EWG 01/2009T

Reducing barriers to trade through development of a common protocol for measuring the seasonal energy efficiency (SEER) of air conditioners

Final Report

Chinese Taipei

2010/02/04

Objective of the project

The objective of this project aims to develop an analytical platform to evaluate the SEER values for room air conditioner (RACs) in APEC economies.

This objective will be met based on the data of climate and building load characteristic collected from APEC economies.

With the application of this program, it will help to reduce unnecessary duplicate test and administration process. Meanwhile, it also helps to reduce the cost and times of testing, and further affect the efficiency of trading among APEC economies.

Budget

The total cost of proposal for this study is US$250,000, and the total approved budget is US$60,000 from APEC funding.

Self-financing budget is US$190,000.

Scope of Work

1. **Collect the weather data and the building load curve of the regions concerned.**
2. **Develop a common code for performing Seasonal Energy Efficiency Ratio (SEER) of room air conditioners (RACs).**
3. **Design and deliver one and a half days open workshop at Chinese Taipei on topic of air conditioning SEER to those experts or representatives mainly from APEC economies.**
4. **Publish (consistent with APEC publication policy) and distribute 3 electronic copies of the outcome of workshop to workshop participants and others APEC Economies member.**
5. **Provide an electronic copy of the above publications and the outcome of the development of SEER program to the APEC Secretariat for dissemination via the APEC Website.**

Timetable & Deliverables for tenders

Activities	Dates
Deadline for submission of proposals to the Project Overseer;	30 April 2009
Proposal evaluation and bid selection by Steering Committee of representatives from APEC Member Economies;	1-6 May 2009
Negotiation of contract details between the APEC Secretariat and the successful tender;	7-15 May 2009
Organization of workshop and invitation of speakers sent	17 July 2009
Stage 1	10 July 2009
•Planning overall SEER development structure •Collection of related APEC economies weather data, consumer's behavior of using air conditioner, building load characteristic and the existing regulation and standards	
Finalized the details of workshop and complete lists of experts and participants	28 August 2009
Stage 2	25 September 2009
•Completion initial version of SEER program	
Execution of Workshop;	5-6 October 2009
Publish and distribute the outcome of workshop to participants and APEC Economies.	23 October 2009
Stage 3	20 November 2009
•Complete the final version of SEER program with verified result	
Collection result of workshop, SEER testing method and program	4 December 2009
Produce an electronic version of the above document for dissemination via the relevant APEC Websites.	1 February 2010

Progress

- **Held the SEER Workshop. (Oct. 5-6, 2009)**
- **Complete the development of SEER calculation program.**
- **Publish the outcome of the SEER workshop and SEER calculation program on a website to allow APEC members to download.**
- **Send the output of the project to APEC members by mail.**

Workshop for the Development of SEER

First day – Seminar (5th Oct., 2009 / Mon.)	
	Topic / Speaker
Venue	4F/CR-403, The Howard Plaza Hotel Taipei, Taipei
09:00 ~ 09:30	**Registration**
09:30 ~ 10:00	**Opening Remarks** *Chair:* Dr. Robert Yie-Zu Hu, Deputy General Director of Energy and Envirnment Research Laboratories, ITRI *Co-Chair:* Mr. Terry Collins, Chair of EGEE&C, APEC *VIP Speech:* Mr. Huey-Ching Yeh, Director General of the Bureau of Energy, MOEA, Chinese Taipei
10:00 ~ 10:40	**Title: Policy and standards for the rational use of energy in Japan** *Speaker: Dr. Chaobin Dang, Assistant Professor* *The University of Tokyo, Japan*
10:40 ~ 11:00	Break
11:00 ~ 11:40	**Tilte: CSPF & HSPF for air-conditioner and heat pump in Korea** *Speaker: Dr. Jun-Young Choi, Chief Researcher* *Korea Testing Laboratory/Energy Technology Center, Republic of Korea*
11:40 ~ 13:10	Lunch Break
13:10 ~ 13:50	**Title: SEER for air conditioners in New Zealand** *Speaker: Mr. Edward Winter MSc., Technical & Standards Advisor (Heating & Refrigeration), Energy Efficiency and Conservation Authority, New Zealand*
13:50 ~ 14:30	**Title: The Seasonal Energy Efficiency (SEER) of air conditioners in China standards** *Speaker: Prof. Cheng Jianhong, Researcher* *China National Institute of Standardization, China*
14:30 ~ 14:50	Break
14:50 ~ 15:30	**Title: The role of SEER of air conditioner in energy efficiency management in Chinese Taipei** *Speaker: Mr. Shin-Hang Lo, Manager* *Energy and Environment Research Laboratories, ITRI, Chinese Taipei*
15:30 ~ 16:10	**Title: SEER testing method and standard development in US** *Speaker: Mr. Christopher G. Stone, General Manager* *Intertek, USA*
16:10 ~ 16:50	**Title: Establishment of the CNS national standards and development of SEER measuring method for air conditioners in Chinese Taipei** *Speaker: Mr.Chwan-Shing Huang, Vice General Manager* *Research & Planning Department, Taiwan Electric Research & Testing Center, Chinese Taipei*
16:50 ~ 17:20	**Panel Discussion**
Second Day – Panel Discussion (6th Oct., 2009 / Tue.)	
09:30 ~ 10:10	**Title: The measures of promoting SEER for air conditioners from manufacturer's point of view** *Speaker:Mr. Steve, R.C. Chang* *TRAEA, Chinese Taipei*
10:10 ~ 10:50	**Title: Introduction of the development of an analytical platform for measuring the SEER of air conditioners of APEC member economies** *Speaker: Ms. Hsiao-Chi Hsu, Associate Researcher* *Industrial Technology Research Institute, Chinese Taipei*
10:50 ~ 11:10	Break
11:10 ~ 11:40	**Panel Discussion**
End of Workshop	

Experts	From 6 economies： China、Japan、Korea、New Zealand、 USA、Chinese Taipei
Active participants (invited)	From 3 economies： Indonesia、Malaysia、Russia
Total participants	From 10 economies： The total number of attendance is 51.

Speakers invited by Chinese Taipei were from 5 different economies, which were China, Japan, Korea, New Zealand, and USA. And 4 speakers from Chinese Taipei.

NO.	Economy	Name	Topic of presentation
1	New Zealand	Mr. Edward Winter MSc., Technical & Standards Advisor (Heating & Refrigeration), Energy Efficiency and Conservation Authority	SEER for Air Conditioners in New Zealand
2	Japan	Dr. Chaobin Dang Assistant Professor, The University of Tokyo	Policy and standards for the rational use of energy in Japan
3	China	Dr. Jianhong Cheng Researcher, China National Institute of Standardization	CSPF & HSPF for Air-conditioner and Heatpump in Korea
4	South Korea	Dr. Jun-Young Choi Chief Researcher, Korea Testing Laboratory/Energy Technology Center	The Seasonal Energy Efficiency (SEER) of Air Conditioners in China standards
5	USA	Christopher G. Stone General Manager, Intertek	SEER testing method and standard development in US

Active participants invited by Chinese Taipei were from 3 different economies：

Indonesia, Malaysia and Russia.

	1	**Russian Federation**	**Sergey Molodtsov** Deputy Director on science, Centry for energy policy, Moscow
Active Participant	**2**	**Malaysia**	**Zaini Abdul Wahab** Demand Side Management, Energy Commission, Malaysia
	3	**Indonesia**	**Totok Sulistiyanto** Vice President, ASHRAE Indonesia Chapter

Activity pictures

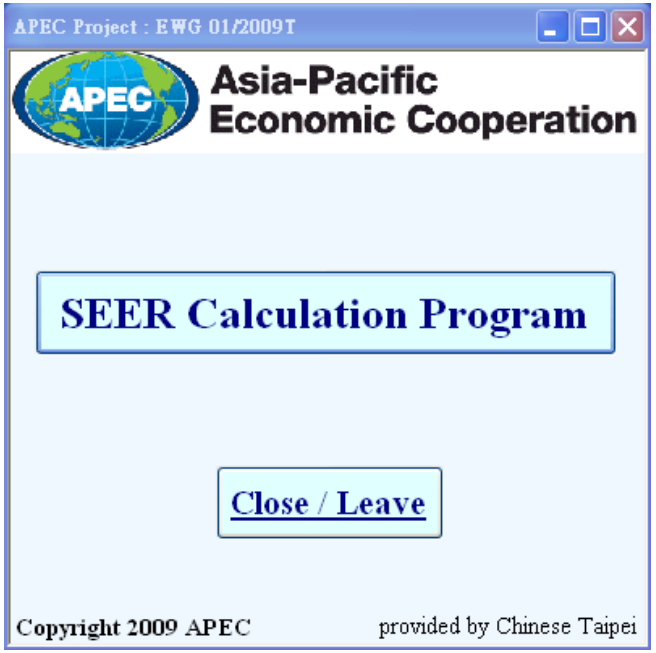
In the panel discussion, the workshop was brought out some very constructive suggestions and actions to follow, such as :

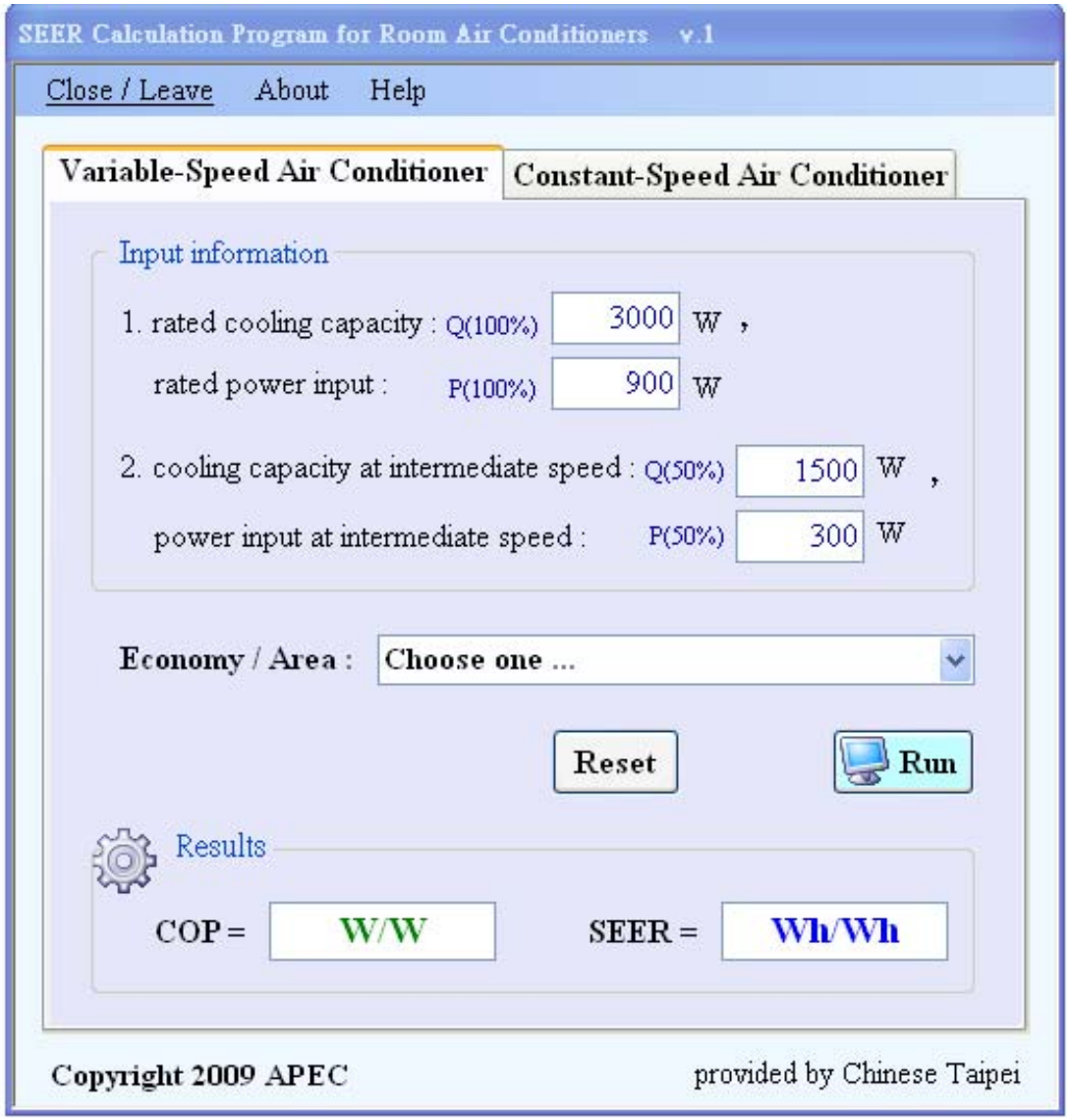
- **Natural refrigerant** application to air conditioners is a beneficial issue not only to energy efficiency lifting, but also to environmental protection issue. That means the green energy is a critical issue for natural refrigerant in air conditioners, instead of HFC and HCFC refrigerants.
- Is there any **connection channel** to other international organization, such as APP, ISO and others? Through the channel built, the information and experience can be shared and exchanged, so that it will be conducive to the elimination of trade barriers.
- **Manufacturers** should be invited and actively involved in the SEER developing stage, so that the implementation of any regulation will be easier to promote.
- This meeting mainly focus on the discussion of the efficiency of air conditioners, but the **renewable energy** is another big issue and has drawn attentions worldwide. Hope that this issue can be discussed in the upcoming APEC relative meetings.
- The **humidity** factor can be considered in the SEER calculation software developed by Chinese Taipei. Hopefully, its application can also include the package units, not just for room air conditioners or window-type units.

SEER Standards for APEC Economies

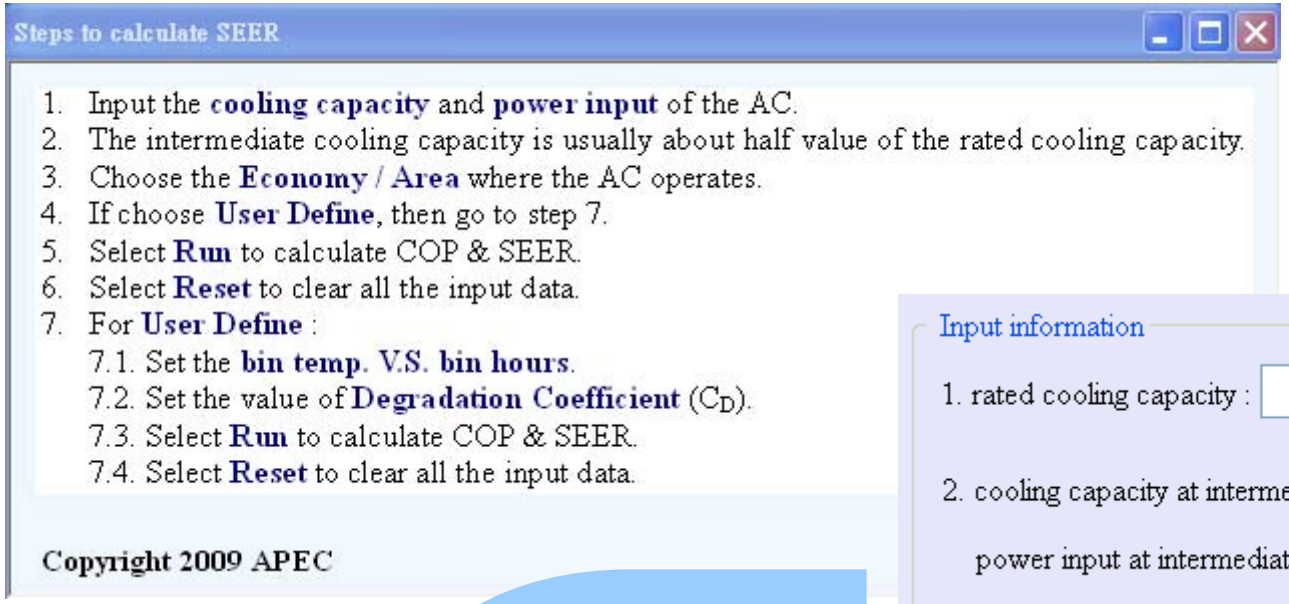
Economies	USA	Canada	Japan	China	Korea	Australia & New Zealand	Chinese Taipie
Standard	ASHARE 116-1995	CAN/CSA C656-M92	(1)JRA 4046：2004 (2)JIS C 9612：2005 Appendix 3	GB/T 7725-2004 Appendix E	KS C 9306-2007	AS/NZS 3823 -2001	CNS 14464 & CNS 3615
Reference	ANSI/ASHRAE 116, Methods of testing for seasonal efficiency of unitary air-conditioners and heat pumps	(1) All types of central air conditioners are rated using SEER (2) test procedure for central air conditioners：ARI 210/240-89 & ASHRAE 37	(1) JRA 4046, Room air conditioners, 2004 (2) JIS C 9612, Room air conditioners, 2005	GB/T 7725-2004, Room Air Conditioners	KS C 9306-2007, Room air conditioners	Working on it	Draft

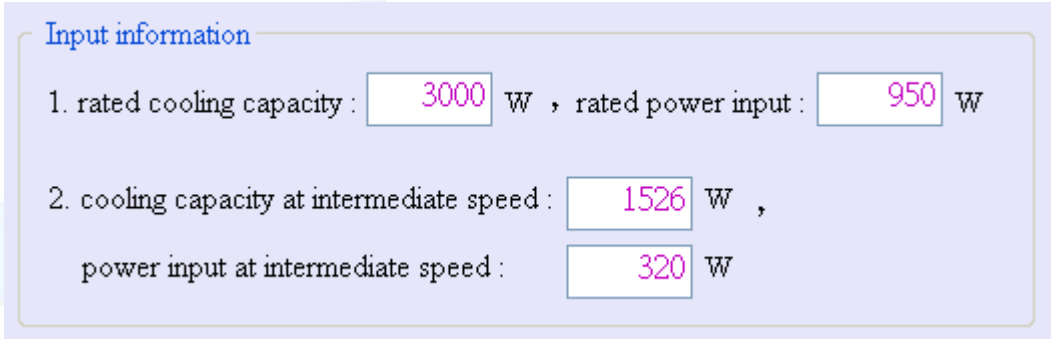
Main frames of SEER calculation program

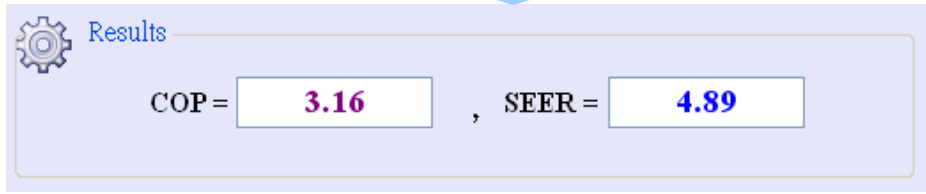


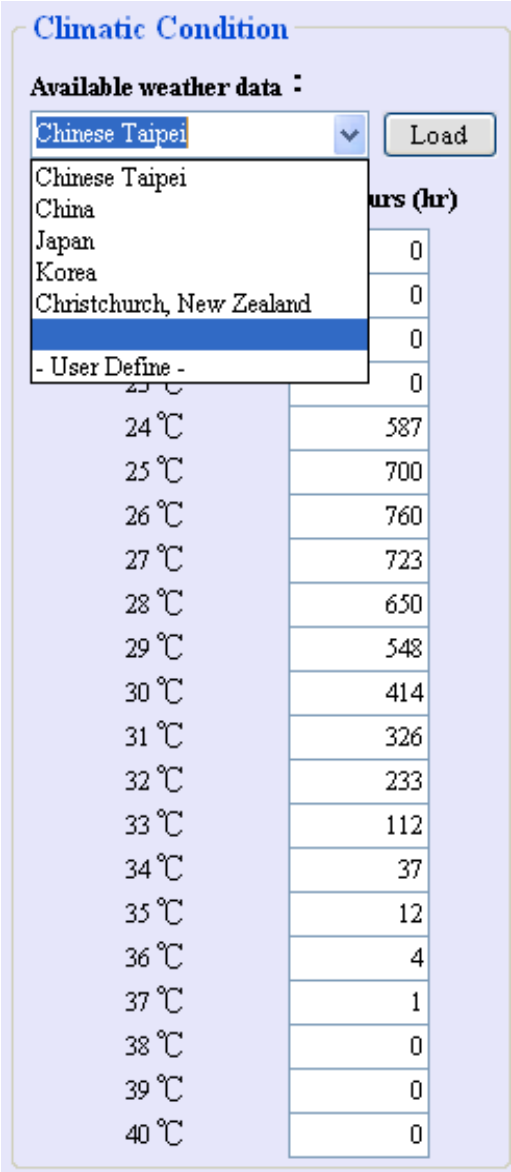


Steps to calculate SEER







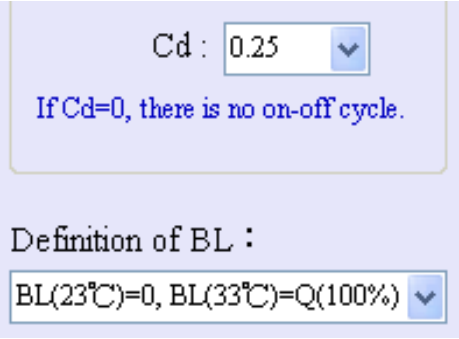


This program so far includes 6 economies' standards (or drafts) about SEER.

The 「User Define」 function allows user to try different bin temp. V.S. bin hours to simulate the SEER value in different area.

User can set the bin temp. V.S. bin hours or just load the default data and modify the relative bin hours.

User can also set the value of degradation coefficient (Cd) and the definition of building load (BL).



Conclusions

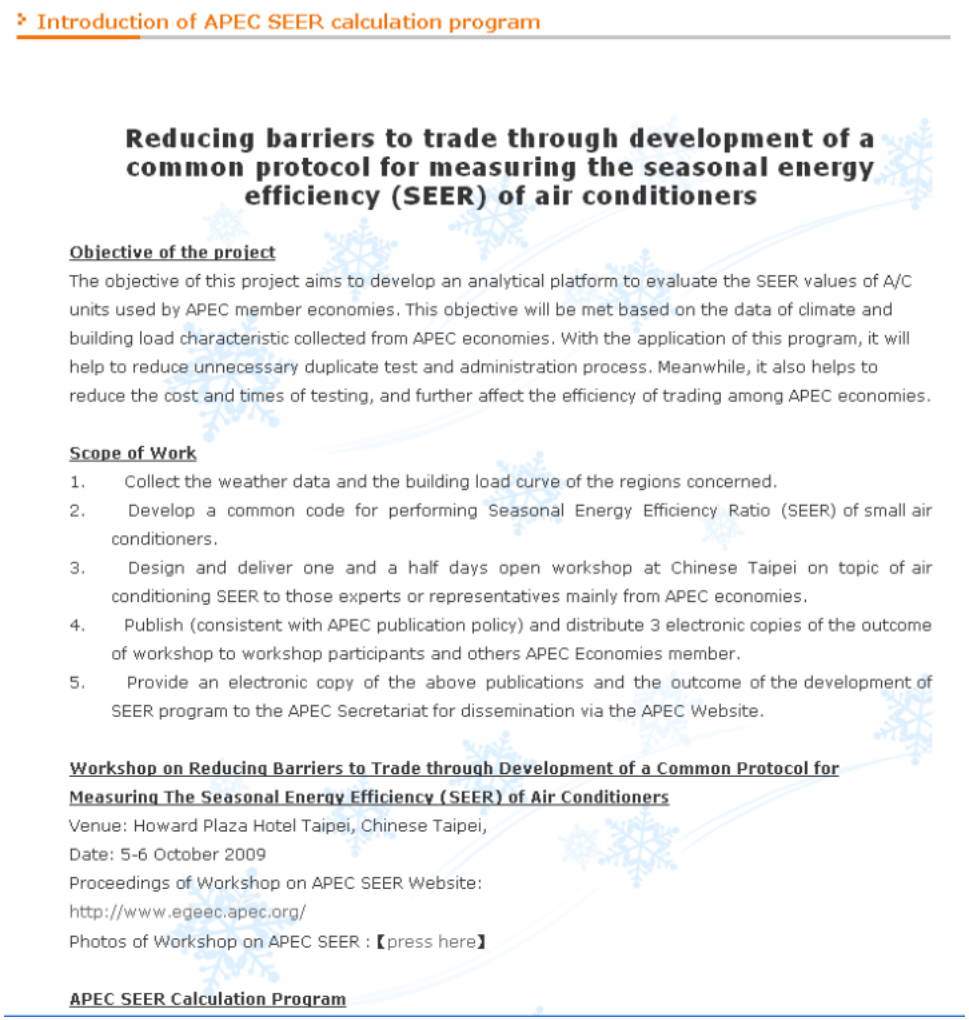
An electronic copy of the above publications and the outcome of the development of SEER calculation program will be send to each APEC economy member by mail.

They also can be downloaded from the website: http://www.hvac-net.org.tw/action/?parent_id=14

With SEER platform, as the worldwide users enter the parameters required, the SEER can be simply calculated based upon weather data and the test results of the air conditioners.

SEER calculation program helps promote the concept of part-load efficiencies of air conditioners and finally contributes to energy saving.

With the application of this program, it will help to reduce unnecessary duplicate test and administration processes. Meanwhile, it also helps to reduce the cost and time of testing, and further affects the efficiency of trading among APEC economies.



Introduction of APEC SEER calculation program

Reducing barriers to trade through development of a common protocol for measuring the seasonal energy efficiency (SEER) of air conditioners

Objective of the project

The objective of this project aims to develop an analytical platform to evaluate the SEER values of A/C units used by APEC member economies. This objective will be met based on the data of climate and building load characteristic collected from APEC economies. With the application of this program, it will help to reduce unnecessary duplicate test and administration process. Meanwhile, it also helps to reduce the cost and times of testing, and further affect the efficiency of trading among APEC economies.

Scope of Work

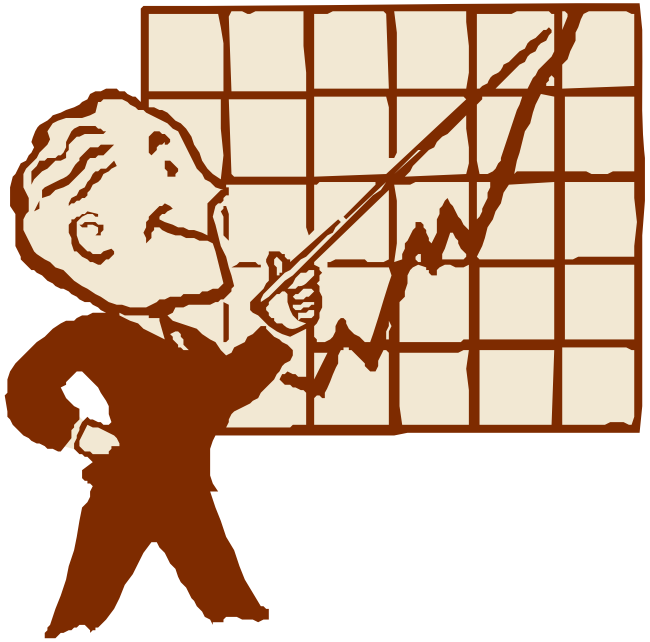
1. Collect the weather data and the building load curve of the regions concerned.
2. Develop a common code for performing Seasonal Energy Efficiency Ratio (SEER) of small air conditioners.
3. Design and deliver one and a half days open workshop at Chinese Taipei on topic of air conditioning SEER to those experts or representatives mainly from APEC economies.
4. Publish (consistent with APEC publication policy) and distribute 3 electronic copies of the outcome of workshop to workshop participants and others APEC Economies member.
5. Provide an electronic copy of the above publications and the outcome of the development of SEER program to the APEC Secretariat for dissemination via the APEC Website.

Workshop on Reducing Barriers to Trade through Development of a Common Protocol for Measuring The Seasonal Energy Efficiency (SEER) of Air Conditioners

Venue: Howard Plaza Hotel Taipei, Chinese Taipei,
Date: 5-6 October 2009
Proceedings of Workshop on APEC SEER Website:
http://www.egeec.apec.org/
Photos of Workshop on APEC SEER : 【press here】

APEC SEER Calculation Program

Part of the web page where to download the outcome of the project



Thank you !!