



PROJECT IMPLEMENTATION PLAN

Ref. No. 19-IN-06-GE-DLN-A-AP02-PP2000019-001

PIP Issue Date	17 May 2020
Project Code	19-IN-06-GE-DLN-A-AP02
Title	General Aspects of Energy Management and Audit
Reference	Project Notification (Revision 1) 19-IN-06-GE-DLN-A Self-learning e-Courses for the Industry and Service Sectors dated 8 January 2019
Timing and Duration	23 December 2020-31 December 2021 (12 months)
Venue	e-Learning
Implementing Organization(s)	APO Secretariat
Number of Participants	Minimum 400 participants
Self-registration	<p>Self-registration opens from 10:00 AM Japan Standard Time on 23 December 2020 on the eAPO web portal: http://eAPO-tokyo.org</p> <p>Note: Participants can register directly from this portal on the APO website. Those who are already registered can access the course by using the assigned username and password. If you have forgotten your username and password, please refer to the help page on the home page of the portal.</p>

1. Objectives

- a. To acquaint participants with the global energy scenario and environmental issues due to rapid industrialization and excessive use of non-renewable fossil fuels;
- b. To familiarize participants with international agreements on climate change, international standards for energy management systems, renewable energy sources, and basic concepts of energy audit; and
- c. To build the capacity of participants to conduct energy audit based on monitoring, targeting, financial management, project management, and material and energy balance.

2. Background

Energy is one of the major inputs for economic activity, especially for developing economies in the Asia-Pacific region. Energy consumption is increasing at a rapid pace, while available resources such as fossil fuels are limited. The reliance on fossil fuels results in releases of carbon dioxide and other harmful pollutants to the atmosphere, contributing to climate change and related adverse effects like acid rain, ozone layer depletion, global warming, loss of biodiversity, etc.

Sustainable development and Green Productivity (GP) practices contribute to energy conservation. In combination with energy management and audit, they can promote the transition from carbon-intensive to environment-friendly, sustainable living patterns.

In global terms, Asian countries consume about two-thirds of total energy and contribute to three-quarters of carbon emissions. Moreover, Asia has lower energy productivity (defined as the ratio of output per unit of energy consumption) and higher carbon intensity at the aggregate level compared with the EU28. Enhancing competitiveness by improving energy productivity and reducing carbon intensity is therefore critical. The adoption of energy-efficient tools and techniques, conducting energy audit, and transitioning to renewable sources will not only lower energy costs and reduce carbon footprints but also help APO member countries to enhance energy security and meet national energy conservation targets.

This self-learning e-course will focus on the role of energy management and audit in sustainable development and reducing CO₂ emissions. It will also build the technical competencies of current as well as aspiring energy managers and/or auditors.

3. Scope and Methodology

Scope

The course will cover the following modules:

Module 1: The Global Energy Scenario

• Introduction • types of energy (commercial and noncommercial, renewable and nonrenewable resources, primary and secondary energy) • primary energy consumption • conventional fuel (coal, oil, gas, hydro-power, bio-energy) and non-conventional fuel (biomass, wind, solar) • energy intensity • energy security, and energy conservation • policy trends and interventions, including renewable purchase obligations (RPOs), renewable energy certificates (RECs), power purchase agreements (PPAs), feed-in tariffs, incentive and support mechanisms, distributed energy, and environment-related measures.

Module 2: Global Environmental Issues

• Climate change • water, soil, and air pollution • global warming, greenhouse gas emissions, and ozone-layer depletion • solid and hazardous waste management • resource depletion, consumption, and waste • freshwater scarcity • biodiversity loss • carbon capture, usage, and storage • carbon pricing • low-carbon energy systems • the circular economy, GP, cleaner production, and resource efficiency • linkages between energy and environmental issues.

Module 3: International Agreements on Climate Change and Policies

• Precautionary principles and polluter-pays principles • sustainable development and multilateral environmental agreements, conventions, protocols, and declarations • global and national climate change policies • intended nationally determined contribution (NDC) targets.

Module 4: Energy Management and Audit

• Definition and scope of energy audit • types of energy audit • energy audit methodology and approaches • understanding energy costs • bench-marking in energy performance • identification of energy conservation (ENCON) opportunities • matching energy use to requirements • maximizing system efficiencies, optimizing input energy requirements, and fuel and energy substitutions • ENCON measure classifications based on techno-economic feasibility • energy audit reporting structure and instruments.

Module 5: Material and Energy (M&E) Balance

- Aims of M&E balance • principles, procedures, and steps involved in preparing process flow diagrams
- facilities as energy systems • energy analysis and Sankey diagrams • case studies.

Module 6: Overview of International Standards for Energy Management Systems (ISO 50001)

- Energy management; introduction to ISO 50001 • PDCA approach to energy management systems (EnMS)
- benefits of EnMS • energy reviews and energy performance indicators • internal energy audits, management review, and improvement measures.

Module 7: Energy Monitoring and Targeting (M&T)

- Introduction to energy M&T • scope of M&T and information sources • elements of M&T • conducting monitoring and verification, information analysis, and establishing energy relationships • CUSUM charts
- setting performance and benchmark targets • energy management information systems • case studies.

Module 8: Financial Management

- Fundamental concepts and definitions • financial decision-making processes • time value of finances, simple and compound interest, cash flow, valuing future cash flows, and perpetuities and annuities • investment appraisal methods, net present value (NPV), simple and discounted payback periods, and internal rates of return (IRR) and profitability indexes • sensitivity and risk analyses • means of financing, energy performance contracting, and energy service companies • case studies.

Module 9: Project Management

- Project definition, scope, and objectives • project development cycle steps • project identification and screening • technical design, financing, and contracting • implementation and performance monitoring • project planning techniques • implementation plans for top management; planning budget, procurement procedures, and construction • measurement and verification guidelines • examples of measurement and verification procedures.

Module 10: New and Renewable Energy Sources

- Classification and examples of conventional/non-conventional and renewable/non-renewable energy sources.

Self-assessment quiz (after every three modules)

Final exam

Methodology

Delivery of course modules pre-recorded by resource persons, quizzes for self-assessment (after every three modules), and a final examination to qualify for the APO e-certificate for eligible participants. The presentations will cover detailed technical knowledge, selected case studies, and best practices.

Six webinars of 60–90 minutes each, held every two months, will be conducted as question-and-answer sessions. During these sessions, the resource persons will interact with participants and offer clarifications to queries. Registered participants will be informed of the dates and times of the webinars later.

4. Qualifications of Candidates/Target Participants

The target groups are environmental/GP/energy management personnel, trainers, and consultants; university students in degree courses related to energy, the environment, climate change, sustainable development, etc.; and senior/mid-level managerial and technical personnel from industry in the environment/energy field.

5. Eligibility for e-Certificate

A minimum score of 70% on the graded exercise is required to qualify for the APO e-certificate.



Dr. AKP Mochtan
Secretary-General