

# REPORT 1

## External Evaluation Report Template

### 1. Executive summary

This report is evaluating a qualification framework for solid waste (non-hazardous) managers developed in the mean of the SWFM-QF project *Towards a European qualification for Solid Waste Facilities' Managers*. The project aims at developing a European qualification and training framework to address the needs of Facilities Managers in the waste management industry. SWFM-QF project is being carried out by a consortium of organisations from across 8 European nations. The Solid Waste Facilities Manager manages the operations of various Solid Waste Facilities like: Transfer Stations, Waste Recycling Centres, Landfills, Materials Recovery Facilities, Mechanical Biological Treatment Plants, Incinerators and Composting Plants.

The evaluation report includes evaluation of qualification frameworks and suggested range of training material (Info-Training Toolkit). In the project there were developed a suite of qualifications; composed of *common qualifications* and *technical qualifications*.

Table 1 Common and technical qualifications

COMMON QUALIFICATIONS	TECHNICAL QUALIFICATIONS
Environmental management	Composting
Financial & contractual	Landfill site
Health & safety	Mechanical-biological treatment (MBT)
Human resources	Recycling
New project	Thermal Treatment
Operational	Transfer Stations

The evaluation was performed to make internal and external comparisons of qualification framework for solid waste (non-hazardous) managers and training material (Info-Training Toolkit) – internal comparison and with EFQ, NFQ, BF and technical standards. The important factor in evaluation was also to determine whether the knowledge, experience and skills required in qualification framework and range of training material in Info-Training Toolkit correspond to those which are useful for Solid Waste Facilities' Managers in practice.

### 2. Introduction

This report is evaluating a qualification framework for solid waste (non-hazardous) managers developed in the mean of the SWFM-QF project *Towards a European qualification for Solid Waste Facilities' Managers*. The project aims at developing a European qualification and training

framework to address the needs of Facilities Managers in the waste management industry. SWFM-QF project is being carried out by a consortium of organisations from across 8 European nations. The evaluation report includes evaluation of qualification frameworks and suggested range of training material (Info-Training Toolkit). The materials were delivered by the Polish partner of SWFM-QF project – The Institute Of Environmental Protection – National Research Institute (IEP-NRI).

### **SWFM-QF project**

The Solid Waste Facilities Manager manages the operations of various Solid Waste Facilities like: Transfer Stations, Waste Recycling Centres, Landfills, Materials Recovery Facilities, Mechanical Biological Treatment Plants, Incinerators and Composting Plants. According to recent studies (ECORYS 2009), waste management is the largest sub-sector of the EU27 eco-industry with a total turnover of €70.5 billion in 2004 and €92.2 billion in 2008. The employment of the sector is estimated at about 845 thousand and 1.467 thousand in respectively 2000 and 2008. Another study (BIO Intelligence Service 2011) concludes that by achieving full implementation of EU waste legislation, the turnover of waste management and recycling would increase by €5 billion per year and over 400,000 jobs would be created within the period 2008-2020. The waste management industry has changed a lot in recent years and continues to develop as new legislation, technologies, and techniques are advanced.

Introducing integrated waste management approach and replacing landfill with other more advanced waste management techniques have influenced decisively the evolution of the sector. As a result, the “new generation” of the waste management facilities are becoming highly technical worksites implementing innovative solutions and a number of processes on one site. This in turn affects the structure of qualifications and the composition of the skills for the professionals in the sector.

#### **a. Brief overview of the report**

The evaluation report consists of 6 chapters. Chapter 1 is executive summary. Chapter 2 - Introduction, includes a short description of evaluation report determinants – its institutional context and a brief description of the evaluated project. It also includes a brief information about evaluator and evaluation methodology. Chapter 3 is dedicated to the description of the evaluation process – including evaluation context, scope and encountered difficulties. The aim of chapter 3 is to give reasoning implemented by the evaluator. Chapter 4 is to present detailed results of evaluation. Chapter 5 is presenting conclusions reached by evaluator as well as suggestions of possible changes in the evaluated materials.

#### **b. General information about evaluation method:**

Evaluation was made on using document review prior to the fieldwork. A document review includes programme documentation (e.g. developed qualification framework for non-hazardous solid waste and Info-Training Toolkit). In the evaluation there were also used relevant reports, publications and legislation acts related to the issue. A list of additional documents included in evaluation process can be found in annex 1.

The main element of the evaluation process was to make internal and external comparisons of qualification framework for solid waste (non-hazardous) managers and training material (Info-Training Toolkit) – internal comparison and with EQF, NQF, BF and technical standards. Comparison process covered the following issues:

- compatibility between qualification framework and range of training material (Info-Training Toolkit),
- compliance with the European Qualifications Framework (EQF),
- compliance with the National Qualifications Framework (NQF),
- compliance with Bologna Framework (BF),
- compliance with the National and European substantive standards in terms of common and technical qualifications (eq. legal acts, norms, BREFs).

In the comparison process there were used the following criteria:

- logical and artificial structure,
- adequacy of requirements (qualification framework) / information (Info-Training Toolkit) to the described qualification,
- reference to existing EFQ, NFQ,
- reference to BF if the EQF reference if level is 6 or more.
- compatibility of requirements described in terms of knowledge, skills and competences with the EQF reference level (insufficient, excess or insufficient)

c. Information about author/evaluator

Evaluator has 11 years of experience in waste management industry. For 5 years had been working in waste treatment plant. Currently is working as an assistant on Warsaw University of Technology, Faculty of Environmental Engineering (waste management team). Apart from research work has also industry experience; is an expert of Innovation Accelerator in the evaluation of technology innovation, expert of Main Technical Organization (NOT) in the evaluation of technology innovation, author of opinions and training materials including: opinions on compliance with the requirements of BAT technology, the analysis of environmental issues in industry, training in the field of waste management, author/co-author of numerous reports and environmental impact studies for environmental decisions.

3. Description of the evaluation process

a. Overview of internal evaluation process

i. Evaluation context

This report is evaluating a qualification framework for solid waste (non-hazardous) managers developed in the mean of the SWFM-QF project Towards a European qualification for Solid Waste Facilities' Managers. The evaluation process was carried out in order to assess the suitability of qualification frameworks and suggested range of training material (Info-Training Toolkit) in the process of increasing mobility in occupations related to waste management in Europe. The evaluation process covered also the internal consistency between qualification frameworks and suggested range of training material (Info-Training Toolkit).

ii. Evaluation scope

The main element of the evaluation process was to make internal and external comparisons of qualification framework for solid waste (non-hazardous) managers and training material (Info-Training Toolkit). The important factor in evaluation was also to determine whether the knowledge, experience and skills required in qualification framework and range of training material in Info-Training Toolkit correspond to those which are useful for Solid Waste Facilities' Managers in practice.

Assessment was carried out taking into account the chosen method, range and criteria of evaluation.

iii. Evaluation process

The evaluation process was carried out in stages, covering successively all the qualifications and Info-Training Toolkit elements.

Qualification frameworks have been evaluated in terms of:

- usefulness of competence in practice
- structure (coherence, logic, complementarity),
- knowledge, skills and qualifications in relation to the EQF level 6,

Training material has been evaluated in terms of:

- sufficiency of training material due to adequate qualification framework,
- the quality of training tool.

At first there have been evaluated technical then common qualifications.

iv. Problems or other relevant information

The main problem in the evaluation process was the lack of opportunities to discuss with the authors of individual qualifications questionable issues. Furthermore, to evaluate the material was presented after the translation process, which may result in "losing" of certain elements.

Nevertheless, the evaluation was performed accurately, based on the available materials, knowledge and experience. It seems that the scope is sufficient to possible amendments aimed at improving the material developed in the SWFM-QF project Towards a European qualification for Solid Waste Facilities' Managers .

b. What criteria did you choose to use in the evaluation process and why

In the comparison process there were used the following criteria:

- logical and artificial structure,
- adequacy of requirements (qualification framework) / information (Info-Training Toolkit) to the described qualification,
- reference to existing EQF, NQF,
- reference to BF if the EQF reference if level is 6 or more.
- compatibility of requirements described in terms of knowledge, skills and competences with the EQF reference level (insufficient, excess or insufficient)

c. Preparation works

I. Was each part of the qualification/training material fairly evaluated, and how did you make sure it was

Each part of the qualification material / training was assessed using the same criteria described in detail in point 3b. For each part of the qualification/training material (including Common and technical qualifications) there have been made internal and external comparisons of qualification framework and training material (Info-Training Toolkit). Internal comparison covered:

- Compatibility of learning outcomes with knowledge, skills and competences assigned.
- compatibility between qualification framework and training material;

External comparison covered EFQ, NFQ, BF and technical standards.

II. How did you ensure that the evaluation process would be:

- Valid

For the evaluation process to be valid, it is based exclusively on existing and real materials, regulations and laws. Are not taken into account theoretical considerations.

- Authentic

Evaluation made in this report is based on the original opinion and statements of the evaluator specifically with reference to the materials delivered by the Institute Of Environmental Protection – qualification framework and training material for common and technical qualifications.

- Reliable

To be reliably assessment was made exclusively on the basis of available knowledge and experience of the evaluator; as well as on current state of art waste management facilities in terms of the conditions prevailing on the Polish market (as the nearest evaluator).

- Consistent

For the assessment was consistent all the elements were evaluated taking into account the same evaluation criteria covered by the same evaluation range.

- Sufficient

For the sufficient evaluation it was crucial to reference to the essential points of the project. These is set out in section 3.a.II. Each qualification (common and technical), including qualification framework and training material, was assessed in accordance with the evaluation scope.

#### 4. Results

##### a. Evaluation of Technical qualifications

##### i. Qualification framework – What was the outcome of the evaluation – any comments suggestions?

There is a lack of cohesion between the qualification framework's structure in technical modules. Each waste processing technology (composting, MBT, incineration or disposal) includes common processes such as: the reception of waste, providing basic process (along with the servicing and maintenance of plant); final waste handling (if any) or the sale of products; emissions control (air emissions, sewage emissions, odors); document management and R&D of the plant. Learning outcome units should be similar for all processes and differ only because of the technical and organizational determinants of individual processes. Such unified arrangement would increase the mobility from one plant to another by using analogy.

Another issue is transport of waste, which may be a part of waste treatment plant (e.g. recycling, MBT) and may also be an external service. Therefore, these issues if they are to be raised, should be included in a separate learning outcome unit that may be a part (optionally) of any technical qualification.

Detailed comments on specific qualifications modules are described below.

### Composting

The qualification framework for composting module has a consistent structure. Broadly covers issues concerning the operation of the composting facility -the knowledge, skills and competence corresponds to the level 6 of EQF.

### Recycling

Qualifications framework in module recycling has not fully understandable structure, at least for evaluator. Learning outcome unit REC-3 (*Permissions management*) should be moved to common qualifications, module Environmental management. This Learning outcome unit should be required for every waste processing technology/method. Apart from that, in technical qualifications part there is no need to include formal and legal issues.

Range of requirements seems to be too narrow in case of recycling module. Do not deal with the management of end products / waste generated, emissions control (sewage, noise, etc.). However in the common qualifications there is operational and environmental management which includes emissions prevention and control from the installation, one can skip this element. However, the requirements for the recycling process should be discussed more.

There is also no module on the organization of the recycling process at the plant and conduct research and development (improving the process).

In this qualification framework knowledge, skills and competence do not correspond to the level 6 of EQF. It would be useful to make this qualifications framework has been extended.

### MBT

Is not quite clear why under the MBT has been obligatory included anaerobic digestion. Within the MBT can be implemented anaerobic or aerobic process. Maybe it would reasonable to divide qualification into composting, anaerobic digestion and mechanical treatment of waste (all as separate qualification). The waste processing plants are different combinations of these processes, e.g. mechanical processing and composting; mechanical processing, composting and anaerobic digestion; mechanical treatment, composting and landfill.

The qualification covers a wide range of knowledge, skills and competence of almost all important issues and corresponds to the level 6 of EQF

### Incineration

The process of thermal treatment of waste is a difficult process that requires close monitoring due to the risk it brings. The units of learning outcomes is not enough detailed knowledge concerning the thermal process, for example to deal with situations start and stop the installation. Missing unit of learning outcomes dedicated to monitoring system, which in the case of incineration plant, is a very important element of control. It would be useful to make this

qualifications framework has been extended. Some of these elements are included in common qualifications - operational management. But still in case of incineration process it is insufficient.

#### Transfer station

The module transfer station includes sufficient range of demanded knowledge expressed by required units of learning outcomes for position of Waste Facility Manager. A little more attention could be devoted to different aspects of waste compacting. It's key issue on transfer stations. Even though the demanded knowledge, skills and social competence corresponds to the level 6 of EQF.

#### Landfill

The qualification framework for landfill has a consistent structure. Covers a wide range of knowledge, skills and competence of almost all important issues. However, there is lack of a learning unit concerning closing and remediation of landfill lodgings. Furthermore knowledge, skills and competence corresponds to the level 6 of EQF

- ii. Knowledge, skills and competencies – What was the outcome of the evaluation – any comments suggestions?

In most cases, the knowledge, skills and competence essentially correspond to the unit of learning outcomes that is described. The modules are very different in detail and extent of described knowledge, skills and competence. In the future, developing further qualifications would be worth to impose as much detail should be described in units of learning outcomes and the same should be performed according to learning outcomes. This would standardize qualifications.

Some modules need to be developed due to level 6 EQF that covers:

- advanced knowledge of a field of work, involving critical understanding of theories and principles,
- advanced skills, demonstrating mastery and innovation required to solve complex and unpredictable problems in a specialized field work ,
- manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable contexts of work,
- take responsibility for managing professional development individuals and groups

In some modules, it is difficult to separate the description of "knowledge" and "competence", and they must be clearly separated. Describing the knowledge, skills and competencies one should pay more attention to the formulation of linguistic descriptions. It is important for the transparency of qualifications structure.

In all modules in the case of competence more attention should be paid to the issue of responsibility. A person who performs a function plant manager should be responsible for the safe and proper functioning of installation in any respect.

- iii. Learning outcomes – What was the outcome of the evaluation – any comments suggestions?

Learning outcomes are generally good assignment to units of learning outcomes. On average, one unit of learning outcomes is assigned by 4-6 learning outcomes. Learning outcomes should be closely linked in with Info-training toolkit for each qualification.

The proposed learning outcomes are sufficient in practical dimension, which is very important due to the fact that they are a the basis for the recognition and transfer of qualifications.

- iv. Info-training toolkit – What was the outcome of the evaluation – any comments suggestions?

Should be strongly related to the required qualifications. In some cases, teaching program treats the issues too broadly. One should note that the required skill level 6 includes advanced knowledge and skills in the particular field.

Teaching program should be therefore advanced and focused strictly on issues a given field (according to the qualification framework). Basic knowledge should be acquired at lower levels of qualifications. These minimum requirements should be expressed in the course description in the form of preliminary qualifications for the participants.

In some cases, too little attention has been devoted to issues of practical /operational difficulties. The practical issues will be crucial for the proper management of the waste treatment facility. The curriculum is missing the section on case studies, which, for such qualifications would be very valuable.

Issue that needs to be improved is to stronger link between the proposed training program and learning outcomes. Learning outcomes define the knowledge, skills, and competence acquired in the learning process. Proven by relevant exams/certificates, learning outcomes are the basis for getting units of learning outcomes and subsequently qualifications.

Another issue is the ability to gain access to materials that represent a source of expert knowledge according to teaching program. These materials should be a recognized and easily accessible source of information on the appropriate area of waste management. Best if these materials are available through the internet.

Below are specific comments on the Info-training toolkit for each technical qualifications.

### Composting

The content of the training material with the requirements of the qualifications. Each Unit of education has its equivalent in the training module. The range the training could be supplemented by block "common problems in the composting process". Requirements for people undergoing training (input criteria) should be referred to the NQF / EQF / BF. The same applies to trainers. It is also essential to determine how the knowledge and skills from the course will be verified. What certificates related to CVET (European Credit System for Vocational Education and Training) will be available.

### Recycling

Teaching program corresponds to qualifications framework demands. However, it is too poor to achieve after this course knowledge, skills and competences in the field of recycling, consistent with the level of 6 EFQ.

Requirements for people undergoing training (input criteria) EQF. They should also refer to BF. The same applies to trainers. It is also essential to determine how the knowledge and skills from the course will be verified. What certificates related to CVET will be available.

### MBT

The info-training toolkit is far too superficial in relation to the qualification framework and in this context it is difficult to assess if it prepares to achieve knowledge, skills and competencies at the level 6 in EQF scale. It would be advisable if the program was referring to learning outcomes contained in the qualification framework.

It should be described what skills are acquired after the course. Best referring to learning outcomes.

There are no qualification requirements for applicants and trainers. Requirements for people undergoing training (input criteria) should be referred to the NQF / EQF / BF. The same applies to trainers. It is also essential to determine how the knowledge and skills from the course will be verified. What certificates related to CVET.

There should also be given educational materials and their sources (possible easily accessible).

### Incineration

Teaching program in general corresponds to qualifications framework demands. However, it is too poor to achieve after this course knowledge, skills and competences in the field of incineration plant management consistent with the level of 6 EQF. Should be described what skills are acquired on the course. Best

referring to learning outcomes (as in the case of the module for the transfer station).

Requirements for people undergoing training (input criteria) should be referred to the NQF / EQF / BF. The same applies to trainers. It is also essential to determine how the knowledge and skills from the course will be verified. What certificates related to CVET.

There should also be given educational materials and their sources.

#### Transfer station

The info-training toolkit does not have the range of issues discussed in the course and are given only qualifications that the candidate will have at the end of the course. The description of training program should cover substantive issues according to the area of knowledge required in units of learning. Very good step, however, is to assign to each module of the course learning outcomes, in accordance with those contained in the qualifications framework. The positive are also easily accessible training materials.

There are no requirements for trainers and undergoing training. Requirements for people undergoing training (input criteria) should be referred to the NQF / EQF / BF. The same applies to trainers. It is also essential to determine how the knowledge and skills from the course will be verified. What certificates related to CVET will be available.

#### Landfill

Teaching program is closely adapted to the requirements of the qualifications of the landfill. Each training module corresponds to one unit of learning outcomes. It would be useful to describe what qualifications a person gets after mastering each of the modules of the course (preferably based on learning outcomes).

Requirements for people undergoing training (input criteria) should be referred to the NQF / EQF / BF. The same applies to trainers. It is also essential to determine how the knowledge and skills from the course will be verified. What certificates related to CVET will be available.

### b. Common qualifications

- i. Qualification framework – What was the outcome of the evaluation – any comments suggestions?

Evaluation of common qualifications is rather difficult due to the fact that it touches on some specific areas of operating waste treatment facility. On one hand the installation manager must know the whole operations in the facility. On the other hand he is in the management of human resources (having partial knowledge in selected areas) which first of all must be properly managed. It must therefore have sufficient knowledge to properly manage the people and the activities in the waste treatment facility, bearing full responsibility for

them. The point is that there must be balance between the required level of knowledge in specific areas and ability control all these areas by one person. The point is not that the facility manager knew everything, but to know how to use the resources he manages and control them.

Below are specific comments on the qualification framework for each common qualification.

#### Health and safety at work module

The module health and safety at work includes sufficient range of demanded knowledge expressed by required units of learning outcomes for position of Waste Facility Manager. The knowledge, skills and competence corresponds to the level 6 of EQF.

#### Public procurements

The public procurements includes sufficient range of demanded knowledge expressed by required units of learning outcomes for position of Waste Facility Manager. The knowledge, skills and competence corresponds to the level 6 of EQF.

Qualification public procurements should also specify that, despite fairly extensive knowledge, in certain situations manager should use the appropriate specialist such as a lawyer. Ability to use specialist knowledge is also an element of professional competence and evidence of responsibility.

#### Financial management

Greater emphasis should be placed on ensuring the financial liquidity a waste treatment facility. Unit of effects of learning outcomes FCM-1 contains learning outcomes for the planning of the budget, however, it seems that too little emphasis is placed on issues related to financial liquidity. This issue is crucial for the stable functioning of a waste treatment facility and should be strongly highlighted.

Issues raised in FCM3, FCM4 and FCM5 in some respects overlap. Therefore, they can be partially compressed by and included one or two units of learning outcomes. This applies especially to FCM3 and FCM4.

In other issues related to the financial management qualification includes sufficient range of demanded knowledge expressed by required units of learning outcomes for position of Waste Facility Manager. The knowledge, skills and social competence corresponds to the level 6 of EQF.

#### Operational management

The module operational management includes wide range of demanded knowledge expressed by required units of learning outcomes for position of Waste Facility Manager. The knowledge, skills and social competence in a substantial part correspond to the level 6 of EQF.

Unit learning outcomes OM3 on the sustainable operation and development could be expanded. This enlargement should include a reference to the application of best available technology requirements (BAT) and simultaneous control of emissions to particular components of the environment.

#### Project management

Project management qualification includes sufficient range of demanded knowledge expressed by required units of learning outcomes for position of Waste Facility Manager. The knowledge, skills and competence corresponds to the level 6 of EQF.

#### Environmental management

Environmental management qualification includes sufficient range of demanded knowledge expressed by required units of learning outcomes for position of Waste Facility Manager. In some places, the scope of the qualifications coincide with the operational management. It may be appropriate to revise these two areas and the removal of overlapping elements (leaving them more matching qualification). It seems that all the elements relating to quality control environment, including formal issues, emission standards, and reporting should be included in environmental management. Purely technological issues should be included in the relevant technological modules.

The knowledge, skills and social competence corresponds to the level 6 of EQF.

#### Human Resource management

The module Human resource management includes wide range of demanded knowledge expressed by required units of learning outcomes for position of Waste Facility Manager. The knowledge, skills and social competence in a substantial part correspond to the level 6 of EQF.

- ii. Knowledge, skills and competencies – What was the outcome of the evaluation – any comments suggestions?

In most cases, the "knowledge", "skills" and "competence" essentially correspond to the unit of learning outcomes that is described.

The modules are very different in detail and extent of described knowledge, skills and competence. In the future, developing further qualifications would be worth to impose as much detail should be described in units of learning outcomes and the same learning outcomes.

- iii. Learning outcomes – What was the outcome of the evaluation – any comments suggestions?

Learning outcomes are generally good assignment to units of learning outcomes. Learning outcomes should be closely linked in with Info-training

toolkit for each qualification. Since learning outcomes are a measure of the requirements you expect and determinant of the quality of education in order to achieve certain qualifications, it must be formulated in a clear and transparent manner. In other words the learning outcome, must be unique in the interpretation and evaluation. In most cases, this condition is fulfilled, but there should be paid attention to the process of formulating learning outcomes, also in terms of semantics.

- iv. Info-training toolkit – What was the outcome of the evaluation – any comments suggestions?

The Info-training toolkit should pay more attention to the link between the scope of the qualifications framework. Each learning unit (from qualification framework) should be assigned to a certain range of course. It will be also necessary to further confirmation of skills.

It also seems that the issues described in info-training toolkit in some points are characterized very generally. One should note that this knowledge is associated to waste treatment facilities and knowledge should refer to this range. Although this applies to qualifications "common" it should be recognized in relation to waste treatment facilities, because they have their specifics.

Below are detailed comments on the info-training toolkit for each common qualification.

#### Health and safety at work module

Teaching program included in the tool information and training is too poor in respect to qualifications framework. Insufficient refers to the specific issues relating to health and safety issues with regard to waste treatment plants. It would be best if each of the learning modules would refer to the one unit of learning outcomes (as is in case of the module composting). Then it is easy to adapt to the requirements of the program.

Requirements for people undergoing training (input criteria) should be referred to the NQF / EQF / BF. The same applies to trainers. It is also essential to determine how the knowledge and skills from the course will be verified. What certificates related to CVET will be available.

There should also be given educational materials and their sources (possible easily accessible).

#### Public procurements

There is no info-training toolkit corresponding to qualifications on public procurement. Should be developed information and training tool dedicated for this qualification. The structure of the tool will not be composed because the qualification consists of one unit of learning outcomes - containing 9 of learning

outcomes. It is suggested to assign each module of the course learning outcomes with those 9 learning outcomes in the qualifications framework.

Requirements for people undergoing training (input criteria) should be referred to the NQF / EQF / BF. The same applies to trainers. It is also essential to determine how the knowledge and skills from the course will be verified. What certificates related to CVET will be available.

There should also be given educational materials and their sources (possible easily accessible).

#### Financial management

Teaching program included in the information tool and training is too poor in respect to prepared qualification requirements. Teaching program is also not adequate to the required qualifications that might be useful in facilities' manager practice. Provides general economic issues, which are not in detail related to a waste treatment facility. It would be best if each of the learning modules would refer to the one unit of learning outcomes. Then it is easy to adapt to the requirements of the program.

Requirements for people undergoing training (input criteria) should be referred to the NQF / EQF / BF. The same applies to trainers. It is also essential to determine how the knowledge and skills from the course will be verified. What certificates related to CVET will be available.

There should also be given educational materials and their sources (possible easily accessible).

They have not been given specific requirements for infrastructure at place of education. But it seems that there should be adapted training rooms equipped with audiovisual tools.

#### Operational management

Teaching program included in the information and training tool is insufficient in respect to qualifications framework. Should be extended if possible.

Requirements for people undergoing training (input criteria) should be referred to the NQF / EQF / BF. The same applies to trainers. It is also essential to determine how the knowledge and skills from the course will be verified. What certificates related to CVET will be available.

There should also be given educational materials and their sources (possible easily accessible).

#### Project management

Teaching program included in the tool information and training is too poor in respect to qualifications framework. Insufficient refers to the specific issues relating to project management issues with regard to waste treatment plants.

Requirements for people undergoing training (input criteria) should be referred to the NQF / EQF / BF. The same applies to trainers. It is also essential to determine how the knowledge and skills from the course will be verified. What certificates related to CVET will be available.

There should also be given educational materials and their sources (possible easily accessible).

#### Environmental management

The info-training toolkit does not have the range of issues discussed on the course and are given only qualifications that the candidate will have at the end of the course. The description of training program should cover substantive issues according to the area of knowledge required in units of learning. Each module of the course is assigned to learning outcomes, in accordance with those contained in the qualifications framework. The positive are also easily accessible training materials.

There are no requirements for trainers and undergoing training. Requirements for people undergoing training (input criteria) should be referred to the NQF / EQF / BF. The same applies to trainers. It is also essential to determine how the knowledge and skills from the course will be verified. What certificates related to CVET will be available.

#### Human Resource management

Teaching program included in the tool information is too weakly related to learning outcomes in qualification framework.

Requirements for people undergoing training (input criteria) should be referred to the NQF / EQF / BF. The same applies to trainers. It is also essential to determine how the knowledge and skills from the course will be verified. What certificates related to CVET will be available.

There should also be given educational materials and their sources (possible easily accessible), and in this case there is no source.

## 5. Conclusions

### i. Discussion of main comments & suggestions

Developed qualifications seem to be a very important factor in improving the quality of the waste management industry. Last years waste treatment facilities are becoming highly technical worksites Implementing innovative solutions and a number of processes on one site. For this reason, there are more expectations persons managing that type of objects. One must possess a number of skills - both technological and general (common). However, ddeveloped material in some places still needs refinement, which is a natural process for creating such comprehensive studies. Below there have been formulated the most important comments, suggestions and reflections arising from the evaluation.

- On the market there is a significant demand for the introduction of qualification frameworks for waste treatment facilities managers. This is due to both: the degree of complexity of these objects, as well as occupational mobility.
- There is a lack of cohesion between the Qualification frameworks structure in technical modules. Each waste processing technology (composting, MBT, incineration or disposal) includes common processes such as: the reception of waste, providing basic process (along with the servicing and maintenance of plant); final waste handling (if any) or the sale of products; emissions control (air emissions, sewage emissions, odors); document management and R&D of the plant. Learning outcome units should be similar for all processes and differ only because of the technical and organizational determinants of individual processes. Such unified arrangement would increase the mobility from one plant to another by using analogy.
- The modules of technology unsatisfactorily has been addressed the issue of control of emissions from the installation. Emissions control should be included in any technology module, because it is a very important element in terms of the safety of people and the environment. At this point it should also find a reference to the best available technology (BAT). The person managing the installation should be familiar with the requirements of BAT and BREF for managed installations, especially they have an inter European context.
- There is also no requirements (or there are is not clearly highlighted) for conducting research and development in waste treatment plants. It is important due to the frequent need to modify the applicable processes/equipment due to the very diverse quality of waste. In reality it often turns out that the technology provided by the producer requires an individual to adapt to the waste and for example enrichment process by an additional device. In addition, the effective operation of a waste treatment plant requires a continuous improvement of the process performed. For this reason, the necessity of R&D work should be the responsibility of facility manager.
- Some learning units will be common to several qualifications. If unify the structure of qualifications frameworks, then by going to work with one type of plant to another such person would have been part of the learning units included. For example learning units concerning transport and mechanical treatment may appear in the transfer station, MBT and in the recycling plant. Transport in fact can be implemented by any type of waste treatment facility. Such unification of structure could also increase the mobility of workers from one technology to another.
- In the future prepared in the SWFM-QF project qualification framework for solid waste (non-hazardous) managers should be closely linked with the system of evaluation by providing:
  - methods and processes used to establish that learner has in fact assimilated the specific knowledge, skills and gained specific competence,
  - describe the process of proving achieved learning outcomes through award of qualifications or their parts (learning units),

- the process of confirming that certain learning outcomes achieved by a learner correspond to specific outcomes required for a learning unit or qualification.
- Qualifications frameworks in terms of knowledge, skills and competences should focus on practical use plant waste management. The level of detail issues characterized in the qualification should therefore be adjusted and present (due to level 6 of the EQF):
  - advanced knowledge of a field of work, involving critical understanding of theories and principles,
  - advanced skills, demonstrating mastery and innovation required that solve complex and unpredictable problems in a specialized field work,
  - manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable contexts of work,
  - take responsibility for managing professional development Individuals and groups.

These elements should therefore be a component of each of the described qualifications.

- Teaching program and info-training toolkit should be strongly according to the qualification framework. Learning outcomes should be result of learning modules in a course. This should be clearly written in the description of the training.
- The training should be focused on showing practical/ useful aspects of the of the managing waste treatment facility. In some cases, too little attention has been devoted to issues of practical /operational difficulties. The practical issues will be crucial for the proper management. Compulsory part of training should also be study visits to relevant sites of waste treatment and training in-situ (in some cases this has been taken into account). It should also suggest the use of audio-visual training tools that allow you to show a lot of practical aspects in the form of animation / films. This is very important especially in the training of the technical modules.
- Requirements for people undergoing training (input criteria) should be referred to the NQF / EQF / BF. The same applies to trainers. It is also essential to determine how the knowledge and skills from the course will be verified. What certificates related to CVET will be available.

## ii. Summary and rationale for suggested changes

Most of developed qualification frameworks have consistent structure. They broadly cover issues concerning the operation of selected waste treatment facilities -the knowledge, skills and competence corresponds to the level 6 of EQF.

In the case of technical refinement will require module recycling and waste incineration module. Notes relating to the qualifications frameworks of the other

modules can be taken into account (if there are such possibilities) or can provide guidance for the future.

Info-training toolkit needs further development in several cases of technical skills and in almost all areas of common qualifications. It's mainly about the clear link between the teaching program and obtained learning outcomes with requirements included in the qualification frameworks. This link should be very clear, optimally when each part of the course is assigned appropriate learning outcomes.

The last thing that certainly needs to be changed is a greater emphasis on practical knowledge acquired on the course. In some teaching programs these elements have been taken into account, but not in all. Compulsory part of training should be:

- classes in waste treatment facilities (study visit with practical demonstration)
- discussing of case studies (including significant problems associated with the operation of waste treatment facilities, a kind of FAQ);
- use multimedia tools during teaching in classes for showing films, animations, diagrams, etc.

Regarding the specific comments in the text they provide guidance for further work in the project. If a part of them may be included it will be very beneficial for improving the quality of developed materials. However, despite of some shortcomings arising from natural mode of cooperation related to the development of demanding and extensive studies, prepared qualification framework for solid waste (non-hazardous) managers developed in the mean of the SWFM-QF project is a very valuable contribution to improving the quality of management of non-hazardous waste facilities in Europe. With this approach, waste treatment facilities will be managed by a highly qualified professionals. In addition, qualifications will be unified across Europe which will affect the possibility of recognition in different countries

## 6. Annexes

### Important documents and legal acts used in evaluation process:

Directive 1999/31/EC (The Landfill Directive)

Directive 2000/76/EC on the incineration of waste

Directive 2008/98/EC on waste (Waste Framework Directive)

Directive 2008/1/EC concerning integrated pollution prevention and control

Integrated Pollution Prevention and Control Reference Document on Best Available Techniques for the Waste Treatments Industries, August 2006

Integrated Pollution Prevention and Control Reference Document on the Best Available Techniques for Waste Incineration, August 2006