in the future of export routes for Caspian and Central Asian hydrocarbons.

throughput of 150,000 barrels a day) and the Baku–Batumi rail network (150,000–200,000 bpd) to sea terminals.

³³ *Baku–Tbilisi–Ceyhan pipeline*, BP, <http://www.bp.com/sectiongenericarticle.do?categoryId=9006669>

³⁴ Kashin, Vasilii and Sterkin, Fillip, 'KTK mal Kazakhstanu', *Vedomosti*, no. 155 (1929), 21 August 2007, <http://www.vedomosti.ru/newspaper/article.shtml?2007/08/21/131351>; 'Kazakhstan Prepared to Construct New Oil Pipeline via Azerbaijan and Georgia', *Trend Capital*, 7 September 2007.

³⁵ According to 2006 estimates the Kazakh–Caspian Transportation System was scheduled to come into operation in 2010. However, the 2008 forecast by Kazmunaigaz postpones the KCTS launch to 2012.

'Kazakhstan announces Trans-Caspian oil transport system', December 2006, <http://www.kogiguk.com/News/Archive/2006/Dec/Article2932.htm>; 'Kazakh Caspian Oil Transportation System Represents Prospective Direction: Kazakh Company President', *News Agency Trend-Capital*, 31 January 2008. <http://capital.trendaz.com/print.shtml?newsid=1124250&lang=EN>

³⁶ 'Kazakhstan ratifies oil transit treaty with Azerbaijan', *Kazinform*, 30 May 2008.

³⁷ For an assessment of the dependence of Kazakhstan’s gas output on oil production see Part Two of this study.

³⁸ The Turkey–Greece Interconnector (TGI), Italy–Greece Interconnector (IGI), and Trans-Adriatic Pipeline (TAP) could be used to transport smaller volumes of non-Russian gas (from Azerbaijan) into Balkan countries and Italy. TGI is already in operation and could be considered the first element of a Fourth Corridor west of Turkey.

1.3.2 Diverse Approaches

China and Russia employ different strategies toward securing Central Asian energy deals than the USA or EU.³⁹ Whereas the latter are not averse to attaching political or economic reform measures as part of their loan offers and are apt to encourage these states to partake in international organisations, such as the Organisation for Security and Co-operation in Europe (which Kazakhstan has been approved to chair in 2010), Beijing and Moscow, in contrast, have traditionally been less questioning of the authoritarian political regimes typically prevalent in Central Asia.

In economic terms, a growing competition between China and Russia to secure Central Asian gas supplies has resulted in the determination of both countries to forge favourable commercial ties with Central Asian producers. In contrast, member-states within the EU (hence the EU as an entity) often lack a common political approach in this respect. So far, the European gas agenda, which includes Central Asian gas supply, has not moved toward practical implementation, unlike the Russian and Chinese projects (which are examined further in Part Three of this study).

Although Russia has often cashed in on pre-existing economic, political and cultural ties with Central Asian countries, it is now compelled to use solely economic rationale in order to forge ties with Kazakhstan, Turkmenistan and Uzbekistan. Central Asian gas is essential to Russia's own gas balance until its new hydrocarbon projects, such as the Yamal Peninsula fields, come on-stream. The ever-increasing interest of Beijing, Washington and Brussels in securing Central Asian energy supplies as an alternative (mainly to Russian and Middle Eastern/African sources) has prompted Moscow to offer greater incentives to Kazakhstan, and other Central Asian producers, to ship their oil and gas through Russian territory instead. It is thus unsurprising that Russia has already agreed to pay European prices (minus transport and other related costs) for Central Asian gas from 1 January 2009.⁴⁰ Kazakhstan estimates that the result of these arrangements will be 60–70% gas price increases from the 2008 level of \$180 per thousand cubic metres (\$/mcm) to \$306/mcm in January 2009.⁴¹ However, future export prices for Central Asian gas will depend on the volatility of oil markets.⁴²

In 2007, Gazprom also pushed forward a long-delayed deal with its Kazakh counterpart, Kazmunaigaz, to develop a potentially highly lucrative energy project involving the processing of Karachaganak gas at the Russian Orenburg plant. Another key factor that will determine Kazakhstan's stance vis-à-vis Russia is the dependence of the Atyrau and Mangystau hydrocarbon-rich provinces of western Kazakhstan on Russian electricity and water supplies, which are crucial for the successful operation of the local energy

³⁹ It is important to note that the United States and Europe have a serious technological advantage over Russia and China where Caspian offshore oil and gas development is concerned.

⁴⁰ 'On working meeting of Alexey Miller and heads of gas companies from Kazakhstan, Uzbekistan and Turkmenistan', JSC 'Gazprom', Press Release, 11 March 2008.

⁴¹ 'Kazakhstan sees 70 pct gas price rise from 2009', Reuters, 18 March 2008.

⁴² On oil product-linked gas prices see: Stern, Jonathan, *Is There A Rationale for the Continuing Link to Oil Product Prices in Continental European Long-Term Gas Contracts?*, Oxford Institute for Energy Studies, NG19, April 2007, <http://www.oxfordenergy.org/pdfs/NG19.pdf>.

infrastructure. Russia is also assisting Kazakhstan in developing its domestic nuclear sector which could free up additional gas volumes for export.⁴³

Beijing is keen to secure additional energy supplies to fuel its growing economy. China's gas strategy in Central Asia has also been characterised by its successful attempts (in the case of Turkmenistan) to secure equity gas, i.e. when Chinese companies develop a given gas field, build associated transportation and processing infrastructure, and transport this gas to their home market.

Central Asian countries are not indisposed to engaging with a rapidly growing China, despite their traditional cautiousness toward their eastern Asian neighbour. Gas co-operation with Beijing can bring other considerable benefits for Central Asian states such as investment, infrastructure development (for example, the construction of roads and railways) and growth in other trade sectors. China has an upper hand over Russia in terms of its cash power and in terms of effective implementation of large-scale projects.

The growing competition between Russia and China over Central Asian energy supplies has prompted Moscow to advance the idea of forming an energy club within the Shanghai Co-operation Organization (SCO) in order to 'harmonise energy strategies' of Russia, China and Central Asian countries.⁴⁴ It is currently unclear whether the SCO (which includes China, Russia, Kazakhstan, Uzbekistan, Kyrgyzstan and Tajikistan) could become a forum for facilitating energy dialogue between its member-states, taking into account their diverse interests as well as the fact that the key Central Asian gas producer, Turkmenistan, does not currently have any affiliation with the SCO.⁴⁵

The years 2007–2008 have been highlighted by intense activity over three gas export routes: pipelines to Russia (the expansion of the Central Asia–Centre route up to 80 bcm per annum and construction of the Caspian Littoral pipeline with a capacity of around 20 bcm), the Trans-Asia gas pipeline network to China (30–40 bcm) and the US/EU sponsored Trans-Caspian pipeline (30 bcm).⁴⁶ None of these projects has been completed, and it is unclear whether there is enough Central Asian gas for all the proposed pipelines. What is indeed clear is that Kazakhstan, Turkmenistan and Uzbekistan have already been reaping the economic and political benefits of the growing competition between Russia, China and Europe for Central Asian gas.

⁴³ For further explanation see the section on 'Gas for Power Generation' in Part Three of this study.

⁴⁴ In June 2006 President Vladimir Putin voiced the idea of the SOC energy club. In 2007 energy ministers of the SOC member-states held their first consultations on energy co-operation and common energy security. In August 2008, President Dmitry Medvedev stressed the importance of energy dialogue within the Shanghai Co-operation Organization which is yet to finalise its Energy Club arrangements.

⁴⁵ Apart from its member-states, the SCO also includes four observer countries, India, Iran, Mongolia and Pakistan, See: <http://www.sectSCO.org/>

⁴⁶ These are examined in Part Three of this study.

1.3.3 Stability of the Region

The August 2008 military conflict between Georgia and Russia over the autonomous region of South Ossetia, which has been *de facto* independent from Georgia since the early 1990s, is likely to shift the balance of power between the main players involved in the formation of the future Caspian and Central Asian energy sector, including:

- Caspian and Central Asian producers/transit countries: Turkmenistan, Kazakhstan, Azerbaijan, Uzbekistan, Turkey and Iran;
- foreign corporations operating in the region's hydrocarbon sector;
- major external players: China, Russia, the European Union and the United States.

The Georgia–Russia stand-off has highlighted how many other frozen inter-ethnic conflicts have serious potential to destabilise the 'fourth corridor' of energy supplies to Europe which runs through Georgia (with its break-away regions of Abkhazia and South Ossetia), Azerbaijan (with the *de facto* independent and predominantly Armenian-populated Nagorno–Karabakh region), and Turkey (with unresolved issues of Kurdish separatism). Many of these conflicts have long histories of interethnic violence, thus representing dormant volcanoes ready to erupt.

The volatility of these transit routes is likely to shape investment decisions of international oil companies involved in the development of Central Asian and Caspian hydrocarbons and their transportation to global markets. Governments of these resource rich countries are bound to have serious concerns about the safety of BTC, WREP and BTE pipelines, the railway networks and the oil terminals at the Georgian Black Sea ports of Batumi, Kulevi and Poti, all of which were halted by the Georgian–Russian hostilities.⁴⁷ Although the pipelines were only temporarily shut down for security reasons, and were not targeted or damaged in the conflict, their future expansion and the construction of related new pipeline projects, such as the Kazakhstan–Caspian Transportation System, the Trans-Caspian gas pipeline and Nabucco, are now uncertain. In this situation, Central Asian and Caspian producers may opt for traditional exports via Russia (providing Moscow successfully expands the capacity of its oil and gas export routes) and the new export pipelines to China.

Russia's resurging military might in the region could also influence decision-makers and producers in the Caspian and Central Asia. In this situation, the United States, Europe and China represent other external players with considerable military capabilities which could shape the security of the region and the energy routes that run through these volatile territories.

The unabated competition between Russia, the USA and Europe as guarantors of security in the Caspian and Central Asian countries is likely to destabilise the region even further. In this situation, individual countries and break-away territories will side with different external interests or might try to play them against each other for political and economic gains. The way forward for external players is not the division of spheres of influence in the region, but the provision of legal mechanisms which will secure inter-ethnic stability in the region and

⁴⁷ The BTC pipeline had been previously put out of service by fire, for which Kurdish separatists took responsibility.

diffuse potential grounds for local conflicts. In this case, the Kosovo example could be used by external forces to either stabilise or destabilise the region. The key issue here is how the main external players could share the responsibility of ensuring the stability of the region.

In the future, politically isolated Iran could also become an important player in energy supplies from the Caspian and Central Asia. First, Iran could become a potential gas supplier to Europe, providing there is adequate investment available. Second, Iran has long been considered a potential transit route for Caspian and Central Asian energy supplies. Both Kazakhstan and Turkmenistan supply limited volumes of oil to Neka on the Caspian coast of Iran as part of oil swap deals for Iranian oil shipped from the Persian Gulf.⁴⁸ In the recent wake of the BTC shut-down and the conflict in the South Caucasus, even more oil flowed through Neka, including supplies from Azerbaijan, reminding industry observers that Iran is the cheapest export route for Caspian crude. The Russian company, Gazprom Neft' is also supposed to provide assistance to the National Iranian Oil Company (NIOC) to build a pipeline from Neka to the Gulf of Oman. Additionally, in 2007 Kazakh and Iranian officials expressed interest in building a pipeline from Kazakhstan to Iran. There is, therefore, some momentum for a north-south export route through Iran, and the armed conflict in Georgia only strengthened this sentiment, at least politically. A potential rapprochement between the USA and Iran could further change the energy game in the region and give a boost to alternative energy supplies in Europe as well as other exotic routes for Caspian and Central Asian oil and gas. Potential political and security problems regarding specific oil and gas pipeline routes may change Kazakhstan's export plans for its hydrocarbons. However, so far Kazakhstan remains committed to supplying oil via Azerbaijan, Georgia and Turkey despite the recent hostilities between Georgia and Russia.

⁴⁸ Turkmenistan has also been exporting its gas to Iran.

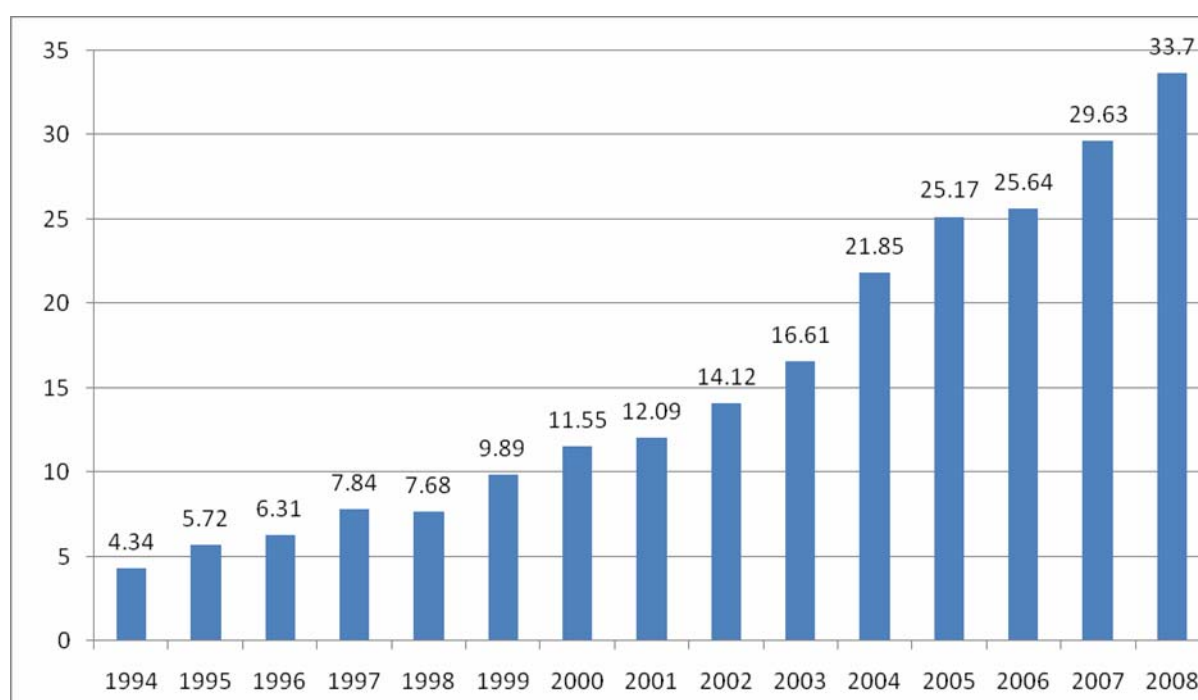
2. The Current Status of Kazakhstan's Gas Industry

Apart from historical, political and geopolitical factors outlined in the previous part of the study, Kazakhstan's evolving gas industry is driven by challenges and opportunities associated with:

- the dependence of gas deliveries on oil production;
- the geographic location of different gas fields and the relevant infrastructure for external markets;
- the ownership structure (private/public, foreign/domestic) of relevant companies.

The aim of this section is to present the current state of Kazakhstan's gas industry by focusing on the factors above which will be further explored in Part Three, 'The Future of Kazakhstan's Gas'.

Figure 1: Kazakhstan's gross gas production (bcm) 1994–2008



Source: ENI, Kazakhstan's State Committee for Statistics, 2008 MEMR forecast

2.1 Kazakhstan's Gas Potential

According to official Kazakh figures, domestic hydrocarbon reserves amount to 3.3–3.7 trillion cubic metres of gas, of which 2.5 tcm are proven.⁴⁹ Kazakhstan's gas potential could reach 6–8 tcm with further development of Caspian mineral resources. BP estimates of 2008 place Kazakhstan's proven reserves at 1.90 tcm (1.1% of global share). There are two other

⁴⁹ Ministry of Energy and Mineral Resources of the Republic of Kazakhstan.

gas producing nations in the former Soviet Union that surpass Kazakhstan in terms of proven gas reserves: Russia with its 44.65 tcm (25.5% of global share) and Turkmenistan with 2.67 tcm (1.5% of global share).⁵⁰

Over the past decade, Kazakhstan's gas sector has achieved considerable production growth, from 4.34 bcm in 1994 to 29.63 bcm in 2007 (see Figure 1). Production in January–July 2008 was 19.74 bcm, up 13% year-on-year, and full-year production could potentially exceed the energy ministry's estimate of 33.7 bcm in Figure 1.

Table 1: Kazakhstan's gas fields (official figures)

<i>Gas fields</i>	<i>Field types</i>	<i>Gas resources (bcm) (A+B+C1)</i>	<i>Share of Kazakhstan's total gas reserves (%)</i>
Karachaganak	Oil and gas condensate	1370	45.5
Tengiz	Oil	569	18.9
Kashagan	Oil	227	7.5
Zhanazhol	Oil and gas condensate	133	4.4
Imashevskoye	Gas and oil	129	4.3
Zhetybai	Oil and gas condensate	99	3.3
Tenge	Oil and gas condensate	45	1.5
Uzen'	Gas and oil	43	1.4
Urikhtau	Gas and oil condensate	40	1.3
Prorva	Oil and gas condensate	28	0.9
Kalamkas	Gas and oil condensate	27	0.9
Amangeldy	Gas	25	0.8
Teplovsko–Tokarevskoye	Gas and oil condensate	25	0.8
Zhetybai South	Oil and gas condensate	23	0.8
Shagyrlı–Shomyshty	Gas	20	0.7
Chinarevskoye	Oil and gas condensate	17	0.6
Korolevskoye	Oil	16	0.5
Tasbulat	Oil and gas condensate	13	0.4
17 medium small gas fields (3.1–10 bcm)	Various	99	3.3
44 small gas fields (1–3 bcm)	Various	44	1.5
71 smaller gas fields (up to 1 bcm)	Various	20	5.5
Total		3011	100

Source: *Programma razvitiya gazovoi otrasli Respubliki Kazakhstan na 2004–2010 gody*, June 2004.

According to several official forecasts, Kazakhstan's gas production in 2015 could vary between 60 and 80 bcm per annum and could potentially reach 100 bcm by 2020.⁵¹ Since

⁵⁰ *BP Statistical Review of World Energy 2008*, p. 22; see: Simon Pirani (ed.), *Russian and CIS Gas Markets and Their Impact on Europe*, Oxford University Press, January 2009.

⁵¹ 'Kazakhstan k 2015 godu budet dobyvat' 130 millionov tonn nefi i 80 milliardov kubemetrov gaza', *Interfax*, 12 October 2007; *Oil and Gas Journal of Kazakhstan*, no. 2, 2008; *Oil and Gas Journal of Kazakhstan*, nos. 4-5, 2008.

2006, Kazakhstan's gas output has been growing at the rate of 4–5 bcm per annum. If domestic gas production maintains the same steady pace, Kazakhstan could reach at least 70 bcm in 2015. With Kashagan production scheduled to commence in October 2013, Kazakhstan could come closer to the projected figure of 80 bcm by the end of 2015. However, this will eventually depend on gas volumes reinjected back into the reservoir to boost oil production at Kashagan.⁵²

The key feature of Kazakhstan's gas is its close association with domestic oil production. Gas volumes from Kazakhstan mainly come from oil, oil-gas, and gas condensate fields (See Table 1). In the mid-2000s, associated gas accounted for around 45% of gas production (Table 2). With the development of new hydrocarbon fields in the Caspian, the dependence of gas deliveries on oil production is projected to increase.⁵³

Table 2: Associated and non-associated gas production in Kazakhstan (bcm) 2004 – January–June 2008

<i>Type</i>	2004	2005	2006	2007	January–June 2008
Non-associated gas	11.59	14.49	14.41	16.68	9.88
Associated gas	10.26	10.68	11.23	12.95	7.40
Total	21.85	25.17	25.64	29.63	17.28
Associated gas as proportion of total	47%	42%	44%	44%	43%

Source: Kazakhstan's State Committee for Statistics.

In August 1999, Kazakhstan began to introduce legal mechanisms aimed at increasing gas output from oil production by requesting oil companies to introduce associate gas utilisation in their development projects. In December 2004, Kazakhstan introduced measures aimed at reducing the flaring of gas associated with oil production.⁵⁴ In October 2005 and January 2007 the parliament prohibited this practice, although some exemptions were made in relation to industrial and environmental hazards and pilot projects involving experimental field development and tests (up to three years, subject to a governmental approval).⁵⁵ Kazakhstan's government seeks to completely eliminate gas flaring by 2012.

⁵² See the relevant section on Kashagan in this Part of the study.

⁵³ See Table 31 in Part Three of this study.

⁵⁴ Zakon 'O vnesenii izmenenii i dopolnenii v nekotorye zakonodatel'nye akty Respubliki Kazakhstan po vorposam nedropol'zovaniya I provedeniya neftyanykh operatsii v Respublike Kazakhstan', no. 2–III, 1 December 2004.

⁵⁵ Zakon, 'O Nefti', no. 2350, 28 June 1995; Zakon 'O vnesenii izmenenii i dopolnenii v nekotorye zakonodatel'nye akty Respubliki Kazakhstan po vorposam nedropol'zovaniya I provedeniya neftyanykh operatsii v Respublike Kazakhstan', no. 79–III, 10 October 2005.

Table 3: Kazakhstan's gas utilisation (bcm), 2005

Exports	7.5
Reinjected	5.0
Flared	2.5
Technical use and losses	5.0
Total	27.0

Source: Ministry for Energy and Mineral Resources.

Kazakhstan's legislative efforts in relation to its gas sector development, coupled with the growing demand, have boosted domestic gas output from 4.34 bcm to a projected 33.7 bcm in 2008 (see Figure 1).

Another feature of Kazakhstan's gas is its sour quality which varies among different fields. Environmental concerns have already boosted the costs of the Caspian oil and gas production, where giant hydrocarbon fields have particularly high levels of poisonous hydrogen sulphide (H₂S) and other sulphates: 15–17% in Tengiz, 18–23% in Kashagan and 20% in Imashevskoe, a large north Caspian gas condensate field under joint Russian–Kazakh control. Karachaganak, the main hydrocarbon field of Kazakhstan in terms of gas potential, contains only 3.5% of this poisonous gas, whereas another sizeable field, Zhanazhol contains about 2–6% of H₂S.

Due to its associated nature and quality, only about 45% of the total gas volume produced in Kazakhstan is marketed to customers. In this study, gas actually marketed will be called 'sales gas' and distinguished from gross gas production. Sales gas is the product which remains after reinjection, technical use, losses, flaring and processing. In 2007, three Kazakh gas-processing plants (Tengiz, Zhanazhol and Kazakh) produced 13.4 bcm of sales gas (Table 4) which was sold to domestic consumers and exported.

Table 4: Kazakhstan's gas production balance, 2005–2007 (bcm)

	2005	2006	2007
Gross production	26.2	27	29.6
Reinjection/technical use/losses, flaring	14.6	14.7	16.2
Sales gas	11.6	12.3	13.4
Sales gas as proportion of total	44%	45%	45%

Source: Ministry of Energy and Mineral Resources, 2008.

2.2 Hydrocarbon Fields

Kazakhstan's gas resources could be categorised into three categories on the basis of their size, stage of industrial development and economic viability.⁵⁶ The first group is represented by strategic hydrocarbon fields of the pre-Caspian region, Karachaganak, Tengiz and Kashagan, which will make up the largest part of Kazakhstan's future gas output. These fields, however, are technologically and environmentally challenging. The second group is

⁵⁶ Kazakhstan's Programme of Gas Sector Development. 2004.

composed of medium-sized fields with declining production and low levels of sulphates. The third group contains small, predominantly pure gas fields.

Ninety-seven percent of Kazakhstan's gas reserves are located in this western part of the country, namely in Atyrau, Mangistau, western Kazakhstan and Aktobe provinces. The four regions are home to the country's largest hydrocarbon fields, including Karachaganak, Kashagan, Tengiz, Zhanazhol and smaller pre-Caspian fields, such as Zhetybai, Tenge and Uzen' hydrocarbon groups. These are close to the existing pipeline infrastructure and the traditional Russian route. Other sizeable and commercially attractive gas reserves are located in Zhambul province (Amangeldy), Southern Kazakhstan province (Pridorozhnoe) and Kyzyloda province (Akshabulak and Kumkol).

Kazakhstan's future gas output will predominately come from five hydrocarbon fields (with 79% of proven national gas potential), Karachaganak, Tengiz, Kashagan, Koroloveskoe and Zhanazhol (Table 5).

Table 5: Kazakhstan's key hydrocarbon fields

FIELD	RESERVE ESTIMATES (bcm)	
	KAZMUNAIGAZ	GOVERNMENT
Karachaganak	821.5	1300
Tengiz	525.9	569
Korolevskoye (adjacent to Tengiz)	29.1	16
Kashagan	489.5	227
Zhanazhol	118.2	133

Source: KazTransGaz (part of the national oil and gas company Kazmunaigaz), October 2007. Kazakhstan government, June 2004.

2.2.1 Karachaganak

One of the world's largest oil and gas condensate fields, Karachaganak comes at the top of the list of Kazakhstan's gas resource base. In 2007, Karachaganak made up 49% of Kazakhstan's gas production and 18% of oil production. The field of over 280 square kilometres is located in the northwest by the Russian border and makes up over 40% of Kazakhstan's gas potential (see Table 1). The field has already attracted over \$6 billion of foreign investment. According to BG Group's estimates, Karachaganak contains HIIP (hydrocarbons initially in place) of 9 billion bbls (1.2 billion tonnes) of gas condensate and 1.3 trillion cubic metres of gas.⁵⁷ Figures released by KazTransGaz in autumn 2007 estimate Karachaganak proven gas reserves at 821.5 bcm.

Soviet geologists discovered Karachaganak in 1979. By 1984 the field was linked via a 130 km pipeline network to gas-processing facilities at Orenburg, Russia. In Soviet times, the

⁵⁷ BG Country Operations – Kazakhstan, <http://www.bg-group.com/international/kaz.htm>

field was operated by KarachaganakGazprom; after 1991, Kazakhgaz, newly independent Kazakhstan's state gas company, took over operatorship. In 1992, Kazakhstan granted exclusive rights to British Gas (now BG Group) and Agip (now ENI) to negotiate a development agreement. The two companies formed a contractor group and in 1995 jointly took over operatorship under the terms of a Production Sharing Principles Agreement (PSPA) with Kazakhstan. At the same time, Gazprom was invited to join the Contractor Group with a 15% share. Two years later, in 1997, BG Group and Agip transferred a 20% share in Karachaganak to Texaco (now Chevron) while the Russian oil company, Lukoil, took over Gazprom's 15% equity (see Table 6).

Table 6: Karachaganak Petroleum Operating B. V. (KPO)

Karachaganak partners	Country	(%)
ENI (joint operator)	Italy	32.5
BG Group (joint operator)	UK	32.5
Chevron	USA	20
Lukoil	Russia	15

The companies formed a consortium, Karachaganak Petroleum Operating B. V. (KPO),⁵⁸ the operations of which are guided by the Final Production Sharing Agreement (FPSA) signed in November 1997 by the government of the Republic of Kazakhstan and the four partners.⁵⁹ The agreement (effective 27 January 1998) granted the consortium exclusive 40-year concession rights and established a four-phase programme for the development of Karachaganak.

Two phases have already been completed. Phase I (1995–1997) involved mainly preparatory work with some initial investment of \$160 million and the formation of the consortium. The development of Phase II took place in 1998–2004 with an overall investment of \$4.3 billion. The key objectives of this phase were to increase annual sales to 9 million tonnes of condensate and 6 bcm of gas and to provide export access for Karachaganak liquids to the Caspian Pipeline Consortium (CPC) pipeline. To achieve these objectives the consortium partners modernised and enhanced existing facilities which involved working-over more than 100 wells. At the same time, KPO constructed new gas injection and gas-processing facilities (namely, the Karachaganak Processing Complex (KPC) and the gas and liquids separation and reinjection plant – Unit 2), 120 MW power plant, the 635 km Karachaganak–Bolshoi–Chagan–Atyrau oil pipeline linking the field to the CPC. At the completion of phase II in 2004, Karachaganak's output rose to 8 bcm of gas and 7.5 mt of liquid hydrocarbons. According to Chevron, in 2006 18.5% (4 mcm/day) of daily gas production of 21.42 mcm was reinjected. In 2007 gas production at Karachaganak reached 11.9 bcm with 99.65% of gas utilised and no longer flared.⁶⁰

In June 2007, the KPO partners reached an agreement on phase III with KazRosGaz, a joint venture between Kazmunaigaz and Gazprom. KPO intends to invest an additional \$8 billion

⁵⁸ The consortium was formally known as the Karachaganak Integrated Organization (KIO).

⁵⁹ In October 2008 the head of Kazenergy Timur Kulibaev (see the political section of this study) stressed that Kazakhstan has been negotiating Kazmunaigaz's potential involvement in the Karachaganak consortium. Kazakhstan expects that Kazmunaigaz will

⁶⁰ KPO and MEMR of Kazakhstan, 2008.

in the project. Under the 12-year agreement, when phase III goes on stream in 2012, KPO will increase the supply of Karachaganak gas to the Orenburg gas-processing plant from the current level of 7.5 bcm/year to 16 bcm/year. The expansion of Karachaganak, from 2008, includes the development of 122 new wells, which is projected to boost the annual production of gas to 37–38 bcm by 2017 and 16.4 million tonnes/year of liquid hydrocarbons.⁶¹ Furthermore, the 147 km Uralsk gas pipeline (UGP) is under construction to supply local customers; at its completion in late 2008 it will reach 0.5 bcm/year capacity. In addition to its commitments to the Orenburg processing plant, Kazakhstan is also considering building an onsite gas-processing plant, with a capacity of 5–7 bcm/year, to supply gas to domestic consumers in Western Kazakhstan province. Potential gas supplies from Karachaganak are examined further in the next part of the study.

Karachaganak remains Kazakhstan’s only sizeable hydrocarbon project (apart from Tengiz and Kashagan) in which the national oil and gas company, Kazmunaigaz, does not retain a share. In October 2008 the head of Kazenergy, Timur Kulibaev, stressed that Kazakhstan would continue negotiations regarding Kazmunaigaz’s potential involvement in the Karachaganak consortium. Kazakhstan expects its national oil company to acquire a share of 10-20% in Karachaganak with other consortium members cutting their shares on a pro-rata basis, as has occurred in the case of Kashagan.⁶² Kazakhstan’s interest in acquiring a stake in Karachaganak appears to be driven by economic considerations, rather than governmental policy, intent on reducing the presence of IOCs in the domestic energy sector.⁶³

2.2.2 Tengiz

In April 1993 Kazakhstan (represented by the state company Kazakhoil, now Kazmunaigaz) and the US company Chevron formed a joint venture, Tengizchevroil (TCO). The Kazakh government granted an exclusive 40-year right to TCO to develop Tengiz and Korolevskoye hydrocarbon fields. The project will require a total investment of \$23 billion.

Table 7: Tengizchevroil

Tengiz partners	Country	Share (%)
Chevron	USA	50
ExxonMobil	USA	25
Kazmunaigaz	Kazakhstan	20
LukArco	Russia–UK	5

In 1996–97, Tengizchevroil expanded into a four company consortium: ExxonMobil Kazakhstan Ventures, an ExxonMobil subsidiary, and LukArco, a joint venture between Lukoil of Russia and Atlantic Richfield (Arco) of the USA, acquired 25% and 5% respectively (see Table 7). In 2000 BP merged with Arco and took over its share in LukArco; LukArco is now owned 54% by Lukoil and 46% by BP. Apart from its 5% equity share in the Tengiz field, LukArco also has a 12.5% share in the CPC.

⁶¹ Kazmunaigaz, Press-release, 13 March 2008.

⁶² Carl Mortished, ‘BG Group’s big holding in Kazakhstan under review’, *The Times*, 13 October 2008. For additional information on Mr Kulibaev see the political section of this study.

⁶³ Ibid.; see the section on Kazakhstan and IOCs in Part One of this study.

The supergiant Tengiz hydrocarbon field, discovered in 1979, is located on the northeast coast of the Caspian Sea. The field is 19 kilometres (12 miles) wide by 21 kilometres (13 miles) long. While being among the ten largest hydrocarbon fields in the world, Tengiz is the deepest (3810 metres) globally developed oilfield. It contains around 3133 million metric tonnes (25 billion barrels) of oil, of which about 750 million to 1125 million metric tonnes (6 billion to 9 billion barrels) are recoverable. Tengiz oil is transported to Russia's largest port on the Black Sea, Novorossiisk, via the CPC.

Apart from yielding high quality light oil, Tengiz and Korolevskoye fields are used to produce dry gas and liquefied petroleum gas (LPG) (from associated gas) as well as sulphur from hydrogen sulphide. According to official Kazakh figures, Tengiz contains 526–570 bcm of fully proven gas reserves, while the adjacent Korolevskoye field contains 16–29 bcm of proven gas reserves. Prior to 2000, TCO flared most of the associated gas due to complications with impurities (like sulphur). In 2000–2001, the consortium upgraded the existing facilities with the aim of producing larger oil volumes as well as high quality dry gas and LPG. As a result, TCO boosted oil production by 30%, while producing around 2500 tonnes/day of LPG and 2.5 bcm of gas per annum. By 2006, TCO gross gas production reached almost 7 bcm, half of which was sold as sales gas. The largest part of LPG output is shipped to Europe by rail, with natural gas exported via the Central Asia–Centre pipeline.

TCO has also started production of sulphur in order to solve the problem of high levels of hydrogen sulphide in Tengiz. However, in 2007 Kazakhstan's authorities fined the consortium for storing uncondensed sulphur during 2003–2006 when TCO found it difficult to sell sulphur on domestic or international markets. In the summer of 2007, the Parliament of Kazakhstan threatened to revoke the Tengiz/Korolevskoye exploration licence if TCO failed to reduce stockpiles of sulphur, considered damaging to the environment. The consortium now seeks to solve the problem by producing sulphur granules which are to be sold to China, Russia, the Mediterranean and Central Asia, as well as domestically.

Future oil and gas volumes from Tengiz (and potentially other Caspian hydrocarbon fields) will depend on the success of TCO's gas reinjection project. In 2002 Kazakhstan's authorities approved a new phase of Tengiz hydrocarbon production which involves the construction of Second Generation Project (SGP) and the introduction of Sour Gas Injection (SGI). Since its initiation the SGP/SGI costs have doubled from \$3 billion to \$6 billion. This phase started in 2004 and was scheduled to be completed in 2007, but has not been fully implemented (as discussed in Part Three). When Tengiz came on-stream, high pressure in the field (12,000 psi) ensured easy oil extraction without the need for artificial pressurisation. By 2004, the pressure in the field had fallen as low as 8500 psi. The main aim of the SGP/SGI is to increase oil output through sour gas reinjection, which will boost pressure in the reservoir and increase oil output. At the same time, Tengizchevroil will retain substantial volumes of Tengiz gas for potential future use, delaying many of the technological, logistical and environmental issues associated with sour gas processing as well as production of sulphur from hydrogen sulphide.

In late 2007 TCO was producing approximately 300,000 barrels of oil and 11.2 million cubic metres of gas per day. Gas output at Tengiz is projected to reach 21 mcm of gas per day by the end of 2008.⁶⁴ In October 2008, when SGI/SGP expansion was completed, daily production reached 540,000-620,000 barrels of oil.⁶⁵ In November-December 2008, it is projected that around 2-3.5 million barrels will be shipped via the oil route through Azerbaijan, Georgia and Turkey.⁶⁶

2.2.3 Kashagan

Kashagan is Kazakhstan's largest offshore hydrocarbon field, with a potential of 38 billion barrels of oil. Estimated recoverable hydrocarbon resources are 7–9 billion barrels of oil (11–13 billion barrels with gas reinjection) and 489.5 bcm of proven gas reserves. The field is projected to yield 1.5 million barrels of oil per day, making it the “most prolific field after Ghawar in Saudi Arabia.”⁶⁷ The field is located near the city of Atyrau, in the North Caspian shallow and ice-prone waters with unique habitats of migratory birds and sturgeon. Kashagan stretches over a vast territory of 75 by 45 kilometres.

On 18 November 1997, Kazakhstan signed the North Caspian Production Sharing Agreement (PSA) with Offshore Kazakhstan International Operating Co. (OKIOC) licensing an area of over 5500 square km. In 1998, OKIOC included nine consortium partners: ENI's subsidiary Agip (Italy), BG (UK), BP Amoco (UK), ExxonMobil (USA), Shell (UK), Total FinaElf (France), Phillips Petroleum Co. (USA), Statoil (Norway) and Inpex Masela Ltd. (Japan). In 2001, Agip was chosen as the project operator by the consortium partners, after which OKIOC changed its name to Agip Kazakhstan North Operating Company B.V. (Agip KCO). At the same time, BP and Statoil chose to sell their shares. In 2003, BG had agreed to sell its share in the consortium to the China National Offshore Oil Corporation (CNOOC) and Sinopec of China, but the other partners of Agip KCO exercised their pre-emption rights; they acquired half of BG's share and the other half went to Kazakhstan.⁶⁸ In early 2008 the consortium included seven partners, one of which is the national oil and gas company Kazmunaigaz, officially representing the government in Agip KCO (see Table 8).

At present, the North Caspian PSA covers five massive geological structures, the first of which, Kashagan East-1, was discovered in September 1999 (the discovery was made official in July 2000) and was declared commercially viable in June 2002. The second structure, Kalamkas, was discovered in October 2002, followed by the discovery of Kashagan South West, Aktote and Kairan. It is yet to be determined whether the recently discovered structures can source hydrocarbons on a commercial basis.

⁶⁴ 'TCO will produce 14.3 million metric tonnes of oil', *Oil and Gas of Kazakhstan*, no. 4–5, October 2007.

⁶⁵ 'Chevron Achieves Full Production from Tengiz Expansion Projects', *Chevron*, Press Release, 25 September 2008; 'Tengiz crude starts flowing in BTC pipeline-source', *Reuters*, 29 October 2008

⁶⁶ Ibid.; 'Kazakhstan starts transporting oil by Baku-Tbilisi-Ceyhan pipeline', *ITAR-TASS*, 03 November 2008.

⁶⁷ Comment by ENI Chief Executive Paolo Scaroni, as quoted in “A group of Western oil companies have signed an agreement with Kazakhstan to resolve conflict over Kashagan field”, *Dow Jones Newswires*, 31 October 2008.

⁶⁸ Pre-emption rights relate to a situation when a shareholder intending to sell shares has to offer them first to existing shareholders before being able to sell them to outsiders.

Table 8: Agip Kazakhstan North Operating Company B.V. (as of May 2008)

Kashagan partners	Country	Share (%)
ENI	Italy	18.52
ExxonMobil	USA	18.52
Shell	UK–Netherlands	18.52
Total	France	18.52
Conoco	USA	9.26
Kazmunaigaz	Kazakhstan	8.33
Inpex	Japan	8.33

As with Tengiz, Kashagan is logistically, technologically and environmentally challenging. The northern Caspian freezes in the winter making offshore production difficult. It also contains high levels of hydrogen sulphide and is located at the centre of the sensitive Caspian natural habitat.

The main difference between the Tengiz and Kashagan projects is total estimated costs: they are \$23 billion and \$136 billion respectively. In the summer of 2007, Agip KCO was forced to increase the Kashagan budget from \$57 billion to \$136 billion and to postpone production from 2008 to 2010. Subsequently, the production start date was further delayed to the fall of 2013.⁶⁹ Naturally, this was not well received in Kazakhstan, which sought to benefit from high oil prices. The Kazakh authorities suspended the Kashagan project for three months, due to breaches of environmental legislation, and threatened to annul ENI’s licence as project operator.⁷⁰

Table 9: North Caspian Operating Company (NCOC)

Kashagan partners	Country	Share (%)
Kazmunaigaz	Kazakhstan	16.81
ExxonMobil	USA	16.81
Shell	UK–Netherlands	16.81
Total	France	16.81
ENI	Italy	16.81
Conoco	USA	8.39
Inpex	Japan	7.56

On 31 October 2008 Kazakhstan finalised new arrangements with the project partners under which the state will be ensured stable revenues for the duration of the project. Kazakh officials insisted that the technical and logistical complexity of the Kashagan project made it impossible for ENI to continue as the sole project operator.⁷¹ As a result, a new consortium structure, the North Caspian Operating Company (NCOC), has been suggested and agreed upon by Kazakhstan and the Kashagan partners.⁷² NCOC will take over the project in

⁶⁹ 'Kashagan execs meet in Kazakhstan to advance plan', *Reuters*, 8 May 2008.

⁷⁰ See section on Kazakhstan’s relations with IOCs in Part One of this study.

⁷¹ Interview with the Minister of Energy and Mineral Resources of Kazakhstan, Sauat Mynbaev, *Vremya*, 23 July 2008.

⁷² “Details of the final Kashagan agreement”, *Reuters*, 31 October 2008.

January 2009. Under the new arrangement, Kazmunaigaz's stake in Kashagan is to increase from 8.33% to 16.81% with other members cutting their shares on a pro-rata basis within the newly established consortium (see Table 9). NCOC will be based on the corporate management system of Total, whose representative will be the first rotating managing director of NCOC with the executive of Kazmunaigaz as his deputy.⁷³ Each partner will be responsible for a specific part of the project. For example, at the initial phase Shell will run the production operations after which Kazmunaigaz will subsequently take over. During the second phase, ExxonMobil will be responsible for drilling, Shell will be in charge of offshore development, and Eni will be responsible for the onshore processing plant.

In addition to the new consortium structure, a separate deal on floating royalties has been reached, which requires the Kashagan consortium to pay 3.5% of output to the Kazakh government at oil prices over \$45 per barrel, 7.5–8% at \$130, and 12.5% at \$195.⁷⁴ In order to prevent further escalation of project costs, the Kashagan consortium partners would also be unable to tap into oil production revenues to compensate for costs incurred after 2013. These new arrangements seek to ensure stable revenues for Kazakhstan for the duration of the project.

The Kashagan development strategy introduced in 2008 by Agip KCO appears to differ from the consortium's previous plans which sought a joint commercial production of oil and gas.⁷⁵ In 2006, the consortium seemed to pursue a similar strategy to that of Tengizchevroil in Tengiz and Koroloveskoye fields. Namely, the Kashagan consortium planned to construct a gas-processing plant and storage facilities for sulphur, with LPG production for domestic and external markets considered as an option. There was also talk about a potential supply of Kashagan gas via the existing and planned gas pipelines to China, Russia and Europe.⁷⁶ Moreover, Kazakhstan intends to build a gas-processing complex in Atyrau province, which could receive about 6 bcm/year of gas from Tengizchevroil, about 3 bcm/year from Kashagan and further supplies from Aktoty, Kairan and Kalamkas fields.⁷⁷

However, rising project costs and environmental problems associated with stockpiling of sulphur, which comes from gas purification, appear to have led to changes. The consortium now seeks to reinject around 80% of the associated gas produced at Kashagan without ever bringing it onshore, meaning that there will be less associated gas available for domestic consumption or export.

The field is projected to be developed in two main stages, the Experimental Programme (EP) and Further Phases of Development (FPD), with 240 wells drilled, 52 of which will be used for the reinjection of associated gas.⁷⁸

⁷³ All companies involved in the project will be represented in the new management of NCOC.

⁷⁴ Gordeeva, Maria, 'Kazakh oil field plans role reshuffle after 2013', *Reuters*, 31 July 2008.

⁷⁵ *Kashagan Field*, Agip Kazakhstan North Caspian Operating Company, JSC Kazakh Institute of Oil and Gas, NIPI Caspian Engineering & Research LLP, 2008.

⁷⁶ These export routes are examined in Part Three of this study.

⁷⁷ See the section on Kazakhstan's petrochemical sector in Part Three of this study.

⁷⁸ *Kashagan Field*, Agip Kazakhstan North Caspian Operating Company, JSC Kazakh Institute of Oil and Gas, NIPI Caspian Engineering & Research LLP, 2008.

The EP phase is likely to take around five years, planned for 2013–18, during which time the field will reach commercial production and an assessment of the reservoir undertaken. Initial production levels of 75,000 barrels of oil per day (bpd) will be increased to 300,000–450,000 bpd and 28.9 million cubic metres of associated gas per day (10.5 bcm/year). The consortium aims to reinject up to 55% of this associated gas, leaving around 4.8 bcm per annum available for further use. There will be around 3800 tonnes of sulphur produced per day when this gas is purified.

The proportion of the reinjected gas is projected to increase (with sulphur production becoming obsolete) as the gas–oil ratio changes. During the FPD, oil production could reach 1.5 million barrels per day, while associated gas output is forecast to increase to 148 million cubic metres per day (54.1 bcm/year). At this stage around 90% of associated gas will be reinjected. It is also likely that the entire remaining annual volume will be utilised by the field’s own production facilities. However, the volume of gas reinjection at the FPD stage of the project has not been finalised and will depend on the outcome of gas reinjection and the reservoir response during the Experimental Programme.

The future of Kashagan gas development depends on the successful implementation of various new technological approaches to gas processing/reinjection at Kashagan as well as the economic viability of gas utilisation for external markets and domestic consumption. So far, Kazakhstan and the Kashagan consortium appear to have abandoned their earlier plans on Kashagan gas production in favour of oil.

Kashagan oil will be exported via the CPC, Atyrau–Samara, and Baku-Tbilisi-Ceyhan routes and will also rely on the Eskene West Railway export project, Eskene–Kuryk pipeline and the Kazakhstan–Caspian Transportation System (KCTS), as described in Part One of this study. It is important to note that KCTS relies on a stable operation of transit routes running via Georgia and Azerbaijan and the recent military conflict between Tbilisi and Moscow could hinder its further development.⁷⁹ In this case, the routes via Iran and China (via the 3000 km Atyrau–Alashankou oil pipeline) could become more attractive for Kashagan oil exports. At the same time, potential political and security problems in relation to specific oil pipeline routes may change the plans of the Kashagan consortium in relation to gas reinjection, making more gas available for export and domestic markets. However, so far Kazakhstan remains committed to supplying oil via Azerbaijan, Georgia and Turkey despite the recent hostilities between Georgia and Russia.⁸⁰

Future gas availability at Kashagan is further assessed in Part Three of this study.

2.2.4 Zhanazhol

Zhanazhol was discovered in 1978 and production began in 1987. It is the fourth largest hydrocarbons field in Kazakhstan in terms of gas reserves and contains 118.2–133 bcm of proven gas and potential reserves of up to 276 bcm. The field is located in Aktobe oblast in Western Kazakhstan near the Bukhara–Ural gas pipeline. After the collapse of the USSR,

⁷⁹ See the Geopolitical section of Part One of this study.

⁸⁰ ‘Kazakhstan starts transporting oil by Baku-Tbilisi-Ceyhan pipeline’

Kazakhstan transferred Zhanazhol and the adjacent Kenkiyak subsalt and Kenkiyak post-salt fields to the control of the joint stock company Aktobemunaigaz, controlled by Kazakh authorities. In September 1997, Chinese National Petroleum Corporation (CNPC) obtained a 66.7% share in Aktobemunaigaz from the government. The latter sold its remaining 25.12% stake in May 2003. At present, CNPC–Aktobemunaigaz is the sole operator of the Zhanazhol and Kenkiyak fields. With the Zhanazhol licence expiring in 2015 (Kenkiyak subsalt in 2015 and Kenkiyak post-salt in 2022), CNPC–Aktobemunaigaz is confident that the Kazakh authorities will renew the licence until 2034.

Over the past ten years, CNPC has invested around \$2 billion in upgrading gas transportation and gas-processing facilities. In October 2005, North-West Pipeline Company "Munaitas" (a joint pipeline constructing venture between Kazakhoil (51%) and CNPC (49%)) completed the construction of the 157.7 km gas pipeline, Zhanazhol-CS-13 (Compressor Station No. 13) with an annual capacity of 5.3 bcm. The new pipeline connected Zhanazhol and the adjacent fields to the Bukhara–Ural gas pipeline.

Modernisation of gas-processing facilities at Zhanazhol has been one of the main priorities of CNPC. In 2003 the Chinese company reconstructed the outdated and deteriorating facilities at the first Zhanazhol gas-processing plant, built in 1987. As a result, the plant's annual output increased to 3 million tonnes (21.9 million barrels) of oil and 0.8 bcm of gas. At the same time, CNPC also completed the construction of the second Zhanazhol plant with an annual capacity of 2 million tonnes (14.6 million barrels) of oil and 1.4 bcm of gas.

In 2005, CNPC began construction of the third Zhanazhol gas-processing plant, which is scheduled to be completed by 2010 with a total investment of \$800 million. At the first stage, the new plant will have an annual projected capacity of 2.2 bcm, reaching 5.19–6 bcm upon its completion. As a result, by 2010 CNPC will be processing about 8 bcm/year of gas at Zhanazhol.⁸¹

In 2006, CNPC–Aktobemunaigaz produced 2.95 bcm of gas and 5.9 million tonnes of oil which increased to 2.97 bcm of gas and 6 million tonnes of oil in 2007. By the end of 2010 the company seeks to boost the annual gas output up to 7.2 bcm. Through deep processing at Zhanazhol, CNPC also aims to produce around 474,000 tonnes of LPG per annum, 182,000 tonnes of granulated sulphur, 1 million tonnes of gas condensate and 221,000 tonnes of light oil.⁸²

CNPC has made further acquisitions in the oil and gas sector of this Central Asian republic, such as PetroKazakhstan; but at present, the Zhanazhol field is China's main gas asset in Kazakhstan and could be used to supply gas to China via a planned Western Kazakhstan–Western China pipeline (examined in Part Three of this study).⁸³

⁸¹ 'Zhanazhol GPP: The expansion is in progress', *Oil and Gas of Kazakhstan*, no. 3, 2007.

⁸² Ibid.

⁸³ CNPC bought PetroKazakhstan in 2005 for \$4.18 billion. In 2006 the Chinese company agreed to sell 1/3 of PetroKazakhstan to Kazakhstan's national oil and gas company, Kazmunaigaz. Since July 2007,

2.2.5 *Imashevskoye*

The Imashevskoye gas condensate field is located in Western Kazakhstan, bordering the Russian region of Astrakhan. Imashevskoye contains 128.7 bcm of proven gas resources. After the collapse of the Soviet Union, Kazakhstan and Russia contested exploratory rights to Imashevskoye. Russia sought full control over the field by asserting that it is geologically linked to the Russian Astrakhanskoye field, an assertion with which Kazakhstan disagreed. In 2004–2005, the two countries reached an agreement on the division of the field along its mid-line. Potential challenges to Imashevskoye gas development include high levels of hydrogen sulphide, inadequate capacity of the adjacent gas-processing plant at Astrakhan and the lack of transportation facilities.

2.2.6 *Medium to Small Fields*

Most of Kazakhstan's smaller fields, Zhetybai (99 bcm), Tenge (45 bcm), Uzen' (43 bcm), Urikhtau (40 bcm), Prorva (28 bcm), Kalamkas (27 bcm), Amangeldy (25 bcm), Teplovsko–Tokarevskoye (25 bcm), Zhetybai South (23 bcm), Shagyrlı–Shomyshty (20 bcm), Chinarevskoye (17 bcm), Korolevskoye (16 bcm), and Tasbulat (13 bcm), are located in Western Kazakhstan. Their sizes mean that they are unlikely to be an attractive option for gas exports.

Out of the thirteen fields only Amangeldy is of significance due to its geographic location and its important role in Kazakhstan's prolonged efforts to ensure that its southern regions are supplied with domestic gas.

Amangeldy is the only sizeable gas field in Southern Kazakhstan, with estimated gas reserves of 22–25 bcm. The field is located in Zhambyl oblast and is being developed by KazTransGaz's subsidiary, Amangeldy Gas Limited.⁸⁴ It has been developed primarily in order to reduce the dependence of Southern Kazakhstan's provinces on gas imports from Uzbekistan. The field has been linked by a 193 km Amangeldy–CS5/Taraz gas pipeline to the Bukhara–Tashkent–Bishkek–Almaty trunk pipeline. In 2007, Amangeldy Gas produced 0.32 bcm of gas, and production is projected to reach 0.43 bcm/year by 2010. However, these volumes are unlikely to be adequate to make Southern Kazakhstan fully independent from Uzbek imports. For example, gas demand in Zhambyl oblast alone reached 1.17 bcm in 2007.

Kazmunaigaz and CNPC have had an equal share of 50% in PetroKazakhstan. See: <http://petrokazakhstan.kz/rus/pages/history.html>

⁸⁴ Apart from Amangeldy Gas limited, which develops and processes gas at Amangeldy, KazTransGaz controls a group of other companies, some of which are examined elsewhere in this study. These companies are: Intergaz Central Asia (operator of Kazakhstan's gas trunk pipelines), Kaztransgaz Aimak (gas retail and distribution company) formerly known as KazTransGaz Distribution, KazTransGaz Almaty (management company of gas retail and distribution facilities in the city of Almaty and the Almaty province), KazTransGaz LNG (company currently processing Zhanazhol gas for the city of Aktobe), Samruk–Energo (power-generation company managing Zhambyl power plant, Almaty Power Consolidated, KMG–Energo), Kaztransgaz–Tbilisi (gas distribution company in the city of Tbilisi, Republic of Georgia), KyrKazGaz (joint venture between KazTransGaz and Kyrgyzstan's gas company KyrgyzGaz which manages the Kyrgyz section of the Uzbekistan–Kazakhstan gas trunk 'Bukharskiy gas-producing region – Tashkent – Bishkek – Almaty').

Nevertheless, the Amangeldy field development has become an important negotiating tool for Kazakhstan when negotiating import prices with Uzbekistan. Kazakhstan's gas imports are examined below.

2.2.7 Coal-bed Methane

According to official estimates, the coal mining provinces of central Kazakhstan contain large volumes of coal-bed methane (CBM) of about 1.1–1.4 trillion cubic metres.⁸⁵ The main coal mining region of Karaganda is responsible for about 40–50% of this figure with a ratio of 16–57 cm of methane per tonne of produced coal. Theoretically, these resources could yield production levels adequate to meet domestic gas demand in the next 70–80 years, while freeing more natural and associated gas of Kazakhstan for export markets.⁸⁶ Although a regional programme 'Methane' was adopted in 2001, so far the authorities have not been successful in securing financial backing for commercial CBM production.

2.3 Pipelines

Apart from being a gas producer, Kazakhstan is one of the former Soviet Union's main transit countries. The total projected annual capacity of Kazakhstan's gas pipelines is 235 bcm, with a combined length of 10,138 kilometres of gas trunk pipelines (Table 10). In recent years the system has been used (i) to transit about 55 bcm/year of Central Asian gas to Russia, (ii) to transit 60–70 bcm/year of Russian gas from Orenburg a short distance through northwest Kazakhstan and back into Russia at Aleksandrov Gai; and (iii) to supply the domestic market. In 2006 Kazakhstan transited more than 107 bcm of Central Asian and Russian gas.

Under the current arrangements with the Kazakh government, Intergaz Central Asia manages the gas trunk pipelines in the Republic and is responsible for transportation, storage and sales of natural gas.

The Intergaz Central Asia company was established in July 1997 as a 100% subsidiary of Intergas International BV registered in the Netherlands. From 1997 to 2000 the companies were controlled by the Belgian company, Tractebel. In November 2000, Tractebel transferred control of Intergaz Central Asia over to KazTransGaz, a transportation subsidiary of the national oil and gas company, Kazmunaigaz.

Intergaz Central Asia controls the following gas pipelines:

- Central Asia–Centre pipeline (for gas volumes from Turkmenistan and Uzbekistan);
- Orenburg–Novopskov and Soyuz pipelines (Russian gas transit);
- Bukhara–Ural and Bukhara gas-producing region–Tashkent–Bishkek–Almaty (for gas from Uzbekistan);
- Akshabulak–Kyzylorda;
- Amangeldy–Compressor Station 5.

⁸⁵ Kazakhstan's gas programme.

⁸⁶ 'Ugol'naya i atomnaya promyshlennost Kazakhstana', *Kazakhstan*, no. 4, 2005.

Table 10: Gas transport

<i>Pipeline</i>	<i>Year</i>	<i>Projected pressure (MPa)</i>	<i>Diameter (mm)</i>	<i>Length (km)</i>	<i>Projected annual capacity (bcm)</i>	<i>Actual and projected annual capacity (bcm) in 2004</i>
CAC-1	1967	No longer operational due to deterioration				
CAC-2	1969–1970	5.5	1200	372	14.4	7
Looping of CAC-2	1975–1985	5.5	1200	633		
CAC-3	1974	5.5	1200	754	13.3	-
CAC-4	1973–1975	7.5	1400	821	31	40
Looping of CAC-4	1975–1984	7.5	1400	514		
CAC-5	1985–1986	5.5	1200	823	14.6	8
Central Asia–Centre (CAC) total:				3941	86.9	55–60
Okarem–Beyneu	1973–1975	5.5	1000/1200	473	12	5.4
Makat–Northern Caucasus	1987	7.5	1400	371	31	17–25.5
Soyuz	1976	7.5	1400	424	31	26–28
Orenburg–Novopskovsk	1975	5.5/7.5	1200	328	11.68	10–14
Bukhara–Ural	1963–1964	5.5	1000	1175	14.4	7.2–15
Zhanazhol–Oktyabrsk	1988	5.5	500	270	0.9	0.6
Kartaly–Kustanai	1965	5.5	800	154	3.8	0.87
Bukhara Gas Area–Tashkent–Bishkek–Almaty (BGA–TBA)	1962–1999	5.5	800/100	1585	13	7.9–13
Gazli–Chimkent	1988	7.5	1200	314	11.5	14.4–26
Amangeldy–CS-5	2003	5.5	530	193	2.5	2.5
Akshabulak–Kyzyloda	2004	5.4	325	124	0.259	-
Zhanazhol–CS-13	2005	5.4	813	163	5.2	-
Aksai–Astana	-	5.5	1000	1777	11.4	-
TOTAL				11292	235.53	201.87–245.87

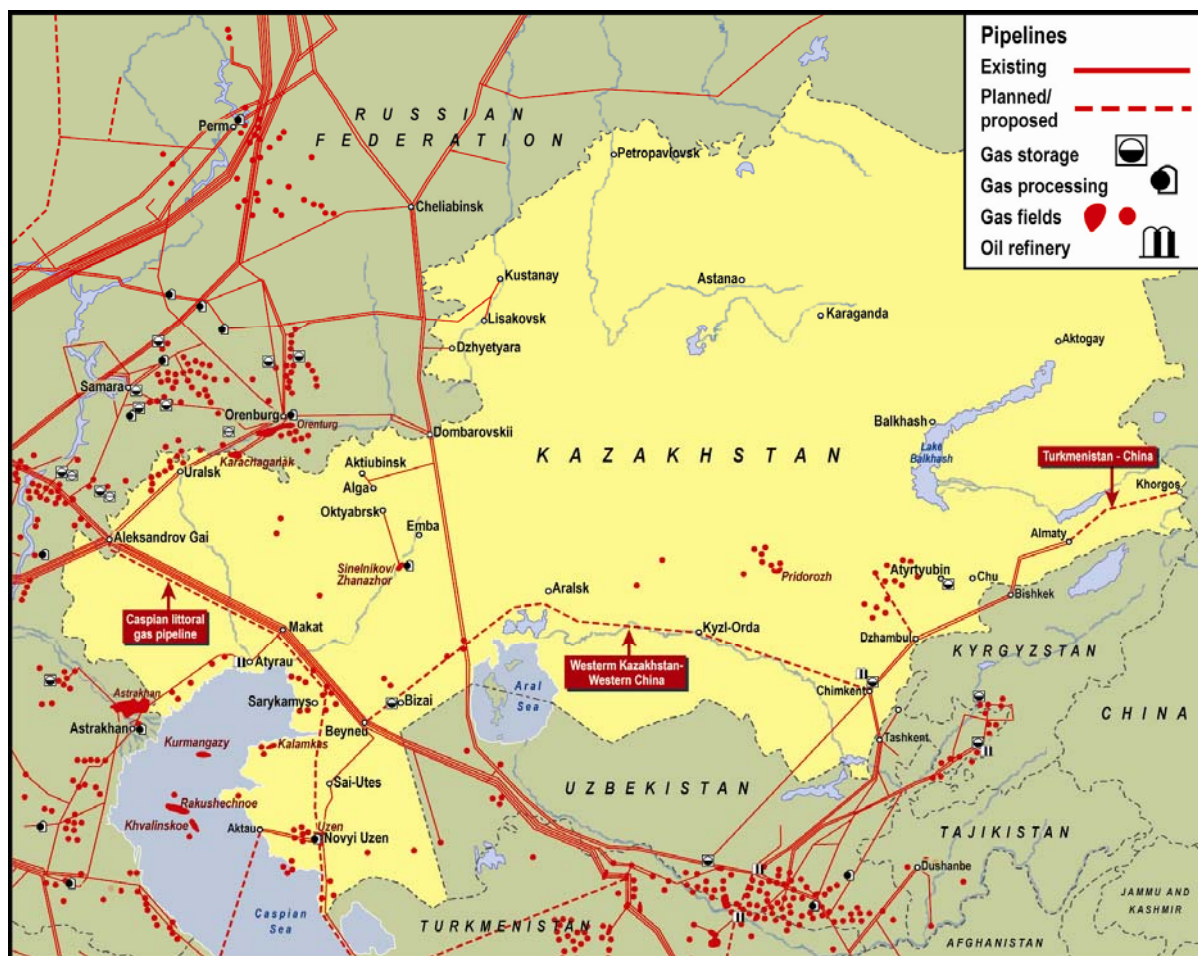
Note: The stated annual capacity of 2004 may be considerably different in 2008.

Source: Kazakhstan's Gas Programme, 2004.

2.3.1 Kazakhstan's Main Gas Trunk Pipelines

The *Central Asia–Centre (CAC)* gas trunk pipeline system consists of five parallel gas pipelines, representing the main transit route for Central Asian gas.

Map 1 Major Gas Fields and Pipelines of Kazakhstan



The pipeline starts at the Kazakh–Uzbek border feeding into the Gazprom-controlled Russian gas pipeline system at the Compressor Station Aleksandrov Gai. Several spurs run from CAC to Turkmenistan, also to the Northern Caucasus. The CAC pipeline was constructed over the period of 1967–1986 with a projected annual capacity of 60 bcm. After the collapse of the USSR in 1991, CAC carried on average about 35–40 bcm of gas per annum which, however, varied in different years sinking to low levels in the late 1990s. CAC capacity in 2008 was estimated at not more than 47 bcm before refurbishment started.

The *Orenburg–Novopskov* and *Soyuz* gas pipelines run through Western Kazakhstan from the Orenburg gas-processing plant to the Compressor Station Aleksandrov Gai. Although the

projected annual capacity of the two pipelines is 42.6 bcm, over the past few years only around 25–29 bcm of gas was transported via this route.

The *Bukhara–Ural* gas pipeline consists of two parallel pipelines and has an annual capacity of 14.4 bcm. The pipeline was built in 1963–1964 with the sole purpose of transporting gas volumes from Uzbekistan and Turkmenistan to the industrial centres of Russia. Subsequently, the direction of flow in the pipeline was reversed to supply Russian gas to Aktobe oblast in Western Kazakhstan as a substitute to Turkmen gas.

The *Bukhara Gas Area (Gazli)–Tashkent–Bishkek–Almaty (BGA–TBA)* is a major pipeline used for delivering Uzbekistan’s gas to Southern Kazakhstan with an annual volume of over 2 bcm. It is also a transit route for gas supplies of 0.7 bcm from Uzbekistan to northern Kyrgyzstan. The pipeline commences in Uzbekistan’s gas rich region of Bukhara near the town of Gazli and ends in Kazakhstan’s former capital, Almaty. The BGA–TBA trunk pipeline also crosses the territory of Kyrgyzstan at two points: the northwestern part of Talas province and the Chuysk province where it runs through the Kyrgyz capital of Bishkek. Since 2004, due to the inability of Kyrgyzstan to finance the modernisation of the pipeline, the Kyrgyz section of BGA–TBA has been managed by KyrKazGaz, a joint venture between Kyrgyzstan’s national gas company Kyrgyzgaz and Kazakhstan’s KazTransGaz. Kazakhstan has pledged to invest \$17.5 million in the modernisation of the Kyrgyz section of the deteriorated pipeline by the end of 2008.

2.3.2 Depreciation of Pipelines

Following the demise of the USSR, Kazakhstan was left with a highly deteriorated gas pipeline infrastructure (see Table 11). Gas trunk pipelines built in the Soviet Union had an average working life of 30 years. However, Kazakhstan’s highly corrosive, high alkali soil, combined with lack of adequate maintenance, led to accelerated deterioration of the pipeline network. Post-Soviet economic chaos in the Central Asian countries also undermined the aging transit network. For example, Turkmenistan, the largest supplier of gas to the CAC pipeline, did not export gas during 1997–1998, leaving Kazakhstan with insufficient financial resources to maintain the trunk pipeline network.

Soon after its establishment, KazTransGaz initiated a new investment programme of over \$1 billion to modernise the existing gas trunk pipelines. In 2001–2006, 875 kilometres of Kazakhstan’s gas trunk pipelines were rebuilt and modernised. These include newly-built pipelines, Amangeldy–CS-5, Akshabulak–Kyzyloda, and Zhanazhol–CS-13 (see Table 10). As a result, the annual capacity of Kazakhstan’s part of the Central Asia–Centre pipeline network was increased to 54.6 bcm from 40 bcm in 2001. In 2007, Kazakhstan sought to further increase the transit capacity of this network from 54.6 bcm to 60 bcm by completing the construction of two new loopings, CAC-4 and CS Opornaya. However, as mentioned earlier CAC capacity in 2008 was estimated at not more than 47 bcm due to its deterioration.⁸⁷ In the future, KazTransGaz plans to expand the capacity of this pipeline

⁸⁷ ‘Europe Cooperates with Central Asia to Prevent Leakage in Gas Pipelines’, *News Central Asia*, 29 September 2008, <http://www.newscentralasia.net/Regional-News/353.html>

network up to 80–100 bcm depending on the availability of additional volumes of gas from Turkmenistan and Uzbekistan.⁸⁸

Table 11: Depreciation levels of Kazakhstan’s gas pipelines in 2004

<i>Name</i>	<i>Depreciation (%)</i>
Central Asia–Centre 1	90
Central Asia–Centre 2	88
Central Asia–Centre 3	70
Central Asia–Centre 4	70
Central Asia–Centre 5	25
Makat–Northern Caucasus	30
Orenburg–Novoposkovsk	65
Soyuz	57
Bukhara–Ural 1	100
Bukhara–Ural 2	no data
BGA–TBA	60–90
Gazli–Chimkent	30
Kartaly–Kustanai	90
Okarem–Beyneu	70
Uzen–Aktau	70

Source: Kazakhstan’s programme of gas sector development, 2004–2010.

2.3.4 Gas Storage Facilities

Despite the fact that Kazakhstan’s gas storage facilities were part of the unified Soviet gas network, they were not physically linked. The country’s largest gas storage facility at Bozoi (3.5 bcm) is currently used to meet peak demand in the Tashkent region of Uzbekistan in order to ensure uninterrupted Uzbek gas supplies to southern Kazakhstan during winter months. The other two gas storage facilities, Akyrtoobe (0.2 bcm) and Poltoratskoye (0.4 bcm) served the Tashkent–Chimkent and Gazli–Chimkent–Bishkek–Almaty pipelines, aimed at providing gas supplies to the Uzbek capital of Tashkent and Kyrgyzstan.

The absence of gas storage facilities in hydrocarbon-rich Western Kazakhstan has contributed to the flaring of associated gas. In order to facilitate gas exports and to meet domestic demand in southern regions, Kazakhstan plans to build a new gas storage facility linked to the Central Asia–Centre pipeline and another facility near Almaty. However, these plans have not yet led to concrete results.

2.3.5 Current Gas Transit

As mentioned in Part One, in Soviet times central administrators in Moscow considered Kazakhstan to be a transit area for gas deliveries from Turkmenistan and Uzbekistan. As a result, the gas trunk pipelines did not cover the entire territory of Kazakhstan, and were not linked to a national network. At the same time, the western and northern parts of the Republic where the transit pipelines were originally built were well supplied with gas, whereas gas for the industrialised and densely populated southern part of the country was mainly imported

⁸⁸ See Part Three of this study for further discussion of this issue.

from Uzbekistan. This situation is likely to remain unchanged until Kazakhstan manages to develop new gas export routes.

Thus it is unsurprising that the Russian company, Gazprom, is the main partner of Intergaz Central Asia, responsible for 88% of the revenues of the Kazakh gas transportation company. The relationship between the Russian and Kazakh counterparties is focused on two areas: transit of Central Asian gas which Gazprom buys from Turkmenistan and Uzbekistan via Central Asia–Centre and Bukhara–Urals gas trunk pipelines, and transit of Russian gas via Orenburg–Novopskov pipeline in the northwestern part of Kazakhstan.

On 11 November 2005, Gazprom and Intergaz Central Asia signed two five-year agreements increasing the tariff for gas transit through the Kazakh territory from \$0.68 to \$1.1 per thousand cubic metres/per 100 km. Under the terms of the first agreement, the Kazakh company will transit maximum volumes of Gazprom-owned gas from other Central Asian countries (Uzbekistan and Turkmenistan) to the Kazakh/Russian border as follows: 55.2 bcm in 2006, 55.7 bcm in 2007 and 55.2 bcm during the period 2008–2010. In 2006, 39 bcm of Turkmenistan’s gas was transported through Kazakhstan to Russia. Most of this was supplied to Ukraine; 9 bcm of Uzbek gas and 7.9 bcm of Kazakh gas were also exported via Russia. The second agreement is concerned with the transit of Russian gas: in 2006, Intergaz Central Asia transported 69.7 bcm of Russian gas; for 2007–2010 transit volumes will be set on an annual basis.

In 2007, Kazakhstan’s total gas transit reached 98.01 bcm (8.5% less than in 2006).⁸⁹ In January–June 2008 Kazakhstan was responsible for gas transit of 58.29 bcm.⁹⁰ In 2008, the annual volume of its gas transit is projected to reach 118.83 bcm. Since 2005, gas transit has slightly declined mainly due to the introduction of gas swap deals between Russia, Kazakhstan and Uzbekistan and the reduction of Russian and Turkmen gas volumes transported through Kazakhstan’s trunk pipelines in winter months.

In addition to these five-year arrangements, in February 2006 the Russian and Kazakh companies signed an additional one-year agreement on the transit of 6.0 bcm of Russian gas via the Orenburg–Novopskov pipeline at the same tariff of \$1.1/mcm. Under the terms of existing contracts with Gazprom, Intergaz Central Asia is legally responsible for any direct losses and fines that the Russian counterparty may incur because of failure to transit these agreed volumes of gas.

Since January 2007, Kazakhstan’s transit tariffs for the transportation of Central Asian gas to Russia have gone up from \$1.1 to \$1.4 per mcm/100 km due to the price increase for gas supplied by Uzbekistan and Turkmenistan to Russia (see Part Three of this study).⁹¹ This tariff will remain unchanged until 31 December 2008.⁹² Starting in January 2009, Central

⁸⁹ Source: KazTransGaz, 2008.

⁹⁰ Source: Kazmunaigaz, July 2008.

⁹¹ Initially Kazakhstan sought to increase the transit tariffs from \$1.1 to \$1.6 per mcm/100 km, similar to the rates charged by Ukraine. However, Russia’s offer of gas swap deals between Kazakhstan, Uzbekistan and Russia (seeking to maintain relatively low prices for gas imported into Kazakhstan) led to the tariff being set at \$1.4/mcm/100 km. See the section on Gas Imports.

⁹² KazTransGaz, Press Release, 04 February 2008.

Asian gas will be sold to Russia at 'European prices'. This could result in Kazakhstan's transit tariffs going up even further to cover the increasing costs of gas used at the compressor plants on the transit pipelines.⁹³

Table 12: The main activities of Intergaz Central Asia

Services		2005 (\$ million)	2006 (\$ million)
Transportation of gas	Transit of Turkmen and Uzbek gas	291.2	502.2
	Transit of Russian gas	79.5	83.0
	Gas export	21.7	32.8
	Domestic gas	16.6	18.0
	Transit of Kyrgyzstani gas	3.8	5.1
Other	Gas sales	1.8	14.5
	Technical servicing of pipelines	0.6	0.9
	Gas storage	0.26	0.32
Total:		415.5	656.9

Note: Conversion to dollars by author, at 133.77 tenge per \$1 in 2005 and 127 tenge per \$1 in 2006. The transit tariff increase (from \$0.68/mcm/100 km to \$1.1/mcm/100 km) led to the jump in revenues from transit of Turkmen and Uzbek gas from 2005 to 2006.

Source: Intergaz Central Asia *Annual Report for 2006*.

2.4 Domestic Market

Kazakhstan's domestic gas market operates as several regional submarkets, some of which are still dependent on gas imports from Russia and Uzbekistan. This is due mainly to the location of the main hydrocarbon fields in the western part of the country and the gas transport infrastructure inherited from Soviet times which was designed for gas transit, rather than domestic consumption. Gas is produced in six out of the fourteen provinces of Kazakhstan (see Table 13). Western Kazakhstan (Aktobe, Atyrau, Western Kazakhstan and Mangistau provinces) is responsible for over 95% of domestic gas output.

Natural gas is supplied only to nine out of the 14 provinces of Kazakhstan.⁹⁴ Domestic gas supplies are predominantly handled by KazTransGaz, a subsidiary company of the national oil and gas company Kazmunaigaz. KazTransGaz supplies gas via its pipeline network to state-controlled gas distribution companies, KazTransGaz Aimak and KazTransGaz Almaty. KazTransGaz subsidiaries supply gas to seven out of nine regions of Kazakhstan which receive natural gas, namely Almaty, Aktobe, Kyzylorda, Koztanai, Zhambyl, South Kazakhstan and Western Kazakhstan provinces.

Gas produced in Western Kazakhstan is purified by the Russian–Kazakh joint venture, KazRosGaz, at the Orenburg Gas processing plant in Russia, part of which is then re-

⁹³ In order to transport gas through the lengthy transit pipelines of Kazakhstan the use of compressor stations is required. In their operation these stations use a portion of the transited gas.

⁹⁴ Gasification and power generation figures are examined in Part Three.

imported back into Western Kazakhstan province.⁹⁵ Russia exports its own gas to the Kostanai province of Kazakhstan. Supplies to Kyzylorda and Aktobe provinces come from the Akshabulak and Zhanazhol fields respectively. Aktobe province also obtains imported gas from Uzbekistan.

Table 13: Kazakhstan’s natural gas production per province (mcm), 2000–2007

Province	2000	2001	2002	2003	2004	2005	2006	Jan–Nov, 2007
Total	11541.9	11609.8	14109.1	16596.9	22102.1	24972.9	26381.6	26757.5
Aktobe	356.7	504.9	603.7	1029.1	1838.9	2280.3	3436.5	2964.9
Atyrau	5161.2	6155.4	6781.4	6936.1	7302.5	7433.0	7027.3	6718.6
Zhambyl	-	-	-	20.3	187.6	300.0	279.8	288.0
Western Kazakhstan	4675.9	3808.8	4844.1	5788.3	9123.3	11533.3	12076.3	13448.2
Kyzylorda	-	-	344.1	645.4	875.9	676.5	1029.6	1031.6
Mangistau	1348.1	1140.7	1535.8	2177.6	2773.9	2749.8	2532.1	2306.2

Source: Kazakhstan’s State Committee for Statistics, 2007.

The densely populated and the rapidly growing southern part of Kazakhstan (Almaty, Zhambyl, Kyzylorda, southern Kazakhstan provinces and the city of Almaty) which are located far from the existing hydrocarbon fields of Western Kazakhstan make up over 40% of Kazakhstan’s domestic gas demand. These provinces primarily depend on gas imports from Uzbekistan.

2.4.1 Gas Imports

In 2006, Kazakhstan’s annual domestic gas consumption was 7.95 bcm (9.9% higher than 2005) while gas imports reached 3.23 bcm (6.5 % more than 2005).⁹⁶ In comparison to 2006, domestic gas demand in 2007 grew by 17.7% to 8.38 bcm, while gas imports rose to 4.5 bcm amounting to a 15.2% growth.

Table 14: Kazakhstan’s domestic gas demand and imports, 2006–2007

<i>Kazakhstan’s gas</i>	<i>2006</i>	<i>2007</i>
Imports (bcm)	3.23	4.5
Demand (bcm)	7.95	8.38
Share of imports in total demand (%)	40.6	54.4

Source: Kazmunaigaz.

To sum up, in 2006 gas imports made up 40.6% of Kazakhstan’s domestic gas demand. In 2007, this figure was as high as 54.4% (see Table 14). However, contrary to Kazmunaigaz’s figures, the Interstate Statistical Committee of the Commonwealth of Independent States

⁹⁵ KazRosGaz is examined in Part Three in this study.

⁹⁶ Source: Ministry of Energy and Mineral Resources of the Republic of Kazakhstan, 2006–2007.

suggests that in 2006–2007 the share of gas imports in domestic consumption was in decline from 49% in 2006 to 34% in 2007 (see Tables 14 and 15 for comparison).

Table 15: Kazakhstan’s gas imports (mcm), 2004–2007

Supplier	2004	2005	2006	2007
<i>Russia</i> (share in total imports in parentheses)	6391 (55%)	6750 (60%)	6935 (63%)	2024 (28%)
<i>Turkmenistan</i> (share in total imports in parentheses)	1889 (16%)	1162 (10%)	1795 (16%)	2110 (29%)
<i>Uzbekistan</i> (share in total imports in parentheses)	3372 (29%)	3317 (30%)	2337 (21%)	3047 (43%)
Total	11652	11229	11066	7181
Share of imports in total apparent consumption	71 %	54%	49%	34%

Source: Interstate Statistical Committee of the CIS, *External Trade of the Countries of the CIS in 2007: Statistical Abstract* (Moscow, 2008).

While it would be difficult to apply one particular explanation for this discrepancy, several factors could account for the difference in the available statistics. These could include a difference in the labelling of gas which enters Kazakhstan’s gas network due to the swap trade between Russia, Kazakhstan and Uzbekistan (described below) as well as the fact that Karachaganak gas, processed at Orenburg in Russia, is then imported into Kazakhstan. Diverse methods for estimating consumption, imports and exports for Kazakhstan could also provide another explanation. In addition, the CIS Committee refers to apparent (not net) consumption, which is estimated as production plus import minus export (see Table 16). Apparent consumption includes gas reinjected for oil production and the estimated technical losses/waste figures which include gas flared during oil production. This could also contribute to an understanding of the statistical variance.

Table 16: Kazakhstan’s gas balance (bcm) in 2001–2007

	2001	2002	2003	2004	2005	2006	2007
Production	11.61	14.10	16.59	22.10	24.97	26.38	29.22
Sales gas					11.6	12.3	13.4
Export	5.53	10.43	11.00	17.28	15.43	15.06	15.22
Import	4.22	8.17	8.69	11.65	11.22	11.06	7.18
Apparent consumption	10.29	11.84	14.28	16.47	20.77	22.38	22.17

Source: Interstate Statistical Committee of the CIS, 2008.

2.4.2 Import Price

In 2006, Kazakhstan imported 1.58 bcm of Uzbek gas to its southern provinces at \$55/mcm. However, in 2007 Uzbekistan sought to double export prices. In the fall of 2006, Kazmunaigaz reached a gas swap agreement with Gazprom and Uzbekneftegaz. Under the agreement Kazakhstan would supply gas from the Karachaganak field to Russia in exchange for Uzbek gas, supplied by Gazprom. As a result of this arrangement, in 2007 Kazakhstan managed to retain the price for Uzbek gas imported to the southern part of the country (2.7 bcm in 2006 and 3.3 bcm in 2007) and the Aktobe province (0.61 bcm) at \$55/mcm respectively.⁹⁷ In 2007, Western Kazakhstan and Kostanai provinces received 0.4 and 0.9 bcm of gas respectively from Karachaganak at \$35/mcm.

In December 2007, Kazmunaigaz, its subsidiary KazTransGaz, Gazprom and Uzbekneftegaz reached a new gas swap agreement on gas supplies from Uzbekistan to Kazakhstan's provinces of Zhambyl, Almaty, Southern Kazakhstan and the city of Almaty. Under this agreement gas prices in the first half of 2008 remained the same as in 2007 – \$55/mcm. It is worth noting that Uzbekistan sought to hike the price for gas supplied to Kazakhstan to \$185/mcm; however due to a gas swap deal with Gazprom, Kazakhstan managed to avoid a considerable price increase. For example, in the first half of 2008, Uzbekistan supplied its gas to Kyrgyzstan and Tajikistan at \$145/mcm and \$150/mcm respectively. Earlier, Gazprom and Kazakhstan signed a similar agreement on Russian gas supplies to Kostanai and Western Kazakhstan provinces for the first half of 2008 which would remain at the same price level as in 2007.

In 2008 the total volume of gas imported into Kazakhstan through swap operations is projected to reach 5.06 bcm.

Table 17: Kazakhstan's gas imports (volumes and average prices) in 2007–2008 (first quarter)

<i>Origin</i>	2007		January–March 2008	
	Volume (bcm)	Price \$/1000cm	Volume (bcm)	Price \$/1000cm
Russia	2.02	39.33	0.68	41.80
Turkmenistan	2.10	60	0.14	60
Uzbekistan	3.04	55.86	0.71	55.33

Source: *Oil and Gas of Kazakhstan*, no. 2–3, 2008.

In the second half of 2008, the situation with Kazakhstan's gas imports started to change with prices increasing from a minimum of \$55/mcm to around \$85/mcm. Gas prices for Uzbek imports (handled by Gazprom and supplied to Southern Kazakhstan, Zhambyl and Almaty

⁹⁷ In 2007 (in addition to the mentioned agreements) Gazprom supplied 300 mcm of Uzbek gas to Kazmunaigaz for the Zhambyl hydroelectric power plant at \$75/mcm.

provinces) had already risen by 54%, whereas Russian import prices for Kostanai province grew by 42%, with the Russian–Kazakh joint venture KazRosGaz hiking prices by 53% for gas supplied to Western Kazakhstan province.⁹⁸ In 2009 Kazakhstan is likely to pay even higher prices for imported gas. According to the agreement between Russia, Kazakhstan, Turkmenistan and Uzbekistan mentioned earlier, Central Asian gas exports to Russia are planned to reach European netback price levels, in the context of Russia’s broader move to equalise CIS and European prices. Nevertheless, Kazakhstan may seek to use gas swap supplies from Karachaganak to Russia as a way of keeping gas imports to southern Kazakhstan relatively low. Another option for Kazakhstan is to build a 10 bcm gas pipeline from Western Kazakhstan to China. This could become a solution to the growing demand in the southern part of the country. This pipeline project is assessed in Part Three of this study.

2.5 Gas Exports

Similar to figures regarding imports, statistical information on gas exports from Kazakhstan can vary considerably. For example, though in 2006 Kazakhstan exported 7.88 bcm of gas, the CIS Statistical Report shows double that amount – 14.38 bcm (see Table 18). The main reason for this discrepancy is that the same gas volume to Russia was subsequently exported to Ukraine, but was accounted for as having originated in Kazakhstan separately (thus doubling the export amount). The statistical discrepancy involving exports also arises from raw gas supplies from Karachaganak to Russia’s Orenburg gas-processing plant via the 140 km Karachaganak–Orenburg pipeline (with an annual capacity of 8 bcm). Since this is a service pipeline (which is not operated by Kazmunaigaz and its subsidiaries), gas volumes transported via this route are often excluded from the statistical data.

Table 18: Kazakhstan’s apparent gas exports, 2005–2007

<i>Destination</i>	2005	2006	2007
Russia	6.96	7.17	7.51
Ukraine	-	5.94	7.67
Armenia	1.21	0.32	-
Azerbaijan	1.49	0.51	-
Georgia	0.81	0.21	-
Moldova	1.30	0.09	-
Kyrgyzstan	0.62	0.12	-
Total apparent export	12.40	14.38	15.18

Source: Interstate Statistical Committee of the CIS, *External Trade of the Countries of the CIS in 2007: Statistical Abstract* (Moscow, 2008).

In 2006, Kazakhstan’s gas exports increased by 4.5% in comparison to 2005, reaching 7.92 bcm. In 2007, gas exports remained unchanged at 7.9 bcm. Most of the exported gas volumes were supplied by the Karachaganak consortium (5.6 bcm) as well as Tengizchevroil and Tolkynneftegaz (2.3 bcm).

Kazakhstan exports most of its gas volumes through a Kazakh–Russian joint venture, KazRosGaz which at present has a *de facto* monopoly on gas exports from Kazakhstan.

⁹⁸ Interview with Esenali Usenov, Managing Director of KazTransGaz, Panorama, 1 August 2008.

2.5.1 KazRosGaz

KazRosGaz is a joint venture between Gazprom (50%) and Kazmunaigaz (50%), primarily formed to deal with Karachaganak gas. KazRosGaz was established in June 2002 on the basis of an intergovernmental agreement on co-operation in the gas sector signed by Kazakhstan and Russia in November 2001. The joint venture was formed to conduct operations with Kazakh gas, 'including gas marketing, processing, transportation, realization of natural gas and gas processing products both on domestic and foreign markets.'⁹⁹ The partnership buys gas from the Karachaganak consortium, processes it at the Orenburg gas-processing plant in Russia and subsequently supplies the processed gas volumes to Gazprom which then exports the gas via its pipeline infrastructure to external markets.¹⁰⁰

In 2007, Russia and Kazakhstan reached an agreement on the Orenburg plant, which will be jointly owned by Gazprom and Kazmunaigaz. The Kazakh company will pay \$350 million for its 50% stake and will also invest an additional \$250 million in the modernisation of the plant's facilities, which will require a total estimated investment of \$500 million. By 2012 the Orenburg processing plant will be upgraded to handle 31.6 bcm of gas from the Orenburg (Russia) and Karachaganak (Kazakhstan) hydrocarbon fields. The plant's annual output will be 26.5 bcm of processed gas, 824,000 tonnes of LPG and 1.6 million tonnes of sulphur.

In the autumn of 2007, KazRosGaz and the Karachaganak consortium agreed that by 2012 KCO will increase the annual supply of Karachaganak gas from the current level of 7.5 bcm to 16 bcm to the Orenburg plant at \$33 per 1000 cubic metres. In 2008 the processed gas was exported by KazRosGaz at \$180/mcm (sold to Gazprom for subsequent export). Initial Karachaganak volumes are expected to reach 8.5–9 bcm per annum. In 2012 KazRosGaz plans to export 12–13 bcm of processed gas. Russia has also initially agreed that KazRosGaz will be allowed to export some (currently undisclosed) gas volumes to the CIS states and Europe at the export price of \$180/mcm. However, this price regime is projected to change when Russia starts paying 'European prices' for Central Asian gas in January 2009; although it is not yet clear exactly how that concept will be defined.

The growing international competition for Caspian and Central Asian gas further boosted the bargaining position of Kazakhstan, Turkmenistan and Uzbekistan vis-à-vis Russia. In November 2007, Gazprom signed a supplementary agreement to the existing gas contract with Turkmenistan setting gas prices at \$130 (in lieu of \$100) per 1000 cubic metres for the first half of 2008, which would increase to \$150 per 1000 cm in the second half of 2008. In December 2007, Gazprom also reached agreements regarding price increases on gas supplied by Uzbekistan and Kazakhstan (see Table 19). The Russia–Kazakh Karachaganak deal of autumn 2007 was likely the main reason for Moscow's decision to offer the highest price of \$180 per mcm to Kazakhstan and not to the other Central Asian producers.

⁹⁹ JSC Gazprom Press Release, 21 July 2003, <http://www.gazprom.ru/eng/news/2003/07/10807.shtml>

¹⁰⁰ *Spravka po voprosam eksportnykh postavok OAO 'Gazprom' (Report on JSC Gasprom's export supplies)*, <http://www.gazprom.ru/articles/article5354.shtml>

Table 19: Central Asian gas prices for Gazprom in 2008. (\$/1000 cm)

Country	First half of 2008	Second half of 2008
Kazakhstan	180	180
Uzbekistan	145	175
Turkmenistan	130	150

Source: Kazmunaigaz, March 2008.

In terms of marketing and sales of Central Asian gas, Russia and the three Central Asian producers may adopt a new business framework similar to the one adopted by Russia and Kazakhstan when KazRosGaz was set up.

2.6 Domestic Tariffs and Prices

Domestic gas prices in Kazakhstan are regulated by the state agency for regulation of natural monopolies. According to the agency, the prices cannot be changed more than once per calendar quarter (three months). Gas retail companies which do seek a price change must apply to the agency for an official approval, which is not always granted. The agency also regulates gas storage and transport tariffs within Kazakhstan (see Table 20). The current gas storage tariff charged by KazTransGaz's subsidiary Intergaz Central Asia has remained unchanged since 2003. This tariff of 4.87 tenge/ (or \$0.03–0.04/) mcm is only applicable to winter months, when stored gas volumes are used to cover seasonal demand growth.

Tariffs for gas transport within Kazakhstan have also not changed since 2001 and are currently set at 420 tenge/ (\$3–3.5) mcm for large commercial consumers and at 171 tenge/ (\$1.2–1.4) mcm for domestic gas retail companies supplying gas to households. These tariffs are uniform throughout the territory of Kazakhstan and are not distance-related. Domestic gas retail and distribution companies have traditionally set gas transport and distribution tariffs for individual provinces in collaboration with regional authorities. At this stage, several factors play a key role in the formulation of tariffs and wholesale prices, including distance, import dependence and the condition of the transportation network. For example, as Table 20 indicates, Kazakhstan's key distribution company, Kaztransgas Aimak, charges consumers in resource-rich Western Kazakhstan \$3/(386 tenge) mcm whereas import dependent customers in Southern Kazakhstan pay as much as \$19/(2295 tenge) mcm. These tariffs are the same for individual and commercial consumers.

In 2004 average domestic wholesale gas prices varied between \$29–55/mcm. By the autumn of 2007 this price level had gone up to \$32–\$60/mcm. In a similar manner to domestic gas transport tariffs, wholesale gas prices vary across Kazakhstan: \$32/mcm in Western Kazakhstan, \$55/mcm in the south and \$60/mcm in the north. In 2004, imported gas cost \$38–55/mcm. As mentioned earlier, in 2007 the average gas import price varied between \$55–60/mcm and remained at the same level in the first quarter of 2008. Despite the fact that Kazmunaigaz aims to gradually bring domestic gas prices to market level, political considerations on behalf of the government may considerably hinder such attempts. Price dynamics in external markets will also determine whether the Kazakh government will have incentives to opt for external markets or further gasification of the domestic market. If export gas prices are to increase in excess of \$300/mcm in 2009, the continued capping of domestic

wholesale prices may be gradually abandoned.¹⁰¹ At the same time, a continued global financial crisis and low export prices may hinder Kazakhstan's ambitions in relation to the development of its gas sector.

Table 20: Gas transportation tariffs within Kazakhstan (tenge per one thousand cubic metres), autumn 2007

<i>Company</i>	<i>Description</i>	<i>Tenge per one thousand cubic metres)/US\$</i>	<i>Date of introduction</i>
Kaztransoil	Distribution of gas	233/\$1.89	September 2004
Intergaz Central Asia	Gas storage	4.87/\$0.03	April 2003
	Transportation of gas for retail companies selling gas to individual households	171/\$1.39	June 2001
	Transportation of gas for commercial consumers	420/\$3.41	June 2001
KazTransGaz Aimak	Distribution of gas for consumers within Mangistau province	386.89/\$3.14	November 2007
	Distribution of gas within Aktobe province	587.40/\$4.78	November 2007
	Distribution of gas within Western Kazakhstan province	1315.61/\$10.70	November 2007
	Distribution of gas within Zhambyl province	1367.52/\$11.12	November 2007
	Distribution of gas within Southern Kazakhstan province	1890.87/\$15.38	November 2007
	Distribution of gas within Kyzylorda province	2295/\$18.67	November 2007

Note: The following exchange rate applies: 122.87 tenge per \$1 in autumn 2007.

Source: Kazakhstan's State Agency for regulation of natural monopolies, November 2007.

2.7 Production Costs, Profit Margins and External Markets

Kazakhstan's gas production costs remain relatively low in comparison to the growth of gas prices in external markets. In 2005, production costs went up by 9.5% and in 2006 by 3.5% (see Table 21). At the same time, gas prices in external markets increased by 53.5% in 2005 and 19.1% in 2006. According to Kazakhstan's State Committee for Statistics the cost of domestic gas production constituted only 5.3% (around \$15mcm) in the autumn of 2005 and 4.8% (around \$14.80/mcm) at the end of 2006 in relation to gas prices in external markets.

Table 21: Average production costs of gas in Kazakhstan per 1000 cm (tenge/US\$), 2000–2006

2000	2001	2002	2003	2004	2005	2006
753/\$5.30	1211/\$8.26	1399/\$9.21	1562/\$10.19	1683/\$11.95	1931/\$15.20	1987/\$14.85

¹⁰¹ Average domestic wholesale prices increased to \$85 per 1000 cm in the summer of 2008 due to higher import prices. This could signal a shift in Kazakhstan's policies of restraining domestic gas price increases.

Note: The following exchange rates apply: 142.01 tenge per \$1 in 2000, 146.60 tenge per \$1 in 2001, 151.89 tenge per \$1 in 2002, 153.27 tenge per \$1 in 2003, 140.83 tenge per \$1 in 2004, 127 tenge per \$1 in 2005, 133.77 tenge per \$1 in 2006.

Source: Kazakhstan's State Committee for Statistics, 2007.

Natural gas is the second cheapest fuel after coal, both in relation to production costs and wholesale domestic prices. Production of coal is nearly three times less expensive than that of gas and domestic consumers can pay as much as five times more for gas than coal (see Tables 19 and 22). On average, when it comes to sales, natural gas production offers higher margins (as much as four times greater) than any other type of domestically consumed energy resources. For example, in 2006 the average gas price for domestic industrial consumers was \$47–59/mcm, whereas production costs were \$14–15/mcm.

Table 22: Kazakhstan's domestic energy market (industrial sector prices), January, July and December 2006 (in tenge) /US\$

	Unit	January	July	December
Oil				
Production cost	Tonne	46193/ \$342.27	50636/ \$409.80	47690/ \$359.19
Sale price	Tonne	25320/ \$187.61	25588/ \$207.08	26550/ \$199.96
Price difference	Times	0.5	0.5	0.6
Petrol				
Production cost	Tonne	25975/ \$192.46	27402/ \$221.77	33399/ \$251.55
Sale price	Tonne	57354/ \$424.97	60797/ \$492.04	65427/ \$492.78
Price difference	Times	2.2	2.2	2.0
Diesel				
Production cost	Tonne	21994/ \$162.96	28043/ \$226.95	28983/ \$218.29
Sale price	Tonne	59740/ \$442.64	57908/ \$468.66	61858/ \$465.90
Price difference	Times	2.7	2.1	2.1
Fuel oil				
Production cost	Tonne	7031/ \$52.09	10018/ \$81.07	10018/ \$75.45
Sale price	Tonne	20356/ \$150.82	21984/ \$177.92	19744/ \$148.70
Price difference	Times	2.9	2.2	2.0
Natural gas				
Production cost	1000 cm	1950/ \$14.44	1920/ \$15.53	2032/ \$15.30
Sale price	1000 cm	6410/ \$47.49	7595/ \$61.46	7909/ \$59.56
Price difference	Times	3.3	4.0	3.9
Coal				
Production cost	Tonne	617/ \$4.57	639/ \$5.17	694/ \$5.22
Sale price	Tonne	1264/ \$9.36	1341/ \$10.85	1389/ \$10.46
Price difference	Times	2.0	2.1	2.0

Note: The following exchange rates apply: 134.96 tenge per \$1 in January 2006, 123.56 tenge per \$1 in July 2006, 132.77 tenge per \$1 in December 2006.

Source: Kazakhstan's State Committee for Statistics, 2007.

2.8 Kazakhstan's LPG Production

In 2005–2007 annual domestic demand for Liquefied Petroleum Gas (LPG) was 0.42–0.46 million tonnes (see Table 24). LPG is often considered a good alternative to domestic natural gas supplies, taking into account their problematic distribution through the existing highly deteriorated gas pipeline system.

Unlike the wholesale domestic market for natural gas, Kazakhstan's LPG market has come closer to international price levels for this type of fuel. In 2004, domestic LPG prices reached \$250–300 per tonne which correlated to external market prices taking into account the costs of LPG transportation.¹⁰² By January 2008, average retail LPG prices varied from \$290 per tonne in Western Kazakhstan to \$1163 per tonne in Southern Kazakhstan (with the average retail price for the entire country set at \$881.1 per tonne).¹⁰³ The Kazakhstan government has never seriously attempted to regulate domestic LPG prices due to the nature of the sector. Unlike pipeline gas, LPG can be delivered throughout the entire territory of Kazakhstan in cylinders and also exported. Despite the challenges of storage and transportation of large LPG quantities, conventional technologies and standard fractional equipment makes LPG production competitive. Kazakhstan has also promoted LPG production as a way of minimising flaring of associated gas.

There are several producers currently involved in the domestic LPG production in Kazakhstan. These include Tengizchevroil (TCO), Pavlodarsky refinery, PetroKazakhstan Chimkent refinery, Kazakhstan gas-processing plant, Zhanazhol gas-processing plant and Atyrau refinery (see Table 32). TCO is responsible for 70% of Kazakhstan's LPG output, having produced 414,000 metric tonnes in the first half of 2007.

Table 23: LPG producers in Kazakhstan (thousand tonnes), 2006

Producer	2006
Pavlodarsky refinery	181.74
PetroKazakhstan Chimkent refinery	130.67
Atyrau refinery	9.55
Kazakhstan gas-processing plant	100.19
Tengizchevroil	784.42
Zhanazhol gas-processing plant	28.86
Total	1235.43

Source: Kazmunaigaz.

In 2007 Kazakhstan's domestic annual production of LPG exceeded 1.4 million tonnes (see Table 33). Over 70% of this amount was exported to Turkey and Eastern Europe. LPG export volumes are primarily conducted by rail, such as transportation of Tengiz LPG to the Black Sea LPG terminal at Odessa.

By 2010 annual domestic LPG output is forecast to reach 3.2 million tonnes, 2.4 million tonnes of which can be exported.¹⁰⁴

¹⁰² Kazakhstan's Gas Programme, June 2004.

¹⁰³ *Oil and Gas of Kazakhstan*, no. 2, 2008

¹⁰⁴ Ibid.

Table 24: Kazakhstan LPG industry in 2005–2007 (thousand tonnes)

	2005	2006	2007
Domestic demand	429	447	460
Export	820	823	968
Total production	1249	1271	1428

Source: Kazakhstan's Ministry of Energy and Mineral Resources, 2008

3. The Future of Kazakhstan's Gas

The rapidly changing global energy scene, dominated by volatile oil and gas prices, the emergence of powerful new consumers in the Asia-Pacific region, reserve depletion within the OECD and political instability in the energy-producing regions, has attracted the attention of most of the players in the energy market, from the consuming nations of Europe and Asia to the gas-producing states of the Caspian and Central Asia. New price regimes in external markets, propelled by a recent steady growth of gas prices (linked predominantly to oil price dynamics), combined with the intensified global competition for gas supplies offers Kazakhstan a unique chance not only to boost its export revenues, but also to solve several key challenges facing its gas sector, including:

- its traditional dependency on a single export route and on an export price of a sole buyer/transit country – Russia;
- lack of geographical connections between different parts of the domestic pipeline infrastructure;
- and the long-standing dependency of the domestic gas market on imported gas.

Apart from geopolitics and domestic politics, the future of Kazakhstan's gas sector will be determined by five inter-related factors:

- gas utilisation choices, particularly with regard to reinjection;
- potential growth of domestic demand;
- potential gas volumes from Kazakhstan and other Central Asian/Caspian producers;
- current and potential external markets for Kazakh gas;
- economic and political viability of pipeline projects for Kazakh gas exports.

3.1 Future Production, Demand and Exports

Kazakhstan seeks to increase gas production from 29.63 bcm in 2007 to 60-80 bcm in 2015. Various scenarios have been offered for gas export volumes from Kazakhstan. According to official figures, sales gas output is projected to go up from 13-16 bcm in 2007-2008 to around 30 bcm in 2015.¹⁰⁵ At the same time, domestic gas demand is forecast to double from the current (2007-2008) level of 8-10 bcm to 15-19 bcm in 2015.¹⁰⁶ Gas export volumes will be in the range of 20 bcm by 2015. Gas volumes available for export will depend on two main factors:

- volumes of gas reinjection at Tengiz, Kashagan and Karachaganak; and
- utilisation of gas in the petrochemical industry.

¹⁰⁵ As mentioned earlier in this study, gas actually marketed will be called 'sales gas' and distinguished from gross gas production. Sales gas is the product which remains after reinjection, technical use, losses, flaring and processing.

¹⁰⁶ Data supplied by the Ministry for Energy and Mineral Resources of Kazakhstan, Kazmunaigaz and Institute for Economic Studies, Republic of Kazakhstan.

3.2 Potential Domestic Gas Demand

3.2.1 Gas Reinjection

As mentioned in Part Two, the levels of gas reinjected into the Caspian fields (aimed at boosting oil output) will determine how much spare Kazakh gas will be available for external markets. The future of gas development in Kashagan depends on the successful implementation of various technological approaches to gas processing/reinjection at Tengiz. In the fall of 2007, Tengizchevroil (TCO) carried out a trial launch of Second Generation Project (SGP) and the Sour Gas Injection (SGI).¹⁰⁷ The full launch of the SGI unit has been postponed due to gas escaping during reinjection. In the summer of 2007, TCO completed the drilling of the first injection well. However, after the problems with the SGI launch, the planned drilling of the second and third wells has been postponed. Success of gas-reinjection is also measured by the number of pores it fills in the reservoir and whether the injected gas displaces oil as intended;¹⁰⁸ furthermore, success can only be established two to three years after the initial injection. As mentioned before, gas-reinjection is vital for oil production at Karachaganak and the Caspian offshore fields. Unsuccessful gas reinjection could mean more gas volumes becoming available for export. Due to the initial problems with gas reinjection at Tengiz Kazakh experts have been sceptical that TCO will be able to successfully implement reinjection.¹⁰⁹ However, in the autumn of 2008, TCO completed the expansion projects bringing oil production to 540,000 barrels per day.¹¹⁰ It is expected that by the end of 2008 about one-third of the sour gas produced will be reinjected back into the reservoir. The remaining volumes will be used to produce commercial gas, LPG and sulphur.

3.2.2 Domestic Demand and Kazakhstan's Gasification

Coal remains the dominant fuel in Kazakhstan making up 49.3% of primary energy demand, followed by gas at 29%, oil at 18.1% and hydro 3.6%.¹¹¹ The proportion of gas in the country's primary energy demand could increase, providing that Kazakhstan successfully implements its plans to boost gas use in power generation in the resource-rich western part of the country and to move gas from the west, to the fast growing and energy-hungry south.

Apart from the long distances between resource-rich western Kazakhstan and the resource-poor south, in 2002–2007 relatively low domestic wholesale prices of \$24–45 per mcm hindered gasification of the country's regions. At present, the domestic market, with state regulated prices, is solely controlled by Kazmunaigaz's subsidiary KazTransGaz, although there are a few cases of short-term commercial contracts on gas supply in some regions. It is

¹⁰⁷ 'SGI reinjects produced sour gas into the reservoir at very high pressures to boost production. SGP was brought up to about one-third of its full capacity and is currently separating the natural gas for injection while also stabilizing and sweetening the crude oil. Once fully operational, SGP is designed to also process sour gas into gas products and elemental sulfur', *Chevron*, Press Release, 29 January 2008.

¹⁰⁸ Ibid.

¹⁰⁹ See: Martyniuk, Oksana, 'Milliard v plast', *Gazeta.kz*, 31 October 2007, <http://www.gazeta.kz/art.asp?aid=98546>; 'Gas reinjection at Tengiz stopped', *Oil and Gas of Kazakhstan*, no. 6, 2007.

¹¹⁰ 'Chevron Achieves Full Production from Tengiz Expansion Projects', *Chevron*, Press Release, 25 September 2008.

¹¹¹ 2006 data, see: *The Kazakhstan Power Report*, Business Monitor International, 2008.

unclear whether the government will opt for full-scale reform of the domestic gas market as planned in neighbouring Russia.¹¹² Similar to Russia's Gazprom, Kazmunaigaz has lobbied for a change of Kazakhstan's government policies in this respect. State regulated prices and the geography of hydrocarbons and gas consumers curtail the modernisation of the domestic gas networks and prevent further gasification.

The resource-rich provinces of the western part of the country (responsible for 95% of Kazakhstan's gas production) enjoy high to medium levels of gasification: 91% in Mangistau, 67% in Western Kazakhstan, 58.3% in Aktobe, 56% in Atyrau. Kyzylorda province, with moderate gas production, has 44.5% gasification. In the high energy consuming south, only the old Kazakh capital, Almaty, has gasification of over 80%, followed by Southern Kazakhstan (41.5%), Zhambyl (24%) and Almaty (5.7%) provinces. In Kostanai province in northern Kazakhstan the level is 16 percent.

As mentioned in Part Two, in 2006 Kazakhstan's domestic annual gas consumption increased by 9.9% in comparison to 2005, reaching 7.95 bcm. In 2007, domestic gas demand grew by 17.7% in comparison to 2006 rising to 8.38 bcm and is projected to reach 15-19 bcm by 2015 (see Table 25 and Table 31).

Kazakhstan plans to handle the growing domestic gas demand in a variety of ways:

- the western regions will be supplied from local fields;
- the northwest will receive imported and domestically produced gas;
- the central, eastern and northern parts of Kazakhstan will rely on LPG;
- the southern regions will obtain imported gas, LPG and domestic gas supplies from Kumkol and Amangeldy fields and possibly from Western Kazakhstan via the Beyneu–Bozoi–Samsonovka (Western Kazakhstan–Western China) pipeline.

The proposed Western Kazakhstan–Western China gas pipeline (discussed below) could also be used to increase gasification levels in the central and eastern parts of the Republic.

Table 25: Projected annual gas consumption in Kazakhstan (million cubic metres), 2010–2040

Period	Total consumption	Actual domestic consumption	Regional gas submarkets		
			Western	Northern	Southern
2010–2014	13819	11135	5259	812	5067
2015–2019	15015	12221	5792	914	5528
2020–2024	16317	13345	6250	1063	6034
2025–2029	17690	14480	6824	1149	6497
2030–2034	18498	15191	6922	1214	7052
2035–2039	19297	15942	7231	1280	7426
2040	20278	16350	7489	1331	7833

Source: Institute for Economic Studies, Republic of Kazakhstan, 2008.

¹¹² See Mitrova, Tatiana in the forthcoming volume, Pirani, Simon (ed.), *Russian and CIS Gas Markets and their Impact on Europe*, Oxford University Press: January 2009.

3.2.3 Gas for Power Generation

The heating and power-generation sectors make up 51% of gas consumption within Kazakhstan, whereas the industrial and domestic sectors are responsible for 30% and 19%, respectively.

Table 26: Kazakhstan's gross electricity and heat production from combustible fuels, 2006

	<i>Coal</i>	<i>Oil</i>	<i>Gas</i>
Electricity Production (TWh)	50.40	5.00	8.48
Heat Production (PJ)	395.39	-	-

Source: Electricity Information, IEA, 2008.

Eighty-nine percent of Kazakhstan's electricity production comes from fossil fuels followed by hydropower, 11%. Coal is responsible for 79% of Kazakhstan's gross power generation. Industrial consumers account for around 70% of electric power consumption, while the remainder is utilised by households (9.3%), services (8%), transport (5.6%), and agriculture (1.2%).

Kazakhstan's power-generating sector operates as three regional submarkets: southern, northern-central and western.

- southern Kazakhstan (Almaty, Kyzylorda, Zhambyl and Southern Kazakhstan provinces) has a unified network with Uzbekistan and Kyrgyzstan and imports around 15% of electricity from these two countries. Southern Kazakhstan power generation is also dependent on external coal supplies and gas imports from Uzbekistan. Electricity is also supplied from Ekibastuz via a 500 kW line;
- northern and central Kazakhstan (Akmola, Karaganda, Kostanai, Pavlodar, Eastern Kazakhstan provinces) have a highly developed unified network with Russia. This regional submarket is self-sufficient due to the availability of cheap coal produced at Ekibastuz. This also enables the region to export excess power supply to Russia and China;
- western Kazakhstan (Atyrau, Aktobe, Mangistau, and Western Kazakhstan provinces) imports electricity via the unified network with Russia, although Aktobe province operates as a self-contained market. Despite the fact that Western Kazakhstan is the centre of oil and gas production in the Republic, over 60% of its electricity demands have traditionally been covered by Russian imports.

Therefore, despite excess electricity production in northern and central Kazakhstan, the Western and Southern parts of the country continue to rely on imports. Kazakhstan intends to develop a large-scale construction of gas-turbine power stations in resource-rich Western Kazakhstan to lessen its dependence on Russian imports and to make considerable excess supply available for export, as well as domestic use.

Local authorities and oil companies have plans for creating their own power supplies with the construction of gas-fired plants. At present, Kazakhstan's gas-fired plants include Tengizchevroil (240 Megawatts), Karachaganak (120 MW), Kyzylorda (50 MW), Zhanazhol (48–56 MW), Ural (28 MW), Kandyagash (100 MW). The latter is currently under construction and is scheduled for completion by 2009. In terms of gas utilisation, a gas-fired plant requires an annual volume of 200–220 mcm of gas per 100 megawatts, as the case of the Kandyagash gas-fired plant indicates.¹¹³ Planned gas-fired projects also include AgipKCO (230 MW), Zhambyl (240 MW), a 200 Megawatt GTI at the Kumkol fields in Kyzylorda province developed by Petro Kazakhstan Inc., as well as two plants at Aktobe (360 MW and 180 MW) to be constructed by SBS Steel.¹¹⁴

If all these projects are built, the amount of gas required in the heating and power-generation sector could exceed the earlier projections by 2.4–2.6 bcm per annum.¹¹⁵ It is also likely that gas will play a major role in power generation predominately in the western part of the country. Due to long distances between the resource-rich west and the energy-hungry south, gas-fired power-generation facilities in Southern Kazakhstan, such as the Zhambyl GRES power plant, have experienced serious problems with imported gas supplies from Uzbekistan. In winter months, Uzbekistan uses the gas allocated for Kazakhstan to meet surges in domestic demand, forcing the Zhambyl GRES to switch to heavy fuel oil (which is at least twice as expensive as imported gas).

Table 27: Kazakhstan's Natural Gas Consumption for Power Generation (bcm), 2001–2005

2001	2002	2003	2004	2005
1.81	1.86	2.03	2.13	2.16

Source: International Energy Agency, *Natural Gas Information*, 2007.

The Zhambyl GRES (with a capacity of 1000 MW) is responsible for 25% of electricity demand in Southern Kazakhstan, and since the annual growth of electricity demand in the southern regions is around 10–12%, (compared to the national average of 5–6%), a potential Western Kazakhstan–Western China gas pipeline could be used to supply Caspian gas to Zhambyl GRES.¹¹⁶

In addition, Kazakhstan's government has considered nuclear energy as a possible alternative to gas in power generation. In October 2006 Russia and Kazakhstan set up a joint venture which seeks to develop nuclear stations in Kazakhstan.¹¹⁷ According to some forecasts, Kazakhstan may free additional volumes of gas for export if it successfully implements construction of several nuclear power plants, with the first one (600 megawatt output)

¹¹³ *Gas Turbine Power Station in Aktobe Oblast with Capacity of 100 MWt*, A Pre-Feasibility Study Report, PREGA, Kazakhstan, October 2006, Kazakhstan's government decree on the construction of the Kandyagash gas-fired plant, No. 579, 26 June 2006.

¹¹⁴ Alshanov, Rakhman, 'Novyi ekonomicheskii kurs Kazakhstana', *Kazakhstanskaya Pravda*, 25 January 2005.

¹¹⁵ According to the Kazakhstan Gas Programme of 2004, gas share in the domestic heating and power generation was projected to increase from 0.6 bcm in 2004 to over 2.2 bcm by 2010.

¹¹⁶ Urmanov, Adil, 'Kolavatt tarifom krasen', *Biznes i vlast*, 06 May 2008.

¹¹⁷ See: http://www.rosatom.ru/press-releases/2797_13.10.2006.

scheduled to be built at Aktau in Western Kazakhstan.¹¹⁸ In 2014, in its first stage, the projected Aktau nuclear station will have an output of 300 megawatts. Although the Aktau plant will be built in the resource-rich province of Western Kazakhstan, the nuclear sector is unlikely to play a significant role in freeing more hydrocarbons for export until 2025–2030.

3.2.4 Gas in Petrochemical Production

From 2002 to 2006, Kazakhstan's government initiated a number of measures aimed at the development of a domestic petrochemical industry. These include a special programme for the period up to 2010, as well as a plan 'On the Creation of World-Class Petrochemical Complexes in Kazakhstan' and the establishment of a special petrochemical department in the national oil and gas company, Kazmunaigaz.

Kazakhstan's overall strategy on petrochemical development places a heavy emphasis on gas rather than oil. As a result, it abandoned a gas strategy developed by ExxonMobil which rejected the use of gas in petrochemical production, arguing that most of the produced gas should be exported via the existing Russian route.¹¹⁹ Unlike Exxon, Kazakhstan's Ministry of Energy and Mineral Resources and consultants Nexant Inc. came up with a new approach to gas use in petrochemical enterprises. The alternate strategy is based on the competitiveness of relatively cheap and potentially large volumes of associated gas as well as the government's plan to eliminate flaring, availability of relevant technologies, growing export market for petrochemical products and high returns on investments. Recently, existing petrochemical plants have had no choice but to buy oil at world prices from international consortia operating in Kazakhstan. High costs and attractive crude oil export markets were the main problems of using high quality Kazakh oil as a source for the domestic petrochemical sector. In comparison to oil, associated gas appears to be more attractive, although economic comparisons are complex. The technological and logistical challenges associated with gas production and transportation make the international consortia who are developing Kazakhstan's hydrocarbon fields sell gas below the international market price as the case of Karachaganak gas indicates – \$33 per 1 thousand cubic metres.

Levels of ethane in Kazakhstan's gas also make it an attractive source for the proposed petrochemical production. Ethane is an important petrochemical feedstock for the production of ethylene and other chemical compounds. Kazakhstan's gas contains about 13–16% of ethane in comparison to a world average of 1–6%, making petrochemical production on the basis of gas highly competitive.

Apart from modernising the existing petrochemical plants at Aktau (plastics and polystyrene), Chimkent (tires) and Karaganda (rubber goods), the government seeks to build a gas-chemical complex at Karabatan in Atyrau province, close to the Tengiz field. The complex will consist of two gas-processing plants. The cost of the project was initially estimated at around \$5.2 billion and could increase depending on the volatility of energy and steel prices. The Atyrau plant construction commences in December 2008, with the entire project scheduled to be completed in 2013. Initially, the plant will produce polypropylene and

¹¹⁸ Verkhoturov, Dmitry, 'Novaya AES na meste staroi', *Expert*, no. 26 (128), 9 July 2007.

¹¹⁹ 'Gazovye rekomendatsii ExxonMobil', *Neftegazovaya Vertikal*, no. 5, 2004.

polyethylene as the main basis for the next more sophisticated stage of petrochemical production of high added value products, such as ethyl benzene, ethylene glycol, polyethylene terephthalate and polyvinyl chloride.

At the initial stage the gas-processing complex will require 7 bcm of gas. The project operator, Kazakhstan Petrochemical Industries (KPI),¹²⁰ has already taken a number of steps to secure petrochemical technologies and gas volumes from the Caspian producers for the proposed gas-chemical complex. KPI has forged a strategic partnership with Basell International Holdings B.V – which will be sharing relevant technologies with the new enterprise. In March 2008, Tengizchevroil signed a contract pledging the supply of around 6–7 bcm of gas for the proposed enterprise.¹²¹ The complex may also process gas from Aktoty, Kairan, Kalamkas and Kashagan fields. In the next ten years these volumes could increase considerably. According to Kazakhstan’s Ministry of Energy and Natural Resources, by 2017 the domestic petrochemical industry could require around 20 bcm of gas, 7.6 bcm of which will be used for the ethane output. However, it is unclear how KPI will deliver petrochemical products to external markets let alone secure such large volumes of associated gas from Caspian producers. Although in July 2005, under a memorandum of understanding, Agip KCO promised to supply 3 bcm of gas a year to KPI, it remains to be seen whether the new Kashagan consortium will deliver this volume under its new project strategy, introduced in 2008.¹²² In any case, future Caspian gas volumes will very much depend on how much gas is to be reinjected into the reservoirs at Tengiz and Kashagan.

It is important to note that the 2005 petrochemical production strategy of Kazakhstan is based on gas prices of \$25–45 per 1000 cubic metres.¹²³ However, it is unclear how the recent volatility of export prices will affect the prospects of Kazakhstan’s petrochemical sector.

3.3 External Markets

3.3.1 Russia

As described earlier, Central Asian gas has traditionally been supplied to external markets via the Russian territory and has played an important role in the Russian gas balance in terms of both domestic consumption and exports. Thus, Central Asian gas plays an important role in Russia’s gas export strategy in relation to Ukraine¹²⁴ and Europe.¹²⁵ In 2007, nearly the entire volume of Kazakhstan’s total exports of around 8 bcm ended up in Ukraine.¹²⁶

¹²⁰ Joint Stock company, Kazakhstan Petrochemical Industries, is jointly controlled by the national oil and gas company Kazmunaigaz (50%) and Sat & Company (50%). Source: Kazakhstan Stock Exchange, October 2007. Kazmunaigaz intends to increase its share in KPI to 75%.

¹²¹ *Oil and Gas of Kazakhstan*, no. 3, 2008.

¹²² See the section on Kashagan in Part Two of this study.

¹²³ Source: *General Plan of Kazakhstan’s Petrochemical Industry Development*, Nexant ChemSystems, July 2005.

¹²⁴ The issue of Central Asian gas exports to Ukraine is thoroughly explored by Simon Pirani in *Ukraine’s Gas Sector*, Oxford: Oxford Institute for Energy Studies, June 2007.

¹²⁵ Gazprom’s European strategy is examined by Jonathan Stern in *The Future of Russian Gas and Gazprom*, Oxford: Oxford University Press, 2005.

¹²⁶ In 2006 Russia also exported 36.5 bcm from Turkmenistan and 4.77 bcm from Uzbekistan. See Pirani, op.cit., p. 28.

In conditions of falling domestic gas output from existing fields and logistical, geological and technological challenges associated with the development of new fields, the Russian gas company, Gazprom, has taken a number of steps to secure additional gas volumes from Central Asian suppliers on the basis of long-term contracts.¹²⁷

In April 2003, Russia and Turkmenistan signed a long-term gas agreement in relation to gas volumes which Turkmenistan will be supplying to Gazprom from 2003 to 2028. Turkmenistan pledged to increase its annual gas supplies to Russia from 60–70 bcm in 2007, to 63–73 bcm in 2008 and to 70–80 bcm in 2009 and thereafter.¹²⁸

Earlier, in 2002, Gazprom signed a long-term agreement with Uzbekneftegaz covering the period of 2003–2012. Under its terms, the Uzbek side would supply Russia with 10 bcm of gas a year starting in 2005. At present, Uzbekistan produces about 13 bcm of gas per annum. However, this figure could double by 2012–2013, when the Kandym–Khauzak–Shady–Kungrad gas fields (500 bcm) reach annual production levels of over 11 bcm (from the initial 3 bcm).¹²⁹ The entire volume of gas from these fields is projected to be exported via the existing pipeline network route to Russia. Moscow also aims to build an additional 20-30 bcm pipeline from Uzbekistan via Kazakhstan to Russia.¹³⁰ However, it is not clear when this pipeline project will be implemented.

In 2006 Kazakhstan transported, via the traditional Russian route, 7.9 bcm of its own gas, in addition to 42 bcm of gas from Turkmenistan and around 9 bcm of Uzbek gas. According to preliminary Kazmunaigaz estimates, Kazakhstan’s combined Caspian gas exports to Russia could reach 9.1–15 bcm per annum. Gas volumes from Turkmenistan and Uzbekistan could vary between 70–80 bcm and 10–21 bcm respectively. In relation to Turkmenistan, it is important to note that despite the 2003 agreement with Russia to supply 60–70 bcm of gas by 2007, Turkmenistan managed to export to Russia only 42–44 bcm in 2006–2007. Therefore, by 2020, combined annual gas exports from Central Asian producers to Russia could vary between 89 and 116 bcm. These projected export volumes are bound to face bottlenecks in the traditional export system until the Central Asia–Centre and Caspian Littoral pipelines are refurbished and expanded – which in any case will not create more than 100 bcm of transportation capacity out of Central Asia.

¹²⁷ According to the 2001 forecast of Kazakhstan’s Ministry of Energy and Mineral Resources, by 2015 Russia’s gas balance (export/import/domestic demand) will require an additional volume of Central Asian gas in the range of 150–170 bcm per year. *Oil and Gas of Kazakhstan*, No. 6, 2001.

¹²⁸ Stern, op. cit., p. 77.

¹²⁹ This group of fields is currently being developed under a PSA regime by a joint venture of Lukoil Overseas Holding Limited (a subsidiary of the Russian company Lukoil) (90%) and Uzbekistan’s national oil and gas company, Uzbekneftegaz (10%). Lukoil’s initial investments in the project have already doubled from \$1.5 billion to \$3.3 billion. Source: Lukoil Overseas Holding Limited.

¹³⁰ Press Release by Lukoil Overseas Holding Limited, 8 October 2007; “Russia, Uzbekistan to build gas pipeline”, *International Herald Tribune*, 02 September 2008.

Table 28: Gas exports to Russia from Turkmenistan, Uzbekistan and Kazakhstan’s Caspian fields (bcm), 2015

	Probable	Maximum possible
Kazakhstan (Caspian resources)	9.1	20
Uzbekistan	10	26
Turkmenistan	70	80
TOTAL	89.1	126

Source: Official data, author’s estimates

3.3.2 Chinese and European Markets

In 2006, China produced 58.6 bcm of gas, but gas demand grew at 21.6 % in comparison to its domestic production of 17.2 percent. By 2010, domestic demand in China is likely to be around 100 bcm, whereas the national gas production is forecast to reach 82–87 bcm.¹³¹

Over the past few years Beijing has been negotiating natural gas supplies from Russia, Central Asia and Myanmar (Burma). At present, it appears that most of China’s future pipeline gas imports will come from Myanmar (up to 10 bcm per annum), Turkmenistan (up to 30 bcm) and Kazakhstan (up to 10 bcm). Diversity in the number of potential pipeline gas suppliers to China gives Beijing an important leverage when negotiating gas import prices.

In the 2000s, European politicians have become concerned with the security of European gas supply, mainly due to a projected increase in European import dependence, surging demand in the Asia–Pacific region, reserve depletion within the OECD, political instability in the Middle East and Africa and the deteriorating political and geopolitical relationships between Europe and Russia.¹³²

Various scenarios and forecasts have been offered in relation to the growing EU dependency on imported gas. The EU forecasts that gas imports will make up around 80% of European demand by 2030 whereas IEA projections highlight gas imports reaching a 65% share of the OECD Europe gas portfolio within the same timeframe. These estimates, coupled with the Russian–Ukrainian gas crisis of January 2006,¹³³ have urged European politicians to focus on potential alternative gas suppliers, including Central Asian and Caspian producers.¹³⁴

¹³¹ For an overview of Chinese gas development, see Fridley, David 'Natural gas in China', in Stern, Jonathan (ed.), *Natural Gas in Asia: the Challenges of Growth in China, India, Japan and Korea*, 2nd Edition, Oxford: Oxford University Press: 2008.

¹³² See: Stern, Jonathan, *The New Security Environment for European Gas: Worsening Geopolitics and Increasing Global Competition for LNG*, Oxford Institute for Energy Studies, October 2006.

¹³³ See: Stern, Jonathan, 'The Russian–Ukrainian gas crisis of January 2006', *Oxford Energy Comment*, 16 January 2006, http://www.oxfordenergy.org/pdfs/comment_0106.pdf.

¹³⁴ Russia is by far the largest gas supplier to Europe having been responsible for about 25% of the total EU gas trade, whereas some parts of Europe are almost entirely dependent on Gazprom’s supplies. See Honoré, Anouk, *Future Natural Gas Demand in Europe*, Oxford Institute for Energy Studies, January 2006.

3.3.3 Pipeline Competition in 2007

In 2007 the competition for Central Asian gas intensified. In May, Russian President Vladimir Putin reached a provisional agreement with Turkmenistan, Kazakhstan and, subsequently, Uzbekistan on the construction of the Caspian Littoral gas pipeline. The Putin-initiated declaration stated that the four states will consequently sign an agreement on the modernisation of the existing gas transportation network and the construction of new export capacity for Central Asian gas. At the final press conference, the president of Turkmenistan, Gurbanguly Berdimukhamedov and his Kazakh counterpart, Nursultan Nazarbaev, stressed that the construction of the Caspian Littoral gas pipeline would not undermine the potential for the Trans-Caspian pipeline since there would be enough gas volumes available for all existing and proposed pipelines.¹³⁵ The May 2007 declaration stated that a specific agreement between Russia, Turkmenistan, Kazakhstan and Uzbekistan on the Caspian Littoral pipeline would be signed by September 2007. However, the main pipeline project participants, Russia, Turkmenistan and Kazakhstan only managed to reach an agreement on 20 December 2007 due to intense negotiations over export prices.

Meanwhile, in June–September 2007 the Central Asian backers of the May Declaration were also courted by the United States and China about alternative gas routes. In April 2007 Beijing reached an agreement with Kazakhstan on the construction of a gas pipeline to China, with Turkmenistan following suit in July.

In August 2007, the US Assistant Secretary of State for Economy, Energy and Business Affairs, Daniel Sullivan, visited Baku (Azerbaijan) and Ashgabat (Turkmenistan), to seek Central Asian co-operation on the Trans-Caspian gas pipeline. This high profile visit to Baku resulted in a \$1.7 million grant agreement between the US Trade and Development Agency and Azerbaijan's State Oil Company to conduct a feasibility study into the gas pipeline.¹³⁶ In Turkmenistan, Daniel Sullivan stressed that 'Nations should never be left with only one option—one market, one trading partner, one vital infrastructure link'.¹³⁷ So far, however, apart from the grant allocated to Azerbaijan, neither Turkmenistan nor Kazakhstan has received any additional funding from the USA in relation to this project.

Gazprom's spokesperson, Sergei Kupriyanov, stressed that the US–Azeri agreement would not affect Gazprom's plans. He emphasised that financing was provided by the US State

¹³⁵ Grib, Natalia et al, 'Utechka gazoprovodov: Rossiyu lishayut aziatskikh energonositelei', *Kommersant*, no. 149 (3725), 21 August 2007.

¹³⁶ 'U.S., Azerbaijan To Study Trans-Caspian Pipelines', *RFE/RL*, 16 August 2007, <http://www.rferl.org/featuresarticle/2007/08/ED7E990D-F4BC-41B9-91E0-69C269B7F002.html>.

¹³⁷ Mr Sullivan also added that 'Economic stability and independence, and prosperity come from having multiple outlets to the world—multiple sets of pipelines, multiple transport corridors, and multiple trading partners.' See: 'Turkmenistan and Its Emerging Opportunities: Speech at the Ak Altyn Hotel Conference Room', Remarks by U.S. Assistant Secretary of State Daniel Sullivan, Ashgabat, Turkmenistan, 14 August 2007, <http://turkmenistan.usembassy.gov/transcript20070814.html>

Department which, in his opinion, 'once again proves that the Trans-Caspian pipeline is a purely political project.'¹³⁸

The next section presents an assessment of these pipeline projects.

3.4 Pipeline Projects

In order to solve the aforementioned problem of bottlenecks within the existing pipeline export infrastructure, in May 2007 Russia, Turkmenistan, Kazakhstan and Uzbekistan reached a preliminary agreement on the modernisation of the Central Asia–Centre gas pipeline and the construction of the Caspian Littoral gas pipeline.

3.4.1 Central Asia–Centre Pipeline

The annual capacity of the Central Asia–Centre (CAC) trunk gas pipeline network needs to be expanded from the current level of 54.8 bcm to 100 bcm. The need for expansion is driven by the levels of deterioration of the network (as described in Part Two) and the projected increase of gas output from Turkmenistan, Uzbekistan and Kazakhstan. In 2004 Bateman Engineering N.V. concluded a feasibility study on the reconstruction and modernisation of the Central Asia–Centre gas pipeline network from 2004 to 2020. By 2012–2015, seven stages of the CAC upgrade are scheduled to be implemented:

- stage one (annual capacity: 51.5 bcm), at this initial stage, KazTranGaz has focused on the CAC-4¹³⁹ segment of the CAC pipeline network by reconstructing some of its sections and existing compressor stations;
- stage two (59.4 bcm), the CAC-4 pipeline looping is to be completed while a new plant is to be constructed at the Compressor Station (CS) Opornaya;
- stage three (66.5–80 bcm), the looping of CAC-2 pipeline and five new compressor plants will be built;
- stage four (86.3 bcm), modernisation of pipeline compressors on CAC-4;
- stage five (92.5 bcm), new plant will be built at the CS Makat;
- stage six (98 bcm), new compressor plants will be built at the Compressor Stations Opornaya, Beyneu, Sai-Utes;
- stage seven (100.2 bcm), construction of new pipelines within the CAC gas pipeline network.¹⁴⁰

¹³⁸ 'Russian Transit Monopoly in Central Asia Broken', *Kommersant*, 21 August 2007, http://www.kommersant.com/p796916/hydrocarbons_transport/.

¹³⁹ See Table 10 and 11 in Part Two of this Study.

¹⁴⁰ Source: Kazmunaigaz.

Kazakhstan intends to implement the CAC upgrade on its own (via Kazmunaigaz's subsidiary, KazTransGaz) as long as transit volumes of Turkmen and Uzbek gas do not exceed 60 bcm. KazTransGaz has already completed stage one of the CAC modernisation project.

Kazakhstan has stressed that it may seek to form a joint venture between KazTransGaz and Gazprom to increase the CAC capacity beyond 60 bcm per annum. Both companies will be equally represented in the new consortium which could also become an operator of the expanded CAC section. However, the new joint venture will not control any of KazTransGaz's existing gas assets, which include a substantial part of the CAC gas pipeline network.

Preliminary estimates put the CAC 80 bcm expansion at over \$2 billion. Further increase in the CAC throughput by 20 bcm (up to 100 bcm) will cost an additional \$1.1–1.5 billion. These initial estimates are no longer relevant as steel prices have multiplied fourfold in the past two years. The final costs would also depend on how Gazprom and Kazmunaigaz choose to handle this project, including the selection of sub-contractors and suppliers.

3.4.2 Caspian Littoral Gas Pipeline

According to the above-mentioned May Declaration, Russia, Turkmenistan and Kazakhstan aim to build a new 1700 km Caspian Littoral gas pipeline which will run from Turkmenistan (over 500 km¹⁴¹) along the eastern shore of the Caspian Sea into Kazakhstan (around 1200 km) then parallel to the Central Asia–Centre 3 pipeline which is also scheduled to be upgraded (see Map 2). The initial cost of building this new pipeline was estimated at \$1 billion. The Caspian Littoral pipeline (also known as the Pre-Caspian gas pipeline) will be built in two stages: at the initial stage (2009–2010), the pipeline will have an annual capacity of 20 bcm, of which Kazakhstan and Turkmenistan will contribute up to 10 bcm each. In future, this capacity could be increased further, depending on the availability of additional gas volumes from Central Asian producers. In terms of pipeline construction and gas production, the new Caspian project is to be handled by Gazprom of Russia, Kazmunaigaz of Kazakhstan and Turkmenneftegaz of Turkmenistan. Both Turkmenistan and Kazakhstan will be responsible for the construction of the Caspian Littoral pipeline sections within their territorial boundaries. In order to accommodate new volumes of Central Asian gas, Russia will expand the pipeline connection point of the Central Asia–Centre pipeline network at Alexandrov Gai. The construction of the Caspian Littoral gas pipeline is planned to commence in early 2009 and projected to be completed in 2010.

It is unclear whether the Russian gas transport system will have adequate spare capacity to receive additional volumes (about 40–50 bcm per annum) of Central Asian gas in 2010–2015. According to the Russian Ministry of Economic Development, the existing Russian gas transport system is inadequate even for exporting larger volumes of domestically produced gas. However, Valery Yazev, the chairman of the Russian Natural Gas Association and chairman of the Energy, Transport, and Communications Committee of the State Duma, is

¹⁴¹ These figures were released by Gazprom in July 2008, www.gazprom.com/eng/articles/article29535.shtml.

confident that Russia will expand the capacity of the gas transport system in time, 'The total capacity of our pipelines is to grow by nearly 30 billion cubic metres of gas, reaching 90 billion. That gas will come to Russia, and we will re-export it through Russian pipelines together with Turkmenistan and Kazakhstan.¹⁴² This suggests a future 90 bcm limit for Central Asian gas supplied to and via Russia.¹⁴³

Map 2: Caspian Littoral gas pipeline



Source: JSC Gazprom, 2008.

3.4.3 Trans-Asian Gas Pipeline Network

On 18 August 2007, Kazakhstan and China reached an agreement on the construction and operation of a new gas pipeline to China. This was followed by a further agreement (signed in November 2007) between Kazmunaigaz and CNPC. Provisional agreements envisaged that the Trans-Asian Gas pipeline network would consist of two trunk pipelines. The first (running through Southern Kazakhstan) will be a Kazakh section of the Turkmenistan–China gas pipeline. This particular pipeline will primarily rely on gas volumes from Turkmenistan

¹⁴² Martynov, Kirill, 'Cost of Victory', *Kommersant*, 29 June 2007.

¹⁴³ In September 2008 Russia announced its intention to build an additional 20-30 bcm pipeline from Uzbekistan via Kazakhstan to Russia. The pipeline will handle additional gas volumes from Uzbekistan and Turkmenistan. However, it is not clear when this pipeline will be built.

while the second is projected to run from the resource-rich Western Kazakhstan to Western China (see Map 3).

China is currently expanding the capacity of the first pipeline (4000 km) of the West–East gas pipeline network to 17 bcm. This pipeline runs from Lunnan in Xinjiang province to Shanghai carrying gas from China’s Tarim Basin reserves. By 2010, China seeks to construct the second West–East pipeline (6500 km) with an annual capacity of 30 bcm, running from Xinjiang to Guangdong province on the southern coast of the country.¹⁴⁴ The Turkmenistan–China and Kazakhstan–China pipelines will feed into China’s 2nd West–East gas pipeline. The rapidly growing and densely populated southeastern part of China is the main industrial centre of the country which will be responsible for the largest portion of China’s future gas demand.

3.4.3.1 Turkmenistan–China Gas Pipeline

The Kazakh section of the Turkmenistan–China gas pipeline will run from the Uzbek–Kazakh border to the border between China and Kazakhstan via the Kazakh city of Chimkent ending in Khorgos, in the Xinjiang Uygur Autonomous Province of China. The Kazakhstan–China pipeline is part of the Turkmenistan–China gas pipeline project running from Turkmenistan (188 km) via Uzbekistan (530 km) then through Southern Kazakhstan (1333 km) on to western China. The Turkmenistan–China trunk pipeline will consist of two parallel pipelines, each of 1067 mm in diameter, and five compressor stations. The transportation capacity of the Turkmenistan–China pipeline will be 30 bcm per annum. In 2007 the construction of the pipeline was estimated at over \$6.5 billion.¹⁴⁵ All the necessary investment will come from CNPC, which seeks to implement the construction of the pipeline by 2010.

China has also taken a number of steps to secure gas volumes (from Turkmenistan) adequate to fill the 30 bcm pipeline and ensure a safe transit through Uzbekistan and Kazakhstan. In April 2006, China and Turkmenistan signed an agreement on the Turkmenistan–China gas pipeline. Beijing also signed similar agreements with Uzbekistan (April 2007) and Kazakhstan (November 2007) in relation to the pipeline sections which run through their territories.

In February 2008, KazTransGaz (a subsidiary of Kazmunaigaz) and Trans-Asia Gas Pipeline Limited (owned by China National Oil and Gas Exploration and Development Corporation, a subsidiary of CNPC) formed a joint venture which will be the sole operator of the Kazakh section of the new Central Asia–China pipeline. Trans-Asia Gas Pipeline Limited has also

¹⁴⁴ China’s West–East gas pipeline was originally estimated to cost around \$20 billion and will have a total length (inclusive of the main part and eight branches) of 9,120 kilometres. The largest gas pipeline project in the world to date, it will run through 14 territorial units within China. The pipeline seeks to promote three issues: i) maintain China’s high economic growth rate, ii) slow down the environmental degradation (by using more gas instead of coal), iii) promote economic integration of the relatively poor autonomous provinces of Western China with the fast-growing and wealthier eastern provinces of the country. See: Keun-Wook Paik, *Sino-Russian Oil and Gas Cooperation: Half Empty or Half Full?*, forthcoming 2009.

¹⁴⁵ It is important to note that costs of almost all gas projects have increased considerably in the past 1–2 years.

formed joint ventures with relevant Uzbek and Turkmen gas companies to operate their respected sections of the gas pipeline.

The 2006 Chinese–Turkmen document focuses on securing gas supplies for the pipeline. Turkmenistan pledged to supply China with 30 bcm of gas per annum for a period of 30 years, starting in 2009. According to industry sources, in 2008 China reportedly offered to pay \$195/mcm for Turkmen gas.¹⁴⁶ However, the Chinese subsequently denied this press report.

In July 2007, CNPC and Turkmenistan’s state committee for oil and gas resources signed a production sharing agreement in relation to the development of gas reserves at Bagtyyarlyk on the right bank of Amu-Darya River in northeastern Lebap province of Turkmenistan. These gas reserves are estimated at 1.3 trillion cm.

In August 2007, Turkmenistan granted CNPC a license to develop new gas reserves at Bagtyyarlyk with the aim of supplying 17 bcm of gas to China annually, starting in 2009. The remaining 13 bcm of gas are projected to come from two older gas fields, Samandepi and Altyn Asyr, in the southeastern Mary province of Turkmenistan. According to Turkmenistan’s president, Gurbanguly Berdimuhamedov, the two fields will yield additional volumes of gas after new gas-processing facilities are installed. Gas fields in the Mary province have also traditionally been used to supply gas to Russia and Europe. Nevertheless, Gazprom’s main resource base here is the Daulatabad/Sovetabad field and not the mentioned Samandepi and Altyn Asyr fields which will feed into the pipeline destined for the Chinese market.

However, Turkmenistan’s plan to connect gas fields of Mary oblast to a potential Turkmenistan–Afghanistan–Pakistan–India gas pipeline could intensify the international competition for Turkmen gas resources, despite the relatively recent discovery of the giant South Yolotan, Osman and Yashlar fields.¹⁴⁷

To ensure additional gas supplies from Central Asia, Beijing is seeking to develop energy relations with Uzbekistan and Kazakhstan. In May 2007, China and Uzbekistan agreed to jointly develop the Mingbulak field in the Fergana valley. The second Central Asian gas pipeline to China, Western Kazakhstan–Western China (Beyneu–Bozoy–Kyzylorda–Chimkent), running only through Kazakhstan could also act as a guarantee for adequate Central Asian gas supplies to China.

¹⁴⁶ “China-Turkmen gas price seen setting new benchmark”, Reuters, 21 January 2008.

¹⁴⁷ See *Turkmenistan Gas Production and Export: the next 10 years*, OIES: forthcoming 2009.

Map 3: Turkmenistan–China (30 bcm) and Kazakhstan–China (10 bcm) gas pipelines



3.4.3.2 Western Kazakhstan –Western China Pipeline

The Beyneu–Bozoy–Kyzylorda–Chimkent gas pipeline will be 1480 km in length, 1016–1067 mm in diameter and will have a projected annual capacity of 10 bcm (29.61 mcm per day).

This pipeline project was first initiated in 2005 and has undergone a number of changes including the geographical route of the pipeline and its annual capacity. Initially, Kazakhstan and China were planning to build the pipeline along the 'central route': Atyrau (Makat)–Aktobe (Zhanazhol)–Chelkar–Atasu–Dostyk–Alashankou with an annual capacity of 30 bcm, which was projected to reach up to 40 bcm by 2015. Since then, the capacity of the pipeline has been decreased to 10 bcm due to economic reasons.

At first, complications and delays with the development of Kazakhstan's Caspian hydrocarbon resources (especially Kashagan) dented initial forecasts in relation to the Kazakh gas output, and thus affected the capacity of the planned pipeline. Second, the gas pipeline turned out to be unappealing for Chinese investors with its preliminary cost of US\$3.84 billion and the payback period of 30 years. Preliminary estimates also suggested that gas transported via this pipeline to the south of the country would cost almost three times as much as gas imported from Uzbekistan. The change of the 'central route' to the current one has probably been driven by two factors: access to a larger number of gas resources and the gasification problem in southern Kazakhstan.

Beyneu is far more important as a strategic starting point in comparison to the previously envisioned Atyrau in the north Caspian. Beyneu is located at the Central Asia–Centre gas pipeline network within geographic proximity to Kazakhstan's Caspian hydrocarbon fields.

Beyneu is also a connecting point to the Okarem–Beyneu gas pipeline (473 km) with access to the Caspian resources of Turkmenistan. The Okarem–Beyneu pipeline, feeding into CAC-3, has been modernised by Petronas. Its annual capacity is 10 bcm.

In June 2006 KazTransGaz and Petronas Carigali (Turkmenistan), an affiliate of Malaysia's Petronas Carigali Overseas, signed a memorandum of understanding on the transportation of natural gas from Turkmenistan via Kazakhstan. Petronas is developing several hydrocarbon fields in the Turkmen part of the Caspian with an estimated resource base of 1 trillion cubic metres. Total recoverable gas reserves of these fields are estimated to reach 545 bcm. In 2009 the Malaysian company aims to produce around 5 bcm of gas. By 2010 Petronas intends to build an onshore gas terminal which will feed its offshore gas into the Okarem–Beyneu line. Within the same period, the terminal's gas output is scheduled to reach up to 10 bcm per annum. Kazmunaigaz intends to buy Turkmen gas from Petronas and transport it to southern Kazakhstan and possibly China.

Bozoy, on the Aral Sea, is another strategic point on the proposed Western Kazakhstan–Western China pipeline. Aral gas resources of Uzbekistan are estimated at 0.5–1 trillion cubic metres. In August 2006 Uzbekistan signed a production sharing agreement with an international consortium of the national oil and gas holding Uzbekneftegaz (Uzbekistan), Lukoil (Russia), Petronas (Malaysia), CNPC (China) and two Korean companies, KNOC and steel manufacturer POSCO. All companies have an equal share of 20% in the consortium, apart from the Korean 20% stake which is divided between KNOC (10.2%) and POSCO (9.8%). The presence of CNPC and Petronas in the consortium could facilitate gas supplies from the Aral fields for the new pipeline; moreover, Uzbekneftegaz is also backing the idea of feeding Aral gas into the pipeline. Aral Sea gas production is scheduled to start by 2012 with a peak production level of about 25 bcm a year. Kazakhstan's own gas, from the hydrocarbon fields in Aktobe province, could also be allocated for the new pipeline project. It is important to note that China's main gas asset in Kazakhstan, the Zhanazhol field, is also located in Aktobe province.¹⁴⁸

Kyzylorda is the final important point on the proposed pipeline that could connect potential gas output from the Kumkol hydrocarbon fields at Akshabulak. The Russian company Lukoil and CNPC are jointly developing these resources, where gas production levels reached 119 mcm of gas in 2006. In September 2007 Lukoil and CNPC signed a strategic partnership agreement which could result in gas volumes from Kumkol going to China.

Apart from potential gas exports to China, the pipeline will help to solve the gasification problem in the central, eastern and southern parts of Kazakhstan, namely in the Kyzylorda, South Kazakhstan, Zhambyl and Almaty provinces and the former Kazakh capital of Almaty. Domestic annual consumption in this area is projected to reach 6-7 bcm by 2015, 8.5 bcm by 2020 and up to 10 bcm if a gas pipeline network is constructed in the Almaty province.

The proposed pipeline is a highly important interconnector pipeline linking the main gas routes of central Kazakhstan into a unified system which will provide Kazakhstan with great flexibility in supplying gas to different markets and also in terms of potential gas swap deals. It will seek to do so by first connecting the Central Asia–Centre and Bukhara–Ural gas trunk

¹⁴⁸ See Part Two of this study

pipelines. Second, according to Kazakhstan's agreement with Russia for supplying gas supplies from Karachaganak to the Orenburg gas-processing plant, the Central Asian country

is to build an interconnector pipeline between the Soyuz, Orenburg–Novopskov and Central Asia–Centre trunk pipelines. Once again, it is important to note that the new pipeline is also vital to Kazakhstan's prolonged efforts to supply Caspian gas to the industrial and urban centres in the southern part of the country.

Kazakhstan considers this pipeline to be an energy security project that will ensure Kazakhstan's domestic gas demand without the need to rely on imports. According to Prime Minister Karim Masimov, the government examined three options for financing this project, 'The first one is financing fully at the expense of the state. The second one is borrowing of funds by Kazmunaigaz, while the guarantor will be the state. And the third option is the possibility of a state-private partnership'.¹⁴⁹

In early November 2008 CNPC and Kazmunaigaz signed a preliminary agreement on the construction of the Western Kazakhstan-Western China gas pipeline which will supply 5 bcm of gas to China and around 5 bcm to Southern Kazakhstan.¹⁵⁰ It has been provisionally agreed that the pipeline construction will commence in 2010 and will be completed in two stages by 2015. It appears that initial Kazakh gas exports to China will rely on gas produced by CNPC at the Zhanazhol field.¹⁵¹ Kazakhstan and China are still yet to define how this pipeline project will be financed and implemented.

3.4.4 *Trans-Caspian Gas Pipeline*

Recent geopolitical developments involving Russia as well as the Middle East have renewed European and American interest in the Trans-Caspian gas pipeline (TCGP) system. The project, actively lobbied for by the United States in the 1990s, initially aimed to promote gas exports (up to 30 billion cubic metres per annum) from eastern Turkmenistan via a sub-sea pipeline and to the coast of Azerbaijan and on to Turkey. The pipeline was to be 1020 miles in length and was to cost between \$2–3 billion. The project was designed to accommodate 16 bcm of gas for the Turkish market and 14 bcm for European consumers. However, from the very beginning the project has been problematic to implement, despite two successful feasibility studies by Enron and Unocal, the 1999 gas agreement between Turkmenistan, Georgia, Turkey and Azerbaijan and the formation of PSG, an international pipeline consortium, which included the Bechtel Group, General Electric and Shell. Subsequently, the project became stalled and was finally abandoned, mainly because of a conflict between Turkmenistan and Azerbaijan over their gas share in the proposed pipeline and the division of Caspian hydrocarbon fields. Although in May 2001 both countries tried to resolve such differences, the pipeline project became embroiled in a dispute regarding an unclear legal

¹⁴⁹ Kazakhstan-Segodnya, 26 February 2008.

¹⁵⁰ 'Kazmunaigaz i CNPC dogovorilis' sotrunichat' po proektu stroitel'stva gazoprovoda Kazakhstan-Kitai, *Oil of Russia*, 05 November 2008.

¹⁵¹ 'Kazakhstan and China signed an agreement on the expansion of cooperation in the gas sector', *Xinhua News Agency*, 02 November 2008. On Zhanazhol see Part Two of this study.

status of the Caspian Sea, which in Soviet times was controlled by the USSR and Iran. The two countries never established a maritime border.

After the collapse of the Soviet Union, there were attempts by the littoral states to resolve the legal status of the Caspian Sea. However, negotiations have not been successful apart from a bilateral agreement between Russia and Kazakhstan on the division of the Caspian hydrocarbon fields, reached in 2002. Turkmenistan and Iran had initially denounced the Russian–Kazakh agreement as contravening the existing legal regime of the sea. However, Azerbaijan welcomed the deal.

Recently, renewed European and US interest in the Trans-Caspian pipeline has been associated with the Nabucco gas project, which was initiated in 2002 and has been actively promoted by the EU under its Trans-European Energy Networks initiative. The proposed 3300 km Nabucco pipeline is likely to run from Erzurum, Turkey to the Austrian gas hub at Baumgarten.¹⁵² At Erzurum, the Nabucco pipeline will be linked with the Tabriz–Erzurum gas pipeline and the South Caucasian gas pipeline, Baku–Tbilisi–Erzurum, which could also be potentially connected with the proposed Trans-Caspian gas pipeline. Nabucco is projected to carry initially 8–13 bcm of gas per year; by 2020, its gas volumes could reach up to 31 bcm per annum. In May 2008 the construction cost of the Nabucco pipeline was estimated at €7.9 billion (\$12.3 billion).¹⁵³

In 2004 the Nabucco Gas Pipeline International GmbH was formed by OMV (Austria), MOL (Hungary), Transgaz (Romania), Bulgargaz (Bulgaria) RWE (Germany) and Botas (Turkey), with each company holding a 16.67% share. The consortium is led by OMV. Since then, more companies have expressed an interest in joining the consortium, namely Gaz de France (France), the national oil company of Azerbaijan, and Kazmunaigaz (Kazakhstan).

Potential gas volumes for Nabucco could come from a variety of energy-rich countries, including Azerbaijan, Turkmenistan and Kazakhstan as well as Iran, Iraq and potentially other Persian Gulf producers. Current political instability in the Middle East has meant that gas volumes for Nabucco could only come from Central Asian suppliers. Kazakhstan could also become the key onshore harbour for Central Asian gas supplies for the updated Trans-Caspian gas pipeline (TCGP) project which could run from Aktau on the Caspian coast of Kazakhstan (by the Tengiz hydrocarbon field) to Baku, Azerbaijan. There, the TCGP will be connected to the South Caucasus gas pipeline which runs onshore from Baku via Tbilisi, Georgia to Erzurum, Turkey. The Kazakhstan section of the TCGP will also be connected at the port of Turkmenbashi to Turkmenistan's Caspian fields. TCGP's total length will be 1592 km which includes onshore sections in Kazakhstan (600 km), in Azerbaijan and Turkey, from Baku to Erzurum (692 km) and the offshore section at the bottom of the Caspian Sea (300 km). The pipeline will have a nominal capacity of 20 bcm, expandable to 30 bcm. Since its first initiation by the United States in the 1990s, the Trans-Caspian project has not seen much progress.

¹⁵² It is important to note that the actual starting point of the Nabucco pipeline will depend on the suppliers of gas.

¹⁵³ 'Nabucco pipeline cost rises to 7.9 bln euros', *Reuters*, 29 May 2008.

As an alternative to the Trans-Caspian submarine gas pipeline, other methods of delivering gas volumes from Kazakhstan and Turkmenistan have been suggested, namely:

- liquefied natural gas (LNG);
- compressed natural gas (CNG);
- gas-to-liquids (GTL).¹⁵⁴

These are discussed below.

3.4.4.1 Alternative Pipelines

There are several issues that make the construction of the Trans-Caspian and Nabucco pipelines problematic, namely competition from other projects, Russia's well-known opposition to these projects and towards Central Asia's involvement in them, as well as the unclear legal status of the Caspian Sea.

Table 29: Potential and future gas routes from Russia and CIS countries to Europe

<i>Project</i>	<i>Route</i>	<i>Length (km)</i>	<i>Capacity (bcm)</i>	<i>Completion date</i>
Caspian Littoral	Turkmenistan–Kazakhstan–Russia	510	20–30	2010–15
South Stream	Russia–Black Sea–Bulgaria	900	30	2012–15
Nabucco	Turkey–Bulgaria–Romania–Hungary–Austria	3300	15 (30)	2012–15
Trans-Caspian	Turkmenistan–Caspian Sea–Azerbaijan	1592	20 (30)	?

Source: IEA, OMV, Gazprom.

Gazprom and the Italian company ENI are planning to build the 900 km South Stream pipeline and signed a memorandum of understanding in this respect in June 2007. They plan to complete the pipeline in three years, once the EU has approved the project. The pipeline will run from the Russian Black Sea coast to Varna in Bulgaria and then in two directions: to Greece and southern Italy (southwestern route), and to Romania, Slovenia, Hungary, northern Italy and Austria (northwestern route). The pipeline's capacity is scheduled to reach 30 bcm of gas per annum. The combined potential length of the Nabucco and Trans-Caspian pipelines is 4300 km, whereas the combined Caspian Littoral route (from Turkmenbashi via CAC to the Russian border) is 1390–1700 km, depending on the route. This could potentially make the Russian-backed project economically more competitive in terms of length and perhaps construction costs (see Table 30).

¹⁵⁴ These projects are examined in *Gas Exports to Europe: Transportation Alternatives*, S.H. Lucas and Associates, Inc. 2007.

Table 30: Export pipeline projects

<i>Pipeline</i>	<i>Capacity (bcm)</i>	<i>Length (km)</i>	<i>Year</i>	<i>2008 export prices per 1000 cm (\$)</i>	<i>Suppliers</i>	<i>Transit</i>
CAC expansion	80–100.2	1,968	2012–2015	150–190	Turkmenistan Uzbekistan Kazakhstan	Uzbekistan Kazakhstan
Caspian Littoral	20–30	1390–1700	2009–2015	150–190	Turkmenistan Kazakhstan	Kazakhstan
Western Kazakhstan–Western China	10	1,480	2009–2012	195	Kazakhstan	None
Turkmenistan–China	30–40	2,051	2008–2010		Turkmenistan	Uzbekistan Kazakhstan
Trans–Caspian	28–32	1,592 to Turkey Hub	?	120–130	Turkmenistan Kazakhstan Azerbaijan	Kazakhstan Caspian Sea Azerbaijan

Note: Future export prices for Central Asian gas will depend on the volatility of oil markets.

Source: Gazprom, Kazmunaigaz.

3.4.4.2 *The Legal Status of the Caspian Sea*

Apart from its problematic economic viability, the proposed pipeline faces an uncertain legal status with regard to the Caspian Sea, which is yet to be determined by all five littoral states. Before the collapse of the USSR in 1991, there were only two Caspian littoral states: Iran and the Soviet Union. Although both signed bilateral treaties on the Caspian Sea in 1921 and 1940, they never established seabed boundaries or held any consultations regarding oil and natural gas exploration in the area.

The main problem today is whether to define the Caspian body of water as an inland lake or a sea. If it is indeed defined as a sea, then the Law of the Sea Convention applies. This designates that full maritime boundaries of the five littoral states (Azerbaijan, Kazakhstan, Russia, Turkmenistan and Iran) bordering the Caspian would be established and that the sea and sub-marine resources would be divided into national sectors. The Law of the Sea does not apply to inland lakes, in which case the Caspian would be developed jointly.

An agreement on the legal status of the Caspian Sea will require not only Russian but also Iranian consent; this is highly unlikely given the current state of Washington's relations with Teheran over the controversy concerning Iran's nuclear programme. Russia has already voiced its concerns about the possible environmental effects that the Trans-Caspian gas pipeline could produce in the region. Russia also demands that all Caspian countries should be consulted before the project commences, in which case Russia and Iran could stall the whole project.

Simultaneously, Azerbaijan and Kazakhstan must reach a consensus with Turkmenistan on the division of hydrocarbon resources in this area, which has been contested since the collapse of the Soviet Union. Although Kazakhstan signed a similar agreement with Russia in 1998 and with Azerbaijan in 2001, it has so far been unsuccessful in courting Turkmenistan in this respect. Other exotic pipeline routes through Afghanistan to India and Pakistan or via Iran (favoured by Kazakhstan) also appear to be hindered by political circumstances.

3.5 Non-Pipeline Alternatives: LNG, CNG, GTL

These three alternative concepts are based on the initial 20 bcm annual capacity of the Trans-Caspian gas pipeline.¹⁵⁵

LNG

As an alternative to the TCGP, this project would involve 14.6 million metric tonnes per annum (mmtpa) LNG production with an LNG train size of 5 mmtpa. LNG liquefaction would be conducted at the east Caspian port of Atyrau in Kazakhstan while a re-gasification plant would be built near Baku in Azerbaijan. The project would also require two gas pipelines with a total length of 1292 km: the first would run from North-Western Kazakhstan to Atyrau (600 km), while the second would start at Baku and end at Erzurum (692 km). In addition to the two pipelines and the two LNG plants, the project would involve eight ships to transport LNG over a marine distance of 300 km.

CNG

The Compressed Natural Gas project would have an annual capacity of 20 bcm and would require 12 CNG terminals (six on each side of the Caspian Sea). Each terminal would have a capacity of 3.3 bcm per year. The project would require a CNG compression plant at Atyrau, a CNG pipeline injection plant near Baku, the two pipelines mentioned above in the LNG case, approximately 24 ships to deliver CNG exports over the 300 km distance and a shipyard.

GTL

The Gas-to-Liquids project would target an annual capacity of 204 thousand barrels per day, equivalent to 20 bcm. GTL would be based on Sasol Chevron technology¹⁵⁶ and would involve six parallel 34,000 bpd trains. GTL production would be conducted in the northwestern part of Kazakhstan where LPG and Naphtha are already being produced. The transportation costs to Europe are estimated at \$8.73/bbl.

In terms of economic viability and commercial competitiveness, the Trans-Caspian gas pipeline remains a better option than the above-mentioned LNG, CNG and GTL alternative projects. The gas pipeline is the lowest cost project offering the highest net-back option ranging from \$89 to \$129 depending on gas prices in 2011 (\$260–300).

Nevertheless, the European Union considers alternative projects as a possible way of delivering Caspian gas to Europe without the threat of causing environmental damage, as

¹⁵⁵ *Gas Exports to Europe: Transportation Alternatives.*

¹⁵⁶ See: <http://www.sasolchevron.com/technology.htm>.

Russia is concerned about in the case of the Trans-Caspian pipeline. For this reason, in 2007 the European Commission conducted a Pre-Feasibility Study for Transport of LPG from Kazakhstan and Turkmenistan towards the EU.¹⁵⁷

The key obstacle to the construction of the Trans-Caspian gas pipeline involves the parties that will finance and build the project. At present, it is unclear who will take part. On the other hand, it is clear that the Caspian Littoral pipeline will be built by Turkmenistan, Kazakhstan and Russia, and that the Turkmenistan–Uzbekistan–Kazakhstan–China pipeline is to be fully financed by Beijing, giving Central Asian producers an incentive to supply their gas to their energy-hungry neighbour at a discount.

The price of \$195 per 1000 cubic metres of gas (which China allegedly offered to Turkmenistan in early 2008), is competitive with the price Turkey has been paying for Azeri gas or the 2008 Russian price of \$130–180 to Central Asian producers. However, the Chinese price situation is bound to be affected by the European price level paid by Russia for Central Asian gas in 2009, which will be driven by the volatility of oil markets. When assessing the economics of the Chinese route, it is important to view the project within the larger context of Beijing's relations with Turkmenistan, Kazakhstan and Uzbekistan. Apart from oil and gas pipelines, China and the Central Asian countries, especially Kazakhstan, are developing large-scale infrastructural projects, such as the construction and modernisation of railways and highways, aimed at boosting trade relations with Beijing.

So far Central Asian producers have only benefited from European attempts to secure gas volumes from the region. Kazakhstan, Turkmenistan and Uzbekistan have managed to come together to form common energy policies both in terms of the gas export routes and prices. Although the existing gas transportation network ensures mutual dependence between Central Asian producers and Russia, the growing Chinese and European interests in the region have boosted the bargaining position of Turkmenistan, Kazakhstan and Uzbekistan vis-à-vis Russia. All three countries have managed to secure new price deals with Russia's Gazprom.

¹⁵⁷ The study is a part of the project 'Regulation of Transport of Dangerous Goods along the TRACECA Corridor', <http://www.traceca-org.org/>.

4. Conclusions

4.1 *Kazakhstan's Gas Balance and Production Plans*

Over the past decade, Kazakhstan's gas sector has achieved impressive production growth, from 4.34 bcm in 1994 to 29.63 bcm in 2007 with the potential of exceeding 33 bcm in 2008. In the course of the past two years, the Ministry of Energy and Mineral Resources has offered several forecasts on Kazakhstan's gas production which vary between 60 and 80 bcm by 2015. Since 2006, its gas output has been growing at a rate of 4–5 bcm per annum. If domestic gas production maintains this pace, Kazakhstan could reach an output of about 70 bcm by 2015.

Table 31: Kazakhstan's projected gas production and demand, 2008-2015 (bcm)

	2008	2009	2010	2011	2012	2013	2014	2015
Production	33.7	38.9	42.6	43.2	43.9	45.1	53.3	61.5
Sales gas	16.6	18.9	21.0	23.6	25.0	27.2	29.0	32.6
Sales gas as proportion of total production	49%	49%	49%	55%	57%	60%	54%	53%
Domestic demand	10.4	11.9	13.3	15.3	16.0	18.3	18.9	19.7
Domestic demand as proportion of sales gas	63%	63%	63%	65%	64%	67%	65%	60%
Net export gas availability (Sales gas-minus demand)	6.2	7.0	7.7	8.3	9.0	8.9	10.1	12.9

Source: Ministry of Energy and Mineral Resources, September 2008

With production at Kashagan scheduled to commence in October 2013, Kazakhstan could come closer to the projected figure of 80 bcm by the end of 2015, providing Kashagan yields up to 10 bcm by that date. However, this seems highly unlikely, taking into account the project's complexity and continuous production delays. Kazakhstan is unusual in that sales gas – gas remaining for consumption after flaring, reinjection and losses – comprises only 45% of production. If that proportion remains constant up to 2015, then the amount of sales gas would rise to 31.5 bcm (from total production of 70 bcm), and in the best possible circumstances to 36 bcm (from total production of 80 bcm). The MEMR projections of September 2008 suggest the proportion of sales gas in overall production could increase from 45% in 2007 to 60% in 2013 (see Table 31). Although the Energy Ministry downgraded its earlier projections for overall gas production in 2015 from 70 bcm to 60 bcm, it still believes that sales gas volumes will remain at the same level of 30 bcm per annum. New technologies used at Tengiz and Kashagan are the likely explanations of the gradual increase of the proportion of sales in overall production. However, it is still unclear why the proportion of sales gas is to decline from 60% in 2013 to 53-54% in 2014-2015.

Any reduction in the levels of reinjection, and/or the levels of flaring, could produce further increases in the amount of sales gas available. However, there seems to be no clear indication

that reinjection can be reduced. The Kashagan consortium is expecting to reinject up to 55% of associated gas, leaving around 4.8 bcm per annum available for further use during the first five years of production (2013–18). Subsequently, around 90% of associated gas is forecast to be reinjected.

Kazakhstan hopes to end gas flaring by 2012. Flaring accounts for one-fifth of the gas counted as produced but not available for sale. In reality it could be more than that. But the government's success will depend on its ability to compel the oil producers to invest in the necessary infrastructure, and in this regard there is little cause for optimism unless domestic prices are raised sufficiently to provide commercial incentives for utilisation.

Assuming that Kazakhstan indeed has around 30 bcm of sales gas available in 2015, it seems likely that around 18 bcm of it could be available for export. Domestic consumption is increasing rapidly, as it is elsewhere in Central Asia, and is forecast to double from the current (2007-2008) level of 8-10 bcm to 15-19 bcm in 2015.¹⁵⁸ Net export gas volumes (sales gas minus demand) are also projected to double from 6.2 bcm in 2008 to 12.9 bcm in 2015 (see Table 31).

In 2007, 4.5 bcm of gas was imported, and these volumes are likely to increase, in line with the projected economic growth in southern Kazakhstan, and which case at least 5–6 bcm will be imported. A 10 bcm Western Kazakhstan–Western China pipeline could be the means to reducing Uzbek imports as it could supply up to 5 bcm of gas to Southern Kazakhstan (as well as 5 bcm to China) by 2015. China would have a serious impetus to help finance the project as long as it can secure essential gas supplies, either from its own company (CNPC) from the Zhanazhol field or from other contractually assured sources.

This implies that in 2015, 10-13 bcm of sales gas will be allocated to the domestic market, leaving 18-20 bcm for export (see Table 32). Of these volumes, it may be expected that 15 bcm/year will be sold to Russia, in line with preliminary agreements already reached. A further 5 bcm could go to China. If the Kazakhstan–China pipeline is not built by 2015, then extra volumes would be available for westward export. But unless and until a ‘fourth corridor’ emerges, in other words not likely before 2015, then these volumes would need to be transported via Russia.

¹⁵⁸ Data supplied by the Ministry for Energy and Mineral Resources of Kazakhstan, Kazmunaigaz and Institute for Economic Studies, Republic of Kazakhstan.

Table 32: Kazakhstan's Gas Balance, 2007 and 2015

	2007	2015
Gross gas production	29.63	61.5
Sales gas	13.4	28-33
Domestic demand	8.4	15-19
Imports	4.5	5-6
Export availability including:	7.6	18-20
commitments to Russia	7.6	15
commitments to China	-	5
available gas for additional export	-	trace

Source: Official data; author's estimates

4.2 Gas Utilisation and Domestic Demand

Low domestic gas prices offer both challenges and opportunities for fuelling the economic growth of burgeoning southern Kazakhstan as well as for the domestic petrochemical sector. Since Kazakhstan's strategy to develop the national petrochemical industry is based on low wholesale gas prices, substantial changes in the existing price regime could hinder such plans. Higher prices in external markets and an increase in exports could also mean inadequate volumes for the petrochemical sector, whereas lower prices could result in greater volumes of gas available for the industry.

It is so far uncertain whether Kazakhstan will opt for full-scale reform of the domestic gas market as planned in neighbouring Russia. The Kazakh government has not voiced any clear commitments toward reforming the heavily subsidised domestic market. However, state regulated prices, combined with long geographic distances between the fields and the markets, curtail the modernisation of the domestic gas networks as well as further gasification.

Domestic gas demand is projected to rise to 15-19 bcm/year by 2015, assuming that gas is being used in power generation in western Kazakhstan and consumption continues to increase in southern Kazakhstan. Successful implementation of plans to build a nuclear plant in western Kazakhstan could pave the way for large-scale nuclear industry development and free up more gas, but such plans are unlikely to make an impact before 2020. In order to meet growing consumption in southern Kazakhstan before then, construction of the West-South pipeline may become of crucial importance.

Kazakhstan's choices in terms of gas utilisation for petrochemical production and for the domestic energy market will therefore define the volume of gas available for export.

4.3 Gas Exports

At the moment, gas exports depend on one buyer, Russia, due to the way in which export pipelines were geographically laid out. The proposed expansion of traditional Russian routes (Central Asia-Centre and Caspian Littoral pipelines) depends on larger gas volumes from Turkmenistan and Uzbekistan. Construction of the Trans-Asian gas pipeline to China depends on Turkmen gas volumes becoming available, but also opens new opportunities for Kazakhstan in terms of linking all transit pipelines into a unified system. This might allow

Kazakhstan greater freedom in terms of gas swaps with different producers and gas deliveries to southern Kazakhstan – provided that the West–South (Western Kazakhstan–Western China) branch of the Trans-Asia gas pipeline network goes ahead as planned.

Potential growth of demand in Uzbekistan, which exports its gas to southern Kazakhstan, and historic interruptions in Uzbek imports could mean that Kazakhstan may try to limit gas imports from Uzbekistan.

The European Union, with the assistance of the United States, has also courted Turkmenistan as the key supplier for a potential Trans-Caspian gas export route to Europe and for the Nabucco project. Azerbaijan, Turkey and Iran could also play an important role in shaping new gas export routes from the Caspian and Central Asian region. However, the undefined legal status of the Caspian Sea, Russia’s resistance to the construction of the Trans-Caspian gas pipeline, and geopolitical uncertainty (mainly involving the Iranian aspect) currently undermine the possibility of implementing gas pipeline projects that will bypass Russian territory.

In terms of supplies to Europe, the Russo-Georgian conflict has further called into question the prospects for pipelines within the region. At present, it is possibly considered safer for Central Asian producers to ship gas to Russia and to China instead.

Future export prices for Central Asian gas will depend on the volatility of oil markets. Lower prices in external markets could make the Chinese route more competitive in relation to the Russian and planned European routes. Similarly, a potential rapprochement between the West and Iran could considerably change the energy game in the region and give a boost to alternative energy supplies to Europe as well as other exotic routes for Caspian and Central Asian oil and gas.

Because of its gas supply commitments to Russia, Kazakhstan might be unable to provide any substantial volumes of gas for European markets by 2015. This could change if (a) only the minimum amounts of gas are reinjected at Tengiz and Kashagan, and (b) China did not succeed in tying up extra volumes first. Moreover, until any ‘fourth corridor’ project is successfully completed, that is not likely before 2015, any exports to Europe would have to be transported via Russia.

Appendix One: Selected Kazakh Oil/Natural Gas Projects

Name of Field/Project	Project Partners	Estimated Reserves	Projected Investment	Project Status
Aktobe	CNPC Aktobemunaigaz (88%), (within Block ADA partners include Korean National Oil Corp (KNOC), LG International Corp, Vertom)	1.17 billion barrels of oil	\$4.1 billion	Producing 116,660 bbl/d of oil (2005), 69.6 Bcf/y of natural gas (2005)
Arman	Nelson Resources, Canada (50%), Shell (50%)	10.8 million barrels of oil	--	Produced 3,600 bbl/d of oil, 852 thousand cubic feet (mcf) of gas in 2005
Emba	Kazakhoil–Emba (Kazmunaigaz subsidiary) 51%, MOL Rt, Vegyepszer (Hungary) combined 49%	500 million barrels of oil	--	Producing 57,700 bbl/d of oil (2004); produced 3.1 Bcf of natural gas (2004)
Karachaganak	Karachaganak Integrated Organization (KIO): Agip (Italy) 32.5%; BG (U.K.) 32.5%; Chevron (U.S.) 20%; Lukoil (Russia) 15%	2.3–6 billion recoverable barrels of oil & gas condensate reserves; 16–46 Tcf of recoverable natural gas reserves	\$4 billion for Phase Two (completed in 2004)	Producing 202,900 bbl/d, 1.1 mmcf/d natural gas (2005), 70% of oil exported through CPC
Karakuduk	Lukoil	Total estimated proved plus probable reserves of approximately 63 million barrels	\$190 million through 200 with \$170 million expected between 2006–2010	Producing 10,076 bbl/d of oil; produced 4.8 mmcf/d natural gas (2005)
Karazhanbas	Nations Energy	400 million barrels of oil	\$250 million since 1997, \$120 million in 2005	Producing 44,800 bbl/d (2005), (80–90 thousand bbl/d planned in next 2 years); produced 1.8 mmcf/d natural gas (2005)
Kashagan	Agip Kazakhstan North Caspian Operating Company (Agip KCO) (formerly OKIOC): Eni, Total, ExxonMobil, and Shell (18.52%), ConocoPhillips (9.26%), Kazmunaigaz (8.33%), Inpex (8.33%)	9 billion to 13 billion recoverable (up to 38 billion probable)	Originally priced at \$29 billion but estimates put final total approaching \$50 billion	Production starting no sooner than 2009 (initial production slated for 75,000

				bbl/d, max 1.2 million bbl/d by 2013)
Kazgermunai	Petrokazakhstan (25%), Kazmunaigaz 50%	100 million barrels of oil	\$300 million	Produced 37,300 bbl/d of oil; 32 mmcf/d of natural gas (2005)
Khvalinskoye	Kazakhstan and Russian JV	400 million barrels of oil 12.3 trillion cubic feet of natural gas	\$3.5 billion for petrochemicals plant.	Field is located on the Kazakh–Russian border in the Caspian Sea and is Russia's jurisdiction
Kumkol (North)	Turgai Petroleum: Petrokazakhstan (50%), and Lukoil (Russia)	97–300 million barrels of oil	--	Producing 60,000 bbl/d of oil, 18.3 mmcf/d of natural gas (2005), Legal dispute between PKZ and Lukoil has stopped production in the past
Kumkol South and South Kumkol	PetroKazakhstan Kumkol Resource (PKKR), wholly owned by PetroKazakhstan	116 million barrels of oil		Producing 62,000 bbl/d of oil, 18.1 mmcf/d of natural gas (2005); Development of export pipeline infrastructure will allow for production growth
Kurmangazy	Kazmunaigaz (50%), Rosneft/Zarubezhneft (50%). Total will receive equity stake in Kazmunaigaz's share.	2.2–8.8 billion barrels of oil	--	Russia and Kazakhstan recently agreed to PSA; Start date of 2009, Rosneft reports first assessment well drilled yielded disappointing results
Mangistau	Mangistaumunaigaz (Kazmunaigaz subsidiary)	1.4 billion barrels of oil	--	Producing 113,200 bbl/d of oil, 33.3 mmcf/d of natural gas

				(2005)
North Buzachi	Lukoil (50%), China National Petroleum Corp. (50%)	1 to 1.5 billion barrels of oil	Over \$800 million	Producing 15,000 bbl/d of oil, 4.5 mmcf/d of natural gas (2005), Accelerated development plan approved in 2004
Nursultan ('N' Block)	Possibly ConocoPhillips, Shell, Kazmunaigaz	4.65 billion barrels of oil		PSA negotiations expected to be completed during 2006
Satpayev	Kazmunaigaz, Oil and Natural Gas Corp. (ONGC)	1.85 billion barrels of oil		PSA expected to be signed in 2007
Tengiz	TengizChevroil (TCO): Chevron (U.S.) 50%; ExxonMobil (U.S.) 25%; Kazmunaigaz 20%; LukArco (Russia) 5%, discovered in 1979, agreement signed in 1993	9 billion barrels of oil	\$23 billion over 40 years	Producing 271,000 bbl/d of oil (2005); expected max production of 1 mill. bbl/d by 2012; produced 580 mmcf/d of natural gas in 2005
Tsentralnoye	Kazmunaigaz, Gazprom, Lukoil	N/A	N/A	PSA still being negotiated. Field is in Russian sector of Caspian
Uzen	Uzenmunaigaz (Kazmunaigaz subsidiary) 100%	147 million barrels of oil	--	Producing 127,000 bbl/d of oil (2004), 29.8 Bcf of natural gas (Jan–Sep 2004), 30% improvement from 2003 from advanced technologies

Source: EIA, 'Kazakhstan: Major Oil and Natural Gas Projects,'
<http://www.eia.doe.gov/emeu/cabs/Kazakhstan/kazaproj.html>.