

**APEC Energy Overview and Workshop Introduction**

*APEC Workshop on Recent Advances in Utility Based Financial Mechanisms that Support Renewable Energy and Energy Efficiency*

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**Presentation Overview**

- APEC Energy Working Group (EWG)
- APEC Expert Group on New and Renewable Energy Technologies (EGNRET)
- Workshop motivation and overview
- Review of electric utility finance mechanisms
- Concluding thoughts

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**What is APEC?**

- Asia-Pacific Economic Cooperation (APEC) was created in 1989
- Objective: Promote trade liberalization, trade facilitation and technical assistance
- APEC Economies account for more than one third of the world's population, 60% of world GNP and 50% of world trade
- Implements its activities through 11 working groups including the Energy Working Group

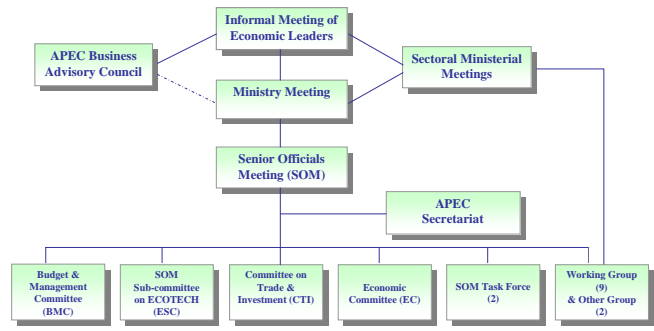
(<http://www.apec.org>)

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### APEC Member Economies span the Pacific

- Australia
- Brunei Darussalam
- Canada
- Chile
- Peoples Republic of China
- Hong Kong China
- Indonesia
- Japan
- Republic of Korea
- Malaysia
- Mexico
- New Zealand
- Papua New Guinea
- Peru
- Republic of the Philippines
- Russia
- Singapore
- Chinese Taipei
- Thailand
- United States
- Vietnam

### Asia Pacific Economic Cooperation



### APEC Energy Working Group (EWG)

- The EWG was launched in 1990
- The EWG seeks to maximize the energy sector's contribution to the region's economic and social well-being, while mitigating the environmental effects of energy supply and use
- Australia has been the EWG Lead Shepard since its inception
- The Energy Security Initiative (ESI) is the principal mechanism through which the EWG addresses the short and long term energy security challenges in APEC in a sustainable manner
- The APEC Energy Ministers (EMM8) last met in Darwin, Australia in September 2007 under the theme "Strengthening our Community, Building a Sustainable Future"

([www.ewg.apec.org](http://www.ewg.apec.org))

### The Energy Working Group is supported by 7 sub-foa groups

- Expert Group on Clean Fossil Energy (EGCFE) – Chair: USA ([www.egcf.ewg.apec.org](http://www.egcf.ewg.apec.org))
- Expert Group on Energy Efficiency & Conservation (EGEEC) – Chair: New Zealand ([www.egeec.apec.org](http://www.egeec.apec.org))
- Expert Group on Energy Data & Analysis (EGEDA) – Chair: Japan ([www.ieej.or.jp/egeda/](http://www.ieej.or.jp/egeda/))
- Expert Group on New and Renewable Energy Technologies (EGNRET) – Chair: USA ([www.egnret.ewg.apec.org](http://www.egnret.ewg.apec.org))
- APEC Biofuels Task Force- Chair: USA ([www.biofuels.apec.org](http://www.biofuels.apec.org))
- Asia Pacific Research Center (APERC) ([www.ieej.or.jp/aperc/](http://www.ieej.or.jp/aperc/))
- Energy Business Network- Chair: New Zealand ([www.ewg.apec.org](http://www.ewg.apec.org))

### Projects are conducted by writing proposal to the APEC Secretariat in Singapore

- APEC funds about \$8 million/year of projects across all working groups
- In 2008, 120 projects were submitted for APEC support with 32 being from the Energy Working Group
- Proposals go to one of three funds
  - APEC Operational Account
    - *The most general fund used to address APEC priorities*
  - APEC Support Fund
    - *Directed at capacity building in development APEC economies*
  - APEC Trade Investment and Liberalization Fund (TILF)
    - *Donated by Japan, and directed at projects directly related to trade, such a equipment standards*

### The EWG Secretariat has led the development of comprehensive project overview reports

- Overview of APEC Energy Working Group Projects, April 15, 2007\*
  - Identifies and categorizes 250 EWG projects conducted since 1992
- Overview of APEC Energy Working Group Projects  
Stage 2: Project Outcomes  
Report 1: Energy Efficiency and Conservation, Energy Data and Analysis and Promoting Energy Trade and Investment (May 16, 2008)\*
- Overview of APEC Energy Working Group Projects: Stage 3, is the subject of a current EWG project proposal and will look at project outcomes for clean fossil energy and new and renewable energy technologies including alternative transport fuels

\*Available from: <http://www.ewg.apec.org>

### The APEC Renewable Energy Expert Group's Activities are Diverse and Complementary

- Lead and work with EWG major initiatives
  - APEC 21<sup>st</sup> Century Renewable Energy Development Initiative
  - EWG led Energy Security Initiative (2001)
  - Ministerial Level Financing Initiative (2004)
  - Ministerial Level Hydrogen Initiative (2004)
  - Ministerial Level Biofuels Initiative (2006)
- Organize workshops
- Conduct research projects
  - 43 have been completed since 1992
  - 7 are being implemented in 2008-2009

### Current APEC EGNRET Projects (1)

- APEC 21st Century Renewable Energy Development Initiative (Collaborative I): Workshop on Best Practices in Energy Efficiency and Renewable Energy in Commercial Buildings (EWG 02/2007A) Mexico
- 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) USA
- APEC 21st Century Renewable Energy Development Initiative (Collaborative IX): Alternative Transport Fuels Policy Options for APEC Economies (EWG 04/2007A) New Zealand
- APEC 21st Century Renewable Energy Development Initiative (Collaborative VI): Successful Business Models for New and Renewable Energy Technology implementation in APEC Economies (EWG 03/2008) New Zealand

## Current APEC EGNRET Projects (2)

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) Chinese Taipei

- Addressing grid-interconnection issues in order to maximize the utilization of new and renewable energy sources (EWG 02/2009) Japan
- 2008 APEC Photovoltaic Conference (EWG Self funded) Chinese Taipei, October 7-8, 2008 (<http://www.apecpv.itri.org.tw>)
- **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) USA**

## Utility finance project motivation: APEC economies account for over 50% of the world energy demand

- APERC has estimated US\$ 5.95-7.55 trillion total investment is needed in the energy sector through the year 2030\*
- The electric utility sector will require 60.4% of this as it expands from 2,138 TW in 2002 to 4,207 TW in 2030
  - New and Renewable Energy Challenge: Instead of constructing 2000 large (1,000 MW facilities), construct 2,000,000 small (1 MW facilities)
- It is important that new energy production be based on best practices in the use of new and renewable energy technologies as well as cost effective energy efficiency measures

\*APEC Energy Demand and Supply Outlook 2006, Asia Pacific Research Center, Tokyo, Japan ([www.ieej.or.jp/aperc](http://www.ieej.or.jp/aperc))

## Electric utilities across the APEC region are embracing NRET for many reasons

- Reduce green house gas emissions
- Improve the local environment
- Increase local employment
- Economic benefits of using domestic energy resources
- Increase energy security in their economies

## Utility Finance Project Summary Report

- Six basic financial mechanisms were reviewed under four broad categories
  - Quota schemes
    - Renewable portfolio standards
  - Performance-based incentives
    - Feed-in tariffs
    - Net metering
  - Capital payment incentives
    - Rebates and loan programs
  - Market-based instruments
    - Renewable energy certificates
    - White certificates (energy efficiency)

***A principal goal of the summary report is to be a starting point for understanding the current state of the art in financing utility based renewable energy and energy efficiency***

- The report discusses policy effectiveness as well as some principal similarities and differences among these financial mechanisms
- A note of caution: terminology is not standardized and the state of knowledge is rapidly changing

***A principal goal of the workshop is to share experiences and explore how APEC can best assist member economies in increasing the implementation of utility based renewable energy and energy efficiency programs***

- The agenda is based on bringing together different perspectives
  - Government energy policy decision makers
  - Electric utility representatives
  - Researchers and practitioners

***Renewable portfolio standards***

- A Renewable Portfolio Standard (RPS) is a regulatory policy which places an obligation on electric utilities to produce a specified fraction of their electricity from renewable energy sources
  - A total of 28 US states are implementing an RPS
  - The targets of RPS are different in each state, varying from 8% in Illinois to 25% in New York by 2013
  - Resources utilized vary across states and are associated with local characteristics
  - Eight states allow energy efficiency to be counted towards RPS goals

***RPS issues***

- RPS mechanisms have tended to be most successful in the US in stimulating new renewable energy capacity where they have been used in combination with federal Production Tax Credits
- There is an argument that RPS creates “limited” long-term markets for renewable energy
  - Once that goal is reached, there is nothing to make electric suppliers obtain more renewable energy power
  - RPS depends on competitive bidding and limits participation to only participants with high power in the market
- Many states are starting to examine combining RPS and feed-in tariffs

**Feed-in laws specify how much the renewable generators are paid for their electricity**

- Feed-in laws go by many names
  - Feed-in tariffs
  - Renewable tariffs
  - Renewable energy producer payments
  - Standard offer contracts (Ontario)
  - Advanced renewable feed-in tariffs

**World Feed-in tariffs have similar prices**

**First year Renewable Tariffs in US\$/kWh**

	Wind	PV	Hydro	Biogas	Program Duration
Ontario	0.0877	0.3336	0.0877	0.0877	20 years
Austria	0.0978	0.5960		0.2196	
Brazil	0.0715		0.0505	0.0631	
Czech Republic	0.1117	0.6002			
France	0.1062	0.7217	0.0711	0.1166	15 yrs for wind and biomass; 20 yrs for solar and hydro
Germany (2008)	0.1040	0.6057	0.0955	0.1403	20 years
Italy		0.7126			
Portugal	0.1024		0.1062		12 years
Spain (2007)	0.0981	0.5897		0.1750	
Turkey	0.0713				

**Similarities and differences between German and Spanish feed-in policies are instructive**

- Common elements
  - Both provide long-term contracts and fixed-price payments that encourage investor security
  - Both provide payments based on generation costs for a specific technology
  - Both evenly distribute the cost of their feed-in tariff policy
- Differences
  - Forecast obligation
  - Voltage support incentives
  - Peak generation differentiation

**Successful feed-in tariffs have the common characteristics**

- Long-term guaranteed payments that adequately reflect generation costs and profit
- Incentive levels that decrease over time, i.e. “tariff digression”
- Incentive levels that are specific to certain renewable energy technologies (i.e., PV, wind, biomass, etc.)
- Incentive levels that are tailored to achieve specific policy goals, i.e., development in different wind regimes, use of certain conversion technologies, etc., i.e. “stepped tariff”

### ***Net metering is a critical first step in supporting renewable energy production on the “customer side” of the meter***

- Under net metering, consumers can offset the cost of electricity they buy from a utility by selling renewable electric power they generate back to the utility
- Both net metering and feed-in tariffs are a performance-based renewable energy incentive scheme
- True net metering calls for the utility to purchase power at the retail rate and use one meter
- Net metering rules vary significantly by country, state, and province
- Interconnection rules needed for net metering are important but have been defined and are available
- In the US, as part of the Energy Policy Act of 2005, all public electric utilities are required to make available upon request net metering service to any electric consumers that the electric utility serves

### ***Net metering has a number of advantages***

- It is considered a low-cost, easily-administered mechanism for encouraging investment of small-scale renewable energy systems
- It allows customers to “bank” their energy and use it at different times than it is produced
- Utilities can benefit from net metering because it can improve system load factor by producing electricity during peak periods
- Net metering is needed to properly credit consumer based renewable energy production for local and global environmental benefits

### ***The US is developing a number of innovative business models based on net metering***

- Power Purchase Agreements (PPAs)
- Installation aggregation
- “Solar options” on new home constructions

### ***Solar Purchase Power Agreements coupled with net metering allow for turn key solar installations***

- Sun Edison will provide turn key solar PV for eight Wal-Mart stores, four in California and four in Hawaii
- The solar photovoltaic systems will be deployed with the SunEdison Power Purchase Agreement (PPA) model, whereby customers purchase solar electricity, rather than solar equipment
- SunEdison will finance, install, operate and maintain the photovoltaic power plants for Wal-Mart
- Under the PPA model, SunEdison only charges customers for electricity produced at rates equal to, or below the customer's existing retail prices

### Capital payment incentives can take a number of forms

- A rebate, or up-front subsidy, is a direct payment to consumers to refund part of the installation costs of renewable energy systems, or buy down costs of energy efficiency equipment
- Utilities may offer rebates to their residential customers for the installation of energy efficient appliances
- Utilities may offer low interest rate loans to its customers for a variety of energy efficient improvements ranging from replacement thermal windows and insulation upgrades to improving heating and cooling system installations
- Buy-back programs are being offered to customers by some utilities. Buy-back programs for inefficient equipment such as old refrigerators, air conditioners
- There are currently debates over the issue of capital payments (i.e., rebates or up-front subsidies) and performance-based or production incentives (i.e., feed-in tariffs and net metering)

### Renewable energy certificates are tradable environmental commodities

- Renewable Energy Certificates (RECs) are also known as Green tags, Green Certificates, Renewable Energy Credits, or Tradable Renewable Certificates
- One certificate represents proof that 1 megawatt-hour (MWh) of electricity was generated from an eligible renewable energy resource
- The US has two main markets for renewable energy certificates
  - Compliance markets are in US states with Renewable Portfolio Standard policies
  - Voluntary markets are ones where customers choose to buy power from renewable energy sources voluntarily
- One advantage of RECs is that it allows consumers to support renewable energy even when their utilities do not provide green power options

### Prices of renewable energy certificates are a function of supply and demand

Unit: \$/MWh

Generation Type	Midwest	West	National
Biomass		\$3-10	\$1-5
Solar		\$18-21	\$21
Wind	\$1-4	\$3-7	\$1-4
Geothermal		\$1-7	

Source: Evolution Markets. From Lori Bird, "Overview of Renewable Energy Certificate (REC) Markets," National Renewable Energy Laboratory, presented at the FTC Workshop, January 8, 2008.

### White certificates are the most recent financial mechanism to be developed

- White certificates are also known as Energy Savings Certificates, Energy Efficiency Credits or White Tags
- White Certificates represent a specific, verified quantity of reduction in energy use. Each certificate is a unique and traceable commodity guaranteeing that additional 1 MWh of energy is saved and that the benefit of these savings has not been accounted for elsewhere
- Australia was the first nation that commenced tradable energy efficiency certificates, starting in New South Wales (NSW) on January 1, 2003 and in the Australian Capital Territory (ACT) on January 1, 2005
- Three US states—Connecticut, Nevada and Pennsylvania, allow white certificate trading
- Italy started a scheme in January 2005. France started it in 2006. UK has combined its obligation system for energy savings with the possibility to trade obligations and savings



### ***There is a growing world-wide interest in white certificates***

- The market for white certificates in the US can be expected to grow larger than the renewable energy certificate market because it requires less government approval and expense to install energy efficiency measures in factories and commercial buildings than to construct most renewable energy projects
- One important issue is how to ensure that customers are not double counting their white certificates with other incentive programs for energy efficiency
- There is still a lack of a good and widely accepted measurement and verification processes for trading White Certificates

### ***Concluding thoughts***

- Different renewable energy policies have been adopted to date and there are continuous debates over the merits and success of each policy scheme
- An advantage of feed-in tariffs is that they can be structured to create incentives for renewable energy where the resource is comparatively weak, e.g., pay more for wind power in less windy areas—but, the problem is getting the price right
- Rather than viewing feed-in tariffs as a competing policy with RPS, states and countries can view feed-in tariffs as another tool to be adopted to reach existing RPS goals
- The countries with proven success in feed-in tariffs like Germany and Spain have undergone several amendments before reaching their present success
- APEC economies would be well advised to study the existing feed-in policies and tailor them to fit their renewable energy markets

### ***APEC utility finance workshop next steps***

- Each speaker will be asked their thoughts on how to best move ahead in the concluding session of the workshop
  - Which financial mechanisms do you think would be most useful to your economy?
  - What are the constraints that you see to applying the financial schemes that have been discussed to your economy?
  - What is most needed to help your economy adopt the financial mechanisms that have been discussed?
  - Are there specific lessons learned in your economy on financial mechanisms you can share?
- Your comments will form the basis of a new project that the APEC Expert Group on New and Renewable Energy Technologies will propose for implementation in 2009-2010

***Thank you for your attention!***

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