

Module Title:	Sustainable Energy
Language of Instruction:	English
Credits:	10
NFQ Level:	8
Module Delivered In	No Programmes
Teaching & Learning Strategies:	Module will be delivered through lectures, tutorials, and case studies. Students undertake a number of energy based projects including an energy audit of a commercial operation.
Module Aim:	The aim of this module is to exercise judgement in appraisal of projects and operations; with specific emphasis on energy management and conservation
Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Analyse the theory and principles behind the current new energy efficient technologies, and the emerging SMART technologies the the potential opportunities that may develop.
LO2	Evaluate facilities for potential energy savings projects.
LO3	Understand the current and future implications of Emission Trading System, Carbon Trading, Green House Gas (GHG) permits, Integrated Pollution Prevention Control (IPPC) Licensing and legislative requirements on projects and industry.
LO4	Carry out energy audits of industrial & commercial facilities and produce professional reports with recommendations.
LO5	Develop a structured approach to Energy Management: EN 50001(IS 393) S.E.A.I. E MAP process
Pre-requisite learning	
Module Recommendations <i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>	
No recommendations listed	
Incompatible Modules <i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>	
No incompatible modules listed	
Co-requisite Modules	
No Co-requisite modules listed	
Requirements <i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>	
No requirements listed	

Module Content & Assessment

Indicative Content

New Green Energy Technologies

Biomass, production systems, sustainability and energy conversion. Wind Power, evaluation of site-wind energy potential, wind farm planning, and layouts. Selection of turbines, Gate connection and control type. Biofuels Fuel Cell technology. Gasification, and waste to energy hierarchy. Marine Current Turbines (MCT) design and development.

Environmental Impacts and Awareness

Integrated Pollution Prevention Control (IPPC) Licensing GHG, Emission Trading Systems Legislative requirements for NO_x, SO_x, particulate emissions, Paris COP implications. Internalities associated with compliance with emission limit values using 'end-of-pipe Primary and secondary control measures.

Project Evaluation

Micro CHP (combined heat and power) units into commercial applications. Biomass project for a commercial facility ESCO (Energy Service Company) and energy supply contracts. Calculations, Primary Energy Savings (PES), Carbon footprint, CO₂ savings. Energy Map: Sustainable Energy Authority of Ireland (S.E.A.I.) Grant applications and project viability

Industrial Energy Auditing

Electrical load profile analysis and opportunity for cost reduction from tariff structure. Reviewing Max Demand, M.I.C. Motive Power HVAC systems, operation and control Compressed air systems analysis and evaluation Lighting and control systems MMP Maintenance Management Policies

Assessment Breakdown	%
Continuous Assessment	10.00%
Project	20.00%
End of Module Formal Examination	70.00%

Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Examination	Students will be expected to sit a number of individual written assessments throughout the academic year, typically at the conclusion of one or more learning outcomes	1,2,3,5	10.00	n/a

Project

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Project	Students will produce a number of reports/projects throughout the academic year and will produce written reports describing each one. Typical projects are: 1- Micro CHP (Combined Heat and Power) Project 2- Energy Audit Commercial operation: - Report 3- Feasibility study into the development of an on-shore wind farm - Report	1,2,3,4,5	20.00	Sem 1 End

No Practical

End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	A final written examination will assess the extent to which the student has achieved the module learning outcomes	1,2,3,5	70.00	End-of-Semester

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Every Week	3.00
Estimated Learner Hours	Every Week	3.00
Total Hours		6.00

