



**21<sup>st</sup> WORLD PETROLEUM CONGRESS**  
**MOSCOW, 15-19 JUNE 2014**

## **Responsibly Energising a Growing World**

### **21<sup>st</sup> WPC Technical Programme** **– Overview –**

#### **Theme:**

#### **Responsibly Energising a Growing World**

As the world population increases, access to affordable, safe and reliable sources of energy will be a key factor in promoting economic development and well being for humankind. Oil and natural gas will continue to be the world's leading energy resource for the foreseeable future. Meeting future demand in a sustainable and socially responsible manner will require massive investments, leading edge technologies, the highest skilled human resources, and superior ethical business practices. Producers, consumers, governments and societies need to cooperate responsibly to develop all energy resources. To do so, the industry has to energise its professionals; in particular youth, to become even more innovative in ensuring future growth.

#### **Structure:**

#### **Technical Programme Sessions**

The technical programme of the 21st WPC is organised in 4 thematic blocks:

**Block 1: Exploration and Production of Oil and Natural Gas**

**Block 2: Refining, Transportation and Petrochemistry**

**Block 3: Natural Gas Processing, Transportation and Marketing**

**Block 4: Sustainable Management of the Industry**

The technical sessions of the 21st World Petroleum Congress include topical CEO-Level Round Table (RT) discussions, leading-edge Best Practice Keynotes (BP), and the technical Forums (F) with expert panels presenting key industry topics, through papers as well as interactive posters at the Digital Poster Plaza.

# – 21<sup>st</sup> WPC Topics and Descriptions –

## Block 1: Exploration and Production

### Forums

#### 1. New opportunities in old fields

This session will illustrate successes and challenges of mature fields. Hydrocarbons recovery from old fields represents enormous challenges. When the oil recovery ratio of all the existing fields is increased by 1%, the oil supply is extended by more than two years of production worldwide. This session aims to describe all the innovative technologies and approaches that give new opportunities in old fields. This includes technologies such as IOR (Improved Oil Recovery), EOR (Enhanced Oil Recovery), which can also be used on recent producing fields, as well as new ways available to redevelop mature fields: new reservoir models, new drilling technologies and new surface facilities for instance. Investments in old fields, to provide new production and cash flow, certainly constitute a solution to the current world energy growing demand.

#### 2. Exploration and production in the Arctic

The Arctic region is one of the last remaining frontiers for E&P. Covering a large area under ice and mid-ocean conditions, access to geoscience & engineering data, knowledge, expertise and technology are critical for taking on the economic and technical challenges facing the industry. Innovative solutions requiring large investments, sound regulations and prudent environmental protection will be necessary to develop the Arctic resources. Building on exploration and production activities in offshore Arctic territories, established research programs, new concepts for development design, production and transportation are key topics addressed in this forum.

#### 3. Deep water exploration and production

Fossil fuels will remain as the world's major supply of energy in the future. The growing demand of energy requires increasing production by continuous discovery of new hydrocarbon fields, production at even greater water depths, more over pressured, more hostile environments, and reservoirs buried at great depths. Access to knowledge, technology and expertise with project excellence and operational integrity, have enabled the industry to pioneer exploration and production techniques in some of the most difficult environments, including deep and ultra-deep water depths. In addition, development of satellite reservoirs tied to very distant processing unit, while coping with the difficulties of more and more viscous oil are part of the technology challenges experienced and still has to be faced by the industry. Integrated solutions and E&P innovations continue to make the deep water a viable prospect globally, where some of the most recent giant discoveries will continue to be made.

#### 4. Unconventional oil and gas exploration and production

New technologies are needed across the entire range of E&P activities, including exploration, characterization, stimulation and responsible use of water resources. This session will address the broad range of technologies employed to responsibly explore for, characterize, and produce unconventional resources.

#### 5. New technologies for geosciences

The industry continues to generate opportunities via technological innovations to enhance its success in locating, extracting and transporting oil and gas supplies to meet global demand. Technology is a key driver in our industry's ability to meet increasing demand. It has given us the ability to supply energy from resources once considered impossible to access. Technology allows us to maximise recovery of hydrocarbons, positively impact development effectiveness and improve operational reliability and integrity. Technology continues to expand and extend the possibilities - at it's very best it is a game changer. This forum will address innovations from the outcrops to assets, ranging from exploring hydrocarbons more effectively and to developing new options. The challenge is to develop cost-effective

technologies that reduce the environmental footprint of their utilization and tackle such issues as seismic advances to image in complex geological and environmental conditions.

## **6. Challenges in complex geological environments**

Recently more and more new discoveries have found oil and gas in very complex geological environments, such as sub-salt layers, carbonate reservoirs with highly heterogeneous reservoir quality, igneous and metamorphic rocks with poorly predictable fracture systems, heavily folded zones with steeply dipping layers, and reservoirs with fresh water aquifers amongst others. Modern technologies should be adapted to each of them to find the respective solutions individually. General solutions do not exist.

## **7. Advanced drilling and production technologies**

Advances in drilling and production technologies have increased the upper limit of ultimate recoverable resources from both new and mature fields. Challenging environments have required development of technologies to access resources in deeper water, sub-salt, high pressure, high temperature and sour gas fields. This session covers the full spectrum of drilling and production technologies.

## **8. Integrated reservoir management and surveillance**

The surveillance of the reservoirs is a tool of controlling the validity of the static models (“geofantasy”). Feeding back the surveillance data to the static and dynamic models for resolution of them is / can be improved. This will add to the prolongation of the life cycle of the production or even to identification of upsides. Additionally, a better understanding of the processes in the reservoir can provide ideas of efficient water management and early application of secondary tertiary production methods.

## **Best Practice Keynotes**

### **1. Management of Arctic and deep water mega projects**

The oil and gas industry generates mega projects. In the recent past, we have seen such very large, integrated and complex projects in the deep waters. Innovative technologies have made these projects possible (giant FPSOs, subsea oil / gas separation...). Arctic appears now to have quite large hydrocarbons resources with new technical, logistical or environmental challenges. Extreme weather conditions (very low temperatures, strong winds, presence of ice bergs...) and a very sensitive Arctic environment constitute new difficulties for the oil and gas industry. This session aims to describe the best practices in the management of such deep water or Arctic mega projects, from the discovery till the first oil. This includes not only the technical aspects, but also the human resources or HSE challenges for instance.

### **2. Best practice for managing E&P risks**

The key issue in enhancing the attractiveness of E&P projects for investors is to demonstrate that we are able to assess, mitigate and control the risk elements inherent in these. In subsurface modern acquisition and processing, visualization technologies matched to direct surface observations (mapping) and subsurface core analyses help to generate more reliable static models. Up-to-date drilling, completion and processing technologies help achieve an early development of the fields. Other risks i.e. marketing, financial, economic, political and legal risks also have to be considered.

## **Round Tables**

### **1. Where should we look for new resources?**

The oil and gas industry is responsible to deliver the new supplies of energy in a safe, secure and environmentally responsible way to meet global demand. Meeting this rising demand will require us to develop many challenging resources and we will need to pursue all commercially viable energy sources. This will take the ingenuity of our people and continued advancements in technology. Many of these potential resources will be in harsh and remote locations or come from unconventional resources such as shale gas and oil sands as well as enhanced recovery of existing conventional fields. In the future, the search for new resources will continue to require more efficient exploration and production technologies, rejuvenate old ideas and move to new frontiers at a continuously increasing pace.

## **2. What do we need for new geographic frontiers?**

When E&P operations commence in new areas, care must be taken to protect both the environment and local communities. What new technologies are needed to enable safe and responsible exploration and production from these new frontiers? How do we engage with the local communities to respect and address their current concerns and priorities from the earliest stages of exploration through to production and abandonment?

## **3. How should we optimise cycle time from exploration to production?**

Haste can lead to waste and unintended consequences. How can we profitably and responsibly expedite all phases of exploration and production so as to minimize the time between acreage acquisition and first oil? Risks to be addressed include adequate assessment of recoverable hydrocarbons to appropriately scale facilities and ensure that precautions and procedures are in place to safeguard the environment.

# **Block 2: Refining, Transportation and Petrochemistry**

## **Forums**

### **9. Reducing the carbon footprint of fuels and petrochemicals**

Techniques will be discussed which allow for the reduction of CO<sub>2</sub> emissions during the production and / or consumption of fuels and petrochemicals. Pertinent examples are: CO<sub>2</sub> recovery, cogeneration of electricity, recent developments in catalytic refining processes (deep hydrotreating, fluid catalytic cracking (FCC)), efficient hydrogen production and the catalytic valorisation of CO<sub>2</sub>.

### **10. Innovative catalytic processes for hydrocarbon conversion**

This forum will discuss catalytic solutions to improve feedstock and/or product flexibility. Topics will include catalytic conversion of heavier refinery feedstocks (high sulphur and nitrogen contents); possibilities to directly use crude oil as feedstock for FCC and novel processes for isobutane / alkene alkylation on solid acid catalysts. Moreover, the flexibility between gasoline and diesel production and the increase of light alkene yields from FCC will also be topics covered in this forum.

### **11. Technologies for biofuels production**

Current and improved technologies for the production of biofuels will be discussed, in particular the synthesis of bio alcohols (bio ethanol and bio butanol) from different feedstocks; the production of biodiesel via esterification of fatty acids or via their co-processing. Also, the synthesis of dimethyl carbonate from bio-based feedstocks (e.g. from methanol and CO<sub>2</sub>) will be addressed in this forum.

### **12. Oil and products pipeline transportation and storage**

The Forum will discuss state-of-the-art technology, procedures, processes and methods employed by pipeline, terminals and maritime transportation companies that operate in the logistics of oil, natural gas and by-products transportation. The immense transportation infrastructure developed along the years needs to be maintained and expanded in order to allow oil and gas to flow from the well to the end users. This industrial segment is of extreme relevance in guaranteeing the competitiveness of the oil and gas industry, as well as assuring safety and reliability. This Forum will provide an opportunity for delegates to learn and share innovative experiences and best practice in the areas of design, construction, assembly and materials; automation, supervisory systems and measurement; maintenance and rehabilitation; inspection techniques; structural integrity, reliability and risk analysis; corrosion prevention; subsea pipelines; GIS and mapping; environment and operational safety; as well as terminals and storage systems and the interface pipeline/terminal and tanker/terminal.

### **13. Valorisation of Natural Gas Liquids (NGLs)**

Short chain alkanes derived from natural gas liquids (NGLs) can be an abundant source for the production of fuels and petrochemical basic products. Examples are the catalytic

conversion of C<sub>3</sub> and C<sub>4</sub> alkanes to aromatic hydrocarbons, the catalytic dehydrogenation of, for example, propane to propylene or the alkylation of aromatics with ethane / propane.

## Best Practice Keynotes

### 3. Ensuring prudent operations in refineries

It is essential that modern and environmentally acceptable refineries are operated in a safe and efficient manner. Successful examples for prudent operation of a refinery will be presented and the ways to their implementation described, including disaster management plans.

### 4. Optimising transportation, blending and storage of oil and oil products

An integral part of any production and use of oil and / or products is their efficient and safe transportation and / or storage. Moreover, blending of several product streams is often required in order to obtain marketable products. These complex interrelations will be dealt with in this session.

## Round Tables

### 4. Influence of product specifications on modernising refineries

In different locations around the world refineries produce products (e.g. fuels, lubricants) to meet local specifications. Sometimes these differences in specifications are driven by political interests (e.g. the sulphur content of transportation fuels and heating oils) or by the technical requirements (e.g. low temperature flow properties). The influence of these factors on modernising/revamping refineries will be discussed by experts from different parts of the world.

### 5. Sustainability of biofuels from different feedstocks

Biofuels are produced from different sources e.g. sugar cane, corn and fatty acids. In future cellulose or lignin may add to this feedstock spectrum. Renowned experts in the field will discuss the sustainability of biofuels from different feedstocks and also in comparison to the sustainability of fuels produced from fossil resources.

### 6. Challenges for integrating refinery and petrochemical complexes

This session will deal with synergies between a refinery and a petrochemical plant in order to optimise feedstock utilisation of common investments. Panel members will throw light on the different directions and the pros and cons of this issue.

## Block 3: Natural Gas processing, transportation and markets

### Forums

#### 14. New developments and future growth in CNG, LNG, GTL, CTL, BTL, CBM, Hydrates - supply and demand

World energy demand is being increasingly supplied from natural gas transported in liquid form; substituted for oil based liquid fuels and used in applications where major pipeline infrastructure is not in place. This forum will describe both the supply and demand aspects of the growing use of gas in the world's fossil fuel supply, including small scale CNG and LNG, floating LNG.

#### 15. Impact of the growing unconventional gas supply

The growing supply of unconventional gas, particularly shale gas and CBM, has transformed the North American natural gas market and depressed prices to levels not seen for decades. The jury is still out on how quickly new technologies can be applied to other regions of the world (eg Europe, Asia, South America) and the supply response that can be expected. The growth in unconventional gas supply promises to have a major impact on extending the life of fossil fuel resources around the world and the forum will discuss the challenges associated with new supplies of unconventional gas.

## **16. New developments in long distance transportation of gas - pipelines, ships and cross border issues**

The growing demand for natural gas has necessitated the initiation of more new logistic solutions between producing and consuming countries. The landlocked natural gas producing countries are obliged to look at the possibilities to arrange for pipeline connections. Those producers and consumers that have access to the sea can consider erecting LNG facilities. This forum will highlight the latest developments in this field focussing on cross border issues both in technical and geopolitical terms.

## **17. Meeting the growing demand for gas from Asia – implications for supply and transportation**

Natural gas is entering an age of rapid development. It is predicted that gas demand will increase more in Asia than any other regions of the world. For the next decade Asia will be the place for a growing gas supply and demand business. So supply and demand should be integrated to formulate a secure business chain. Unique technologies and large investments are needed to unlock this potential.

## **Best Practice Keynotes**

### **5. Best practice in hydraulic fracturing**

The growing supply of natural gas from unconventional sources such as tight gas and shale gas has been facilitated by the application of sophisticated hydraulic fracturing technologies. To achieve commercial production rates there are many issues and challenges associated with the safe, environmentally responsible and cost effective application of this technology which will be addressed in this session.

### **6. Management of gas mega projects**

Management for mega gas projects is changing especially for unconventional gas or offshore gas. It is vital to have well planned and integrated disciplines. HSE management; procurement and installation are critical. New technology adoption and a value chain consideration are closely related to the commissioning and operation of the project.

### **7. Best practices in new gas technologies for processing and transportation**

As the industry develops more challenging gas resources, new technologies in gas processing and transportation can play a vital role in the viability of the project. Key areas for improvement include new catalysts, drag reduction additives, and advances in compressor and other machinery design that allow for higher efficiency, greater reliability, and lower maintenance costs. Improvements in land and marine transport and storage options will also be discussed. To secure regulatory approval, processing and transportation systems, especially in pristine areas must meet increasingly stringent standards to minimize the impact on unique and/or fragile ecosystems and local communities.

## **Round Tables**

### **7. Do we need a global gas market?**

The increasing need for environmentally cleaner fuels has positioned natural gas to the fore. Crude oil has got a daily exchange based on pricing mechanisms. The same does not apply uniformly to natural gas which is differentially priced on different continents. Consequently the global market develops slowly. The LNG spot pricing has facilitated the development of the global market. In this discussion different views are tackled about the relation of global markets and market price differentiation.

### **8. What is the future of natural gas?**

Gas is nowadays regarded as affordable, acceptable, abundant and a reliable source of energy. The utilisation of gas has been getting broader. The gas value chain is being extended. With competitiveness of gas price and technology innovation, the downstream of the gas business is rapidly developing. Gas vehicles, gas shipping, including CNG and LNG, are becoming popular. Small scale land LNG facilities are being built. Gas as a fuel is entering even more households around the world. What is the role of gas as a fuel in the future?

## Block 4: Sustainable Management of the Industry

### Forums

#### **18. Financing investments in the oil and gas industry: challenges and opportunities**

Capital costs and financial risks are increasing as reserves are developed in challenging or remote regions and / or large scale developments, such as LNG and infrastructure projects. Creative financing techniques and new sources of finance will be required to manage the allocation of risks through mechanisms such as insurance, contracts and international capital markets, to ensure that sufficient funding is available to finance new projects.

#### **19. Ensuring the security of supply of equipment, materials and local content infrastructure**

Ensuring the security of supply of materials, equipment, technology, services, as well as human and financial resources is critical for the oil and gas industry. Major economical crises are impacting the capability of many industries and creating a scenario of uncertainties. On top of that new local content policies are being introduced in many countries adding complexity to the capability of the oil and gas industry to secure the supply of energy required for the next decades.

#### **20. Operational issues surrounding HSE and management of disasters**

In order to provide sustainable operations in the oil and gas sector, industry practices need to pay special attention to the environment, safety, labour protection and especially to practices of prevention, localisation and response to disasters.

#### **21. Regulatory issues: governance, risks and compliance – GRC**

Good governance, regulatory compliance and risk management are all key factors in ensuring the industry's sustainability. This session will describe how these factors need to be addressed thoroughly and effectively by all the industry stakeholders.

#### **22. The role of innovation and technology in shaping the oil and gas industry**

Innovation and technology is vital in promoting best practice, piloting new research and linking the industry to academic and research institutions. This session will discuss how innovation and technology is used by the industry to ensure it continues to move forward to become ever more productive and efficient.

#### **23. Energy efficient technologies ensuring environmental sustainability of the oil and gas industry**

Energy efficient technologies, including carbon capture and storage (CCS), are seen as a potential major contributor in reducing greenhouse gas emissions. This session will address the latest developments from the entire value chain.

#### **24. Human resources: challenges and opportunities**

In the oil and gas industry, manpower is one of the key drivers to success. This session will include all aspects of human resources, including education, recruitment, training and retention. It will also address actions necessary to attract both women and the younger generation to the technical professions in the industry.

#### **25. The role of the oil and gas industry in tackling energy poverty**

Energy poverty is an increasingly acknowledged global challenge that impacts economic growth, development and social well being. As social responsibility becomes more and more a way of doing business for the oil and gas industry, so efforts to find ways to tackle energy poverty have become urgent. What can the oil and gas industry do as part of these efforts? How will energy poverty initiatives shape the operations of our industry? And the relations with local communities? How should the industry design its CSR policies to cope with energy poverty?

## Best Practice Keynotes

### 8. Knowledge management

This Best Practice Keynote will address processes, strategies and policies to identify, create, represent, distribute and enable adoption of insight and experiences in the oil and gas industry. The main focus are the organisational objectives, such as improved performance, competitive advantages, innovation and sharing knowledge, as an enabler of organisational learning.

### 9. Ethics and anti-corruption

Ethical and non-corrupt behavior are key factors in ensuring the oil and gas industry's sustainability. Lessons learned and best practices from corporate responsibility and transparency initiatives will be presented in this session.

## Round Tables

### 9. Where are we now in the climate change agenda?

The oil and gas based industry accepts being a part of the climate change problem, and as such sees itself as a key player in finding and developing solutions. This Round Table will address the current status of the industry's responses to mitigate climate change.

### 10. International cooperation

In order to guarantee that the oil and gas industry will supply the energy needed to responsibly energise our growing world there is a greater recognition that cooperation and collaboration are required in the future to create commercial, operational and political synergies. What are the key elements for a successful strategy? What are the areas that NOCs / IOCs and SOCs can best cooperate with each other and with the other key stakeholders such as governments, suppliers, communities etc.?

### 11. Transformation of oil companies into energy companies

Many NOCs and IOCs have undergone or are undergoing changes which will see them transform themselves into National / International Energy Companies (NEOs / IEOs). This session will address and discuss the trend and the subsequent associated challenges which it brings.

### 12. Geopolitics

The petroleum business is interconnected, globalised and interdependent, and as such geo-political issues can impact many areas, such as access to exploration areas and poor boundary demarcation zones for example. These in turn impact supply and price as well as having a disruptive effect in general. These geo-political factors will be discussed from the perspective of business, government and academia.