

IEEJ: November 2009

Northeast Asia Petroleum Forum 2009

Korean Oil & Gas E&P : Current Status and Outlook

North East Asian Forum
Institute of Energy Economics, Japan

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Global E&P Environment and Challenges for NEA

Increasing Difficulties

- Easy, Cheap Oil ⇒ **Tough/Hard Oil**
 - No more decent reserves in 'Easy-to-access' Area
 - the industry turns to untapped resources!
(ex. deepwater, frontier, unconventional)
 - Face an array of Challenges!
 - Natural production declines in Mature fields
 - Number of new big discoveries are reducing!

Global E&P Environment and Challenges for NEA

Increasing Difficulties

- **“Aboveground Access” Is what really matters!**
 - Sufficient Oil & Gas Resources underground
 - Proven Oil Reserves of 1.2 Trillion Barrels plus Non-conventional Oil (Upto 7 Tri.B)[IEA]
 - However, Reserve Access is Limited due to ;
 - Neo-Resource Nationalism in Producing Countries
 - Heightening Geopolitical Risk in Producing Countries

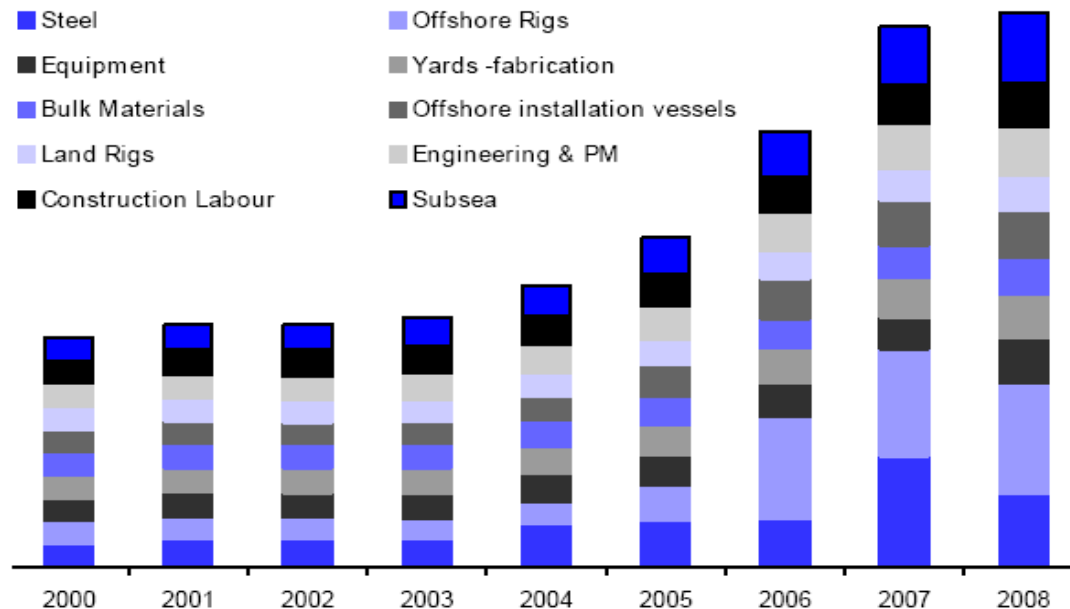
Global E&P Environment and Challenges for NEA

Increasing Difficulties

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▪ Spiraling E&P Costs !

- New E&P Spots : Deepwater, Frontier, Unconventional
- Limited access promotes E&P cost escalation : More than doubled since 2000
- Prolonged E&P activities in Frontier areas will underscore rising costs



Source: CERA data, Deutsche Bank estimates

Global E&P Environment and Challenges for NEA

Increasing Difficulties

- **Lack of Investment**

- Lack of E&P Investment in the 1990s(Low Oil Price Times)

causes ;

- Shortage of Skilled/Experienced personnel
 - Shortage of Adequate Equipments

Global E&P Environment and Challenges for NEA Vulnerability in Oil Supply Security

Dependence on Middle East for Crude Oil

	China	Japan	Korea	US	Europe
Middle East % of Total Imports	50.0%	86.9%	86.3%	18.6%	19.3%
Alternative Sources	<ul style="list-style-type: none"> ▪FSU ▪West Africa 	<ul style="list-style-type: none"> ▪Almost None 	<ul style="list-style-type: none"> ▪Almost None 	<ul style="list-style-type: none"> ▪Canada ▪Mexico ▪South America ▪Central America ▪West Africa And so on . . 	<ul style="list-style-type: none"> ▪FSU ▪North Africa ▪West Africa ▪South America ▪Central America And So On . . .

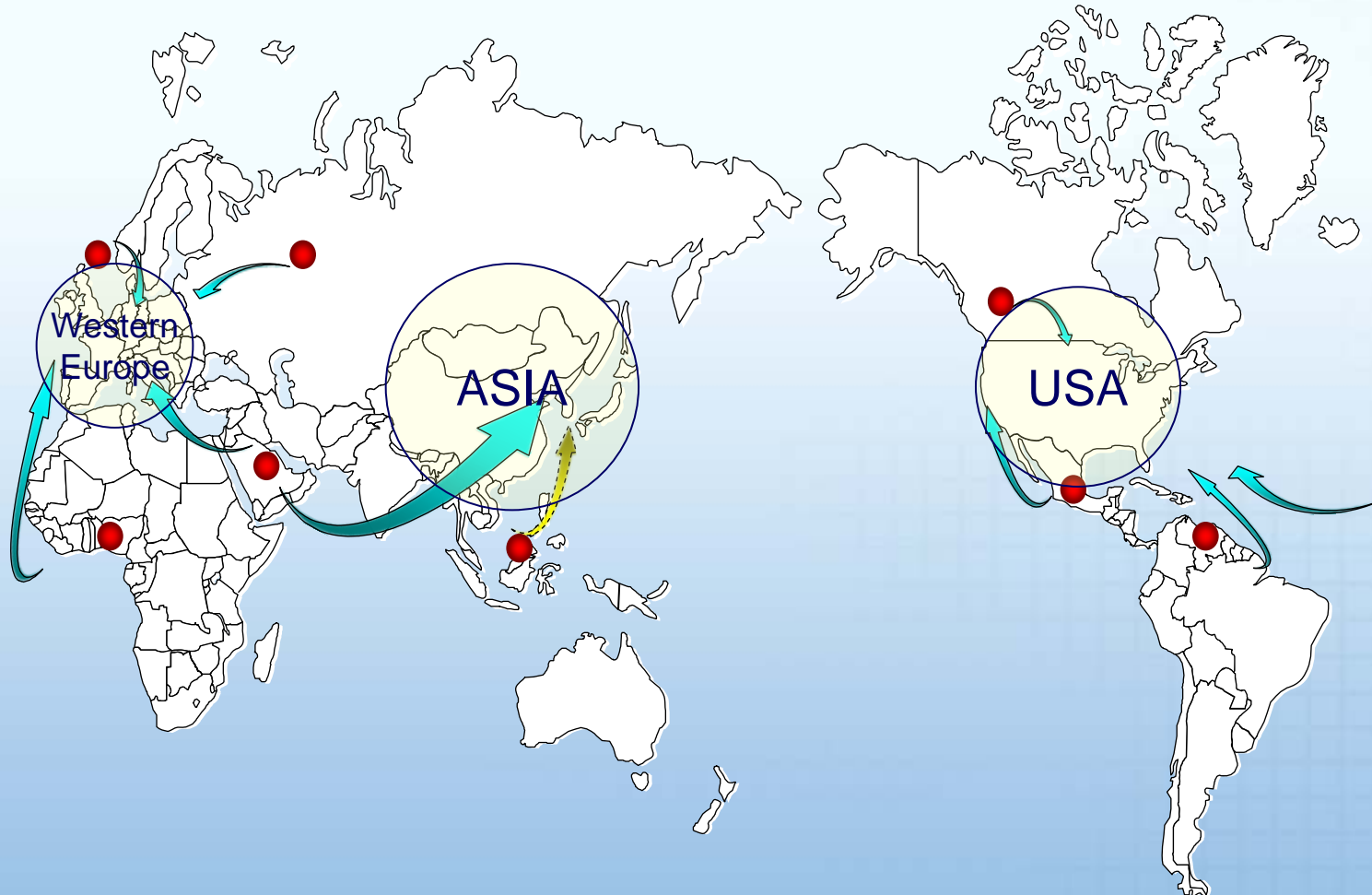
Source : BP Statistical Review of World Energy 2009 , Petroleum Intelligence Weekly February, 2009

- Compared to other regions NEA countries have few sources other than ME
- It is hard to secure stable supply from ME for the political reasons
- Thus it is inevitable for NEA countries to look for overseas E&P projects

Global E&P Environment and Challenges for NEA

Vulnerability in Oil Supply Security

- **Limited Oil Import Sources other than Middle East**



E&P Policy of Korea

▪ Korea's Petroleum Demand

- Korea is the World Ninth Largest Oil Consumer (2.1mil.B/D)
- Oil Composes 43.3% of Total Energy Demand(2007)
 - To be reduced to 33.3% in 2030
- However, the absolute volume of consumption is to stay
 - Large Portion of Industrial Use : 55%(1,150th.B/D)
 - Especially, Naphtha demand : 40% (847th.B/D)
- Needs for Stable Supply Security ⇒ **Needs for E&P**

▪ Target Rate of Equity Productions to Consumption

2008	2009	2010	2011	2012	2013	2030
5.7%	7.4%	9.1%	13.9%	18.1%	20.0%	40.0%

E&P Policy of Korea

■ Milestones of Korea's E&P History

- 1973 The First Oil Shock
- 1979 Establishment of KNOC
- 1981 KODECO starts E&P in Indonesia
- 1984 KNOC, SK Energy led consortium starts E&P in Yemen
- 1987 Gas Discovery in Korean Continental Shelf
- 1990 Discovery of Libyan Elephant Fields(Production commence in 2004)
- 1992 Vietnam Block 11-2 Awarded (as operator)
- 1998 Discovery of Donghae-1 Gas Field (Production commence in 2004)
- 2000 Discovery in Vietnamese Block 15-1 (Production commence in 2003)
- 2003 Myanmar Block A-3 spud (Daewoo, Production commence in 2005)
- 2004 Production commence in Camisea, Peru (SK Energy)
- 2006 Acquisition of Black Gold (Oilsands) Block in Alberta, Canada
- 2008 Acquisition of ANKOR(former Taylor Energy) in Gulf of Mexico,USA
- 2009 Acquisition of Petro-Tech (Peruvian)

E&P Policy of Korea

- **Korean Equity Production and Reserves Increased through 2000s**
 - Reserves : 916 mil.BOE(Dec.2000) \Rightarrow 2,248 mil.BOE(Dec.2008)
 - Production : 47.6 thou.BOE/D(Dec.2000) \Rightarrow 186 thou.BOE/D(Dec.2008)

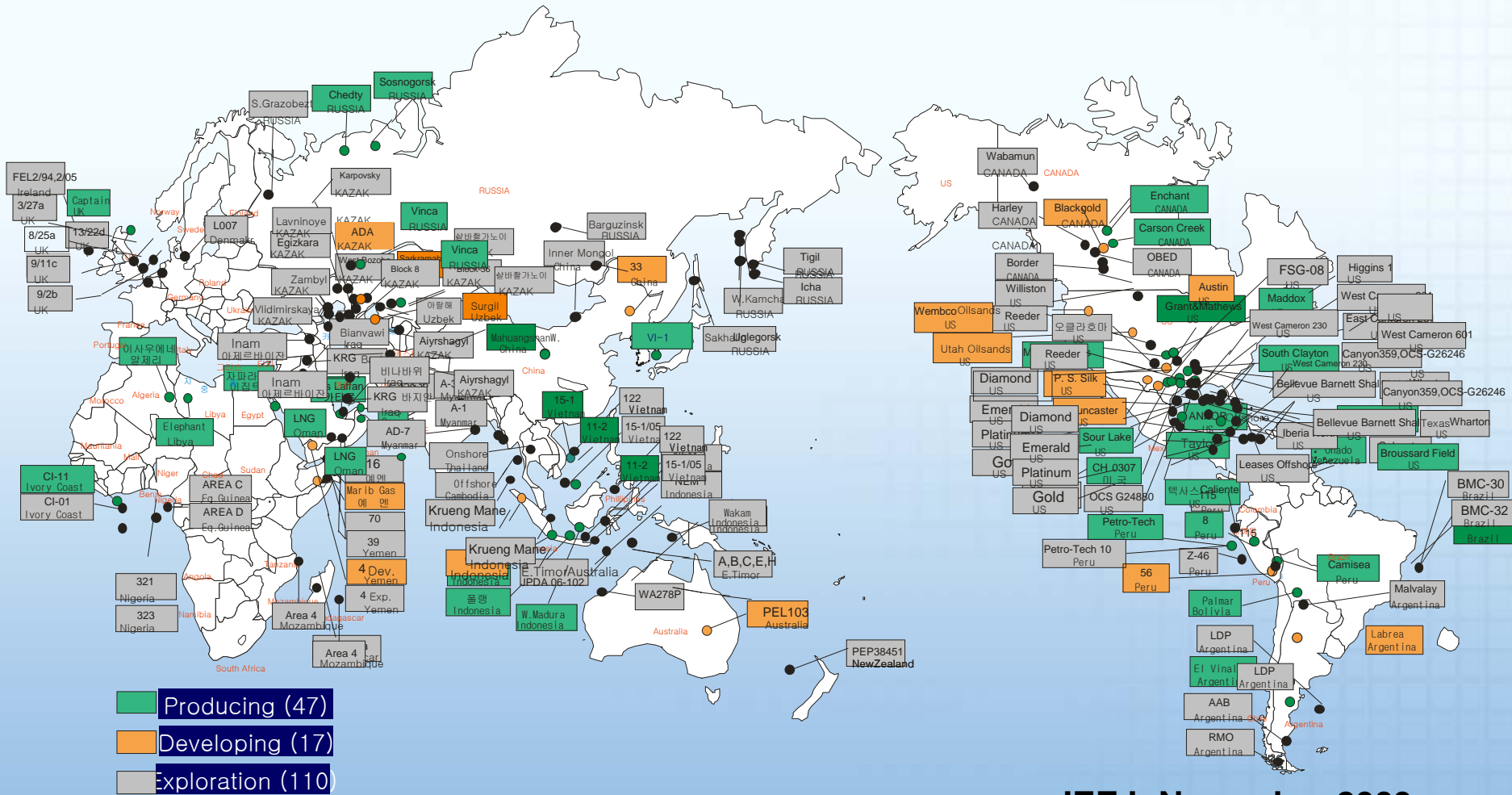
Equity Reserves and Production

As of Dec.2008

	Crude Oil (thou.Bbl)	Gas (thou.Ton)	Crude&Gas (thou.Bbl)
Reserves	1,079,627	259,749	2,248,346
Equity Production (B/D, Ton/D)	89.6	11.3	186

E&P Policy of Korea

● 174 E&P Projects in 39 Countries (Including Korea) (as of Aug. 31, 2009)



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E&P Policy of Korea

▪ Policy for Supporting E&P Business

- Supporting KNOC to be Regional Major Company and Leads the Korean E&P Sector
- Active Support of Private E&P Companies
- Use of Private Sector Funds in Producing Projects
 - Low Risk, but Large Amount of Funds Required
 - Oil Development Fund, Pensions
- National Oil Company Lead with Government Support in Exploration and Developing Projects
 - High Risk, but Small Amount of Funds Required
 - Inducing Investment for Private E&P Companies

E&P Policy of Korea

Energy Strategies in 2009

Prior Policy 1

Green Growth

Prior Policy 2

Stable Energy
Demand/Supply

Prior Policy 3

***Resources
Development
Projects***

Prior Policy 4

Energy Welfare
& Safety

Raising Global Competency in E&P

Reinforcing Diplomatic Relationship with Producing Countries

Expanding E&P Infrastructure

Concentrating on Non-Conventional and Domestic E&P

E&P Policy of Korea

Raising Global Competency E&P

- Enlarging Size and Capability of KNOC
 - World's 60th Company by 2012
- Acquiring Producing Assets
 - Adding Producing Blocks to Secure Stable Oil Supply

Reinforcing Diplomatic Relationship with Producing Countries

- Strengthening Official Development Aid (ODA) for Developing Countries
- Interactive Multi-dimensional Cooperation with Producing Countries

E&P Policy of Korea

Expanding E&P Infrastructure

- Financing for E&P
 - Establishing Oil Development Funds : KNOC invest 100 bil. Won (\$84mil.) to induce Private Sector
 - State-controlled Financial Institutes to Support Loans and Guarantees
- Nurturing Experts
 - Establishing 'School of Petroleum Engineering'
- Improving Core Technical Skills
 - Strengthening Support for Research & Development

Concentrating on Non-Conventional and Domestic E&P

- Non-Conventional Oil
 - Participating in Extra-Heavy Oil Projects
- Korean Continental Shelf

Strategy of KNOC Overview

Introduction



- **Founded March 1979**
- **To Provide Hope and Comfort the People through Stable Oil Supply**

Exploration & Production

*Production 72 thou.B/d
Reserves 622 MMBbl*

Stockpiling Petroleum

*Storage 115 MMB
Capacity 138 MMB*

Improving Petroleum

*Distribution
Infra-structure*

Financing & Technical Support

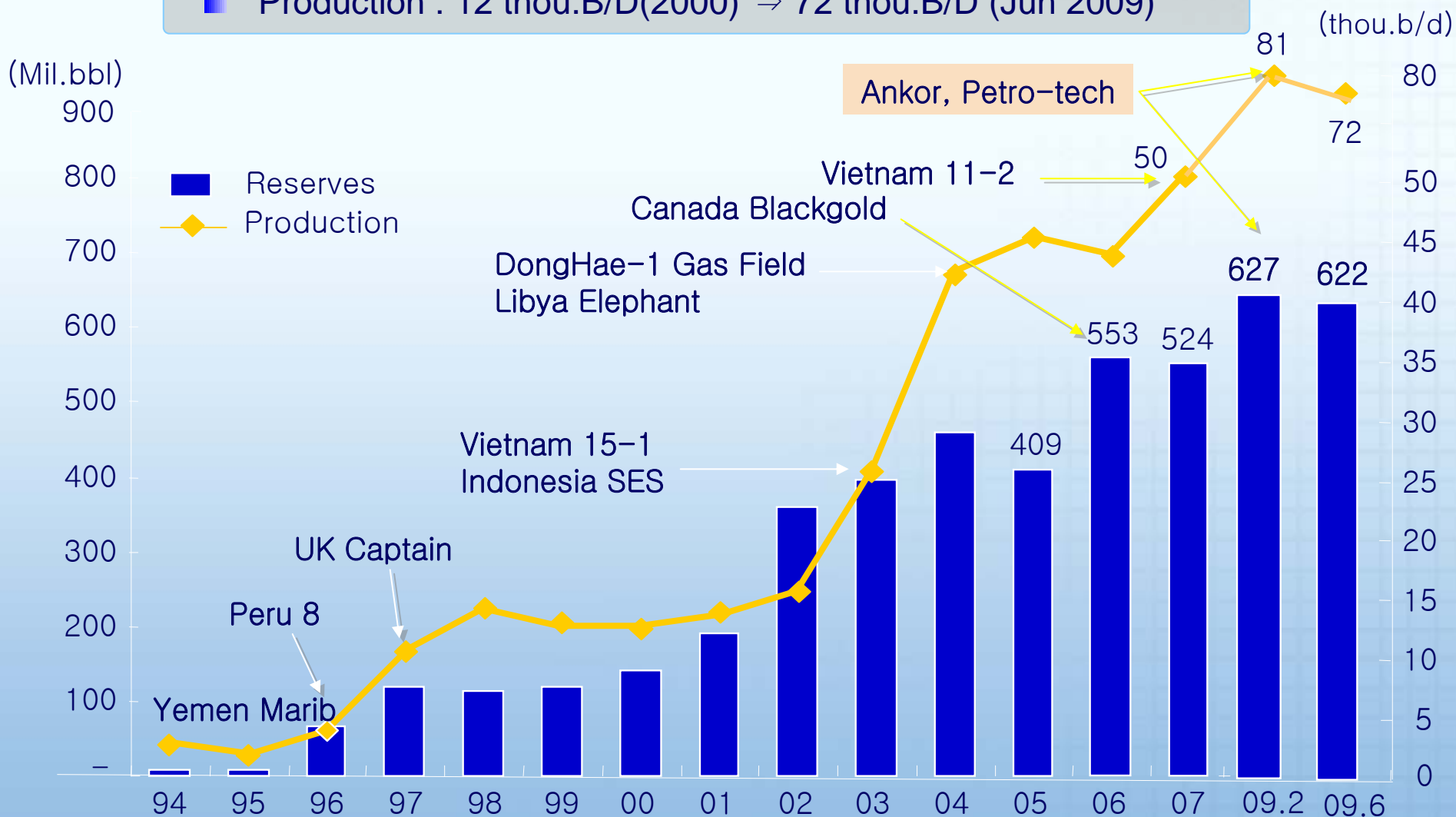
Stabilizing Petroleum Supply

Contributing to the Korean Economy

Strategy of KNOC Overview

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- Reserves : 140 mil.Bbl(2000) ⇒ 622 mil.Bbl (Jun 2009)
- Production : 12 thou.B/D(2000) ⇒ 72 thou.B/D (Jun 2009)

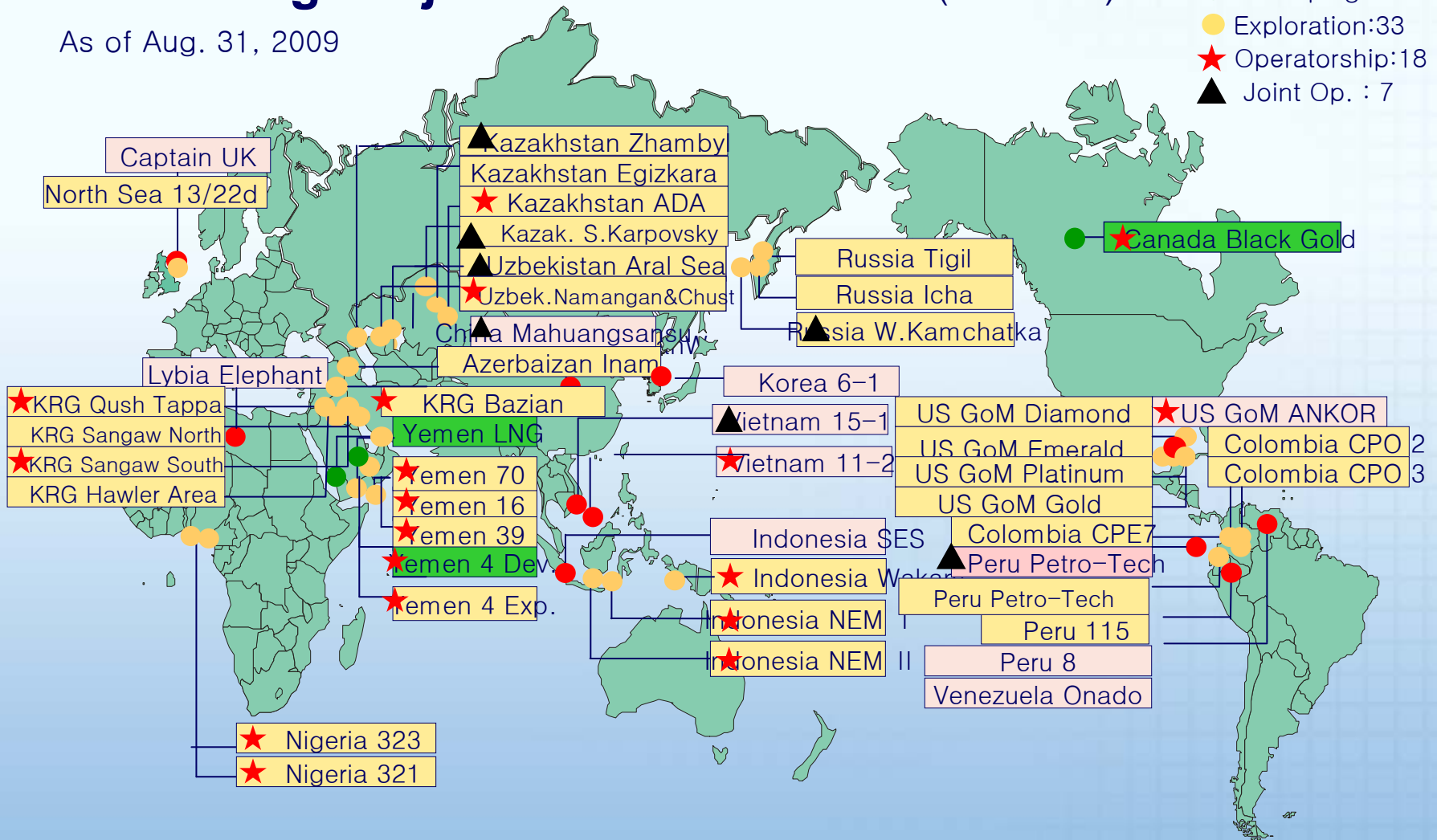


Strategy of KNOC Overview

47 On-Going Projects in 18 Countries (Inc. Korea)

As of Aug. 31, 2009

- Producing: 11
- Developing: 3
- Exploration: 33
- ★ Operatorship: 18
- ▲ Joint Op. : 7



Strategy of KNOC

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Achievements during 2008

- 9 Exploration Blocks, 2 Producing Blocks

Name of Blocks	KNOC Interest	Oil/gas	Total Resources (Oil Equivalent)	KNOC's Resources
US Taylor Producing	80%	Oil	61 mmbbl	48.8 mmbbl
Kazahgstan Zhambyl	9.45%	Oil	1,600 mmbbl	151.2 mmbbl
Iraq KRG Qush Tappa	80%	Oil	1,008 mmbbl	806 mmbbl
Iraq KRG Sangaw South	60%	Oil	320 mmbbl	192 mmbbl
Iraq KRG Sangaw North	20%	Oil	786 mmbbl	157 mmbbl
Iraq KRG Khabat	15%	Oil	1,094 mmbbl	164 mmbbl
Iraq KRG Dimir Dagh	15%	Oil	630 mmbbl	95 mmbbl
Iraq KRG ZAB	15%	Oil	1,496 mmbbl	224 mmbbl
Iraq KRG Hawler	15%	Oil	617 mmbbl	93 mmbbl
Iraq Bazian	20%	Oil	1,272 mmbbl	254 mmbbl
Columbia exploration	30%	Oil	333 mmbbl	100 mmbbl
Total			9,454 mmbbl	2,285 mmbbl

Strategy of KNOC

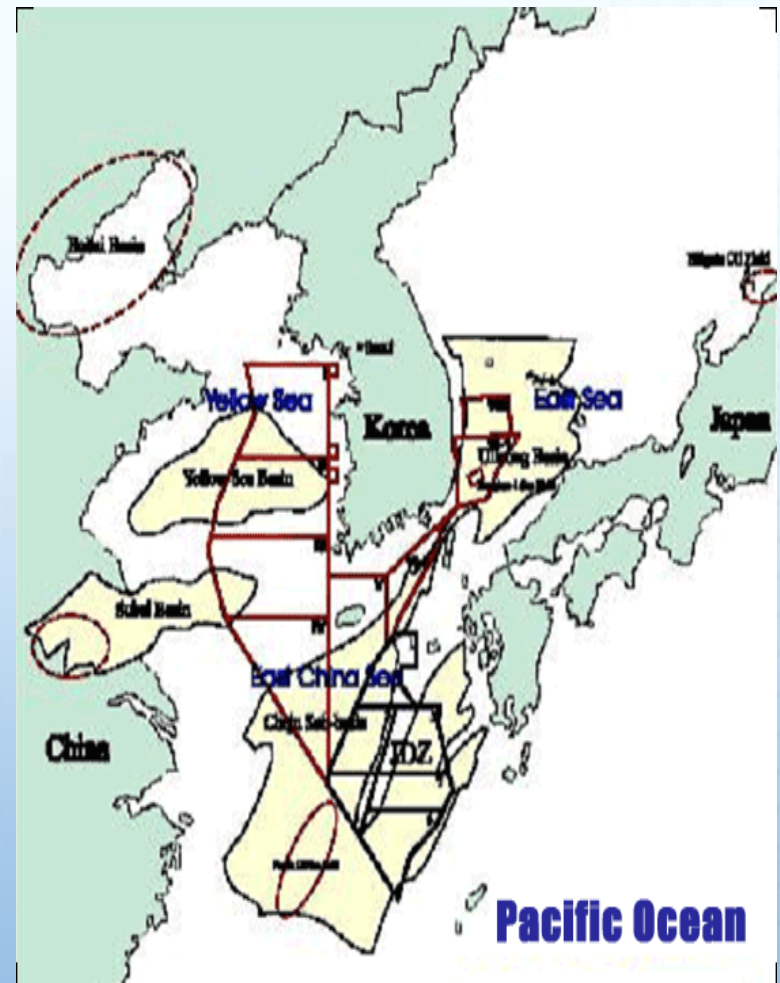
Successful E&P Activities

Donghae-1 Gas Field (South Korea)

KNOC discovered the first
commercial natural gas field
Donghae-1 in East Sea of
South Korea

- Share (%)
 - * KNOC 100%
- Reserves : 169 bil.cf
- Production Start : Jul. 2004
- Current Prod. Rate : 50 mil.cf/d

Block Map



Strategy of KNOC

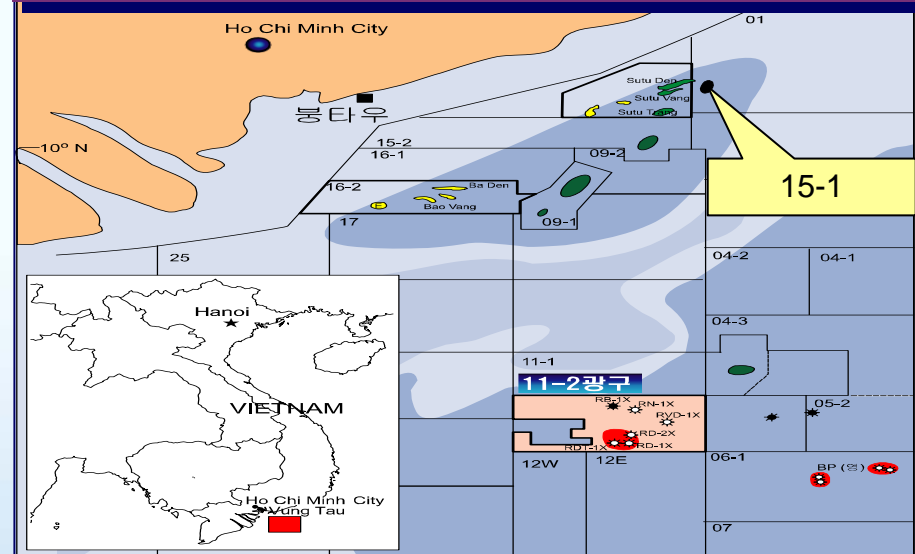
Successful E&P Activities

Block 15-1(Vietnam)

A milestone in a 20-year history of overseas oilfield development

- Participated in 1998
- Share (%)
 - * Korea : KNOC 14.25%, SK 9.0%
 - * Vietnam : PV 50%
 - * USA : ConocoPhillips 23.25%
 - * France: Geopetrol 3.5%
- Reserves : 568 mil.Bbl
- Production Start : Oct. 2003
- * Current Prod. Rate : 103,000 b/d

Block Map



FPSO



Strategy of KNOC

Successful E&P Activities

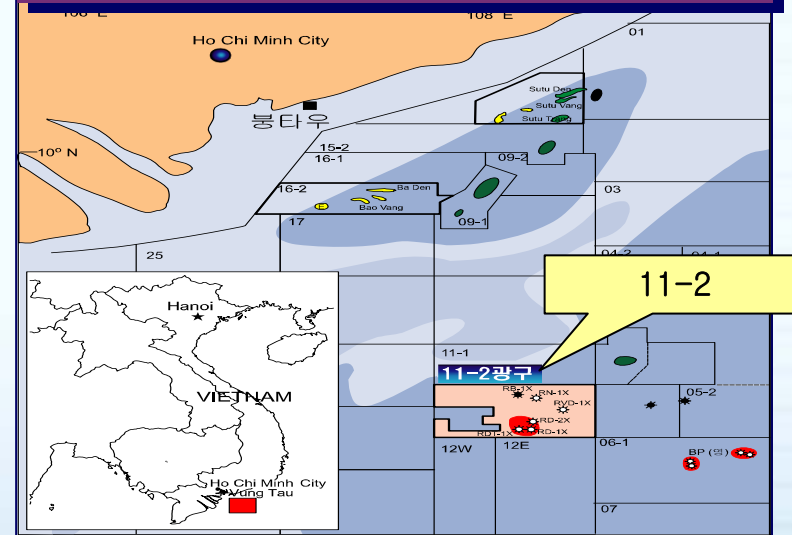
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Block 11-2 (Vietnam)

KNOC operates the producing block using Korean technology and capital

- Participated in 1992
- Share (%)
 - * Korea : 75% [KNOC 39.75%, LG11.25%, Daesung 6.9375%, Daewoo etc. 7%]
 - * Vietnam : PVEP (25%)
- Reserves : 163 mil.BOE
- Production Start : Nov. 2006
 - * Current Prod. Rate : 30,000boe/d
- Oil discovered in RONG TRE prospect in 2005

Block Map



Flat form



Strategy of KNOC

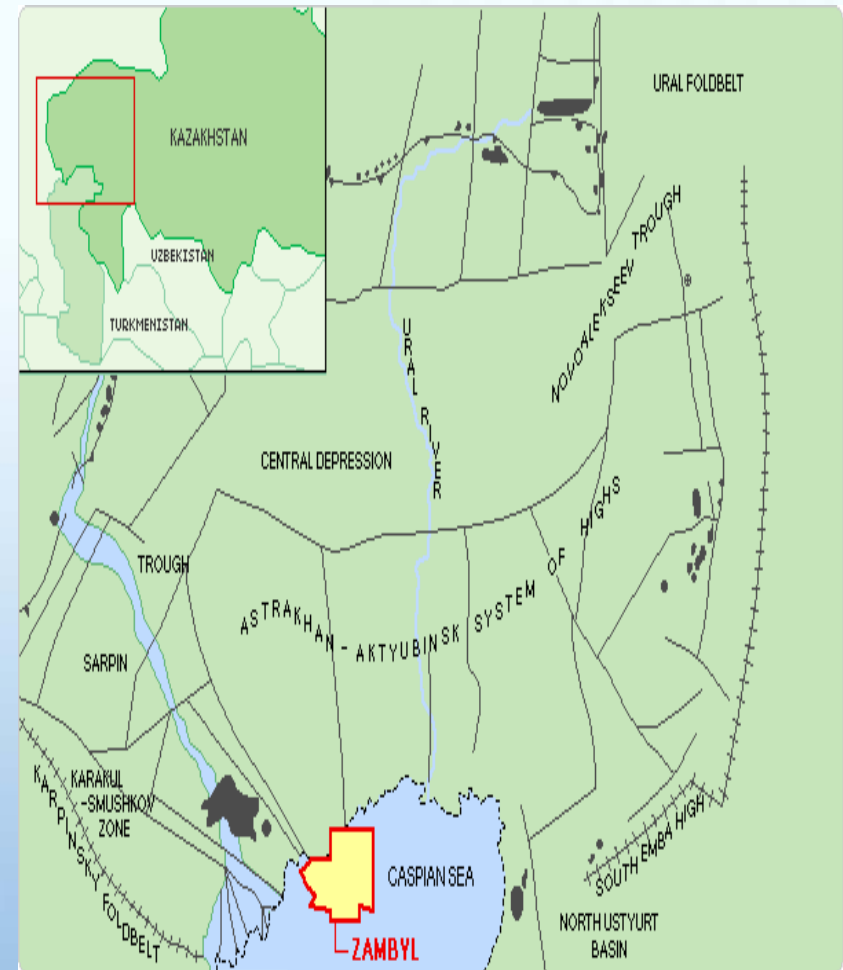
Successful E&P Activities

Zhambyl (Kazakhstan)

Operating large exploration block in CIS region with Kazakhstan's National Oil Company

- Participated in Jan 2009
- Share (%)
 - * KC Kazakh B.V. (Korea) : 27%
(KNOC 9.45%, SK etc. 17.55)
 - * KMG (Kazakhstan) : 73%
- Operator : KC Kazakh B.V. & KMG
(Joint Operation)
- Exploration Period : 6 years
- Prospected Resources : 1.6 billion bbl

Block Map



Strategy of KNOC

Successful E&P Activities

BlackGold Oilsands (Canada)

Acquisition of BlackGold Oil Sand in 2006

- Participated in 2006(Jul.)
- Share (%)
 - * Korea : KNOC 100%
- Reserves : 234 million barrel
- Current Stage : Development
- Production Schedule
 - *10,000b/d('12), 30,000b/d('18)

Block Map



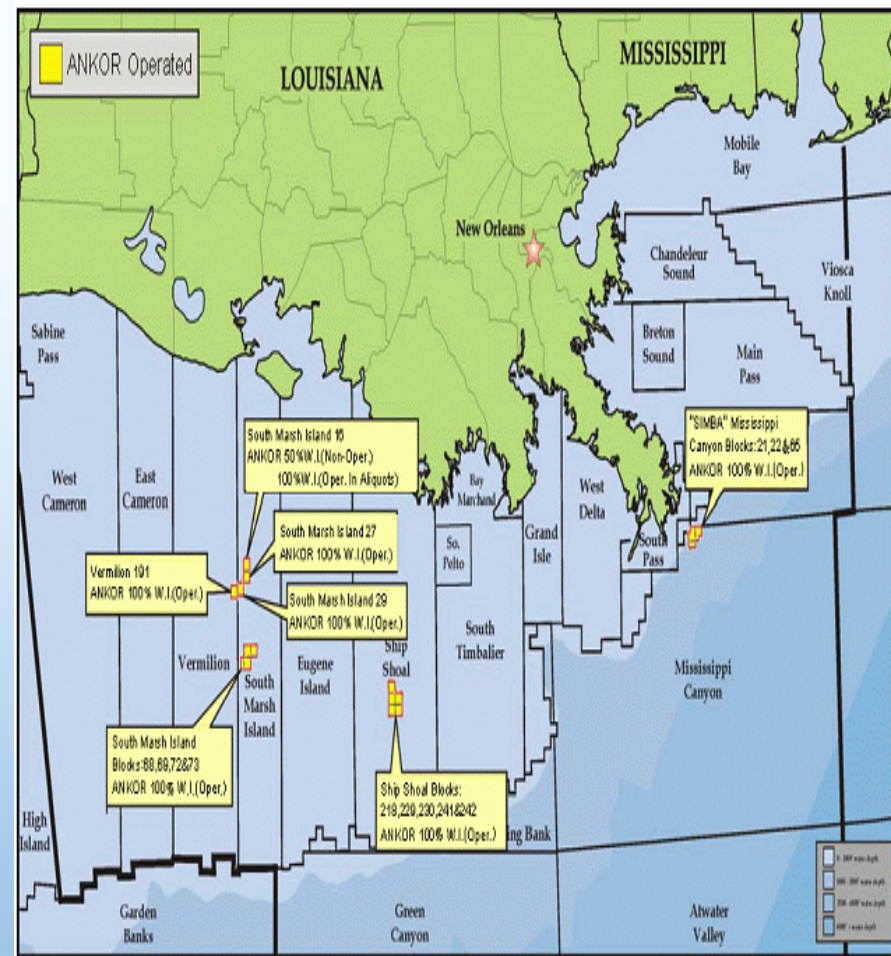
Strategy of KNOC Successful E&P Activities

ANKOR (USA)

KNOC's successful M&A deal (Taylor Energy)

- Acquired in Mar. 2008
- 5 production blocks
- Share (%)
 - * KNOC 80%,
 - * Samsung 20%
- Reserves : 76 mil.Bbl
- Current Prod. Rate : 18,000 boe/d

Block Map



Strategy of KNOC

Successful E&P Activities

Petro-Tech (Peru)

KNOC's successful M&A deal

- Acquired in Feb 2009
- Share (%)
 - * Korea : KNOC 50%,
 - * Columbia : Ecopetrol 50%
- Reserves(2P) : 158 million barrel
- Production : 14,900boe/d

Block Map



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Strategy of KNOC

Successful E&P Activities

Block Elephant (Libya)

The biggest oil discovery since
mid 1980s in Libya

- Participated in 1991
- Share (%)
 - * Korea :4% [KNOC 2%, SK etc. 2%]
 - * Italy : ENI (8%)
 - * NOC : Libya [88%]
- Reserves : 488 mil.Bbl
- Production Start : May 2004
- * Current Prod. Rate : 121,000 b/d

Block Map



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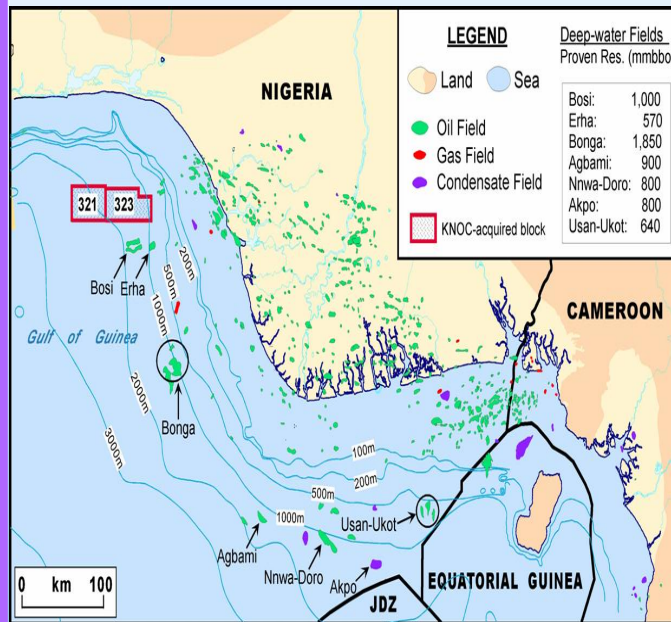
Strategy of KNOC

Successful E&P Activities

Block OPL321,323 (Nigeria)

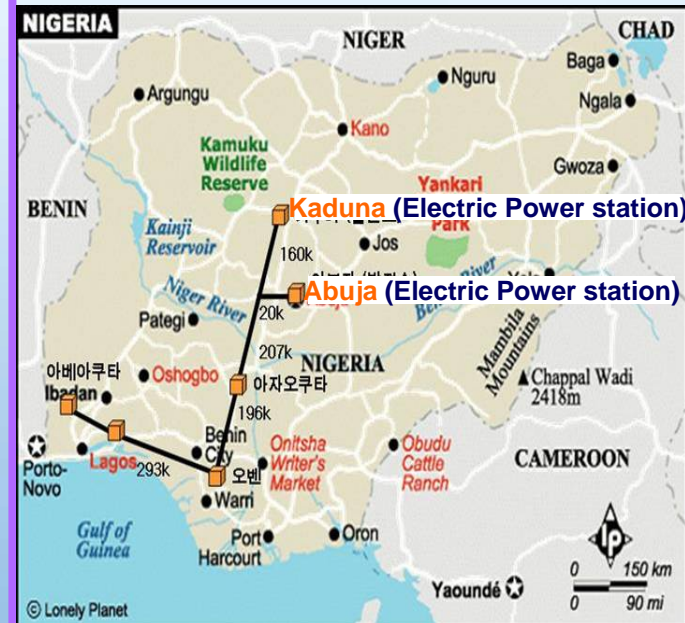
Upstream

- OPL 321 & OPL323
- Co-Biz Structure
- Korea 60%, Equator 30%, Nigeria Local 10%



Downstream

- Electronic Power Business
- Building 2 Power Station [2,250MW] and Gas Pipeline [1,200km]



Strategy of KNOC Tasks

Regional Major Company

Production of 300 thou.B/D by 2012

**Enlarging
Organizational
Scale**

- Organic Growth thru M&A
(Producing Assets)
- Financing Ability
- Operator Capability

**Focusing on
Key Projects**

- Focusing on Core Areas
- Expanding Support for R&D
- Strengthening Int'l Network

**Global
Competency**

- Improving Operating
Techniques
- Nurturing Talented Experts

Strategy of KNOC Target by 2012

Regional Oil Major

Establishment
as a Competitive Oil Major

Reserves
(Billion bbl)

0.6

1.9

x4

**Technical
Experts**
(100 personnel)

5

25

x5

Asset
(Billion \$)

9.4

30

x3

Production
(1000 b/d)

60

300

x5

**World
Ranking**

98th

60th

38

Strategy of KNOC Target by 2012

● Growing up of KNOC

KNOC's role has evolved from oil stockpile to a major player in upstream in and outside the country

TODAY

● Established World Class National Petroleum Company

2012

- 6X Growth in Production
- 4X Growth in E&P Reserves
- 3X Growth in asset
- Proved and Experienced energy company

2008

Industry Opportunities and National Interests Support Case for a new KNOC Mission

1999

- The concept for stockpile changed from "Static" to "Dynamic".
- invested in twenty E&P ventures in domestic and

1989

- Discovered natural gas in domestic continental shelf
- Participated in overseas E&P ventures

1979

- KNOC founded
- to secure oil supplies for the nation

Stockpiling

E&P Ventures Acquisition

Growth Strategy focused on Upstream

Strategy of KNOC

Core Strategic Area



Strategy of KNOC Technical Advancing

Advanced Technical Skills

Deepwater Exploration

- Improving Offshore Exploration Tech in ;
- Korean Continental Shelf
- Nigeria Deepwater

Enhanced Oil Recovery

- Increasing Reserves in Producing Area ;
- US Gulf of Mexico

Non-Conventional (Heavy Oil)

- Stable Producing base ;
- Canadian Black Gold
- Venezuelan, Colombian Extra-Heavy Oil

Concluding Remarks

Suggestion for Cooperation

- Recognize and Take common View : North East Asia is World's Largest Demand Center
 - Needs to co-operate among the North East Asian Countries
 - Seek Mutual interest together

- Joint Development projects in ;
 - High Risk Area nearby
 - East Siberia, Arctic
 - Non-conventional Oil and Gas Resources
 - Technical Research & Development
 - Joint Survey

Concluding Remarks

Suggestion for Cooperation

- **Healthy Competition and Cooperation**
 - Avoid Excessive Competition in Overseas E&P projects
 - Seeking Synergy Effect in Securing Energy Supply
- **‘Win-Win’ Model for State-owned/State-controlled companies/organizations**
 - Effective Way to Detour Resources Nationalism in Producing Countries
 - Mutual Interest for NEA Countries
 - Synergy Effect for the benefits of North East Asian Countries and Producing Countries

Thank you
for your Attention

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