

16 CDP Hours

Mandatory REM Type 1

2-Days Workshop on

Financial & Carbon Analysis for Thermal and Electrical Energy Efficiency Projects



Organised By:



MyHS00015/22-E002



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Workshop Overview

Energy efficiency (EE) investments increasingly require strong financial and carbon justification to compete with production upgrades, automation initiatives, and digital transformation projects. However, many EE proposals struggle to secure approval due to limited understanding of financial appraisal techniques, complex electricity and fuel pricing structures, and the absence of robust cash flow modelling.

This practice-intensive, two-day workshop equips participants with the essential skills to evaluate, model, and communicate the financial and carbon viability of electrical and thermal EE projects. Using real industrial data and guided Excel-based exercises, participants will learn how to quantify energy and cost savings, develop cash flow models, incorporate carbon valuation, and apply professional financial indicators including:

- Simple Payback Period (SPP)
- Return on Investment (ROI)
- Net Present Value (NPV)
- Internal Rate of Return (IRR)
- Benefit-Cost Ratio (BCR)
- Savings-to-Investment Ratio (SIR)
- Life Cycle Costing (LCC)

The workshop covers both electrical (motors, variable speed drives, heating, ventilation and air-conditioning systems, lighting) and thermal (boilers, steam systems, heat recovery, insulation) energy systems. Participants will also learn modern decision tools such as internal carbon pricing (ICP), carbon-adjusted Net Present Value, and the use of Marginal Abatement Cost Curves (MACC) to prioritise carbon mitigation strategies.

Through demonstrations, worked examples, and group-based exercises, participants will build strong practical competence in financial modelling and project justification.



Workshop Outcomes

By the end of the workshop, participants will be able to:

1. Interpret Energy Tariffs & Fuel Pricing

Understand electricity tariff structures (Time-of-Use, Maximum Demand, Automatic Fuel adjustment (AFA)) and thermal fuel pricing (natural gas, diesel, LPG) to calculate accurate electrical and thermal cost savings.

2. Quantify Energy, Cost & Carbon Savings

Compute energy savings, monetary savings, and carbon emission reductions for electrical and thermal energy efficiency projects.

3. Build Professional Cash Flow Models

Construct complete cash flow models that include capex, opex, escalation, discounting, carbon valuation, replacement costs, and lifetime performance.

4. Apply Key Financial Evaluation Tools

Calculate and interpret Simple Payback Period, Discounted Payback Period, Return on Investment (ROI), Net Present Value (NPV), Internal Rate of Return (IRR), Benefit-Cost Ratio (BCR), Savings-to-Investment Ratio (SIR), and Life Cycle Costing (LCC).

5. Conduct Sensitivity & Scenario Analysis

Assess the impact of tariff changes, fuel price fluctuations, carbon pricing, and performance uncertainties on project financial viability.

6. Develop Management-Ready Financial Justification

Prepare clear investment proposals, charts, tables, and executive summaries—including Marginal Abatement Cost Curves (MACC)—to communicate financial and carbon benefits effectively to management.



Target Participants

This workshop is ideal for:

- Energy managers, sustainability officers, and facilities engineers
- Energy Service Company (ESCO) practitioners and project developers
- Energy auditors and consultants
- Corporate financial planners evaluating capital expenditure (CAPEX) for EE projects
- Engineers and managers in industrial, commercial, or government institutions
- Academics, researchers, and postgraduate students in engineering, economics, renewable energy, or sustainability
- Anyone who needs to quantify the financial or carbon returns of energy efficiency investments

No prior background in finance is required. Core concepts are introduced gradually with hands-on practice.

Workshop Highlights

A two-day intensive Workshop with:

- Step-by-step guidance on the use of financial tools and modelling concepts
- Multiple worked examples covering electrical and thermal energy systems
- Guided Excel exercises
- Case study analysis
- Scenario-based problem solving
- Instructor-led discussions and feedback

The practice-driven session ensures participants not only understand the financial evaluation methods but also gain the confidence to apply them independently in real-world EE project assessments.



Day 1 – Financial Foundations & Cash Flow Modelling

Time	Module
9.00 - 9.30	Session 1: Introduction
9.30 - 10.45	Session 2: Understanding Energy & Cost Savings
10.45 - 11.00	Tea Break
11.00 - 13.00	Session 3: Utility Tariffs & Fuel Pricing
13.00 - 14.00	Lunch
14.00 - 15.30	Session 4: Cash Flow Modelling
15.30 - 15.45	Tea Break
15.45 - 17.00	Session 5: Financial Performance Indicators (NPV, IRR, Payback, SIR, BCR)

DAY 2 – LCC, Carbon Economics & Decision Tools

Time	Module
9.00 to 10.45	Session 6: Life Cycle Costing (LCC)
10.45 - 11.00	Tea Break
11.00 - 13.00	Session 7: Carbon Abatement Costing & MACC
13.00 - 14.00	Lunch
14.00 - 15.30	Session 8: Investment Decision-Making & Sensitivity Analysis
15.30 - 15.45	Tea Break
15.45 - 17.00	Session 9 & 10: Full Case Study & Wrap Up



Trainer's Profile



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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 with Petronas and Hume Industries, before embarking on a distinguished 30-year journey as an academic leader, researcher, consultant, and professional coach. Over the years, he has led and completed more than 100 research and consultancy projects for both local and multinational organisations. He holds numerous patents and has authored over 500 refereed journal papers and books on energy and resource conservation. He was listed as a Global Top 2% Scientists by Stanford University, and recently as a Global Top 1% Engineering and Technology Scientists by Research.com. He is a co-author of the globally referred Book on Process Integration and Intensification - Saving Energy, Water and Resources.

Prof Zain is a Fellow IChemE, Fellow Academy of Sciences Malaysia, a professional engineer, a chartered engineer, a professional technologist, a certified energy manager, a Registered Energy Manager (REM-Type 1& Type 2), a Registered Energy Auditor (REA) 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 was the National Project Director for the Building Energy Benchmarking Project 2024 that resulted in the Energy Efficiency and Conservation Act (EECA) BEI Labelling Guideline. Prof Zain also chaired the EECA 2024 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 and National Energy Awards, and to be ranked 1st globally by the Times Higher Education on SDG7 - Affordable and Clean Energy.



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PROF IR TS DR SHARIFAH RAFIDAH WAN ALWI

Prof Ir Ts Dr Sharifah Rafidah Wan Alwi, PEng, MIEM, CEng, MChemE, 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). Prof Sharifah is also the co-founder and Director of Optimal Systems Engineering Sdn Bhd, a UTM Spin-off company.

She is an expert resource minimisation consultant for multiple industries and is among the leading researchers in resource integration technique development. 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 a professional engineer, a professional technologist, a UK/EU chartered engineer, a certified energy manager, a Registered Energy Manager (REM-Type 1 & Type 2), a Registered Energy Auditor (REA) and a certified coach for ASEAN energy managers and a certified trainer for ASEAN energy managers.



Trainer's Profile



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ASSOCIATE PROF IR DR LIM JENG SHIUN

Assoc Prof Ir Dr Lim Jeng Shiun is currently the research fellow of Process Systems Engineering Centre (PROSPECT), Universiti 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 Registered Energy Manager (REM-Type 1 & Type 2) and Registered Energy Auditor (REA) certified by Energy Commissions of Malaysia, and a certified trainer for ASEAN energy managers. 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 (RM5,321,080) 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.



One – Stop Energy & ESG Solutions

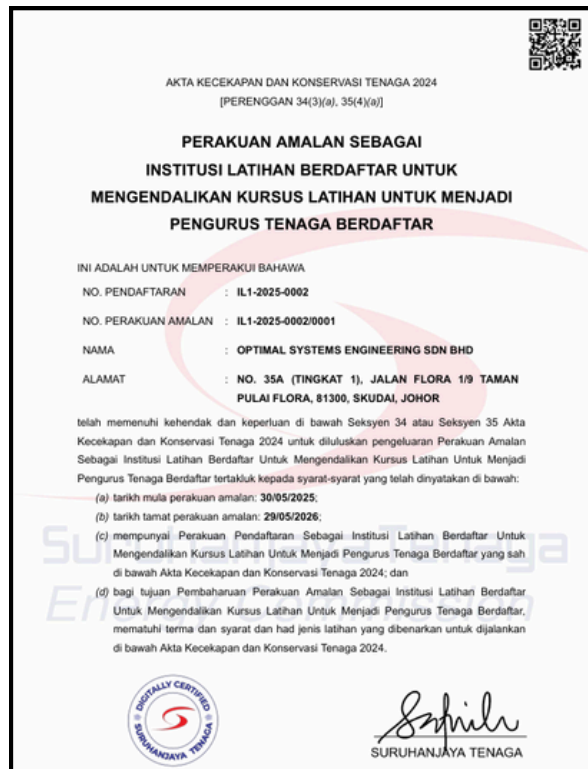
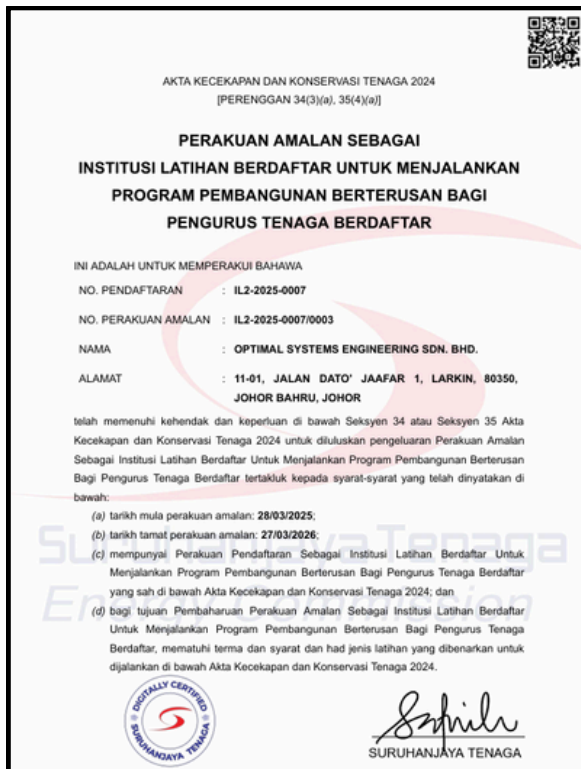
Optimal Systems Engineering Sdn. Bhd.

- R&D-Driven Solutions via UTM Process Systems Engineering Centre
- ST-Approved RTI; REM-2 certified & HRDC accredited trainers
- Policy advisors involved in shaping national energy acts & policy frameworks
- Recognised EnMS Champion driving award-winning energy transformation
- 25+ Years Experience as an ESCO & practicing Registered Energy Auditors (REA)
- Trusted by 700+ Organisations local & multinational, as ESCO & training partner

OFFICIAL RTI – REM under EECA 2024

Registered Training Institution (RTI) for Registered Energy Managers (REM)

- Approved by the Energy Commission
- Authorized to conduct REM Type 1, Type 2 and CDP trainings
- Compliant with the EECA 2024



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.
- Over 20 years experience in energy audit and optimisation consultancy, R&D and professional training for over 500 national/multinational companies.
- Certified trainer, auditors & centre for training & 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
- Ansell Malaysia
- Hershey Malaysia
- 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, UNIKL

25+

Years Experience in
Energy Audit and
Optimisation

#1

Global Rank in R&D on
'Heat Exchanger.
Retrofitting and Design'
Elsevier Scival 2014

700+

National & Multinational
Companies Benefitted
from our Energy Training
Workshops

