Energy Working Group

Success Stories

25 Years of Cooperation

50th EWG Meeting

December 2015

APEC Energy Working Group Success Stories

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When APEC Energy Ministers first met in 1996 in Sydney, they agreed that meeting APEC's rapidly increasing demand for energy in an environmentally responsible way would be essential if the region's economic growth potential was to be fully realized. This goal is as true today as it was in 1996. We still envision an APEC region with strong energy security, energy efficient and sustainable communities, cleaner energy resources, an equipped workforce, and open trade and investment in energy goods and services.

Members have made much progress since that first Ministerial Meeting, and since the first EWG meeting in 1990. Indeed, 2015 marks the EWG's 25th year and 50th meeting. This booklet includes just a few of the many successful activities the EWG has undertaken.

Our work currently is supported by four excellent Expert Groups, a Low Carbon Model Town Task Force and an Energy Resilience Task Force. Over the years, we have also been supported by Task Forces on high priority areas such as biofuels, and energy trade and investment. We also have the good fortune to be supported by two research institutions, the Asia Pacific Energy Research Center (APERC) since 1995 and the recently established APEC Sustainable Energy Research Center (APSEC) from 2014. APERC, as you will see from these success stories, has led work on data and analysis, and implemented and set the benchmark for the EWG's peer reviews.

The Energy Working Group so far has undertaken and completed over 420 projects. Our activities have addressed a range of energy issues from exploration and production to fuel use, power generation, energy end use, and environmental and regulatory policies; the most of any APEC Working Group or any Committee. In 2014 and 2015 alone, we initiated 45 new APEC-funded and self-funded projects.

We have published 216 reports ranging from one in 1995 on natural gas for vehicles to one in 2015 on District Energy Systems Development--sharing technical approaches and best practices to achieve our common energy and climate goals. EWG publications score among some of the most accessed publications on the APEC Secretariat website. We also have developed a constantly expanding website, the Knowledge Sharing Platform, to document and share case studies, best practices and innovations in the field of smart energy .

We have trained many thousands of people, allowing our members to draw on best practices and experts from around the region and the world. Just to give a sense of this breadth, we have: tackled technical and technological challenges by delivering training on carbon capture and storage for fossil fuel based energy; built skills, jobs and safety in APEC members through development of a high quality training curriculum for solar panel installers; supported more sustainable cities by mobilizing expertise from around the region on Low Carbon Model Towns; and shared policies and practices with each other on how to eliminate inefficient fossil fuel subsidies.

Where has all this work brought us? We are better able to cooperatively weather short-term energy supply disruptions and to secure an affordable and cleaner energy supply for the region through longer-term measures improving the quality of energy policies and decision-making and increasing the accessibility of energy data, projections and analysis. We are on target to reduce energy intensity by 45 percent by 2035 compared to 2005, on a regional average basis, as directed by our Ministers and Leaders. We are implementing projects to support the Leaders' goal to double renewable energy as a share of energy supply by 2030 compared to 2010, which means moving from about a 10 percent to 20 percent renewables share. We are making progress removing inefficient fossil fuel subsidies. We continue to work on cleaner fossil fuels with projects ranging from saving water in power generation and conversion to energy efficient power plants. Finally, we are commited to tackling energy and climate resiliency for both the near- and longer term.

Thank you to all who have made, and are making, all this possible.

Sincerely,

Phyllis Genther Yoshida

Phyllis Genther Yoshida
Lead Shepherd, APEC Energy Working Group

Asia Pacific Energy Research Centre (APERC)

"We instruct the EWG to explore mechanisms to encourage economies to set individual goals and action plans for introducing low-emission power sources, with assistance from APERC and relevant technology expert groups…." APEC Energy Ministers 2010

Background:

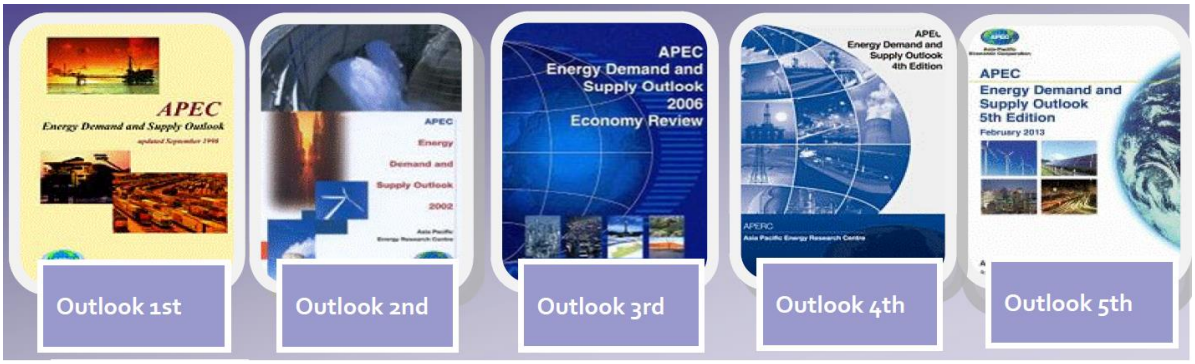
The Asia Pacific Energy Research Centre (APERC) was established in July 1996 in Tokyo. Its past and present activities include work on 1) Energy Demand and Supply Outlook; 2) Peer Review on Energy Efficiency (PREE); 3) Cooperative Energy Efficiency Design for Sustainability (CEEDS); 4) Peer Review on Low Carbon Energy Policies (PRLCE); 5) Low Carbon Model Town Project (LCMT); and 6) Oil and Gas Security Initiatives (OSGI) among others, which are all directed at helping APEC members address energy challenges.

Purpose:

APEC Energy Demand and Supply Outlook: The APEC Energy Demand and Supply Outlook is designed to provide a basic point of reference for anyone wishing to become more informed about the energy choices facing the APEC region. The business-as-usual projections illustrate the risks of the development path the APEC region is now on. Alternative scenarios examine options for improving sustainability. APERC normally prepares a new version of the Outlook every two or three years.

Recent editions of the Outlook have been published in two volumes. Volume 1 discusses the outlook for the APEC region as a whole, and compares the outlook for the various APEC economies. Volume 2 provides an "Economy Review" discussing the outlook for each APEC economy. The APEC Demand and Supply publications are available online at http://aperc.ieej.or.jp/publications/reports/outlook.php.

Peer Review on Low-Carbon Energy Policies (PRLCE): Modeled on the successful Peer Review of Energy Efficiency (PREE), PRLCE is designed to assist volunteer economies in developing policies that support energy security and environmental protection through promoting low-carbon energy supply (e.g. renewable energy). The objectives of the APEC PRLCE to more effectively promote low-carbon/low-emission energy sources are to:



- Share experiences and knowledge among APEC economies regarding their strategies, measures and roadmaps for promoting low-emission power sources, as well as how the government can accelerate their implementations;
- Explore how government can create effective and efficient low-carbon/low-emission energy policies and formulate action plans to achieve the goals, given the diversity and circumstances of individual member economies;
- Identify effective policies to encourage technological innovations and promote large-scale commercialization;
- Provide recommendations on how implementation of action plans could be improved with a view to achieving the goals and to over-come impediments in the current plan; and
- Explore ways that cooperative efforts among the APEC economies could assist in achieving these objectives.

Four PRLCEs have been conducted since it was endorsed by the EWG in August 2011. Thailand was the first economy to host the PRLCE in May 2012 with focus on the renewable energy use of the economy. This was followed later in November of the same year by the Philippines which was very timely in view of the economy's implementation of the Renewable Energy Law.

The PRLCE served as an avenue for the economy on effective implementation of the renewable energy polices set in the Law. The PRLCE in Indonesia was the third in the series conducted in November 2013 while Malaysia hosted the latest PRLCE in May 2014.

The peer review in Indonesia touched upon the economies existing renewable energy targets in its National Energy Policy. Meanwhile, in the PRLCE in Malaysia, two sectors were reviewed at the request of the Malaysian Government; the power sector (which includes the FIT mechanism implementation) and the transport sector.

APEC Oil and Gas Security Initiatives (OSGI): APEC Energy Ministers encouraged the EWG and APERC to work on activities to improve the response to oiland gas emergency response workshops and exercises, which are to be performed in collaboration with the International Energy Agency (IEA) and the Association of Southeast Asian Nations (ASEAN).

The main objectives of the APEC Oil and Gas Security Exercises are as follows:

- To investigate the domestic systems for the emergency preparedness in each APEC economy;
- To develop possible scenarios of oil and gas emergency situations; and
- To accumulate the necessary information and analysis by mobilizing capable experts in the APEC region.

In 2012, APERC proposed the APEC Oil & Gas Security Initiatives (OSGI), a new project which succeeds OSGE. OSGI consists of three pillars: *Oil & Gas Security Exercise (OSGE)* on a voluntary basis and not on schedule, *Oil & Gas Security Network (OSGN)* by officials in charge of oil and gas security policy in each Economy and *Oil & Gas Security Studies (OGSS)* on research topics related to oil and gas security in the APEC region.

Follow-Up Peer Review on Energy Efficiency (PREE)

"We instruct the EWG to consider follow-up efforts including capacity building activities, policy research support and processes to gauge the success of member economies' efforts to implement the recommendations of PREE…" Energy Ministers 2012

Background:

The EWG's "Follow-up PREE" started in 2012 as a direct response to the APEC Energy Ministers call in Fukui, Japan in 2010 to "consider follow-up efforts including capacity building activities, policy research support and processes to gauge the success of member economies' efforts to implement the recommendations" of PREE. APERC ably implements the follow-up reviews. In this regard, the Follow-up PREE assists former PREE host economies in implementing the PREE recommendations.

The monitoring process serves to identify recommendations that require more focus and support to implement. For example, the follow-up for Viet Nam focused on capacity building in monitoring and evaluation of the energy efficiency programs. Follow-up PREE activity continued in 2013 for the Philippines. The Philippine activity was the first time the EWG used a peer review format for follow-up focused on the host economy's priority sectors -- sugar, cement, and commercial buildings. The continuation of PREE and Follow-up PREE also strengthen APEC Economies' efforts to improve energy efficiency improvement as envisaged by APEC Energy Ministers and to achieve the goal to reduce APEC's aggregate energy intensity by 45 percent in 2035. In 2015, APEC is on target to achieve this goal.

Objectives:

- Assess energy efficiency plans of a host economy, taking into account the diversity of the strategies and circumstances of individual economies;
- Provide expert level evaluation of energy efficiency policies and measures as well as recommendations for energy efficiency improvements; and
- Monitor progress towards attaining energy efficiency goals and the implantation of action plans.

Accomplishments:

The Follow-up PREE is helping ensure the effectiveness of peer reviews conducted on the energy efficiency policies across the APEC economies.

For the Philippines, the PREE Review Team in 2012 produced 54 recommendations on various sectors and the Government has made progress on many of these recommendations. The Follow-up PREE Review Team found that the government, industries and companies have a positive attitude towards energy efficiency, and had made excellent progress setting the groundwork to establish an energy efficient economy. The Review Team tailored their

recommendations towards aligning policy options under a unified framework, and sharing best practices and innovative approaches from around the world. At the request of the host economy, the Follow-up PREE focused on sugar, cement and glass industries and commercial buildings due to the fast growing and high-energy intensity nature of these areas. In line with other APEC economies, the Philippines is working to support the ambitious aggregate goal of reducing energy intensity by 45 percent by 2035 (using 2005 as a baseline year).

The next economy hosting the Follow-up PREE was Thailand. It focused on transportation. A team of nine experts spent from August 3-7, 2015, in Bangkok, Thailand. Thailand is aiming to encourage energy efficiency in all sectors, including transportation, through campaigns aiming to build up energy-saving conscience. Thailand is aiming to encourage energy conservation in all sectors, including transportation, through campaigns aiming to build up energy-saving conscience. Suggestions were well received and Thailand's Department of Land Transport (DLT) and the Energy Policy & Planning Office (EPPO) are finding the recommendations useful as they update their regulations.

Next Steps:

There are two major steps underway.

1. Owing to the success of the Follow-up PREEs, more economies are interested in conducting follow-ups.
2. The resulting information will be used to help define the EWG's energy efficiency work program.

The continuation of the PREE and the Follow-up PREE continue to contribute to achieving the aspirational goal to reduce APEC's aggregate energy intensity by 45 percent by 2035 agreed by APEC Leaders in 2011.

SaskPower's Boundary Dam Project

*"Cost-effective technologies for **carbon capture and storage** (CCS) are essential to reducing carbon emissions from power generation…"* APEC Energy Ministers 2010

Background:

As part of Canada's commitment to protect the environment through Responsible Resource Development, the Government of Canada invested C$240 million towards SaskPower's Boundary Dam carbon capture and storage (CCS) project; the world's first commercial-scale CCS project at a coal-fired power plant.

The EWG met in Vancouver, Canada in May 2011. The group discussed progress in the oil and gas industry, and on CCS. CCS refers to technologies that capture CO_2 produced from fossil-fuel combustion and other industrial processes, storing them underground in suitable geological formations or using them in applications such as Enhanced Oil Recovery (EOR), and preventing them from contributing to climate change. The demonstration and deployment of CCS technology in the coal-fired power and other industrial sectors has the potential to be an important tool to address environmental concerns from energy production and other industries in the future and is serving as a model for APEC economies.

Context:

Canada remains a global leader in CCS with 4 large-scale demonstration projects either in

operation or under construction, and over C$1.8 billion invested by the Federal Government and the provincial governments of British Columbia, Alberta, and Saskatchewan in CCS research, development, and demonstration initiatives in government laboratories, academia, and throughout the private sector. These investments have the potential to leverage up to a total of $4.5 billion in public-private support for specific CCS initiatives in Canada.

Implementation:

In 2012, Canada became the first country in the world to publish regulations that effectively ban the construction of traditional coal-fired electricity plants. Within these regulations that came into effect in 2015, a strict emissions standard of 420 tonnes of CO_2 per gigawatt hour of electricity produced for coal-fired electricity generation was set. Meeting this standard will require new coal plants and those reaching the end of their economic life to be equipped and operating with CCS technology.

Officially commencing operations in October of 2014, SaskPower transformed Boundary Dam's Unit 3 into a reliable, long-term producer of more than 120 megawatts of clean, baseload electricity. The project now represents the world's cleanest coal-fired power generation unit, able to reduce its CO_2 emissions by 90 percent or up to one million tonnes of CO_2 per year. The captured CO_2 will primarily be used to boost production in nearby oil fields through enhanced oil recovery before remaining safely stored, deep underground for the long-term. In addition, the project will capture 50 percent of the unit's nitrogen oxide emissions, and 100 percent of the sulfur dioxide emissions, which are converted into 96 percent pure sulfuric acid, and sold as an additional source of revenue.

Next Steps:

Operational data and experience being collected at the Boundary Dam CCS Project is critical to decisions that will be made by SaskPower in terms of continued CCS development. Units number 4 and 5 at Boundary Dam are nearing the regulatory requirement to either retire or retrofit coal-fired plants with CCS technology. The outcomes and learnings of Unit number 3 are critical to allow SaskPower to accurately forecast if it is feasible to retrofit those two units with carbon capture technology as well. SaskPower and BHP Billiton announced a partnership to establish a global CCS Knowledge Centre to share SaskPower's CCS expertise and knowledge with member organizations.

For more on the SaskPower Boundary Dam project, visit http://www.saskpowerccs.com/

APEC Smart DC Community Power Opportunity Assessment
Chiang Mai, Thailand

"A priority goal in developing a resilient APEC community will be to provide energy access to our people, including in remote communities." APEC Energy Ministers 2015

Background:

The demand for electricity is growing across the APEC region. Areas without electricity are usually rural and remote. The cost for generating electricity from renewable energy sources, considered the most viable option to meet this power demand, is still considerably high; therefore, there is a need to develop the most efficient power system possible. Community DC power systems, which are 30 percent more efficient than AC power grid systems, coupled small scale renewables, can play an important role in meeting this demand while supporting sustainable economic development.

There is a need to share information and best practices, integration with renewables, and DC devices among APEC economies. The exchanges help community DC power systems be developed to their full potential and take advantage of new smart grid technologies to maximize their efficiency while lowering their overall cost. Many organizations in the APEC economies are researching and implementing DC power systems and devices such as in China, Japan, Thailand and the United States. Outside of APEC economies, India and Africa have also high interest in DC microgrids with applications to rural communities.

Purpose:

The main goal of the project was to provide the opportunity to assess smart DC community power in APEC economies. The EWG Expert Group on New and Renewable Energy (EGNRET) undertook the APEC Project on "APEC Smart DC Community Power Opportunity Assessment". The work supported a workshop that brought together representatives in the DC power systems area such as private sector, research institutions, universities and government entities. In addition, expert participants in area of AC power systems, microgrid, and power distribution shared their best practice and expertise.

The specific objectives for the workshop were: 1) identifying and reviewing best practices and opportunities for DC Power Systems in the APEC region; 2) identifying key barriers, R&D and implementation plan recommendations for DC community power; and 3) developing an overall roadmap for smart DC community power development in the APEC region.

Workshop Activities:

The APEC Workshop on Smart DC Power Opportunity for Community was held at Chiang Mai World Green City, Chiang Mai, Thailand on November 10-11, 2014. The Department of Alternative Energy Development and Efficiency (DEDE), Ministry of Energy, Thailand hosted the workshop. The Asian Development Institute for Community Economy and Technology, Chiang Mai Rajabhat University, Thailand

organized it. EGNRET Chair and representatives of the 11 member economies, totaling 93 participants, attended the workshop. In addition, EGNRET members had many productive discussions and received ideas of ways forward with the application of community power.

During the opening ceremony, the Governor of the Provincial Electricity Authority of Thailand (PEA) and the President of University of Phayao (UP) signed a MOU. This collaboration on the development of Smart Grid City Model between PEA and the UP university networks will serve as a model of efficient power distribution systems for Thailand. It will also spurring greater collaboration between ASEAN and APEC on the development of a suitable smart grid model for the region.

The speakers and attendees had a wide range of experience from technology, policy and financing that resulted in comprehensive presentations and discussion sessions. China and the United States are the main APEC economies that are actively leading DC microgrid related projects and shared their expertise. All participants actively provided the status of the community power situation in their respective economies and way forward for the implementation of the community power systems.

The Community DC Microgrid Site Visit was at the Chiang Mai World Green City (CWGC), the venue of the workshop. The CWGC is comprised of 3 zones: Smart Community, Green Institute and Green Exhibition. The Smart Community Zone is powered with the 50 kW PV system with community DC Microgrid. DC power will be utilized for all electrical appliances in each building of the smart community. The buildings include 6 residential housing units, an office, a restaurant, a convenience store, a coffee shop and vegetable farm. This is the first system in the world that uses direct current to power the entire community. In addition, the Smart Community DC microgrid is integrated with other renewable energy technologies such as biodiesel generators, an AC microgrid and a Biomass Gasifier. Therefore, 100 percent power usage in the Smart Community is from renewable energy, making it the first energy sustainable community in Thailand.

Next Steps & Opportunities:

Lessons from the workshop established that a lack of understanding of DC power advantages requires a concerted effort to promote information exchange amongst all parties. The promotion can be in the form of demonstration sites in the APEC economies supported by the creation of a shared database of best practices. In addition, global standards must be created to support researchers and manufacturers to further develop DC power technologies. Ideally each country should provide policy and financial mechanisms support for the local manufactured content of the device and well as project developers. DC power application opportunities should start with a focus on

households, buildings, local communities and islands.

As a result of networking during the workshop, APEC economies have initiated additional collaboration since the meeting took place in Chang Mai. For example, Thailand and Malaysia are collaborating on an APEC project for the evaluation of community PV systems in the APEC economies. In addition, Thailand and the International Copper Association are developed a proposal for an APEC training center for PV rooftop installers.

Thailand, Japan and the United States participated in the 1st IEEE International Conference on DC Microgrids. Finally, many APEC members are joining meetings and webinar sessions led by the EMerge alliance to develop the standards for DC power system application. In conclusion, to further promote greater development of DC community power systems, more DC related networking, meetings, policy and standards development, and joint demonstration projects should be undertaken.

CCUS Capacity Building Success Story

"Cost-effective technologies for carbon capture and storage (CCS) are essential to reducing carbon emissions from power generation…" APEC Energy Ministers 2010

Background:

The APEC Energy Working Group's Expert Group on Clean Fossil Energy (EGCFE) has made very significant contributions over the past decade to sharing information related to mitigating global climate change through significant reductions in the projected growth of CO_2 emissions from the production and use of fossil fuels. Specifically, the EGCFE has focused its work on:

- Improving the efficiency and performance of electricity generation from fossil fuels.
- Technical, economic, and regulatory/permitting issues related to the introduction of carbon capture, utilization and storage (CCS/CCUS) for coal-based power plant projects in developing APEC economies.
- Increasing the knowledge and awareness of CCUS technologies in developing APEC economies, including the preparation of training materials in order to accelerate the introduction and acceptance of CCUS in these economies.

Purpose:

Over the past decade, the EGCFE has conducted a series of CCUS capacity building projects that have been greatly appreciated by the economies involved. In addition to these building capacity projects, CCUS training workshops have been set up in developing economies. These projects developed a set of

learning modules that can be more broadly used by developing APEC economies and others. The series consists of the following projects:

- An assessment of the geologic storage potential of CO_2 in APEC economies (Phase I - EWG 06/2003), which constituted one of the first attempts to assess the prospectivity for CO_2 storage in the region.
- Development of extensive training materials to promote and transfer CCS technologies to developing APEC economies, including piloting the materials in the Republic of Korea (Phase II – EWG 02/2004).
- Initial developing economy workshops held in China and Mexico (Phase III – EWG 07/2005).
- Two additional CCS training capacity-building workshops (Phase IV - EWG 09/2008A) held in Indonesia as part of a joint workshop with the International Energy Agency in November 2009, and in Hangzhou, China, in June 2010.
- Phase V (EWG 05/2010A) workshops held in Viet Nam, Thailand, and Mexico. The first two of these were coordinated with CCS feasibility studies being conducted by Asian Development Bank (ADB) in Southeast Asia.

Implementation:

The Mexico workshop under Phase V was very successful in terms of attendance, with 220 people attending, including undergraduate students in the geosciences, some 30 university professors and educators, Comisión Federal de Electricidad (CFE, Federal Electricity Commission) staff, researchers, and government officials.

The participants rated nearly all sessions highly and there was significant interest in having additional follow-on capacity building focused on CO_2 use for enhanced oil recovery and natural gas processing, along with financing and public awareness. Subsequently, EGCFE and CFE developed an action plan to focus the next EGCFE CCUS capacity-building effort on developing training directed at Mexican universities.

The EGCFE held three CCUS capacity-building workshops. The first workshop, an Advanced Storage Workshop involving 40 participants mainly from CFE, Universidad Nacional Autónoma de México (UNAM, National Autonomous University of Mexico), Instituto Politécnico Nacional (IPN, National Polytechnic Institute) and Mexican Petroleums (PEMEX, the Mexican state-owned petroleum company), was held during August 2014 in Mexico City. The second workshop, which was aimed at engineering teachers and students from IPN and UNAM, was held in October 2014, also in Mexico City, with 240 participants. The third workshop was held at the University of Sonora in Hermosillo in January 2015, with over 200 participants. These events covered the basics of CO_2 geologic storage, with more details on CO_2 storage capacity assessment, monitoring, measurement, EOR, and risk assessment, and presented several CCUS storage case studies.

Next Steps:

The longer-term goal of the APEC EGCFE's CCUS capacity building is to assist developing member economies' efforts to gain the capacity to undertake their own CCUS feasibility studies and eventually implement and deploy CCUS in their economies. Altogether, more than 800 participants have attended the EGCFE's series of CCS capacity building workshops. Responses to evaluation questionnaires circulated at the end of each of the workshops were highly favorable, and provided useful inputs for planning the succeeding workshops.

JODI – A Success Story in International Cooperation
Expert Group on Energy Data and Analysis (EGEDA)

"We direct the Energy Working Group to promote the implementation of the Energy Security Initiative. In the short term, undertake work on improving monthly oil data, where available…" APEC Energy Ministers 2002

Background:

Six international energy organizations, established JODI, the Joint Organizations Data Initiative, as a collaborative data collection effort to promote oil data transparency in the midst of oil price volatility at the turn of the century. EGEDA, already collecting data for APEC, expanded its data collection in 2002 when it became, on behalf of the EWG, a founding member in the joint oil data transparency initiative known as JODI, originally called the Joint Oil Data Initiative. In doing so, it joined with the International Energy Agency (IEA), the Statistical Department of the European Union (EUROSTAT), the Organization of Petroleum Importing Countries (OPEC), the Latin American Energy Organization (OLADE) and the United Nations Statistics Division (UNSD).

The Energy Working Group established EGEDA as its data collecting arm at the 2nd APEC EWG Meeting in March 1991 in Jakarta. Its overall objective is to contribute toward improving the quality of energy policies and decision-making in APEC member economies and to increase the efficiency of the regional energy market by improving the quality, availability and accessibility of energy data and projections and by analyzing regional energy trends. EGEDA is responsible for managing and reviewing the operation of the APEC Energy Database that is hosted at the Institute of Energy Economics in Tokyo.

Objective:

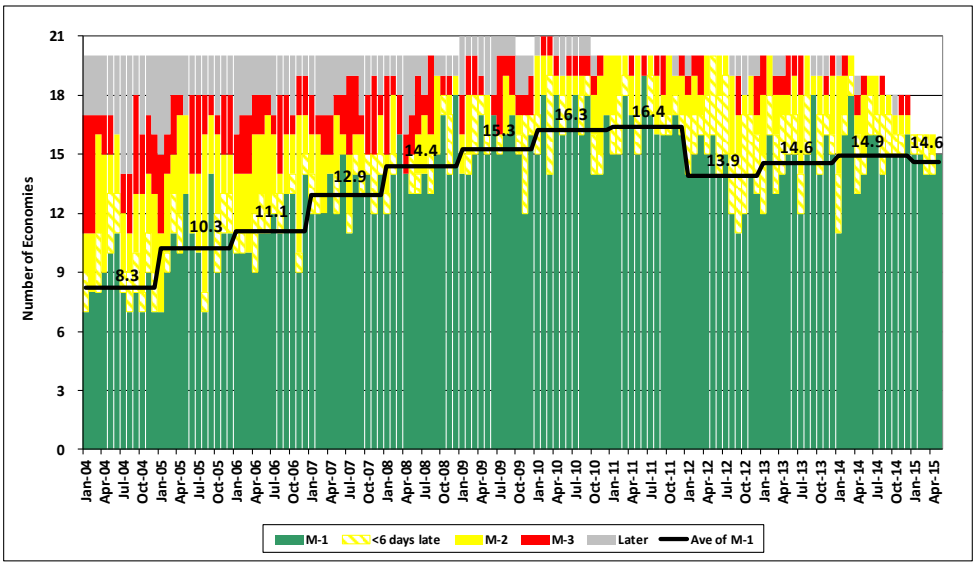
The primary goal of JODI is to raise awareness among oil market players about the need for more transparency in oil market data, and more recently, in gas market data. The first priority of the six organizations in 2002 was to assess the oil data situation in their respective members. The assessment included the collection of monthly oil statistics from each organization's members through a harmonized questionnaire on 42 key oil data points. Progress was immediate: within six months, 55 were participating in the exercise. Six months later, there were over 70 participants, representing 90 percent of global oil supply and demand.

As the scale of JODI and global interest in it continued to grow, it was clear that there was a second objective -- the information had to be made available in a compatible form. As a result, the JODI-Oil World Database was created. Participants in the 5th JODI Conference in October 2004 then strongly recommended that this joint global database be made freely accessible to all - organizations, economies, industry, analysts and journalists.

Implementation:

At the early stages of the initiative, the APEC Economies submitted what data they had available. Only a few APEC economies are able to submit monthly oil supply and demand data one month after

Figure 1: Timeliness of JODI Oil Data Submission in APEC

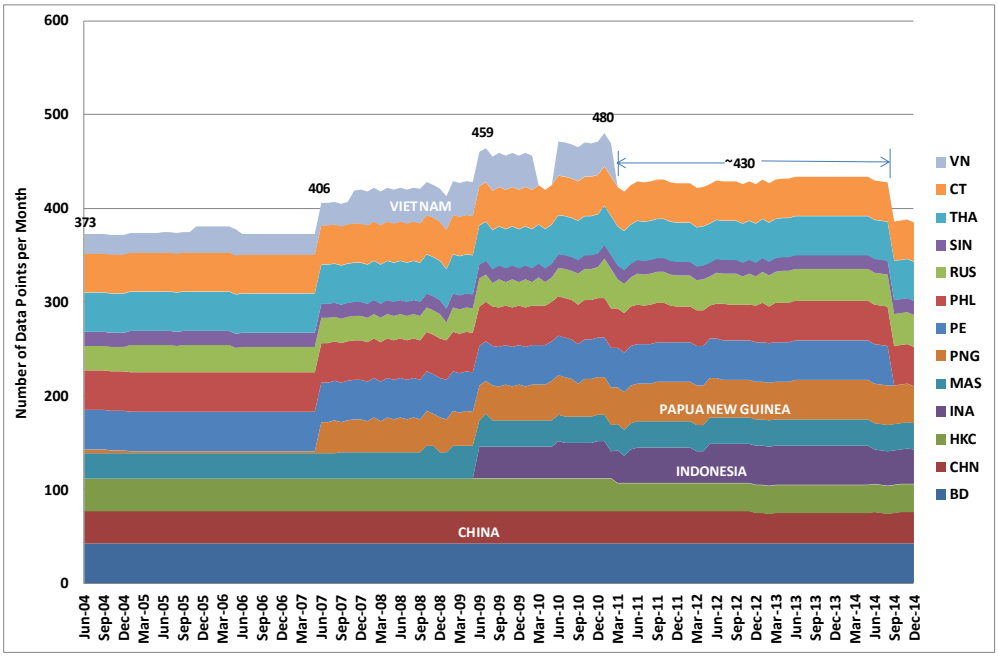


the end of the month or M-1 (month minus 1). In fact in 2004, the monthly average number of economies submitting at M-1 was only 8 out the 21 APEC member economies. The number of economies submitting JODI data at M-1 gradually increased until it reached a peak of 16 economies per month in 2011. In June of that year, 19 of the 21 member economies submitted at M-1. However, due to the difficulty in collecting data from various sources on a monthly basis, this achievement was not sustained. After 2011, M-1 submission stabilized at around 14 economies per month, still way above the monthly average from 2004 to 2007. Figure 1 shows the timeliness of JODI Oil data submission in APEC from 2004 to 2015.

Similarly, during the early stages of JODI data collection, a number of economies are not able to submit all 42 data points that were being requested. These data points are for seven products: 1) crude oil, LPG, Gasoline, Kerosene, Gas/Diesel Oil, Fuel Oil and Total Oil Products; and the corresponding six flows: 10 indigenous production for crude oil, 2) refinery output for products, 3) imports, 4) exports, 5) stock change, 6) stock closing and refinery intake for crude oil and demand for the products.

In January 2004, out of 546 data points expected from the 13 non-OECD APEC member economies, only 373 or 68 percent are submitted. This increased to 406 data points in January 2007 when Papua New Guinea was able to collect and submit the refinery data. From just 3 data points per month, Papua New Guinea was able to increase to 42 data points per month. In January 2009, the monthly data points submitted by these economies increased to around 460 when Indonesia started to submit JODI data. APEC non-OECD member economies have averaged 430 per month. The substantial increase over time was helped by many capacity building workshops and in depth training by EGEDA, often in

Figure 2: Number of Data Points Submitted per Month by Non-OECD APEC Member Economies



conjunction with other organizations such the IEA.

In 2006, EGEDA started to collect monthly gas data from APEC member economies in view of the growing importance of natural gas in the energy supply of all member economies. It started with a trial data collection for the months of September to November of that year. As the IEA was already collecting monthly gas data from the OECD member economies, EGEDA focused on the non-OECD member economies of APEC. Seven (7) of the 14 non-OECD member economies responded to the trial data collection. The trial collection was extended for another 3 months and later elevated to regular collection. The participating non-OECD member economies increased to 10 by June 2007.

When JODI Gas became a global initiative in 2009, APEC was already prepared to participate as most of its member economies were already providing monthly gas data. In January 2013, 12 of the 13 non-OECD member economies had submitted data to the initiative.

Next Steps:

The success of JODI in APEC is due to the cooperation of the member economies and the support provided through capacity training. Economies that have no monthly data collection system in past were able to establish a data collection and reporting system through JODI. EGEDA will continue working with the member economies to enhance oil and gas data. The EWG is exploring if this success should be replicated in other areas to support a more transparent energy market in APEC.

Energy Smart Communities Initiatives Knowledge Sharing Platform (ESCI-KSP)

"Promote energy efficiency by taking specific steps related to transport, buildings, power grids, jobs, knowledge sharing, and education in support of energy-smart low-carbon communities…" APEC Leaders 2011

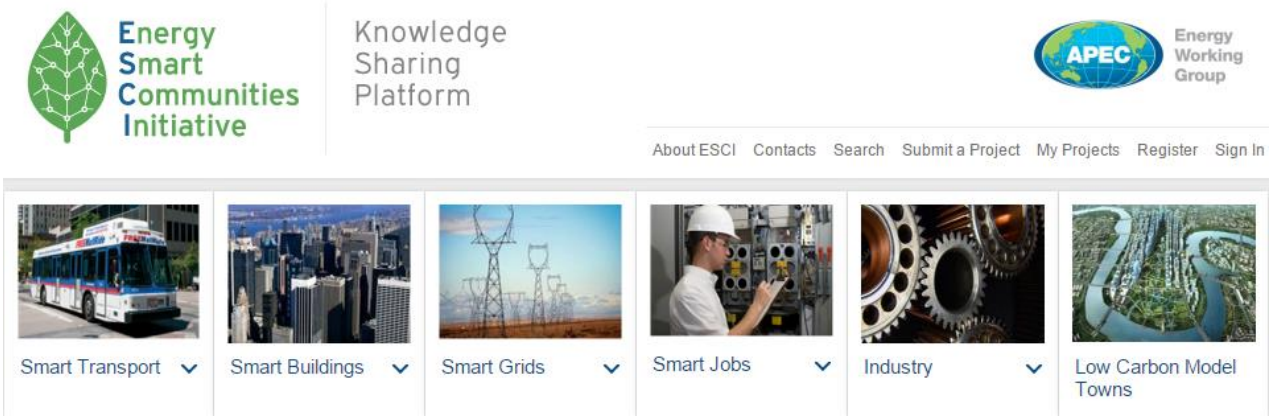
Background:

In November 2010, U.S. President Barack Obama and Japanese Prime Minister Naoto Kan announced the Energy Smart Communities Initiative (ESCI) in conjunction with the APEC Economic Leaders' Meeting and later taken up by the Energy Working Group (EWG). The initiative has grown to include five main pillars, namely, smart transportation, smart building, smart grid, smart jobs and consumers, and smart industry as well as two cross-cutting initiatives, which are Low Carbon Model Towns (LCMT) and the Knowledge Sharing Platform (KSP). ESCI-KSP is the avenue for sharing information related to the Energy Smart Communities Initiative as well as relevant activities member economies and companies are taking.

Objectives:

The University of Pennsylvania Institute for Urban Research and the Taiwan Institute of Economic Research maintain ESCI-KSP with support from the National Development Council of Chinese Taipei. Its objectives are to:

- Provide case studies, policy briefs, research findings and data in order to demonstrate the practicality of clean energy technologies related to the APEC goal to reduce aggregate energy intensity by 45 percent from 2005 by 2030.
- Inform APEC decision-makers about green growth, sustainable development and long term job creation.
- Serve as a communications resource for the APEC energy working group, associated partners, and researchers and policymakers in APEC economies.



Progress and Accomplishments:

Hosting ESCI Best Practice Award Program

As the information hub of ESCI network, the KSP has helped disseminate and share best practices of ESCI's areas of focus in a systematic manner. As a way to encourage best practices, facilitate knowledge-sharing and give public recognition to individual accomplishments in the energy smart related cases within the APEC region, ESCI-KSP hosts an ESCI Best Practice Award Program. The first awards occurred in 2013 and the second awards in 2015.

The 2013 Awards are in two categories: individual and integrated. Three projects were selected as the winners for each category based on four criteria, namely, innovativeness, completeness, practicability and contribution. The Award ceremony was held November 18, 2013 in Da Nang, Viet Nam. The winners were:

Individual		
Award Level	**Project Title**	**APEC Member**
Gold	"Get Downtown" in Ann Arbor	United States
Silver	Solar Cities Program	Australia
Bronze	Car-sharing in Fukuoka, Japan	Japan
Integrated		
Award Level	**Project Title**	**APEC Member**
Gold	Samui Island Low-Carbon Model Town Project	Thailand
Silver	Yingge – Waterfront Cultural Town	Chinese Taipei
Bronze	National Library Building	Singapore

Following the success of 2013 Annual ESCI Best Practices Awards Program, the ESCI-KSP, hosted the 2015 Annual ESCI Best Practices Awards Program in Honolulu, Hawaii in order to continue the momentum of regional efforts in developing new methods, technologies and applications within the APEC region. The winners were:

Pillar	**Case Study**	**Rank**	**APEC Member**
Smart Transportation	I3 Travel Project – Promoting Low Carbon Tourism and Intelligent Transportation Services in Sun-Moon-Lake Area	Gold	Chinese Taipei

Smart Transportation	Car Free Days in Seoul	Silver	Korea
Smart Buildings	Energy Conservation Campaign at Richmond Stylish Convention Hotel	GOLD	Thailand
Smart Buildings	Phyathai2 International Hospital, Energy Conservation is a Green Hospital	SILVER	Thailand
Smart Grid	Hawaii Clean Energy Initiative	GOLD	United States
Smart Grid	Construction and Establishment of the Smart Micro Grid Demonstration Park in Linbain Township	SILVER	Chinese Taipei
Smart Jobs	Energy Efficiency Training Program	GOLD	Australia
Smart Jobs	Energy Hog	SILVER	United States
Low Carbon Model Town	Yokohama Smart City Project (YSCP)	GOLD	Japan
Low Carbon Model Town	Kashiwanoha Campus City	SILVER	Japan

Hosting the APEC Conference on Future Energy Smart Communities Model

Chinese Taipei with Singapore and the United States hosted the APEC Conference on Future Energy Smart Communities Model in October 2014 in Taipei. Participants at the conference included experts from the Organization for Economic Cooperation and Development (OECD), Economic Research Institute of ASEAN (ERIA) and APEC member economies. The lessons from the conference resulted in a five-point suggested plan for the next-stage of actions to promote and implement ESCI that member economies endorsed at EWG48.

Case Studies in ESCI-KSP

The ESCI-KSP website launched in March 2013 and has collected 432 cases from 18 APEC economies so far. The case studies are designed to aid in cataloging and sharing information and best practices that are developed for ESCI's areas of focus. It is an opportunity for researchers, scientists, academics and the general public to learn, engage and share the latest in sustainability and energy efficiency. Latest policies, projects and information related to ESCI are continuously being submitted by member economies. In addition, in the first 10 months of 2015 alone, ESCI-KSP had nearly 30,000 page views and nearly 10,000 sessions by visitors.

Green Transport Benefits of Electric Vehicles

"Since transportation accounts for a substantial share of total energy use and greenhouse gas emissions, we direct the Energy Working Group and Transportation Working Group to assess the measures APEC economies could take in the transportation sector to be more energy efficient, and to identify additional areas of collaboration." APEC Energy and Transportation Ministers 2011

Background:

The Energy Working Group has undertaken capacity building projects to support the adoption of electric-drive technologies, and is working with the Automotive Forum to drive interoperability testing and standard in the APEC economies.

The wider application of electric drive technologies will translate into reduced combustion of transport fuel and reduced roadside emissions of carbon monoxide and nitrogen oxide that contribute to urban smog, with consequent health benefits for the growing urban population in the APEC region.

Electric-drive technologies directly improve the air quality in metropolitan areas; cut down greenhouse gas emissions (the reduction is dynamic depending on the electricity generation feedstock); reduce operating costs to consumers; and, stabilize and sectoral energy security. For transport fuel exporting economies, greater use of electric vehicle strategies to limit internal fuel consumption would make additional fuel available for export, with positive impacts on balance of trade and economic growth. For transport fuel importing economies, it can curb rising fuel import dependency and ease pressure on world fuel markets, boosting energy security and improving trade balances.

Purpose:

Hong Kong, China: One project in October 2011 promoted the development of a fundamental green transport energy technology through a two-day workshop with over 150 participants held on October 24th and 25th of 2011 at the Hong Kong Science Park and a one-day visit to EV manufacturers and charging stations in Shenzhen, China on October 26th of 2011. Fifteen economies participated in the workshop, namely, Brunei, Canada, Chinese Taipei, Chile, the People's Republic of China, the United States, Hong Kong, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore and Thailand as well as experts and delegates from Germany, Switzerland, Portugal and Macau. A total of 29 speakers (EV experts and delegates of participated economies) were invited to present and share their valuable knowledge and experience of their respective economies in the field of EVs.

The key objectives were: (1) to share the experience of power and transport planners in developed and developing economies in APEC region to facilitate the deployment of electric vehicles (EV) green transport strategies and policies; and (2) to build interest in green vehicles among the workshop participants, facilitate trade and investment in electric vehicles, energy storage facilities and the related charging

infrastructures and to facilitate the transition from fossil fueled to electric driven vehicles.

Findings from the workshop include the following:

- Governments should take the lead in adopting EVs with incentive schemes such as subsidies and tax reduction;
- Charging standards should be standardized to facilitate more rapid development of charging infrastructure and trade between economies; and
- Advancement in battery technology would bring about increase in driving range and lower EV cost.

Together with the EV technology developments, these factors will facilitate a wider adoption of EVs. In addition, the workshop identified areas for future work as well as opportunities for regional cooperation between APEC economies to enhance the development of EV.

This project builds on a number of studies and research projects that have been conducted by EWG and relevant expert groups on energy efficiency and renewable energy technologies as well as the policies, programs, best practices, strategies and business models to promote these technologies.

Christchurch, New Zealand: The APEC Electric Vehicle Connectivity Workshop 2012 followed up on the Hong Kong, China event. It was held on June 20, 2012. The project's objective was to enhance understanding in APEC economies of EV connectivity to electricity grids and identify opportunities to increase the harmonization of standards and requirements to promote the deployment and integration of EVs, both vehicles and supporting technologies. This project involved three steps: 1) a survey of APEC economies on existing EV connectivity infrastructure, regulations, and standards; 2) a desktop review of the results; and 3) a workshop to discuss the findings and collect APEC feedback.

Electric and plug-in hybrid electric vehicles are an important opportunity to achieve sustainability outcomes as they can actively displace the use of oil throughout the APEC region with electricity, including electricity generated from renewable energy sources; reduce greenhouse gas emissions; improve air quality; improve transport energy end use efficiency; increase local and regional energy security; improve integration of

renewable electricity generation; and improve resilience in the transport sector.

The deployment of electric vehicles in a given economy requires careful consideration of the electrical systems, hardware configuration conditions, and existing standards and regulations. Differences in these conditions across APEC economies may create barriers to the diffusion of EVs across the region. Currently, there is an increasing amount of pressure on harmonizing these requirements by users and producers of EVs to maximize their market opportunities. This project directly promoted the development of an important industry as APEC economies are aiming to be major players in electric vehicle industries both as producers and consumers continuing the major role APEC economies play in the world automotive markets.

The workshop was attended by approximately 90 delegates. The final report was disseminated to all APEC economies.

EV Interoperability Center: Recognizing that greater regulatory cooperation and regulatory alignment on Electric Vehicle (EV) standards can boost the widespread usage of electric vehicles in our economies and building on the 2011 and 2012 workshops, the APEC Energy Working Group is working with the Automotive Dialogue to establish an EV Interoperability and Research Center is proposed to help economies meet their regulatory alignment objectives. It will foster greater electric vehicle production and use - and greater trade and investment opportunities - while advancing APEC's green growth, connectivity, regulatory coherence, and regional economic integration objectives.

The APEC EV Interoperability and Research Center together with the established interoperability centers in the United States and Europe will draw from existing international resources and fora. This cooperation will enable them to provide technical and market analysis and support for helping economies achieve the following goals: alignment of EVs, charging systems, infrastructure and communications; promotion of aligned vehicle-to-charging infrastructure connectivity and communication for electric vehicles in all APEC economies; alignment of EV, battery, and interoperability test procedures and verification tools; alignment of test procedures for energy consumption of EVs; assisting economies in using renewable sources of energy for powering EVs; and exchanging information on international EV initiatives, industry conferences, and regulatory best practices.

APEC Peer Review on Energy Efficiency (PREE)

"We will advance work on sharing best practices in energy efficiency with a view to deploying cleaner and more efficient technologies, and welcome the implementation of the voluntary APEC Peer Review on Energy Efficiency." APEC Leaders 2009

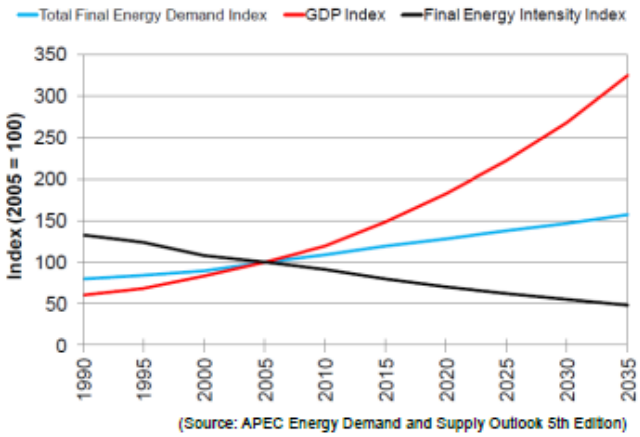
Background:

The APEC Peer Review on Energy Efficiency (PREE), originally proposed by Japan, is a voluntary peer review mechanism to assist APEC economies in developing or implementing policies on energy efficiency. It is organized by the Asia Pacific Energy Research Center (APERC). In 2007, with a view to assisting interested economies in developing policies that support energy security and environmental objectives, APEC Energy Ministers directed the EWG to develop a voluntary Energy Peer Review Mechanism, with an initial focus on progress towards attaining energy efficiency goals. The PREE also is contributing to achieving the inspirational goal to reduce APEC's aggregate energy intensity (energy per unit of GDP) by 45 percent by 2035 agreed by APEC Leaders in 2011.

Objectives:

The APEC PREE shares information on energy efficiency performance, as well as on policies and measures for improving energy efficiency. In addition, the PREE provides opportunities for learning from other APEC member economies' experiences and broadening the network among energy efficiency experts. APEC PREE also collects and analyzes how energy efficiency goals on an overall and/or sectoral basis and action plans could be effectively formulated in each APEC economy reviewed, taking into account the diversity of possible strategies that could be used, according to circumstances of individual member economies.

Figure: APEC Final Energy Intensity Improvement



(Source: APEC Energy Demand and Supply Outlook 5th Edition)

Activities:

There have been two activities undertaken as a part of PREE. The first one is peer reviews of volunteer member economies, and the second one is collecting all the energy efficiency policies of the APEC member economies, based on their APEC PREE, energy efficiency aspects of the IEA Energy Policy Review, and other data voluntarily provided.

Procedure for Peer Reviews:

A review team composed of no more than 10 experts from at least 3 APEC member economies and APERC is formed. The team then visits economies which volunteer for review for up to one week (five working days) per economy. The Final Report is written and placed on the EWG and APERC websites after its endorsement by EWG. The implementation of PREE recommendations is at the discretion of the reviewed economies.

Review Criteria:

- Does the APEC Member economy have overall and/or sectoral energy efficiency goals? Are they measure and verifiable?
- If measurable and verifiable overall and/or sectoral energy efficiency goals have been set, is the APEC member economy envisaging reasonable efforts for exploring the potential for future improvement in energy efficiency?
- Is the government collecting data on the trends of energy consumption and energy efficiency performance in all or key energy consuming sectors?
- Is the government monitoring the effectiveness of its energy efficiency policies and measures?
- Does the APEC member economy have overall and/or sector-specific energy efficiency action plans? If relevant to the chosen energy efficiency strategy of the APEC member economy, do they contain concrete policies and measures for achieving energy efficiency goals?
- Alternatively, does the APEC member economy have a broader suite of regulatory and/or market-based responses (e.g., domestic emission trading) which could encourage energy efficiency improvement?
- Are the action plans being appropriately implemented and backed by sufficient financial and human resources, appropriate to the chosen energy efficiency strategy?
- Are there any inconsistencies among policies and measures, for example, spending a lot of government resources for improving energy efficiency while subsidizing energy prices?
- What are the roles of the government and private sector for pursuing energy efficiency? What kind of public-private partnership or (cooperation) is occurring?
- Is the APEC member economy on the right track towards achieving its own energy efficiency goals? If not, what options for implementation are available that are relevant to the chosen energy efficiency strategy and that reflect the individual circumstances of the member economy being reviewed?

Policy Recommendations:

Extensive policy recommendations are prepared for each participating economy in the following categories:

- Institutional Context
- Energy Efficiency Goals, Targets and Strategy
- Energy Data Collection and Monitoring
- Policy measures in Various Sectors (e.g. residence, commercial, government, industry, transport, electricity, appliances and equipment)

The recommendations are published in each PREE report so all APEC economies can learn from them. They are available on the APERC website at

http://aperc.ieej.or.jp/publications/reports/pree.php.

	Economy	Review	Report
Phase 1	New Zealand	February 2009	April 2009
	Chile	March 2009	April 2009
	Viet Nam	June 2009	December 2009
	Thailand	November 2009	March 2010
Phase 2	Chinese Taipei	August 2010	November 2010
	Peru	November 2010	May 2011
	Malaysia	November 2010	May 2011
Phase 3	Indonesia	October 2011	June 2012
	The Philippines	February 2012	November 2012
	Viet Nam (follow-up)	February 2012	November 2012
Phase 4	Brunei Darussalam	June 2013	November 2013
	The Philippines (follow-up)	September 2014	November 2014
Phase 5	Thailand (follow-up)	August 2015	

Next Steps:

The APEC EWG with APERC will continue to undertake PREE reviews for those remaining economies that are interested. We will also continue follow-up PREE reviews to track and help with implementation of recommendations. Finally, we will pull together best practices and lessons learned from the PREE process for dissemination throughout APEC and globally.

The Low Carbon Model Town (LCMT) Experience in Peru

"Introduction of low-carbon technologies in city planning to boost energy efficiency and reduce fossil energy use is vital to manage rapidly growing energy consumption in urban areas of APEC."
APEC Energy Ministers 2010

Background:

The Low Carbon Model Town (LCMT) project promotes low-carbon town developments in order to manage rapidly growing energy consumption, especially in residential or industrial areas of the APEC region. The low-carbon development plan at San Borja, Peru was selected as the case for LCMT Phase 4. Its main focus was on "residential area development," which was not fully covered by previous LCMT cases.

Objectives:

The key objectives of the Peru project were:

1) Further refine "the Concept of the Low-Carbon Town in the APEC region," that provides effective approaches to develop it in varying areas, and a suite of measures to reduce CO_2;
2) Provide a Feasibility Study and Policy Review focusing on San Borja, Peru by checking CO_2 reduction goals, verifying how to develop an attractive and innovative low-carbon development plan by feasibility studies, and making a recommendation on low-carbon measures by policy reviews; and
3) Share best practices and real-world experiences of low-carbon development with planners and policy makers throughout the APEC region.

Implementation:

The "Concept of the Low-Carbon Town in the APEC Region: Third Edition" was refined through a preparatory study by a team of low carbon town experts and a review on the preparatory study by APEC LCMT Study Group A. The Study Group A members (Six experts from China, Japan, Thailand, the Expert Group on New and Renewable Technology (EGNRET) and OECD) along with the Asia Pacific Energy Research Centre (APERC) research staff visited Vancouver, Calgary and Toronto in Canada and Philadelphia in the United States on June 22 – July 2, 2014. The Energy Working Group (EWG) endorsed the refined "Concept" at its meeting that November and published it on the APERC website. The draft of LCT-I System was included in the refined "Concept" as an annex and will be further examined through trials in next phases.

The Feasibility Study for San Borja, Lima, Peru was led by Hitachi Consulting Co., Ltd., a contracted consultant, who was selected through an international tender in February 2014. The Feasibility Study set CO_2 emissions reduction goals and developed a high level vision for a LCMT in San Borja. The areas of analytical focus were Urban Function Management, Transportation Planning, Buildings Planning, Energy Planning and Environmental Planning. The proposed 22 Low-Carbon Measures (LCMs) will help San Borja exceed its 15% GHG emissions reduction target compared to its 2012 baseline by 2021. They completed the feasibility study in November 2014 and the final feasibility report was submitted to the APEC Secretariat.

For the Policy Review of a low-carbon development project for San Borja, the LCMT Study Group B members (6 experts from Australia, Korea, New Zealand, the Philippines and Russia) along with APERC research staff visited San Borja on 19-21 January 2015. The review team had comprehensive discussions with representatives and experts from the San

Borja municipality. Based on these discussions, there were 50 recommendations in broad areas including Legal Framework, Urban Planning, Low Carbon Building, Energy Management, Energy Efficiency, Transport, and Environmental Planning. The draft report of the policy review was prepared in mid-August, and outcomes were presented at the 9th Meeting of Low Carbon Model Town Task Force held in conjunction with APEC EWG 49 meeting in Gyeongju, Republic of Korea in June 2015.

Key Findings and Next Steps:

The proposed low carbon measures will help San Borja achieve 28% GHG emissions reduction compared to its 2012 baseline by 2021. These targets are supported by a set of concrete low carbon measures both on energy demand and supply side based on the comprehensive and systematic evaluation. The 50 policy recommendations are another example of findings, which are helpful to overcome barriers for the success of the San Borja low carbon development project and provide ideas and lessons to other interested economies.

One of the next steps is to further refine the "Concept" including updating the Low-Carbon Measures. The project also aims at establishing the guideline of LCT-I System so that the government officials and low-carbon town planners in the APEC region can use it easily. The case town for Phase 5 has already been selected and trials to test the LCT-I System in the previous case towns are also undertaken.

The conclusion of the LCMT feasibility study carried out in San Borja will allow Peru to set the roots of a sustainable and model city for others in the APEC region. The technical cooperation provided by the EWG and LCMT will serve to that purpose.

APEC Low Carbon Model Town (LCMT)
Promotion through the Eco-Point Program

"Introduction of low-carbon technologies in city planning to boost energy efficiency and reduce fossil energy use is vital to manage rapidly growing energy consumption in urban areas of APEC."
APEC Energy Ministers 2010

Samui Island in Thailand is successfully applying the APEC Energy Working Group's Eco-Point Program to develop as a low-carbon model town. The EWG's low carbon feasibility study of Samui Island resulted directly in the development of an Eco-Point Program (EPP), a bottom-up approach to promote low carbon lifestyles and measures. EPP is an incentive program promoting green consumption towards low carbon society by giving points and rewards to the consumers who purchase certified eco-goods and services.

Figure 1. Energy Planning Feasibility Study for Samui Island, Thailand

Background:

Ministers at the 9th APEC Energy Ministers Meeting (EMM9), held in Fukui, Japan on June 19, 2010, called for the realization of a Low Carbon Town Concept, a people-oriented approach that includes participation of all stakeholders especially local people. The EWG has since conducted four feasibility studies (Tianjin, China; Samui Island, Thailand; Da Nang, Viet Nam; San Borja, Peru) and will undertake two additional studies (Bintung, Indonesia and Mandaue City, Philippines) in the next year. The EPP is intended to be applied as voluntary basis. Its main elements consist of an eco-point certification system, an eco-point valuation approach, an EPP office (or EPP certification body; EPP-CB), eco-products (including both goods and services), eco-point funds and eco-point rewards. The EPP guidelines are assisting APEC economies to develop low carbon communities. In order to help with implementation, the EWG prepares an EPP Roadmap for each community reviewed.

Objectives:

APEC EWG is seeking to further develop and facilitate implementation of EPP. The key objectives of EPP are:

1. Creating guidelines for an eco-point program for supporting the implementation of low carbon measures in the APEC projects.
2. Building an EPP online-Forum through ESCI-KSP, the EWG's on-line networking system, to share experiences and knowledge on low

carbon technologies among the APEC member economies.

3. Enhancing understanding of needs and benefits for low carbon society resulting in increased public environmental awareness through public consultations during the guideline development via the on-line network, meetings and seminars.
4. Developing a recommended roadmap for effective implementation of the EPP which will incorporate all low carbon measures into action in APEC economies.

Key Activities:

The EWG is further developing the Eco-Point Program guidelines. The activities include the review of Eco-Point Program as well as similar schemes in various economies in order to delineate the key success factors and lessons learned. The following activities will:

- Collect additional data on similar programs such as those in Japan and South Korea.
- Develop robust EPP Guidelines by looking at definitions, goals & scopes, frameworks, methodologies and steps for implementation.
- Establish an EPP Forum and EPP Recommendations to gain valuable comments and knowledge and increase sharing among local and international experts through focus group meetings and EPP web-based forum.
- Hold a final round of consultations with APEC economies on the EPP guidelines through a seminar.

Accomplishments:

Comprehensive guidelines for Eco-Point Program implementation have been developed. The implementation of EPP uses a step-by-step sequential approach to implement an EPP. As shown in Figure 2, an EPP office coordinates crucial EPP elements and interaction among elements.

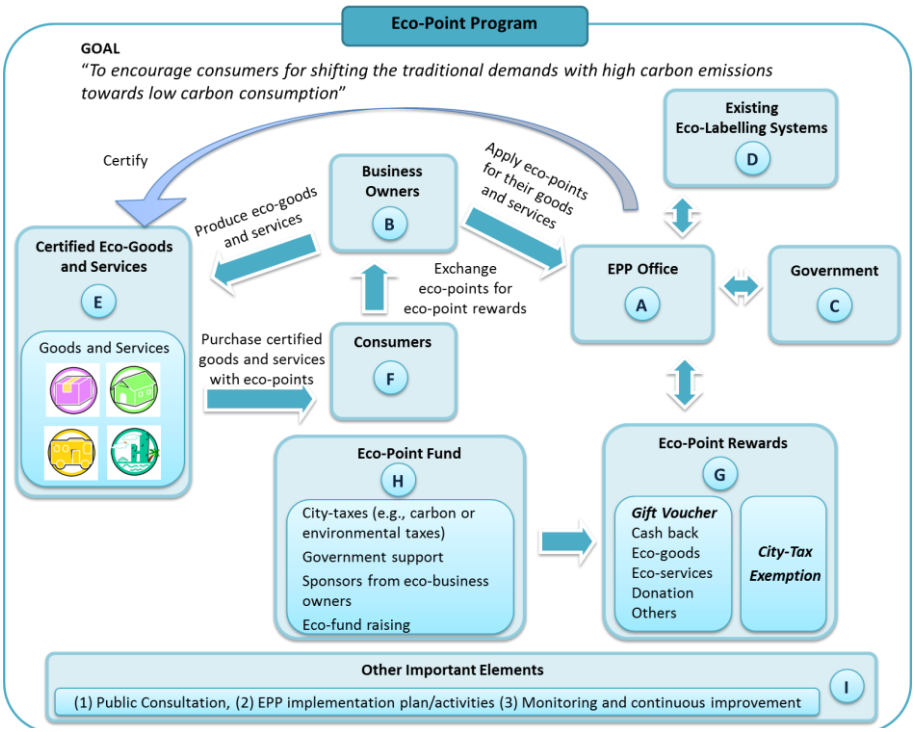


Figure 2. Framework for the Eco-Point Program

Implementation:

A series of focus group meetings were conducted during the development of the guidelines in each feasibility study. The focus groups included attendees from targeted and potential stakeholders such as implementing agencies, eco-goods and services providers, eco-products labeling & certifying bodies, and consumers. As a result, the meetings indicated the EPP guidelines can accommodate and be applicable to each APEC economy's conditions. For example, EPP guidelines provide the pathway for economies with an existing eco-products certification system as well as without eco-products certification system.

For example, the EPP guidelines and roadmap were tailored for Samui Island. The EPP guidelines complied with local conditions, recommending goods and services as well as scheme for certification and point redeeming systems. Public consultations included local stakeholders such as hotels, resorts, transportation, superstores, Bangkok Airways, the Provincial Electricity Authority (PEA) as well as the Samui municipal officials. Concerns raised included the additional costs of an infrastructure investment of eco-points collection and redemption.

Knowledge from the Samui Island experience helped further develop the EPP Guidelines.

The Department of Alternative Energy Development and Efficiency (DEDE) under Ministry of Energy (MOE) in cooperation Samui municipality have allocated a budget to support the implementation of the low carbon project as well as persuading local businesses to contribute their own budget in some projects. The process is ongoing. Projects to date include:

- 2013 SAMUI Low Carbon Town Capacity Building for Local Stakeholders
- 2014 SAMUI Eco-Point Program
- 2014 SAMUI Action Plan
- 2014 Conceptual Design SAMUI Smart Grid System and EV Infrastructure Study
- 2014 Green Room Concept and Pilot Program

Thailand hopes to extend and apply the lessons and EPP guidelines throughout the country.

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