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Optimise
Optimal Systems Engineering Sdn Bhd
ENGINEERING SUSTAINABILITY

12 CDP
Hours Approved by Energy Commission

3 DAYS WORKSHOP

MAXIMISE PROCESS THERMAL ENERGY EFFICIENCY & COST SAVINGS VIA

INDUSTRIAL THERMAL ENERGY AUDIT (ITEA)

16 - 18 December 2024
(Monday - Wednesday)

Registration Deadline: 12 December 2024

Featuring Software:
Pinch Analysis

MALAYSIA MyHIJAU

MyHS00015/22-E002

OPTIMAL HEAT

HRD CORP CLAIMABLE

WORKSHOP OVERVIEW

Up to 50% of industrial thermal energy input are finally lost as waste heat in exhaust gases, cooling water, heated surfaces and in products/byproducts (US-DoE). Thermal energy efficiency improvement typically offers among the biggest scope for energy cost saving in industry. By benchmarking process and equipment performances, identifying inefficiencies and implementing targeted measures involving optimization of operating parameters and equipment upgrades, significant cost savings and emission reduction can be achieved. Regular monitoring and maintenance of optimal operations ensure sustained energy cost savings, GHG emission reduction and compliance with regulations.

WORKSHOP OBJECTIVE

This course aims to equip participants with practical concepts, principles, tools and systematic techniques to conduct energy audit, benchmark and analyse the thermal energy efficiency of industrial processes and utility systems, and effectively apply the tools and techniques for thermal energy cost saving measures.

WORKSHOP LEARNING OUTCOMES

At the end of the workshop participants are expected to be able to

- Holistically perform energy audit involving process as well as the utility areas.
- Conduct process/equipment energy accounting using energy balances & Sankey diagram.
- Apply systematic procedure for macro and technical-level energy audit and analysis.
- Utilise Pinch Analysis benchmarking tool to establish energy recovery targets for process and utilities and to assess potential to maximise energy savings.
- Gain awareness on Pinch Analysis Optimal-Heat software for maximising heat recovery.
- Identify, analyse and evaluate energy savings measures covering thermal utility system such as boiler and steam system, combined heat and power (cogeneration); and processes and such as reactor, ovens, dryers, separator and heat exchangers.

WHO SHOULD ATTEND?

Utility/Facility Managers and Engineers, Energy Auditors, Energy Managers, Lecturers and Researchers.

COURSE SCHEDULE

DAY 1		
08:00am – 08:45am	Registration & Breakfast	
08:45am – 09:00am	Overview of Workshop	Prof Ir Ts Dr Zainuddin Abd Manan
09:00am – 10:15am	Industrial Energy Audit – The Big Picture	Prof Ir Ts Dr Zainuddin Abd Manan
10:15am – 10:30am	Break	
10:30am – 11:15am	Essentials of Steam Properties for Utility and Process Analysis	Prof Ir Ts Dr Zainuddin Abd Manan
11:15am – 12:00pm	Process and Equipment Energy Accounting – Part 1 with Working Session	Prof Ir Ts Dr Zainuddin Abd Manan
12:00pm – 13:00pm	Process and Equipment Energy Accounting – Part 2 with Working Session	Prof Ir Ts Dr Zainuddin Abd Manan
13:00pm – 14:00pm	Lunch Break	
14:00pm – 15:30pm	Energy Audit – Overall Approach and 10 Key Steps	Prof Ir Ts Dr Zainuddin Abd Manan
15:30pm – 15:45pm	Break	
15:45pm – 17:00pm	Maximising Thermal Energy Efficiency Using Pinch Analysis: • Essential Pinch Analysis Working Concepts & Principles • Accounting Heat Sources & Demands, Heat Pinch and Heat Recovery Systems	Prof Ir Ts Dr Zainuddin Abd Manan

COURSE SCHEDULE

DAY 2		
8:30am – 9:00am	Registration and Breakfast	
9:00am – 10:30am	Pinch Analysis Energy Benchmarking and Targeting (Part 1) • Setting the Benchmark Minimum Energy Targets (MET) • Working Session (Pinch MET-Benchmarking)	Prof Ir Ts Dr Sharifah Rafidah Wan Alwi
10:30am – 10.45am	Break	
10.45am – 11.15am	Pinch Analysis Energy Benchmarking and Targeting (Part 2) • Working Session (Pinch MET-Benchmarking)	Prof Ir Ts Dr Sharifah Rafidah Wan Alwi
11:15am – 13:00pm	Heat Recovery Systems – Analysis, Design and Retrofit (Part 1) • Heat Recovery Network (HEN) Representation and Design on Grid Diagram • Working Session HEN Design • Use of Pinch Analysis Software: Optimal-Heat	Prof Ir Ts Dr Sharifah Rafidah Wan Alwi
1:00pm – 2:00pm	Lunch Break	
2:00pm – 4:00pm	Heat Recovery Systems – Analysis, Design and Retrofit (Part 2) • Grassroot vs Retrofit Heat Integration • MET-Driven Process Retrofit with Industrial Case Study (ICS)	Prof Ir Ts Dr Sharifah Rafidah Wan Alwi
4:00pm – 4.15pm	Break	
4:15pm – 5:00pm	Heat Recovery Systems – Analysis, Design and Retrofit (Part 3) • Heat Recovery Network Retrofit on ICS	Prof Ir Ts Dr Sharifah Rafidah Wan Alwi

COURSE SCHEDULE

DAY 3		
08:30am – 09:00am	Breakfast	
09:00am – 10:00am	Fuel and Combustion	Assoc Prof Ir Dr Lim Jeng Shiun
10:00am – 10:45am	Boiler Efficiency	Assoc Prof Ir Dr Lim Jeng Shiun
10:45am – 11:00am	Break	
11:00am – 12:15pm	Thermal Utility Analysis & Improvements – Steam generation	Assoc Prof Ir Dr Lim Jeng Shiun
12:15pm – 1:00pm	Thermal Utility Analysis & Improvements – Utility Distribution: Steam and Thermal Oil System	Assoc Prof Ir Dr Lim Jeng Shiun
1:00pm – 2:00pm	Break	
2:00pm – 3:15pm	Thermal Utility Analysis & Improvements – Steam distribution and condensate recovery	Assoc Prof Ir Dr Lim Jeng Shiun
3:15pm – 3:30pm	Break	
3:30pm – 5:00pm	Combined Heat and Power Systems (Cogeneration)	Assoc Prof Ir Dr Lim Jeng Shiun
5:00pm – 5:15pm	Wrap up and Closing	Assoc Prof Ir Dr Lim Jeng Shiun

TRAINERS' PROFILES

TRAINER 1

PROF IR TS DR ZAINUDDIN ABDUL MANAN

Prof Ir Ts Dr Zainuddin Abdul Manan is a professor of chemical and energy engineering, the founding director of UTM Process Systems Engineering Centre (PROSPECT), founding Dean of UTM Faculty of Chemical and Energy Engineering, the former UTM Vice President (Academic and International) and the CEO and founder of the UTM spin-off, OPTIMISE.

He began his career as an engineer in Petronas and Hume Industries and has been an academic leader, researcher, consultant and professional coach for 30 years. He completed over 100 R&D & consultancy projects for local/multinational organisations, has numerous patents and over 500 published refereed journals and books on energy and resource conservation.

Zain is a Fellow IChemE, Fellow Academy of Sciences Malaysia, a professional and chartered engineer, a professional technologist, a certified energy manager, a Registered Electrical Energy Manager (REEM) and a certified coach for ASEAN energy managers. He has trained professionals from over 700 organisations and delivered over 400 invited talks in professional courses, conferences and seminars worldwide.

He is the National Project Director for the Building Energy Benchmarking Project and chairs the Energy Efficiency and Conservation Act (EECA) Thermal Energy drafting committee under the Malaysian Ministry of Energy Transition and Water Transformation (PETRA). He founded the UTM Sustainable Energy Management initiative that led UTM to be the first 3-Star AEMAS-Certified organisation in ASEAN, to win the ASEAN Energy Awards and to be ranked 1st globally by the Times Higher Education on SDG7 – Affordable and Clean Energy.

PROF IR TS DR SHARIFAH RAFIDAH WAN ALWI

Prof Ir Ts Dr Sharifah Rafidah Wan Alwi, PEng, MIEM, CEng, MIChemE, is a Professor in the Faculty of Chemical and Energy Engineering, Universiti Teknologi Malaysia. She previously helmed as the Director of Process Systems Engineering Centre for ten years (2011 to 2021). She is an expert resource minimisation consultant for multiple industries and is among the leading researchers in resource integration technique development. Prof Sharifah is also the co-founder and Director of Optimal Systems Engineering Sdn Bhd, a UTM Spin-off company.

She has been extensively involved in 80 research projects, 17 industrial based projects for various companies and government agencies and has trained engineers from more than 300 companies in the field of sustainable engineering design and management. Together with her team, they have developed 7 resource minimisation software. Sharifah has won various international and national awards such as Green Talents 2009 (Germany), IChemE Highly Commended Sir Frederick Warner Prize 2011 (UK), ASEAN Young Scientist and Technologist Award 2014, National Young Scientist Award 2015, ASEAN-US Science Prize for Women 2016 in Energy Sustainability, Malaysia Research Star Award 2016, 2018, 2019, Top Research Scientists Malaysia 2018 and Sarawak State - International Women Award 2021. She was listed as ‘Asian Scientist 100’ in 2017 and ‘Asia’s Rising Scientists’ in 2020, and ‘8 Women Scientists from Asia You Should Know’ in 2021 by AsianScientist.com.

Sharifah is also the Associate Editor for Journal of Cleaner Production and UTM Sustainable Energy Management System advisor. She has also served as the Chair for the Science Leadership Working Group under Young Scientist Network, Academy of Sciences Malaysia (YSN-ASM) and Chair for Malaysia IChemE Young Engineer Group (YEG). Sharifah is also a professional engineer, a professional technologist, a UK/EU chartered engineer, a certified energy manager, a registered electrical energy manager and a certified trainer for ASEAN energy managers.

TRAINERS' PROFILES

TRAINER 3

ASSOCIATE PROF IR DR LIM JENG SHIUN

Assoc Prof Ir Dr Lim Jeng Shiun is currently the research follow of Process Systems Engineering Centre (PROSPECT), Univesiti Teknologi Malaysia. His core expertise is in the innovative development and application of process systems engineering techniques for resource conservation, energy and carbon planning. Stanford University recognised him as one of the World's Top 2% Scientists.

Dr Lim has published more than 136 indexed articles to date. His Scopus h-index is currently 32 with 4247 citations. He is appointed as the International Editorial Board Member of JCLEPRO (IF: 11.072). He is also appointed as the guest editor for Special Issue of JCLEPRO and Chemical Engineering Transactions (Scopus indexed), besides serving as the technical secretariat for international conferences.

Dr Lim is a certified country expert of "Steam System Optimisation" and "Thermal Energy Efficiency and Solar Thermal Energy Integration" under UNIDO. He is also a professional Chartered Engineer, Certified Energy Manager (AEMAS), Certified Energy Auditor (MAESCO) and a Registered Electrical Energy Manager certified by Energy Commissions of Malaysia. As an engineer in practice, he has applied the output of his research work in consultancy projects for the industrial community. He has been extensively involved in 35 research and industrial-based projects (RM 5,321,080) for various companies and government agencies.

The key clients include local industries and multinational companies such as SHELL, ANSELL, FABER MEDISERVE, OLEON, KELOGG, Mölnlycke in Malaysia and PERTAMINA in Indonesia. He has assisted those companies in identifying the GHG reduction potential and energy-saving opportunities worth millions of dollars through process integration and process systems engineering approach.

OPTIMISE Energy Audit, GHG Accounting and EnMS Track Records

- Led UTM to be globally ranked 1st on SDG 7 - Affordable and Clean Energy
- Co-developer of ASEAN EMGS Energy Management System Standards with MGTC.
- Led UTM to win the ASEAN Energy Award and EMGS 3 Star EMGS Gold Standard.
- Involved in certification of energy managers and energy end users for 15 years.
- Developer of award-winning energy audit and energy monitoring software.
- Led UTM to achieve over RM 30 million energy savings between 2011-2023.
- Instructors with over 20 years experience conducting energy audit and optimization projects and professional training for over 500 national/multinational companies.
- Certified trainer, auditors & centre for training and certification of energy managers.

Selected References

- Shell, Middle Distillate Synthesis
- BP – Amoco
- MLNG
- Felda Proctor and Gamble
- MIMOS Semiconductor
- Riau Pulp and Paper Mill
- Qatar LNG
- Pertamina Engineering Group
- PT Titan Petrokimia Interindo
- Pan Century, IOI Oleochemicals
- BASF – Petronas
- MTBE (Petronas)
- Huntsman Tioxide
- Malaysia Newsprint Industries
- Malaysia Palm Oil Board
- Malaysia Energy Commission
- Technip (M) Sdn Bhd
- PT Chandra Asri
- Petronas Penapisan (M) Sdn Bhd
- Petronas Gas Sdn Bhd
- Kaneka Malaysia
- UKM, UPM, USM, UM, MICET

20+

Years Experience in Energy Audit and Optimisation

#1

Global Rank in Research 'Heat Exchanger. Retrofitting and Design' Elsevier Scival Spotlight 2014

400+

National & Multinational Companies Benefitted from our Energy Training Workshops

WHAT OUR TRAINEES Said

★★★★★

The ITEA Training was very useful for companies aiming to enhance energy efficiency of plant operations. From theory to in-depth methodology, participants learnt many new methods from OPTIMISE experienced professors and educators. I recommend those who are going for sustainability to join this training. Well done OPTIMISE!

AZREE HAZWAN
PROJECT MANAGER
BECIS MALAYSIA
Industrial Thermal Energy Audit (ITEA) participants

★★★★★

I enjoyed the training so much as it allowed me to refresh my engineering calculations and link them with my industrial experience. Even though I have 15 years industrial experience in oil and gas, I learnt so much during this training.

IZZA MAHMOD
IMPROVEMENT EXECUTIVE
PETRONAS CHEMICAL ETHYLENE SDN.BHD
Industrial Thermal Energy Audit (ITEA) participants

★★★★★

The course provides good guidance on conducting thermal energy audit which is very different (maybe more rigorous) than the electrical energy audit that I'm familiar with and have participated in. It's a good refresher course from what I've learnt during my undergrad years, and even more relatable since I got to apply it to an actual scale that matches my current responsibility. The step-wise details on the audit approach is also very helpful for me to get started.

NASSYA BINTI MOHD SAID
EXPERIENCED RESEARCHER
SIRIM MALAYSIA
Industrial Thermal Energy Audit (ITEA) participants