TRAINING MODULE
ENERGY MANAGEMENT IN BUILDING

PROGRAM OUTLINE DAY 1

Time	***Topic***	***Duration***
9.00 a.m.	***Introduction & Overview***	***15 mins***
9.15 a.m.	***Section 1: Overview of Energy*** *1.0 Introduction* *2.0 Types of energy* *3.0 Energy source in Malaysia* *4.0 Energy demands in Malaysia* *5.0 The forecasts on energy supply and demand* *6.0 Energy policies in Malaysia* *7.0 Authorities and regulatory structure* *7.1 Electricity sector* *7.2 Petroleum energy sector* *8.0 Energy efficiency potentials for building sector* *8.1 Areas and potentials for energy savings in building sector*	***1 hr***
10.15 a.m.	***Break***	***15 mins***
10.30 a.m.	***Section 2: Introduction to Energy Management System(EnMS)*** *1.0 Introduction to energy management* *2.0 Key definition* *3.0 Energy management implementation process* *4.0 Energy management system (EnMS)* *4.1 Why is EnMS needed?* *4.2 Energy management system component and cycle* *4.3 EnMS key components and key requirements* *4.4 Management commitment* *4.4.1 Authorized representative* *4.5 Energy policy* *4.5.1 Energy manager*	***1 hr 15 mins***
11.45 a.m.	***Implementation of EnMS*** *4.6 Planning* *4.6.1 Data & information gathering* *4.6.2 Review and analyze energy supply and consumption data* *4.6.3 Determine energy performance baseline* *4.6.4 Confirm energy performance indicator* *4.6.5 Establish energy objectives and targets* *4.6.6 Energy management action plan* *4.6.7 Prepare action plan* *4.6.8 Presenting the action plans*	***1 hr 15mins***
1.00 p.m.	*Lunch Break*	***1 hr 30 mins***

2.30 p.m.	***Implementation of EnMS*** *4.7 Implementation & Operation* *4.7.1 Promoting the action plan: Awareness program* *4.7.2 Competencies and training* *4.7.3 Internal and external communication* *4.7.4 Operational controls* *4.7.5 Energy efficient design* *4.7.6 Purchasing*	***1 hr***
3.30 p.m.	***Tea break***	***15 mins***
3.45 p.m.	***Implementation of EnMS*** *4.8 System & performance checking* *4.9 Management Review for improvement* *5.0 Energy management standard* *5.1 Why energy management standard?* *5.2 Energy management & system optimization* *5.3 Introduction ISO 50001 standard* *5.3.1 What is ISO 50001 and why it is important* *5.3.2 Basic approach in ISO 50001 standard* *5.3.3 Key requirement in ISO 50001 standard* *5.4 To certify or not to get certify*	***1 hr 15 mins***
5.00 p.m.	***End of Day 1***	

PROGRAM OUTLINE DAY 2

Time	*Topic*	*Duration*
9.00 a.m.	***Section 3: Introduction to Electricity Supply System*** *1.0 Introduction to electricity supply system.* *2.0 Introduction to energy bills* *2.1 Key definitions* *2.2 Electricity tariff* *2.3 Chilled water tariff and bills* *3.0 How waste increase the "price" of energy*	***1 hr 30 mins***
10.30 a.m.	***Morning Break***	***15 mins***
10.45 a.m.	***Section 4: Energy Conservation Measures*** *1.0 Introduction* *2.0 Identifying process – Energy audit* *3.0 Identifying energy conservation potentials and energy cost savings* *4.0 Common energy conservation measures at building facilities* *4.1 Cooling* *4.2 Fans and Pumps* *4.3 Ventilation* *4.4 Lighting* *4.5 Hot Water* *4.6 Vertical Transportation Systems* *4.7 Electrical Power* *4.8 Building Envelope* *4.9 Environment Control* *4.10 Sensors* *4.11 Building Management System* *5.0 Calculating costs and benefits* *5.1 Making the financial case* *5.2 Other benefits* *6.0 Opportunities for change*	***2 hrs 15 mins***
1.00 p.m.	***Lunch***	***1 hr 30 mins***
2.30 p.m.	***Section 5: Energy Performance Monitoring, Targeting & Reporting*** *1.0 Introduction* *2.0 Success factors* *3.0 Goals of monitoring, targeting & reporting* *3.1 Benefits* *4.0 Monitoring, targeting & reporting technique* *4.1 Key principles* *4.2 The monitoring, targeting and reporting process* *5.0 Measurement and verification* *5.1 Formalized monitoring and targeting for energy retrofits*	***1 hr***

	5.2 Working definition *5.3 M&V protocols* *5.4 Why measure & verify* *5.5 General approach to M&V +the IPMVP* *5.6 M&V options* *5.7 Key steps in selecting M&V options* *5.8 A quantitative basis for M&V* *5.8.1 The performance model* *5.8.2 Baseline definition* *5.8.3 Baseline adjustment*	
3.30 p.m.	***Tea Break***	***15 mins***
3.45 p.m.	***Section 6: Energy Efficient Operation & Maintenance*** *1.0 Introduction* *2.0 O&M component and structure* *3.0 O&M assessment* *3.1 O&M assessment is not an energy audit* *3.2 Who should perform O&M assessments?* *3.3 O&M assessment approach* *3.4 Types of buildings that are suitable for O&M assessments* *3.5 Key elements in the O&M assessment plan* *3.6 What's next?* *4.0 Energy efficient operation and maintenance plan* *4.1 Repair, maintain and operate existing equipment efficiently* *4.2 Operations &maintenance planning application tool* *4.3 Computerized maintenance management system* *4.4 Implement training to improve skills and increase awareness* *5.0 Key steps towards operational efficiency* *6.0 Computerized maintenance management system(CMMS)* *6.1 CMMS benefits* *6.2 Disadvantages of CMMS* *6.3 CMMS needs Assessment* *6.4 CMMS capabilities* *6.5 CMMS selection* *6.6 Lessons learned from implementing a CMMS* *7.0 Computerized energy management system (CEMS)* *8.0 Building centralized information system*	***1 hr 15 mins***
5.00 p.m.	***End of Day 2***	

PROGRAM OUTLINE DAY 3

Time	***Topic***	***Duration***
9.00 a.m.	***Section 7: Benchmarking*** *1.0 Introduction* *1.1 Building category* *1.2 Characteristics of building* *2.0 Benchmarking* *2.1 What is a benchmark?* *2.2 What is energy benchmarking?* *2.3 Why benchmark?* *2.4 Benchmarking for success* *2.5 Developing benchmarking plan* *3.0 Successful benchmarking* *3.1 Key steps and benefits of benchmarking* *3.2 Benchmarking categories* *3.3 Building services benchmarking*	***1 hr 15 mins***
10.15 a.m.	***Break***	***15 mins***
10.45 a.m.	***Chapter 8: Retrofitting Projects towards energy efficient building*** *1.0 Introduction* *2.0 Key definition* *3.0 Energy and non-energy benefits* *4.0 The staged approach to building upgrades* *5.0 Phases in retro-commissioning* *5.1 Phase 1: Planning* *5.1.1 Select a project* *5.1.2 Get support* *5.1.3 Develop projects goal* *5.1.4 Kick-off meeting* *5.2 Phase 2: Assessment* *5.2.1 Review facility documentation and data* *5.2.2 Develop plan & scope of works* *5.2.3 Conduct site assessment* *5.2.4 Prepare initial finding list* *5.2.5 Develop and present an interim report* *5.2.6 Conduct diagnostic monitoring and functional tests* *5.2.7 Confirm and prioritize improvement measures for implementation* *5.2.8 Assessment phase deliverables* *5.3 Phase 3: Implementation* *5.3.1 Implement improvement measures* *5.3.2 Monitoring & verification of results* *5.4 Phase 4: Transition & handling over* *5.4.1 Retest and re-monitor* *5.4.2 Update building documentation*	***1 hr 15 mins***

	5.4.3 Conduct training *5.5 Prepare and submit final report* *6.0 Participants and responsibilities* *6.1 Building owner/ facility representative* *6.2 Building Operator/ O&M personnel* *6.3 Commissioning service provider* *6.4 Contractors and manufacturer representatives* *6.6 Testing specialists*	
1.00 p.m	***Lunch***	***1 hr 30 mins***
2.30 p.m.	***Section 9: Awareness and training programs*** *1.0 Background and introduction* *2.0 Building employee awareness* *2.1 Key steps in developing energy awareness program* *2.2 Possible barriers and how to deal with them* *3.0 Building motivation* *3.1 Good practices for building awareness and motivation* *3.2 How long does it take to complete this step?* *4.0 Training on energy management and energy efficiency* *4.1 Gaps in knowledge and the need for training* *4.2 Training program for employees* *4.3 Types of training and target groups* *4.3.1 Management training for management groups awareness seminar for management team and decision makers* *4.3.2 Technical training for engineers and supervisors* *4.3.3 Training for operational personnel* *4.4 Internal training* *4.5 Key steps of developing and implementing the training program*	***1 hr***
3.30 p.m.	***Break***	***15 mins***
3.45 p.m.	***Section 10: Financing options & business case proposal for conservation measures implementation*** *1.0 Background and introduction* *2.0 Options of funding to implement energy conservation projects* *2.1 Energy Performance Contracting (EPC)* *2.1.1 Benefits of EPC* *2.1.2 Who can use the EPS mechanism?* *2.1.3 EPC implementation models* *2.1.4 Key steps in EPC implementation* *2.1.5 Key success factors in EPC implementation* *2.1.6 EPC project implementation process* *3.0 Business case proposal for energy saving project* *3.1 Background and introduction*	***I hr***

	3.2 How to do it? *3.3 Key considerations and points in preparing the business case proposal* *3.4 Key steps and strategies to prepare business case proposal* *3.5 Preparing the proposal* *3.6 Other tips for writing a business proposal* *3.7 Presenting to the top management*	
4.45 p.m.	***Wrap-up session***	***15 Mins***
5.00 p.m.	***End of Program***	