HVAC Energy Efficiency – Challenges & Opportunities

How to Approach to realizing the potential

10 & 11 November 2009, 9am – 5pm
Holiday Inn Park View Singapore

Today, the industry sector accounts for more than half of total national energy consumption. If we make our industries more energy efficient, we can greatly enhance Singapore's energy security and make our economy more resilient to fluctuations in energy supply. Energy efficiency will also improve the cost competitiveness of our industries, especially that of energy-intensive industries such as our refinery, petrochemical, electronics and pharmaceutical industries.

Air-conditioning accounts for approximately 30% of the electricity consumption for Singapore. For the pharmaceutical and semiconductor industry, HVAC systems generally accounts for 20 – 40 % of overall plant's energy consumption.

This program is specially designed for the purpose of providing hands on tools and strategies for mangers in charge of enhancing their company's energy efficiency.

Objectives

At the end of this workshop, participants should be able to:

Understand the design philosophy of ultra-efficient HVAC system using the Equal Marginal Performance Principle[i]

- Optimize energy for both water and air side performance rooms
- Analyze and measure the system efficiency of HVAC systems to an accuracy of ± 5%
- Identify improvement opportunities for their HVAC systems through the break-out and consultation sessions with the trainers

Methodology

- Lectures
- Break-Out
- Consultation Sessions
- Analysis of case studies
- Site visit to Galen[ii] to reinforce concepts

Targeted Audience

- Design and Installation of HVAC for the Pharmaceutical
- Electronics
- Energy Services Consultants
- Engineers
- Facility and Energy Managers
- Laboratory
- Maintenance
- Operation
- Semiconductor Sector

Programme Outline

Day One

- Improving energy efficiency of chiller plants through utilization of variable speed and optimization of entire systems
    - Design and operation of ultra-efficient HVAC system systems using Equal Marginal Performance Principle
- HVAC Design Considerations for hot and humid climate
- Good and Bad practices in the design and operation of HVAC systems
- Case-studies presentation
- Break-out sessions + Consultation with trainers

Day Two

- Demand side (air-side systems) for clean-rooms
- Configuring, implementing, operating, and continuously commissioning chilled water plant with relational[1], demand-based control
    - Optimizing all-variable speed systems with demand-based control
    - Instrumentation requirements for accurate measurement of chiller performance
- Case study on the efficient chiller system at Galen
- Incentive schemes to improve energy efficiency of HVAC systems for industry
- Site Visit to Galen

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[1] The Equal Marginal Performance Principle (or EMPP) replaces conventional temperature and pressure control loops controls with a simpler, direct power based control enabled by networked digital controls which results in simpler and easier to maintain mechanical configurations and more stable operation than conventional setpoint-feedback controls employed. The Equal Marginal Performance Principle generally directs designs toward systems with equally sized chillers, towers, pumps, and away from extras such as balancing valves and dampers or circuit setter devices.

[2] The 6-storey Galen building has recently completed the replacement of existing air-cooled chillers with water cooled chillers, and energy management systems have been installed to control and configure energy consumption to ensure optimal usage. The current system efficiency of the Galen chiller plants is 0.58 kW/RT.

[3] Combining variable speed and digital network technologies provide energy efficiency enhancing opportunities with what are called “relational control” techniques. Relational control employs the network capacity of modern DDC systems to operate each HVAC component in accordance with system requirements and in an optimal relationship to the current operation of all other system components. Relational control techniques offer dramatic improvements in energy efficiency, stability and system performance. This new family of control strategies represents a significant change from the stand alone nature of PID control that is still widely employed today. There are currently two primary categories of relational control as applied to HVAC systems. Demand based control, which is derived from the Equal Marginal Performance Principle, is employed to optimize the operation of systems that are composed of multiple power consuming components such as central systems. Intelligent iterative control is employed to improve the efficiency and performance of systems that distribute a resource such as heating, cooling or airflow to multiple zones.

About the Trainer

Mr Thomas Hartman is Principal and the founder of The Hartman Company, a technology development and applications firm that works with designers, manufacturers and end users to apply emerging ultra-efficient HVAC technologies. Among the most notable of Mr. Hartman's developments have been the "Equal Marginal Performance Principle" and relational control concepts. These provide new approaches to integrating variable speed and other new HVAC technologies with network controls for simpler, lower cost and better performing building comfort systems. Tom Hartman holds a number of patents for advanced technologies and works world wide with manufacturing and engineering partners to develop sound, cost effective products and designs that utilize these technologies for a wide variety of applications. In addition to the development of the Equal Marginal Performance Principle and relational control, Hartman has developed and works to apply a number of other indoor comfort enhancing technologies. Tom currently serves as an editorial advisor to Heating, Piping and Air Conditioning Magazine and the on-line publication, automatedbuildings.com. Tom is also a member of ASHRAE SSPC 55 and lectures and writes about comfort and energy issues for major symposiums and periodicals all over the world.

Mr Lee Eng Lock has been conducting energy audits, retrofits, and designing and building extremely energy efficient buildings and mechanical systems. He is also the pioneer in very accurate long term measurement and monitoring for mechanical plants. In 1985, he was involved in the HVAC system for AT&T Consumer Products Pte Ltd in Kampong Ubi which achieved what is believed to be the world record for combined air and water side performance, at better than 0.70 kW/ton. Visiting scientists from the Lawrence Berkeley National Laboratory were extremely impressed with the very precise monitoring and trending at one-minute intervals for all parameters, using software written in Singapore, with Laboratory grade instrumentation, and hand calibration of sensors using internationally recognized fundamental standards for thermometry. In the late 1990s, he was the only overseas engineer invited to sit on the International Performance Measurement and Verification Protocol technical committee of the US Department of Energy. His particular specialty is in high performance clean rooms and semiconductor wafer fabs, doing design build projects in Asia and USA, and energy audits and design charrettes for major semicon manufacturers such as STMicro worldwide, Texas Instruments USA, Sony Semiconductor in Kokubu, Japan, the Hsinchu Science Park wafer fabs for the Ministry of Energy in Taiwan, and recently the Chiang Kai Shek Airport in Taipei. In 1994, he was awarded the Association of Energy Engineers USA Energy Project of the year for the Western Digital factory in Kuala Lumpur, benchmarked as the most efficient of any disk drive factory in the world, including all services such as vacuum, compressed air, class 10 clean rooms, process cooling, and chiller plant.

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Early Bird (Registration with payment made on/before 29 Oct 09)	**Normal Fee** (Closing date: 03 Nov 09)	**No. of Delegates**	**Fees Payable**
$260	$400		
	Total		

Participant's Details

1. Name(*Dr/Mr/Mrs/Ms):_____Designation:_____

   HP No: _____ Email:_____PEB □

2. Name(*Dr/Mr/Mrs/Ms):_____Designation:_____

   HP No: _____ Email:_____PEB □

3. Name(*Dr/Mr/Mrs/Ms):_____Designation:_____

   HP No: _____ Email:_____PEB □

Organization's Details

Company Name:
_____

Company Address:
_____

Contact Person's Name: (*Dr/Mr/Mrs/Ms)_____

Tel:_____Fax:_____

Email:_____

Administrative Information

Registration and Payment

Please complete the enclosed registration form and forward it together with your cheque atleast 7 days before the commencement of the programme to:

Sustainable Energy Association of Singapore (SEAS)
2 Bukit Merah Central, #18-02, Spring Building Singapore
Singapore 159835

Crossed cheque should be made payable to "**Sustainable Energy Association of Singapore**"
Applications will close on 3 November 2009.

Cancellation

SEAS reserves the right to change programme venue, cancel or reschedule the programme if necessary or warranted by circumstances beyond our control.

There will be no refund of fees for withdrawal. However if the registration participant is unable to attend, a representative may be allowed to attend at no extra cost. Please inform us of the changes by fax or via email 3 days before the commencement of the programme.

Confirmation of Registration

Confirmation of registration will be given 5 working days before the commencement date via email. Registration is confirmed only upon receipt of payment.

If you do not hear from us, please contact Ms Joann Ng at 63388578 or email us at training@seas.org.sg . You may fax your registration form to 62764257.