

**APEC EXPERT GROUP ON
NEW & RENEWABLE ENERGY TECHNOLOGIES (EGNRET)**

**33rd Meeting
Chinese Taipei
5-6 October 2009**

Introduction

The 33rd meeting of the Expert Group on New and Renewable Energy Technologies (EGNRET) was held October 5-6, 2009, in Chinese Taipei. This meeting included a joint meeting on October 6 with the Expert Group on Energy Efficiency and Conservation (EGEEC), a mini-workshop and a 2-day workshop.

A quarter day mini-workshop for the EGNRET project, "Successful Business Models for New and Renewable Technologies in the APEC Region," (EWG 03/2008) was held the morning of October 6. The purpose of the workshop was to review the draft final report and provide feedback to the project developers.

The second workshop was associated with the Chinese Taipei-led project "APEC 21st Century Renewable Energy Development Initiative (Collaborative IX): APEC Workshop on Implications of Bio-refineries for Energy and Trade in the APEC Region (EWG 05/2008A)." This workshop was held October 7-8, 2009, at the same venue as EGNRET-33. A project background report which provides a comprehensive review of bio-refinery technology and workshop presentations are available on the workshop Web site at: http://www.netd.itri.org.tw/apec_biorefinery2009/Presentation.html

The EGNRET meeting was co-chaired by Dr. Cary Bloyd of the U.S. Department of Energy's Pacific Northwest National Laboratory and Dr. Hom-Ti (Tom) Lee, Deputy Director, New Energy Technology Division, Industrial Technology Research Institute. Representatives from Canada, Japan, Korea, New Zealand, Chinese Taipei, Indonesia, Malaysia, Mexico, the Philippines, Singapore, Thailand, and the United States of America participated in the meeting.

Dr. Bloyd welcomed the delegates and opened the meeting. Dr. Lee then introduced Mr. Yunn-Ming Wang, the Deputy Director General of the Bureau of Energy (BOE), Ministry of Economic Affairs, who gave an official welcome to the delegates on behalf of Chinese Taipei. In his remarks, Mr. Wang noted that Renewable Energy Development Act was approved by the legislature on June 12, 2009. It is the most important foundation for the long-term development of renewable energy in Chinese Taipei Taiwan. In addition, Mr. Wang mentioned that a Green Energy Industry Program has been proposed by the Ministry of Economic Affairs and a vision for the development of the green energy industry was set and expected to be a new growth engine for Chinese Taipei industry and lead a low carbon and high value-added transformation of Chinese Taipei industry.

Following the welcome, a final agenda distributed by the Chair was reviewed and accepted. Delegates were informed that following EGRNET 33, they were invited to a two-day APEC Workshop on Implications of Bio-refineries for Energy and Trade in the APEC Region held on October 7-8, 2009 to be held at the same venue.

Overview of New and Renewable Energy in Chinese Taipei

The Chair then introduced Mr. Chun-Li Lee, Section Chief, Bureau of Energy, Ministry of Economic Affairs, who gave a detailed overview of new and renewable energy utilization in Chinese Taipei. The presentation provided an overview of the energy situation and policy in Chinese Taipei, followed by the current state of and targets for renewable energy, and concluding with information on the dawning green energy industry program. Mr. Lee noted that Chinese Taipei is 99.3% dependent upon imported energy supplies. In 2008, the primary energy supply in Chinese Taipei was composed of 49.4% oil, 32.5% coal, 9.4% natural gas, 8.3% nuclear and 0.4% renewable energy. Of the total final energy consumption in 2008, 51.7% was used in the industrial sector, 12.8% in the transport sector, 11.5% in the commercial sector, 11.3% in the residential sector, and 1.0% in the agriculture sector. It was noted that from 1988-2008 the average annual growth rates of energy consumption and GDP were 4.9% and 5.5% respectively, thus economic growth has not yet been decoupled from energy consumption.

In 2008, renewable energy in Chinese Taipei accounted for 8% of installed capacity of power generation. This amount is targeted to roughly double to 15% of installed capacity of power generation, or 8,250 MW, by 2025. The use of solar thermal water heating is also expected to more than double, from 1.76 million square meters in 2007 to 4.09 million square meters in 2025. Significant increases are also expected in wind, solar photovoltaic (PV) and biomass energy. Wind energy will increase from 358 MW in 2008 to 3,000 MW in 2025, solar photovoltaics from 4.1 MW to 1,000 MW and biomass from 772 MW to 1,400 MW.

Chinese Taipei also has programs supporting both biodiesel and bioethanol. Since July 2008, all diesel has been required to be blended with 1% biodiesel (B1). In 2010, the required level will increase to 2% (B2) at all stations (about 1000 KL/year of biodiesel). Bioethanol is currently imported and produced domestically from sweet potatoes. A government vehicles E3 demonstration program has been ongoing both in Taipei City and Kaohsiung City.

Chinese Taipei marked a significant achievement in the promotion of renewable energy with the passage of the Renewable Energy Development Act, approved by the legislature on June 12, 2009. A renewable energy goal of 10,000 MW was set, feed-in tariffs for renewable electricity will be announced annually, and a special purpose fund will be established.

In the green energy industry program, industries are classified into two categories. The first one is the "Twin-pillar Industries" including solar photovoltaics and LED lighting. The other is "Five Potential Growth Industries," which includes wind power, biofuels, hydrogen and fuel cells, energy information and communication technology, and electric

vehicles. The total production value of green energy industries is expected to increase by a factor of 7 over the next six years, from US\$4.86 billion in 2008 to US\$35 billion in 2015.

Program Overview and Recent APEC Activities and Completed Projects

The Chair reviewed the agenda, and noted that the usual 2 ½ day agenda had been compressed to two days to enable members to attend the two project workshops associated with the meeting and the EGEEC joint meeting. The Chair then briefed the participants on the recent activities and developments that occurred after the last meeting of the Expert Group on April 30-31, 2009, in Honolulu, Hawaii. Completed projects reviewed were the APEC project “Establishment of the Guidelines for the Development of Biodiesel Standards in the APEC Region” (presented by Thailand); the “Workshop on Best Practices in Energy Efficiency and Renewable energy in Commercial Buildings,” and “Alternative Transport Fuels Policy Options for APEC Economies.” Key conclusions from EWG 37, which was held April 20-24, 2009, in Santiago, Chile, were also presented. The Chair noted that the EWG has endorsed the United States taking on the Lead Shepherd and Secretariat roles, which Australia had been responsible for since 1990. The Lead Shepherd is now Dr. Phyllis Yoshida, Deputy Assistant Secretary for International Cooperation, Office of Policy and International Affairs, United States Department of Energy (phyllis.yoshida@hq.doe.gov). The Secretariat contact point is now Ms. Karen Alozio (karen.alozie@hq.doe.gov).

Important upcoming meetings noted were EWG 38, to be held in Bali, Indonesia November 16-20, 2009; EWG 39 to be held March 9-13, in Japan; and EMM 9 to be held in June 2010 in Japan. The Chair also reported that he is now working at the US Department of Energy’s Pacific Northwest National Laboratory, and members should update his contact information to cary.bloyd@pnl.gov.

Member Economy Presentations: Zero energy buildings in APEC member economies

The economy presentation topic for EGNRET 33 was: "Zero energy buildings in APEC member economies." This topic was chosen since it is one of the areas that were to be discussed at the joint EGNRET/EGEEC meeting on October 6. The presentations are available on the EGNRET Web site at www.egnret.ewg.apec.org.

EGNRET Project Update

The EGNRET is currently implementing eight projects, as described below. Five of the projects are scheduled to be completed by the end of 2009.

APEC 21st Century Renewable Energy Development Initiative (Collaborative IX): Establishment of the Guidelines for the Development of Biodiesel Standards in the APEC Region (EWG 02/2007A)

Substituting biodiesel for fossil fuel can reduce air emissions, increase domestic supplies of renewable fuel and create new markets for agricultural sectors. Biodiesel, also known as renewable diesel fuel, can be produced from various animal fats and vegetable oils. However, the quality of biodiesel produced depends on the natural characteristics of feedstocks.

EN 14214:2003 and ASTM D 6751:2003 are widely used European and North American biodiesel standards. The feedstocks for biodiesel production in European countries and North America are completely different from those that are and could be potentially used in most APEC economies. Moreover, climate differences may require slightly different biodiesel specifications to fulfill market acceptance. Therefore, the objective of this project was to establish the guidelines for the development of biodiesel standards in the APEC region for enhancing the trade of biodiesel among APEC member economies. This project also promoted the possibility for expanding the use of sustainable energy sources with a neutral effect on greenhouse gas emissions.

The first project workshop was held October 25-26, 2007, in conjunction with EGNRET 29 in Bangkok, Thailand. The second Workshop on the Development of Biodiesel Standards in the APEC Region was held in Chinese Taipei July 16-18, 2008. The workshop was attended by 76 people from 10 APEC economies and one non-APEC economy. At the workshop, past progress in the development of biodiesel standards was reviewed and recommendations were made on how to best move forward. The workshop summary included a listing of 21 barriers, 26 research needs, and 16 lessons learned. Workshop presentations are available at: <http://www.netd.itri.org.tw/apec/index.htm>. The project was completed, and a final report was distributed by Thailand to all APEC member economies.

**APEC 21st Century Renewable Energy Development Initiative (Collaborative IX):
Alternative Transport Fuels Policy Options for APEC Economies (EWG 04/2007A)**

The purpose of the project was to provide guidelines for the implementation of successful programs for the introduction of alternative transport fuels that are both coherent throughout APEC economies and applicable to individual economies. The audience for the project is principally governments and government agencies.

The work consisted of reviewing both successful and unsuccessful alternative transport fuel programs in the APEC economies and elsewhere. Success factors and failure factors were thus identified. From this analysis, guidelines for successful projects were compiled. A resource database was compiled for economies to refer to.

The project workshop was held in association with EGNRET 32 to review the draft report and to explain the outcome to the APEC economies. The project was completed, and a final report was distributed by New Zealand to all APEC member economies.

APEC 21st Century Renewable Energy Development Initiative (Collaborative VIII):

Workshop on Recent Advances in Utility Based Financial Mechanisms that Support Renewable Energy and Energy Efficiency (EWG 02/2007)

The objective of this USA led project was to provide APEC decision makers with recent advances in utility based financial mechanisms that support renewable energy and energy efficiency. As many economies have liberalized their electric utility sectors, new approaches have been developed to promote renewable energy and energy efficiency activities that are seen to benefit the economy as a whole, but which can cost more than fossil based electricity production. This project brought together experts who have been involved in developing such programs so that APEC planners and policymakers could benefit from their experiences in terms of what programs worked and what programs do not work. The types of programs reviewed included advanced renewable energy tariffs, renewable energy feed-in tariffs, feed laws, minimum price standards, minimum price systems, fixed price systems, standard offer contracts, renewable energy premiums, and renewable energy bonus payments. A workshop was held March 30-April 1, 2009 at the same venue as EGNRET 32. The project was completed, and a final report that included all the workshop presentations was distributed by the United States to all APEC economies and is available on the EGNRET Web site: www.egnret.ewg.apec.org.

APEC 21st Century Renewable Energy Development Initiative (Collaborative VI): Successful Business Models for New and Renewable Energy Technology in the APEC Region (EWG 03/2008)

The purpose of this New Zealand led project was to identify those business models that have been successful in the introduction and operation of New and Renewable Energy Technologies (NRETs) and to develop best practice principles that will assist developers in establishing commercial arrangements for NRETs that will be applicable to individual APEC economies. The audience for the project was both the private and public sectors of developed and developing APEC economies.

The work consisted of reviewing both successful and unsuccessful business models in the APEC economies and elsewhere. Success and failure factors were thus identified. From this analysis, best practice principles for successful business models were formulated. A resource database was also compiled for reference by APEC economies.

This project included a workshop at EGNRET 33 that involved reviewing the draft report and explaining the outcome to the APEC economies. The project has been completed, and the project final report will be available on the EWG and EGNRET Web sites.

APEC 21st Century Renewable Energy Development Initiative (Collaborative VI): Best Practices in New and Renewable Energy Technologies in Urban Areas in the APEC Region (EWG 04/2008)

It has been estimated that 75% of the world energy's energy consumption takes places in cities. APEC, as home to many of the world's most dynamic and fastest growing cities,

could set an example of how to best use new and emerging technologies to reduce energy consumption while maintaining economic growth. This project will highlight best practices in the use of new and renewable energy and energy efficient technology based systems as they have been applied in APEC cities. Best practices will include not only specific technology application such as building integrated photovoltaics (BIPV) but also innovated renewable energy purchasing policies being implemented in APEC urban areas. The project report will include the development of a city energy roadmap that would help guide further cooperation in the area of clean and efficient urban energy systems. The project consultant has been chosen and the project is on schedule for completion by December 1, 2009. The project is being led by the USA.

APEC 21st Century Renewable Energy Development Initiative (Collaborative IX): Workshop and Report on Implications of Bio-refineries for Energy and Trade in the APEC Region (EWG 05/2008A)

The objective of this project is to provide APEC decision makers with recent advances in bio-refinery development. A bio-refinery integrates various biomass conversion processes to produce not only biofuels but high value co-products. As many economies highly support the development of bio-refinery technology, it is very likely that bio-refinery applications will get into the trade market in the APEC region before 2015. This project will bring together experts who have been involved in the development of bio-refineries so that APEC decision makers can benefit from their experiences in setting up policies. A workshop will be held to discuss the future of bio-refineries in many aspects including the technological and economic assessment, market penetration, and trade opportunities. This project will also prepare a report to integrate and synthesize the information gained in the workshop. The project workshop will be held October 7-8, 2009, just after EGNRET 33, in Chinese Taipei. The project is being led by Chinese Taipei and will be completed by the end of 2009.

Addressing Grid-interconnection Issues in Order to Maximize the Utilization of New and Renewable Energy Sources (EWG 02/2009)

This Japan-led project is examining the grid-interconnection issues associated with large penetration levels of renewable energy. However, power output from new and renewable energy power sources like solar photovoltaics and wind turbines fluctuates depending on environmental conditions. When these new and renewable energy sources are connected to power grids, these fluctuations can negatively affect power grid frequencies, voltages, and harmonics. Because of this, power utility companies often limit the amount of new and renewable energy that can be grid-interconnected. The aim of this project is to identify and summarize research that is being undertaken or solutions that have already been identified regarding issues that limit the amount of new and renewable energy that can be grid-interconnected, including a focus on energy storage solutions.

As the introduction of fluctuating renewable energy sources, including wind power and solar photovoltaics, expands, each APEC economy is working to find solutions that support the expansion of these clean energy sources. The project consultant will be

charged with analyzing what research has been/is being undertaken in various APEC economies and which measures/technologies have been successful or hold great promise. A project consultant has been chosen and the project is on schedule.

Related to this project, a US-led self-funded workshop on Renewable Grid Integration Systems was held from January 12-15, 2009 in Lanai, Hawaii. The objective of the workshop was to share experiences and to engage experts from APEC economies in discussions on how greater renewable energy can be reliably integrated into electric power grids. More information about the workshop can be found at www.sandia.gov/regis. The final workshop report, which summarizes all presentations given at the workshop, is available at www.sandia.gov/regis/REGIS-finalreport.pdf.

Using Smart Grids to Enhance the Use of Energy Efficiency and Renewable Energy Technologies (EWG 01/2009S)

This US self-funded project will examine the status and potential within APEC economies of smart grid technologies to enhance the use of renewable energy and energy efficient buildings, appliances and equipment. Smart grids integrate technologies to improve the management of the grid itself, energy efficiency and renewable energy technologies “behind the customer meter” (including “smart buildings”), and intelligent controls to link the grid with customers in a more efficient and seamless fashion. The report will focus on APEC economies and include a survey of how smart grid technologies and practices have been used to enable new products and services, optimize the use of power grids, allow greater use of renewable energy options, and encourage greater demand-side efficiency response in APEC economies. A follow on workshop will take place to examine findings of the study and lay a path forward for future progress in these areas. The project is expected to be completed in 2010.

Review of APEC Project Proposal Process

The Chair reported that project proposals for 2010 will follow the same schedule that was observed in 2009, with projects being submitted in three periods. Since details related to the new project process are still being determined, only project submission times to the BMC have been determined at this time. For 2010, the BMC will hold three intersessional project approval sessions as defined below:

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|--|--------------------|
| <u>Session One</u> : Proposal application deadline | March 10, 2010 |
| <u>Session Two</u> : Proposal application deadline | June 9, 2010 |
| <u>Session Three</u> : Proposal application deadline | September 23, 2010 |

There will be an opportunity within each funding round to review projects following feedback from the Secretariat Project Assessment Panel.

As with 2009 projects, a number of important general changes to previous project management apply:

- All sessions will operate with immediate funds disbursement. In line with this, there is no longer an “urgent project” classification. All projects, whether they are related to the Leader’s Statement or not, may be submitted in session one.
- The two-year disbursement rule has been removed. New projects must now specify a project end date. It is expected that any unspent funds at the nominated end date will be returned to APEC. Deviations will be considered only in exceptional cases.
- Multi-year projects will only be considered from Session Three.
- Project may only be submitted for approval twice. Unsuccessful projects must go through a complete reassessment if they are being re-submitted.

All EGNRET projects will still need to be ranked by the EWG. Thus, first session 2010 project proposals will need to be submitted at EWG 38. The deadline for submission to the EWG will be provided when it is available. Once ranked by the EWG, the projects may be submitted to any of the three 2010 funding sessions.

Following a discussion of the new project proposal process, it was decided that project overseers should consider re-submitting 2009 project synopsis that were not submitted for APEC funding in 2009 to EWG 38. It was also recommended that EGNRET try to develop one or more joint proposal with EGEE&C when they meet together on October 6, 2009. Finally, since there will now be three project submission periods, the Chair advised that we could wait until the first meeting of 2010 when we have further directions from the EWG to propose projects in addition to the previously developed but unsubmitted 2009 projects and a potential new joint project with EGEE&C.

Joint EGNRET and EGEE&C Session

The joint EGNRET/EGEE&C meeting was held on the afternoon of October 6, 2010. The meeting began with the Chairs of each group presenting an overview of each group’s activities. This was followed by a presentation by Mr. Kenji Kobayashi, President of APERC, on the PREE and CEEDS projects that are being led by APEC for the EWG. The EGEE&C Chair then gave an overview of EGEE&C priorities relevant to EGNRET based upon the recent EGEE&C priorities survey exercise. There was next a brief presentation by Deputy Secretary General Loo Took Gee, Malaysia Ministry of Energy, Green Technology and Water, on the 1st international Green Technology Expo to be held in Kuala Lumpur 14-17 October 2010. Delegates were invited to attend and to contact her office if they needed additional information.

The two groups then discussed potential joint project opportunities. The discussion was organized around the following six areas:

- Zero energy buildings
- Sustainable cities
- Energy efficiency and renewable energy in transport
- Smart grids

- Energy indicators
- Energy efficiency and renewable energy in the industrial sector

Following a general discussion, it was agreed that the highest priority joint project area was energy efficiency and renewable energy in the industrial sector, followed by smart grids, and then zero energy buildings (and more broadly, sustainable cities). The group agreed to try develop at least one joint proposal for the first session of 2010. It was also felt that the two groups should try to meet jointly at least once every other year, if not once a year.

Administration and Operation

The next EGNRET meeting was discussed and Malaysia said they would host EGNRET 34, along with a possible meeting of the Biofuels Task Force. The Chair asked if there was any other business. There being none, the Chair thanked Chinese Taipei for hosting the meeting and closed the 33rd meeting of the APEC Expert Group on New and Renewable Energy Technologies. Meeting minutes will be distributed and approved out of session.

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