

CCSワークショップTokyo2007

— CO₂ 排出抑制対策の柱として —

CCSWorkshopTokyo2007

平成19年11月19日(月)

ホテルグランドパレス2F「ダイヤモンドルーム」

November 19, 2007

Hotel Grand Palace



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CCS Workshop Tokyo 2007

日 程 : 平成19年11月19日 (月)

会 場 : ホテルグランドパレス2F「ダイヤモンドルーム」

Date : November 19, 2007

Place : Hotel Grand Palace

主 催 財団法人地球環境産業技術研究機構 (RITE)
共 催 財団法人エンジニアリング振興協会
後 援 経済産業省、独立行政法人産業技術総合研究所、
財団法人石炭エネルギーセンター、財団法人電力中央研究所、
石油技術協会、エネルギー・資源学会、社団法人物理探査学会、
社団法人資源素材学会、社団法人化学工学会、
社団法人日本エネルギー学会

Dear participants in the coming CCS workshop:

The first commitment period of Kyoto protocol will start April 2008 although CO₂ emission in Japan is still in excess compared with Kyoto target. We believe CO₂ capture and geological storage will be one of key technologies to reduce CO₂ emission for years to come.

The past RITE international workshops held in Tokyo and Kyoto produced fruitful results in providing with information on recent CCS technologies. The coming workshop will provide more updated information on CCS including those on commercial projects, R&D, and governmental regulation. In the workshop we will have presentations both from overseas and Japan and a panel discussion with key scholars in CCS which will be useful for making the audience realize effectiveness of CCS.

RITE also started to support FutureGen project led by US as a partner from Japan and will hold FutureGen workshop in February 2008 and hope as many scholars who are interested in CCS as possible will participate in the workshop.

Yoichi Kaya, Director General
RITE, Japan

Program

10:00 開会挨拶 RITE 専務理事 樋口正治
 来賓挨拶 経済産業省 大臣官房審議官 (地球環境問題担当) 伊藤 元

<海外招聘者講演>

10:15 「ノルウェーの CCS 商業プロジェクトについて」 Royal Norwegian Embassy
 Per Christer Lund (Norway)

11:00 「欧州の CCS 技術の現況について」 IEA GHG R&D Program John Gale (UK)

11:45 昼食休憩

13:00 「韓国における CCS 研究開発の現状について」 KIER Chang-Keun Yi (Korea)

13:45 「豪州の CCS 実証、商業プロジェクトと
 R&D の状況について」 CSIRO John Wright (Australia)

14:30 <コーヒーブレイク>

15:00 パネルディスカッション「CCS の実用化に向けての課題」
 コーディネーター：赤井誠 (AIST)
 パネリスト：上記海外招聘者 (4名)、大隅多加志 (RITE)、村井重夫 (RITE)

17:00 閉会挨拶 RITE 研究所副所長 木村邦夫

17:30 意見交換会

Opening Remarks	10:00- Masaharu Higuchi <i>Senior Managing Director, RITE</i> Hajime Ito <i>Deputy Director-General for Environment Affairs, METI</i>
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Invited Speakers Speech	10:15- Per Christer Lund <i>Counsellor, Royal Norwegian Embassy</i>
	11:00- John Gale <i>General manager, IEA Greenhouse Gas R&D Programme, UK</i>

11:45 - Lunch Break-

Invited Speakers Speech	13:00- Chang-Keun Yi <i>Director, Fossil Energy and Environment Department Korea Institute of Energy Research</i>
	13:45- John Wright <i>Director, Energy Transformed Flagship, Energy Technology, CSIRO, Australia</i>

14:30 - Coffee Break-

15:00- Panel on Future CCS and issues to be solved

Chair: Makoto Akai
*Principal Research Scientist Leader,
Socio-economic and Policy Study, AIST*

Panelists: Per Christer Lund
John Gale
Chang-Keun Yi
John Wright
Takashi Ohsumi
Chief Researcher, CO₂ Sequestration Research Group, RITE
And Shigeo Murai
Group Leader, CO₂ Sequestration Research Group, RITE

Closing remarks	17:00- Kunio Kimura <i>Deputy Director-General, RITE</i>
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17:30- Reception

Per Christer Lund

Counsellor, Science and Technology, Royal Norwegian Embassy

Born: August 28, 1961



Profile:

Per Christer was born in Stavanger, Norway, in 1961, and obtained a master and doctor degree in Chemical Engineering at the technical university of Trondheim (NTNU) in 1993.

Per Christer has been working within the areas of energy and environment since then in various positions and various companies.

His first contact with CCS was as a post-doc with AIST in Tsukuba, Japan in 1992/93, where he worked with among others Dr. Ohsumi on development of ocean deposition models. After returning to Norway, Per Christer changed the focus to energy markets and development of risk management systems. The second Japanese experience was in 1997, when Per Christer worked at the nuclear station "Fugen" in Tsuruga, employed by now Japan Atomic Energy Agency.

Per Christer worked 2 years for the Nordic power exchange with consulting assignments in India, Turkey, Ireland and Bulgaria on deregulated market designs.

Per Christer is currently science and technology counselor at the Norwegian Embassy in Japan, with main responsibility for the bilateral science and technology agreement between Japan and Norway.

Field of expertise:

CCS - Carbon Capture and Storage technologies

Energy trading and associated risk management

Design and principles of deregulated energy markets

Major commercial CCS projects in Norway.

Outline of presentation for the CCS Workshop Tokyo November 19, 2007.

Per Christer Lund, Science and Technology Counsellor, Royal Norwegian Embassy, Tokyo

Norway was one of the very first countries in the world recognizing and acting against global warming. The Brundtland Report of 1987, "Our Common Future" was a early warning of the now globally accepted challenge, and the Norwegian government in 1992 introduced the world's first CO₂ tax, currently at USD 50/ton. The Norwegian government has again raised global warming as a major national priority, which the following 4 major CCS projects in Norway clearly indicates:

The Sleipner project.

The CO₂ tax of 1992 prompted Statoil (now StatoilHydro after the merger of the two Norwegian companies on October 1st this year) to initiate a project to capture CO₂ from their Sleipner West natural gas field and re-inject it into the "Utsira formation" - a deep geological layer beneath the A platform on the nearby Sleipner East field. The Utsira formation has an overlying gas-tight cap rock 800 meters thick prevents the CO₂ from seeping up into the atmosphere. This solution was backed by the Sleipner license partners, and has cut CO₂ emissions by almost a million ton per year. That corresponds to roughly 3% of Norway's CO₂ emissions in 1990.

Sleipner West came on stream in October 1996, which also brought the world's first offshore carbon capture plant into operation along with its first carbon storage project in a geological formation 1 000 meters beneath the seabed. By now, about 9 million tons CO₂ has been deposited at the Utsira formation.

The Snøvit project

The Snøvit field in the Barents Sea, operated by StatoilHydro, is the world's first gas liquefaction plant with carbon capture and storage (CCS). This development combines sub sea production installations with a 145-kilometer multiphase-flow pipeline running to a gas liquefaction plant with export of liquefied natural gas (LNG) at around -163 °C to Europe and the USA.

CO₂ will be removed from the natural gas through a conventional amine process and returned all the way back to a porous sandstone layer some 2,500 meters beneath the seabed - safely below the gas reservoir. Some 700 000 ton CO₂ are due to be stored in this way every year.

European Carbon Test Centre at Mongstad (TCM)

The TCM is located at Norway's largest refinery in Mongstad on the west coast north of Bergen. By 2010, a new gas-fired combined heat and power plant (CHP) - now under construction - will start operation here. The plant will produce 280 MW of electricity, 350 MW of heat and 1.3 million ton of CO₂ per year (Mt/a). Since the electricity will partly be used to decrease the burning of fossil fuels in the refinery, 0.35 Mt/a CO₂ emissions will be avoided as soon as the plant comes into operation. Under an agreement between StatoilHydro and the Norwegian government about 2-2,5 million tones of CO₂ will be captured from the CHP-plant and parts of the existing refinery with project sanction planned for 2012. To achieve this major development at an acceptable level of technical and financial risk, a phase 1 - called TCM-will build a large scale test facility for new and improved technology for CO₂-capture at a cost of several hundred mill US\$. TCM consists of a partnership of equal owners (companies and the Norwegian state) which are now planning a test plant with 2 different test units totaling 100,000 t/a CO₂ which will - like the CHP-plant - enter into operation in 2010.

The StatoilHydro-Shell "Halten CO2 Project"

StatoilHydro and Shell are cooperating in a project to assess the use of CO₂ from a 860 MW gas-fired power station. The initial project assumption of using the captured CO₂ for enhanced oil recovery (EOR) in the offshore Draugen oil field turned out to be uneconomic, leading to a redefinition to pure geological storage for which mapping work is underway. In addition to captured CO₂, electricity from the power station would be transmitted both to gas export facility and to the two oil fields. Transmitting power offshore avoids the use of relatively inefficient offshore turbines, which are known to contribute to the release of nitrogen oxides. Emissions of CO₂ and nitrogen oxides from these facilities could be reduced to a negligible level. Between two and 2.5 million tones of CO₂ per year will be stored annually.

The Karsto project.

The Norwegian government is planning to construct a CO₂ capture facility at the Karsto gas-fired power plant. The Karsto gas power plant started to produce electricity in September 2007. The plan is to add CO₂ capture by 2011 or 2012.. Capture of about 1,1 million ton CO₂/year will be required for the 430 MWe plant.

John Gale

born 29th June 1956, Pershore, United Kingdom



1. Current Position:
General Manager, IEA Greenhouse Gas R&D Programme (IEA GHG)
2. Education and Degrees
BSc Pure and Applied Chemistry, Bristol University, 1981
3. Teaching and Research
Research Manager, British Coal Corporation, 1981-1990
Group Manager, CRE Group Ltd, 1991-1993
Principal Consultant, IMC Group Ltd, 1994-1999
Manager, IEA Greenhouse Gas R&D Programme, 1999 to present
4. Research Area
Clean coal utilisation and environmental management, Energy and Environment
5. Awards
2 publication awards
6. Activities in Academic Societies
Fellow Royal Society of Chemistry
7. Government Activities
Member various advisory panels for UK DTI and DEFRA
8. International Activities
Co-ordinating lead author, IPCC Special Report on CO₂ Capture and Storage,
Member FutureGen sub surface advisory panel,
Editor in Chief, International Journal on Greenhouse Gas Control.
9. Principal Publications (Books only)
None

Developments in the Implementation of CCS in Europe

Abstract

The aim of this paper is to summarise developments within the European sector on the deployments of integrated demonstration projects on CCS. Within the last year both the London Protocol and the OSPAR marine environmental conventions have been amended to include CO₂ capture and storage in sub sea geological formations. This move means that it is now legal to inject CO₂ into geological formations under the North Sea for storage purposes which is a significant step formation in the deployment of CCS in Europe. It was expected that there would be considerable opposition from the environmental NGO's who wanted a stipulation that the CO₂ would be pure. However both Conventions recognised that inevitably there would be some low level impurities in the CO₂ when captured from fossil fuel plants and that as long as the CO₂ was "overwhelmingly" CO₂ storage operations would be permissible. Again this was a significant potential stumbling block to sub sea storage that has now been overcome. The next hurdle to be overcome is the development of national regulations to be developed to allow CCS projects to be permitted so that the OSPAR amendment can be ratified.

In 2007 the European Commission has issued a Communiqué (COM(2006)843, 10.01.07) entitled Sustainable power generation from fossil fuels: aiming for near-zero emissions from coal by 2020. The commitments in this communiqué were to:

- Make demonstration of sustainable fossil fuel technologies a priority research topic for 2007-2013
- Make a substantial increase in EC R&D funding
- For Member states to make an equal commitment
- Support up to 12 large scale demonstrations
- All new fossil fuelled plants will need to be 'capture ready'

The European Commission has also reviewed its regulatory position and has decided that CCS should not be included under existing environmental directives and that a new CCS Directive will be developed. The drafting of this Directive is now underway and a draft document is expected to be circulated to members in spring 2008. After which there will be a 3 month consultation period with member states, which after modification it is hoped that the Directive will be adopted by late 2008. Again the Directive will require member states to have appropriate national legislation in place to allow the permitting of CCS projects.

A number of countries, particularly those around the North Sea, are now pressing ahead with the development of national CCS regulations. The Netherlands has already adapted its existing Mining Act to allow the permitting of a commercial offshore CO₂ re-injection project - known as K-12B. Norway has already permitted the Sleipner and Snohvit off-shore operations under its existing Pollution Control. The United Kingdom will announce an Energy Bill in late 2007 which will allow the permitting of offshore CO₂ injection projects in the UK sector of the North Sea. A joint UK/Norwegian Government Task Force has been set up to explore how to harmonize regulations between the two countries on CO₂ injection and to explore how best use can be made of existing oil and gas infrastructure. The first phase of this working group ended in Mid 2007 it is planned that a second phase involving more OSPAR countries will start in Spring 2008.

To take advantage of the ECs demonstration project plans both the UK and Netherlands Governments have announced their intent to build at least one fossil fuel fired CCS demonstration project by 2012. In the UK there are some 9 proposed demonstration projects and the Government will announce a competition in Spring 2008 to finance the construction of the CCS component of one of these projects. The competition announcement is expected by the end of 2008. A similar process is expected in the Netherlands in 2008. Norway has announced plan to build with Government support two new gas fired power plants with CCS by 2012 the first will be at Mongstad. In addition, to the Mongstad plant the Norwegian Government will establish a European CO₂ Capture R&D Centre at Mongstad with the support of Statoil, Hydro, Vattenfall and DONG Energy.

Chang-Keun Yi

Born on June 1, 1960 in Korea



1. Current Position

Director, Fossil Energy & Environment Research Department, Korea Institute of Energy Research (KIER)

2. Education

Ph.D. in Chemical Engineering, Lehigh University, USA, 1994

MS in Chemical Engineering, KAIST, Korea, 1985

BS in Chemical Engineering, Chungbuk National University, Korea, 1982

3. Position Held

Director, Fossil Energy & Environment Research Department in KIER, 2007 - now

Chief, Clean Energy System Research Center in KIER, 2002 - June 2007

Research Engineer in KIER, 1985 - 1990 and 1994 - 2002

4. Research Area

Capture CO₂ in the flue gas

Synthetic gas cleanup technologies

5. Membership of Academic Societies

The Board of Korea Institute of Chemical Engineers (KICChE), 2005

The Board of Korea Society of Energy and Climate Change, 2005 - 2006

Editor of a Journal, Korea Chemical Engineering Research, 2007 - present

Editor of a Journal, Korea Society of Energy and Climate Change, 2005-present

8. International Activities

A Korean representative, Carbon Sequestration Leadership Forum (CSLF)

A member of Government Steering Committee, FutureGen

9. Principal Publications (Books only)

None

Current CCS R&D Activities in Korea

Chang-Keun Yi, Korea Institute of Energy Research

71-2, Jangdong, Yuseonggu, Daejeon, 305-343, Korea

Korea ranks the 10th largest greenhouse emitter in the world and imports most of energy resources from other countries. Even though Korea is now within non-annex I group, Korea government is doing great efforts to find appropriate way to adapt new challenge of Climate Change.

To actively pursue the Climate Change Convention and Kyoto protocol, Korea built "Inter-ministerial Committee for Climate Change" with the prime minister being appointed as a chair in April 1998 and established "The 1st National Initiative for Addressing Climate Change" in February 1999. In September 2001, "Climate Change Convention Response Committee" with the prime minister being appointed as a chair was inaugurated and the relevant regulations were established. The committee was a government-level organization in which the 14 ministries and offices, private groups and government-invested R&D institutes participate. "The 2nd National Initiative for Addressing Climate Change" in March 2002 and "The 3rd National Initiative for Addressing Climate Change" in March 2005 were established and pursued so far. The National Initiative was to pursue various projects such as status and prospect of greenhouse gas emission, greenhouse gas reduction plan, development and supplying of renewable energy, establishment of partnership with the industries and privates.

The Ministry of Commerce, Industry and Energy (MOCIE), the Ministry of Science & Technology (MOST), the Ministry of Maritime Affairs & Fisheries (MOMAF) and the Ministry of Environment (MOE) are funding and supervising various kinds of R&D programs. Their R&D efforts in Korea are classified three groups: energy efficiency program, new and renewable energy program, and carbon capture and storage program. Current status of technology development on greenhouse gas reduction in Korea will be introduced. Some representative technologies on carbon capture and their targets will be explained.

Lecture 4

John Wright

born on August 22, 1944 in Sydney, Australia

**1. Current Position**

Director, CSIRO Energy Transformed Flagship Program

2. Education and Degrees

B.Sc. in metallurgical engineering University of New South Wales, Sydney, 1966

Ph.D. in extractive metallurgy, University of New South Wales, Sydney, 1970

Advanced Management Program, Harvard Business School, Boston, 2000

3. Positions Held

Scientific Officer, AMDEL, South Australia, 1970 - 1973

Principal Research Scientist, CSIRO Mineral Chemistry, 1974 - 1980

Principal Engineer, Hatch Associates, Toronto, Canada, 1981 - 1983

Chief research Scientist, CSIRO Mineral and Process Engineering, Melbourne, 1984 - 1994

Chief of Division, CSIRO Coal and Energy Technology, Sydney, 1994 - 2002

Director, CSIRO Energy Transformed Flagship Program, Newcastle, 2002 - present

4. Research Area

Low Emission Energy Technologies

5. Membership of Academic Societies

Fellow of the Australian Academy of Technological Science and Engineering

Fellow of the Australian Institute of Energy

Fellow of the Australasian Institution of Mining and Metallurgy

Fellow of the Australian Institute of Company Directors

Conjunct Professor, Department of Engineering, University of Newcastle

6. International Activities

Executive Committee, International Energy Agency, Hydrogen Implementing Agreement

Implementation and Liaison Committee, International Partnership for the Hydrogen Economy

7. Publications

Author of over 80 journal publications in metallurgy and energy related topics

CCS Workshop Tokyo 2007

Australian CCS Commercial and R&D Projects

John Wright

Director

CSIRO Energy Transformed Flagship Program

There is currently a high level of CCS activity in Australia covering the spectrum from demonstration, pilot and basic research. The activity includes investigations into capture and sequestration singularly, and in combination, to demonstrate near zero emissions technology. Pilot and demonstration projects include post combustion capture, oxy-firing, IGCC with CCS from both black and brown coal and from natural gas power generation. There is also strong research activity in CSIRO, the Cooperative Research Centres and the universities.

The high level of activity is the result of several drivers. There is recognition by industry and government that a lack of GHG-reduction activity is an unacceptable risk in a future carbon constrained world. The federal government has instituted a range of funding assistance to approved low emission projects through a Low Emissions Technology Fund (LETDF) and participation in the Asia Pacific Partnership (APP) on Clean Development and Climate. There is considerable funding support through the Australian Coal Association's COAL21 program financed by a voluntary levy on exported coal. The government is planning to introduce an Australian emissions trading scheme commencing in 20011-12. And finally, the federal government has just announced a clean energy target (CET) requiring up to 15% of Australia's electricity generation to be generated by technologies that have a GHG intensity of less than 200kg of CO₂ per MWh by 2020. This requires the implementation of CCT from fossil fuels - and it will also give a boost to the penetration of renewable energy which is also covered under the clean energy target.

The presentation will list and describe all of the Australian pilot and demonstration activities, together with their size, partners, location, and type of operation. Research activities will also be briefly described to give an up to date summary of activities, approaches and long-term aspirations for the role of CCS in Australia.

Coordinator

赤井 誠



生年月日 1950年2月25日
 所属・役職名 独立行政法人 産業技術総合研究所 エネルギー技術研究部門 主幹研究員
 最終学歴、学位 東京工業大学大学院 理工学研究科 原子核工学専攻 博士課程修了 工学博士
 略歴 80年4月 通商産業省 工業技術院 機械技術研究所 入所
 01年4月 組織改変に伴い、(独) 産業技術総合研究所へ
 エネルギー利用研究部門 主任研究官
 03年3月 エネルギー利用研究部門 小型分散システム研究グループ長
 04年7月 エネルギー技術研究部門 分散システムグループ長
 06年7月 現職

研究、及び対外活動

研究

～ 89年 高温ガス熱交換器、二相流のシミュレーション、二相流計測用高速X線CTの研究開発、MHD 発電用石炭燃焼器の研究開発等
 88年～： エネルギーモデルによる技術導入シナリオの分析・評価、外部性評価、技術の社会受容性に関する研究、水素によるエネルギーマネジメントシステムに関する研究、CO₂の回収隔離に関する研究（基礎研究～政策研究）他

対外活動

91年頃～： MITI/METI、NEDO の各種委託研究委員会の委員長・委員
 (技術評価・技術開発戦略策定、個別 R&D プロジェクトの推進等、CCS の評価) 国際エネルギー機関 (IEA) への代表専門家など
 ・エネルギー技術研究委員会 (CERT) ・技術評価に関する専門家会合
 ・温室効果ガス関連研究開発プログラム
 ISO/TC207 (環境管理規格) /SC5 (LCA) /WG3主査
 99～03年： CO₂海洋隔離に関する国際共同研究プロジェクトマネージャ CCS の社会的受容性、政策的位置づけに関する調査研究委員会主査
 02年～： METI 「二酸化炭素の国別排出インベントリ算出における隔離技術の適用ルールに関する研究」プロジェクトリーダー
 03年～： 気候変動に関する政府間パネル (IPCC) の「CO₂回収隔離に関する特別報告書」統括執筆責任者 (Coordinating Lead Author)
 04年～： IPCC 「国別温室効果ガス排出インベントリガイドライン」執筆責任者 (Lead Author)
 炭素隔離リーダーシップフォーラム (CSLF) 技術グループ日本代表
 04年～： METI 技術戦略マップ (CCS 関連) 作成委員会 METI 超長期エネルギービジョン検討委員会委員及び WG 主査 RITE 「低品位廃熱を利用した CO₂分離回収技術開発推進委員会」委員長
 05～06年： METI/MRI 「地中隔離技術利用検討委員会」主査 (CCS-CDM プロジェクトの検討)
 06年～： METI エネルギー技術戦略検討委員会委員及び WG 主査
 07年～： RITE 「石炭ガス化技術等実証普及事業推進委員会 (FutureGen 委員会)」委員長
 RITE 「CO₂海洋隔離プロジェクト技術委員会」委員長

審議会等

01年～： METI/NEDO の技術開発に係る施策・制度、プロジェクト評価委員会の主査・委員 (含 CCS 関連)
 05年～： 総合科学技術会議 基本政策専門調査会 エネルギー分野推進戦略プロジェクトチーム
 06年～： 中央環境審議会地球環境部会 「二酸化炭素海底地下地層貯留に関する専門委員会」総合資源エネルギー調査会 総合部会 基本計画小委員会 METI 「二酸化炭素回収・貯留 (CCS) 研究会」
 07年～： 長期需給見通し (2030年) 策定に向けたエネルギー技術サブWG主査 Cool Earth - エネルギー革新技術計画検討委員会委員長

Makoto Akai

National Institute of Advanced Industrial Science and Technology (AIST)

1-2-1 Namiki, Tsukuba, Ibaraki 305-8564 Japan

Tel: +81-29-861-7244; Fax: +81-29-851-7523

e-mail: m.akai@aist.go.jp

He obtained academic B.S. in Mechanical Science and Engineering, M.S. and Ph.D. degrees in Nuclear Engineering from Tokyo Institute of Technology (Japan) in 1973, 1975 and 1980 respectively. After joining the Mechanical Engineering Laboratory, Agency of Industrial Science and Technology, Ministry of International Trade and Industry (MITI) in 1980, he was engaged in modeling of turbulent two phase flow, development of components such as high temperature heat exchanger and coal combustor, development of ultra high speed X-ray tomography for two phase flow measurement, etc. for 80's. In late 80's, he proposed a concept of Carbon Dioxide Capture and Sequestration (CCS) technology as a countermeasure toward Climate Change problem and has been carrying out relevant studies. From 90's, his research topics has shifted to socio-economic aspects of energy technologies, which include Life Cycle Assessment (LCA), energy system analysis including hydrogen energy system, CCS, etc., energy modeling, evaluation of externalities of energy system, etc.

He has been chairing or a member of various steering committees of national projects under the Ministry of Economy, Trade and Industry (METI, former MITI). He also has played key roles in international activities which include, convener of ISO/TC207(Environmental Management)/SC5(Life Cycle Assessment)/WG3, project manager for "The International Collaboration Project on CO₂ Ocean Sequestration" under IEA/CTI, delegate to "Experts Group on R&D Priority-Setting and Evaluation" under IEA/CERT, delegate to "IEA Hydrogen Programme - Annex 18: Evaluation of Integrated Systems", Coordinating Lead Author to the IPCC Special Report on Carbon Dioxide Capture and Storage, Lead Author to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, etc. Following the reconstruction of Japanese Government (April 2001), he joined National Institute of Advanced Industrial Science and Technology (AIST) under METI and after leading research groups such as Distributed Energy System, and Socio-economic and Policy Study, he has been working as a Principal Research Scientist. Currently, most of his time except research is devoted to lead and contribute to the development of energy and environmental strategy by METI, and CCS related activities.

Panelist

大隅 多加志

昭和26年9月22日生まれ

財団法人 地球環境産業技術研究機構 研究参事

経 歴： 昭和49年3月 東京大学理学部化学科 卒業
 昭和53年3月 東京大学大学院理学系研究科博士課程 中退
 昭和53年4月 東京工業大学理学部化学科 助手
 昭和62年4月 財団法人 電力中央研究所 入所
 平成12年4月 財団法人 地球環境産業技術研究機構 出向
 現在にいたる

専門分野： 地球化学（海洋・地震・火山・エネルギー技術関連）

著 書： 気候変動に関する政府間パネル（IPCC）CO₂回収貯留特別報告書（2005）
 第6章「海洋」執筆
 図解 CO₂貯留テクノロジー（RITE 編；2006年12月 工業調査会刊）分担執筆

**Takashi OHSUMI**

born on September 22, 1951

Research Fellow, Research Institute of Innovative Technology for the Earth

Graduated from Dept. Chem. the University of Tokyo, in 1974

Graduate School in Science, the University of Tokyo, in 1978

Working with Tokyo Institute of Technology as Instructor, from 1978 - 1987,

And then with Central Research Institute of Electric Power Industry, from 1987

also working with Research Institute of Innovative Technology for the Earth, form 2000 to now

Expertise: Geochemistry of ocean, earthquake, volcano and energy-related technologies

Author of Books:

Chapter 6 of IPCC Special Report on Carbon Dioxide Capture and Storage

(Oxford Univ. Press 2005)

Chapter 2 of "CO₂ Storage Technology Illustrated" (Kogyo Chosa-kai 2006 edited by RITE, in Japanese)

村井重夫

昭和18年3月3日生まれ

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経 歴: 昭和41年 京都大学理学部化学科卒業
昭和43年 京都大学大学院理学研究科 (化学専攻) 修士課程修了
昭和46年 京都大学大学院理学研究科 (化学専攻) 博士課程修了
住友電気工業株式会社入社
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平成15年 住友電気工業株式会社定年退職
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専 門: 温暖化対策技術、海洋化学、分析化学
著 書: CO₂固定化・削減・有効利用の最新技術 (CMC 出版) (2004年)
受 賞: 日本分析化学会学会功労賞 (2001年)



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Current Position: Chief Researcher,
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Education and Degrees:

BS in chemistry at Kyoto University, 1966
MS in chemistry at Kyoto University, 1968
End of doctoral course in chemistry at Kyoto University, 1971
University of Kyoto, awarded D. Sc., conferred in 1974

Carrier:

Sumitomo Electric Industries, Ltd., 1971 ~ 2003
Guest Researcher of National Bureau of Standard (USA), 1976 ~ 1978:
Guest Researcher of Catholic University (USA), 1977 ~ 1978
RITE Chief Researcher, 2001 ~

Research Area:

Mitigation technology of global warming, Ocean chemistry, Analytical chemistry

Awards:

Merit award of the Japan Society for Analytical Chemistry (2001)

Principal Publications:

Recent Advance in Technology for Fixation, Cut and Available use of Carbon Dioxide, 2004 (Co-writing)



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