Global Energy Trends & Issues:
Impact on Northeast Asia

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About Knowledge Ops, Inc.

- Field Operation Processes & Decision Support
  - Field Based Information Infrastructure
    - Operations & Maintenance
    - Logistics
- Principals have extensive experience in upstream field operations
  - Acknowledged expertise
  - Published
  - Senior executives with major industry players
- Vetted Solutions
  - Industry
  - Military
- Knowledge About Operations
  - Business Process Modeling (BPM)
  - Information and Data Flow
- Spinout
  - Established professional services firm
  - Extensive tested and documented methodology

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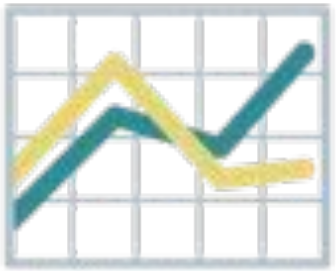
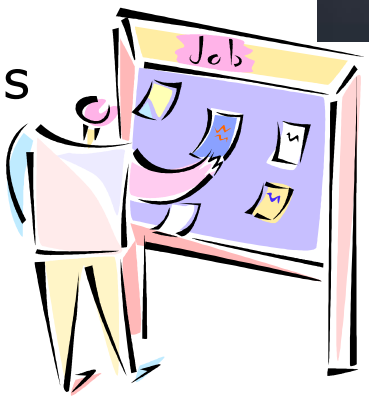
Discussion Points

- Macro Economics
  - Global / Asia
  - Renewables
- Operations in our Post-Deepwater Horizon World
  - US / Rest of World
  - Supplier Implications
- Economic Development
  - Role of Energy
  - Emergence of Natural Gas
  - Economic Value





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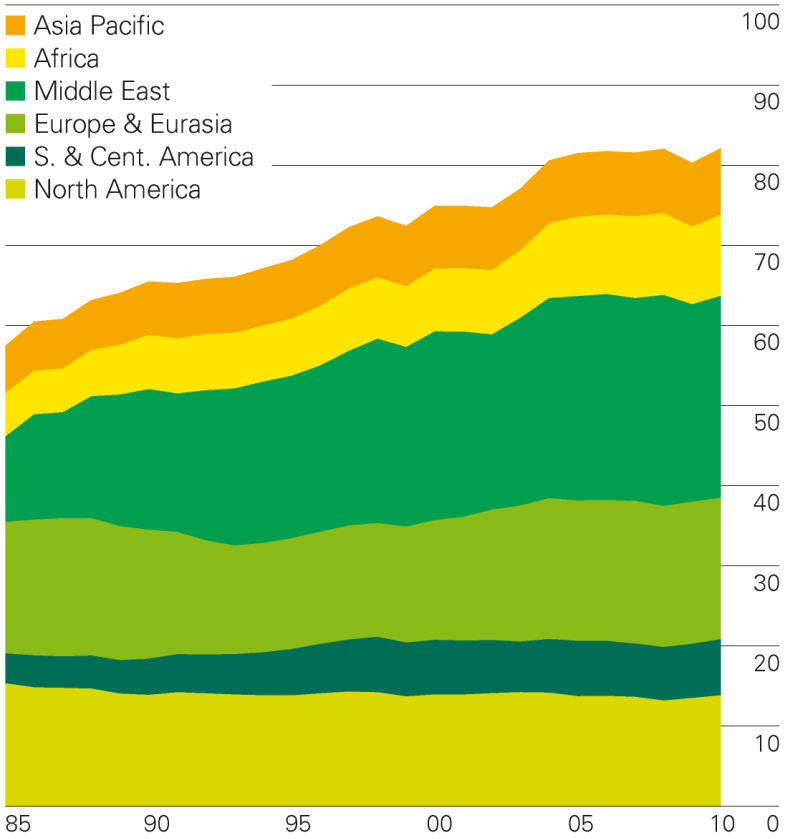
Key Global Macro Drivers

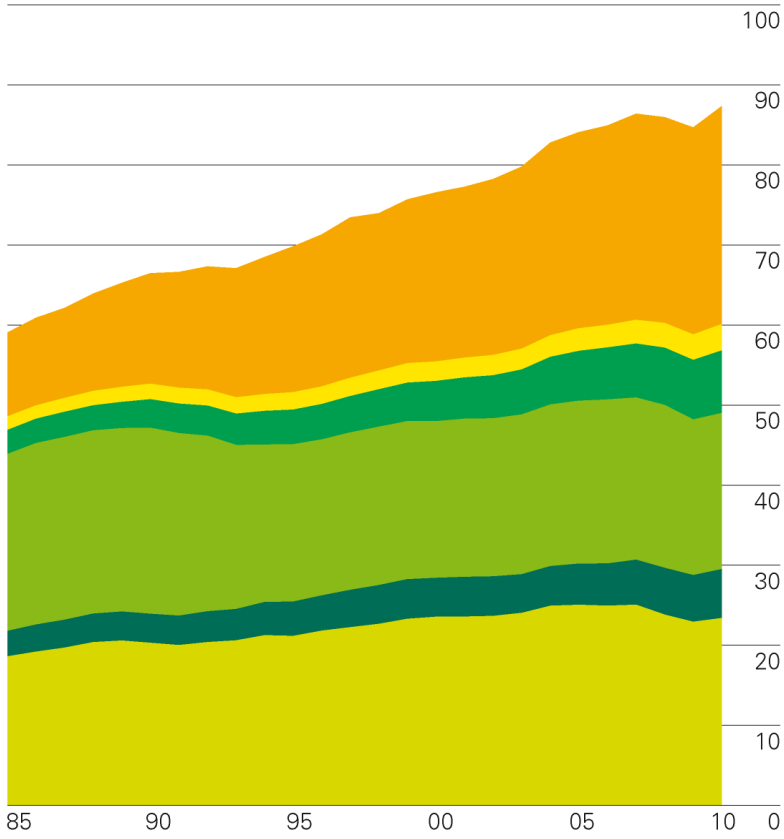
- Modern societies demand available yet low cost energy sources
- World population is projected to grow to 8.9 billion by 2050 – United Nations
- Movement from West to East
- Climate Change issues remain unresolved
- Future role of nuclear unclear
- Operational challenges the oil & gas industry face
  - Reserve replacement slows from Majors
  - Emergence of the National Oil Companies (NOCs)
  - Safety & Environment issues Paramount

Asia Dominate Consumption Growth

Production by region
Million barrels daily



Consumption by region
Million barrels daily

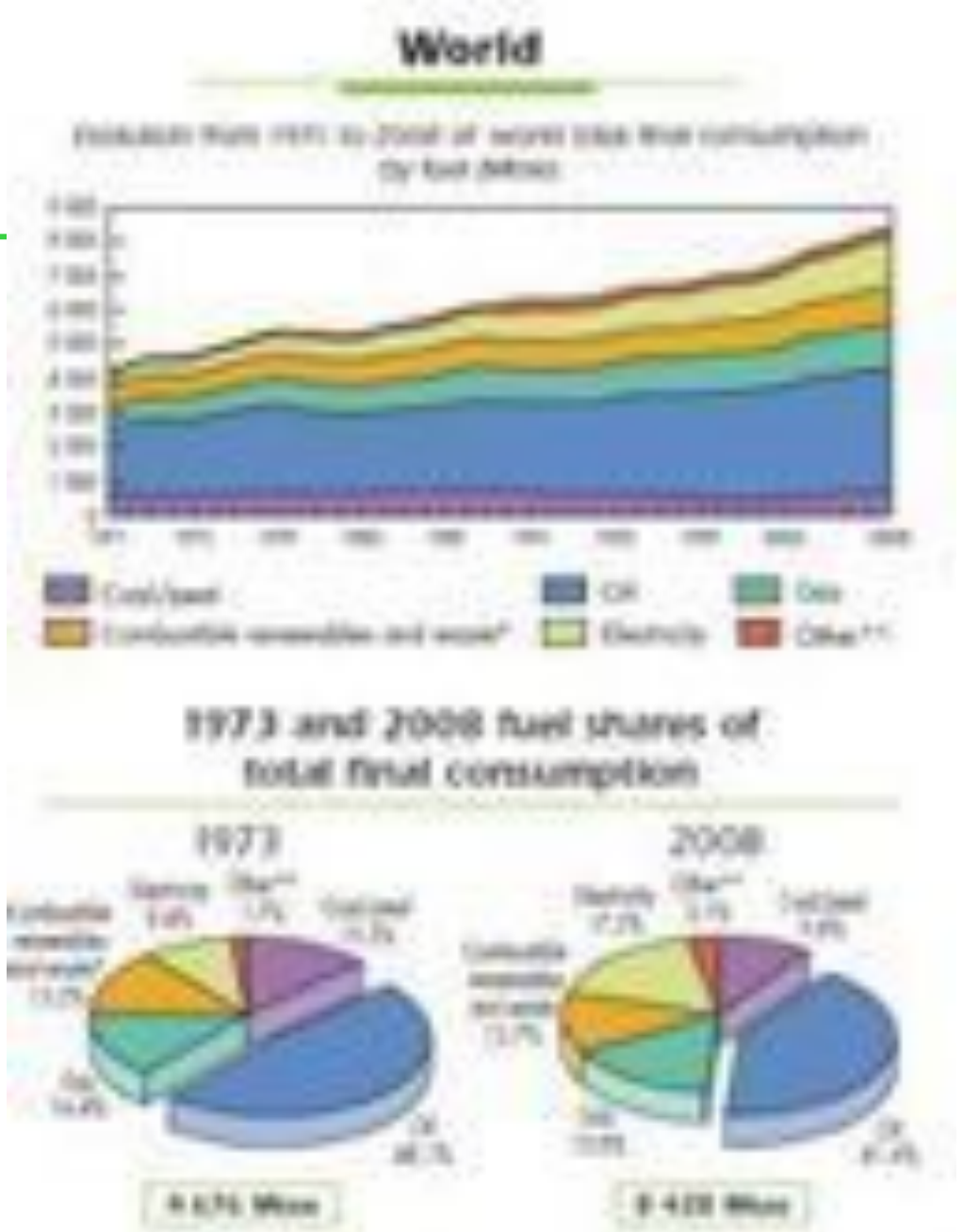


World oil production increased by 1.8 million b/d in 2010; growth was broadly-based, with increases in all regions except Europe & Eurasia. Moreover, growth was broadly split between OPEC and non-OPEC countries. World oil consumption increased by 2.7 million b/d; growth was above average in all regions, although Asia Pacific countries accounted for the majority (54%) of global consumption growth.

Source: BP

Global Energy Portfolio

- Transition to non-fossil fuels is slow
- Oil remains dominate
- Consumption doubled in 35 years
- Gas as a Bridge Fuel?



Source: IEA 2010 Key World Energy Statistics

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Some Interesting Renewable Facts

A Sector at an Inflection Point?

- US Navy Jet fighters use biofuel — Bioenergy News
- Natural Gas as "Bridge Fuel" — Scientific American
- 600kw Solar System under construction at Maui – Solar Energy News
- $300 million greentech fund launched – True North Venture Partners
- UK Government Cuts Support for Large Solar Plants – Reuters
- Datacenters to Capitalize on Iceland Geothermal Energy* – Invest in Iceland
- Chevron - largest producer of geothermal energy - Chevron
- "Getting renewables on a level playing field with fossil fuels should be a top priority for Congress" - U.S. Green Chamber Of Commerce

* The author is a shareholder and the former CEO and Board member of the firm driving this project

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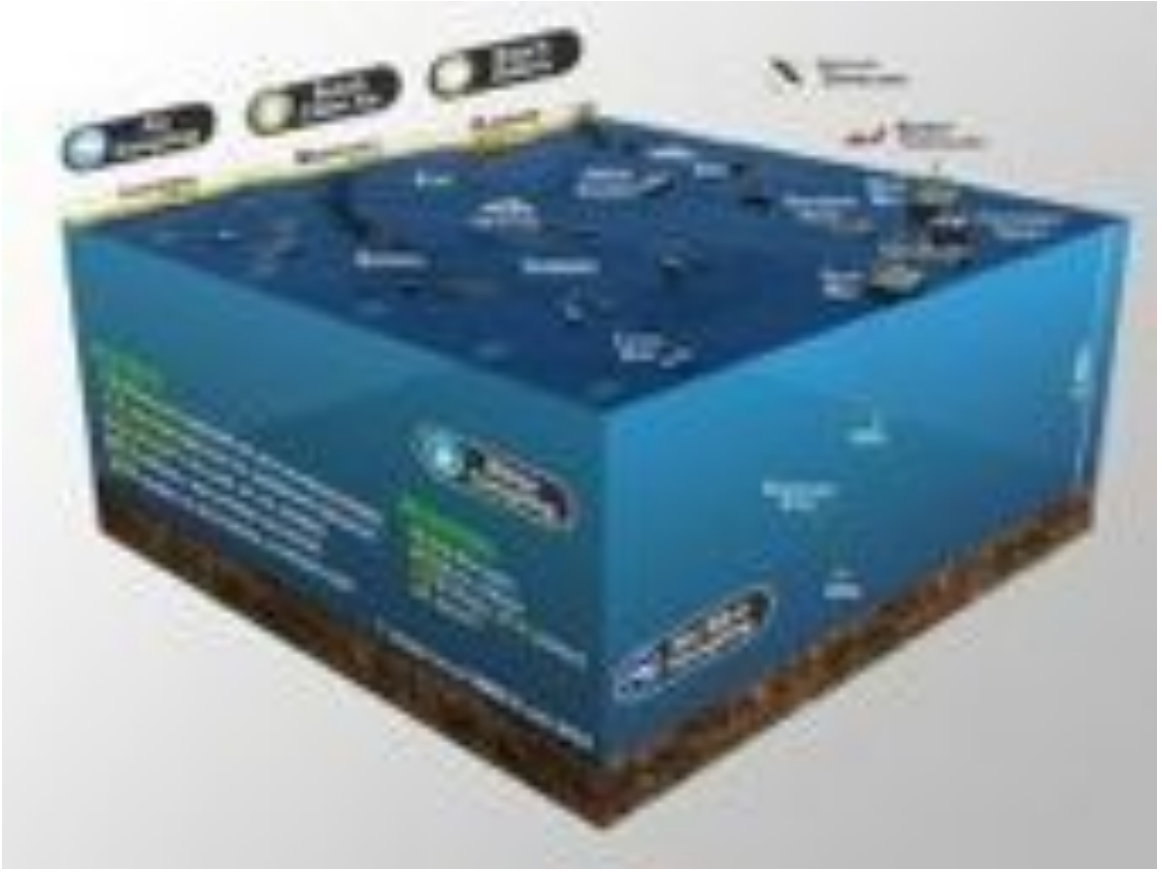
Our Post BP Macondo World

- Seminal Moment —"Game Changing"
- CEO is now directly accountable for field operations!!
- Complex Energy Infrastructure
- Systemic Risk of Complex Infrastructure
- Massive Industry Response
- Societal Intolerance for business as usual



Industry is taking dramatic steps to assure that this never happens again—anywhere!

If it does the response will be rapid & impactful!

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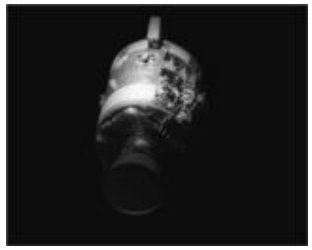
Houston, We Have A Problem

- Societal
  - Legitimate Concerns
  - Not Just Poor Perception or Misunderstanding
  - Not Just the USA
- Political
  - Both Sides of the Aisle
  - State & Local
- Engineering Process
  - Systemic & Complex
  - Extending Across Supply Chain

Risk Management

Now Bet-Your-Company!



Apollo 13 Damaged Service Module

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Systemic Risk Management

- Systemic vs. Occupational Only
  - Systemic
    - Man, Machine, Process, Environment Interface
    - Holistic - More than Fault Tree Analysis
    - Linkages are Weak Points
      - Include Supply Chain Linkages
    - The Best Perspective
  - Occupational
    - Simplistic
    - Slogans and OSHA "like" reporting
    - Good not Great (or acceptable today)
- Systemic is ONLY Viable Approach
  - Real Time Systems
  - Appropriate Human Training

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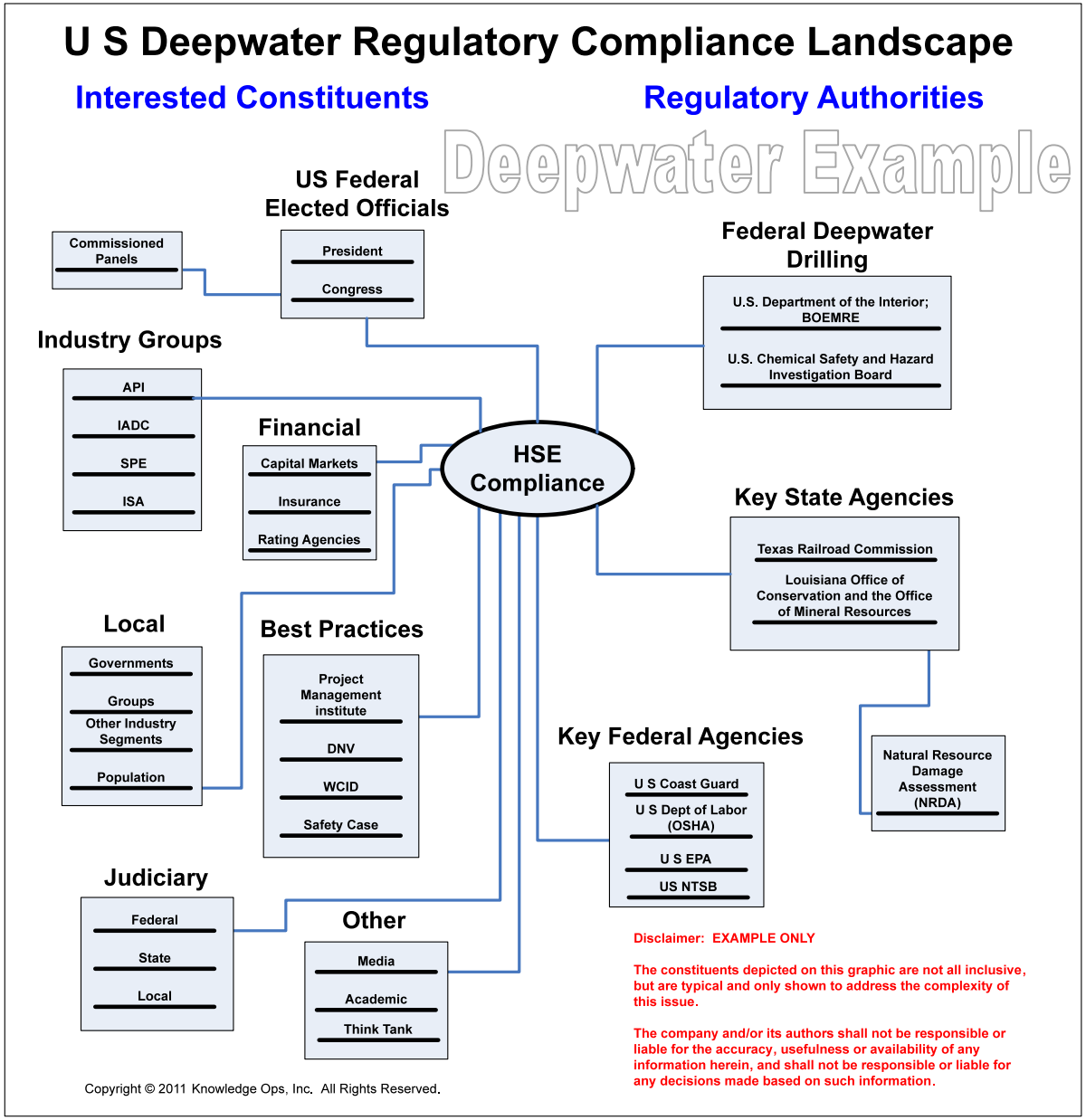
Maximizing Field Operations Process & Equipment Integrity

Compliance Influencers

- Health, Safety, Environmental (HSE)
  - Heightened Visibility
  - License to Operate
- Changing Landscape
  - Regulations
  - Other influences
- The New Reality



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Energy Industry Compliance Matrix

Probable *License-to-Operate* Regulatory Compliance Matrix

Hydrocarbon Value Chain

Offshore (maritime operations) → **Onshore**

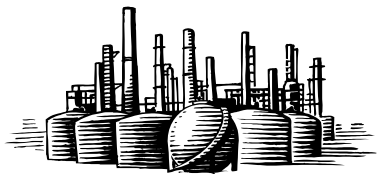
Firm / Function	E&P			Midstream		Downstream	
	Drilling	Production	Gathering	Transportation	Storage	Refining	Manufacturing
Operators	2011	2012	2011	2011	2013?	2011	2011
Drilling Contractors							
Engineering Companies							
Service Companies							
Manufacturers							
Suppliers							

Legend

Compliance Criticality

Most Critical — Year

Least Critical



Source: Knowledge Ops, Inc.

Originally published by Shemwell, Scott M. (2011, January) The Blast Heard Around the World. Petroleum Africa Magazine. pp. 32-35.

+ Electric Power Generation & Distribution

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Final Thoughts

- Complex Energy Infrastructure Critical for the Global Economy
- Societal Intolerance
- License-to-Operate At Risk
- Cost of Failures are High & Real

Failure Is Not An Option!

Apollo 13
Splashdown

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Economic Development:
Some Interesting Points

- In the United States – energy tomorrow
  - The Oil & Gas industry directly employees 2.1 million people
  - Natural gas supports nearly 3 million jobs in 49 states
  - Supports 9.2 million jobs
- Worldwide
  - No reliable job figures
- Disputed Offshore Claims – Wall Street Journal
  - From Japan to Malaysia

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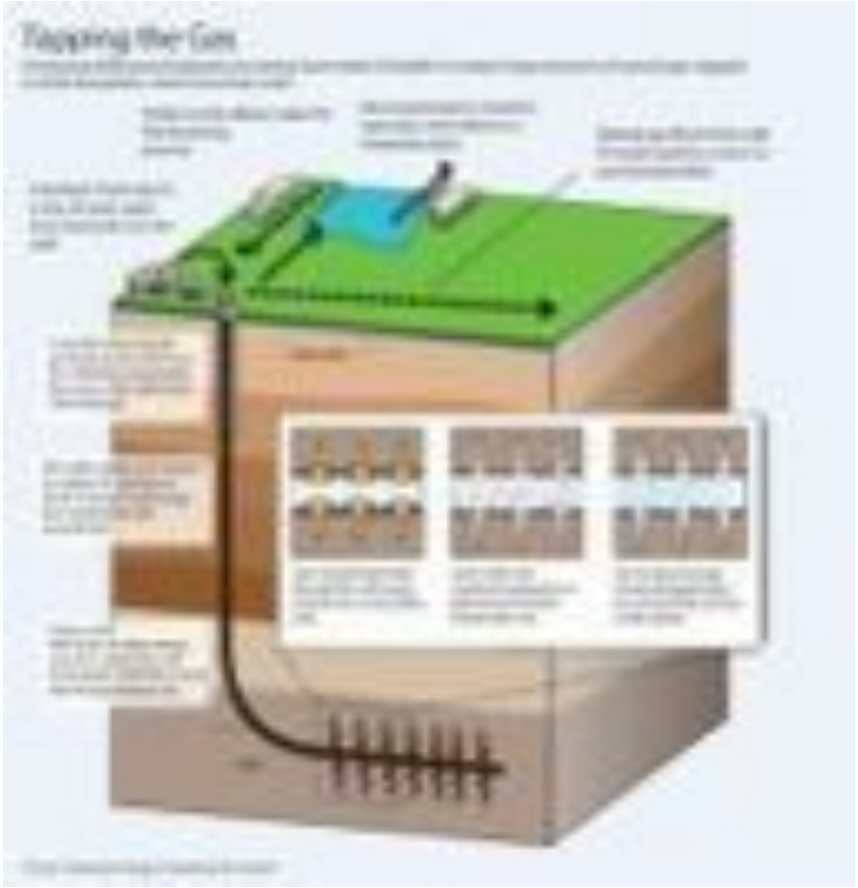
Shale Gas Will Rock the World

- 1,000 trillion cubic feet recoverable in North America alone—enough to supply the nation's natural-gas needs for the next 45 years
- "Shale gas will revolutionize the industry—and change the world"

  - Amy Jaffe

  Baker III Institute for Public Policy at Rice University



http://online.wsj.com/article/SB10001424052702303491304575187880596301668.html

North Dakota Booms Video

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Known Shale Gas Reserves

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Select Key Shale Gas Statistics

- The average cost of completing an oil well in North Dakota was approximately $4.1 million during 2006
- Each drilling rig represents approximately 120 direct and indirect jobs
- The average yearly wage for the oil and gas production industry is more than 100% above the statewide average wage

http://www.api.org/policy/exploration/upload/StrategicEnergyResources-BakkenShale.pdf

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Shale Horizontal Well Costs Breakdown

Cost Category	Drill & Test	Complete	Total
Survey & Permits	11,736	-	11,736
Building Road & Location	71,770	7,523	79,293
Footage Contract	436,592	-	436,592
Day Work Contract	304,533	-	304,533
Rig For Completion	-	61,689	61,689
Drill Bits	111,401	1,354	112,755
Rental Equipment	181,531	50,254	231,785
Labor & Travel	136,318	84,860	221,178
Trucking & Hauling	71,168	28,588	99,756
Power, Fuel & Water	9,930	-	9,930
Mud & Chemicals	291,894	-	291,894
Drill Pipe	50,946	-	50,946
Mud Logging	43,784	-	43,784
Logs	37,916	33,101	71,018
Bottom Hole Pressure Test	-	15,046	15,046
Directional Services	601,844	-	601,844
Engineering and Geology	38,819	6,018	44,837
Cementing Surface Casing	42,129	-	42,129
Cementing Production Casing	-	160,692	160,692
Cleaning Location	13,842	1,505	15,347
Environment & Safety Eqt	21,666	-	21,666
Misc. Material & Service	50,630	12,639	63,269
Total Intangibles	2,528,451	463,269	2,991,720

Cost Category	Drill & Test	Complete	Total
Surface Casing 9 5/8"	142,396	-	142,396
Production Casing 5 1/2"	-	597,134	597,134
Tubing 2 7/8"	-	128,915	128,915
Christmas Tree & Tubing Head	6,921	52,360	59,282
Tanks	-	51,157	51,157
Heater-Treater	-	60,184	60,184
Flowline	-	9,028	9,028
Packer	-	15,046	15,046
Misc. Equipment	-	45,138	45,138
Total Tangibles	149,317	958,963	1,108,280
Total Well Cost	2,677,768	1,422,232	4,100,000

Note: Updated from Sandra Johnson, "Bakken Shale," Oil and Gas Investor, (June 1990

Approximate circa 2006

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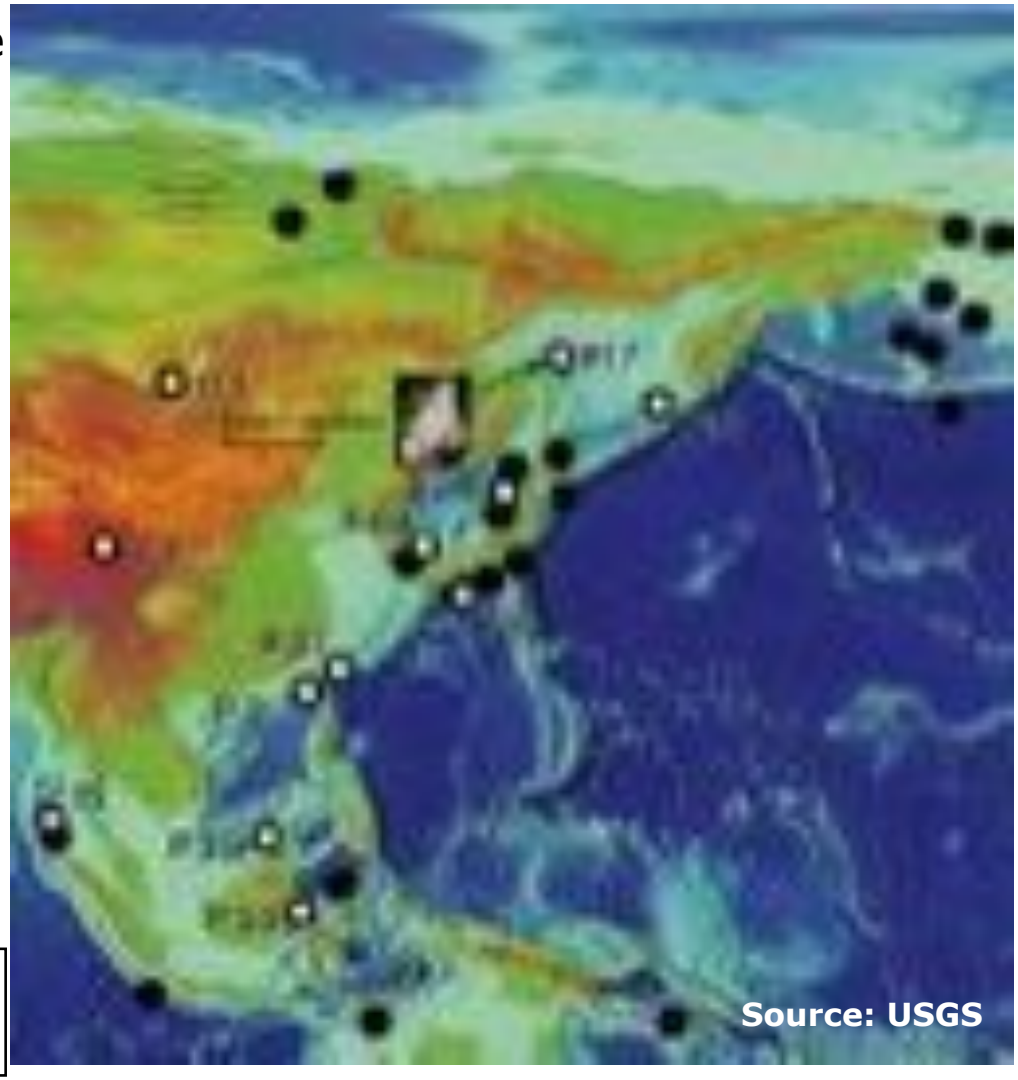
Gas (Methane) Hydrates
Future Source for NEA?

- Gas Hydrates is an are ice-like crystalline solids formed from a mixtures of water and natural gas
- They are found in sub-permafrost locations on land in polar regions and on most continental margins of the world in near sea-floor sediments below about 500 m water depth
- Current global estimates converging around about 10 exagrams (10,000 gigatons) of methane carbon
- Technical & Environmental Issues Remain



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Value to Society

- Tax revenue
  - Production sharing
  - Leases
- Energy is THE key to growth & higher standard of living

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Implications for Northeast Asia

- Energy Security
  - Must be proactive and not depend on others
  - Capitalize on regional resources
- Cooperation & Collaboration
  - Offshore Drilling Disputes must be addressed
  - Cost of new energy sources and renewables will be high both in cost, time, and expertise
- Infrastructure needs to be "borderless"
  - Regional models exist--Europe / US & Canada
- Robust Energy Sector
  - Basis of continued economic development
  - Creates high paying jobs
  - Strengthens political position of NEA countries

Concluding Thoughts

- Our modern society depends on complex energy infrastructure
- Society's Call to Action
  - Safe operations
  - Environment friendly
  - Low cost
  - Basket of energy sources

Great Challenges—Great Opportunities

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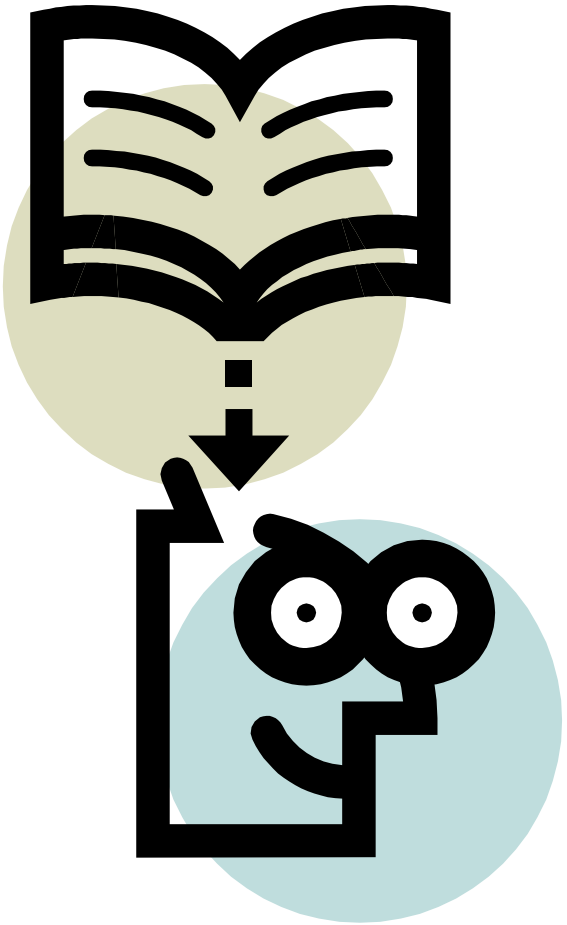
Appendices

- Additional Resources
- Glossary of Terms
- S. Shemwell Bio
- Contact Information



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Additional Resources

- Referenced in this presentation
  - BP—Statistical Review of World Energy 2011
  - BP—Energy Outlook 2030
  - U.S. Energy Information Administration: Independent Statistics & Analysis
  - The Blast Heard Around the World
  - ExxonMobil—2010 The Out look for Energy: A View to 2030
  - International Energy Agency
  - Energy Tomorrow

- Bibliography
  - World Energy Council 2010 Survey of Energy Resources
  - Rapid Response Management—Thriving in the New World Order
  - Cross-Culture Negotiations
  - NaturalGas.org
  - American Petroleum Institute
  - Northeast Asia Energy Focus
  - Renewable Energy Focus.com
  - Houston Technology Center
  - Gas Hydrate Studies
  - The National Methane Hydrates R&D Program

Glossary of Key Terms

BOERME	The Bureau of Ocean Energy Management, Regulation and Enforcement http://www.boemre.gov/
OECD	Organisation for Economic Co-operation and Development http://www.oecd.org/
OPEC	Organization of the Petroleum Exporting Countries http://www.opec.org/opec_web/en/index.htm

Scott M. Shemwell, D.B.A.

Dr. Scott M. Shemwell is an acknowledged authority and thought leader in field operations and risk management with over 30 years in the energy sector leading turnaround and transformation processes for global S&P 500 organizations as well as start-up and professional service firms. He had been directly involved in over $5 billion acquisition and divestitures as well as the management of significant projects and business units.

Most recently, he worked at Wescorp Energy, Inc. as Chief Operating Officer after merging Strategic Decision Sciences, Inc. in 2007 where as CEO he helped global clients tackle difficult strategic problems and attain operational excellence.

Mr. Shemwell's unique background and expertise in oil-field management make him highly qualified to guide oil and gas companies in creating economical and efficient oil fields of the future. Prior to starting Strategic Decision Sciences in 2003, he directed Oracle's Energy Practice as vice president responsible for driving the strategic direction and business development efforts for Oracle's global energy and chemical business sectors.

In 1997, Mr. Shemwell was brought into MCI Systemhouse to expand its energy practice where his most notable achievement was the development and implementation of the firm's Y2K practice with a focus on the real-time systems responsible for both upstream and downstream petroleum production operations.. He also has industry leadership experience as CEO of Real-Time Data Solutions, Inc., director at Halliburton Corporation and head of its Information Technology line of business. While serving on the Halliburton Energy Services Leadership Team, he was directly engaged in the transformation of the company into its Integrated Solutions business model as well performing as the CIO of the $2 billion Terra Nova project.

Mr. Shemwell is recognized as an authority in risk management, technology, knowledge management, industry change, process change management/modeling and simulation, and logistics and operational supply chain management, having authored over 300 articles and presentations on these subject matters. He is the author of *Essays on Business and Information*, a collection of short essays focusing on the relationship between business processes and information technology, written from his perspective as an energy industry executive and adviser.

Formerly a Commissioned Officer in the United States Army Air Defense Artillery, he holds a Bachelor of Science in physics from North Georgia College, a Master of Business Administration from Houston Baptist University and a Doctor of Business Administration from Nova Southeastern University.

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