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Energy Prospects in Yamalo-Nenets Autonomous Okrug

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INSROP International Northern Sea Route Programme

International Northern Sea Route Programme (INSROP)

Central Marine Research & Design Institute, Russia	The Fridtjof Nansen Institute, Norway	Ship & Ocean Foundation, Japan

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What is an INSROP Working Paper and how to handle it:

INSROP is a five-year multidisciplinary and multilateral research programme, the main phase of which commenced in June 1993. The three principal cooperating partners are **Central Marine Research & Design Institute (CNIIMF)**, St. Petersburg, Russia; **Ship and Ocean Foundation (SOF)**, Tokyo, Japan; and **Fridtjof Nansen Institute (FNI)**, Lysaker, Norway. The INSROP Secretariat is shared between CNIIMF and FNI and is located at FNI.

INSROP is split into four main projects: 1) Natural Conditions and Ice Navigation; 2) Environmental Factors; 3) Trade and Commercial Shipping Aspects of the NSR; and 4) Political, Legal and Strategic Factors. The aim of INSROP is to build up a knowledge base adequate to provide a foundation for long-term planning and decision-making by state agencies as well as private companies etc., for purposes of promoting rational decisionmaking concerning the use of the Northern Sea Route for transit and regional development.

INSROP is a direct result of the normalization of the international situation and the Murmansk initiatives of the former Soviet Union in 1987, when the readiness of the USSR to open the NSR for international shipping was officially declared. The Murmansk Initiatives enabled the continuation, expansion and intensification of traditional collaboration between the states in the Arctic, including safety and efficiency of shipping. Russia, being the successor state to the USSR, supports the Murmansk Initiatives. The initiatives stimulated contact and cooperation between CNIIMF and FNI in 1988 and resulted in a pilot study of the NSR in 1991. In 1992 SOF entered INSROP as a third partner on an equal basis with CNIIMF and FNI.

The complete series of publications may be obtained from the Fridtjof Nansen Institute.

ENERGY PROSPECTS IN YAMALO-NENETS AUTONOMOUS OKRUG.

INSROP III.07.7

1 INTRODUCTION

The project was initialised and formulated on the basis of INSROP Phase one *results. The* INSROP reports III.7.3 – III.7.5 documented the potential for ice-classified tankers for shipments of oil products, condensates and crude oil from the Northern Regions by use of the Northern Sea Route.

Energy Projects in Russia face both internal domestic and external foreign competition. This applies to capital allocation as measured by the attractiveness and return on investments, the various risks associated with the project, the logistics framework surrounding the transportation, and the demand and supply on world markets.

Domestic Russian prices have approached world market price adjusted for internal transportation. Since the breakdown of the Soviet Union, we also have seen that Russian energy companies invest abroad and take active part in exploration and production in foreign countries. We thus have seen a development were also domestic Russian companies are faced with the rule of the market, and actively have to assess whether to allocate capital to develop the domestic portfolio, or seek other markets to which market entry for crude oil easier can be facilitated. In this scenario where also the Russian investor act to maximise returns on invested capital, one need to evaluate the Russian market comparatively to other regions and markets.

World oil production has grown steadily over the last 25 years. A slight dip occurred in the early 80ies as the Iran - Iraq war took place, and a co-ordinated OPEC effort to limit supply and raise prices succeeded. The effort led to a short to medium run price equilibrium of around USD 30 per tonne. The price effect coupled with technological advances lead to a significant boost for upstream exploration & production activities (E & P) world-wide, both on - and offshore. Today's world production is mainly a result of this increased E & P activity, and a consequence of efforts to reduce the dependence on the Middle East as a supplier. Other regions were thus allocated capital and focus, and the degree of regional supply of energy that has taken place, will be commented.

From the table below, we see that over the 11 years period total crude oil supply has increased with 14,3 percentage points from 2,94 to 3,36 Billion tonnes. In a period of continuous growth, the most notable feature is the decline in the production of the Former Soviet Union by 43 % and North America with 6 %. In terms of growth we see that both Europe and South & Central America about doubles production and increase with about 100 million tonnes each, Africa with slightly less and Asia Pacific with 23 %.

CRUDE OIL MARKETS, PRODUCTION 1986 - 96 (MILL MT)											
Oil Production	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Total North America	706	701	698	665	656	671	665	654	649	647	661
Total S. & C. America	203	200	210	212	230	242	248	257	272	294	314
Total Europe	214	219	217	211	217	228	244	257	301	312	328
Total Former Soviet Union	615	625	624	610	571	516	451	402	364	355	353
Total Middle East	644	637	748	801	862	837	910	946	961	968	983
Total Africa	262	260	274	296	321	332	333	332	333	340	360
Total Asia Pacific	296	299	303	312	323	332	332	335	344	350	364
TOTAL WORLD	2 940	2 942	3 074	3 108	3 180	3 158	3 183	3 182	3 224	3 266	3 362

Source : BP Energy Statistics 1997

However, although a reallocation of capital and effort has taken place, there is no way around the dominant long run position of the Middle East. After the Iran-Iraq war ended, the Middle East has doubled its production, which in absolute terms that means 340 million tonnes over the period. Subtracting the decline in the Former Soviet Union and North America of 307 million tonnes, the Middle East has captured about 50 % of the actual world

supply increase. In terms of reserves to production ratio, the Middle East is able to produce for another 90 years on its current proven reserves. Europe as a region for comparison, has only reserves for only 8 years.

3 WORLD CRUDE OIL CONSUMPTION 1986 – 96

The regional consumption pattern only partly follows allocation of capital and the production pattern. The two most significant patterns related to consumption is the reduction in the Former Soviet Union from 418 to 197 million tonnes, a reduction of 53 %. Secondly the growth in Asia pacific of 361 million tonnes, a net increase of 69 % over 11 years.

CRUDE OIL MARKETS, CONSUMPTION 1986 - 96 (MILL MT)											
Oil Consumption	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Total North America	878	898	934	941	927	911	928	937	966	955	986
Total S. & C. America	157	162	167	168	167	169	176	179	187	195	204
Total Europe	688	691	700	700	710	710	712	712	711	724	740
Total Former Soviet Union	418	420	415	413	418	398	348	277	236	217	197
Total Middle East	147	151	151	156	165	169	172	176	183	189	191
Total Africa	81	84	88	92	94	95	97	100	102	106	110
Total Asia Pacific	524	541	583	617	653	681	727	755	807	848	885
TOTAL WORLD	2 893	2 947	3 037	3 087	3 134	3 134	3 161	3 136	3 192	3 235	3 313

Source : BP Energy Statistics 1997

In terms of crude oil consumption, this is normally closely correlated to general economic growth as measured by Gross Domestic Product. If we correlate economic growth as measured by GDP in the Economic Area of the members of the Organisation for Economic Co-operation and Development (OECD), versus the crude oil consumption of the same area, the GDP explains 0,987 of crude oil consumption. The relationship for single countries like South Korea is 0,977, whereas the linkage for Japan is somewhat weaker (0,79) but still significant. For Japan this could indicate a relative shift towards other energy bearers, like nuclear power and natural gas.

Correlation between Economic Growth & Crude Oil Consumption 1990 - 1997									
Billion USD & Million Tonnes	1990	1991	1992	1993	1994	1995	1996	1997	R2
OECD GDP	16 941			17 513	18 001	18 407	18 936	19 472	0,987
OECD Oil Consumption	1919,1	1926,6	1974,1	1984,3	2039,4	2046,2	2104,2	2130,6	
South Korea GDP	254			308	334	364	390	411	0,977
South K Oil Consumption	49,5	59,9	72,3	79,3	87,0	94,8	101,4	105,9	
Japan GDP	2 970			3 124	3 144	3 191	3 316	3 345	0,786
Japan Oil Consumption	247,7	252,1	258,5	252,7	268,4	268,6	269,9	266,4	

Source : BP Energy Statistics 1998, OECD GDP Statistics 1998

The world balance and imbalance regions in terms of crude oil, determines the potential and need for interregional trade movements, either by ship or pipeline transport. By subtracting regional consumption from production one arrives at the balance level for the individual region. Regions in balance and thus net exporters of crude oil, are the Middle East with a surplus of 793 million tonnes, Africa with 249 million tonnes, and most noteworthy the Former Soviet Union, that although experiencing a massive decline in production, saw consumption reduced at even faster pace.

Contrary to common belief, the FSU has increased its exports from a low in 1992 of 104 million tonnes to 156 million tonnes by 1996. The relative importance and future role of the Former Soviet Union and in particular Russia, Kazhakhstan and Azerbadjan as world market exporter will not be reduced, rather to the opposite.

CRUDE OIL MARKETS, BALANCE & IMBALANCE REGIONS 1986 – 96											
Balance Regions	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Total Middle East	497	486	597	645	697	667	737	770	778	779	793
Total Africa	181	176	186	204	227	237	236	233	232	234	249
Total Former Soviet Union	197	205	209	197	152	118	104	125	128	138	156
Total S. & C. America	46	38	44	45	63	74	71	78	85	99	110

Source : BP Energy Statistics 1997

Imbalance regions could basically be described as the industrialised world defined by membership in Organisation for Economic Co-operation and Developments (OECD). OECD is concentrated in North America, Europe and the Far East & Oceania. The net import by OECD as measured by the United States, Western Europe, Japan and Rest of OECD Pacific (Australia, New Zealand and South Korea) are shown below.

Imbalance Regions	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Total North America	-172	-197	-236	-275	-271	-240	-264	-284	-317	-309	-326
Total Europe	-473	-472	-483	-489	-493	-483	-468	-455	-410	-412	-412
Total Asia Pacific	-228	-241	-280	-305	-330	-348	-395	-420	-463	-498	-522

Source : BP Energy Statistics 1997

However, the Asian deficit of 522 million tonnes is so large that, neither Japan, South Korea, Australia or New Zealand can account for this alone, especially when taking into account the

growth of the Chinese and South East Asian countries in the period evaluated.

EU US, R OECD PACIFIC & JAPAN (OECD - ROW) IMPORT 000' TONNES

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
USA	301 013	310 972	360 518	399 309	399 658	387 956	392 786	429 236	444 623	439 743	468 076
Western Europe	462 201	412 455	472 409	485 604	488 044	506 469	513 838	517 822	489 986	476 392	474 998
Japan	206 153	205 406	219 697	226 519	239 117	245 242	264 214	264 264	279 452	277 908	283 087
R OECD Pacific	60 600	62 800	69 900	76 600	85 900	95 800	108 200	117 200	126 400	135 800	142 900

Source : BP Energy Statistics 1997

It is thus necessary to decompose the Asian deficit further both to obtain a correct picture. This is necessary to determine markets that experience growth, which is necessary to develop new exports. As can be seen by the tables below, China is the major producer of crude oil, followed by Indonesia, Malaysia and Australia.

PRODUCTION BY MAJOR ASIAN ECONOMIC NATION

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
China	130,7	134,1	137,1	137,6	138,3	141,0	142,0	144,0	146,1	149,0	158,5
Indonesia	67,9	67,4	65,0	69,2	71,9	78,3	74,1	74,3	74,3	73,9	77,2
Malaysia	24,2	24,0	26,1	28,3	29,9	31,1	31,7	31,1	31,7	34,0	34,1
Australia	25,8	27,4	26,0	24,5	28,4	26,9	26,5	24,9	26,9	25,4	27,0

Source : BP Energy Statistics 1997

In terms of consumption China is also the major consumer, followed by Indonesia. Important to note is the accumulated growth of the medium sized Asian economies with no or minute domestic production. Alongside China they all contribute significantly to growth world demand in crude oil over the period covered.

CONSUMPTION BY MAJOR ASIAN ECONOMIC NATION

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
China	100,0	105,3	110,2	112,3	110,3	117,9	129,0	140,5	149,6	160,7	172,5
Indonesia	22,1	24,1	25,2	26,9	31,0	32,4	35,2	37,7	37,0	39,2	42,9
Thailand	11,3	12,8	14,5	17,0	19,6	21,4	23,6	26,8	29,8	34,8	38,0
Australia	28,2	28,7	29,9	31,1	31,6	30,8	30,9	32,7	34,0	35,3	35,7
Taiwan	19,2	20,2	23,6	26,1	26,9	27,8	28,6	30,5	32,4	35,4	35,3
Singapore	13,9	14,2	16,5	18,9	19,5	19,9	21,0	22,3	26,0	27,0	26,7
Malaysia	9,4	9,6	10,1	10,9	13,0	13,9	14,0	15,6	17,4	17,9	18,5
Philippines	7,8	9,1	9,8	11,0	11,5	11,1	13,7	14,1	14,9	16,8	17,5
Pakistan	8,2	8,9	9,6	10,3	10,7	11,4	12,4	13,5	14,5	15,1	17,1

Source : BP Energy Statistics 1997

In terms of balance – imbalance the following Non – OECD Asian picture is established.

Indonesia as major producer has experienced increased production in the period, maintains a positive balance, although at declining rates, whereas Malaysia is at status quo.

Asia Oil balance Nations 1986 -96											
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Indonesia	45,8	43,3	39,8	42,3	40,9	45,9	38,9	36,6	37,3	34,7	34,3
Malaysia	14,8	14,4	16,0	17,4	16,9	17,2	17,7	15,5	14,3	16,1	15,6

Source : BP Energy Statistics 1997

In terms of imbalance, the most notable fact is that China develops a deficit over the period from surplus of 31 million tonnes to a deficit of 14 million tonnes, a net import change of 45 million tonnes. Also that Pakistan, Philippines, Singapore, Taiwan and Thailand all have significant import volumes over the period. These are obviously major growth markets in terms of energy, and primarily crude oil imports as shown here.

Asia Oil Imbalance Nations 1986 -96											
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Australia	-2,4	-1,3	-3,9	-6,6	-3,2	-3,9	-4,4	-7,8	-7,1	-9,9	-8,7
China	30,7	28,8	26,9	25,3	28,0	23,1	13,0	3,5	-3,5	-11,7	-14,0
Pakistan	-8,2	-8,9	-9,6	-10,3	-10,7	-11,4	-12,4	-13,5	-14,5	-15,1	-17,1
Philippines	-7,8	-9,1	-9,8	-11,0	-11,5	-11,1	-13,7	-14,1	-14,9	-16,8	-17,5
Singapore	-13,9	-14,2	-16,5	-18,9	-19,5	-19,9	-21,0	-22,3	-26,0	-27,0	-26,7
Taiwan	-19,2	-20,2	-23,6	-26,1	-26,9	-27,8	-28,6	-30,5	-32,4	-35,4	-35,3
Thailand	-11,3	-12,8	-14,5	-17,0	-19,6	-21,4	-23,6	-26,8	-29,8	-34,8	-38,0

Source : BP Energy Statistics 1997

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5   CRUDE OIL TRADE MOVEMENTS.

As we can see from the previous tables and the import – export matrix below, the Middle East is the primary exporter with 900 million tonnes, followed by the Soviet Union with 168 million tonnes (top to bottom). In terms of imports (left to right) the United States is the largest importer with imports of 490 million tonnes, closely followed by Western Europe with 466 million tonnes and Asia Pacific (excluding Japan & China) with 430 million tonnes. From the matrix we can observe that imports are more evenly spread by regions, as previously mentioned by the OECD + China and South East geographic scope, than exports.

TOTAL WORLD INTER-AREA TRADE MOVEMENTS IN CRUDE OIL 1997 (Mill Tonnes)

	USA	Western Europe	Other Asia P	Japan	Central Europe	S. & C. America	China	Africa	Others	Total Exports
Middle East	86,9	187,9	294,4	218,1	19,3	27,8	16,7	32,0	17,6	900,7
F Soviet Union	0,6	90,8	4,8	0,4	31,8	2,2	4,0	0,5	32,5	167,6
S & Cl America	132,1	11,6	3,8	0,2	-	-	1,1	1,3	8,3	158,4
West Africa	68,3	40,1	23,0	1,4	0,1	14,2	5,2	0,9	1,2	154,4
North Africa	15,6	97,9	4,4	1,2	4,0	1,5	-	4,3	6,3	135,2
Others	186,1	37,3	41,7	62,2	10,1	17,1	32,3	9,6		462,6
Total Imports	489,6	465,6	372,1	283,5	65,3	62,8	59,3	48,6	132,1	1978,9

Source : BP Energy Statistics 1998

In terms of regional patterns, the matrix illustrates the point of regional preferences, but also that of diversification quite well. The United States imports are dominated by the South & Central American production, followed by the Middle East and the African West Coast. Canada and Norway are also important suppliers for the United States, although they do not appearing in the matrix. The United States thus have a fairly well diversified import, with manageable political supply risk towards the Middle East. The major leverage of the Middle East is that of supply effect on prices, not on the physical delivery.

Western Europe is clearly more tilted towards the Middle East as a supplier than the United States, but also imports significant volumes from both North and West Africa. Obviously geographic proximity, the sources itself, and a long tradition of Europe's British, Dutch and French vertically integrated companies operating in these markets, are important factors. One should note that the Former Soviet Union is on par with North Africa in importance and

is likely to remain so, Western Europe being the most important market for the FSU.

Asian import is totally dependent on the Middle East as a supplier, and clearly does not pay the same attention to regional supply diversification as does the United States and Western Europe. Transportation cost could obviously be a factor of importance, as probably is the lack of large vertically integrated oil majors. The observed supply diversification of both the United States and Western Europe is also a function of controlling the crude oil value chain from Exploration, Production and Transportation by Proprietary Fleets or long charters to home markets for refining and distribution. As Western Europe's resource base is dwindling, obviously companies must be international in operations if they are to survive as entities.

The Asian economies with less of a history in oil, and with a much steeper learning curve, first had to develop the domestic markets for refining and consumption. With the exception of China, Indonesia and Malaysia it thus a question of reverse integration upstream along the value chain through their purchasing power. In terms of transportation, Asia is basically supplied by economies of scale imports by Very Large Crude Carriers (280.000 dwt +).

Reversing the view to the principal supply region, the Middle East, it is reasonably well diversified in terms of exports markets, and thus fairly well insulated versus demand side political pressure from one or more players. The natural counterpart to exercise significant demand side pressure on the region (OPEC) would have to be a concerted effort by the OECD.

6 LEVEL & DIRECTION OF RUSSIAN CRUDE OIL EXPORTS 1987-98.

6.1 RUSSIAN CRUDE OIL EXPORT - VOLUME

The level of total crude oil export of Russia varies somewhat depending on the source that is used. However the general picture is as previously commented. Russia follows the pattern of the whole of the Former Soviet Union during the period, not unexpected. The correlation between the Production of the FSU and Russia during the period is perfect match, R2 of 0,9997. The consumption pattern is identical, a correlation of 0, 993.

The Former Soviet Union : Production Consumption 1987- 97										
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Production	625,2	623,7	607,2	570,6	515,9	451,2	403,1	363,6	358,4	355,0	362,9
Consumption	420,2	414,6	413,4	418,3	398,2	347,6	277,0	236,1	216,9	196,5	198,6

Source : BP Energy Statistics 1998

The consumption in Russia levelled out in 1996 -97 at 128 million tonnes, Whereas the production increased for the first time since 1987, and stood at 307 million tonnes. The overall balance for the Russian Republic thus increased for the fourth year in a row, and stood at 179 million tonnes by the entry into 1998.

The Russian Republic : Production Consumption Balance 1987- 97										
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Production	569,5	568,8	552,2	515,9	461,9	398,8	354,9	317,6	310,8	302,1	306,9
Consumption	249,8	248,0	252,8	249,7	243,4	224,4	188,6	162,7	146,1	128,0	128,0
Balance	319,7	320,8	299,4	266,2	218,5	174,4	166,3	154,9	164,7	174,1	178,9

Source : BP Energy Statistics 1998

This accentuates the previous comments on the FSU and Russia's importance as an exporter identified by the import – export matrix in the previous chapter. However, the direction of export show that the FSU is not well diversified by regions, but heavily tilted towards the European markets (BP Energy Statistics 1997).

THE FORMER SOVIET UNION : DIRECTION OF CRUDE OIL EXPORT 1997											
W Europe	C Europe	Unident	Asia P	China	ROW	S & C A	USA	Africa	Japan	Canada	Total
90,8	31,8	30,0	4,8	4,0	2,3	2,2	0,6	0,5	0,4	0,2	167,6

6.2 RUSSIAN CRUDE OIL EXPORTS BY MODE 1998

Source : Russian State Customs Statistics 1998

Russian Crude Oil Export 1998 - by Mode

▣ Seaborne Export - Port   ■ Druzhba Pipeline

47 %   53 %
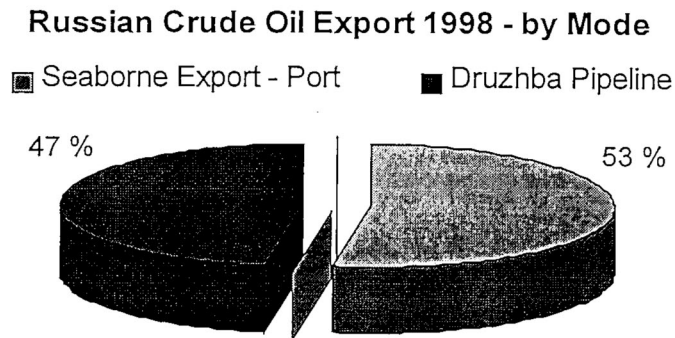
The explanation for the concentration in export markets is fairly logic and follows from the constraints of the former Soviet infrastructure. However, the first observation to be made is that Russia neither has allocated capital to, nor succeeded in, efforts to reduce its logistic dependence on the Soviet past. The pipeline grid and port structure left behind thus leave few alternatives for Russia. The annualised volume for September 1998 (State Custom Statistics Committee 98) indicates the current distribution between terminals and pipelines.

RUSSIAN CRUDE OIL EXPORT BY MODE : 1998
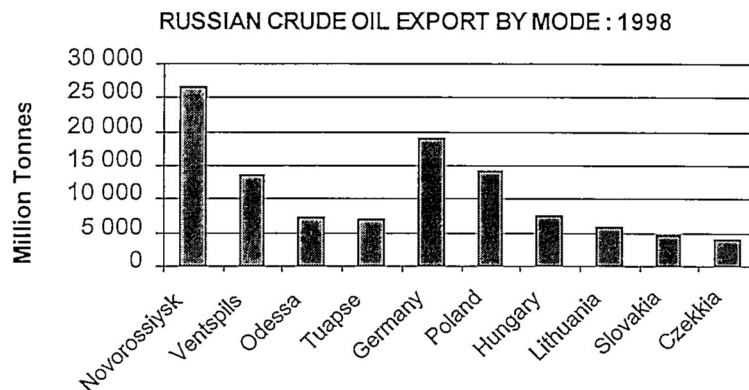
Source : Russian State Customs Statistics 1998

In terms of mode, 47 % of crude oil export is channelled through Druzhba (Friendship) pipeline to former Warsaw Pact members (plus Germany), whereas 53 % is seaborne directed over the seaborne export terminals.

Novorossiysk and Tuapse accounted for 33,5 million tonnes in 1998 (January - October

production annualised) compared to exports through Non-Russian ports of 20,7 million tonnes. The second observation is that the market economy and a functional working relationship between the Russian exporters and the countries Ukraine and Latvia is in place, as new ports or terminals on Russian territory not have been realised.

The Druzbha export is directed towards the market economies of scale and scope, and quite naturally Germany (the former East German connecting grid) is the largest recipient, followed by Poland, Hungary, Lithuania, Czhekkia and Slovakia. However, growth rates in consumption in Europe are not on par with North & South America nor the Asian Region as previously commented.

6.3 RUSSIAN CRUDE OIL EXPORT BY TRADE AREA & SHIPPING REGIONS.

Europe accounts for the majority of the Russian market allocation. Eastern Europe is the more important and imported about 40 million tonnes in 1998. The imports is by pipeline and do not generate shipping demand. Northwest Europe (NWE) imported about 32 million tonnes for which Germany alone represented 19 million tonnes. This also stems from Germany being tied into the pipeline grid in former East Germany. The remainder import to NWE is mainly by Aframax (80.000 -100.000 dwt) tankers out of Ventspils and the Black Sea. South - Southeast Europe in the Mediterranean area imported 13 million tonnes out of Novorossiysk and Odessa. The most notable part of Russian exports is the fact that 12 million tonnes were transatlantic allocation to the Virgin Islands (10,7), Bermuda (1,2) Bahamas and Cuba. The majority of this volume is out of the Black Sea for which the Bosporus constraits economies of scale applies, thus exports primarily by Aframax or part loaded Suezmax (120 – 180.000 dwt) tankers.

The major growth market, the Far and South East Asia received a meagre 400.000 tonnes and clearly indicates that Russia struggles, and for the foreseeable future will continue to struggle on logistics and infrastructure based on its current alternatives when it comes to serving new markets.

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6.4 RUSSIAN CRUDE OIL EXPORTS BY PRODUCER CATEGORY

By analysing Russian export by operators – producers' further patterns can be observed. The major success of the Russian State has been to reduce its role from an active Soviet style ubiquitous part, to play a minor active part in the external Russian crude oil trade. The crude oil and refining industry is completely dominated by the consolidation and formation of domestic Vertically Integrated Companies. Government thus exercises influence as regulator and through royalties, taxes, exports tariffs etc. To which degree its regulatory role has been successful, is another question that will be dealt with later.

RUSSIAN CRUDE EXPORT
By Producer Category and & Export Mode 1998
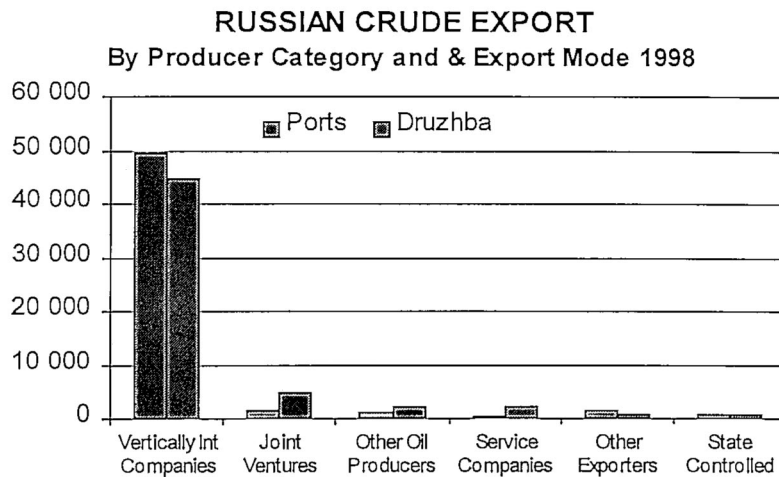
Source : Russian State Customs Statistics 1998

Joint Ventures as a group is the second largest exporter, about 6 million tonnes in 1998, other segments negligible. By choice of mode, and thus also markets, there is a reasonable split, but Joint Ventures are tilted towards pipeline direct into the European market.

Russian Export of Energy Products Million USD 1st Quarter 1998 vs 1997 (Annualised)			
	1998	% of Total	1997
Total Exports	70 448	100 %	82 439
To Outside CIS	53 697	76 %	65 972
To CIS	16 750	24 %	16 467
Energy Total	32 692	46 %	

Source : Russian State Customs Statistics - Interfax Newsagency 1998

The Russian export of energy products is by far the more important sector to the overall Russian Economy. It accounts for 46 % of the national revenue raised from exports. Of this the area outside the Commonwealth of Independent States, formed after the break up of the Former Soviet Union, generate 75 % of the Russian Foreign Exchange earnings. However, from the previous we remember that neither the volume of crude oil exported to Ukraine nor Kazhakstan in 1998 (10 million tonnes) comes close to accrue to 1/4 of the total. The explanation can be found in the volume of the natural gas exports and related direction.

7.1 RUSSIAN EXPORT OF NATURAL GAS 1997 – VALUE AND DIRECTION

In 1997 natural gas alone account for 25 % of the national revenue raised from exports, of which 37 % percent (9 % of the total) were generated in the CIS sphere (State Custom Statistics Committee 98).

Natural Gas, Mln m3	17 324	25 %	20 316
To Outside CIS	10 840	15 %	12 709
To CIS	6 483	9 %	7 607

7.2 RUSSIAN EXPORT OF NATURAL GAS 1998 – VALUE AND DIRECTION.

If we further break down the above-mentioned figures by the direction and value of annualised volumes (January – October 1998), it is clear that Ukraine dominates as a single country. 28,3 % of value of the overall, Germany second by 17,7 % and Italy accounts for 9,17 % as the third largest. In terms of Trade Area, perhaps more interesting in a strategic perspective, the European Union account for 38 % of the Russian exports, whereas the CIS accrue to 30 %, Eastern Europe for 25,5 % and the Baltic states for 2,3 %.

The Former Soviet Union, and its at the time Warsaw Pact allies, thus still dominate the direction of Russian exports. This is a consequence of infrastructure by the delivering part, and necessity or lack of alternatives by the receiving.

Looking ahead, the liberation of the European Gas markets with third party access to the transportation grid in EU, and in particular the effects of RAO Gazprom – Wintershall AG alliance with access to further distribution links, makes the Iberian Peninsula energy markets of obvious interest to Russia as an exporter. However, as far as statistics for 1998 applies, Russia has not yet penetrated this market. For the issue of critical market shares and supply side competition in Europe, the author refer to previous INSROP Papers[1]. A short comment would be that Norway as the second largest exporter looks to increase its market share in Eastern Europe, whereas Russian looks to the South and South West. In terms of diversification in general terms this obviously makes sense.

7.3 RUSSIAN CRUDE OIL EXPORTS VALUE AND DIRECTION

The crude oil volumes and direction have been presented in detail in the previous chapters. By value crude oil generates 16 % of the overall Foreign Exchange revenue, and 14 % originates in non-CIS countries. This conforms more closely to the market shares earlier indicated.

Crude Oil	11 450	16 %	15 165	514
To Outside CIS	9 555	14 %	13 632	530
To CIS	1 894	3 %	1 534	405

7.4 RUSSIAN OIL PRODUCTS EXPORTS VALUE AND DIRECTION

Oil products are also a significant part of the overall Russian exports, generating 6 % of Foreign Exchange earnings.

Oil Products	3 918	6 %	7 600	557
To Outside CIS	3 537	5 %	7 255	550
To CIS	381	· 1 %	344	754

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[1] For more detailed reference to the European Natural Gas markets, see INSROP Working Paper no 41, European Gas Markets and Russian LNG (Eldegaard 96) and Working Paper no 77, Northern Gas Fields and NGH Technology (Ramsland et.al 97).

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8 TYUMEN OBLAST & YAMALO – NENETS AUTONOMOUS OKRUG

8.1 REGIONAL PARTICULARS

Area Size   750,600 square kilometres

Population   477,000

Administrative Centre   Salekhard

8.1.1 GEOGRAPHIC SITUATION.

The YNAO is an independent administrative region (federation subject) on the territory of the Tyumen Oblast. The region compromised of 15 counties (rayons) and 6 regional authorities (Salekhard, Noyabrsk, Novy Urengoi and Nadym).

The Yamalo-Nenets Autonomous Okrug (YNAO) is located on the Western Siberia Arctic North, fringing the Pechora, Kara and Laptev Sea to the North, and form the lowland tundra through which the lower reaches of the Ob-river runs. To the Northwest we find the Yamal Peninsula with its abundant gas reserves, to the Northeast the Gydan Peninsulas vast empty tundra between the Ob Bay and the lower reaches of Yenisey River.

8.1.2 CLIMATE.

Annual Precipitation is between 200-400 m m and average temperatures range between –26 and +10 degrees Celsius.

8.2 ENERGY PRODUCTION AND RESERVES

Its significant natural gas and associated condensates production, dominate current energy activities in the YNAO. The Yamburg and Urengoy group of fields dominates in terms of natural gas production, for which market access and transportation is facilitated by the Yamburg –Druzhba line of 5 X 56 inches pipes. The main line ties into the Druzhba from Urengoy, which runs along Punga – Sheblenka – Uzhgorod – to Budapest.

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In terms of industry consolidation, RAO Gazprom and subsidiary Nadymgazprom dominates the natural gas activities in YNAO. RAO Gazprom has the largest prospected reserves of natural gas in the world, more than 33 trillion cubic metres at the beginning of 1997. Purneftegaz, now under Rosneft control, plays a minor role in terms of other activities.

The table below presents the amounts of licensed hydrocarbon reserves of the category A+B+C1 and their distribution by region as of January 1, 1997. The Nadym-Pur-Taz region and the Yamal Peninsula account for 80 % of the total gas reserves of Gazprom, which makes the YMAO the most significant area in the world as applies to natural gas. Significant recoverable reserves of Condensed gas, 776 million tonnes and 475 million tonnes of crude oil are present. The associated condensate and Liquefied Petroleum Gas (LPG), butan, propan and ethane where previously burned off, as no logistics where present to bring it to the markets. In 1996 at Novy Urengoy construction of gas chemical production facilities for these products continued, but are neither finished nor able to produce significant volumes[2].

Region	Gas (A+B+C1	Condensed gas (A+B+C1)	Oil (A+B+C
Nadym-Pur-Taz	20.9	675.7	248.0
Yamal	5.8	100.2	227.0
WesternSiberia, total (*)	26.8	786.8	484.1
Volga-Ural region	3.7	452.5	113.7
North of European part of Russia	0.3	35.3	11.1
Northern Caucasus	0.1	3.6	5.3
Others	2.5	21.5	49.6
Total	33.4	1299.7	663.8

Source : RAO Gazprom Company Information 1998

The issues to be confronted are thus others than the abundant factor allowance in energy and its natural resource base. Logistics, legal framework, geography and relative positions to demand areas are important factors. In terms of projects pending for which there are abundant potential and sound business plans, the concentration follows two separate tracks ;

1. Focus on the periphery to realise new fields from scratch so as to avoid the old Soviet infrastructure, and reduce the Federal (Central) bargaining position on tariffs etc.

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[2] INSROP Paper no 48 "Marine Transportation of Oil from Timan Pechora and form Inland Russian Fields" (Andresen et.al) address the logistic issue of marine transportation by ice-classified tankers, optimised for operations in the Ob-Bay.

2. Focus on central areas where the size and concentration of reserves are large enough to justify upgrading or new pipelines structures, and the scope and scale of investments correspondingly high to offer the necessary leverage versus the Federal Government.

8.3 YAMAL NENETS AUTONOMOUS OKRUG INVESTMENT ALLOCATION - 1998

Total Foreign Investments in Russia in 1998 accrued to 12,3 Billion USD. Western Siberia, the large region to which Tyumen Oblast along Omsk, Novosibirsk, Tomsk Oblasts, and Kemerovo and Altai regions belongs, received 1, 078 Billion USD which amounts to 8,8 % of Russia's total. The energy sector, which dominates Tyumen and the Okrugs of Khanty Mansiysk and Yamal Nenets, received a minute of 0,69 and 0,23 % respectively, for which YNAO accrues to 28 million USD. Considering the above-mentioned proven reserves, capital allocation by foreign entities to the energy sector in the region is negligible compared to the realities of the production potential.

Foreign Investments in Russia in 1998 (January - September Annualised)					
	Total	% of Total	Direct	Of Which Portfolio	Other
Russia	12 378 371	100 %	2 684 129	255 936	9 438 307
West Siberia	1 086 847	8,78 %	245 519	997	840 331
Omsk Oblast	604 669	4,88 %	22 008		582 661
Novosibirsk Oblast	192 407	1,55 %	129 974	885	61 547
Tyumen Oblast	158 815	1,28 %	87 561	112	71 142
Khanty-Mansiysk Autonomóus Okrug	85 759	0,69 %	37 676		48 083
Yamal-Nenets Autonomous Okrug	28 053	0,23 %	5 399		22 654
Tomsk Oblast	114 538	0,93 %	23		114 515
Kemerovo Oblast	10 783	0,09 %	317		10 465
Altai Territory	5 636		5 636		

Source : Russian State Customs Statistics - Interfax Newsagency 1998

8.4 YAMALO – NENETS AO – PROJECTS UNDER CURRENT PSA, 1999

The major crude oil project pending the legal framework accrues to 121 million tonnes, and is a joint venture between Shell Int and Purneftegaz. This is the major project of interest as of today, but as previously commented by the minor player Purneftegaz in the region. Besides the issue of logistics and geography, the major point is that Gazprom presence dominates the Region.

YAMALO - NENETS AUTONOMOUS OKRUG 1998
Current & Planned Projects Involving Western Participation - Pending Production Share Agreements

Project	Russian Partner	Western Partner	Nationality	Location	Rec Reserves
Pur River	Purneftegaz	Shell	UK/Netherlands	Yamalo-Nenetsk AO	120 700

Source : Russian Petroleum Investor 1998

8.4.1 GAZPROM'S ROLE IN THE YAMALO NENETS AO

Gazprom is generally known to be hostile towards foreign investments and due to its monopoly position has been able to exercise heavy influence on federal, regional and municipal levels. Gazprom's absolute importance, generating 25 % of Russia's Foreign Exchange earnings, has thus been able to block other activities. This however, is a factor that is most probable to change. The fall in world commodity prices, and in particular energy prices which account for 46 % of federal foreign exchange, is bound to alter the strategic perception of the domestic energy sector. The "jewel in the crown" is unlikely to be protected by any means, in particular as the federal coffers experience diminishing returns to scale.

Government owns more than 40 % of Gazprom, and the initiative taken to place 4 % of Gazprom in the international equity market exemplifies the increased propensity to accept the rules of the market. One thus experience that both the Company and the Federal Government see their relative bargaining position weakened versus the local government, foreign Investors and capital providers. Pipeline structures as of yet do not allow for significant volume increases, and shares in major exports markets in Europe approach critical levels. Increase market shares can thus not be achieved by lower prices, as this would also reduce and be contrary to the aim and revenue of government and Gazprom.

Government thus faces the issue of either to reduce its equity position in Gazprom, or to change its legislation to attract capital. One might argue that this is a classic "catch 22", which probably reflects reality to some degree, but more to the point observes that supply side market power has shifted to demand side, and that producer surplus increasingly shifts down the value chain to consumer surplus. As the number of agents increases, most notable entries of Quatar, Nigeria, and potentially Tunisia as LNG suppliers to Europe, the relative bargaining position of Russia decreases.

| Yamalo - Nenets Autonomous Okrug - New Fields on Auction as of 15 July 1999 - By Region						
Name of Block	Tender Initial Price USD	Region	Location	Oil Million Tonnes	Condensate Mln Tonnes	Gas Billion Cum
Tazovsky	7 000 000	Tazovsky	20 km southeast of Tazovsky	534,1	7,2	162,1
Salekaptsky	2 000 000	Tazovsky	45 km west of Gaz-Sale	140,2	5,6	23,8
East Tazovsky	3 000 000	Tazovsky	50 km southeast of Tazovsky	43,3	11,4	65,3
North Russky,	1 000 000	Tazovsky	100 km southeast of Tazovsky			
Tazovsky Total	13 000 000			717,5	24,1	251,2
North Chasepsky	7 000 000	Pur	55 km east of Urengoi	328,9	8,8	158,9
South Yarainersky	500 000	Pur	235 km northeast of Nizhnevartovsk	34,6		
South Khadyryansky	1 000 000	Pur	125 km from Urengoi	17,0	1,6	25,3
Apakospursky	850 000	Pur	85 km northeast of Noyabrsk	9,3	2,8	13,3
West Novogorny	650 000	Pur	55 km northeast of Noyabrsk	5,3		
Arksatoisky	800 000	Pur	80 km north of Noyabrsk			
Ust-Yamsoveisky	200 000	Pur	15 km southwest of Urengoi			
Khadyryansky	1 100 000	Pur	92 km southeast of Urengoi			37,1
North Purovsky	1 200 000	Pur	55 km northwest of Urengoi		15,1	57,8
Pur Total	13 300 000			395,1	28,3	292,3
Pyakutinsky	300 000	Nadym	130 km wnwest of Noyabrsk	33,1		
Malo-Pyakutinsky	200 000	Nadym	110 km nw of Noyabrsk	21,8		
Nadym Total	500 000			54,9	0,0	0,0
Total	26 800 000			1 167,5	52,4	543,5

Source : Yamalo Nenets Regional Authorities 1999

Yamalo Nenets AO

Blocks on Auction July 1999 - Reserves

▦ Oil   ▦ Condensates   ▢ Gas
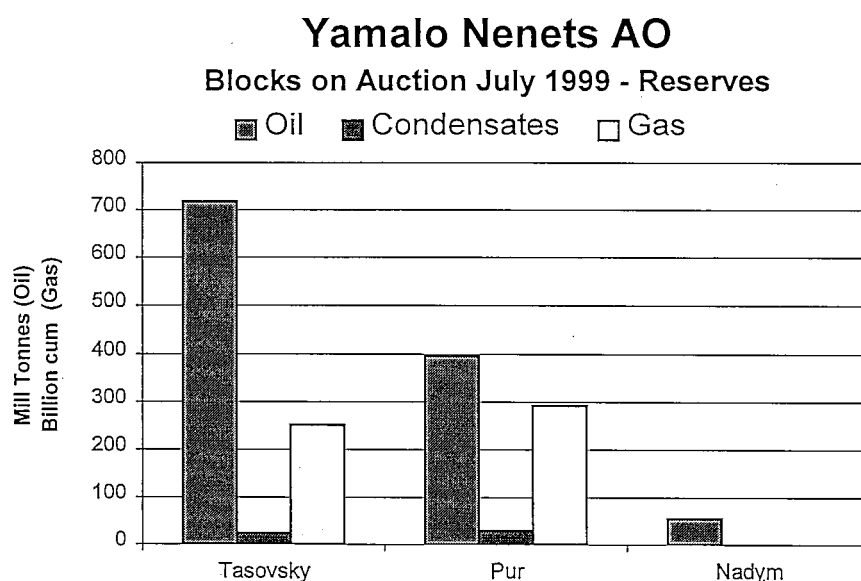
However, the true potential of the region is more to the point reflected by the blocks to be auctioned as of 15 July 1999. The major advantage is the previous contrary, it's unused

crude oil reserves and lack of current logistics. The scale and concentration of reserves, in particular concerning crude oil, is probably too large to be ignored. There will be competition from current and pending fields that have seen their Production Share Agreements through both the Duma and Federation Council.

8.6 COMPETING REGIONS

Russian Energy Sector 1998

Foreign P Pending PSA - Recoverable Reserves
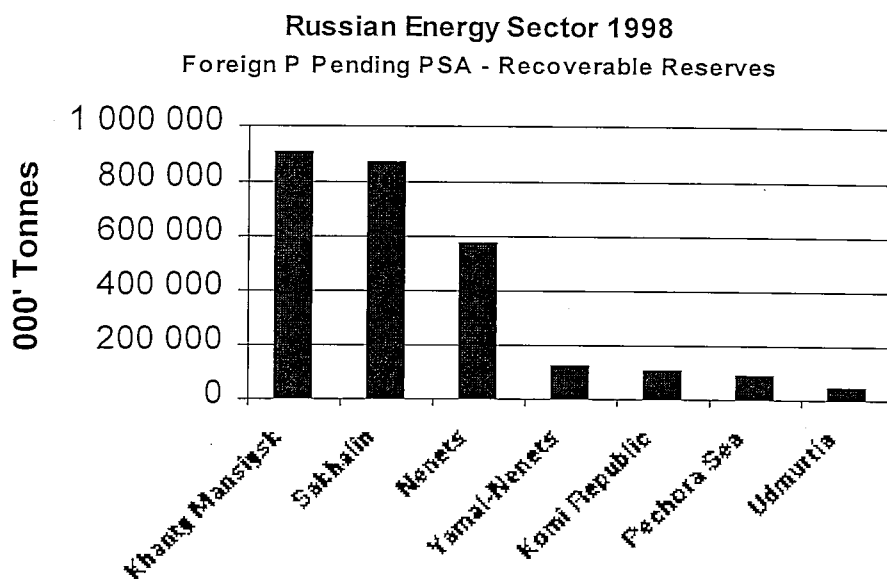
Source : Russian Petroleum Investor 1998

8.6.1 SAKHALIN

To the periphery strategy, obviously the Sakhalin area projects are in perfect fit as it avoids Continental Russia, is offshore based (for which the Russian entities has no or marginal technological proprietary knowledge), and is closely situated to the major demand markets. As a periphery region Sakhalin thus has attracted the largest interest, and recoverable reserves in current projects on hold amount to 872 million tonnes of crude oil.

8.6.2 NENETS AUTONOMOUS OKRUG

The second largest periphery region is the Nenets Autonomous Okrug, in Archangel Oblast for which projects in Timan Pechora and offshore Pechora Sea amount to 575 million tonnes recoverable reserves. With the exception of Kharyaga (Total-France) and Polar Light (Conoco-US), projects are oriented towards a marine logistic solution. Versus Sakhalin, the

Timan Pechora projects have the same advantage of being able to play the central versus the regional card. From the previous we can infer that in terms of demand markets Timan Pechora is at disadvantage versus Asia, but obviously in a much better position than current export alternatives and their constraints. In particular the transatlantic trade to serve the North American market looks obvious, and has also been evaluated for gas exports (Ramsland et al 96).

In this respect, the more important issue is that such a strategy would fit into the current United States supply matrix, where Russia would fill a diversification role. Norway has previously followed this strategy with success. Marine transportation through the "Northern Gate" is accessible in terms of technology and offers flexibility and a comparative advantages that southbound pipeline solutions are unable to offer. Russia and the United States also have a multilateral framework through various Arctic co-operative agreements.

A regular operation by ice-classified tankers serving the North European – American markets would probably serve as a confidence building measure in the region and offer synergies to the parties involved. Basically because it offers mutual benefits in terms of new markets to Russia, and offer investment opportunities to the US and European part. The vessels are the prime factor because the entry barrier in terms of investment level is to high for any of the parties to bring in a third party, whereas the alternative employment for the vessels cannot be realised on cost grounds in alternative markets.

However, as for the others, the current allocation of foreign capital to Nenets do not reflect the potential of the region, but reflect the hold position by the foreign entities. The North as defined by the Komi Republic, Karelia, Archangel, Vologda and Murmansk Oblast received a mere 1 % of total or 128 million USD, of which Nenets where allocated 0,03 % of total.

Foreign Investments in Russia in 1998 (January - September Annualised)					
	Total	% of Total	Direct	Portfolio	Other
Russia	12 378 371	100 %	2 684 129	255 936	9 438 307
The North	128 481	1,04 %	50 738		77 743
Komi Republic	80 996	0,65 %	27 385		53 611
Archangel Oblast	28 747	0,23 %	12 902		15 845
Nenets Autonomous Okrug	3 510	0,03 %	3 474		36
Murmansk Oblast	9 627	0,08 %	1 340		8 287
Karelia	8 426	0,07 %	8 426		
Vologda Region	685	0,01 %	685		

Source : Russian State Customs Statistics - Interfax Newsagency 1998

The Yamal Nenets Aoutonomous Okrug thus conforms to the strategic mix of the Nenets OA with some modification.

8.6.3 KHANTY MANSIYSK AUTONOMOUS OKRUG

Khanty Mansiysk AO is the flip side of the coin, being centrally located and with a long history of oil production as the FSU and Russia's main crude oil supply region. In total Khanty Mansiysk represent 54 % of the total Russian crude oil reserves. Pipelines out of the Okrug are numerous, but in a state of urgently needing repairs. The regions projects on hold involving foreign investors, accrue to 905 million tonnes of recoverable reserves, of which the Priobskoye (YUKOS – BP/Amoco) alone represent 610 million tonnes. In particular BP/Amoco has sunk significant amounts into the Priobskoye development, and to recoup its investment, it is less likely than others to disband its engagement. The slow process of Federal Russia to institutionalise a legislative framework, work to the disadvantage of early starters like Amoco (BP). However, the presence of BP/Amoco in the region has thus probably to a large degree worked the regional authorities in Khanty Mansiysk to observe the necessity for legislative changes. As of 01 January 99, new tax regulations were introduced at federal, regional and municipal levels, exactly to retain the interests and efforts of foreign oil companies in Russia.

8.7 CHANGE THE LEGAL FRAMEWORK

8.7.1 FEDERAL GOVERNMENT

The federal changes introduced is basically a five step approach:

1. The maximum profit rate is to be reduced from 35 to 30 percentage points.
2. A partial revamping of the current restrictions on operating cost deductibles, and in particular specify what are to be considered justified, documented operating and marketing expenses.
3. Codification of Production Share Agreement regulations that governs the profit tax base for Foreign companies operating under PSA's.
4. Not impose Value Added Taxes on advance payment by foreign importers.
5. Abort administrative barriers and taxation on crude oil sold for less than actual production cost.

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The new bill has apparently the full support of Prime Minister Yevgeniy Primakov, which at face value offer some credibility to its enactment. On presumption, Primakov has a better grasp of energy and both its economic and strategic implications from his long term postings in the Middle East than his predecessors.

Reduction of profit tax is important, as is the issue on the deductibles to allow for to inclusion of operating expenses related to exploration and or purchase of geological data. Further interest payments paid on credit lines on production equipment, previously not included. The same equipment is allowed depreciated at annual rates of 48 % versus the current 20 %. This will obviously cut down payback time on initial project outlay.

In terms of reimbursing other expenses incurred, a more straightforward approach is observed. This is a sanguine application, but also one that demand sobriety on the federal side. Limits on deductibles as refers to interest rates on lines of credit are put forth, London Interbank Offered Rate (LIBOR) + 0,3 percentage points. For a full risk assessment and comments and applicability of interest discount rates, see next chapter. But if the federal government aims at attracting long term and stable investors, it should pay attention to its own stability and approach the sector with legislation that is perceived to introduce a new credible and predicable regime. Obviously few, if any, projects in Russia today can raise finance on these terms, and if applied, the government will have to cede a larger part of profits to compensate for lower deductibles during negotiation for the individual PSA.

The federal legislation also affect regional terms, as refusal to reimburse social and other local measures such as health, education, infrastructure improvements in local communities result from being defined as unnecessary, as these shall be served through standard official budgets. This removes one regional string attached to the international enterprise, and intends to deflate overall cost. Being explicitly stated, neither time nor resources should thus be allocated at this issue.

Referring to regional level and scale of reserves, a two-prong approach follows; On the one hand the federal government cede its right to negotiate the PSA to the independent subject for fields with less reserves than 10 Million tonnes. On the other it states a percentage of aggregated reserves that can be negotiated on PSA terms at between 25-30 %, which obviously reduce the incentive to enter into an agreement. On pay back terms, most of the initial investments should thus be recouped at a satisfactory return on equity, before reaching

this point in the production cycle. Thus the foreign enterprise are faced with two alternatives;

1. To seek projects in single groups with very high reserves and long production cycles, so that the initial investment indeed is recouped and assets depreciated before transitioning into standard legislation (and - or to overestimate the amount of recoverable reserves).

2. Secondly to approach areas with units less than 10 million tonnes and negotiate separate regional agreements that returns the appropriate percentage on equity invested.

The second sets more stringent demand to apply ingenuity to both legality and logistics, but what otherwise might be perceived as a high entry barrier, for example an ice-classified solution with smaller units can thus become feasible. A system to connect a larger number of smaller fields in the YNAO by local pipeline grids to a joint storage facility in the Ob-Bay for trans-shipment may then work to its purpose, without being perceived as a threat to others.

Another previous hindrance to finance most likely to be lifted, is the lack of ability to pledge production equipment as collateral, and to transfer the right of the sub-soil user to any third party whether legal entity or physical person. This obviously increases the flexibility for the investor, and will probably lead to a more liquid and transparent energy sector.

If successfully introduced, this has positive implication for major projects on hold, where no or small initial outlays have been incurred as of today. This arises out of depreciation being based on its current and residual value on the asset. Projects in operation for some time will thus see their production assets reduced to a marginal point, without the possibility to obtain the advantage of the deductible market value. However, with the exception of the Amoco (BP) Priobskoye and number of relatively small Joint Ventures, this is a non-relevant issue.

On the whole other things equal, one can conclude that the periphery are to gain from these changes as none of the projects have incurred costs of scale, and applies both to Nenets and Yamalo Nenets AO areas. They should as such be able to take full advantage of these legislative changes, increasing the relative attractiveness of the Russian oil sector.

8.7.2 REGIONAL GOVERNMENT

The only Joint Venture in YNAO operating as of today is Geoilbent, a joint venture between

Purneftegaz, Purneftegazgologiya and Benton Oil (US) to develop the Severo Gubinsky oil field. The company should also be able to take advantage of these changes, as it current production volume, 375 000 tonnes (jan-oct 98 annualised), reflect investment levels of insignificance compared to the overall potential that can be realised.

At the regional level in Yamalo-Nenets Autonomous Okrug changes have been slow to take place due to its dependency on, and influence by, Gazprom. Secondly under the Soviet past the YNAO was under strong control by the Tyumen Oblast authorities, thus cross subsidising along the North-South axis. The major changes to increase the Okrug attractiveness can be referred to as follows:

1. A resolved relationship with Tyumen Oblast as the Okrug was granted independence and a separate regional budget by 1991, thus also obtaining control over use of subsoil resources.
2. A newly elected YNAO district Duma that brought to office legislative and executive bodies.
3. Transparency, market access and valuation possibilities as the YNAO placed regional bonds in the Russian market, secured by regional asset and its domestic rights on subsoil uses.
4. A reduced reluctance by Gazprom to operate alongside foreign entities.

Referring to three, this may be argued to be a paper exercise as the logistic and scale of operation to realise the collateral / security may appear too large to embark upon for a foreign investor. However, this would probably be to grossly underestimate the liquidity of the Russian financial and energy sector. Gazprom besides being fully acquainted with international markets, is a 50 % holder in Rosshelf with significant licences in the Pechora and the Barents Sea. The approach to a marine transportation plan to increase flexibility and lower the threshold for overall investments should thus not be irrelevant. Pipeline costs are proportionate to the length of the route, and scale economies require significant larger annual volumes to be realised for this mode of operation.

9 RISK ASSESSMENT & DISCOUNT RATE

9.1 COMMERCIAL RISK ASSESSMENT

If we allow for the exchange of funds via borrowing and lending, the there will be an equilibrium rate of interest which equates the amount of borrowing with the amount of lending, individuals will disregard their own subjective interest rates and will use the market equilibrium rate of return for making optimal investment decisions, and all individuals will be better of than they would have been in a world without borrowing and lending opportunities.

The Fisher Separation Principle

For the investment decision the **commercial risk** can be split into various levels of risk which are reflected as an accrued premium to the base interest rate. The implications of "Fisher Separation Principle" stated above is that the investor will undertake an investment to maximise his wealth and undertake any project until the marginal rate of return to capital on the last project, equals the market equilibrium rate of return. The concept is to be elaborated on.

The first point to be made is that in a period of recession, there often exist capital surplus, but due to lack of demand, few projects have competitive returns on capital, and competition to borrow capital is low. The base case would thus be to seek the risk free investment, to which US Government Bond comes closest, as the *default risk* of the Goverment is assumed to be zero. **Default risk** thus encompasses **Country Risk**, and as no potential for bankruptcy exist, a negative value is possible. US Government bonds are available for maturities up to 30 years.

However, adverse increases in inflation could significantly affect discounting as the projected capital outlays, could grossly mismatch the income if not taken into account. Using the **Forward Interest Rate** (FIR) principle we avoid the inflation issue, as the future expected inflation is reflected in the FIR and thus the Yield.

The principle of FIR is established by assuming that we hold 3 different bonds with one, two and three years maturity. If we want to deduct the implied forward rate expectation between year 2 and 3 as shown in the equation 1:

$$1+{}_2f_3=\frac{(1+{}_0R_3)^3}{(1+{}_0R_2)^2} \qquad\qquad 1.$$

We simply use the geometric product of the 3-year maturity and divide by the 2-year maturity bond. The yield ratio result is the implied forward rate as shown below (2).

$$1+{}_2f_3=\frac{(1+{}_0r_1)^1(1+{}_1f_2)^2(1+{}_2f_3)^3}{(1+{}_0f_1)^1(1+{}_1f_2)^2} \qquad\qquad 2.$$

An energy and shipping investment is capital intensive if we consider developing new acreage or building new vessels. Lifetime and production cycle for the asset is normally between 25 and 35 years. Thus for project appraisals, correct long term estimates for the discount rate should be sought. The discount period however, seldom match the full lifetime of production unit or the vessel, and normally this period would be between 15 and 20 years. For the energy sector where application of the pay back method still is much in use, this might even be more short term.

However, the length of the period will normally match the rules and regulations for tax and depreciation of the asset in the country the corporate entity is located. To determine implied forward rate from year 14 to 15 for example, two bonds of 14 and 15 yrs maturity is required, and the same methodology applies as shown below (3).

$$1+{}_{14}f_{15}=\frac{(1+{}_0r_1)(1+{}_1f_2)\cdots\cdots(1+{}_{14}f_{15})}{(1+{}_0f_1)\cdots\cdots(1+{}_{13}f_{14})} \qquad\qquad 3.$$

9.2 BASE INTEREST RATE

As benchmark for the relevant interest rate to use when discounting net positive cash flow differentials for the two alternatives, the London Interbank Offered Rate (LIBOR) should be used. This is also the benchmark unit selected by the Federal Russian Government for accounting purposes, see previous chapter. Dependent on the mortgagee and his collateral for the loan, and the lending bank's perception of risk connected to both the collateral and the risk in the market (*co variance risk*), LIBOR + margin on top will be offered. However, if quotation for Forward LIBOR rates do not match the project - / vessel lifetime or discount period, adjustments to compensate can be made. This by using the differential on the LIBOR

rate and the Government bond that reflects the maturity.

The major issue then is whether the lending bank's risk perception towards investments in Russia in general, and the regional energy sector in particular, match the investor's opportunity yield in the market pertaining equity. If so, the equilibrium rate or better has been found. For practical applications one observe that during the spring 98 interest rates developed according to crisis in Asia and in Russia, consequently a step rise in interest rates were observed. To this situation the International Monetary Fund responded, and interest rates have come down since.

Interest Rate - London Interbank Offered Rate USD
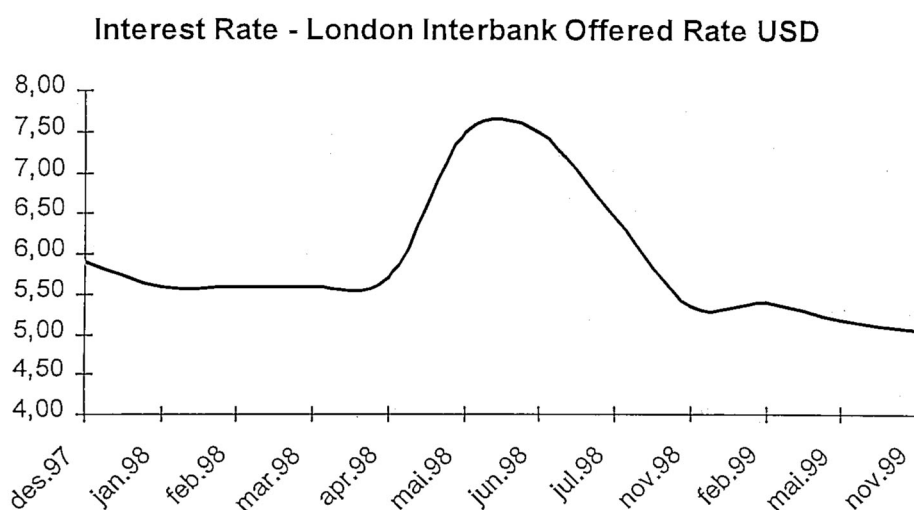
Source : Dagens Næringsliv 1998

Reduction of interest rates is also due to the slow down of both the US and World economy in general. Expectations to be read from the LIBOR USD Forward Rates, is positive in the sense they trend downwards, which will affects discounted cash flows positively. The one-year forward rate is 5,28 %. A depreciation period of 15 – 20 years and a cashflow period of perhaps 30 years, indicate that US Government bond of 30-year maturity is a relevant benchmark. Bond yield on par with LIBOR 5,27 % indicate that inflation neither is a problem today, nor expected in the future. This also applies to long term interest rates in the European Union. One should also take into account that a normally a liquidity premium exist as short term securities, or bonds with low maturities, both are more liquid, and less sensitive to unexpected changes the economy.

Another factor could be if the Government operates large deficits, and traditional "crowding out" takes place. It applies that the Government competes for capital, interest rates are driven up, and investment in the private sector falls. However, the current situation in the Far East, and especially in Japan, is to the contrary. The government observes both recession and low interest rates, and try to stimulate private consumption by tax incentives to get the economy moving again.

Country Risk Assessment
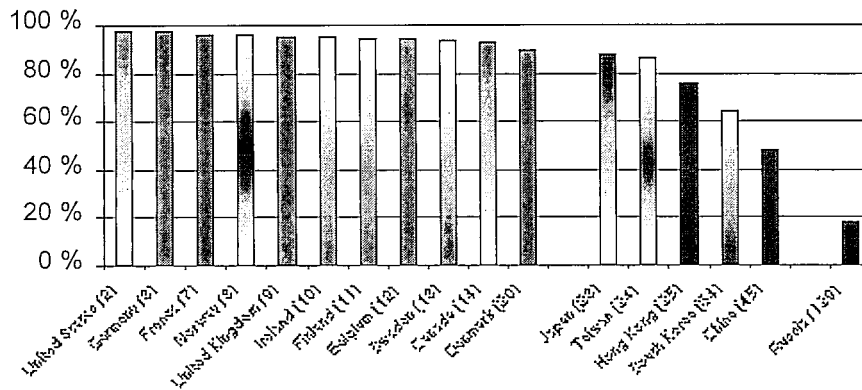
Source : Euromoney Magazine Sept 1998

Country Risk, is a key risk issue the energy investor in Russia should scrutinise to assess the opportunity yield in the market vs the margin on the base interest rate.

Euromoney (sep 98) publishes a worldwide assessment of country risk and rank countries accordingly. In the graph above the NSR relevant countries are ranked from left to right by their individual risk according to the study. The most noteworthy is that NWE and North America are grouped together to the left. They all belong to the multilateral Organisation for Economic Cooperation and Development (OECD), Trade Bloc European Union (EU) or North American Free Trade Association (NAFTA) and the Defence Alliance North Atlantic Treaty Organisation (NATO) (except of Ireland, Sweden and Finland).

The Far Eastern countries are grouped to the right, all are Asia Pacific Economic Cooperation (APEC) countries, Japan and South Korea both OECD members and Allied countries, whereas Taiwan, Hong Kong China, and Russia to the far right, do not belong to

OECD or Alliances.

Political risk is important as it reflects the Government stability and will to observe and attend to generally accepted international legislation and standards. To this issue both the Federal Russian – and Regional Independent Subjects face a challenge, but clearly signals that the process at least has started to move. Sudden changes in the tax code etc. increase the *business risk*. If the full judgement as put forth by the Euromoney survey is applied to Russia as an area for investments, the risk premium would probably approach 70-80 % for non-collateralised, but otherwise interesting projects. Energy projects of some scale often involve bilateral governmental involvement and risk reduction through various instruments.

If using energy finance in Tatarstan as an example, weighted average cost of debt for was LIBOR + 3,23 %. For the part without collateral in place, 45 % on top of LIBOR was charged. The new accounting proposal pertaining a LIBOR + 0,3 % limit allowed deductible on Earnings Before Interest and Taxes (EBIT), obviously do not reflect this reality. The Federal government thus will be hard pressed to reduce its profit share part in the PSA, or face reality of much stronger emphasis on collateral and liquidation on asset on non-performing debt.

INTEREST PREMIUM ON RUSSIAN ENERGY SECTOR DEBT						
Lending Institution	Borrower	Premium on LIBOR	Value Mln $	Weighted Interest	Maturity	Collateral in Place
Dresdner Bank	Tatneft	4,00 %	100,0	0,84 %	jan.99	
Societè Generale	Tatneft	0,25 %	64,6	0,03 %	jan.99	Yes
Societè Generale	Tatneft	5,75 %	19,6	0,24 %	jan.99	No
Chase Manhattan	Tatneft	3,50 %	165,0	1,22 %	jun.98	Yes, subject to restructure
Berliner Bank	Tatneft	3,00 %	90,0	0,57 %	aug.98	Yes, subject to restructure
BHF Bank	Tatneft	4,45 %	36,0	0,34 %	nov.98	Yes, subject to restructure
Sub-Total			475,2	3,23 %		
CSFB	Tatneft		220		okt.98	No
Agricole Indosuez	Tatneft		100		nov.98	No
OtherS	Tatneft		52	45 %		
Total Short Term			847,2			
Short Term debt	Lukoil		525			
Convertible Bonds	Lukoil	3,50 %	230	1,39 %	jun.02	
Convertible Bonds	Lukoil	1,00 %	350	0,60 %	aug.06	
			580	1,99 %		
Credit Lyonaisse Russie	Sibneft	3 %	190	2,71 %		
Raiffeisen	Sibneft	5 %	20	0,43 %		
	Sibneft		210	3,14 %		

Currency risk can be controlled through financial instruments with currency futures and or options. The normal practice is to match currency income and expenditure. As US Dollar is the standard revenue, and most costs are quoted accordingly, it is normally only a question to convert the debt and interest service to USD. Depending on the location of the Flag State the vessels are registered in, this may translate into ***balance sheet risk*** as USD could move adversely to domestic currency.

10 COSTING & FINANCIAL RESULTS

Based on the suggested changes in the federal and regional legal framework a scenario for 20 Years of a group of fields producing 10 million tonnes annually from year 4 for and is put forth under the following assumptions.

The average well depth at 2300 meters, each well producing 600 tonnes per day which put the total number of wells at 46. The crude oil price flat at 12 USD/Barrels through-out the period using the current price as the best estimate of the future price subject to no political nor war like distortions.

Production equipment is assumed leased through-out the period at the cost index from US Energy Information Agency Rocky Mountain Equivalent. This cost is reduced by factors subject to satisfactory local Russian deliveries at 70 % level of total content, and delivered at a Purchasing Power Parity of 4:1 costs. The costs are increased proportionally with production volume to match maximum in year 4, and at annual lease costs increase of 2 %.

Pipeline cost is based on a regional Yamalo Nenets grid of 250 km connecting the producing wells to a terminal in the Ob Bay area. The cost is based on a proportionate reduction of previous estimates of Kazhakstan pipelines at of 3 000 km at a costs indicated at 3 –3.5 bln USD[3]. Total investment costs are assumed incurred at the start of the period.

Pipeline operating costs are scaled down costs of the Prudhoe Bay – Valdez Alyeska (1 285 km) at local operating content of 70 % and PPP of 4:1 to US costs, chosen for operation in about the same geographical and climatic environment. The costs are set at 2% annual increase, following the production interval to maximum in year 4 (2,5, 5, 7,5 10 million tonnes).

Terminal costs are scaled down costs of Alyeska Valdez at 1 500 Million for 65 million tonnes annually, and local operating content of 70 % at PPP 4:1 of US costs. Total investment costs are assumed incurred at the start of the period. Figures for reliable terminal operating cost where not found.

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[3] Source : Russian Petroleum Investor 98

The costing thus indicates the floor for profitable oil production delivered to a terminal in the Ob-bay, less terminal operating and shipping cost. These estimates are subject to the federal and regional government implementing the suggested legal changes that allows for :

- 48 % depreciation on pipeline and terminal investment
- 3,2 % interest on top of LIBOR interest subject to adequate collateral pledged
- 30 % profit tax
- 6 % royalty and an
- 4 ECU per tonnes excise duty.

Further the costs are subject to the Russian industry being able to serve the government aim of 70 % Russian content, delivered at the PPP of 4:1 versus the costs in United States.

Under these assumptions the project returns loss in year 1, but positive cashflow per barrel would roughly be between US $ 2,59 in the first year and US $ 5 in year 20. The project returns profit from the second year and then stabilise at slightly less than US $ 5 per barrels from year 4.

11 CONCLUSION

This paper has approach energy projects in Yamalo-Nenets Autonomous Okrug from the current situation in both the domestic and international energy markets. Russia has experienced a net reduction of both production and consumption of crude oil, but experience an increased surplus balance that is exported. By region, the Asian energy markets clearly experience the strongest demand growth for the period covered, but Europe is the market that receives the predominant part of Russian crude oil and natural gas exports.

This is accentuated by, and not likely to change in the short to medium term, the constraints that follow from the internal infrastructure in logistics. Europe as a market experience limited growth in consumption compared to Asia and North America. Russian producers thus experience that only limited economies of scale can be achieved as of today and that the markets in growth are too far by distance. The relative bargaining power of Russia is thus reduced, which also affect the federal budgets, as the energy sector is the major Foreign Exchange earner for Russia.

In regional terms also geography, logistics, legality and factor allowance are the issues. The central – periphery conflict is confronted both in terms of legislation and by allocation of funds and interest. As of today Yamalo Nenets Autonomous Okrug is the major gas-producing region in the world, but export levels has reached a critical level in terms of market share in Europe. The crude oil sector has the advantage to the contrary of its past, lack of infrastructure and low production levels. To be allocated capital the region will face competition primarily from Sakhalin that is likely to capture the major share of Russian export East & Southeast Asia. In the northwest projects will compete with Timan Pechora projects. Implementation of projects will anyhow be phased in a period where the production in the North Sea is in decline, and thus in a marine transportation perspective phased to serve both Europe and North America at competitive costs if implemented at the assumptions put forth.

In terms of the legislative changes indicated, the periphery and regions are to benefit from the changes, but a major portion of negotiating is still held by federal authorities. The applicable risk perception of Russia in terms investors will to allocated capital, remains the responsibility of, and key issue for, the Federal Government to solve.

Appendix A : Crude Oil Production in Yamalo Nenets AO : Base Case 10 Mln Tonnes

Summary of Lease Equipment Cost and Composite Indices Crude Oil: 10 Wells

Well Depth	Primary Oil Recovery		Direct Operating Cost		Secondary Oil Recovery	
	Index Average	Rocky Mountains	Index Average	Rocky Mountains	Index Average	Texas
2 000	800 400	745 500	138 700	137 800		284 100
4 000	1 027 800	982 200	177 800	155 400		377 000
8 000	1 520 900	1 639 100	249 700	198 300		555 600
12 000	1 933 000	1 859 700	348 300	297 800		
Aggregated Average	1 320 500		228 600			405 600

Summary of Gas Lease Equipment Cost and Composite for one Well

	250000		500 000		1 000 000	
	Index Average	Rocky Mountains	Index Average	Rocky Mountains	Index Average	Rocky Mountains
2 000	22 100	20 500				
4 000	45 700	31 700	31 200	45 700		
8 000	48 100	46 300	44 500	46 200	58 200	
12 000	60 200	59 200	57 800	58 300	58 200	
16 000			58 200		58 300	
Aggregated Average	36 600		49 000		58 200	
Overall Aggregate	25 000					

Summary of Aggregate Average Gas Lease Operating Cost, by Well Depth

2 000	11 200
4 000	15 700
8 000	25 600
12 000	32 100
16 000	38 800

Direct Annual Operating Cost & Indices for Primary Oil Production in California 10 Wells

2 000	150 800
4 000	199 800
8 000	340 400
12 000	340 400
16 000	494 600

Yamalo Nenets Autonomous Okrug
Nadym - Pur - Tazovsky Rayons

Well Depth ft	2300	0,33	6 970
Delivery Tonnes per Well per Day			600
Delivery Tonnes per Well per Year			219 000
Pipeline Capacity			10 000 000
No of Wells Necessary			46
Crude Oil Price			$12,00
Bbl/Tonnes			7,07
Reserves to Production (R/P Ratio)			20

Annual Cost Per 10 Wells : US Energy Information Agency

	Rocky Mountain Equiv	Index Average	Aggregated Average
Primary Oil Recovery	1 639 100	1 520 900	1 320 500
Direct Operating Cost	198 300	249 700	249 700
Secondary Oil Recovery	555 600	228 600	228 600
Total Operating Costs	2 393 000	1 999 200	1 798 800
Total Operating Cost at 10 Mln T	10 926 941	9 128 767	8 213 699
Local Content of Deliveries	0,7	0,7	0,7
Purchasing Power Parity	4	4	4
Deliveries at US Cost	3 278 082	2 738 630	2 464 110
Deliveries at Local Cost	1 912 215	1 597 534	1 437 397
Total Operating Cost at Adjusted Prices	5 190 297	4 336 164	3 901 507
Excise Duty ECU / Tonnes	4	4	4
ECU / USD Exchange Rate	1,1589		
Period	20	20	20
Interest Rate LIBOR	4,8 %	4,8 %	4,8 %
Risk Premium	3,2 %	3,2 %	3,2 %
Applied Discount Rate	8,0 %	8,0 %	8,0 %

Capital Cost Pipeline

Regional Ob Grid 250	290 697 674	290 697 674	290 697 674
Yamal (The) Crossing 500	581 395 349	581 395 349	581 395 349
Dudinka Reversed 600	697 674 419	697 674 419	697 674 419
China Base - Batareniya Direct 2150	2 500 000 000	2 500 000 000	2 500 000 000

Principal

Regional Ob Grid 250	14 534 884	14 534 884	14 534 884
Yamal (The) Crossing 500	29 069 767	29 069 767	29 069 767
Dudinka Reversed 600	34 883 721	34 883 721	34 883 721
China Base - Batareniya Direct 2150	125 000 000	125 000 000	125 000 000

Annuity

Regional Ob Grid 250	21 652 779
Yamal (The) Crossing 500	43 305 558
Dudinka Reversed 600	51 966 670
China Base - Batareniya Direct 2150	186 213 899

Total Annual Pipeline Operating Costs

Alyeska Comparison (1 285 km)	522 900 000
Local Operating Content	0,7
Proportionate at PPP	4

Alternative	Relative by Length	Local Content	Int Content	Total Operating
Regional Ob Grid 250	284 848 249	49 848 444	85 454 475	135 302 918
Yamal (The) Crossing 500	264 501 946	46 287 840	79 350 584	125 638 424
Dudinka Reversed 600	244 155 642	42 727 237	73 246 693	115 973 930
China Base - Batareniya Direct 2150	874 891 051	153 105 934	262 467 315	415 573 249

Total Terminal Cost

Alyeska Comparison	1 500 000 000
Throughput Million T	65 000 000
Local Operating Content	0,7
Proportionate at PPP	4

	Relative by Throughput	Local Content	Int Content	Total Investment
Ob - Bay / Kharasavey 10 million t	230 769 231	40 384 615	69 230 769	109 615 385

YAMALO - NENETS CRUDE OIL PROJECT 10 MILLION TONNES

Production Quantity	2 500 000	5 000 000	7 500 000	10 000 000	10 000 000	10 000 000	10 000 000	10 000 000	10 000 000
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Net Operating Revenue	212 100 000	424 200 000	636 300 000	848 400 000	848 400 000	848 400 000	848 400 000	848 400 000	848 400 000
Variable Costs (Equip Lease 2% AI)	1 297 574	2 647 051	4 130 988	5 618 144	5 730 507	5 845 117	5 962 020	6 081 260	6 202 885
Operating Cost Pipeline (2 % AI)	33 825 730	69 004 488	105 576 867	143 584 539	146 456 230	149 385 355	152 373 062	155 420 523	158 528 933
Fixed Cash Cost (Installment Pipe)	14 534 884	14 534 884	14 534 884	14 534 884	14 534 884	14 534 884	14 534 884	14 534 884	14 534 884
Depreciation (48 % Pipeline)	139 534 884	72 558 140	37 730 233	19 619 721	10 202 255	5 305 173	2 758 690	1 434 519	745 950
Operating Cost Terminal (2 %)									
Fixed Cash Cost (Installment Terminal)	5 480 769	5 480 769	5 480 769	5 480 769	5 480 769	5 480 769	5 480 769	5 480 769	5 480 769
Depreciation (48 % Terminal)	52 615 385	27 360 000	14 227 200	7 398 144	3 847 035	2 000 458	1 040 238	540 924	281 280
EBIT	-35 189 225	265 455 437	474 327 028	665 042 712	671 476 124	673 329 472	672 771 345	670 928 815	668 387 348
Interest Payments (Pipeline)	56 023 256	54 803 086	53 484 937	52 060 940	50 522 597	48 860 724	47 065 403	-45 125 918	43 030 693
Interest Payments (Terminal)	8 802 115	7 932 231	7 132 199	6 396 409	5 719 704	5 097 337	4 524 947	3 998 520	3 514 364
EBT	-100 014 596	202 720 119	413 709 892	606 585 362	615 233 824	619 371 410	621 180 995	621 804 377	621 842 291
Profit Tax (30 %)	0	60 816 036	124 112 968	181 975 609	184 570 147	185 811 423	186 354 298	186 541 313	186 552 687
Royalty (6 %)	0	12 163 207	24 822 594	36 395 122	36 914 029	37 162 285	37 270 860	37 308 263	37 310 537
Excise (4 ECU/Tonnes)	46 356 000	46 356 000	46 356 000	46 356 000	46 356 000	46 356 000	46 356 000	46 356 000	46 356 000
Net Profit	-146 370 596	83 384 876	218 418 331	341 858 632	347 393 647	350 041 703	351 199 837	351 598 801	351 623 066
Cashflow	45 779 672	183 303 016	270 375 764	368 876 497	361 442 937	357 347 333	354 998 765	353 574 244	352 650 296
Remaining Pipeline Value	$290 697 674	$151 162 791	$78 604 651	$40 874 419	$21 254 698	$11 052 443	$5 747 270	$2 988 581	$1 554 062
Remaining Terminal Value	$109 615 385	$57 000 000	$29 640 000	$15 412 800	$8 014 656	$4 167 621	$2 167 163	$1 126 925	$586 001
Net Profit Per Barrel	-$8,28	$2,36	$4,12	$4,84	$4,91	$4,95	$4,97	$4,97	$4,97
Net Cashflow Per Barrel	$2,59	$5,19	$5,10	$5,22	$5,11	$5,05	$5,02	$5,00	$4,99

YAMALO - NENETS CRUDE OIL PROJECT 10 MILLION TONNES

	10 000 000	10 000 000	10 000 000	10 000 000	10 000 000	10 000 000	10 000 000	10 000 000	10 000 000	10 000 000	10 000 000
	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
	848 400 000	848 400 000	848 400 000	848 400 000	848 400 000	848 400 000	848 400 000	848 400 000	848 400 000	848 400 000	848 400 000
	6 326 943	6 453 482	6 582 551	6 714 202	6 848 486	6 985 456	7 125 165	7 267 669	7 413 022	7 561 282	7 712 508
	161 699 512	164 933 502	168 232 172	171 596 816	175 028 752	178 529 327	182 099 914	185 741 912	189 456 750	193 245 885	197 110 803
	14 534 884	14 534 884	14 534 884	14 534 884	14 534 884	14 534 884	14 534 884	14 534 884	14 534 884	14 534 884	14 534 884
	387 894	201 705	104 886	54 541	28 361	14 748	7 669	3 988	2 074	1 078	561
	5 480 769	5 480 769	5 480 769	5 480 769	5 480 769	5 480 769	5 480 769	5 480 769	5 480 769	5 480 769	5 480 769
	146 266	76 058	39 550	20 566	10 694	5 561	2 892	1 504	782	407	211
	665 450 767	662 276 427	658 945 506	655 499 557	651 959 516	648 335 585	644 632 368	640 851 548	636 993 270	633 056 870	629 041 245
	40 767 220	38 321 991	35 680 410	32 826 710	29 743 857	26 413 452	22 815 615	18 928 872	14 730 023	10 194 007	5 293 749
	3 069 087	2 659 565	2 282 928	1 936 535	1 617 957	1 324 961	1 055 492	807 662	579 733	370 106	177 312
	621 614 461	621 294 872	620 982 169	620 736 313	620 597 702	620 597 172	620 761 261	621 115 014	621 683 514	622 492 757	623 570 183
	186 484 338	186 388 461	186 294 651	186 220 894	186 179 311	186 179 152	186 228 378	186 334 504	186 505 054	186 747 827	187 071 055
	37 296 868	37 277 692	37 258 930	37 244 179	37 235 862	37 235 830	37 245 676	37 266 901	37 301 011	37 349 565	37 414 211
	46 356 000	46 356 000	46 356 000	46 356 000	46 356 000	46 356 000	46 356 000	46 356 000	46 356 000	46 356 000	46 356 000
	351 477 255	351 272 718	351 072 588	350 915 240	350 826 530	350 826 190	350 931 207	351 157 609	351 521 449	352 039 365	352 728 917
	352 011 414	351 550 481	351 217 025	350 990 347	350 865 585	350 846 499	350 941 768	351 163 100	351 524 305	352 040 849	352 729 689
	$808 112	$420 218	$218 514	$113 627	$59 086	$30 725	$15 977	$8 308	$4 320	$2 246	$1 168
	$304 720	$158 455	$82 396	$42 846	$22 280	$11 586	$6 025	$3 133	$1 629	$847	$440
	$4,97	$4,97	$4,97	$4,96	$4,96	$4,96	$4,96	$4,97	$4,97	$4,98	$4,99
	$4,98	$4,97	$4,97	$4,96	$4,96	$4,96	$4,96	$4,97	$4,97	$4,98	$4,99

Department of Shipping, Trade and Finance

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12 February, 1999

Claes Lykke Ragner
INSROP Secretariat
PO Box 326
N-1324 Lysaker
Norway

Dear Claes,

Re: Box CLS, Project III.07.7: "Energy Prospects in Yamalo-Nenets Autonomous Okrug", by Trond R. Ramsland

I have now finished reviewing the above paper and here are my reactions.

- Overall this is a well structured paper, with no language problems, quite clear and easy to follow and understand.
- It maintains a good balance of statistical/numerical information and text/analysis.
- It provides a very good analysis of the current situation in the energy sector in the Yamalo-Nenets Okrug and has put together an important base of information.
- However, I believe that the paper overlooks one very important factor: the effect of the level of international oil prices. Oil prices are mentioned in passing but the paper fails to properly analyse the risk of oil price fluctuations, and especially future development projects under the current depressed market conditions. Section 9, which looks at all the different types of risks, misses the opportunity to properly analyse oil price risks. I would suggest some rethinking on these issues and an appropriate revision of the section.
- Finally, I also think that some analysis on the relationship between oil prices and the level of taxation in the Russian oil industry is necessary. The experience of the UK petroleum tax and the way it was used to sustain production in the North Sea under adverse market conditions could be used to draw parallels with the case of Russia.

Yours sincerely

Michael

Michael Tamvakis
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COMMENT TO THE REVIEW OF INSROP PROJECT III.07.7

In general I concur to the review of the discussion paper. On the issue of international oil prices, a separate costing applied to the development of a group of field is included to provide a floor USD / barrel. This takes into account the application of the suggested changes in legality and tax regime in Russia, and applies the relevant purchasing power parities on local contents of division of labour and material.

I agree that the UK petroleum tax amendments and the way the British handle adverse conditions as apply to the North Sea both makes sense and are useful. Straight suggestions to reduce the role of Government, in light of what was obviously an overestimated market, was put forth by the author 3 years ago as refers to the Norwegian sector. Regretfully Government has rather than proactive, been reactive to a point of naivety in that context.

The cost has been applied as refers to production, pipeline and terminal delivery in the Ob-bay.

Bergen 10 March 99

Sincerely

Trond Ragnvald Ramsland

The three main cooperating institutions of INSROP

POLAR CIRCLE

Ship & Ocean Foundation (SOF), Tokyo, Japan.

SOF was established in 1975 as a non-profit organization to advance modernization and rationalization of Japan's shipbuilding and related industries, and to give assistance to non-profit organizations associated with these industries. SOF is provided with operation funds by the Nippon Foundation, the world's largest foundation operated with revenue from motorboat racing. An integral part of SOF, the Tsukuba Institute, carries out experimental research into ocean environment protection and ocean development.

Central Marine Research & Design Institute (CNIIMF), St. Petersburg, Russia.

CNIIMF was founded in 1929. The institute's research focus is applied and technological with four main goals: the improvment of merchant fleet efficiency; shipping safety; technical development of the merchant fleet; and design support for future fleet development. CNIIMF was a Russian state institution up to 1993, when it was converted into a stock-holding company.

The Fridtjof Nansen Institute (FNI), Lysaker, Norway.

FNI was founded in 1958 and is based at Polhøgda, the home of Fridtjof Nansen, famous Norwegian polar explorer, scientist, humanist and statesman. The institute spesializes in applied social science research, with special focus on international resource and environmental management. In addition to INSROP, the research is organized in six integrated programmes. Typical of FNI research is a multi-disciplinary approach, entailing extensive cooperation with other research institutions both at home and abroad. The INSROP Secretariat is located at FNI.