

EXPERT GROUP ON CLEAN FOSSIL ENERGY (EGCFE) PROGRESS REPORT TO THE 48th MEETING OF THE APEC ENERGY WORKING GROUP (EWG 48)

A summary of administrative and project activities undertaken by the EGCFE since the EWG47 Meeting is provided by the EGCFE Chair, Mr. Scott Smouse (USA).

ADMINISTRATIVE

The EGCFE's web site <www.egcfe.ewg.apec.org> is maintained by USDOE's National Energy Technology Laboratory. A major review of the website is underway with the aim to revamp the site in early 2015.

EGCFE Secretariat

Ms. Toshiko Fujita of JCOAL-JAPAC is the EGCFE Secretariat.

Support Contractor

Technical support to the EGCFE Chair is provided by Dr. Ian Torrens (USA) through a USDOE site-support contract, for preparation of project concept notes, full projects proposals, project progress and completion reports, and development of technical programs for EGCFE seminars and workshops.

Planning Activities

EGCFE business meetings are typically held in conjunction with the annual Clean Fossil Energy Technology and Policy Seminar. The last meeting was held on 21 February 2012 in Gold Coast, Australia. However, owing to travel limitations by the U.S. EGCFE Chair, the annual EGCFE seminar and associated business meeting were not held in 2013 and 2014. A meeting had been scheduled in May 2013, which was postponed after cancellation of the annual EGCFE Technical and Policy Seminar owing to the U.S. government budget situation. The next business/planning meeting will be held in conjunction with the next annual Seminar, which is being planned for early 2015 in Malaysia.

PROJECT STATUS

(1) APEC Initiative for Deploying Advanced Clean Coal Technologies (CCT Deployment Initiative): Phase 1 (EWG 02/2013A)

This project, proposed by the United States and Japan with eight other co-sponsoring APEC economies, responds to the APEC Energy Ministers' instruction to the EWG (through their 2010 Fukui Declaration) to develop an initiative to assist developing member economies with deploying advanced clean coal technologies (CCTs) to make coal-fired power generation more efficient. The initiative also responds to the Energy Ministers' instruction to the EWG to extend and reinforce its analysis of technology options for CCS, including CCUS, and the dissemination of best practices for applying these technologies to new and existing power plants.

The project (the first phase of the CCT Deployment Initiative) consists of in-country consultations and assessments of several developing APEC economies by a team of experts, including engineers, technologists, policy analysts, and financial advisors. It assesses the status of CCTs, related policies, and technical, economic, and institutional challenges slowing CCT deployment in each economy. It also addresses the use of low-rank coals, which constitute about half of global coal reserves.

The project includes technology options for carbon capture and storage (CCS), including CO₂ utilization (CCUS), and issues related to early demonstration and adoption of these options.

The overall objectives are to clarify the development status of a variety of clean and efficient coal utilization technologies, and to promote their adoption and implementation. Project elements include:

- assessment of plans for new coal-based energy facilities in several developing APEC economies (Philippines, Malaysia and Thailand for the first year)
- identification and assessment of technical, economic and institutional challenges limiting near-term adoption of clean and efficient coal technologies in each economy, and
- highlighting government policies and incentives needed to support acceleration of CCT deployment in each economy; to disseminate best practices for application of CCTs to new and existing power plants; to

recommend capacity building measures in this area in the selected economies; and to identify APEC efforts needed to promote CCT deployment.

- Establishment of a CCT Deployment Working Group consisting of specialists from the selected developing APEC economies and from other economies that have relevant expertise to support them. The Working Group will include relevant government and industry experts.
- Visits by selected Working Group specialists to the candidate economies to consult with their experts on CCT deployment projects in their economies, provide advice on appropriate steps to promote the efficiency and reliability and reduce emissions from these projects, and recommend capacity building measures in this area in the candidate economies.

The assessment includes:

- CCT-related policies in each economy, including technical, economic and institutional challenges facing their deployment.
- Technology options for CCS including carbon capture, utilization and storage (CCUS), and issues related to early demonstration and adoption of these options.
- Dissemination of best practices for applying CCT technologies to new and existing power plants.

The role of the Working Group is to enhance the effectiveness of this effort, assist in matching the steps needed for CCT deployment to the situation and needs of each candidate economy, and identify capacity-building needs for these economies.

The Working Group will discuss the results of the first year assessment, make recommendations for the most appropriate approaches to CCT promotion in each of the candidate developing economies, and identify how to assist the process through cooperation with developed APEC economies possessing CCT deployment experience. The end product of the first year of the project will consist of a final report containing recommendations regarding the types of CCT best suited to deployment in the candidate developing economies, and identification of ways that APEC can assist in promoting their deployment.

The project is to be managed by a consultant under the guidance of an APEC project steering committee composed of EWG and EGCFE experts. Four proposals from contractors were received in response to an APEC RFP. These were reviewed by Australia, Japan, and the United States, and the contractor Aurecon was selected unanimously in January 2014 to carry out the project. The final report is due in November 2014.

The chosen contractor, Aurecon, held a kick-off videoconference with the Institute of Energy Economics Japan (IEEJ) and the EGCFE chair in March 2014.

Progress to date has included:

- A project kickoff video-conference on 13 March between Aurecon, IEEJ, and the EGCFE chair.
- It was agreed that the developing APEC economies to be targeted would be Thailand and Indonesia. IEEJ has contacted the representatives of these economies to confirm their support for the project.
- A meeting between Aurecon and IEEJ was held in Tokyo on June 10 to finalize the content of the preliminary assessment report and discuss the program for the visits to the two target economies.
- The project team jointly decided on the clean coal technologies to be considered in the study.
- A framework for the preliminary assessment report has been prepared. At the meeting, the respective responsibilities of Aurecon and IEEJ were agreed.

Visits to the target economies were scheduled for 21 - 25 July. Most of the meetings have been set up with the various organizations.

A follow-up project in the CCT Deployment Initiative for the following year is expected to repeat the above steps above for a second set of candidate developing economies (to be selected), drawing on lessons learned during the first year's visits and on the recommendations that emerge from these lessons.

(2) APEC Unconventional Gas Expert Workshop (EWG16/2011)

The intent of this project was to build on the work carried out by the consultant Advanced Resources International on the project EWG 12/2011 (APEC Unconventional Gas Census: Evaluating the Potential for Unconventional Gas Resources to Increase Gas Production and Contribute to Reduced CO₂ Emissions) and to help in the transition to

the next phase by providing timely expert feedback on the report and input to the future work. The APEC PMU approved a sole source award to Advanced Resources International and project extension to March 31, 2014.

The workshop objectives were to obtain feedback from government and industry experts on the findings of the EWG12/2011 project on an unconventional gas census; exchange information on the status of surveys of unconventional gas resources completed, underway, or planned for different APEC economies, and on relevant activities by other international fora; and to recommend future work, including capacity building on technologies, the economics of unconventional gas, public acceptance issues, and needed policy/regulatory structures, such as best practice regulatory and policy approaches to support the development of unconventional gas.

The event took the form of a 1-day Experts Meeting on Unconventional Gas organized by ARI and held in Beijing, China, on September 27, 2013. It was chaired by Scott Smouse. The China Coal Information Institute (CCII) served as the local host and organizer of the Chinese participants. Attendance at the event totaled about 30 with most of the representatives being from China. Experts from Australia, Japan, Korea, and Vietnam also attended.

The Workshop in Beijing helped disseminate the results of the ARI study to APEC experts in the natural gas sector, and identified the key opportunities and challenges for unconventional gas resource development in the APEC region. ARI presented the results of its unconventional gas study, followed by presentations by selected individual APEC economies. Workshop participants provided detailed presentations on unconventional gas resources and development activities in key APEC economies, including Australia, Canada, China, Indonesia, and the United States.

Workshop participants participated in discussion groups to help formulate recommendations to the APEC Energy Working Group and Secretariat for future activities to promote improved understanding of unconventional gas resources. The project built on the work in progress on the project EWG 12/2011 and helped in the transition to the next phase by providing timely expert feedback on the report and input to the future work.

There were three main outcomes and recommendations:

- APEC Unconventional Gas Expert Team: Workshop participants considered that the single most important and helpful role for future APEC assistance would be to sponsor a team of technical experts in unconventional natural gas exploration and development. This team would visit and assist government ministries in key APEC economies which have significant unconventional gas resource potential but which require technical assistance to initiate or accelerate. The Expert Team should include specialists in the following key areas: geologic assessment and development of geologic and well data bases; technology and knowledge transfer from the unconventional gas industries of mature economies (Australia, the US, Canada); and fiscal policies which would promote unconventional gas investment and development.
- Investment by private industry: There is a general need to decrease barriers for bilateral investment in unconventional natural gas, as well as to promote better understanding of the impact of shale gas development on global LNG markets and natural gas pricing.
- Given the large size and particular importance of China's unconventional natural gas resources and industry, as well as its challenging geology and relatively slow development, there are a number of technical areas that need strengthening. These include: sweet spot location and drilling, fracturing, damage reduction of deep coal seams for CBM development; and shale gas exploration and production technologies.

This project, together with the results of the project EWG 12/2011 on an unconventional gas census, led to recommendations for future EGCFE activities in the field of unconventional gas, including the content, timing, and management responsibility for an APEC unconventional gas census. These recommendations form the basis of follow-on project proposals to be submitted for possible APEC funding.

The workshop report is available on the EGCFE website for downloading¹.

(3) Feasibility of accelerating the deployment of carbon capture, utilization and storage (CCUS) in developing APEC economies (EWG24/2011)

¹ <http://www.egcfe.ewg.apec.org/projects.htm>

The objective of this project was to produce a feasibility assessment for accelerating CCUS-EOR in selected developing APEC economies. The approach includes a review of previous assessment efforts and the data and information needs for evaluating CCUS-EOR opportunities; identification and evaluation of barriers to exploitation of these opportunities; assessment of potential policies and programs that could help accelerate the development of large-scale CCUS-EOR demonstration projects; identification and description of existing elements of CCUS-EOR permitting frameworks that are likely to require particular attention by the relevant authorities in developing APEC economies; and development of recommendations for cost-effective capacity-building activities in the area of CCUS-EOR in these economies.

For the purposes of this effort, the developing APEC economies considered were Brunei Darussalam, People's Republic of China, Indonesia, Malaysia, Mexico, Peru, Thailand, and Vietnam.

The study built upon previous work to develop a feasibility assessment of the CCUS-EOR potential in these developing APEC economies. This assessment includes both an estimate of the amount of incremental oil that could be recovered from oil basins in these economies and the amount of CO₂ that would be required, and that could ultimately be stored, to facilitate that recovery.

In total, the eight economies selected to be the focus of this study have the potential to produce 18 to 78 billion barrels (2.5 to 10.6 billion tonnes) of incremental oil from the application of CO₂-EOR, and could store from 5.8 to 24.2 billion tonnes of CO₂ as a result. All APEC economies considered in this project were included because they have some oil resource endowment that could be amenable to the application of CO₂-EOR. However, most of the CO₂-EOR potential in these eight APEC economies exists in just two – China and Mexico.

The project report was prepared by Advanced Resources International and submitted in October 2013. It has been posted on the EGCFE website for downloading².

(4) APEC Expert Workshops on CCUS-EOR (EWG 15/2013A)

At present, in the absence of a price on carbon, the economics of CCS do not favor deployment unless a project receives some form of financial support. There are, however, situations where captured CO₂ can be sold and utilized, rendering the project economics more attractive. The most practicable example of carbon capture, utilization, and storage (CCUS) is for enhanced oil recovery (EOR), where CO₂ is used to stimulate the production of oil from reservoirs (CCUS-EOR) with declining production.

Based on available data, China – the world's largest emitter of CO₂ – offers the greatest opportunity in the APEC region for CCUS-EOR. Committed to reduce its emission levels, China is exploring various CCS options and CCUS-EOR can become a key stepping stone towards the deployment of large-scale CCS in APEC. This APEC project aims to bring CCUS-EOR greater prominence internationally, with particular emphasis on near-term opportunities in China and other developing APEC economies.

The project was approved by APEC on January 1, 2014. An RFP was posted on the APEC website in January 2014, with proposals due by February 28. Five proposals were received, from Advanced Resources International, Alborz Consultants, BBB Energy, Clean Air Task Force, and Development Technologies International. The last was selected unanimously by a panel of EGCFE experts. The contract with APEC was finalized in June 2014. No outputs are yet available. Information on the timing, location, scope, and content of the two workshops follows.

The first workshop will be held in Beijing and hosted by the Peoples University of China. A 2-day event, in the form of roundtable discussions on selected topics, with 30-40 participants is anticipated.

- Day 1: CCUS-EOR Basics and Overview of the EOR Process
 - Advanced CO₂-EOR Technologies
 - EOR Economics and CCUS Investment Models
 - Legal and Regulatory Aspects of CCUS-EOR
 - GHG Compliance and CCUS-EOR / MRV Approaches
- Day 2: Introduction by China and US APEC Representatives
 - CCUS-EOR Opportunities in China

² <http://www.egcfe.ewg.apec.org/projects.htm>

CO₂-EOR vs. Saline Storage / Monitoring Discussion and Close

The second workshop will be organized in the United States and hosted by Southern Company and Mississippi Power, with a visit to the Kemper County Energy Facility, which is a state-of-the-art 582-MW integrated gasification combined cycle (IGCC) plant with the capability to capture about 65% of the CO₂ generated. A 1-day event with at least 10-15 participants is anticipated, in the form of roundtable discussions on selected topics. A brief introduction of each topic will be made followed by discussions facilitated by workshop leaders.

Day 1: Kemper Energy Facility

Welcome: Southern Company Representative & U.S. APEC Representative
Overview of the Kemper Energy Facility and Tour of the Facility
Southern Company Presentations on Facility Operations
Discussion

Day 2: Denbury & Tellus CO₂-EOR Field Operations

Field Visit
Q&A with Operations Staff

Day 3: Roundtable Discussions

CO₂-EOR vs Saline Storage
Approaches and Monitoring, Verification and Accounting Needs
CO₂-EOR Field Experience and Case Studies

Day 4: Lessons Learned and Report Conclusions.

The project has been extended June 30, 2015, as result of delays initiating the project, which pushed the workshops to the year's end. The first workshop will be held on November 10-11, 2014; the second workshop is being planned for February 2-4, 2015. The dates for both were selected to avoid similar other events in the APEC region, as well as the need to plan around holidays.

In addition, the U.S. Trade Development Agency (TDA) will host a self-funded study tour after the second APEC workshop. Discussions are underway with TDA regarding arrangements for an expanded group of experts and interested professionals to participate in the second workshop. The Project Overseer and the Consultant are discussing the content, timing, invitation lists, and logistic details for the combined event. While the APEC Workshop will be separate from the TDA study tour, it will add considerable value to the participants sponsored by APEC, by leveraging resources and increasing the visibility of the event.

(5) CCS Capacity Building in Mexico (EWG17/2013A)

Recognizing that Mexico is the 7th largest emitter of CO₂ in the APEC region and that CCS technology holds the most promise to reduce these emissions, Mexico has started developing and implementing this technology. Two APEC workshops were held to start building CCS awareness and capacity (in 2007 and 2012), but a more robust capacity-building program was needed to sustain the momentum.

This project builds on the previous two workshops and on the network of contacts and resources established during these events, in coordination with related efforts by the World Bank and the Global CCS Institute. The objectives of the project are:

- To organize three targeted workshops aimed at:
 - Undergraduate students in the earth sciences of universities not included in the 2012 APEC workshop;
 - Students and faculty linked to the National Association of Schools of Engineering; and
 - Geologists from industry, academia and other institutions involved in CO₂ storage capacity assessments.
- To develop technical protocols for the assessment of CO₂ storage capacity in deep saline formations. Storage assessment protocols and training should include reference to depleted petroleum reservoirs, enhanced petroleum recovery and deep saline formations given Mexico's geology and storage potential, as well as economic factors.

The training materials for the Mexican workshops will be widely applicable and can be transferred to other developing APEC economies. This project will closely collaborate with other international agencies active in CCS, in particular the Global CCS Institute, which has developed a CCS Roadmap for Mexico. Partnering with these agencies will leverage their organizational and financial resources and further increase the profile and impact of the APEC work.

The project was approved by APEC on 1 January 2014. The RFP was posted on the APEC website in January 2014, with proposals due by February 28. Two proposals were received, from BBB Energy and the Global Carbon Capture and Storage (CCS) Institute. The latter was selected by a panel of EGCFE experts based on the greater likelihood of a successful implementation of the plan workshops owing to the cost-sharing to be provided. The contract with APEC was finalized and signed in June 2014.

The contractor has agreed provisionally on the workshop dates, locations, and topics to be covered:

- Workshop 1: Advanced Storage workshop for 40 people, mostly from major organizations, such as Comisión Federal de Electricidad (CFE, Federal Electricity Commission), Universidad Nacional Autónoma de México (UNAM, National Autonomous University of Mexico), Instituto Politécnico Nacional (IPN, National Polytechnic Institute), and Petróleos Mexicanos (PEMEX, Mexican Petroleums).
- Workshop 2: Introductory workshop on CCS for 240 engineering teachers and students from IPN and UNAM.
- Workshop 3: Introductory Workshop on CCS for 140 earth sciences teachers and students from Northern Mexico universities.

The original timetable according to the RFP called for three workshops to be held from May - September 2014. The contractor completed the first workshops on August 26-27 at DF IPN with over 60 participants. The second workshop was held on 13-14 October at the DF CFE Technology Museum with over 200 participants. The third workshop is to be held in Hermosillo at CFE's Capacity Auditorium for around 140 earth sciences teachers and students from northern Mexico universities. However, that workshop has proved problematic to schedule as the University has very limited dates in November and cannot accommodate it in December on dates that would ensure student availability. The contractor has discussed postponing the last workshop with the SENER (Ministry of Energy), who agreed that that it be held in January 2015, to ensure that more students attend.

In summary, the delayed start of this project, along with the issue of limited dates being offered in November and December by the University in Hermosillo, meant that the timetable to complete the project by the end of 2014, as specified in the RFP, was not possible. Therefore, an extension of the contract to April 30, 2015, to allow conduct of the last workshop and completion of the final report, was requested and approved by APEC.

(6) APEC Expert Workshop on Innovative Systemic Approaches to Enhancing Coal-Fired Power Generation Efficiency (EWG 19/2013A)

This 3-day workshop will interface with the APEC/EGCFE Advanced CCT Deployment Initiative project (EWG 02 2013A) and will provide additional input and information of value to the final report of that project. The workshop will share proven results of various innovative technologies and best practices to enhance coal-power power generation efficiency, reducing coal consumption and CO₂ emissions, as well as ensuring a safer and more secure power grid in emergency supply disruptions. It will include low-cost measures that are applicable to nearly every coal-fired power plant, to enhance power generation efficiency, reducing coal consumption and CO₂ emissions. This is of particular relevance to regions where the energy-mix is dominated by coal.

The agenda will include a visit to Shanghai Waigaoqiao Phase III (2 x 1000 MW) ultra-supercritical power station to showcase technologies and best practices to improve the performance of coal-power generation.

The project will be conducted by a consultant team in close coordination with the APEC project steering committee (PSC) charged with the project EWG 02 2013A. Workshop topics will include:

- Information on state-of-the-art technology demonstrations and deployments aimed at lower-emission power generation through efficiency enhancement.
- Applicability and transferability of these technologies to existing and future coal-fired power plants in regions where the energy-mix is dominated by coal.
- Systemic and holistic approaches to enhance coal-fired power generation efficiency through innovations in optimizing operating procedures and residual thermal resource recycling.

- Input to provide to the finalization of the EWG 02 2013A project on advanced CCT deployment.

An RFP for this project was posted on the APEC EGCFE website, with proposals due by February 2014. Three proposals were received, from China Energy Research Society (CERS) & Beijing LAD Electric Power Technology Co., Ltd.; Forest Power & Energy Holdings, Inc.; and BBB Energy. These are presently being evaluated.

The project was approved by APEC in January 2014. An RFP was posted on the APEC website that same month, with proposals due by February 28. Three proposals were received from China Energy Research Society (CERS) & Beijing LAD Electric Power Technology Co., Ltd.; Forest Power & Energy Holdings, Inc.; and BBB Energy. The proposal from China Energy Research Society and Beijing LAD was recommended based on its overall approach to executing the planned tasks. Also, the committed cost share (i.e., self funding) by the consultant adds significant value to the project.

The original Project Overseer had a possible conflict with two of the proposals that were received. The new overseer is Mr. Mikio Ando of Japan Coal Energy Center (JCOAL) as designated by the official Japanese representative to the EGCFE from the Ministry of Economy, Trade & Industry (METI). The Project Overseer consulted with the China Energy Research Society on provided a revised schedule for the project with an end date of 30 June 2015. A project extension request to this date was submitted to APEC on 10 September 2014 and approved on 24 September.

(7) Coal-Based Power Generation and Conversion - Saving Water

Most energy production and conversion methods need large amounts of water, and most methods of producing fresh water require energy. Policy-makers need to understand the links and trade-offs between water and energy, termed the nexus. This is a critical issue for China and the United States – the world’s two largest producers and consumers of coal – and all economies relying on coal to meet their energy demands.

This project will collect and share information on:

- Developments to make coal-based power generation and conversion to synthetic natural gas and chemicals more efficient and less-water intensive;
- Recovery and reuse of water from coal-based energy production, including use of alternative sources of water and coproduction of water with carbon capture, utilization, and storage (CCUS);
- Policy and regulatory developments in APEC member economies related to the water-energy nexus for coal-based energy production.

The end product of this water-energy nexus project will be a report containing information on the latest developments to make coal-based energy systems, including power generation and production of SNG and chemicals, more efficient and less water-intensive. The report will set the scene by describing the nature and magnitude of the water-energy nexus, drawing from practical examples in regions where water is scarce, and highlighting the technical, economic and institutional issues faced by power generation in such regions. A number of case studies will describe how specific power generating plants in such arid regions manage their water needs. The report will synthesize information from these case studies and other recent sources, to summarize the latest developments for recovery and reuse of water from coal-based energy production, including use of alternative sources of water and coproduction of water with carbon capture, utilization and storage. Policy and regulatory developments related to the water-energy nexus will be highlighted.

The project’s long-term intended impacts are to put developing APEC economies with rapidly growing use of coal for electricity generation and production of SNG and chemicals in position to deploy more efficient clean coal technologies as effectively and economically as possible, and to build professional capabilities and capacity for achieving this. Long-term sustainability is a key objective of the EWG forum. The results of the project are likely to identify more detailed work needed on specific aspects of clean coal technology deployment in developing APEC economies, including the availability and utilization of needed water resources, which could be the object of future APEC projects. The results are likely to identify more clearly the barriers to CCT deployment due to the water-energy nexus in the situations different APEC economies find themselves, and further APEC work may be necessary to resolve the issues and find the most efficient way forward.

This is a new EGCFE project. A concept note has been approved by the APEC secretariat. The full project proposal has been developed and submitted for the second APEC round of funding of 2014.

(8) Comprehensive Integration and Optimization of Coal-Based Clean Power and Chemicals Multi-Generation (CBMG)

The CBMG project proposes a new technological way approach to clean and efficient utilization of coal resources. An integrated coal-based multi-generation system will co-generate electricity, provide heating and cooling for the local community, and produce calcium carbide, combined with CO₂ capture at the lowest cost and minimum environmental impact. The solid residues will be recycled and re-utilized. This system is designed to transform the present electric power or CHP co-generation model into an integrated multi-generation model with almost zero CO₂ emission to the environment.

The main objective of this project is to build a coal-based multi-generation system and to create related websites and a forum where CBMG issues can be discussed and shared. This will enable innovative experience and knowledge on power and chemical product multi-generation to be shared with other APEC economies to enhance the understanding of the CBMG concept. This will assist the development of similar projects in other economies that are suitable for their situation.

The project stemmed from a feasibility study launched by the Shanxi International Energy Group in 2009, and is overseen by Dr. Weiping Yan of the Power Engineering Department of North China Electric Power University.

(9) APEC Forum: Improving the Energy Efficiency of Coal-fired Power Plants & Reducing the Air Pollutants Discharge

This 1-day self-funded event will be held in Beijing, China, on December 4, 2014, will be organized by China Guodian Corporation with support from the National Energy Administration of China. The event will involve cooperation between the EGCFE and the EWG's Expert Group on Energy Efficiency and Conservation. The morning session will deal with *Energy Efficiency of Coal-Fired Power Plants*, and the afternoon session with *Haze/Fog Control Technologies and Policies for Coal-fired Power Generation*.

The morning session presentations include:

- Status analysis on the power generation efficiency of coal-fired power plants in China
- Case study of energy efficiency improving technology for coal-fired power plants
- Review of energy efficiency improvement of coal-fired power plants in APEC region.

The afternoon session presentations include:

- Status and prospect of ultra-low emission technologies for coal-fired power plants
- Deep removal technology for ultrafine particles from flue gas of coal-fired power plant
- Clean coal technology for the energy industry of USA
- Air pollution control by improving the energy utilization efficiency of industrial furnaces.

EGCFE CLEAN FOSSIL ENERGY TECHNICAL AND POLICY SEMINAR

The next annual EGCFE Seminar and business meeting are being planned for Kuala Lumpur, Malaysia, tentatively in early 2015. The Ministry of Energy, Green Technology and Water will host the event. The seminar will be scheduled as soon as the EGCFE Chair can confirm U.S. DOE financial support for the Seminar.

Chinese Taipei has expressed interest in hosting the following Seminar.