



# **WOC-1 Plenary Session**

## **SG 1.2 Assessment of global reserves and resources**

**SG Leader: Dr. Mohamed Kaced**

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### **IGU WOC 1 Meeting**

Seoul, South Korea

12 March 2014



## 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) Khazisyed Ahmedjeelani | Saudi Arabia |
| 16) Montri Silpa-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)

## 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

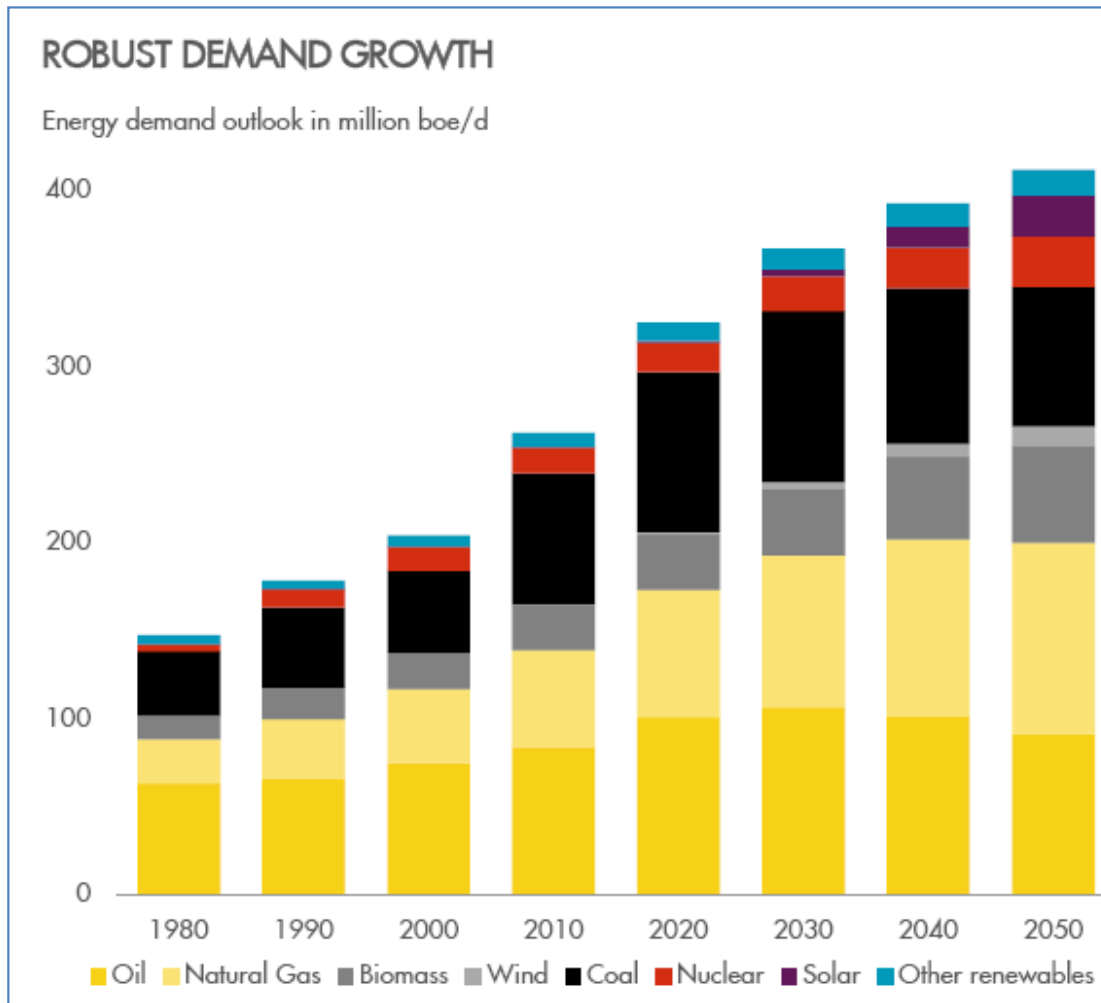
A List of Tables

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

| 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        |
| <b>TOTAL</b>                                      | <b>7,795</b> |



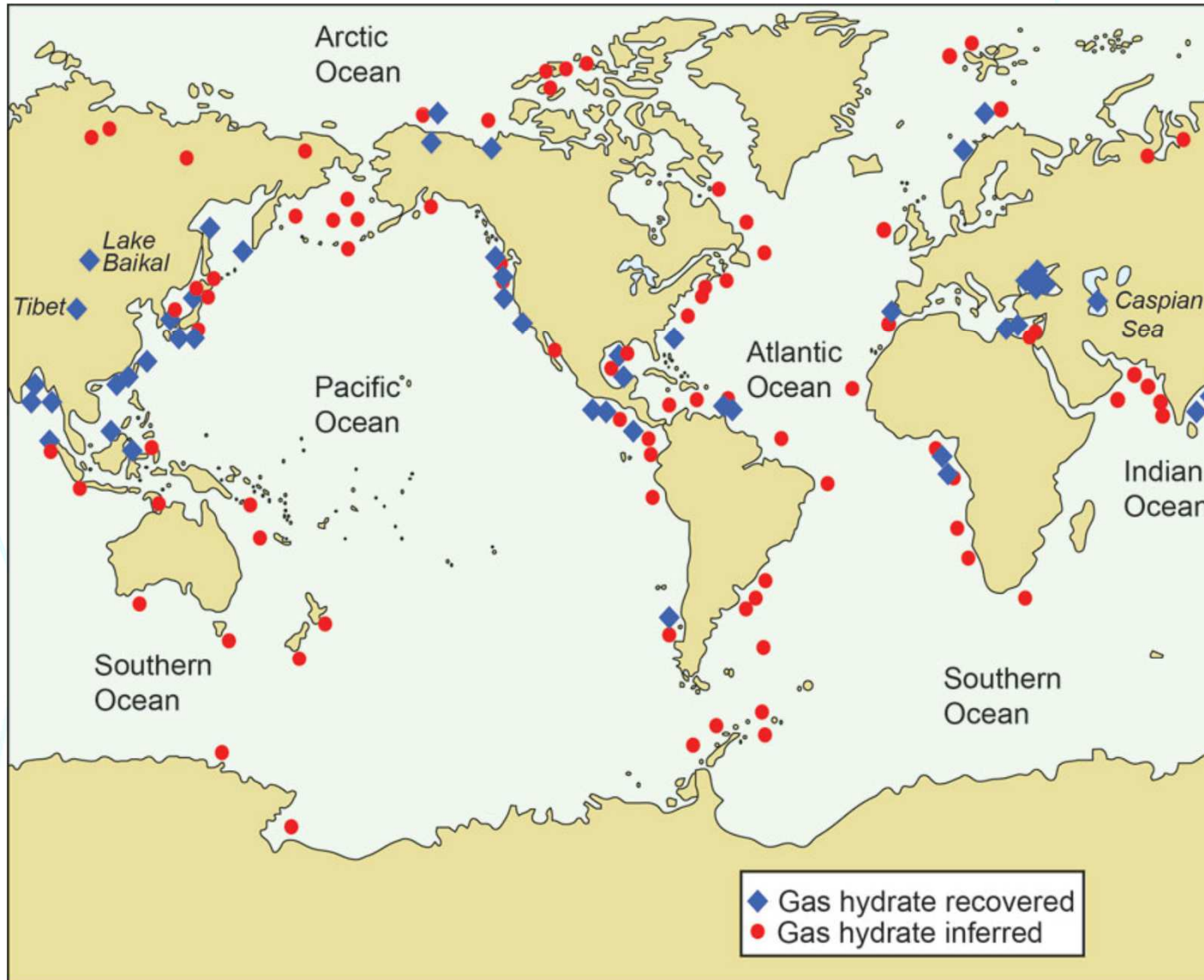
| Region                     | Total gas, tcm |                | Unconventional by type, tcm |            |           |
|----------------------------|----------------|----------------|-----------------------------|------------|-----------|
|                            | Conventional   | Unconventional | 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         |
| <b>World</b>               | <b>519</b>     | <b>337</b>     | <b>78</b>                   | <b>210</b> | <b>48</b> |

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.



# 감사합니다!

