



INTERNATIONAL ENERGY AGENCY GAS AND OIL TECHNOLOGIES INITIATIVE, GOT

Asian Pacific Gas in a Global Context - Setting the Stage

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Global Dialogue

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Points;

- GOT Context
 - Asia Pacific
 - Overall challenges
- GOT Activities
- GOT Milestones
- Discussion







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IEA Gas and Oil Technology Initiative

Highlights:

www.gotia.org

- Established by IEA in March 2013
- Most recent Executive Committee meeting held in Washington D.C. 24 October 2014
- US, Australia, China, Netherlands, Norway, Spain and Switzerland attending events
- Upcoming dialogue with the EU Commission & China







Offshore safety technologies



Save the Date – COLORADO October 28/29, 2014



The need for mobility

Passenger light-duty vehicle fleet growth by region



The PLDV fleet worldwide is projected to expand from around 900 million in 2012 to over 1.7 billion in 2035, with most of this growth coming from non-OECD countries





Gas growth strongest in emerging markets

Natural gas demand



The biggest absolute increases in demand are in China & the Middle East, where in the latter gas use overtakes that of the European Union before 2020





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Gas on the way to become first fuel, with role of LNG on the rise

Main sources of regional LNG supply



2012 2040 Share of LNG rises in global gas trade, pushed by a near-tripling in liquefaction sites: LNG brings more integrated & secure gas markets, but only limited relief on prices

Milestones Ahead



6th GOT ExCo meeting & Nat. Gas Workshop, Perth, 20 – 22nd April '15

OTC2015

2015 Offshore Technology Conference 4-7 May Houston, Texas, USA www.otcnet.org/go/exhibit2015 GOT & BSEE Topical Breakfast, Workshop, Rice University – Offshore Frontier Technology

GOT Shale Outreach - with CSM, CSIRO, TNO





WPFF & China MOST

- Continued cooperation with China Focus: Natural gas supply technologies



IEA GOT – MOST Dialogue







2015/2 - 2016

2015/2

• Possible ExCo meeting & Workshop with EU Commission in Brussels

2016/1

• Dialogue with China/MOST on ExCo meeting & Workshop in China





GOT Output - Examples





GOT Studies Work Group 1, 2, 3

General structure

The paper should include the following segments:

- Executive Summary
- Introduction / Background
- Current Landscape / State of the Art
- Challenges and Technology Gaps
- Outlook
- Enabling Technologies and Catalysts
- Innovation
- Social License to Operate

Work program

The work program will consist of compilation of data to establish a cost index and the main cost-drivers, the market potential and the main regulatory framework which can influence technology development and innovation. These data will be used to identify the most important technologies, technology gaps and innovation potential and make recommendations for prioritization and other measures.

Cost level (where applicable)

- Compile data to establish a cost index the last 10 years.
- Analyze the compiled data to describe how much of the cost increase is caused by changes in activity and how much is due to inflation.
- Identify the most important drivers for cost increase in the time period, (and make forecasts?)

Market:

- Compile relevant market data (e.g. estimates of remaining reserves and resources, estimated date of closure and main production challenges of relevance to drilling and wells).
- Analyze time horizon for implementation of new technology & time criticality; what value is lost by delayed implementation or failure to utilize obvious window of opportunity.
- Analyze size of market (resource base, time, economy) and the share that can be realized by new technology

Regulatory framework:

- Compile information on main regulatory frameworks
- Analyze effects of regulations on the balance between fostering innovation and conservation of existing, "out-dated" technology

Technology assessments:

- Identify the most important new or coming technologies for improving cost-efficiency and functionality for safety, environment and subsurface needs.
- Identify technology gaps and outline new technology research and development processes, including time horizons.
- Analyze match of time horizons between market and technology research and development processes.
- Analyze innovation potential of the outlined technology research and development processes.

Recommendations





Implied supply cost curves shed light on oil supplies relative to the oil price



Large amounts of conventional oil can be produced at relatively low cost; when oil prices increase, more unconventional resources are gradually opened up





Innovation Chain: A full order book for floating production systems

FPSO deployment in the New Policies Scenario and in the High Brazil Case



Building Brazilian capacity all along the supply chain, notably for huge offshore production & storage vessels (FPSOs), is key to meeting production targets





Leverage in global networks: Shale RD & D - Progressing Collaborative Activity

GOT Shale Discussion - CSM, CSIRO, TNO/Horizon 2020, GTI Perth **RD&D** Roundtable Topics; Water issues Regulatory frameworks Networks/leverage 14

GOT Asian Pacific Natural Gas Roundtable, 21st – 22nd April

Australian hosts:

- CSIRO
- Woodside
- UWA





Thank you









Figure 2.1 > Factors determining the viability of natural gas developments







Process



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Overall purpose

Create white papers within relevant challenge areas based on topics identified from the Global GOT Forum

Timeline

- Q1: Finalize scope, bidders list, ExCo approval, call issued
- Q2: Nominate review panel, concept papers (offfers) received, evaluation & award
- Q3: Draft reviews
- Q4: Paper delivered, implementation in GOT



More oil from fewer producers

Incremental oil production by key country in the New Policies Scenario, 2009-2035



Production rises most in Saudi Arabia & Iraq, helping to push OPEC's market share from 41% today to 52% by 2035, a level last seen prior to the first oil shock of 1973-1974





EIT

Outlook

A new diversity in gas supply

Change in annual natural gas production



between 2011 & 2035, with the exception of Europe

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IEA GOT Global Knowlegde Process



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GOT Program of Work - taxonomy







Natural Gas Consumption vs Production



Year	2015	2020	
Consumption	1700~2100	2200~2600	
Production	1400	1500	
Import	300~700	700~1100	
		5.	10

IEA GAS & OIL TECHN

Technol Network 24

Current market conditions vary markedly across the world

Natural gas demand & production growth in selected regions, 2005-2012



Regional differences in gas prices have also grown, with potential implications for investment decisions & company strategies in energy-intensive industries Energy Technology Network

Unconventionals account for half of gas output growth

Growth in unconventional gas production by type



Unconventional gas development spreads well beyond North America, notably after 2020, with China & Australia major contributors to production growth²⁶

A power shift to emerging economies



The need for electricity in emerging economies drives a 70% increase in worldwide demand, with renewables accounting for half of new global capacity

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