

BACKGROUND

The 11th IEF (Rome, April 2008) concluded that “a sustainable energy future implies efficiency improvements, technological advances in both production and consumption of fossil fuels, and development of alternative low-carbon energy sources”. IEF Ministers noted that CCS is an important option that can reduce GHG emissions from fossil fuels.

Given the projected increase in long-term demand, and the dominance of fossil fuels in the energy mix for decades to come, there is an urgent need to improve the sustainability of fossil fuels, especially with regard to their environmental footprint. A wide range of technological solutions, ranging from energy efficiency measures to development of renewables and carbon capture and storage (CCS), will be important tools for mitigating climate change.

The IEF, in conjunction with the Global CCS Institute and hosted by NDRC-ERI, convened in Beijing in October of 2009 a symposium on CCS technology to investigate ways to accelerate its deployment. The Symposium gathered representatives from international oil and gas companies, technology and service providers, research centres and financial institutions. Participants reviewed critical issues related to CCS, exchanged views, and examined means to enhance cooperation and partnership among all stakeholders.

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FIRST IEF - GLOBAL CCS INSTITUTE SYMPOSIUM

BEIJING, 27-28 SEPTEMBER 2009

AN IEF EVENT HELD IN COOPERATION WITH THE GLOBAL CCS INSTITUTE



The International Energy Forum (IEF) is the world's largest gathering of Energy Ministers. IEF Countries account for more than 90% of global oil and gas supply and demand.

In addition to IEA and OPEC countries, transit states and key energy players, including Brazil, China, India, Mexico, Russia and South Africa, participate in the Forum. The magnitude and diversity of this engagement is a testament to the IEF's position as a neutral facilitator. Through the Forum and its associated events, IEF Ministers, their officials, energy industry executives, and other experts engage in a dialogue of increasing importance to global energy security.

The IEF and the global energy dialogue are promoted by a permanent Secretariat of international staff based in the Diplomatic Quarter of Riyadh, Saudi Arabia.

**International Energy Forum - Global CCS Institute
Symposium on Carbon Capture and Storage**

**Challenges and the way forward in accelerating CCS development
and deployment, particularly in oil and gas producing countries**

1 – Context

Given the projected long-term demand and dominance of fossil fuels in the future energy mix, there is an urgent need to improve the sustainability of their production and consumption, especially with regard to the associated environmental footprint. Carbon capture and storage (CCS) development and deployment offer a solution that can contribute, along with energy efficiency, to delivering a sustainable energy future.

The 11th IEF Ministerial (Rome, April 2008) concluded that “a sustainable energy future implies efficiency improvements, technological advances in both production and consumption of fossil fuels, and development of alternative low-carbon energy sources”. Ministers noted that carbon capture and storage is an important option to reduce greenhouse gas emissions from fossil fuels.

The IEF-IFP Symposium on technology (Riyadh, December 2008) acknowledged the crucial role of CCS in delivering a sustainable energy future and concluded that “CCS in conjunction with CO₂-EOR is a “double-win” option as it reduces greenhouse gas emissions while at the same time increasing recoverable reserves in mature fields and hence contributing to global energy security”.

However, CCS technology has some way to go before it makes a significant impact on greenhouse gas emissions. The cost of implementation and the need to increase efficiencies in the capture, transportation and storage of CO₂ are among obstacles still to be overcome before CCS technology attains commercial viability.

Building on the findings of the IEF-IFP symposium, the first IEF symposium on CCS technology to be held in Beijing, 27-28 September 2009, in cooperation with the Global CCS Institute and hosted by the National Development and Reform Commission (NDRC-ERI, China), will focus on ways to accelerate the deployment of CCS especially in oil and gas producing countries.

2 – Objective

The main objective of the symposium is to assess the current state of CCS development, with a particular focus on CO₂-EOR and its potential to enhance global energy security.

The symposium will gather representatives of governments, from producing and consuming countries, from industry, research centres and financial institutions. The audience will review critical issues related to CCS, examine impediments to large-scale CCS implementation and investigate ways and means of accelerating CCS deployment, particularly through enhanced cooperation and partnership. The symposium will also discuss the role of all stakeholders, industry, governments and financial institutions in facilitating CCS deployment and will try to achieve concrete recommendations on actions for governments and industry in consuming as well as producing countries.

Agenda

Sunday 27 September 2009

08.30 - 09.15: Registration

09.15 - 09.45: Welcome Address and Opening Statements

- Han Wenke, Director General of Energy Research Institute, NDRC
- Bob Pegler, Deputy CEO, Global CCS Institute
- Noe van Hulst, Secretary General, IEF

09.45 - 10.00: Keynote Speaker: Xiaohua Zhang, Programme Officer, Adaptation
Technology and Science
Programme, UNFCC

10.00 – 10.30: Coffee & networking break

10.30 – 12.30: Session One: CCS related issues: where we are and current challenges

Moderator: Bob Pegler, Deputy CEO, Global CCS Institute

Panelists:

- Francois Kalaydjian, Director, Sustainable Development Technologies, IFP
- Larry Hegan, Senior Policy Advisor on CCS, Natural Resources Canada
- Tim Bertels, Shell Business Development Manager for CO₂ solutions
- Heleen de Coninck, Manager, Energy Centre of the Netherlands
- Tim Dixon, IEA, GHG R&D Programme
- Fumihiro Ito, Associate Executive Officer, Senior Manager Oil and Gas Project Division, JGC Corporation
- Peta Ashworth, Team Leader, CSIRO, Australia
- Tony Wood, Director, Clean Energy Programme, Clinton Foundation
- Overview of achievements and lessons learned to date
- Progress and developments on technology, policy and regulations
- Costs challenges (costs of CO₂ capture, transportation and storage)
- The impact of the global financial crisis on CCS projects and future funding challenges
- Examples and developments in government - industry collaboration
- Progress in public awareness on CCS and its contribution to mitigating climate change
- Risks associated with CCS, reality and perception
- The geological potential for CO₂ storage in oil and gas producing countries

Roundtable discussion

12.30 – 14.00: Lunch break

14.00 – 16.00: Session Two: CO₂ – EOR: Opportunities and Challenges

Moderator: Said Nachet, Director, Energy Division, IEF

Panelists:

- Deborah Petterson, Assistant Director, Global Oil Markets & Middle East, Department of Energy and Climate Change, UK (representative of the “Four-Kingdom Initiative”)
 - Putu Suarsana, EOR Project, E&P Pertamina
 - Younes Jalali, Scientific Advisor, Beijing Geosciences Center, Schlumberger
 - Bo Peng, Professor, EOR Research Centre, Chinese University of Petroleum
 - Adrian Barrera-Roldan, Exploration & Production, Pemex
 - Zhang Dongxiao, Associate Dean, College of Engineering, Beijing University
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- The potential for CCS in enhanced oil recovery from mature oil and gas fields
 - Technology, funding and regulatory challenges in CO₂-EOR
 - The cost-benefit analysis of CO₂-EOR
 - The impact of oil price volatility on CO₂- EOR
 - How to incentivize CO₂-EOR? What role for the different players?
 - What ‘price of oil’ is needed to promote CO₂-EOR?
 - International cooperation and the role of NOC-IOC collaboration and partnership

Roundtable discussion

- Mr. Bai Rongchun, Deputy Director, National Energy Expert Consultative Committee, China

19.30: Opera Dinner

Monday 28 September 2009

09.00 – 11.00: Session Three: The way forward: from pilot project to commercial scale

Moderator: John Panek, Deputy Director, CSLF, Deputy Director, Office of Clean Energy Collaboration
U.S. Department of Energy

Panelists:

- Fuad Siala, Head Energy Studies Department, Opec
- Ton Wildenborg, TNO, Delft, Netherlands
- Theodore Roosevelt IV, Managing Director Investment Banking, Barclays Capital Council on Climate Change, New York
- Song Zheng, Vice President Greengem, China
- Ashok Bhargava, Principal Energy Specialist, Energy Division, Asian Development Bank
- Lorraine Yin, Programme Development Manager, The Climate Group, China
- Tsuneo Kusuda, Chief Researcher, CO₂ Sequestration Research Group, RITE, Tokyo, Japan
- The outlook for large scale industrial initiatives
- Obstacles and incentives to commercial deployment and the role of governments, industry and financial institutions
- Potential for cost reduction and economic improvement in CCS projects
- Enhancing the global producer-consumer dialogue to promote CCS deployment
- The potential impact on CO₂-EOR projects assuming inclusion of CCS within CDM
- Specific incentives needed to accelerate CCS deployment in oil and gas producing countries
- Improving public perceptions of CCS projects

Roundtable discussion

11.00 – 11.30: Coffee & networking break

11.30 – 12.30: Session Four: Wrap up session: Conclusions and Recommendations
Publication of Concluding Statement by IEF and Global CCS Institute

12.30 – 14.00: Lunch

Notes..

**International Energy Forum - Global CCS Institute
Symposium on Carbon Capture and Storage**

**Challenges and the way forward in accelerating CCS development
and deployment, in particular in oil and gas producing countries**

Background Paper

Purpose

The purpose of this paper is to provide background on the key topics to be discussed at the IEF-Global CCS Institute Symposium on Carbon Capture and Storage (CCS) being held in Beijing, on 27 and 28 September 2009. The symposium will examine the current state of CCS development and deployment including opportunities and challenges with a special focus on policy issues and the potential for CCS to be deployed in conjunction with enhanced oil recovery (EOR).

Participants will review critical issues related to CCS and investigate ways to accelerate its deployment, particularly through enhanced cooperation and partnerships. The Symposium aims to disseminate learning and to develop responses that may feed into CCS and climate change fora including the Carbon Sequestration Leadership Forum, the International Energy Agency Ministerial Meetings, the 15th United Nations Conference of the Parties (December 2009) and the 12th IEF Ministerial Meeting (Mexico, 29-31 March 2010).

The key issues and questions to be addressed by participants include: the progress of CCS to date; actions needed to move from pilot project to commercial scale projects; reduction of barriers to CCS deployment; structural challenges; EOR as an accelerant for CCS deployment; the role of and action required by various stakeholders including industry, governments and financial institutions; policies to support and accelerate CCS deployment; and avenues for further cooperation and dialogue between producing and consuming countries.

1- Introduction

In a carbon-constrained world, the issue of global energy security is becoming more critical. Given the level of projected long-term energy demand and continuing dominance of fossil fuel in the future energy mix, there is an urgent need to improve the sustainability of hydrocarbon production and consumption, especially with regard to its environmental footprint.

While the current global economic crisis is likely to influence short-term political and economic decisions, it is unlikely to alter the long-term energy picture. Established trends including the significant share of fossil fuels in the global energy mix will prevail over the long-term.

According to the IEA, global primary energy demand is expected to grow by more than 40% by 2030. Non-OECD countries are expected to account for 87% of this increase with China and India accounting for 51% and the Middle East, with 11%, emerges as a key demand centre. Under this scenario, fossil fuels will remain the dominant source of energy, accounting for 80% of the primary energy mix in 2030.

Worldwide, 61% of greenhouse gas (GHG) emissions are linked to energy production, delivery and use. At current trends, global energy-related CO₂ emissions are expected to rise by 45% from 28Gt to 41Gt in 2030. 97% of emissions growth is expected to come from non-OECD countries with China, India and the Middle East responsible for three-quarters of this increase. According to some estimates, the Middle East is on track to double its CO₂ emissions by 2030, which will make it the third largest growth area in CO₂ emissions globally.

New, coordinated and cohesive policies must be implemented and concrete actions taken to change the path of this scenario and curb GHG emissions. However, any effective global climate-change strategy will require strong participation from the major oil and gas producing and consuming countries.

CCS is among the most promising GHG reduction technologies and has been singled out for its potential to achieve cuts in CO₂ emissions from fossil energy. The deployment of CCS in conjunction with enhanced oil recovery (EOR) in particular, is demonstrating significant potential to contribute towards global emissions reduction. Economic stimulus and financial rescue packages around world provide a unique opportunity for CCS with the equivalent of US\$ 20 billion being made available to progress its development and deployment.

The imperative to accelerate CCS deployment is also gaining momentum on a number of fronts. The 11th IEF (Rome, April 2008) concluded that *“a sustainable energy future implies efficiency improvements, technological advances in both production and consumption of fossil fuels, and development of alternative low-carbon energy sources”*. IEF Ministers noted that CCS is an important option to reduce GHG emissions from fossil fuels.

The G8 Summit in Hokkaido (July 2008) acknowledged *“the need to act now to commit by 2010, to at least 20 fully integrated industrial-scale demonstration projects for the broad deployment of CCS technology by 2020”*. The recent G8 meeting in L'Aquila, Italy in July 2009 subsequently concluded that *“the development and deployment of innovative technologies such as CCS is expected to contribute substantially to reducing emissions”*, and reaffirmed their commitment to: accelerate the design of policies; regulatory frameworks and incentive schemes focused on the development and deployment of CCS technology; work to identify sources of financing for CCS demonstration projects; identify investment needs and overcome obstacles including the potential development of innovative partnerships.

2 - CCS deployment, where do we stand?

A vast number of initiatives and activities are underway to support widespread deployment of CCS technology including CCS research and development, construction of pilot-scale CCS demonstration projects and the development of directives and related regulations across a number of countries. Several large scale demonstration projects have been announced in Europe, North America and Australia along with cooperative programmes in non-OECD countries.

There is a rising interest and involvement noticeable in producing countries regarding CCS development. Saudi Arabia is an active member of the so-called “Four Kingdom’s Initiative” (together with the UK, Norway and the Netherlands). CCS is also an important part of the EU-OPEC dialogue and OPEC has recently also been admitted to the IEA’s implementing agreement on GHGs. Algeria has realized a full-scale demonstration CCS project in the In Salah gas field. The UAE is increasingly active in developing new initiatives (Masdar).

The progress of CCS to date is encouraging; while there are still a number of technical, economic and legal barriers to large scale CCS deployment, particularly regarding its cost and energy consumption. Research and development efforts, currently underway, are expected to lower investment requirements and operational expenses. These technological improvements combined with financial incentives and regulatory measures should help accelerate CCS deployment.

2.1 – Technology

CCS technologies are generally well understood but need to be scaled up and integrated along the value chain. CCS comprises three steps that have been tested and technically mastered in pilot plants: CO₂ capture, transport and storage. Implementation of these steps requires capital investment and imposes additional system operating costs related to capture equipment, energy for the capture process, transportation and storage systems.

- CO₂ capture can be applied to fossil fuel power plants, industrial processes and in the fuel production and transformation sectors. Capture technologies are based on those that have been applied in the chemical and refining industries for decades. Three main technology options exist for CO₂ capture: post-combustion, pre-combustion and oxyfueling. CO₂ capture requires energy, reduces overall energy efficiency and adds costs. The capture phase represents the main cost as it requires capture-specific equipment and entails additional energy consumption. Approximately 80% of the cost of CCS is attributed to capture, 10% to transport and 10% to storage. Achieving reductions in CO₂ capture costs is critical for the sustainable large scale deployment of CCS.
- CO₂ pipelines have been in operation for around 30 years and an estimated 5,000km of pipeline currently exists. However, deploying CCS on a scale large enough to have a significant impact on climate change mitigation will require new transportation infrastructure to link sources and sinks. This transportation system will need a high level of investment, particularly given the cost increases that have occurred in the last five years.
- Storage of CO₂ presents a number of challenges. Storage in saline formations, depleted oil and gas fields and use of CO₂ for enhanced oil recovery are considered the most viable storage options given the costs and the time involved. The single most fundamental challenge is to identify suitable reservoirs. Oil and gas reservoirs have been demonstrated to as suitable for CO₂ storage to some extent and the experience of the oil and gas industry provides an important contribution to the CCS learning curve. The main challenge is to demonstrate the integrity of storage sites; monitoring activities for leakage will be undertaken and where necessary appropriate remediation action taken. Moreover the costs of CO₂ storage have followed the same rising trends as upstream oil and gas production costs over the last decade. CO₂ storage projects have already been operational for at least ten years in Sleipner, Weyburn and In Salah.

2.2 - Regulatory framework, financing and public acceptance

- Regulatory frameworks are being designed around managing the risk associated with CCS. The task is to ensure that CO₂ is stored safely in sites where the environmental impacts have been assessed and where provisions for management and abandonment of the site ensure that stored CO₂ is retained in the long term.
- Costs and financing: there is a high degree of uncertainty in estimating the costs of CCS due to differences in methodologies applied to existing projects. There is also uncertainty regarding the evolution of costs over time. Technological improvements should help reduce costs but investment in CCS will only occur if there are suitable incentives and regulatory mandates.
- Public acceptance: existing pilot plants, particularly those using EOR, provide good starting points for communicating the feasibility and value of CCS. CO₂-EOR projects demonstrate the win-win potential of optimising the economic value of existing resources, contributing to greater energy security and managing GHG emissions effectively. CCS stakeholders must address public concerns and perceptions and educate and communicate on CCS deployment at a large scale.

3 - Combined with enhanced oil recovery, CCS is a double win option

CCS technology used in conjunction with carbon dioxide/enhanced oil recovery (CO₂-EOR) is a “double-win” option as it reduces GHG emissions while increasing recoverable reserves in mature oil fields, contributing to global energy security.

Improvement in the global oil recovery rate - estimated to average 35% today - through innovation and technological advancement helps to increase recoverable reserves of oil and gas. In some oil fields, companies are already producing at a recovery rate of over 50%, and according to some estimates, an increase of one percentage point in the average recovery rate of existing oilfields would be equivalent to two years of world oil consumption, at current rates.

EOR technology is projected to contribute 6 mb/d to world oil supply in 2030 - with CO₂-EOR accounting for most of the increase. Cumulative production in 2007-2030 amounts to 24 billion barrels. About 9.8 gigatonnes of CO₂ are captured and stored in CO₂-EOR projects over the projection period (IEA WEO 2008) which demonstrates its importance to early confidence building in CCS technology.

EOR-associated oil production currently amounts to 2.5 mb/d with the largest share coming from thermal process and CO₂ injection. The worldwide potential of CO₂-EOR is of the order of 160 to 300 billion barrels, i.e. 7-14 % of current remaining conventional recoverable oil resources.

The Middle East and North America are thought to hold the greatest potential. Even before climate change concerns appeared, the oil industry had been using CO₂ injection techniques in association with EOR efforts for decades, and did so with a very good safety record. The industry possesses the technology and know-how to use gas to improve recovery rates of existing mature oil gas fields. Its ability to deploy these techniques more widely has been constrained only by the availability of suitable supplies. Transportation of the captured CO₂ presents no real challenge to the oil industry.

The economic attractiveness of CO₂ EOR projects is determined by the marginal value of oil, the underlying production costs and the potential cost of supply of CO₂. According to estimates, the injection of one tonne of CO₂ leads to an incremental recovery of between two and three barrels of oil. The value of the extra oil would be compared to the cost of the CCS process.

EOR techniques already play an important role in improving production efficiency, and are set to become more widespread on the back of increasing long term future demand and with more technical oil to develop in the future. The use of CCS-EOR will grow further if CCS projects develop on a scale large enough to contribute significantly to climate mitigation. The development of CCS projects has the potential to provide a significant boost to the use of EOR.

There are four large-scale CCS projects in operation: the In Salah gas field in Algeria (1.2Mt CO₂/yr), Sleipner (1Mt CO₂/yr) and Snohvit (0.7Mt CO₂/yr) in Norway and Weyburn (2.4Mt CO₂/yr) in Canada. The Gorgon project in Australia is now under development and aims to mitigate emissions of more than 3 million tonnes of CO₂ equivalent per year by 2010. These projects operate under existing hydrocarbon production regulations.

The fundamental challenge in increasing the use of CO₂-EOR is the need to ensure sufficient volumes of CO₂ at the right place and the right cost. Growing support for CCS is likely to boost the use of EOR and improve EOR techniques and rates of recovery.

The oil and gas industry's knowledge and experience in EOR and gas transport and storage can be leveraged to accelerate CCS deployment.

4 - The way forward: enhanced cooperation and dialogue to promote CCS

Although CCS technology holds significant potential, there is still a long way to go before it makes a tangible impact on GHG emissions. There is a need for more commercial-scale demonstration projects and international partnerships to help CCS become commercially viable.

Barriers must be overcome before commercial deployment of CCS technology becomes a reality. These include technology efficiency developments, the creation of legal and regulatory frameworks and improvements in public awareness and acceptance.

Regulatory issues, particularly related to storage liability will also need to be addressed. Uncertainties surrounding costs should be tackled and funding solutions need to be found to support the demonstration project phase. All these actions require joint and coordinated efforts by all CCS stakeholders (i.e. governments, industry, academia and NGOs).

Accelerating CCS deployment requires measures that “push” technology advances through investment and cost reductions as well as policies that “pull” CCS through regulatory frameworks, incentives, private-public partnership, international cooperation and an enhanced producer-consumer dialogue.

A demonstration programme of integrated CCS projects would help prove CCS technologies at commercial scale identify risks and achieve public acceptance.

A survey conducted by McKinsey in September 2008 with industry players, NGOs, academics and other stakeholders identified four key potential barriers to the deployment of CCS: public safety and lack of support, lack of specific frameworks, inadequate funding for demonstration projects and an absence of operational commercial units.

- Public acceptance: there are currently public concerns about the environmental integrity of CCS. There are questions about whether the CO₂ stored will remain isolated in the long-term and whether the capture, transport and storage elements present health and ecosystem risks. The public awareness of CCS is also low leading to low acceptance rates and support of CCS technology.

- A legal framework: regulatory issues, particularly those related to the liability of storage will need to be resolved. Regulators need assurance that CCS activities will not result in any adverse effects (through good site selection, operation and closure). Regulations will have to be developed to remove barriers in existing legislation and build on existing laws that apply to similar activities such as oil and gas industry. A regulatory framework at national and international levels is also needed to clarify long term rights, liabilities and institutional structures. Clear, co-ordinated and cohesive policy direction is needed to give investors a signal that this is an area offering sustainable commercial returns.
- Cost and funding: the challenge facing CCS deployment is the reduction of capital requirements and operating costs. There is high degree of uncertainty in estimating the costs of CCS and how costs will develop with time. Economies of scale, operating experience and technological advances will gradually improve project economics. The human resources factor is another constraint to CCS deployment given the high demand for reservoir engineers and other skilled workers. Recent IEA analysis estimates that US\$ 30-50 billion needs to be invested to achieve the stated G8 goal of launching 20 full scale CCS demonstration projects in the next few years. Cutting CO₂ emissions by 50% from current levels by 2050 would require additional estimated capital expenditure of US\$ 14-15 trillion from 2005 to 2050.

Accelerating CCS deployment requires the joint and coordinated efforts of all stakeholders, working together to address existing barriers to the adoption of these technologies and to develop effective policies and measures to overcome them including proposed steps for implementation through international collaboration. The cost of climate change mitigation should be addressed through government fiscal and regulatory incentives and the creation of appropriate public policy.

Including CCS in the Clean Development Mechanism can contribute to accelerate CCS development and deployment and improve the economics of CO₂-EOR projects.

During the IEF-IFP symposium, held in Riyadh (December 2008), the participants discussed technological development in the upstream sector and concluded that *“CCS development and deployment can play a crucial role in delivering a sustainable energy future”; they welcomed all initiatives aiming at making CCS technology deployment economical at large scale and called “for CCS to be included, as soon as possible, in the Clean Development Mechanism”.*

Industry and governments both have a key role to play in achieving the full potential of CCS. Industry can provide know-how, technology innovation and the capital needed to develop large scale projects, while governments can provide the long-term policy and regulatory framework that enables the move to commercial scale deployment. Government-industry cooperation is also needed to communicate on CCS technology and to gain public acceptance.

Cooperation between developed and developing countries and between producing and consuming countries is needed to accelerate CCS deployment, harvest its potential and meet climate change goals. Information-sharing in CCS technology, structural and regulatory capacity building as well as additional R&D on CCS will play an important role in shortening the CCS learning curve.

Some new and innovative schemes are appearing. ExxonMobil and Petrochina signed an LNG contract recently which included a greenhouse gas abatement agreement meaning the CO₂ emitted during the liquefaction process will be captured and sequestered underground. Other milestone events include the Australian government's recent agreement to accept long term liabilities arising from storage of the CO₂ and its approval of the Gorgon Project on Barrow Island.

5 – Conclusion

CCS should be considered in the suite of solutions to mitigate climate change, along with other measures including energy efficiency, energy conservation and renewable energy.

The scientific community, industry and governments are increasingly recognizing CCS as a strategy that can contribute to meet the twin objective of achieving global climate goals and enhancing global energy security.

However CCS technology has some way to go to move demonstration projects to a commercial scale capable of significant impacts on GHG emissions. Efforts must be made to reduce CCS costs by increasing investment in R&D and technological advancement, addressing long-term policy, regulatory frameworks and financial incentives to justify investment.

Cooperation between producing and consuming countries, developed and developing countries, industry and government is a prerequisite to the acceleration of CCS deployment on a commercial scale. An international mechanism for funding deployment of CCS in developing countries is a key element that can be discussed in future international forums.

Given its potential to curb GHG emissions, development and deployment of low carbon technologies such as CCS will certainly be one of the main topics of discussion at the UN Conference on climate change in Copenhagen next December.

This symposium provides an opportunity to discuss issues and to develop messages to international forum in support of the continued development and deployment of CCS. It represents a strategic step in enhancing the producer-consumer and industry-government dialogue and aims to enhance international cooperation for the reduction of barriers and acceleration of industrial scale CCS.

IEF- Global CCS Institute Symposium

“Challenges and the way forward in accelerating CCS development and deployment, in particular in oil and gas producing countries”

Concluding Statement by IEF Secretariat and Global CCS Institute

The IEF - Global CCS Institute symposium was held in Beijing, 27-28 September 2009, hosted by NDRC-ERI, with the participation of representatives from oil and gas companies, technology and service providers, research centres, financial and international institutions and representatives from producing and consuming countries, from developed and developing countries.

This symposium was held following the recommendations of the 11th IEF which concluded that “a sustainable energy future implies efficiency improvements, technological advances in both production and consumption of fossil fuels, and development of alternative low-carbon energy sources”. IEF Ministers noted that CCS is an important option to reduce GHG emissions from fossil fuels.

This symposium represents a strategic step in enhancing the producer-consumer and industry-government dialogues for the reduction of barriers to commercial scale CCS and provides messages to the upcoming IEA and CSLF ministerial meetings in October 2009, Members’ Meetings of the Global CCS Institute in Paris in November 2009, the UNFCCC meeting in Copenhagen in December 2009 as well as the 12th IEF in Mexico in March 2010.

Symposium participants discussed the current state of CCS development and deployment and the potential for CCS to be deployed in conjunction with enhanced oil recovery (EOR). They reviewed critical issues related to CCS, exchanged views on how to accelerate its deployment, and examined ways and means to enhance cooperation and partnerships between all stakeholders. They made the following statements and recommendations:

1. In a carbon-constrained world, the issue of global energy security is of utmost importance given the level of projected long-term energy demand and continuing dominance of fossil fuel in the future energy mix. The sustainability of fossil fuel production and consumption, especially with regard to environmental footprint is an issue of common concern and global importance.

2. New, coordinated and cohesive policies must be implemented and concrete actions taken to curb GHG emissions. The success of any effective global climate-change strategy will depend on strong, co-ordinated and sustained commitment from the major fossil fuel producing and consuming countries.
3. CCS is a key GHG reduction technology given its potential to achieve cuts in CO₂ emissions from fossil energy. The deployment of CCS in conjunction with enhanced oil recovery (EOR) is of particular interest not least because it may prove to be a catalyst and stepping stone for accelerating commercial deployment of GHG reduction technology.

CCS deployment, where do we stand?

4. The progress of CCS to date is encouraging; however, there are still a number of social, technical, economic and legal barriers to large scale CCS deployment, particularly regarding its cost, energy consumption, knowledge sharing challenges and infrastructure requirements for integrated systems. With regard to the legal barriers, the recent example of the Australian government accepting the long term liability of CCS is an important step forward and needs following. A clear regulatory framework is needed to provide business certainty and mechanisms developed to reduce lead times in proving up appropriate storage sites.
5. A number of initiatives and activities are underway to support widespread deployment of CCS technology including CCS research and development, construction of pilot-scale CCS demonstration projects and the development of directives and regulatory frameworks. Greater commitment to full scale demonstration is needed to accelerate commercial deployment of CCS.
6. CCS stakeholders must better address public concerns and perceptions and invest more to educate and communicate with the general public in an objective way on the importance of CCS deployment to build acceptance. Members of the Global CCS Institute* will meet in Paris this November to establish a common approach to this necessary work. Existing pilot plants, particularly those associated with EOR, provide good starting points for communicating the feasibility and value of CCS.

Combined with enhanced oil recovery, CCS is a double win option

7. CCS technology used in conjunction with carbon dioxide/enhanced oil recovery (CO₂-EOR) is a “double-win” option as it reduces GHG emissions while increasing recoverable reserves in mature oil fields, contributing to global energy security.
8. The oil and gas industry’s knowledge and experience in EOR and gas transport and storage can be leveraged to accelerate CCS deployment. Selection of adequate sites needs appropriate attention.

Enhanced cooperation and dialogue to promote CCS

9. Efforts must be made to reduce CCS costs by a significant amount to bridge the sizeable economic gap through increasing investment in applied R&D, increasing knowledge sharing and building capacity to achieve greater efficiency, breakthroughs and technological advancement and provide effective incentives to industry. There is a need for more large scale demonstration projects to gain necessary experience and international partnerships to help CCS become commercially viable.
10. Accelerating CCS deployment requires the joint and coordinated efforts of all stakeholders, to address existing barriers, to develop effective policies and measures and to propose steps for large scale implementation through international collaboration. A key factor will be to establish an effective price for carbon.
11. Cooperation between producing and consuming countries, developed and developing countries, within and across industry and government is a prerequisite to the acceleration of CCS deployment on a commercial scale. Development of business cases and international mechanisms for funding deployment of CCS in developing countries are key elements that should be supported in future ministerial meetings to provide greater predictability for industry.

12. CCS should be included as soon as possible in the Clean Development Mechanism and future mechanisms, as it can accelerate CCS development and deployment and improve the economics of CCS projects thereby lowering perceived risks for investors
13. In order to have a significant impact on CO₂ emission abatement CCS deployment needs to be effective across the globe including major energy consumers such as the USA and China.

Finally, the participants welcomed the announcement of a second IEF-Global CCS Institute symposium to be held in Algeria in early June 2010, hosted by the Government of Algeria.

() IEF is a collaborating member of the Global CCS Institute*