



**Energy
Sustainability
Unit**

EAEF Project 64 Technical Updates

3rd Progress Meeting on EAEF Project 64 & 68

**24 March 2006
Kuala Lumpur Malaysia**

LI Shuo

Energy Sustainability Unit
Department of Building
School of Design and Environment
National University of Singapore

Outline

- Project Progress
- Technical Updates
- Next Phase Working Plan



Energy
Sustainability
Unit

3rd Progress Meeting on EAEF Project 64 & 68
24 March 2006
Kuala Lumpur, Malaysia



This project has been supported by ASEAN Centre for Energy through the EC-ASEAN Energy Facility

Project Progress



Energy
Sustainability
Unit

- Task 1. Investigation to identify and develop a suitable base model for energy performance of commercial buildings

Sub-Task	Leader	Completion Level
Project Inception Meeting	ESU	Completed
Review energy simulation methods commonly used in the region	IEN	Completed
Field data collection	ESU	On going (PTM)
Workshop among members	ESU	Completed
Verify performance of simulation methods using actual measured data	PTM	?
Development of a base model for building energy simulation	ESU	On going (Waiting for data)
Group meeting and study tour to key centre in Europe	INIVE	Completed
Develop measurement and verification protocol	ESU	Completed
Preparation of report	ESU	On going

3rd Progress Meeting on EAEF Project 64 & 68
24 March 2006
Kuala Lumpur, Malaysia

Project Progress



Energy
Sustainability
Unit

- Task 2. Develop energy services project documentation

Sub-Task	Leader	Completion Level
Review existing standard forms of contract	ESU	Completed
Develop standard forms of contract for energy retrofit projects	ESU	On going (DLS)
Development of Tender Document and Specification	ESU	On going (DLS)
Document project procurement procedures and evaluation	ESU	On going (DLS)
Seminar workshop to disseminate findings and seek feedback from industry	ESU	One seminar had been launched

3rd Progress Meeting on EAEF Project 64 & 68
24 March 2006
Kuala Lumpur, Malaysia

Project Progress



Energy
Sustainability
Unit

- Task 3. Review local financing practices and options and develop document templates for project financing and the computation of returns and benefits

Sub-Task	Leader	Completion Level
Review European and ASEAN experiences in performance contracting	PTM	?
Investigate local and regional financing options for energy performance contracting	ESU	On going
Prepare documentary requirements of each financing option	ESU	On going

3rd Progress Meeting on EAEF Project 64 & 68
24 March 2006
Kuala Lumpur, Malaysia



Technical Updates



Energy
Sustainability
Unit

- **Baseline Model**

- The adopted method

- Regression (Single & Multiple linear regression)
 - Artificial intelligent (Neural Network, Support Vector Machine)
 - Computer Simulation (EnergyPlus, DOE2, Visual DOE)

- New method

- Regression --- Cooling Degree Hours
- $$CDH = \sum (T_o - \text{set point})^+$$
- $E = A + \beta CDH$

A – Non climatic part

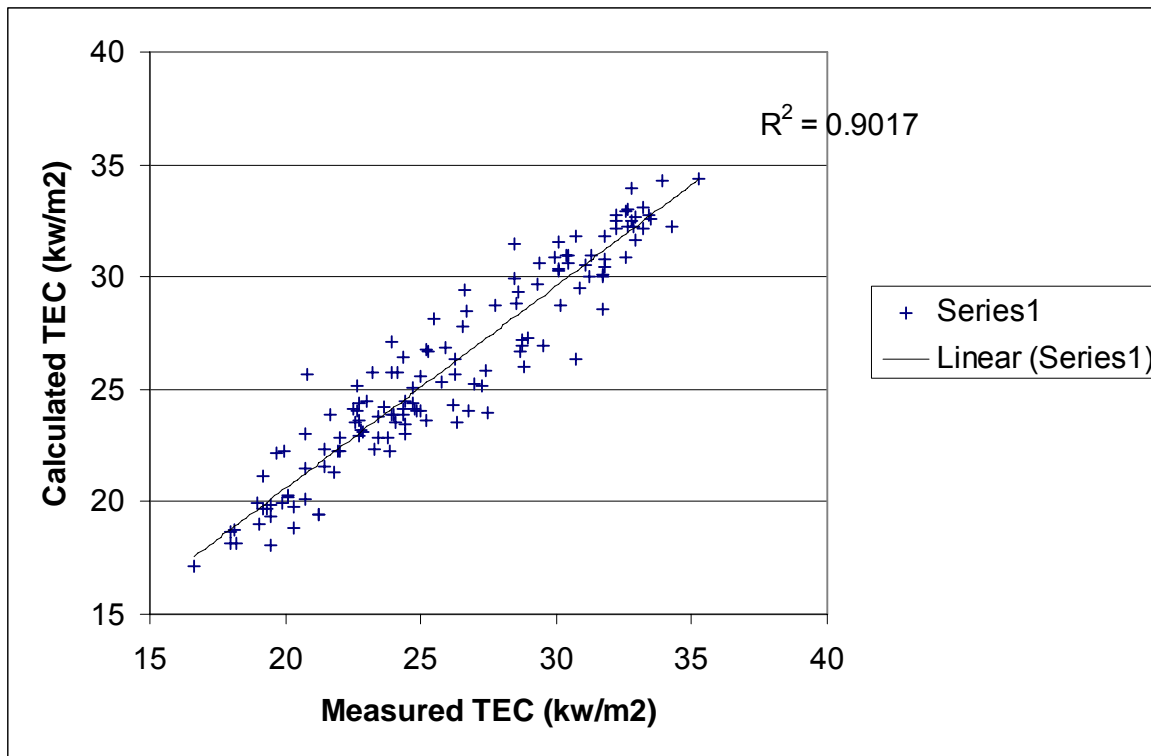
βCDH – Climatic part

3rd Progress Meeting on EAEF Project 64 & 68
24 March 2006
Kuala Lumpur, Malaysia



Baseline --- Cooling Degree Hours Method

- Cal $E = A + \bar{\beta}CDH$



Baseline --- Cooling Degree Hours Method



Energy
Sustainability
Unit

- The system energy audit data is needed to verify this method
- Malaysia side has any system audit data?

3rd Progress Meeting on EAEF Project 64 & 68
24 March 2006
Kuala Lumpur, Malaysia



Technical Updates



Energy
Sustainability
Unit

- Singapore Performance Measurement & Verification Guideline (version 1)
 - Based on IPMVP
 - Assist to built M&V plan in tropic context
 - Chapter 1 - Introduction
 - Chapter 2 – M&V Concept and Methodology
 - Chapter 3 – M&V Option
 - Chapter 4 – Baseline Model Development

3rd Progress Meeting on EAEF Project 64 & 68
24 March 2006
Kuala Lumpur, Malaysia



Technical Updates



Energy
Sustainability
Unit

- Energy Performance Services and Contract
- Dr. Mervi from VTT worked with ESU from Oct 2005.
- Generate a report on the review of the ASEAN and European EPC concepts, best practices of energy procurement models, and some case studies.

3rd Progress Meeting on EAEF Project 64 & 68
24 March 2006
Kuala Lumpur, Malaysia



This project has been supported by ASEAN Centre for Energy through the EC-ASEAN Energy Facility

Technical Updates

- To built a platform for the building owner, ESCOs and financier on energy performance contracting, knowing the current situation of ASEAN countries is necessary.



Energy
Sustainability
Unit

3rd Progress Meeting on EAEF Project 64 & 68
24 March 2006
Kuala Lumpur, Malaysia



Technical Updates



Energy
Sustainability
Unit

Singapore:

- More and more building owners and developers are interest in EPC
- Barrier: Lack of awareness, financial, institutional and legal framework
- Efforts:
 - Energy Efficiency Improvement Assistance scheme (EASe)
Targeted at the manufacturing sector
EASe subsidises owners and operator of these facilities up to 50% or \$200,000 of their cost of engaging specialist ESCOs.
 - Accreditation Scheme of ESCOs
Aim: to enhance the professionalism and quality of services offered by ESCOs and confidence in the energy services sector
 - Innovation Pilot Energy Saving Project for Public Sector Facilities
Targets public sector through energy saving performance contracts for public sector buildings and facilities

3rd Progress Meeting on EAEF Project 64 & 68
24 March 2006
Kuala Lumpur, Malaysia



Technical Updates



Energy
Sustainability
Unit

Malaysia:

- Barrier:
 - Various subsidies make the energy price distorted and the energy price will not reflect the energy cost. Such an environment will not be conducive for the development of the ESCO industry as a market driven activity.
 - Lack of awareness, financial, institutional and legal framework
- Efforts:
 - MIEEIP Project
Aim: remove barriers to industrial energy efficiency and reduce the energy, energy intensities and green house gas emissions.

3rd Progress Meeting on EAEF Project 64 & 68
24 March 2006
Kuala Lumpur, Malaysia



Technical Updates



Energy
Sustainability
Unit

- ESCOs and building owners interview in on going
 - Singapore
 - Malaysia

3rd Progress Meeting on EAEF Project 64 & 68
24 March 2006
Kuala Lumpur, Malaysia



This project has been supported by ASEAN Centre for Energy through the EC-ASEAN Energy Facility

Next Phase Working Plan



Energy
Sustainability
Unit

- Malaysia building baseline model
 - Data collection and Baseline methods
- Computer simulation
 - Malaysia building computer simulation
- Malaysia and Singapore local ESCOs and building owner interview
 - Experience on EPC
 - Contract and Finance Package
 - M&V Guideline
 - Risk assessment and allocation
- Standard Energy Performance Contract
- Finance package

3rd Progress Meeting on EAEF Project 64 & 68
24 March 2006
Kuala Lumpur, Malaysia





Energy
Sustainability
Unit

Thank you!

This document has been produced with the financial assistance of the European Union. The contents of this document are the sole responsibility of Energy Sustainability Unit & Centre for Total Building Performance, National University of Singapore and can under no circumstances be regarded as reflecting the position of the European Union.

3rd Progress Meeting on EAEF Project 64 & 68
24 March 2006
Kuala Lumpur, Malaysia

This project has been supported by ASEAN Centre for Energy through the EC-ASEAN Energy Facility

