WOC-1 Plenary Session

SG 1.2 Assessment of global reserves and resources

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IGU WOC 1 Meeting

Seoul, South Korea

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Members/Participants:

1)	Mohammed Kaced	Algeria
2)	Abdelouahad Belmouloud	Algeria
3)	Naruepon Lecksiwilai	Thailand
4)	Bernard Seiler	France
5)	Said Chelbeb	Algeria
6)	Fayçal Belaid	Algeria
7)	Denis Krambeck Dinelli	Brazil
8)	Fernando Bado	Argentina
9)	Daojiang Long	China
10)	Lilit Cota	Croatia
11)	Peter Westhof	Germany
12)	Shariq Hashmi	Pakistan
13)	Zafeer Hasan Khan	Pakistan
14)	Ram Ramanathan	Saudi Arabia
15)	KhazisyedAhmedjeelani	Saudi Arabia
16)	MontriSilpa-Archa	Thailand
17)	Ladislav Goryl	Slovakia
18)	Bent Svensson	USA
19)	David Parkinson	Singapore

SG1.2 Participants

1. Sapporo : 9
2. Rio de Janeiro: 9
3. Kota Kinabalu: 7
4. Seoul: 4

Focus Groups and Deliverables:

- **Conventional Gas:** Remaining reserve and resource assessment;
  (Team leader: Fernando Jorge Bado _ Tenaris, Argentina)

- **Unconventional gases** (tight, shale gas, CBM, hydrates): reserve and resource assessment;
  (Team leader: Kaced Mohammed_ Sonatrach, Algeria

- **Exploration and discovery trends**, and new frontier and exploration areas.
  (Team leader: Denis Krambeck Dinelli_Petrobras, Brazil.

- **Assessment of gas flaring**: initiatives for reduction and enhancing supply;
  (GGFR team)

Next steps

Tasks and objectives for the 5th Meeting, Spain

Final Report

- **Update of all estimates**
- **Conclusions**

S.G 1.2 Report Structure

2	**GLOBAL RESERVES AND RESOURCES**
	Executive Summary
2.1	Introduction
2.1.1	Petroleum Resources Classification Framework
2.2	**Conventional gas**
2.2.1	The global potential of conventional gas
2.3	**Unconventional gas**
2.3.1	Definitions and concepts
2.3.2	Shale Gas global resource base
2.3.3	Tight Gas global resource base
2.3.4	Coalbed Methane Worldwide Resource base
2.3.5	A Global Inventory of Natural Gas Hydrate Occurrence
2.3.6	Challenges and Environmental Considerations
2.3.7	Conclusions

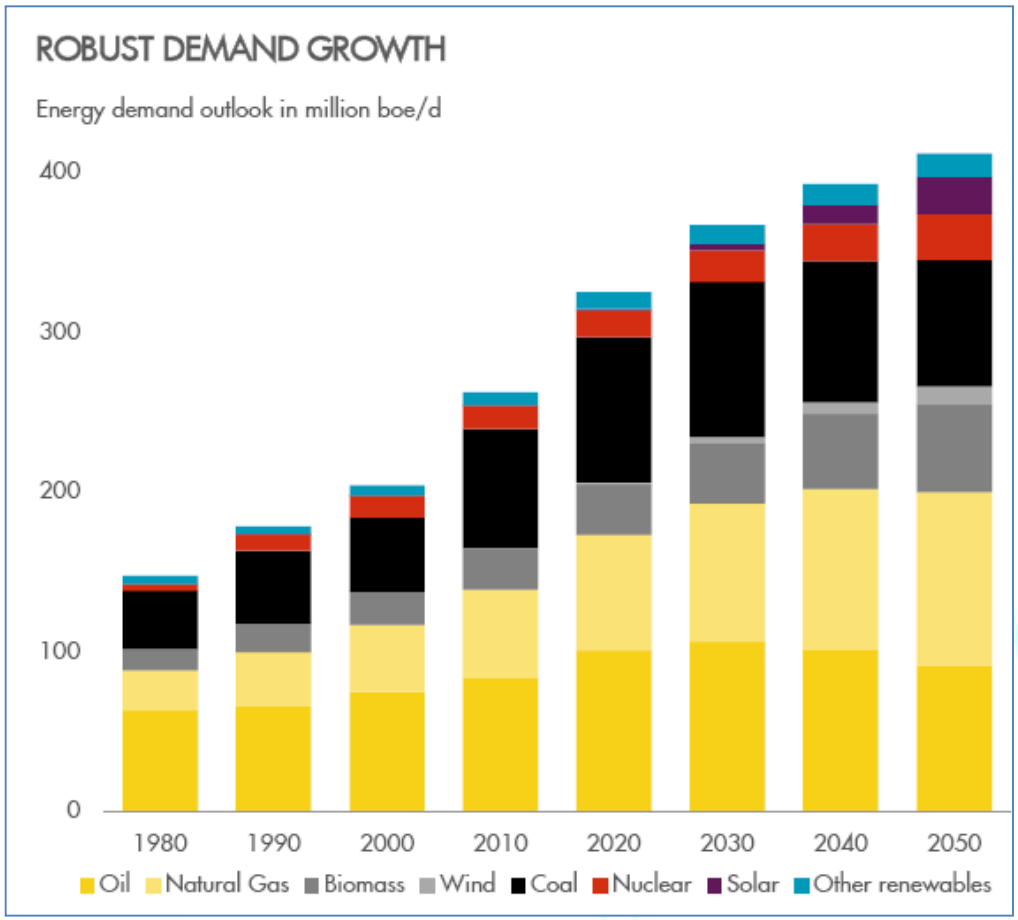
S.G 1.2 Report Structure

2.4 Gas flaring reduction and supply enhancement
2.5 Exploratory and discovery trends
2.5.1 Gas pricing and exploratory risk
2.5.2 Independent producers
2.5.3 Gas discovery trends
2.6 New frontiers and exploratory areas for natural gas
2.6.1 New exploratory frontiers

References
Appendices
A List of Tables
B List of Figures
C Glossary and Acronyms

ENERGY DEMAND OUTLOOK

Global energy mix to 2050



INDUSTRY OUTLOOK

- Hydrocarbons dominate outlook
- Growth required in all sectors of energy mix
- Renewable growth particularly strong
- Energy policy + sustained investment

FOSSIL FUELS WILL SUPPLY MORE THAN 60% OF GLOBAL ENERGY IN 2050

Shale Gas

U.S. Remaining Gas Reserves and Undeveloped Resources

	Shale Gas Resources	
	Distinct Plays (#)	Remaining Reserves and Undeveloped Resources (Tcf)
1. Northeast		
• Marcellus	8	369
• Utica	3	111
• Other	3	29
2. Southeast		
• Haynesville	4	161
• Bossier	2	57
• Fayetteville	4	48
3. Mid-Continent		
• Woodford*	9	77
• Antrim	1	5
• New Albany	1	2
4. Texas		
• Eagle Ford	6	119
• Barnett**	5	72
• Permian***	9	34
5. Rockies/Great Plains		
• Niobrara****	8	57
• Lewis	1	1
• Bakken/Three Forks	6	19
TOTAL	**70**	**1161**

Technically Recoverable Shale Gas Resources (Tcf)	
1. U.S.	1,161
2. China	1,115
3. Argentina	802
4. Algeria	707
5. Canada	573
6. Mexico	545
7. Australia	437
8. South Africa	390
9. Russia	285
10. Brazil	245
11. Others	1,535
TOTAL	**7,795**

Unconventional Gas Resources

Tight Gas, Shale gas and CBM

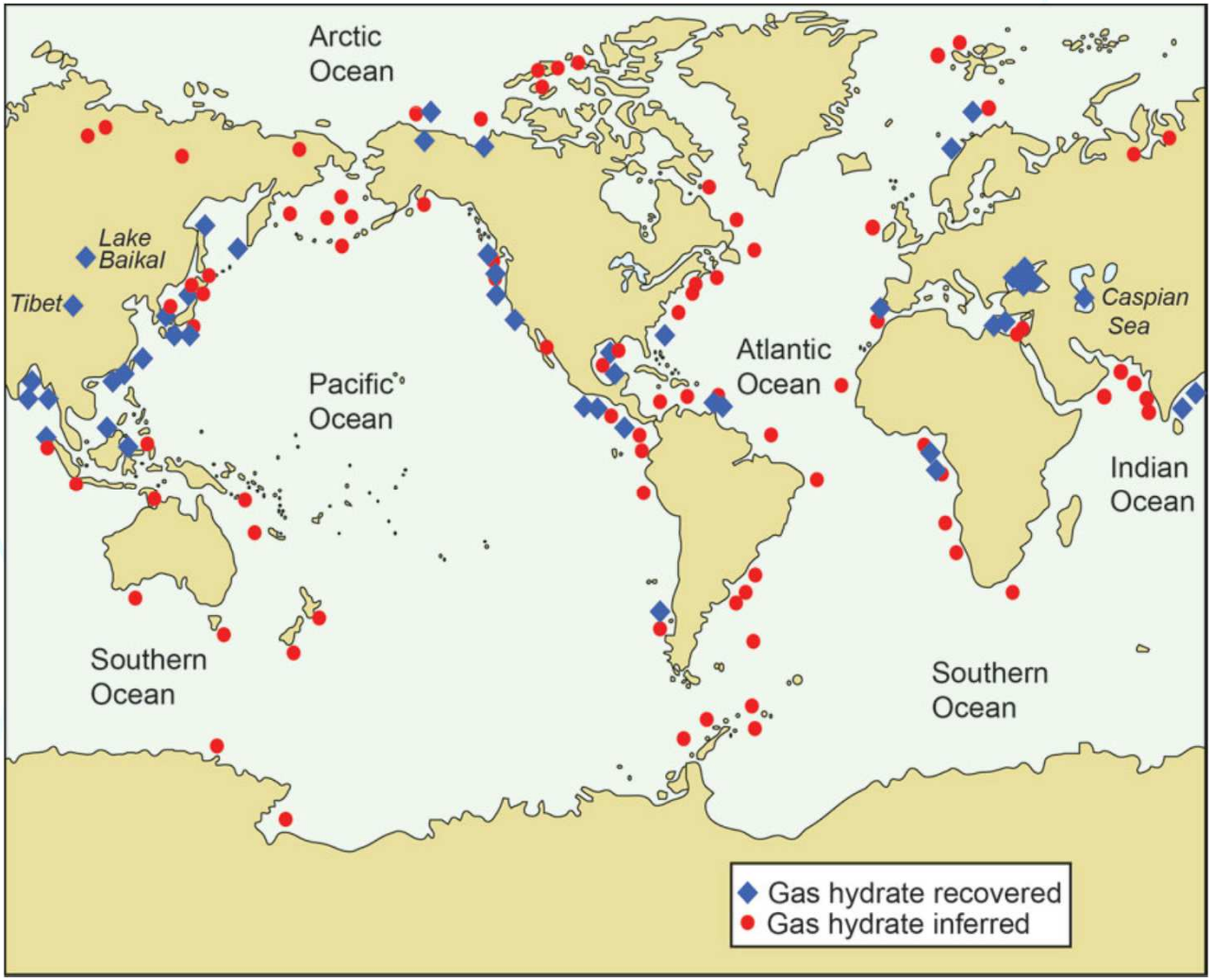
Region	Total gas, tcm		Unconventional by type, tcm		
	Conventional	Unconventional	Tight gas	Shale gas	CBM
Eastern Europe and Eurasia	160	43	10	12	20
Middle East	132	12	8	4	0
Asia Pacific	44	93	20	57	16
OECD Americas	81	82	16	57	10
Latin America (non-OECD)	27	48	15	34	0
Africa	41	38	8	30	0.1
OECD Europe	35	22	4	17	2
World	**519**	**337**	**78**	**210**	**48**

Source: IEA, 2013

Global total sources of unconventional resources in place are estimated at around 340 TCM, of which shales has the largest potential with 210TCM

Where is Methane Hydrate Produced Today?

To date there has been no large-scale commercial methane production from gas hydrate deposits. All of the production has either been small scale or experimental.



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