Environmental Impacts of Energy Systems
Occupational qualification and Learning pathways

Content

1 Introduction

The energy sector is a complex and inter-related network of industries that are directly and indirectly involved in the production and distribution of energy needed to power the economy and facilitate the means of living, production and transportation. It includes companies involved in the exploration and development of crude oil or natural gas reserves, drilling and refining, or integrated power utility companies – like wise renewable energy and coal - with their activities affecting the environment in one way or the other. Performance in the energy sector which is highly depended on skilled and qualified workers, is largely driven by the supply and demand for worldwide energy (Investopedia, 2018).

Skills[1] required to perform jobs competently in this sector are broad range-from basic to quite specific know-how- and require knowledge[2] and training so as to be qualified. The skills which can be gotten either formally by attending a training or educational programme, or informally on the job experience, subsequently requires proof of the competency by way of qualification[3] so as to be placed at the right position in the industry.

Educational programmes and trainings for the energy sector usually focus often on providing knowledge on how to harness the available energy resources and use them efficiently. They seldom bring to light the effect of these processes and systems to the environment. As such the qualified persons with a career in the energy sector are usually not knowledgeable with these effects nor skilled to deal with environmental issues, protection, mitigation or even adaptation to these changes.

Vocation training is one of the numerous access points to additional qualification for persons in the energy sector. There is a dire need for training programmes design to cater for impacts of energy supply systems to the environment and especially designed for those working or trained to work in this sector. The energy sector requires skills and competences at different levels, so should there be a level specification of these environmental impact trainings and the qualification persons are to obtain from the vocational training centres. It is therefore imperative to design a scheme for the description of vocational qualification for Vocational Education and Training (VET) professionals in the energy sector with regards to environmental impacts.

[1] 'Skills' is the ability to apply knowledge and use know-how to complete tasks and solve problems and are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments (The council of the european union, 2017).

[2] 'Knowledge' means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study and is described as theoretical and/or factual (The council of the european union, 2017).

[3] Qualification is achieved by an individual only after s/he has successfully gone through an assessment testing s/he's knowledge, skills and competences. 'Qualification' means a formal outcome of an assessment and validation process which is obtained when a competent authority determines that an individual has achieved learning outcomes to given standards (The council of the european union, 2017).

2 VET professionals in the energy sector

There are various persons working in the energy supply sector. The CLEAN-kWAT project selected and focuses this scheme on the following selected professions from the International Standard Classification of Occupations (ISCO):

1. **Industrial and Production Engineers** conduct research, designs, organizes and oversees the construction, operation and maintenance of industrial production processes and installations. S/he establishes programmes for the coordination of manufacturing activities and assess cost effectiveness and safety. Those included in this occupation are industrial efficiency engineer, industrial engineer, industrial plant engineer, production engineer. Some related occupations classified elsewhere are manufacturing production manager.
2. **Civil engineers** conducts research, advises on, designs and directs construction; manages the operation and maintenance of civil engineering structures; or studies and advises on technological aspects of particular materials. Examples of the occupations classified here are civil engineer, geotechnical engineer, structural engineer. Some related occupations classified elsewhere are civil engineering project manager, geoscientist, metallurgist, mining engineer, town and traffic planners.
3. **Environmental engineers** conduct research, advise on, design and direct implementation of solutions to prevent, control or remedy negative impacts of human activity on the environment utilizing a variety of engineering disciplines. They conduct environmental assessments of construction and civil engineering projects and apply engineering principles to pollution control, recycling and waste disposal. Examples of the occupations classified here are air pollution control engineer, environmental analyst, environmental engineer, environmental remediation specialist, wastewater process engineer. Some related occupations classified elsewhere are environmental scientist, radiation protection expert.
4. **Mechanical engineers** conduct research, advise on, design, and direct production of machines, aircraft, ships, machinery and industrial plant, equipment and systems; advise on and direct their functioning, maintenance and repair; or study and advise on mechanical aspects of particular materials, products or processes. Examples of the occupations classified here are aeronautical engineer, engine designer, marine architect, marine engineer, mechanical engineer. Some related occupations classified elsewhere, ships' engineer
5. **Electrical engineers** conduct research and advise on, design and direct the construction and operation of electrical systems, components, motors and equipment, and advise on and direct their functioning, maintenance and repair, or study and advise on technological aspects of electrical engineering materials, products and processes. Examples of the occupations classified here electrical engineer, electric power generation engineer, electromechanical engineer. Some related occupations classified elsewhere are nuclear power generation engineer, electronics engineer, broadcast engineer, telecommunications engineers.

All the above professionals work in one way or the other in energy supply process and need to have knowledge, skills for environmental issues related to the system on which they work on.

3 Education needs for VET professionals in the energy supply sector

Vocational qualifications for professionals are practical qualifications that will relate to their specific job or career sector. They are designed to combine a mixture of theory and online in a blended learning form together with practical learning as well field visit. These learning programmes contain a huge range of different courses that each of these professionals can do from entry level right up to advance level with the course length depending on what level the individual studies. The proposed programme on environmental education for professional in the energy supply sector is geared for both bachelor and masters level with learning outcomes weighted according to the European Credit system for Vocational Education and Training (ECVET). ECVET systems define the levels as well as the knowledge, skills and competences they are to acquire as follows:

LO	Knowledge	Skills	Competence
EQF Level 6 (1st study cycle)	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles	Advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study	Manage complex technical or professional activities or projects, taking responsibility for decision making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups
EQF Level 7 (2nd study cycle)	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures ...	Manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice ....

Source: Annex ii, recommendation of the European parliament and of the council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32008H0506(01)

The proposed qualification contains 17 level learning outcomes in total, thirteen of which are recommended for the bachelor level (level 6) and all fourteen for the masters' level (level 7) participants. Each course is weighted through ECVET and allocated appropriate points as seen in the table below.

LO	Title	ECVET
1	Energy, environment and the ecosystem	1.5
2	Ecological foot printing for energy systems	3.0
3	Environmental impact and climate change	1.5
4	Conventional energy production systems	3.0
5	Advanced Engines and Turbines	1.5
6	Pollution Sampling and Analysis	3.0
7	Atmospheric Pollution: Impacts and control	2.0
8	Ecological and environmental dimensions of nuclear power plants	1.5
9	Solar energy systems	1.5
10	Wind energy	1.5
11	Wave, tidal and hydrogen energy	1.0
12	Geothermal energy	1.0
13	Hydropower energy	1.5
14	Biomass and waste energy technologies	1.5
15	Energy Management and Conservation	1.5
16	Energy policies, case studies and best practices	2.0
17	Introduction to environmental impact assessment	1.5
	All	**30,0**

The learning outcomes are grouped together to form learning units according to the qualification needed in a particular area. Each unit represents the number competences acquired at the end of the study course. These units are:

Learning Unit	Learning unit titles	Learning Outcomes	Learning outcomes titles
No 1	Introduction to energy and ecosystems	LO1	Energy, environment and the ecosystem
		LO2	Ecological foot printing for energy systems
No 2	Conventional energy systems and their impact to the environment	LO4	Conventional energy production systems
		LO5	Advanced Engines and Turbines
		LO8	Ecological & environmental dimensions of nuclear power plants
No 3	Renewable energy systems and their impact to the environment	LO9	Solar energy systems
		LO10	Wind energy
		LO11	Wave, tidal and hydrogen energy
		LO12	Geothermal energy
		LO13	Hydropower energy
		LO14	Biomass and waste energy technologies
No 4	Environmental impact control and assessment	LO3	Environmental impact and climate change
		LO6	Pollution Sampling and Analysis
		LO7	Atmospheric Pollution: Impacts and control
		LO15	Energy Management and Conservation
		LO16	Energy policies, case studies and best practice
		LO17	Introduction to environmental impact assessment

The learning outcomes in bold prints so as the knowledge, skills and competences described in the text that follows are the addition ones to learning units of persons at the master's level. All persons are recommended to take the LO in light print.

These units can be combined in different ways forming a knowledge path known as the learning pathways (LPs) which correspond to the course. All learning pathways correspond to European Qualification Framework (EQF) level 6 and 7.

4 Occupational qualifications learning pathway and acquired competencies

Each chosen occupation has already a specific technical background. As such for each of the five occupations, their subject-specific profiles were analysed and a learning pathway designed accordingly so as to attain the defined learning outcome for the programme.

4.1 Industrial and Production Engineers / Civil Engineer/ Mechanical

4.1.1 Learning pathway

The objective of this learning pathway is to present knowledge and the main aspects of other energy systems, their impact to the environment and how this can be controlled, assessed and mitigated. Basic facts about the environment, energy and the ecosystem are presented and trainees are equipped with assessing ecological and carbon footprints. Adding to the existing knowledge of conventional energy systems, this path way shall look into new energy generation systems and their impacts to the environment. Trainees shall be acquainted with the basic facts about the functionality of the different renewable energy technologies. Selected experiences and good strategies in partner countries of the CLEAN-kWAT are concisely summarised and looked into. Special attention is given to the different methods on how to control and assess the impacts.

The learning goals are achieved through presentation of training material within the following learning Outcomes (LOs):

- Introduction to energy and ecosystems
- Renewable energy systems and their impact to the environment
- Environmental impact control and assessment

4.1.2 Learning pathway structure

Units of Learning outcome	Learning outcome (LO)		Credit points (CP)	
			Bachelor	Masters
No 1	LO1	Energy, environment and the ecosystem	4.5	4.5
	LO2	Ecological foot printing for energy systems		
No 3	LO9	Solar energy systems	8.0	8.0
	LO10	Wind energy		
	LO11	Wave, tidal and hydrogen energy		
	LO12	Geothermal energy		
	LO13	Hydropower energy		
	LO14	Biomass and waste energy technologies		
No 4	LO3	Environmental impact and climate change	3.5	11.5
	LO6*	Pollution Sampling and Analysis		
	LO7*	Atmospheric Pollution: Impacts and control		
	LO15*	Energy Management and Conservation		
	LO16	Energy policies, case studies and best practice		

	LO17 Introduction to environmental impact assessment		
Total		**16.0**	**24.0**

*Only for master level students

The LP is designed for specialist and students working as industrial and production, civil and mechanical engineers with the purpose to help their training, to upgrade their knowledge and to broaden their wider competences in the subject, thus facilitating their realization in the labour market.

4.1.3 Competences acquired

Knowledge (about)

- The ecosystem and its different components
- Role of each ecosystem component in the energy cycles
- The central role of the sun in the energy flow and its control
- Ecological and carbon footprints, their component and link to the energy supply systems
- Solar and wind technologies, their components and factors that limit their performance;
- Solar and wind energy trends, policy, and other factors that impact their integration into the electricity network;
- Potentials of the wave, tidal and hydrogen as renewable energy sources
- The technology harnessing the wave, tidal and hydrogen energy source
- Advantages and disadvantages of wave, tidal, hydrogen and hydro energy source
- The potentials and availability of geothermal energy and hydropower energy for electricity production
- The various technologies harnessing geothermal energy and hydropower
- The different technology options used in the processing of waste and biomass.
- Recognise the legislative and environmental drivers behind bioenergy technology.
- climate change, global warming, ozone depletion and acid rain,
- The timeline of climate change, how serious is acid rain and ozone depletion,
- The main instrumental chemical analysis used in pollution monitoring and measurement as well as is application.
- Air quality impact assessment of an energy process based on emissions calculations and dispersion simulations for a range of meteorological conditions.
- Usage of commercial package for atmospheric dispersion (ADM4).
- Appropriate control technique for an air-polluting process under consideration.
- The role of energy management and conservation.
- Carbon footprint reduction.
- The techniques and measures for energy management and conservation.
- Strategies put in place by governments to cub the environmental impacts of energy system
- The German strategy -Energy transition
- The major principles of environmental impact assessment
- The different steps in environmental impact assessment

Skills (to)

- Distinguish between energy and environment and be able to associate the two
- Determine the effects of human behaviour on the ecosystem
- Describe, illustrate and evaluate different energy supply systems
- Perform calculations regarding solar, wind, wave, tidal, hydrogen, geothermal, hydropower energy resource, capacity, storage, costs, and carbon;
- Work in compliance with health and safety principles of renewable technologies- wind, wave, tidal, hydrogen, geothermal, hydropower and bioenergy.

- Recognise the different biomass energy sources
- Evaluate the environmental impacts of biomass energy use
- Evaluate the scopes of environmental impacts,
- Apply sampling and sample preparation procedures and the chemical processes for each instrument used in pollution monitoring and measurement.
- Work in compliance with laboratory Health and safety regulations
- Choose and carry out the designs necessary for the implementation of the most appropriate control technique for a given stationary industrial process that emits air pollutants in significant amounts.
- Apply appropriate methods of modelling (mathematic and computational) atmospheric dispersion
- Design an air quality screening approach for a given case study
- Perform an energy audit of an industrial process or commercial installation.
- Propose implementation strategies to institutions, governments and other stakeholders
- identify which strategy is applicable where.
- Assess different case studies/examples of environmental policies in practice
- Analyse the implications of current jurisdictional and institutional arrangements in relation to environmental impact assessment
- Be able to access different case studies/examples of EIA in practice

Competences (in)

- Assessing the control of energy flow by the networks present in the ecological system
- Calculating the ecological and carbon footprint of an energy supply system
- Evaluating the environmental impacts of solar and wind technology along its life cycle
- Analysing the potential environmental impacts of hydropower, wave, tidal, hydrogen, geothermal and bioenergy technology application in a given environment.
- Explaining and interpreting the concept of causes and impacts of climate change, acid rain and ozone depletion,
- Developing data processing skills as well as researching and presentation skills.
- Carrying out small design exercises relevant to particular control techniques through the various air pollution control techniques.
- Presenting cases in a professional way.
- Team work to carry out environmental impact studies related to air quality.
- Apply the essential theories and methodologies for energy auditing and analysis.
- Making judgement of the environmental impact of existing energy system and propose strategies to cub this impacts
- Communicating both orally and in written form the key aspects of environmental impact assessment
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4.2 Environmental engineers

The objective of the learning pathway is to present knowledge and the main aspects of energy systems, their impact to the environment and how this can be controlled, assessed and mitigated. Fundamental of conventional energy systems as well as new energy generation systems and their impacts to the environment are covered adding to the existing knowledge on the environment. Trainees shall be equipped with information on the functionality of the different conventional energy systems as well as renewable energy technologies.

The learning goals are achieved through presentation of training material within the following learning Outcomes (LOs):

- Conventional energy systems and their impact to the environment
- Renewable energy systems and their impact to the environment

4.2.1 Learning pathway structure

Units of learning outcome	**Learning outcome (LO)**		**Credit points (CP)**	
			Bachelor	**Masters**
No 2	LO4	Conventional energy production systems	4.5	6.0
	LO5*	Advanced Engines and Turbines		
	LO8	Ecological & environmental dimensions of nuclear power plants		
No 3	LO9	Solar energy systems	8.0	8.0
	LO10	Wind energy		
	LO11	Wave, tidal and hydrogen energy		
	LO12	Geothermal energy		
	LO13	Hydropower energy		
	LO14	Biomass and waste energy technologies		
Total			**12.5**	**14.0**

*Only for master level students

The LP is designed for specialist and students working as environmental engineers with the purpose to help their training, to upgrade their knowledge and to broaden their wider competences in the subject, thus facilitating their realization in the labour market.

4.2.2 Competences acquired

Knowledge (**about**)

- Petroleum refining, natural gas processing and auxiliary processes;
- Fuel and combustion processes used in process engineering, transport and the power generation industry
- Fundamentals of engines and turbines
- Climate change contribution of engine, turbines and road transport
- Using alternative fuels in this sector to achieve overall carbon reduction.
- Basic functioning of a nuclear power plant
- Explain its advantages, disadvantages and risk of nuclear power plants.
- Solar and wind technologies, their components and factors that limit their performance;
- Solar and wind energy trends, policy, and other factors that impact their integration into the electricity network;
- Potentials of the wave, tidal and hydrogen as renewable energy sources
- The technology harnessing the wave, tidal and hydrogen energy source
- Advantages and disadvantages of wave, tidal, hydrogen and hydro energy source
- The potentials and availability of geothermal energy and hydropower energy for electricity production
- The various technologies harnessing geothermal energy and hydropower
- The different technology options used in the processing of waste and biomass.
- Recognise the legislative and environmental drivers behind bioenergy technology.

Skills (to)

- Identify the environmental issues associated with these technologies;
- Performing technology-specific calculations for different conversion processes;
- Work in compliance to carbon reduction strategies for transport engines and power generation gas turbines
- Apply NOx, CO, HC and particulate control methods in spark-ignition (SI) and diesel engines and their conflict with CO_2 reduction.
- Analyse and assess impacts of nuclear power plants on the ecology and environment
- Perform calculations regarding solar, wind, wave, tidal, hydrogen, geothermal, hydropower energy resource, capacity, storage, costs, and carbon;
- Work in compliance with health and safety principles of renewable technologies- wind, wave, tidal, hydrogen, geothermal, hydropower and bioenergy.
- Recognise the different biomass energy sources
- Evaluate the environmental impacts of biomass energy use

Competences (in)

- Applying theory to the interpretation and critical analysis of data from experiments and other sources
- Developing generic team working, communication, and presentation skills
- Performing well-to-wheels CO_2 analysis and carbon audits.
- Managing waste from nuclear power plants
- Critically discuss the questions related to the possible use of hydropower (systems types, turbines used)
- Recognising the legislative and environmental drivers behind the increased use of waste and biomass for resource, energy recovery and reduction of greenhouse gas emissions
- Evaluating the environmental impacts of solar and wind technology along its life cycle

- Analysing the potential environmental impacts of hydropower, wave, tidal, hydrogen, geothermal and bioenergy technology application in a given environment.

4.3 Electrical engineers

4.3.1 Learning pathway

The objective of this learning pathway is to present knowledge and the main aspects of other energy systems, their impact to the environment and how this can be controlled, assessed and mitigated. Basic facts about the environment, energy and the ecosystem are presented and trainees are equipped with assessing ecological and carbon footprints. Fundamental of conventional energy systems as well as new energy generation systems and their impacts to the environment are covered. Trainees shall be equipped with information on the functionality of the different renewable energy technologies. Selected experiences and good strategies in partner countries of the clean-kWAT are concisely summarised and looked into. Special attention is given to the different methods on how to control and assess the impacts.

The learning goals are achieved through presentation of training material within the following learning Outcomes (LOs):

- Introduction to energy and ecosystems
- Conventional energy systems and their impact to the environment
- Renewable energy systems and their impact to the environment
- Environmental impact control and assessment

4.3.2 Learning pathway structure

Units of learning outcome	**Learning outcome (LO)**		**Credit points (CP)**	
			Bachelor	**Masters**
No 1	LO1	Energy, environment and the ecosystem	4.5	4.5
	LO2	Ecological foot printing for energy systems		
No 2	LO4	Conventional energy production systems	4.5	6.0
	LO5*	Advanced Engines and Turbines		
	LO8	Ecological & environmental dimensions of nuclear power plants		
No 3	LO9	Solar energy systems	8.0	8.0
	LO10	Wind energy		
	LO11	Wave, tidal and hydrogen energy		
	LO12	Geothermal energy		
	LO13	Hydropower energy		
	LO14	Biomass and waste energy technologies		
No 4	LO3	Environmental impact and climate change	3.5	11.5
	LO6*	Pollution Sampling and Analysis		
	LO7*	Atmospheric Pollution: Impacts and control		

	LO15*	Energy Management and Conservation		
	LO16	Energy policies, case studies and best practice		
	LO17	Introduction to environmental impact assessment		
Total			**20.5**	**30.0**

*Only for master level students

The LP is designed for specialist and students working as electrical engineers with the purpose to help their training, to upgrade their knowledge and to broaden their wider competences in the subject, thus facilitating their realization in the labour market.

4.3.3 Competences acquired

Knowledge (about)

- The ecosystem and its different components
- Role of each ecosystem component in the energy cycles
- The central role of the sun in the energy flow and its control
- Ecological and carbon footprints, their component and link to the energy supply systems
- Petroleum refining, natural gas processing and auxiliary processes;
- Fuel and combustion processes used in process engineering, transport and the power generation industry
- Fundamentals of engines and turbines
- Climate change contribution of engine, turbines and road transport
- Using alternative fuels in this sector to achieve overall carbon reduction.
- Basic functioning of a nuclear power plant
- Explain its advantages, disadvantages and risk of nuclear power plants.
- Solar and wind technologies, their components and factors that limit their performance;
- Solar and wind energy trends, policy, and other factors that impact their integration into the electricity network;
- Potentials of the wave, tidal and hydrogen as renewable energy sources
- The technology harnessing the wave, tidal and hydrogen energy source
- Advantages and disadvantages of wave, tidal, hydrogen and hydro energy source
- The potentials and availability of geothermal energy and hydropower energy for electricity production
- The various technologies harnessing geothermal energy and hydropower
- The different technology options used in the processing of waste and biomass.
- Recognise the legislative and environmental drivers behind bioenergy technology.
- climate change, global warming, ozone depletion and acid rain,
- The timeline of climate change, how serious is acid rain and ozone depletion,
- The main instrumental chemical analysis used in pollution monitoring and measurement as well as is application.
- Air quality impact assessment of an energy process based on emissions calculations and dispersion simulations for a range of meteorological conditions.
- Usage of commercial package for atmospheric dispersion (ADM4).
- Appropriate control technique for an air-polluting process under consideration.
- The role of energy management and conservation.
- Carbon footprint reduction.
- The techniques and measures for energy management and conservation.
- Strategies put in place by governments to cub the environmental impacts of energy system

- The German strategy -Energy transition
- The major principles of environmental impact assessment
- The different steps in environmental impact assessment

Skills (to)

- Distinguish between energy and environment and be able to associate the two
- Determine the effects of human behaviour on the ecosystem
- Describe, illustrate and evaluate different energy supply systems
- Identify the environmental issues associated with these technologies;
- Performing technology-specific calculations for different conversion processes;
- Work in compliance to carbon reduction strategies for transport engines and power generation gas turbines
- Apply NOx, CO, HC and particulate control methods in spark-ignition (SI) and diesel engines and their conflict with CO_2 reduction.
- Analyse and assess impacts of nuclear power plants on the ecology and environment
- Perform calculations regarding solar, wind, wave, tidal, hydrogen, geothermal, hydropower energy resource, capacity, storage, costs, and carbon;
- Work in compliance with health and safety principles of renewable technologies- wind, wave, tidal, hydrogen, geothermal, hydropower and bioenergy.
- Recognise the different biomass energy sources
- Evaluate the environmental impacts of biomass energy use
- Evaluate the scopes of environmental impacts,
- Apply sampling and sample preparation procedures and the chemical processes for each instrument used in pollution monitoring and measurement.
- Work in compliance with laboratory Health and safety regulations
- Choose and carry out the designs necessary for the implementation of the most appropriate control technique for a given stationary industrial process that emits air pollutants in significant amounts.
- Apply appropriate methods of modelling (mathematic and computational) atmospheric dispersion
- Design an air quality screening approach for a given case study
- Perform an energy audit of an industrial process or commercial installation.
- Propose implementation strategies to institutions, governments and other stakeholders
- identify which strategy is applicable where.
- Assess different case studies/examples of environmental policies in practice
- Analyse the implications of current jurisdictional and institutional arrangements in relation to environmental impact assessment
- Be able to access different case studies/examples of EIA in practice

Competences (in)

- Assessing the control of energy flow by the networks present in the ecological system
- Calculating the ecological and carbon footprint of an energy supply system
- Applying theory to the interpretation and critical analysis of data from experiments and other sources.
- Developing generic team working, communication, and presentation skills
- Performing well-to-wheels CO2 analysis and carbon audits.
- Managing waste from nuclear power plants
- Evaluating the environmental impacts of solar and wind technology along its life cycle
- Analysing the potential environmental impacts of hydropower, wave, tidal, hydrogen, geothermal and bioenergy technology application in a given environment.
- Explaining and interpreting the concept of causes and impacts of climate change, acid rain and ozone depletion,

- Developing data processing skills as well as researching and presentation skills.
- Carrying out small design exercises relevant to particular control techniques through the various air pollution control techniques.
- Presenting cases in a professional way.
- Team work to carry out environmental impact studies related to air quality.
- Apply the essential theories and methodologies for energy auditing and analysis.
- Making judgement of the environmental impact of existing energy system and propose strategies to cub this impacts
- Communicating both orally and in written form the key aspects of environmental impact assessment