Gas Export Potential of Russia's East:

Are the Russians Coming?..

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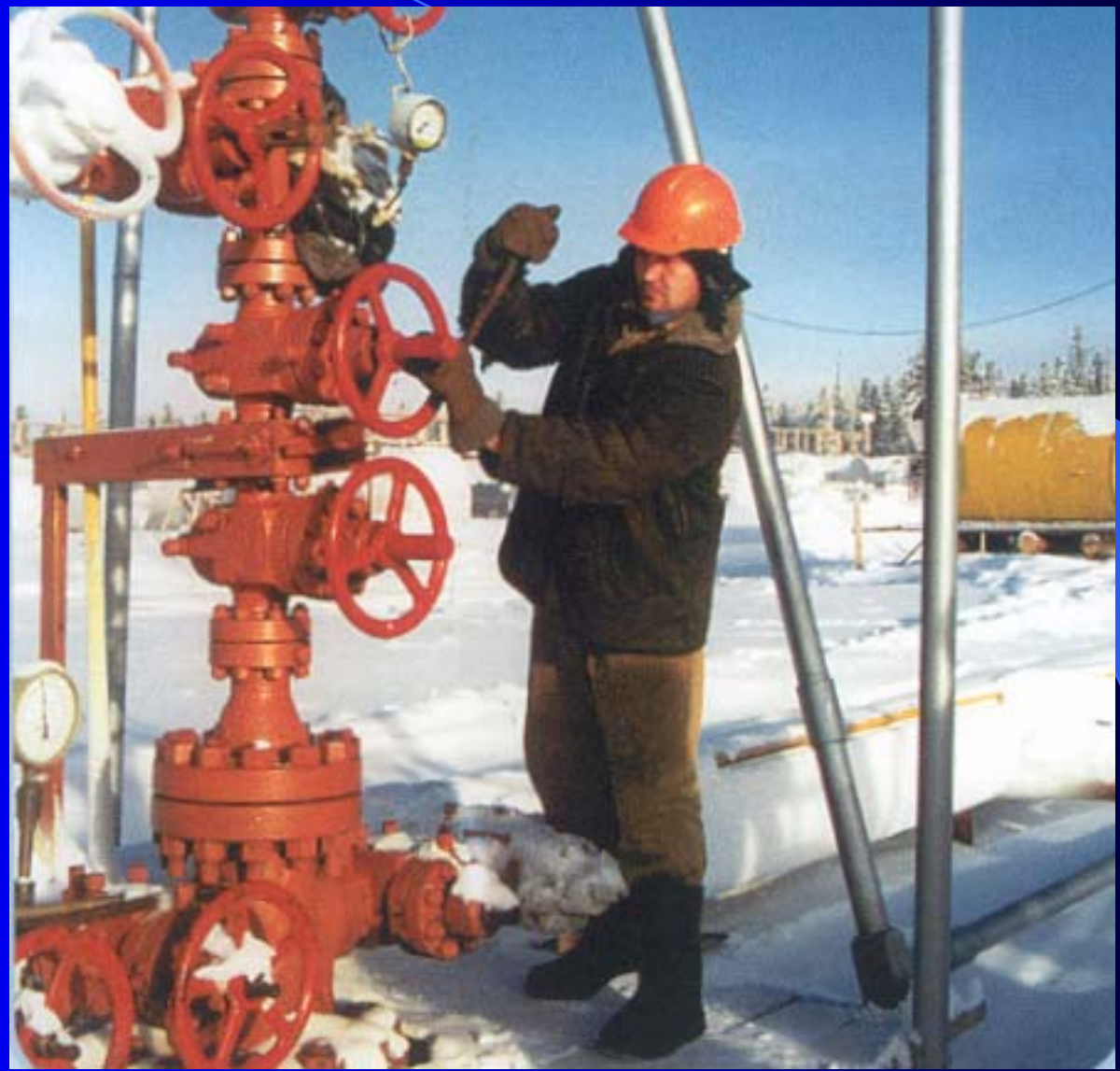
Russia's Far East: Where It Is ...

Producing Gas in Yakutia...



Laying Gaslines Everywhere…

RFE: Existing Pipelines

Natural Gas Resources of the Russian Far East and East Siberia, Tcm[(1)]

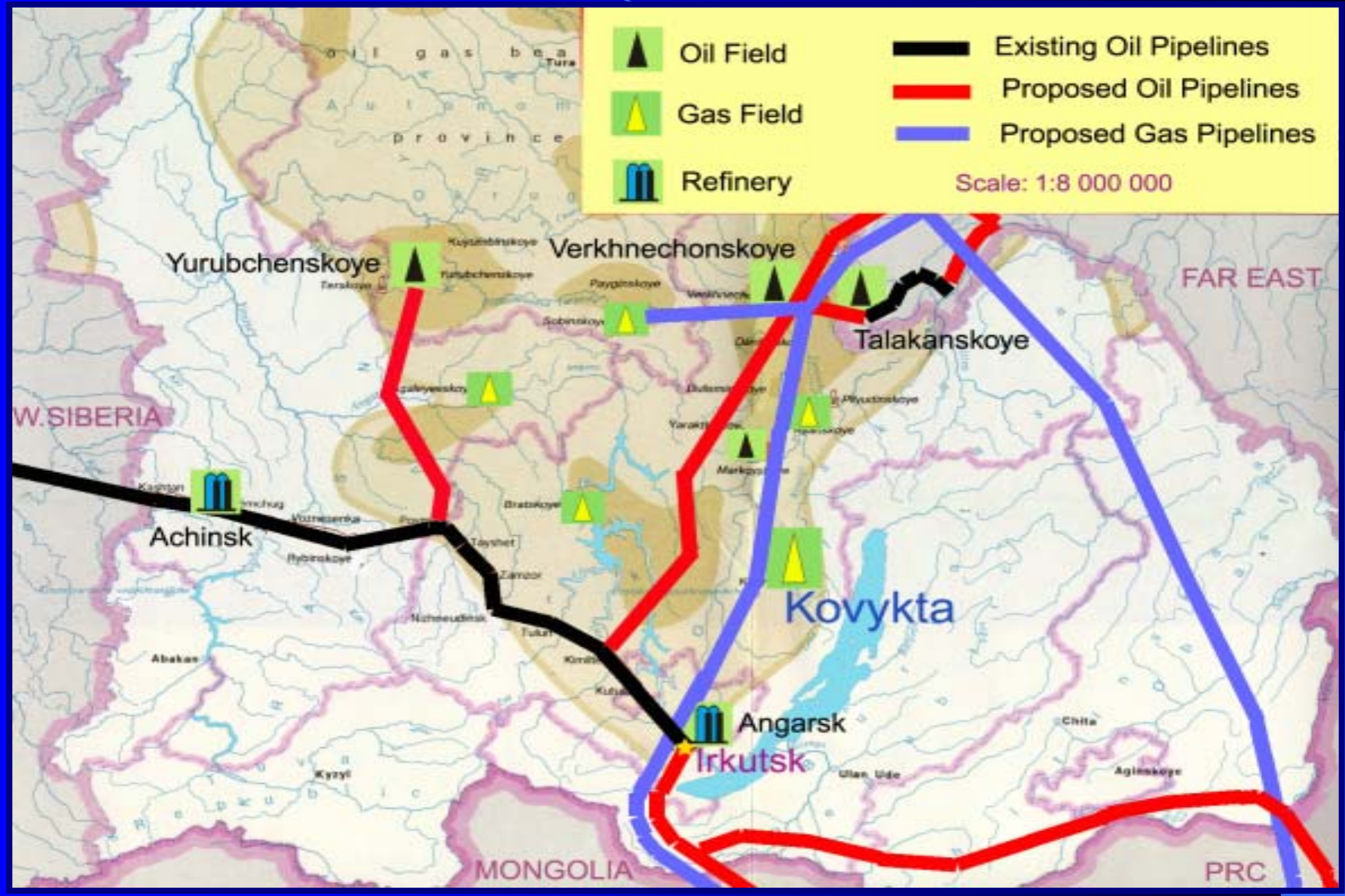
	Initial Resources	Cumulative Production	Current Reserves[(2)]	Undiscovered Resources[(3)]
Far East	**23.94**	**0.07**	**2.28**	**21.59**
Sakha (Yakutia) Republic	9.98	0.03	1.32	8.63
Sakhalin Region	4.24	0.04	0.91	3.29
Other Areas	9.72	0	0.05	9.67
East Siberia	**31.47**	**0.01**	**3.70**	**27.76**
Krasnoyarsk Territory	24.55	0.01	1.89	22.65
Irkutsk Region	6.92	0.00	1.81	5.11
Total	**55.41**	**0.08**	**5.98**	**49.35**

(1) As of 1/1/02, measured under 15°C and 760 mm Hg

(2) Category $A+B+C_1+C_2$

(3) Category $C_3+D_1+D_2$

South of East Siberia, Irkutsk Region



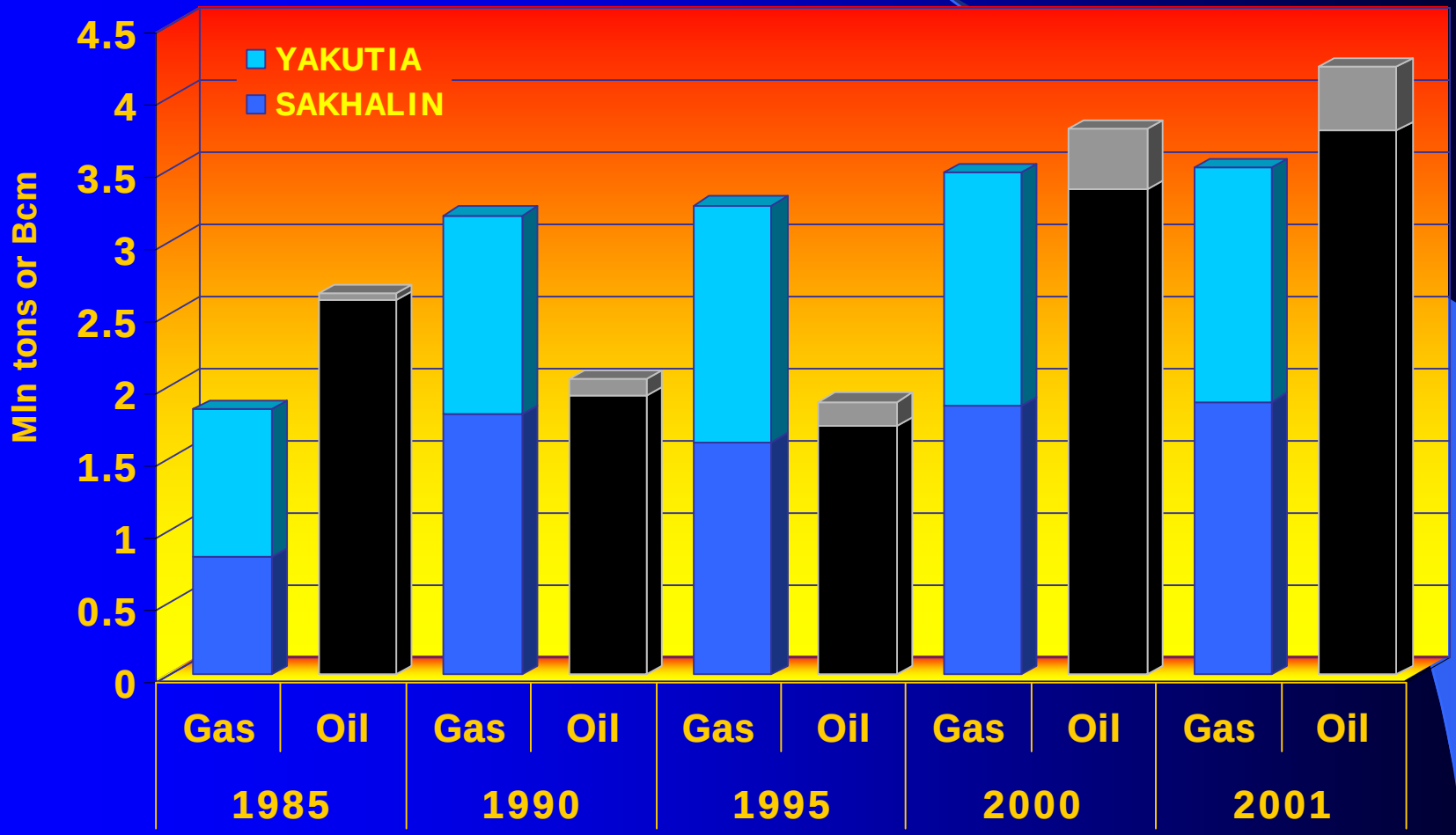
RFE's Hydrocarbons Production – 1990-2001

	1990	1992	1995	1997	1999	2000	2001
Natural Gas, Bcm(1)	**3.17**	**3.20**	**3.24**	**3.35**	**3.36**	**3.49**	**3.52**
Sakhalin	1.80	1.70	1.61	1.80	1.76	1.86	1.89
Sakha-Yakutia	1.38	1.51	1.63	1.55	1.60	1.62	1.62
Crude Oil (2), mln tons	2.05	1.82	1.89	1.96	2.15	3.78	4.21
Sakhalin	1.93	1.68	1.72	1.72	1.84	3.36	3.77
of which *Shakhalin-2*	–	–	–	–	0.14	1.67	2.03
Sakha-Yakutia	0.12	0.14	0.17	0.24	0.31	0.42	0.44

(1) Measured at 15°C and 760 mm Hg

(2) Including field condensate

RFE's Hydrocarbons Production – 1985-2001

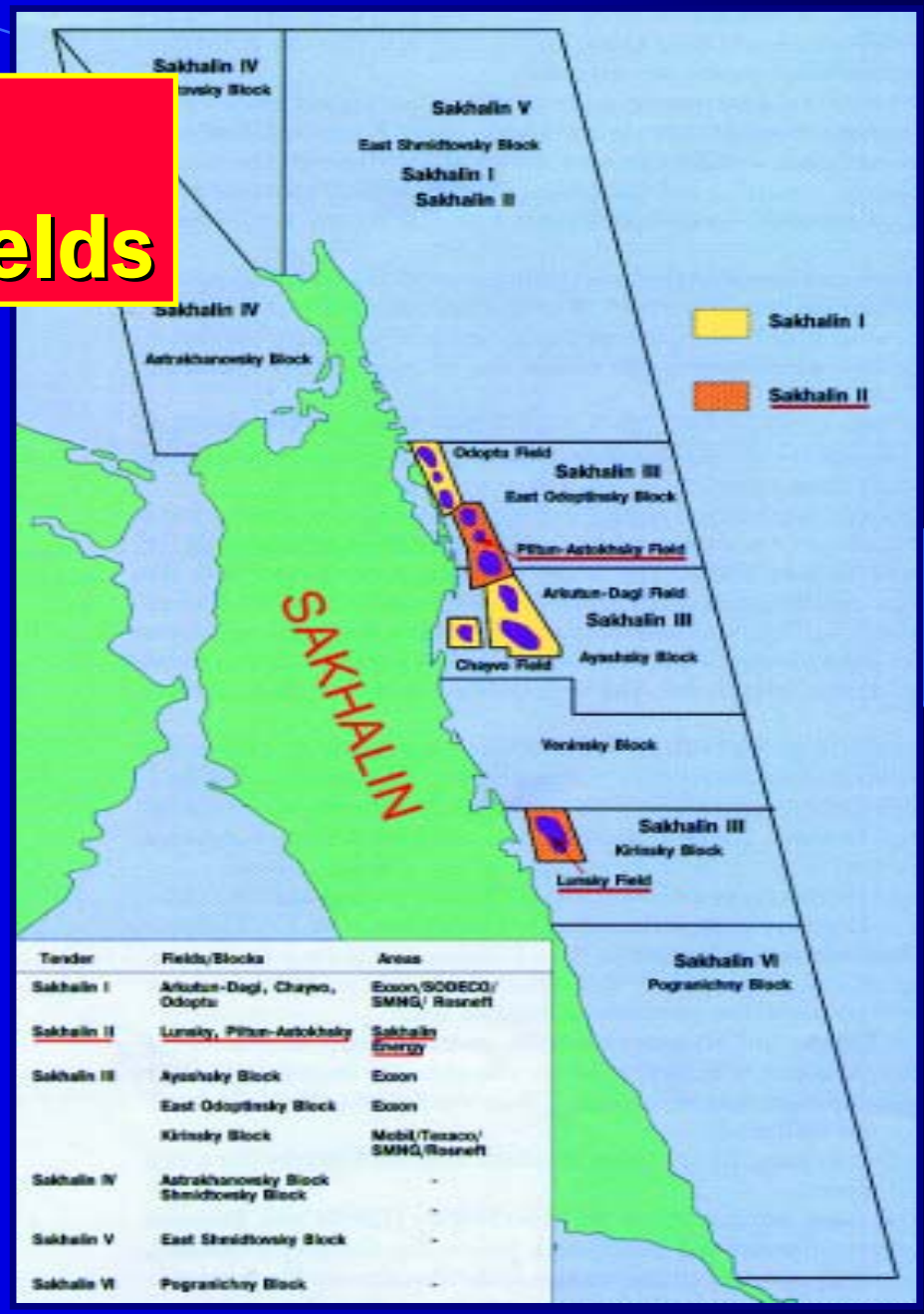


RFE: Proposed Pipelines

Most Advanced Projects

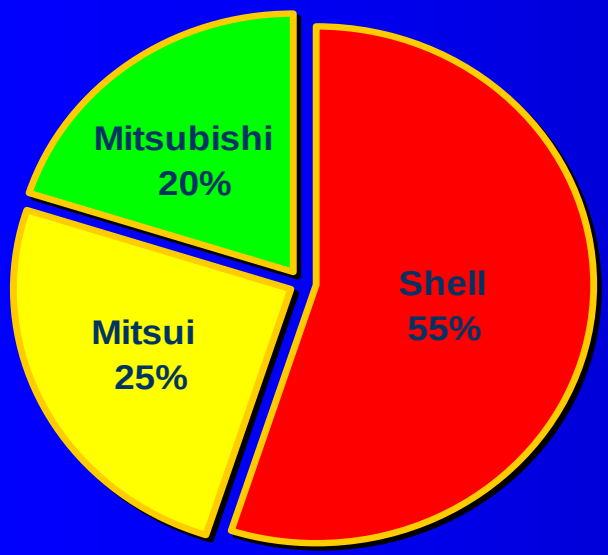
- Sakhalin-2
- Sakhalin-1
- Kovykta

Sakhalin-2: Blocks & Fields



Tender	Fields/Blocks	Areas
Sakhalin I	Arkutun-Dagi, Chayvo, Odoptu	Exxon/SODECO/ SMNG/ Rosneft
Sakhalin II	Lunsky, Piltun-Astokhsky	Sakhalin Energy
Sakhalin III	Ayashsky Block	Exxon
	East Odoptinsky Block	Exxon
	Kirinsky Block	Mobil/Texaco/ SMNG/Rosneft
Sakhalin IV	Astrakhanovsky Block Shmidtovsky Block	- -
Sakhalin V	East Shmidtovsky Block	-
Sakhalin VI	Pogranichny Block	-

Sakhalin-2



Estimated Capex: $10 Bn

Main Objectives:

- Development and exploitation of Lunskoye and Piltun-Astokhskoye offshore fields
- Construction of oil and gas pipe-lines across Sakhalin and of a 9.6 Mt/y LNG plant in southern Sakhalin

Reserves:

gas – 370-400 Bcm, oil – 100 Mt, condensate – 40 Mt

Start of production:

oil – 1999, gas – 2006/07

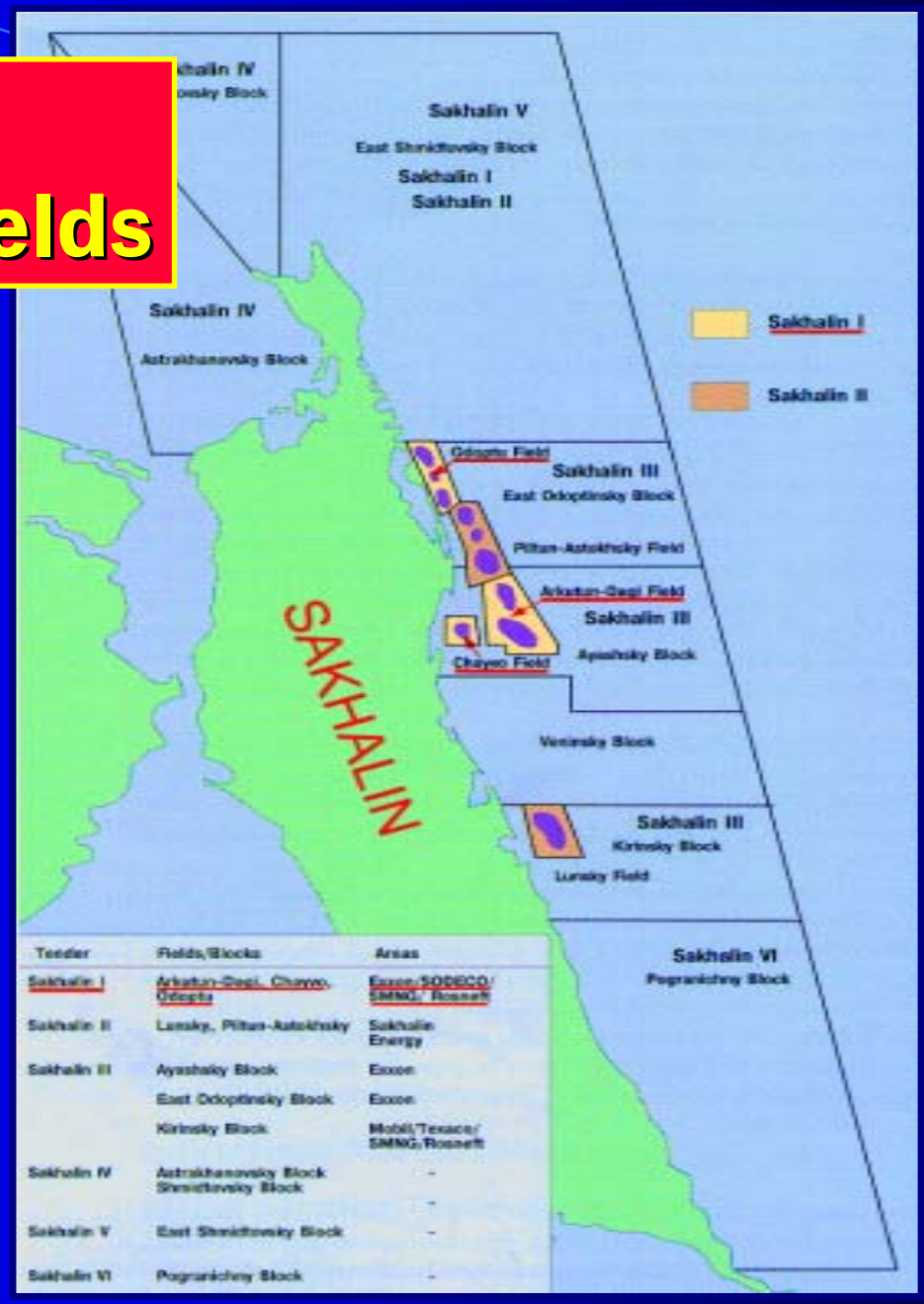
Maximum annual output:

oil – 8 Mt (2005), gas – 18 Bcm (2020)

Current Status: Active, On Target, Negotiating Sales Contracts

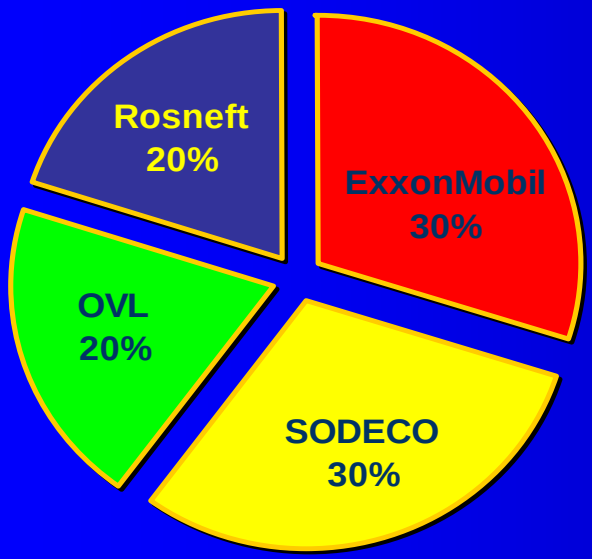
Target Markets for Sakhalin-2 LNG

Sakhalin-1: Blocks & Fields



Feeder	Fields/Blocks	Areas
Sakhalin I	Arkutun-Dagi, Chayvo, Odoptu	Exxon/SODECO/ SMNG/ Rosneft
Sakhalin II	Lunsky, Piltun-Astokhsky	Sakhalin Energy
Sakhalin III	Ayashsky Block	Exxon
	East Odoptinsky Block	Exxon
	Kirinsky Block	Mobil/Texaco/ SMNG/Rosneft
Sakhalin IV	Astrakhanovsky Block	-
	Shmidtovsky Block	-
Sakhalin V	East Shmidtovsky Block	-
Sakhalin VI	Pogranichny Block	-

Sakhalin-1



Estimated Capex: $15 Bn

Main Objectives:

- Development and exploitation of Chaivo, Odoptu-More and Arkutun-Dagi offshore fields
- Construction of gas pipeline(s) across Sakhalin to Hokkaido/Honshu (and/or to northeast China)

Reserves:

gas – 500 Bcm, oil – 310 Mt, condensate – 35 Mt

Start of production:

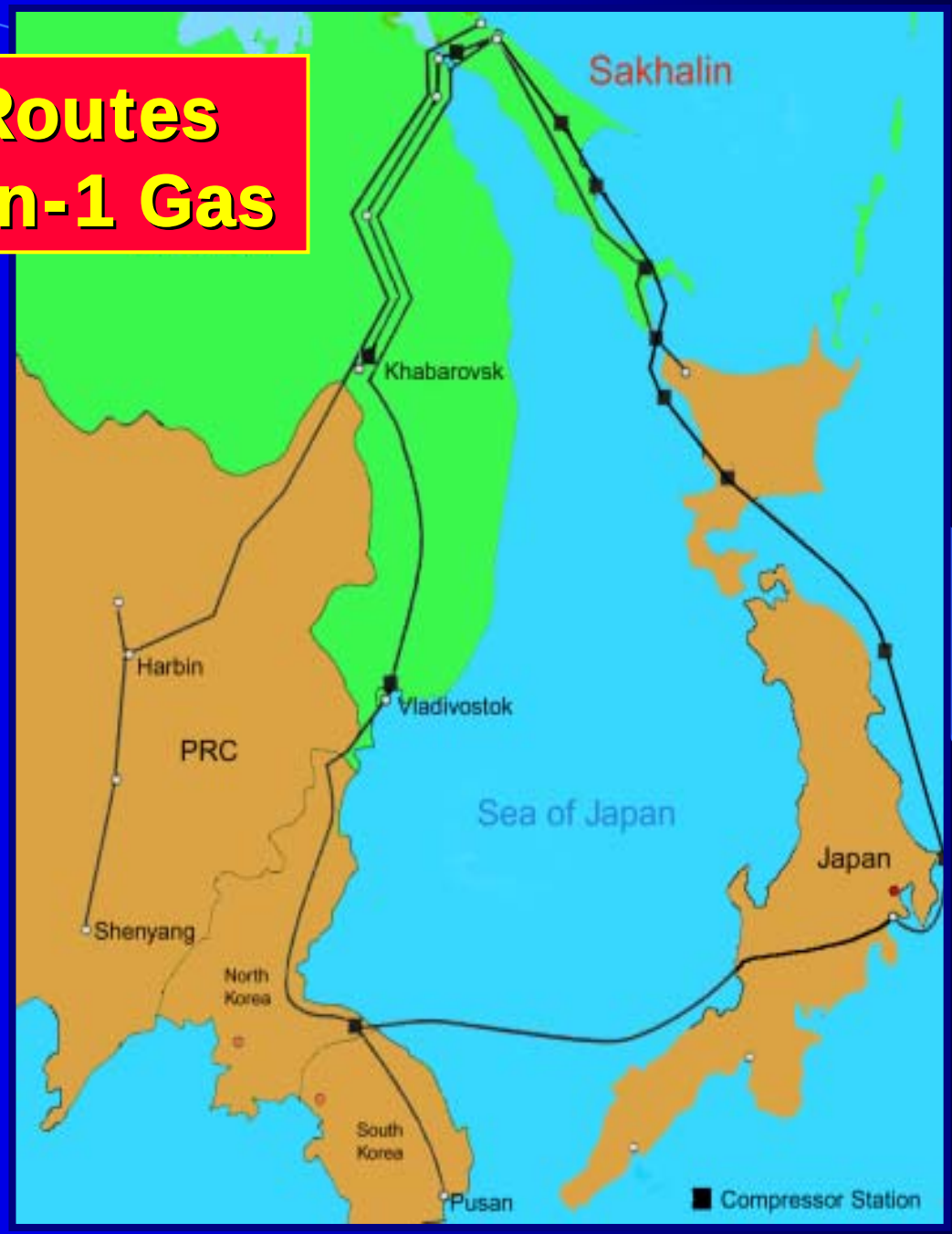
oil – 2005/06, gas – 2008 (?)

Maximum annual output:

oil – 24 Mt (2011),
gas – 17-20 Bcm (after 2023)

Current Status: Active, Under Revision; Commerciality Declared

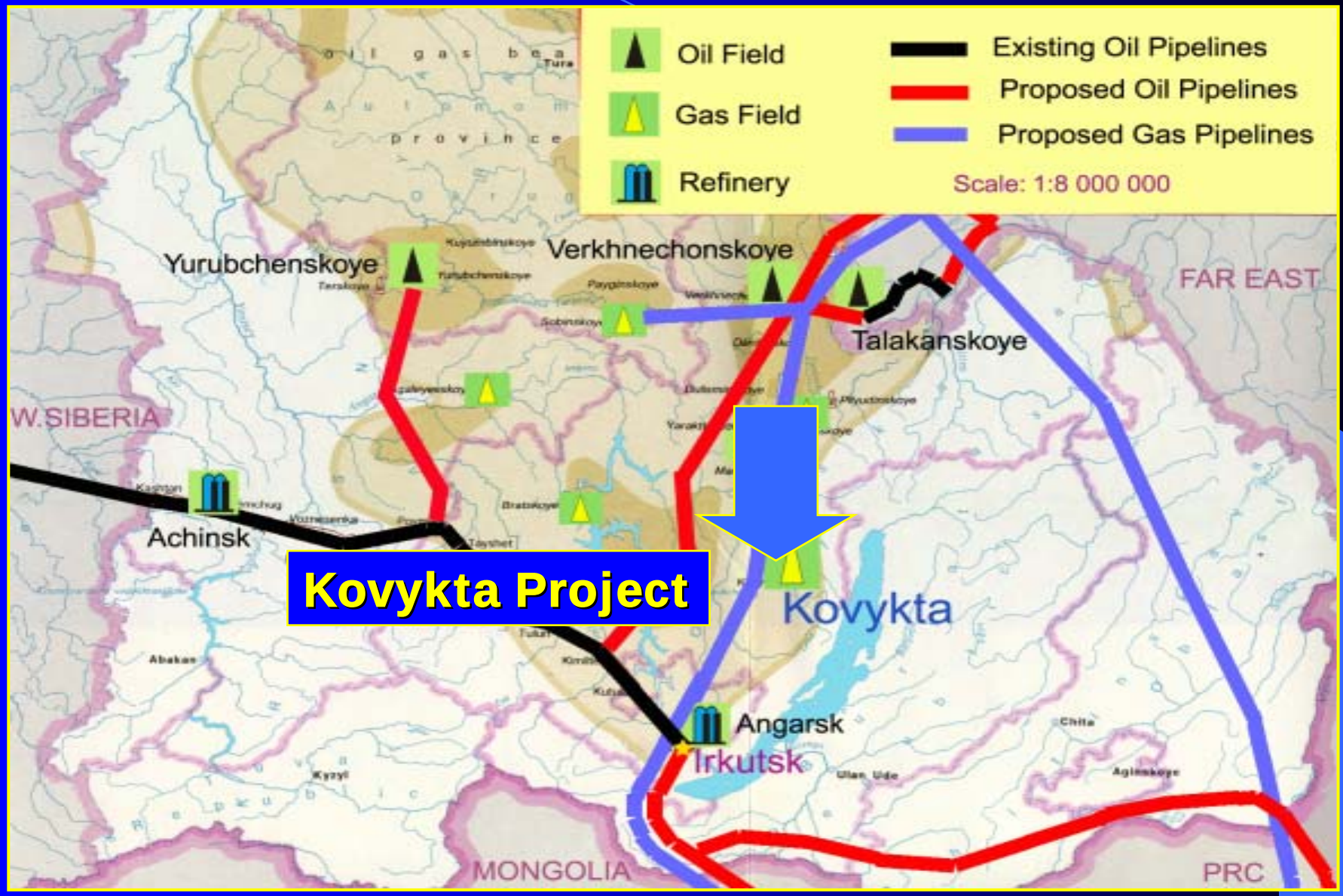
Proposed Routes for Sakhalin-1 Gas



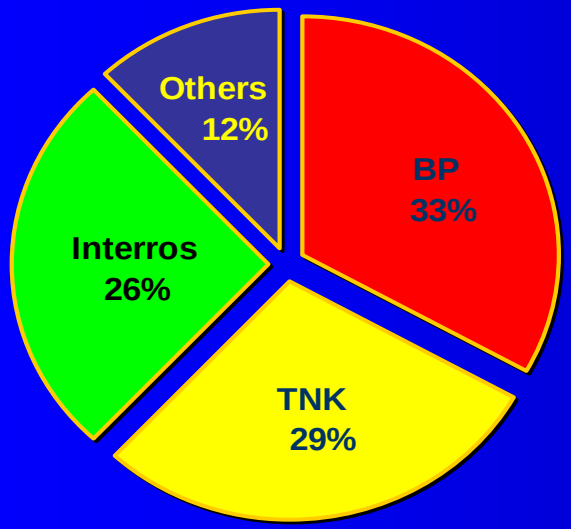
Overall length:
1,950/2,270 km
Thruput capacity:
8 Bcm/yr
Start of delivery:
2008 (?)
Estimated Capex:
not disclosed

Proposed Routes for Sakhalin-1 Gas: Current Option (09/02)

South of East Siberia, Irkutsk Region



Kovykta

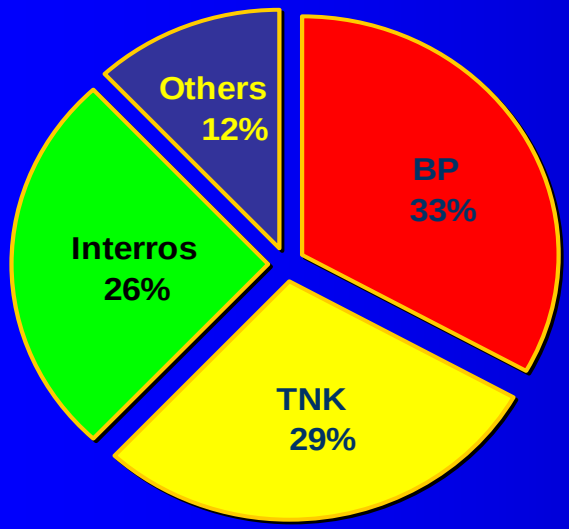


Main Objectives:

- Development and exploitation of Kovykta gas-condensate field
- Construction of a 3,400-4,500-km gas pipeline to the PRC and South Korea via or by-passing Mongolia
- New Alternative: Construction of a 4,000-km gas pipeline to Pacific's Nakhodka and of a major LNG plant there

Kovykta Project: Alternative Pipeline

Kovykta



Main Objectives:

- Development and exploitation of Kovykta gas-condensate field
- Construction of a 3,400-4,500-km gas pipeline to the PRC and South Korea via or by-passing Mongolia
- New Alternative: Construction of a 4,000-km gas pipeline to Pacific's Nakhodka and of a major LNG plant there

Reserves:

gas – 1.4-2.2 Tcm,
condensate – 80-120 Mt

Start of export: 2008-2010 (?)

Maximum annual export:

30 Bcm (after 2015)

Estimated Capex:

$7-10 Bn (field)
$6-9 Bn (pipeline)

Current Status: Impeded by Lack of Progress in Negotiations with the PRC

Less Advanced Projects

- **Sakha-China** (Chayanda Gas):

  Construction of a 12-20 Bcm/y 1,870-km pipeline from Chayanda field (south-western Yakutia; 1.24 Tcm of explored reserves) to Shanyang (PRC) @ ~ $6 Bn

Sakha-China Project: Chayanda Pipeline

Less Advanced Projects

- **Sakha-China** (Chayanda Gas):

  Construction of a 12-20 Bcm/y 1,870-km pipeline from Chayanda field (south-western Yakutia; 1.24 Tcm of explored reserves) to Shenyang (PRC) @ ~ $6 Bn

- **W. Siberia-China** (Gazprom):

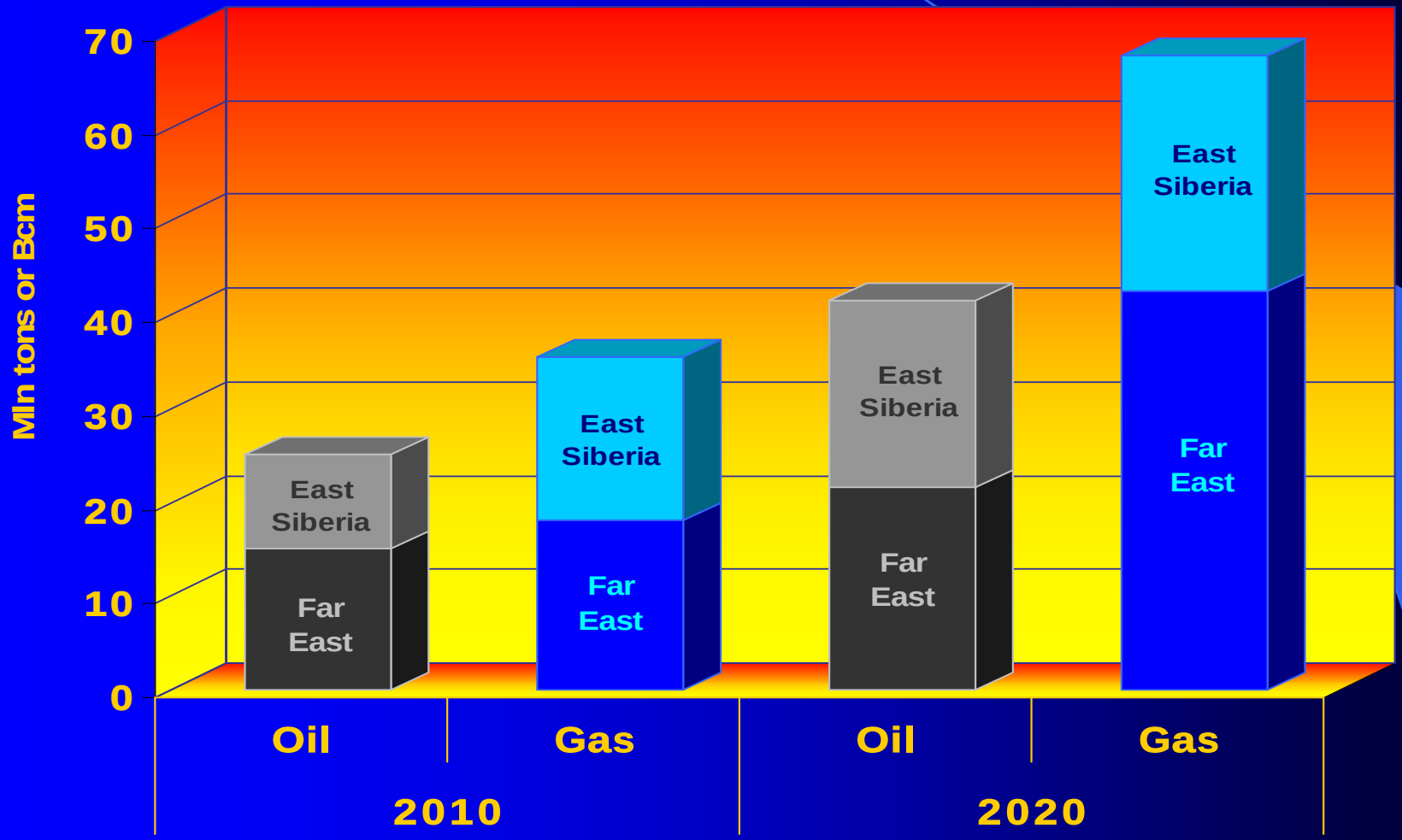
  Construction of a 30-38 Bcm/y 7,640-km pipeline from Pur-Taz fields (northern Tyumen; 1.2 Tcm of explored reserves) to Shanghai (PRC) @ ~ $15 Bn (incl. $9 bn for pipeline)

RFE's Hydrocarbon Balances – 2000-2020

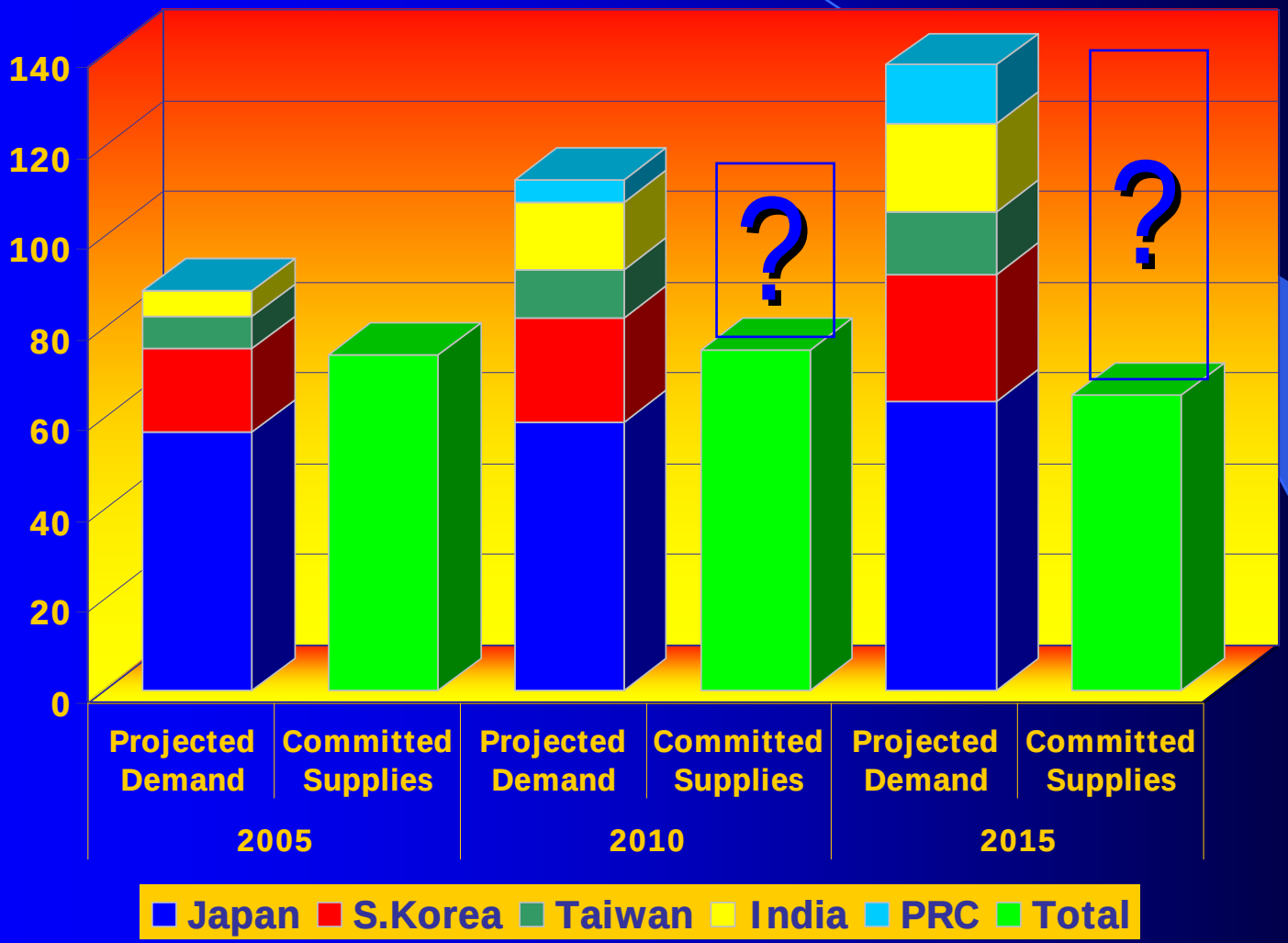
	2000[1]	2010	2020
Natural Gas, Bcm			
Indigenous Production	3.5	20-34	55-75
Inland Consumption	3.5	8-10	20-25
Exportable Surplus	0	12-24	35-50
Crude Oil[2], mln tons			
Indigenous Production	3.8	23-29	30-40
Inland Consumption[3]	6.3	10-12	12-15
Exportable Surplus	–2.6	13-17	18-25
Oil Products, mln tons			
Indigenous Production	6.3	9-11	11-14
Inland Consumption	7.1	10-15	20-25
Exportable Surplus	–0.8	–(1-4)	–(9-11)

(1) Actual. (2) Including field condensate. (3) Refinery intake, own and direct use, and losses.

Russian East's Export Potential: 2010-2020



Asia-Pacific LNG Balance: 2005-2015, Mt/y



Sources: FACTS Inc. and author's estimates

Any Room for Russian LNG?

- **Sakhalin-2** (9.6 Mt/y, starting from 2006/07):

  Definitely "Yes", if mutually beneficial long-term sales contracts are concluded by 2003

- **Kovykta LNG** (>10 Mt/y, starting after 2010):

  Obviously "No", as Asia-Pacific LNG deficit will be readily met by available alternative supplies

What about Russian Pipeline Gas?

Potential Export Supplies:

- Sakhalin-1: **8** Bcm/y after 2008 (?)
- Kovykta: **20** Bcm/y (after 2010), **30** Bcm/y (after 2015)
- Chayanda: **12-20** Bcm/y, starting after 2010 (?)
- W.Siberia: **30-38** Bcm/y, starting after 2010 (??)
- Total: **8** Bcm/y (after 2008) and **80-96** Bcm/y (after 2015, provided that the PRC's market is available)

Potential Import Requirements:

- Japan: **8** Bcm/y after 2008 (?)
- PRC: **12-20** Bcm/y (likely after 2015)
- ROK: **7-10** Bcm/y (conditioned on committed supplies to the PRC)
- Mongolia & DPRK: **1-2** Bcm/y (conditioned on committed supplies to the PRC and/or the ROK)
- Total: **8** Bcm/y (after 2008) and **28-40** Bcm/y (after 2015, provided that the PRC's market is available)

Russian Pipeline Gas: Reality Check

What is on Offer for Asia's Continental Markets?

- 72-88 Bcm/y after 2015 (including 64-76 Bcm/y for China) but Nothing, if the Chinese Market is Unavailable

What is on Ask by Asia's Continental Markets?

- 20-32 Bcm/y after 2015 (including 12-20 Bcm/y by China) but Nothing, if the Chinese Market is Unavailable

Conclusions:

- Chinese Market's Requirements Determine Russia's Gas Supplies to Continental Asia (including ROK, DPRK, and Mongolia)
- These Supplies Fully Depend Upon China's Gas Needs to Import Russian Gas

Does China Really Need Russian Gas?

- As China lacks gas distribution network (requiring ~US$30Bn to create) and relies upon cheap coal, the Chinese insist on low, coal-linked import gas prices (~US$30/1,000 cm against ~US$100/1,000 cm asked for Kovykta gas)
- Beijing is highly concerned about national energy security and prefers to rely upon costy indigenous gas supplies (like those from the Tarim basin @ over US$150/1,000 cm to deliver)
- Russia is actually regarded as a residual gas supplier: "Even if Tarim runs short, [other] domestic gas reserves… could supplement… Russia is the last choice", stated PetroChina vice-president Shi Xingquan in his recent (July 2002) interview to the *China Daily*

Implications for South Korea

- Pipeline gas deliveries from Russia should be completely ruled out before after 2015 (as fully dependent upon the questionable availability of the Chinese gas market)

- Available LNG supplies should be considered instead, with the nearby Sakhalin-2 project likely offering the most competitive and reliable choice for incremental gas imports

THANK YOU
FOR YOUR ATTENTION!