
HELLENIC REPUBLIC



ARISTOTLE
UNIVERSITY
THESSALONIKI

LABORATORY OF HEAT TRANSFER AND
ENVIRONMENTAL ENGINEERING

SCHOOL OF
ENGINEERING



MECHANICAL
ENGINEERING
DEPARTMENT
ENERGY SECTION

Expert Evaluation Report

on training material of the project:

Solid Waste Facilities Managers Qualification Framework:

Towards a European qualification for Solid Waste Facilities Managers

G. Perkoulidis and N. Moussiopoulos

Thessaloniki, August 2014

Table of Contents

1. Introduction.....	1
2. Evaluation process	1
3. Evaluation results.....	2
<u>3.1</u> Comments on the entire Qualification Framework.....	3
4. Evaluation results of the Qualification Framework.....	4
<u>4.1</u> Environmental Management (ULO EM)	4
<u>4.2</u> Financial and Contractual Management (ULO FCM)	6
<u>4.3</u> Health and Safety Management (ULO HS)	8
<u>4.4</u> Human Resources Management (ULO HRM).....	8
<u>4.5</u> New Projects Management (ULO NP)	9
<u>4.6</u> Operational Management (ULO OM).....	10
5. Evaluation of the Technical Qualification Framework	11
5.1 Anaerobic digestion and Mechanical Biological Treatment Module (ULO AD/MTB).....	11
<u>5.2</u> Composting module (ULO COM)	12
<u>5.3</u> Landfill sites module (ULO LF)	12
<u>5.4</u> Recycling module (ULO REC).....	14
<u>5.5</u> Thermal Treatment Module (ULO INC)	14
<u>5.6</u> Transfer Stations Module (ULO TS)	15
6. Evaluation of the Info Training toolkit.....	16
<u>6.1</u> Environmental Module	16
<u>6.2</u> Financial and Contractual Module.....	16
<u>6.3</u> Health and Safety Module.....	16
<u>6.4</u> Human Resources Module	17
<u>6.5</u> New Projects Module.....	17
<u>6.6</u> Operational Module	17
<u>6.7</u> Technical Module	17
7. Conclusions.....	19

1. Introduction

The SWFM-QF project “**Towards a European qualification for Solid Waste Facilities’ Managers**” has been funded in the framework of Lifelong Learning Programme under the action of LEONARDO DA VINCI Multilateral Projects for Development of innovation and aims at developing a European qualification and training framework to address the needs of Facilities Managers in the waste management industry. This evaluation report was prepared by the order of the project coordinator, SIGMA Consultants Ltd.

The report has been structured according the following sections:

- Presentation of the evaluation team and the evaluation process.
- General comments on the training material.
- Detailed analysis of the review.

2. Evaluation process

The evaluation team consisted in a group of two experts: N. Moussiopoulos and G. Perkoulidis.

Professor Moussiopoulos is the author of more than 400 scientific publications, including more than 100 papers in peer-reviewed journals and 26 books. His research work addresses several issues in the broad field of energy and the environment. In the last twenty years Professor Moussiopoulos participated in numerous competitive, mostly EU funded research projects with a total budget exceeding 20 million €. Moreover, for more than 15 years Professor Moussiopoulos co-ordinated several tasks of the European Topic Centre on Air and Climate Change, within the work programme of the European Environment Agency. In the same period, he has been involved in several large environmental impact assessment studies, largely related to air pollution. He has consulted several Greek Ministers and has represented Greece in numerous international committees and bodies. At present he is the Greek representative in the Programme Committee “Regions of Knowledge, Research Potential and Coherent Development of Policies” 7th Framework Programme European Commission and a full member of the Greek Sectoral Research Council for Engineering.

Dr. George Perkoulidis is a teaching and postdoctoral research assistant in Laboratory of Heat Transfer and Environmental Engineering, Department of Mechanical Engineering, Aristotle University Thessaloniki, Greece from 1996 to today. His main activities and responsibilities are: (a) lectures on solid waste management, environmental engineering, thermal processes and refrigeration and (b) design and implementation of Geographic Information Systems, Decision Support Systems, efficient and sustainable processes, risk

assessment and refrigeration. He has participated in ten national and international projects, in 23 papers in journals, in 67 papers in conference proceedings and in multi-reports and other publications.

Info-training toolkit and qualifications frame are evaluated using the following criteria:

- Adequacy and relevance of qualifications according to the project's objectives;
- Consistency and effectiveness of the training approach.
- Expected relevance/impact of project at EU and national level.

The evaluation was carried out by reviewing project related documents and deliverables, as shown in the project site (www.swfm-qf.eu/main) and it was based on evaluators' experience.

3. Evaluation results

During the project, a Qualification Framework for Solid Waste Facilities Managers has been developed, to fulfill the needs of managers of solid waste management facilities. The qualifications are presented as a matrix in accordance with EQF, level 6 knowledge, skills and competences descriptors, supporting to their recognition and adoption in EU countries.

The Qualification Framework consisted of seven sections, according to the following:

1. Environmental Management.
2. Financial & Contractual Management.
3. Health and Safety Management.
4. Human Resources Management.
5. New Projects Management.
6. Operational Management
7. Technical Issues

Technical issues are related to the technical management of the following specific waste treatment plants:

1. Anaerobic Digestion.
2. Mechanical Biological Treatment.
3. Composting.
4. Landfills.
5. Recycling.

6. Thermal Treatment.

7. MSW Sorting Facilities (Transfer Stations)

Review comments are presented in the following sections. Comments on the overall process are included in the next paragraph, while detailed comments on each section are given below.

3.1 Comments on the entire Qualification Framework

A general comment is related to the fact that national conditions are not taken into account. The public and private sector play a different role in each European country concerning solid waste management. The Ministry of Environment, Energy and Climate Change in Greece has developed a strategic plan based on 4 pillars: (a) combating climate change for moving to a competitive low carbon economy, (b) natural resource protection and environmental enhancement, (c) improve quality of life with respect to the environment and (d) enhancement of mechanisms and processes for environmental governance. Moreover, the Ministry implements actions in collaboration with public administration bodies, private sector, social partners, citizens and international community in order to achieve the strategic objectives and establish the pillars of “green” Development. The major challenges that face the solid waste management in Greece are the elimination of health hazards associated with existed illegal and uncontrolled landfill sites, the landfill diversion targets for biodegradable waste, the supply of a network for waste management facilities and the restoration of contaminated land from industrial activity.

Until recently, the waste management activity was faced with NIMBY (not in my backyard) reactions to landfill and transfer station locations in Athens and in Thessaloniki. Local opposition is associated with economic cost attributed to the environment and health risks and the decline in quality of life from the waste management facility. To further enhance the general effectiveness of the training tool, the local prevailing conditions should be taken into consideration.

Practices should have waste prevention focus to assist managers on resourceful techniques for storing and disposing of any kind of produced waste.

Specific training modules should be organized by country and exclusive waste collection, transfer, recycling, treatment and disposal practices should be given for Greece in agriculture and tourism fields.

As far as anaerobic digestion process is concerned, the training module should bring together a broad spectrum of scientists, engineers and other specialists from local and national level departments and institutions, development organizations and other stakeholders

Comments on each field of the Qualification Framework are following in Sections 4 and 5.

4. Evaluation results of the Qualification Framework

This paragraph includes the detailed evaluation results of 6 sections of Qualification Framework.

4.1 Environmental Management (ULO EM)

Overall evaluation: The materialization of environmental protection on site is targeted here in accordance with the existing national and European Union environmental policies. The module covers the full range of Environmental Management Systems (EMS), which depends on business needs. On the other hand, environmental impact assessment system -including elaboration, publicity, and administrative approval- has been regulated for the last fifteen years mainly by Law 1650/1986 and the Joint Ministerial Decisions 69269/5387/1990 and 75308/5512/1990. This legal status has been recently amended by Law 3010/2002. Furthermore, the Directive 2014/52/EU of the European Parliament and of the Council has amended the Directive 2011/92/EU which has harmonised the principles for the environmental impact assessment of projects by introducing minimum requirements with regard to the type of projects subject to assessment, the main obligations of developers, the content of the assessment and the participation of the competent authorities and the public and it contributed to a high level of the protection of the environment and human health. Member States are free to lay down more stringent protective measures in accordance with the Treaty on the Functioning of the European Union (TFEU).

Learning Outcomes: The trainee should be guided to the Environmental Impact Assessment ordinance and the issue of environmental permit (LO1/2). The trainee should not construct or review environmental policies.

Results:

Subunit 1: Environmental Impact Assessment implementation in accordance with Directive 2014/52/EU should be among the basic knowledge abilities of trainees.

Subunit 2: This subunit is overlapping with subunit 1.

Subunit 3: The environmental policies should be referred to health-care waste, which is a by-product of health care that includes sharps, non-sharps, blood, body parts, chemical, pharmaceuticals, medical devices and radioactive materials.

Subunits 4-6:

An analysis should be given for preparing an EMS plan to implement sustainable environmental stewardship practices such that: (a) protect the air, water, land and other natural and cultural resources, (b) meet applicable environmental, public health and resource protection laws and (c) implement cost-effective business practices.

ULO EM-2

Learning Outcomes: LOs are related primarily to preparatory actions for the implementation of environmental policy in a site. Policies on anticipating regulations, optimizing the energy efficiency of equipment and facilities and implementing operational practices designed to improve the economic and environmental performances of activities should also be included.

Results:

Subunit 1: It is an introductory unit that keeps consistency with the module structure.

Subunit 2: It is related to monitoring actions and information on citizens but business also need help to measure their environmental impacts.

Subunit 3: Health and safety resources are ensured when they are available to workers, contractors and trades.

Subunit 4: Training target groups should be clearly addressed.

Subunit 5: There is a partially overlap with ULO-EM-1 (subunits 4-6).

Subunit 6: The Fifth Assessment Report of IPCC provides a clear and up to date view of the current state of scientific knowledge relevant to climate change which should be included in EMS components.

ULOEM-3

Overall evaluation: Personnel should be trained in accordance with the requirements of municipal, hazardous and industrial waste management procedures.

ULOEM-4

Learning Outcomes: Co-benefits of industrial Green House Gases (GHG) mitigation options that arise due to reduced emissions and waste should be covered in the training module. Thus, the reduced environmental compliance and waste disposal costs, the increased production and product quality, the improved maintenance and operating costs and the improved working environment will be shown to trainees.

Results:

Subunit 1: The first point of the agenda is the rehabilitation of old uncontrolled sites for municipal solid waste disposal and of existed contaminated industrial sites in Greece. Then, the associations of local authorities should implement projects on the decrease of amount of waste that goes to landfills. Organic recycling systems in local level should be applied because organic waste that ends up in landfills is a major source of methane gas. Furthermore, a nationwide network of recycling centres and transfer stations should be constructed that will provide year-round recycling and energy recovery from organic waste in anaerobic digestion facilities.

Subunit 2: Application of IPCC models to estimate emissions and EIA are necessary as Strategic Evaluation Assessment (SEA). Institutionalization and application of EIA and SEA at national level should be presented.

Subunit 3: This subunit should possess the ability to identify trends of sustainable waste management.

Subunit 4: Performance auditing in the environmental policies as examining relevance of governmental programmes to national and European needs, assessing implementation of environmental policy programmes, assessing regularity and sound management in financing these programmes and contributing added value and working towards effectively removing causes of problems, should be included in the subunit.

Subunit 5: It could be allocated to subunits 1 and 2.

4.2 Financial and Contractual Management (ULO FCM)

Overall comment: This module is related to budget management techniques; however, the implementation of environmental management systems is closely related to the allocation of financial resources and it should be considered as a single module in this section.

The estimation methods of environmental accounting that calculate costs and benefits and are based on environmental accounting guidelines should be presented.

Technology assessment usually does not have a site-specific perspective but rather starts from the generic technology specifications and then evaluates a regional or global impact using other impact assessment techniques like Risk Assessment (RA) or Life Cycle Assessment (LCA)

Another helpful method is to put the proposed business model into an overall perspective using SWOT analysis—Strengths, Weaknesses, Opportunities and Threats (also abbreviated by SFOT—Successes, Failures, Opportunities, Threats).

ULO FCM-1

Overall comment: Certain financial terms often mean different things to different organizations depending on their own particular accounting policies. Explaining business terms and definitions will be useful.

Subunit 1: Currently issue permits for the operation of transfer stations, approaches and methodologies of the public engagement on waste charging and estimation of incomes and expenditures for benchmark analysis should be included.

Subunit 2: The methods for providing advice to investors on a potential investment in waste management sector should be included. The trainee should be able to calculate the gate fee range, the Internal Rate of Return and the Pay Out Time periods.

ULO FCM-2

Overall comment: The module has the title “Management of the economic aspects of sustainable business practices” but there are not any policies, issues, and actions related to sustainability.

ULO FCM-3

Overall comment: In this module, the preparation of an appropriate contract is referred. A guide should present a list of the principal standard forms of contract, highlighting significant features. The guide should be presented in the form of a matrix. The centre section of the matrix will set out, in bar chart format, the allocation of risk and the weight ascribed to key criteria for each contract form. In providing a contract selection, is not appropriate for this guide to address the broader issue of procurement but it will assume an understanding of procurement and the routes available. ULO FCM-4 and 5 are dealing with them. ULO FCM-3 and 4 could be merged together, while ULO FCM-5 should be kept as an independent module because it presents the contract monitoring, identifies deviations and potential deviations are predicted.

ULO FCM-PP-1

This module includes call for tenders and supplies procurement processes and could be split in two modules. Participatory *training methods* and materials for use should be included for of *evaluation of vendors or suppliers* in accordance with legislation, rules or regulations.

4.3 Health and Safety Management (ULO HS)

Overall comment: This module is dealing with health and safety issues in solid waste management. A list of the best available information for health care pollution prevention and evaluating waste treatment alternatives should be compiled. Onsite training at facilities, tailored to specific environmental needs is recommended.

Preparation and training is imperative when it comes to protecting workers and complying with the law. Workers have a duty to take reasonable care for their own health and safety and must not adversely affect the health and safety of other persons. Workers must comply with any reasonable instruction and cooperate with any reasonable policy or procedure relating to the use, handling and storage of hazardous chemicals at the workplace. Thus, consulting the workers or their health and safety representative should be a training tool.

Experts should provide reports concerning health and safety issues in waste water treatment facilities, recycling centers, and public landfills. Scientists will evaluate the degree to which the health proposed guidelines are based on sound scientific methods, knowledge, and practice. Waste management sites are inherently busy places with high volumes of traffic, often working in confined conditions. From a health perspective, there is the potential for disease such as hepatitis and leptospirosis (Weils Disease) to be carried by rats. Site users and visitors are often unaware of the potential dangers and can become a danger to themselves and others.

4.4 Human Resources Management (ULO HRM)

This module is dealing with Human Resources Management (HRM) and continues efforts to develop and maintain competent human resources to meet the challenging environmental concerns.

Plans, directs, and reviews the work of management staff engaged in day-to-day operation activities in assigned areas of responsibility should be the major principle and technique of human resource management and supervision. Improved staff motivation and community relations are appropriate management processes, which benefit every environmentally sustainable strategy.

The module should propose a management of human resources that implies efforts to recruit, retain and support personnel by such means as provision of effective supervision and continuing education.

4.5 New Projects Management (ULO NP)

ULO NP-1

Overall comment: A strategic planning management process for a solid waste management facility is referred to module. In low-income countries, collection alone drains up 80-90 percent of municipal solid waste management budget. In mid-income countries, collection costs 50-80 percent of total budget. In high-income countries, collection only accounts for less than 10 percent of the budget, which allows large funds to be allocated to waste treatment facilities. Upfront community participation in these advanced countries reduces the collection cost and facilitates waste recycling and recovery. A new project management service should support countries to face increasingly complex development challenges. Project Managers will be provided with a set of tools and guidance to be able to strategically design and implement quality projects that support the achievement, equitability and sustainability of development results.

ULO NP-2

Overall comment: Technical improvement module belongs to scientific and technological services of a solid waste management facility. The energy recovery from an anaerobic digestion facility or a landfill mining could be assessed by a cost benefit analysis.

New trends in solid waste handling and collection practices, such as single-stream collection of recyclable materials should be taken into account. Thus, industrial pollution is reduced after improvements in a recycling centre by 67%. Furthermore, the creation of public awareness for the environment is important to economic and social life.

ULO NP-3

Overall comment: This module is for the waste management process improvements. ‘Call for tenders’ and ‘Construction works on site’ should be linked to ULO FCM-PP-1.

ULO NP-4

Overall comment: Market analysis highlights current market conditions and dynamics in order to assess whether flow controls appear necessary to ensure adequate waste management capacity and to promote recycling efforts. Discrete market segments that both work together and compete to perform the complete job of solid waste management in communities should be recognized. These segments should include: (a) composting, (b) material recovery facilities (recycling centers) for commingled recyclables, mixed waste processing facilities that extract recyclables from mixed waste, paper packers and

buy-back/drop – off centers for recyclables, (c) waste-to-energy conversion and (d) landfills.

4.6 Operational Management (ULO OM)

Overall comment: The operational efficiency in solid waste management facilities is presented here. Benefits and challenges associated with pay-as-you-throw and automated waste collection systems should be included. Operations that improve the utilization of collection equipment by minimizing transportation time and efficiently moving large volumes of waste to disposal sites should be taken into account. The implementation of quality management systems within the material recovery facility and recycling centre industry and monitoring infrastructures of waste-to-energy plants should be presented. Operational completeness is also referred to community engagement, traffic considerations and site security especially when dealing landfill environmental management plan and the fully rehabilitated state including after – care.

ULO OM-1

Overall comment:

The module is referred to proper management of a solid waste facility, where performance measures and adaptive management are taken into account.

Examples of work performed in subunit 1 could be the supervision of personnel operating heavy equipment and the maintenance of it in daily operations.

In subunit 4, a comprehensive supervision will ensure effective teamwork of high standards and thus measure meetings should be included.

In subunit 5, staff should be also aware that visitors will follow the health and safety rules.

In subunit 6, forecasts of wastes generation and composition should be established on the basis of waste surveys in the collection area by independent institution.

In subunit 7, the implementation of work practices that are referred to the optimal use of human resources, should be included.

Without top management commitment, the resources and support necessary for facility environmental management system development and implementation are much more difficult. Thus, management commitment should be included in subunit 8.

In subunit 10, equipment operator safety training should be developed as well.

Subunit 11 is referred parts of operational excellence management system. Thus, the management of change processes that could be used for deviations should be included.

In subunit 12, employees and others may contract the Board or any of their Directors by writing to them or by using online submission.

ULO OM-2

This module deals with the authorization of the facility to implement complementary technical instructions, some of which could be related to improvements to equipment and components.

ULO OM-3

Overall comment: By ensuring a sustainable operations and development, the waste management facility should ensure that the impacts on the environment are managed and controlled.

The title of LO 2 should change to “Maintain low level of impacts of material and energy recovery”.

The subunit 1 title should change to “Demonstrate advanced knowledge of the main principles of sustainable development and how to be implemented”.

The measures are lonely limited to recovered materials and should include energy recovery.

ULO OM-4

Overall comment: Social factors are a community specific issue. The best plan for one community may not be the best for another community. As an example, some communities may support energy recovery, some may prefer greater jobs creation, while some communities may push for greater reductions in environmental discharges. Social factors will be very helpful in this subunit.

5. Evaluation of the Technical Qualification Framework

Comments and recommendations are given here for the Qualification Framework.

5.1 Anaerobic digestion and Mechanical Biological Treatment Module (ULO AD/MTB)

Overall comment: This module addresses Mechanical Biological Treatment (MBT: this acronym is correct). A key advantage is that it can be configured to achieve several different aims. In the line with the EU Landfill Directive and national recycling targets,

the diversion of non-biodegradable waste going to landfill through mechanical sorting into material for recycling and energy recovery as refuse derived fuel.

In this module it should be mentioned that MBT is a generic term for an integration of several mechanical processes commonly found in other waste management facilities such as Materials Recovery Facilities (MRFs or Recycling Centers), composting and Anaerobic Digestion plants. MBT plant can incorporate a number of different processes in a variety of combinations. Additionally, MBT plant can be built for a range of purposes. This module should also provide the range of techniques employed by MBT processes and markets and outlets for MBT outputs. Anaerobic digestion is used to process the segregated organic rich fraction of waste its biological process will produce biogas. Thus, the following issues should be included in this subunit: (i) performance requirements, (ii) waste inputs, (iii) project duration, (iv) project cost, (v) available budgets, (vi) availability of sites, (vii) planning status, (viii) interface with existing contracts, (ix) timescales, (x) governance and decision making arrangements, (xi) market appetite and (xii) risk allocation.

5.2 Composting module (ULO COM)

Overall comment: The health effects of In-Vessel Composting facilities could be referred here, such as those related to bio-aerosol emissions. These are normally found in higher concentrations at facilities where large amounts of organic matter are processed. Although studies on composting facilities have found no increase in cancer or asthma in populations nearby, there have been public concerns that open composting operations could in theory affect the health of those living in close proximity.

5.3 Landfill sites module (ULO LF)

Overall comment: The inability of site new landfills to replace the consumed capacity of existing landfills should first be included in this module. Waste landfills can have a significant adverse impact on the individuals who own property in, reside in, or otherwise use, areas near the landfill. This leads those who stand to be adversely affected by a landfill to take a justifiable ‘NIMBY’ (Not in My Back Yard) position against it. Then, the risk based classification and guidelines for rehabilitation study and final remediation for the closure of uncontrolled landfills should be referred. Special emphasis should be given to on past and state-of-the-art applications of landfill mining.

ULO LF-1

Environmental, political, financial and economical, hydrologic / hydrogeologic, topographic, geologic and other criteria should be referred in this module (partially covered in ULO OM-4. Moreover, specific landfill siting, design, operation and rehabilitation guidelines should be given. The plan site layout and filling sequence should ensure that cells will be open for the shortest period of time. The objectives of landfill gas management are to ensure that there are no adverse health, safety or environmental impacts and to minimize greenhouse gas emission. Thus, the landfill gas risk assessment and monitoring should be included due to the fact that these processes are different from those of ULO AD/MTB. Landfill mining and reclamation process, whereby solid waste which has previously been landfilled is excavated and processed, should also be included (partially referred in ULO NP-2). Finally, a brief explanation of the complete sludge treatment and disposal process should be provided.

ULO LF-2

The type of waste that can be landfilled is provided by collection service or by a material or energy recovery facility (as a residue). The changes in quantity of waste affect the annual methane potential from the landfill more than the waste composition as recent studies have investigated (subunits 1 and 2).

ULO LF-3

Subunit 3: Leachate, an ecosystem pollutant has the potential to cause harm to human, and animal population. Tested technologies for primary biological treatment should be presented in this subunit.

ULO LF-4

Subunit 2: Information about health and safety issues associated with landfill gas – specifically, possible explosion and asphyxiation hazards and issues related to odors emanating from the landfill and low – level chemical emissions should be included here.

ULO LF-7

Subunit 2: Fire prevention crew should regularly monitor and maintain the landfill and a corresponding program that includes annual goal grazing and brush cleaning to reduce fire hazards, maintenance of the tree plantations should be implemented.

ULO LF-8

Subunit 1: Quarterly samples of storm water leaving sites should be analyzed for silt and metals. This management practice should also be included here.

D:\Themis\Training Tool\Enimerwsi SWFM-QF\Revised Harmonised Framework\Revised Harmonised Framework\Common

5.4 Recycling module (ULO REC)

ULO REC-3

The European Commission Integrated Pollution, Prevention and Control Directive, as implemented by the Pollution Prevention and Control (PPC) Regulation 2000 dictated that offensive odour emissions should be prevented, or where that is not practicable, reduced in order to achieve a high level of protection. Thus, the harmonization with these legal themes should be mentioned.

5.5 Thermal Treatment Module (ULO INC)

ULO INC-1

Learning outcome 2: It is related to understand the techniques available to ensure that operators are aware of and implement correct procedures for the reception of waste. Noise emissions should be minimized in waste reception area and thus there should be a link with 6.3 Health and Safety Module.

ULO INC-2

Learning outcome 1: A community typically guarantees a reference solid waste composition that a contractor assumes for design purposes. Thus, if this reference composition changes, perhaps due to increased recycling of paper products, then the community must assume the responsibilities and costs of this change, generally through an increase in tipping fees. Thus, the results of implementing recycling programs should be recorded.

ULO INC-5

Overall comment: This module deals with the implementation and maintenance of systems and procedures for the combustion process.

Learning outcome 1: The treatment of waste in cement kilns should be presented also here and its emissions to air as they are given in EU Directive 2000/76/EC.

ULO-INC-6

Overall comment: This module deals with the management of the procedures for the energy recovery process.

Learning outcome 3: A careful planning process can ensure the selection and implementation for the most cost-effective resource efficient and cleaner production option. Thus, a reference to the resource efficient and cleaner production planning process itself and its own results and benefits, should be made here.

ULO INC-7

Overall comments: It deals with the management of the procedures for the flue gas cleaning and compliance with the compliance with the emission regulation.

Learning outcome 2: Systems for controlling and improving the quality of combustion – reducing emissions of pollutants, removing acid gases (hydrogen chloride, sulphur, dioxide), removing nitrogen oxides, removing dioxins and filtering out particulates and particle-bound pollutants such as many heavy metals, should be referred here.

5.6 Transfer Stations Module (ULO TS)

Overall comment: There are transfer stations that accept materials as trash, recyclables, tires, cardboard, oil and oil filters. Some of them operate as buy back centers.

ULO TS-2

Subunit 2: A waste sorting centre increases the recycling rate for organics (50%). Thus, emphasis should be given for the collection of this type of waste and its future treatment in anaerobic digestion facilities.

6. Evaluation of the Info Training toolkit

The purpose of the evaluation section is to determine the following:

- The training toolkit aims to set clear directions for the waste management of Member States and the industry of EU in line with the waste hierarchy.
- The courses related to mechanical and biological treatment and anaerobic digestion are designed to teach and prepare trainees for the achievement of the last target for the diversion of biodegradable municipal solid waste from landfills that has to be met by the Member States of EU by 16 July 2016.
- The implementation of the Info Training toolkit will verify compliance and will ensure good results for studies, internal and external consultation and impact assessments.
- The course can make participants familiar with assessment and recommendations on collection and transportation system operation, on the importance of maintenance and its needs of solid waste management facilities and equipment.

6.1 Environmental Module

The principles of Qualification Framework have been followed properly. The user of this module can find quality management systems support for anaerobic digestion sites in Scotland but some other links do not work. Thus, the most of training material contents are in accordance with the Environmental module Qualification Framework but some environmental and monitoring sources are not linked (cf. <http://accessengineeringlibrary.com/browse/environmental-monitoring-handbook>).

6.2 Financial and Contractual Module

The principles of Qualification Framework have been followed properly. The influence of receiving funds (sources and / or delays of payments) should be taken into account by Financial and Contractual Module. Furthermore, investment security should be included here, i.e. legislation and regulation (landfill tax and carbon credits), market existence, feedstock supply (availability and gatefees), financial markets and technology risk.

6.3 Health and Safety Module

The principles of Qualification Framework have been followed properly. Contents of 'Health and safety training in waste management and recycling' Adobe Reader file should be separated and used as links for course units.

6.4 Human Resources Module

The principles of Qualification Framework have been followed properly. The skills of people that will participate in human resources management courses should also be registered.

6.5 New Projects Module

The principles of Qualification Framework have been followed properly. The link ‘A guide to project management’ from ‘Implementation and evaluation of improvements’ of ‘Course Unit 3’ should be removed. It gives the http://www.uni-oldenburg.de/fileadmin/user_upload/forschung/download/guideline_project-management.pdf file, which is not a guide to project management. Furthermore, the two files attached in ‘Course Unit 4’ are too large to be uploaded and should be changed with other teaching material.

6.6 Operational Module

The principles of Qualification Framework have been followed properly. The link of http://www.legrand.com/EN/sustainable-development-description_12847.html gives wrong file of ‘Course materials’ in Course Unit 2. Qualification of participants must satisfy all the optional sources.

6.7 Technical Module

This module follows the Technical Qualification Framework. Comments on anaerobic digestion, composting, landfill sites, mechanical biological treatment, recycling, thermal treatment and MSW sorting facilities are given below.

ANAEROBIC DIGESTION

Anaerobic digestion course contains the introduction to anaerobic digestion, the types of digester and its start up, operation and control, regulation and economical aspects. The learning outcomes of Qualification Framework should be followed. The course material of unit 2 is poor while the course material of unit 3 is not relevant with ‘anaerobic digester start up, operation and control’.

COMPOSTING

Despite the fact that this sub-module is well-organized, some links are not working.. The trainers’ and trainees’ requirements are well presented.

LANDFILL SITES

Seven course units describe the structure and contents of landfill site. One weakness of the course units is that there is only one link (Landfill Operations Guidance Manual). The trainers' and trainees' requirements are well presented.

MECHANICAL BIOLOGICAL TREATMENT

A connection of this course with anaerobic digest should be made. The first link of course unit 1 is in Italian language. The trainers' and trainees' requirements are well presented.

RECYCLING

There are five sub-units that describe the structure and contents of recycling. The first link and the third link of course unit 1 are not referred in recycling. The second link (http://www.carbontrust.com/media/13187/ctg054_energy_management.pdf) cannot be found. The first and second links of course unit 3 are very general. The transportation of waste link of course unit 5 was not able to be found. Requirements of trainers should be given in more details

THERMAL TREATMENT

The first sub-unit links should be referred to waste to energy themes (i.e. <http://www.wrfound.org.uk/articles/incineration.html>) and not to waste and recycling. The second link of second sub-unit should be deleted. Requirements of trainers should be given in more details

MSW SORTING FACILITIES

The module is well structured

It is a module prepared in adequate method, covering as more as possible the corresponding issues about targets, outcomes, content, support material etc. It could be merged to the rather poor Recycling module, as already described in details in the corresponding Qualification Framework section (paragraphs 5.4 and 5.6).

Trainers and trainees qualifications are adequately foreseen, as well as the required training facilities and infrastructure.

7. Conclusions

The Qualification Framework developed under the SWFM-QF project “Towards a European qualification for Solid Waste Facilities’ Managers” is well structured. A few alterations are recommended.

Info Training Toolkits have been developed according to the principles, learning outcomes, skills and competences of the corresponding sections of the Qualification Framework. Its implementation will boost recycling and prevent the loss of valuable materials. More emphasis has been given to anaerobic digestion module due to the fact that Europe turning into a more circular economy, which will create jobs and economic growth and will reduce greenhouse emissions and environmental impacts.

t