

GreenVETAfrica

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Abstract	This deliverable presents the findings of a desk research that examined 20 different vocational education and training (VET) programs related to green waste management in four European Union (EU) countries: Italy, Spain, Germany and Netherlands. The aim of the study was to identify best practices and effective strategies in green waste management technical education. The insights and recommendations from this research will be used to inform the development of GreenVETAfrica training program in Nigeria and Ghana.
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EXECUTIVE SUMMARY

This report “Green Waste Management Available Trainings” represents the deliverable “D2.2 - Green Waste Management Available Trainings” of the European Union project “GreenVETAfrica - Green Waste Management and Micro Entrepreneurship VET in Nigeria and Ghana”, hereinafter referred to as GVA, project number 101092386.

This deliverable details GVA’s “Green Waste Management Available Training” which will serve as a foundation for the development of the training program on GWM in African countries.

The document is organized around 6 chapters:

1. Introduction
2. Context
3. Mapping EU VET programs on Green Waste Management
4. Key Findings
5. Conclusions and recommendations
6. Annex A (provides further details of each training program)

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ABBREVIATIONS

CPC	Certificate of Professional Competence
DWMA	Dutch Waste Management Association
EC	European Commission
EU	European Union
EQAVET	European Quality Assurance in Vocational Education and Training
EQF	European Qualification Framework
F2F	Face to Face
HBO	Higher professional education Netherlands
GWM	Green Waste Management
GVA	GreenVETAfrica
MBO	Secondary vocational education Netherlands
PQ	Professional Qualification
VET	Vocational Education and Training
SRFC	Regional Skills Formalization and Certification System
WO	University education Netherlands
WP	Work Package
WM	Waste Management

1. INTRODUCTION

GreenVETAfrica aims to enhance the training capacities of its technical institution partners in Ghana and Nigeria, and establish an innovative vocational training program for Green Waste Management (GWM) and Micro-Entrepreneurship, which will be piloted with 100 students in the two African countries. To achieve this goal, **a research study was conducted on European VET training programs in four EU countries, analysing 20 different training programs related to the area of green waste management.** The results of this research will serve as a foundation for the development of the training program in GWM in African countries.

This document provides a summary of an analysis conducted as part of the GreenVetAfrica project's Work Package 2 (WP2), with the goal of identifying Green Waste Management vocational education and training (VET) programs in the European Union. **The purpose of this document is to present key findings of the analysis.**

The document begins by providing a concise definition of Green Waste Management (GWM) and its relevance within the scope of the GVA project. It is followed by a discussion of the significance of EU regulations in the field of GWM.

The main objective of the research is to analyse 20 Vocational Education and Training (VET) programs from four EU countries: Spain, Italy, Germany, and the Netherlands, which can be found in Annex A of the document. The analysis considers various factors such as accreditation levels, entry requirements, delivery modes, and program duration. However, it is important to note that due to language limitations, some of the sources were only available in the national language, which may have affected the results of the analysis.

Based on the analysis of the VET programs, **the document presents key findings** that can be useful for building effective GWM training programs.

Finally, the document provides **recommendations for the implementation of GWM training programs**, including the selection of entry requirements, consideration of delivery modes, and a description of the content and key competences.

2. CONTEXT

2.1. WHAT IS GREEN WASTE MANAGEMENT?

Green waste management refers to the collection, transportation, processing, recycling, and disposal of organic waste materials such as garden waste, food waste, and agricultural waste in an environmentally-friendly and sustainable manner. This process aims to reduce the amount of waste sent to landfills and promote the reuse and recycling of organic materials, which can help to reduce greenhouse gas emissions and protect the environment. Green waste management also involves the use of composting, anaerobic digestion, and other technologies to convert organic waste into valuable products such as fertilizer and renewable energy sources. However, the focus of the GreenVETAfrica project is mostly the study of training programs focused on waste management in cities (mainly solid and industrial waste).

In Europe, Green Waste management is based on **EU waste policies** which aim to contribute to the circular economy by extracting high-quality resources from waste as much as possible. The European Green Deal¹ aims to promote growth by transitioning to a modern, resource-efficient and competitive economy. As part of this transition, several EU waste laws will be reviewed.² **The Waste Framework Directive³** is the EU's legal framework for treating and managing waste in the EU. It introduces an order of preference for waste management in the five-steps, called the "waste hierarchy".



FIGURE 1: WASTE HIERARCHY

¹ https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

² <https://eur-lex.europa.eu/TodayOJ/>

³ https://environment.ec.europa.eu/topics/waste-and-recycling/waste-framework-directive_en

2.2. GREEN WASTE MANAGEMENT EU POLICIES

EU policies on green waste management exist with the aim to address the environmental, economic, and social challenges associated with the generation and management of waste in the European Union. **These policies aim to promote a more sustainable approach to waste management by reducing the amount of waste generated, increasing resource efficiency, and promoting recycling and recovery of waste materials.** Policies are intended to guide EU member states in their waste management practices and promote a more sustainable and circular economy. In addition to environmental and public health considerations, EU policies on green waste management also address economic and social challenges. For example, these policies can help to create new job opportunities in the waste management and recycling sectors and promote the development of a circular economy, where waste is seen as a resource rather than a burden.

It is worth mentioning that they are also accompanied by funding and support programs, such as the LIFE program, Erasmus+ and other EU initiatives that provide funding for environmental and climate action projects.

Here are some of the key policies at the EU level:

1. **Circular Economy Action Plan⁴**: This plan aims to promote the transition to a circular economy, where waste is reduced and resources are used more efficiently. It includes targets for reducing waste and increasing the recycling of key materials such as plastics, metals, and glass.
2. **Landfill Directive⁵**: This directive aims to reduce the environmental impact of landfill sites by setting minimum requirements for their design, operation, and closure. It also sets targets for reducing the amount of biodegradable waste sent to landfill.
3. **Packaging and Packaging Waste Directive⁶**: This directive sets targets for the recycling and recovery of packaging waste, and promotes the use of environmentally-friendly packaging materials.
4. **European Green Deal⁷**: This is a broad policy framework that aims to make the EU's economy more sustainable and climate-neutral by 2050. It includes targets for reducing greenhouse gas emissions, promoting circular economy practices and reducing waste.
5. **Bioeconomy Strategy⁸**: This strategy aims to promote the sustainable use of renewable biological resources, including green waste, to support economic growth and job creation in Europe.

Overall, EU laws on green waste management are an important pillar for promoting sustainable, environmentally responsible waste management practices that benefit both people and the planet, which should also be one of the key aspects of the Green Waste Management training programs.

By including the legal framework in Green Waste Management as a **part of vocational training programs, trainees can gain knowledge of the relevant EU laws and regulations and learn how to apply them in real-world scenarios.** This knowledge can help trainees to identify and address legal and regulatory issues that may arise in their work, such as compliance with waste disposal regulations or obtaining permits for waste management operations. Understanding the legal framework is an essential part of developing effective waste management strategies that comply with the law and protect public health and the environment. Overall, **including the legal framework in vocational training programs for green waste management can promote a culture of compliance and responsible waste management practices, as trainees who understand the importance of compliance with waste management laws and regulations are more likely to adopt responsible waste management practices in their work.**

⁴ https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en ; and the text <https://eur-lex.europa.eu/TodayOJ/>

⁵ https://environment.ec.europa.eu/topics/waste-and-recycling/landfill-waste_en#:~:text=The%20Landfill%20Directive%20aims%20to,rigorous%20operational%20and%20technical%20requirements.

⁶ https://environment.ec.europa.eu/topics/waste-and-recycling/packaging-waste_en

⁷ https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_es

⁸ https://research-and-innovation.ec.europa.eu/research-area/environment/bioeconomy/bioeconomy-strategy_en

3. MAPPING EU VET PROGRAMS ON GREEN WASTE MANAGEMENT

3.1 LEADING COUNTRIES IN EUROPE IN GWM

In Europe, many countries prioritise sustainability and environmental protection and are well-known for their expertise in Green Waste Management. These countries offer excellent education and training programs in this field. Below are some of the leading countries in Europe renowned for their Green Waste Management education and training programs:

1. **Germany:** Germany has a strong reputation for environmental protection and sustainability and offers many vocational training programs focused on green waste management. These programs cover topics such as composting, recycling and waste reduction.
 - The German Federal Environment Agency⁹ provides information on vocational training programs in the environmental sector, including those focused on green waste management.
2. **The Netherlands:** The Netherlands is known for its progressive environmental policies and offers vocational training programs in green waste management that emphasize circular economy principles and sustainable waste management practices.
 - The Dutch Government's website¹⁰ provides information on vocational training programs in the Netherlands, including those focused on circular economy and sustainable waste management.
3. **Denmark:** Denmark is a leader in sustainability and renewable energy, and offers vocational training programs in green waste management that emphasize waste reduction and recycling.
 - The Danish Environmental Protection Agency¹¹ provides information on vocational training programs in the environmental sector, including those focused on green waste management.
4. **Switzerland:** Switzerland is known for its high-quality vocational education system, and offers training programs in green waste management that focus on sustainable waste management practices and resource efficiency.
 - The Swiss Federal Office for the Environment¹² provides information on vocational training programs in the environmental sector, including those focused on sustainable waste management.
5. **Sweden:** Sweden has a strong commitment to sustainability and offers vocational training programs in green waste management that focus on sustainable waste management practices and circular economy principles.
 - The Swedish Environmental Protection Agency¹³ provides information on vocational training programs in the environmental sector, including those focused on sustainable waste management.

For the purpose of this research, we have chosen to analyse vocational education training (VET) programs in Green Waste Management in **four European Union (EU) countries**. Two of the selected countries: **Italy and Spain**

⁹<https://www.umweltbundesamt.de/en/topics/education-careers/vocational-training-in-the-environmental-sector>

¹⁰<https://www.government.nl/>

¹¹ <https://eng.mst.dk/sustainability/>

¹²<https://www.bafu.admin.ch/bafu/en/home/topics/climate/info-specialists/reduction-measures/climate-programme/climate-programme-training.html>

¹³ <https://www.naturvardsverket.se/Om-Naturvardsverket/Jobba-hos-oss/Utbildning-och-praktik/>

are the countries where GreenVETAfrica partners are based in. The other two countries, **Germany** and the **Netherlands**, are recognised as leading examples in waste management in Europe.

3.2. MAPPING OF 20 EU TRAINING PROGRAMS

Through a desk research, led by MUNDUS, a mapping scheme was developed to identify 20 different Green Waste Management (GWM) training programs across the four selected European countries. For each country, five different training programs in the field were identified. Additionally, a comprehensive directory of GWM vocational education and training (VET) programs has been created and will serve for further development of the project.

This was achieved by conducting online research, consulting educational institutions and industry associations, and gathering information from government agencies and non-profit organisations that focus on green waste management. The described map has helped identify training opportunities, highlight best practices in the field, and inform about the development of new VET programs to meet the needs of the green waste management sector.

Mapping green waste management VET programs in the EU includes identification and categorization of the various training programs that exist in the field. To achieve this, a template for analysis was developed and implemented to assess each program:

TABLE 1: TEMPLATE FOR ANALYSIS OF TRAINING PROGRAM

Title	
Public vs. Private	
Educational level (University, VET, etc..)	
Accreditation level (EQF)	
Entry Requirements	
Modality (f2f, online)	
Duration	
Main training modules	
Key competences	
Syllabus/Curriculum/program	
Possible Work Placement	
Other links	

The analysis focused on the following aspects of each training program:

- 1. Public/private sector program:** There are some differences between the public education programs (free/partly subsidized) or private ones in terms of funding and fees
- 2. Level of education:** The level of education can also vary, ranging from secondary education to higher education or continuing education.
- 3. Accreditation levels:** There are different types of VET programs in green waste management, including apprenticeships, vocational schools, and training courses, which have different accreditation levels. VET

programs may offer accreditation or certification upon completion, which can be important for demonstrating skills and knowledge to employers. In the research the main reference was European Qualification Framework.¹⁴

4. **Entry requirements:** Training may have different entry requirements such as previous education, certifications, and grades, etc.
5. **Modality (Delivery mode):** VET programs can be delivered through traditional classroom-based instruction f2f, online courses, or on-the-job training, blended learning, etc.
6. **Duration of program:** VET programs can vary in length, from short courses to multi-year programs.
7. **Main training modules:** Identification of the main training modules and contents to provide an overview of what is covered in each program.
8. **Key competences:** Key competencies identified from the training programs.
9. **Syllabus/Curriculum/program:** Direct links to description of the training content/program.
10. **Possible Work Placement:** Suggested as potential places where a person can be hired after obtaining the certification.
11. **Other links:** Other useful resources such as links to relevant websites, organizations, and publications are also provided for the future needs of development of training programs

In addition, the different training programs analysed in the four countries are being listed. Later on, for each country a brief summary of the education system and training programs related to green waste management is being presented. When it comes to the analysis of the training programs, detailed information can be found in the Annex A.

TABLE 2: SUMMARY OF TRAINING PROGRAMS ANALYSED PER COUNTRY

Spain	<ol style="list-style-type: none"> 1. Urban and Industrial Waste Management 2. Environmental Health Technician 3. Waste Management Specialist 4. Senior Technician in Waste Management 5. Cleaning in Open Spaces and Industrial Facilities
Italy	<ol style="list-style-type: none"> 1. Superior Technician for Circular Economy and Waste Management 2. Operator for the Treatment, Recovery and Disposal of Waste 3. Waste Recovery and Disposal Technician 4. Superior Technician for Collection Systems & Waste Disposal 5. Environmental Operator Course
Germany	<ol style="list-style-type: none"> 1. Circular and waste management professionals 2. Professional Waste truck driver 3. Specialist for Recycling and Waste Management - focus on waste disposal and treatment, waste recycling and treatment, logistics, collection and distribution (training) 4. Master craftsman for recycling waste management and city cleaning (IHK) 5. Apprenticeship as a specialist in recycling and waste management – focus on waste recycling and treatment
Netherlands	<ol style="list-style-type: none"> 1. Sustainable Integrated Waste Management Training 2. Online course Solid Waste Management 3. Lost Harvest and Wasted Food 4. Course on Solid Waste Management (Online) 5. Waste Management & Sustainability

¹⁴ <https://europa.eu/europass/en/europass-tools/european-qualifications-framework>

3.2.1. Spain

In Spain, vocational training is the responsibility of the autonomous communities. There are also different courses available to improve the professional qualifications of workers as well as those who are unemployed. Specific vocational training is divided into two levels, each with different requirements for access that depend on the age of the student at the end of the calendar year. The levels are: 1) Intermediate Vocational Training Cycle (3 years) and 2) Higher Vocational Training Cycle (4 years).¹⁵

The National Catalogue of Professional Qualifications is an instrument of the National System of Qualifications and Vocational Training that serves to evaluate and accredit the professional competencies that are acquired through work experience or training. It includes the most significant professional qualifications of the Spanish productive system by professional families and levels according to the criteria established by the European Union. It has national validity and collects the various ways of acquiring vocational training. It is the basis and reference for developing the training offer: **1) vocational training certificates** and **2) professional certificates**. Vocational training related to Waste Management belongs to the Professional Family of Security and Environment:

- Higher Vocational Training Cycle - Environmental Education and Control / LOE Title (4 years)
- Professional Certificate “SEAG0109 Interpretation and Environmental Education” (500h)¹⁶

Waste Management Technician

One can opt for a vocational training program such as the Higher Technician Cycle in Environmental Health or obtain the Professional Certificate “SEAG0108 in Urban and Industrial Waste Management directly”.

Depending on the sector and the type of waste generated, these professionals can specialise in:¹⁷

- Urban waste management
- Bio-sanitary waste management
- Hazardous waste management
- Construction waste management
- Petrochemical waste management
- Recovery, recycling and valuation of waste: glass, paper/cardboard, plastic, batteries, metals...

In Spain, following training programs were analysed for the purposes this research:

1. Urban and Industrial Waste Management
2. Environmental Health Technician
3. Waste Management Specialist
4. Senior Technician in Waste Management
5. Cleaning in Open Spaces and Industrial Facilities

3.2.2. Italy

Italy has a vocational education and training (VET) system that includes different training programs related to green waste management. The VET system is regulated by the Ministry of Education and the Ministry of Labour and Social Policies. **The VET system in Italy includes both formal and non-formal training programs.** Formal training programs are offered by technical schools, vocational training centres, and universities, while non-formal training programs are offered by private training institutions, trade associations, and non-governmental organizations.¹⁸

The formal VET system in Italy for green waste management includes a range of qualifications and certifications, including a Certificate of Professional Competence (CPC) and a Professional Qualification (PQ) for waste management technicians. These qualifications are obtained through a combination of theoretical classroom instruction and hands-on training in the workplace.

The VET system also includes apprenticeship programs for young people who want to work in green waste management. These programs provide on-the-job training and classroom instruction and apprentices receive a

¹⁵ <https://todofp.es/sobre-fp/informacion-general/sistema-nacional-cualificaciones-fp.html>

¹⁶ <https://www.miteco.gob.es/es/ceneam/formacion-ambiental/formacion-reglada/formacion-profesional.aspx>

¹⁷ <https://www.cursosypostgrados.com/profesiones/tecnico-en-gestion-de-residuos.html>

¹⁸ <https://www.cedefop.europa.eu/en/tools/vet-in-europe/systems/italy-2019>

salary while they learn. Some regions adopt “Regional Skills Formalisation and Certification System” (SRFC), which makes it possible to formalise and certify the skills acquired by people, not only as a result of training courses but also through work experience, in relation to the professional standards of the Regional Qualification System.¹⁹ The SRFC applies:

- in all training courses in which professional technical skills are developed
- in traineeships and in the civil service
- in apprenticeship
- in the workplace, to integrate the active policy measures provided by the employment centers and accredited private subjects of the Active Network for work

In addition to the formal VET system, Italy has a range of non-formal training programs related to green waste management. These programs are offered by private training institutions, trade associations, and non-governmental organizations. They may include short courses, seminars, workshops, and conferences.

In Italy, following training programs were analysed for the purposes this research:

1. Superior Technician for Circular Economy and Waste Management
2. Operator for the Treatment, Recovery and Disposal of Waste
3. Waste Recovery and Disposal Technician
4. Superior Technician for Collection Systems E Waste Disposal
5. Environmental Operator Course

3.2.3. Germany

Germany, like many other European countries, has a National Vocational Education and Training (NVET) system for Waste Management. The vocational training for environmental occupations is governed by the "Regulation on Vocational Training in Environmental Occupations" (“Verordnung über die Berufsausbildung in den umwelttechnischen Berufen”). This regulation outlines the rules and framework for specialization in four areas: **a) water supply technology, b) wastewater technology, c) recycling and waste management, and d) pipe, sewer, and industrial services.**

The recycling and waste management specialist course offers three options:

- a) Waste disposal and treatment
- b) Waste recycling and treatment
- c) Logistics, collection and sales

Germany operates a dual training system that combines vocational education at a vocational school with an apprenticeship at an industry or company. Upon completion of the three-year training and passing the exams, candidates receive a certificate in Waste Management (WM) that forms the basis for state-approved environmental technology experts. The training focuses on developing competencies for technician-level jobs, including independent planning, implementation, and monitoring in the context of the intended occupation.

After completing the vocational education, candidates can opt for further training as a "Meister" (master craftsman), which includes theoretical and practical training in the craft, as well as business and legal training. The qualification allows them to train apprentices, and the examination for the Masters course is regulated by an Ordinance on the Approved Examination for Certified Master for Circular Economy and Waste Management and City Cleaning'. The Meister training prepares candidates for manager-level jobs.

For accreditation of VET in Germany, the federal government is the overall accreditation body, and centers of expertise or certification agencies operate at the regional level. The local chamber of commerce is the main awarding body, while quality assurance is overseen by local agencies certified by the German Federal Employment Agency. German institutions are active in the European Quality Assurance in Vocational Education and Training (EQAVET), a community of practice aimed at improving quality assurance in European VET systems within the context of the implementation of the European Quality Assurance Reference Framework.²⁰

¹⁹ <https://formazione.lavoro.regione.emilia-romagna.it/qualifiche/approfondimenti/srhc>

²⁰ <https://yourstory.com/mystory/2d5025530b-lessons-on-capacity-bu>

In Germany, following training programs were analysed for the purposes this research:

1. Circular and waste management professionals
2. Professional Waste truck driver
3. Specialist for Recycling and Waste Management - focus on waste disposal and treatment, waste recycling and treatment, logistics, collection and distribution (training)
4. Master craftsman for recycling waste management and city cleaning (IHK)
5. Apprenticeship as a specialist in recycling and waste management – focus on waste recycling and treatment

3.2.4. Netherlands

The VET system in the Netherlands consists of several levels, starting from secondary vocational education (MBO) and leading up to higher professional education (HBO) and university education (WO). The MBO level, which is the main focus of vocational training related to green waste management, offers various courses and programs related to this field.²¹

There are several MBO-level courses and programs related to green waste management in the Netherlands, which are offered by various educational institutions. These programs range from one to four years and include both classrooms learning and practical training.²²

In the Netherlands, the vocational education and training (VET) system related to green waste management is well-established and comprehensive. The system is designed to provide students with the necessary skills and knowledge to work in the industry of green waste management, which includes areas such as composting, recycling, and waste reduction.²³

Additionally, there are several professional organizations in the Netherlands that offer certifications related to waste management, such as the Dutch Waste Management Association (DWMA)²⁴ and the Waste Management Association (WMA). These certifications demonstrate that individuals have the knowledge and skills needed to work in the waste management industry and stay up-to-date with current regulations and practices.

In Netherlands, following training programs were analysed for the purposes this research:

1. Sustainable Integrated Waste Management Training
2. Online course Solid Waste Management
3. Lost Harvest and Wasted Food
4. Course on Solid Waste Management (Online)
5. Waste Management & Sustainability

²¹ <https://www.oecd.org/education/skills-beyond-school/A-Skills-Beyond-School-Review-of-the-Netherlands.pdf>

²² <https://www.government.nl/topics/secondary-vocational-education-mbo-and-tertiary-higher-education>

²³ http://hozekf.oerp.ir/sites/hozekf.oerp.ir/files/kar_fanavari/manabe%20book/TVET/Enhancing%20Teaching%20and%20Learning%20in%20the%20Dutch%20Vocational%20Education%20System_%20Reforms%20Enacted.pdf

²⁴ <https://www.wastematters.eu/>

4. KEY FINDINGS

4.1. BRIEF SUMMARY OF THE KEY ELEMENTS ANALYSED

In the four countries analysed, both public and private sector programs on GWM are widely available. However, the majority of the materials are available only in the national language, limiting our research to sources that allow online translation to English. This is one of the main limitations of our study. The analysis results demonstrate some similarities, particularly between Spain and Italy, as well as between Germany and the Netherlands. A brief summary of the key findings is presented, but for more detailed insights into each training program, please refer to Annex A. **The technical titles and certifications** for green waste management vary by country. The most common program titles found in our research were "**Waste Recovery and Disposal Technician**" and "**Specialist for Recycling and Waste Management/Waste Management Specialist**". The majority of the training programs identified were classified into three categories: a) Regular VET education, b) Subsidised courses, and c) Private courses (with a fee), when it comes to the **educational level category**. **In terms of accreditation levels**, most of the VET or complementary programs found were classified according to the **European Qualifications Framework**²⁵ (EQF) levels 2 to 5, with some variations observed among the countries. However, some programs did not specify their accreditation level. It is important to note that some private/online courses may fall under the category of Non-formal education, and therefore, may not follow the EQF classification system. **Entry requirements** for green waste management VET programs vary depending on the specific program. For example, regular VET education typically requires a degree from obligatory basic education or a higher level of secondary education. Subvention courses are often designed for employed workers, companies, or students, and may have different requirements. Private courses with a fee usually do not have any special requirements for admission. In terms of **delivery mode**, the analysed programs offer a variety of face-to-face, blended, and online courses, providing a good range of options for learners. In Germany and the Netherlands, many programs are part of the dual education system, where training is provided by the company and includes both theoretical and practical components.

Duration of program: There is a great variety for the duration of the training program. For example:

- a) Regular VET education - usually 3 years education
- b) Subvention courses - between 60 - 2 000h
- c) Private course - blended or Online - 60 - 500h

The syllabus, curriculum or content program mostly were publicly accessible and have at least a brief description. However, some courses in Germany and the Netherlands do not have open access. In this section of each table, links to the program description or curriculum are provided, which can be useful for future development of training programs.

Possible Work Placement: This section is the one with the most variety in answers. For most of the countries there are different possibilities both in the public and private sector.

Main training modules and Key competences are going to be described in detail in the following section.

4.2. KEY COMPETENCIES IDENTIFIED

In this research 20 vocational education and training (VET) programs related to Global Waste Management (GWM) were analysed or examined, and based on this analysis, **specific competencies were identified as important for sustainable waste management training programs**.

These competencies are the skills and knowledge that students or trainees should acquire during the program in order to be able to design, implement and monitor effective and sustainable waste management systems. In

²⁵ Ivi14. <https://europa.eu/europass/en/europass-tools/european-qualifications-framework>

other words, these competencies are the essential components or learning outcomes of a high-quality waste management training program. Identified competencies are following:

- Knowledge of the main **waste management policies and regulations**, both nationally and internationally
- Skills in the **identification and quantification of waste**, and in its **classification** according to its composition and dangerousness
- **Understand different types** of waste, their handling, storage, disposal requirements, and their potential effect on the environment
- Ability to **design and plan sustainable waste management systems** that integrate the different waste management strategies (reduction, reuse, recycling, composting, etc.)
- **Knowledge of the technologies and equipment** necessary for sustainable waste management, including landfill management, recycling plant management, hazardous waste treatment facility management, among others
- Knowledge on aspects relating to **safety at work**
- **Skills to assess the environmental and economic impacts** of different waste management options and to select the most appropriate option based on specific circumstances
- **Skills in communication and coordination** with other relevant actors, including companies and local communities
- Skills related to **administrative management** - creating reports and the related documentation
- **Communication skills** to effectively communicate waste management plans and strategies to stakeholders

Based on that, we could also point out **main training topics/subjects** that could be taught in a sustainable waste management training include:

- Waste management policies and regulations
- Classification and characterization of waste
- Waste treatment and disposal technologies
- Waste Collection & Transport
- Design and planning of waste management systems.
- Treatment/disposal Technologies
- Environmental and economic impact assessment
- Communication and coordination with other relevant actors
- Practical cases and case studies on sustainable waste management
- Financial, Social and Institutional aspects

5. CONCLUSIONS AND RECOMMENDATIONS

This research has provided many important insights for the future development of training on Green Waste Management in Africa. EU training programs analysed in this research provided valuable information about different aspects of training organization, key competences and main contents to be included.

Main limitations of this study are lack of the sources available in English and lack of open source training program descriptions. Besides, not all courses specify which are the potential job opportunities to be obtained thanks to this certification. For the purpose of this study we have also contacted various training institutions (especially in Germany and Netherlands), asking for additional information or orientation to other VET institutions from the field, but there was no answer. Here is the list of additional recommendations based on the research:

1. **When building the training content take a closer look at the links in the section Programs/Syllabus:** This means that when designing or developing a training program for green waste management, it is important to carefully review the programs and syllabus of existing VET programs (Annex 1). These programs and syllabus can provide a valuable resource for understanding the content and structure of effective green waste management training.
2. **Include key competencies identified and main content:** It is important to include the key competencies and main content identified from existing green waste management VET programs in this research when building a new training program. This ensures that the program covers the essential skills and knowledge necessary for effective green waste management.
3. **Decide what the entry requirements are:** Entry requirements for a training program can vary widely, from previous education, to certifications, to grades. It is important to carefully consider which entry requirements will be necessary for the new training program to ensure that participants have the necessary foundational knowledge and skills.
4. **Study possibilities for delivery mode:** There are many different delivery modes for VET programs, including traditional classroom-based instruction, online courses, on-the-job training, and blended learning. It is important to analyse the possible delivery methods and select the one that best meets the needs of the target audience and the content of the training.
5. **Describe well how the evaluation is going to be done:** Evaluation and assessment are critical components of any training program. It is important to describe how evaluation and assessment will be done, including the criteria for success, the types of assessments that will be used, and how results will be measured and reported.
6. **Describe what that certificate will allow the person to do:** Certificates or other forms of accreditation can be important for demonstrating skills and knowledge to employers. When developing a new training program, it is important to describe what the certificate or other form of accreditation will allow the person to do, such as qualify for certain jobs or advance in their career. This can help motivate participants to complete the training and achieve their goals.

Final Words

In order to effectively manage waste in developing countries, it is necessary to move away from conventional practices and embrace more resource-efficient, participatory, and locally developed advanced systems. This shift requires **capacity building through education and skill training**, as technologies from developed countries must be adapted to local conditions to succeed. It is crucial to continuously build new capacities among local authorities, industries, NGOs, and the informal sector while also upgrading the existing knowledge base to meet the changing market needs. Higher education institutions, private and government industrial training institutes, vocational education and other training institutions have a significant role in bridging this gap. Such training programs are increasingly recognized by the international community, but also need to be scaled at national, regional, and local levels in the developing countries where they are most needed. The training should link education with industrial demand and certify individuals based on the skills and competencies gained.

Local problems can often be addressed using local resources and training, but new challenges may require more advanced knowledge and concept building. To meet these challenges, it is important to leverage globalization and promote collaborations and exchanges among institutions at a cross bordering level. Therefore, synergies between different actors - education, policy makers and the local business are crucial for the successful creation of the new training programs, but also transnational cooperation and projects can bring significant benefits in supporting the transition to building new capacities in education and training.

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Link to Google drive folder with resources:

https://drive.google.com/drive/folders/1kdKpf5yCneZ16eDkdxJkFPOaiOW9VTab?usp=share_link

ANNEX A- TRAINING PROGRAMS ANALYSIS

SPAIN

	1
Title	Urban and Industrial Waste Management (Gestión de Residuos Urbanos e Industriales)
Public vs. Private	Public (granted)
Educational level (university, vet, etc..)	Certificate of professionalism (VET)
Accreditation level (EQF)	Level 2
Entry requirements	Title of basic secondary Education
Modality (f2f, Online)	F2F
Duration	280h
Main training modules	<p>MF0076_2 Urban waste management. - 100 h</p> <ul style="list-style-type: none"> ○ UF0284 Collection and transportation of urban or municipal waste. - 30h ○ UF0285 Treatment of urban or municipal waste. - 40h <p>MF0077_2 Industrial waste management. - 120h.</p> <ul style="list-style-type: none"> ○ UF0287 Identification of industrial waste. - 30h ○ UF0288 Characterization of industrial waste. - 50h ○ UF0286 Management of inert waste. - 30h ○ UF0289 Operations for the management of industrial waste. - 40h <p>MF0075_2 Safety and health. - 50h</p>
Key competences	<p>C1: Identify the needs of the different waste containers for a given area, as well as the operations for their maintenance.</p> <p>C2: Analyse the characteristics of the collection and transport of urban or municipal waste.</p> <p>C3: Identify the urban or municipal waste treatment operations in treatment plants or landfills.</p> <p>C4: Explain the operations of discharge, biogas extraction, leachate purification, control and sealing of the landfill.</p> <p>C5: Identify the operations for the collection, transport, treatment and dumping of inert waste.</p> <p>C6: Carry out the identification of admissible industrial waste in the treatment plant or security deposit, indicating the procedures to be followed for its final disposal.</p> <p>C7: Characterise industrial waste likely to be treated at the plant or dumped in security deposits.</p> <p>C8: Explain the operations for the management of industrial waste, from its collection to its final disposal.</p> <p>C9: Identify the risks associated with the activity.</p> <p>C10: Apply the appropriate prevention and protection measures to the risks derived from the specific activity.</p>
Syllabus/Curriculum/pro	https://www.zaragozadinamica.es/component/buscadorcursos/1392/100/curso

gram	/gestion-de-residuos-urbanos-e-industriales
Possible Work placements	Not found

	2
Title	Environmental Health Technician (Técnico en Salud Ambiental)
Public vs. Private	Public (granted)
Educational level (university, vet, etc..)	VET
Accreditation level (EQF)	Level 4
Entry requirements	Bachelor's degree, or a certificate accrediting having passed all the subjects of the Baccalaureate (level 3) or Technical Title (Intermediate Vocational Training (level 3).
Modality (f2f, Online)	Face - to - Face
Duration	2.000h
Main training modules	<p>In the educational center, through theoretical-practical training. The contents are grouped into the following professional modules:</p> <ul style="list-style-type: none"> ○ Organization and management of the environmental health unit. ○ Water for use and consumption. ○ Atmospheric pollution. ○ Chemical products and vectors of interest in public health. ○ Solid waste and half built. ○ Control and surveillance of food contamination. ○ Health education and health promotion. ○ Labour Training and Orientation (F.O.L.). <p>In companies, at the end of the training in the educational center, completing and carrying out activities typical of the profession: Training in Work Centers (F.C.T.).</p>
Key competences	<ul style="list-style-type: none"> ○ Administer and manage the environmental health unit. ○ Identify, control and monitor the risks to the health of the general population associated with the use of water. ○ Identify, control and monitor the risks to the health of the general population associated with air and different energy sources. ○ Identify, control and monitor the risks to the health of the general population associated with chemical products and sectors of interest in public health. ○ Identify, control and monitor the risks to the health of the general population associated with the management of solid waste and the built environment. ○ Identify, control and monitor the risks to the health of the general population associated with food contamination. ○ Promote people's health through environmental education activities.
Syllabus/Curriculum/ Program	<ul style="list-style-type: none"> ○ https://www.universidadlaboraldemalaga.es/programaciones/cat/educacion-y-control-ambiental ○ https://www.juntadeandalucia.es/educacion/portals/web/formacion-profesional-andaluza/fp-grado-superior/detalle-titulo?idTitulo=375

	<ul style="list-style-type: none"> ○ https://boe.es/diario_boe/txt.php?id=BOE-A-1995-14110
Other links	https://www.todofp.es/que-estudiar/logse/sanidad/salud-ambiental.html
Possible Work placements	<ul style="list-style-type: none"> ○ Environmental Health Technician ○ Drinking Water Control Technician ○ Atmospheric Pollution Technician ○ Waste Management Technician ○ In the industrial sector and in the administration (national, regional and local) within the area of environmental health

	3
Title	Waste Management Specialist
Public vs. Private	Private (890€)
Educational level (university, vet, etc..)	Not found - Instituto Superior de Medioambiente
Accreditation level (EQF)	No information found
Modality (f2f, Online)	Online
Duration	280h
Main training modules	<ul style="list-style-type: none"> ○ Module I: Urban Solid Waste Management ○ Module II: Industrial Waste Management ○ Module III: Safety Advisor (ADR)- Transport of Dangerous Goods ○ Module IV: Soil and Groundwater Contamination
Key competences	<ul style="list-style-type: none"> ○ Knowledge of waste management regulations and policies (EU and local level) ○ Understanding of the different types of waste and their impact on the environment and human health in the city ○ Familiarity with the various waste management techniques, including collection, transport, treatment, and disposal ○ Ability to identify potential environmental risks (for ground, water, air) and develop strategies to mitigate them ○ Communication skills to effectively communicate waste management plans and strategies to stakeholders.
Syllabus/Curriculum/ Program	https://www.ismedioambiente.com/programas-formativos/curso-especialista-en-gestion-de-residuos/?gclid=EAlaIqobChMI_ZPwvcjR_gIV_gUGAB26WQqeEAMYASAAEgInn_D_BwE
Possible Work placements	Not found

	4
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Title	Senior Technician in Waste Management (Online COURSE Inem Sepe 2023)
Public vs. Private	Public - Subsidized Course for workers (Self-employed or employed)
Educational level (university, vet, etc..)	VET
Accreditation level (EQF)	3
Entry requirements	For employed people and Students in Spain (for free)
Modality (f2f, Online)	Online
Duration	180h
Main training modules	<ul style="list-style-type: none"> ○ Unit 1. Solid Waste ○ Unit 2. Urban Solid Waste ○ Unit 3. Agricultural Waste ○ Unit 4. Livestock Waste ○ Unit 5. Industrial Waste ○ Unit 6. Radioactive Waste ○ Unit 7. Special Waste ○ Unit 8. Waste Treatment ○ Unit 9. The Landfill ○ Unit 10. Waste Thermal Treatment Plants ○ Unit 11. The Triple R ○ Unit 12. Basic Notions on The Environmental Legal Order
Key competences	<ul style="list-style-type: none"> ○ Know the different types of waste generated by the different economic activities ○ The environmental problems that each of them present and the basic regulations that affect them ○ Study valid alternatives for waste management, from minimization to final disposal ○ Administrative procedures to be followed in each case
Syllabus/Curriculum/ Program	https://cursosinem.net/curso-de-gestion-residuos
Possible Work placements	Not found

	5
Title	Cleaning in Open Spaces and Industrial Facilities
Public vs. Private	Public
Educational level (university, vet, etc..)	VET
Accreditation level (EQF)	Non formal education
Entry requirements	For employed people and companies

Modality (f2f, Online)	Online / f2f
Duration	210h
Main training modules	<ul style="list-style-type: none"> ○ MF1313_1: Cleaning of open spaces 50 ○ MF1314_1: Cleaning in industrial facilities and equipment 80 ○ MP0188: Modul of non-labour professional practices (80h)
Key competences	Carry out cleaning tasks in open spaces Industrial facilities and equipment, using the means, tools and vehicles with a tonnage of less than 3,500 kilograms appropriate to each space and/or equipment to achieve an optimum level of cleanliness, hygiene and decoration.
Syllabus/Curriculum/ Program	https://www.academiaintegral.com.es/cursos-gratis/certificados-de-profesionalidad/servicios-socioculturales-y-a-la-comunidad/seag0209-limpieza-en-espacios-abiertos-e-instalaciones-industriales-6923.html
Possible Work placements	Not found

ITALY

	1
Title	Superior Technician for Circular Economy and Waste Management / Tecnico superiore per l'economia circolare e la gestione dei rifiuti
Public vs. Private	State Diploma of Higher Technician
Educational level (university, vet, etc..)	Technical Institute - VET
Accreditation level (EQF)	Equivalent to the 5th EQF level
Entry requirements	<ul style="list-style-type: none"> ○ Young people and adults in possession of a secondary school diploma ○ Recipients must also meet the following requirements: <ul style="list-style-type: none"> ○ Skills in the use of the English language and information technology; ○ Basic skills in mathematics and physics.
Modality (f2f, Online)	F2f
Duration	2 000 hours, of which 800 hours is for internships
Main training modules	<ul style="list-style-type: none"> ○ Elements of waste chemistry, basic elements of plant engineering ○ Waste. general elements. definitions, and legal regime ○ Authorizations and registrations ○ Waste characterization and classification ○ Urban waste collection and technical-economic elements of the public service ○ Waste collection and technologies for the recovery of the various fractions from separate collection ○ The main techniques for the management and treatment of urban and special non-hazardous waste ○ Waste energy. production and supply of renewable energy from waste and/or biomass and waste fuels ○ Special industrial waste treatment plants - chemical-physical liquid waste and industrial waste water treatment platforms. the remediation of contaminated sites ○ Circular economy and recovery/recycling of materials from waste ○ Circular economy, ecological and energy transition ○ Technical English for Waste & Manufacturing & Energy
Key competences	<ul style="list-style-type: none"> ○ Independently apply the methodologies and techniques of the circular economy in the management of the processes for the disposal of production waste and waste, enhancing the raw materials with a view to recovery and rational use; ○ Manage waste recovery processes, as a raw material for the production and energy supply of industrial plants and systems, with a view to low-impact development. Has in-depth knowledge of the types of waste, their characteristics, the correct methods of disposal in compliance with current legislation; ○ Evaluate and manage waste transformation and disposal plants, as well as plants for the production of energy from waste and industrial waste and from the primary sector (biomass); ○ Provide for the administrative management of waste and the identification of environmentally friendly solutions, also in symbiosis with other production

	activities.
Syllabus/Curriculum/ Program	Not found
Possible Work Placement:	<ul style="list-style-type: none"> ○ In medium/large manufacturing companies that produce significant quantities of waste of different types to be managed in storage (DT) and then to qualified subjects for final treatment/recovery. Figures are required for the administrative management of waste, the search for optimal and sustainable solutions for eco-compatible management and the possible possibility of recycling/recovery also in symbiosis with other production activities; ○ At Managers of the SGRU (Public Service) for services rendered to domestic and non-domestic users; ○ At companies that manage waste recovery/disposal plants and companies that produce energy from alternative and/or renewable sources; ○ In engineering and/or environmental consultancy firms or in the design of plants and services in the waste recovery management sector; ○ At companies that operate in the manufacturing sector through the recovery and recycling of waste, by-products and waste or recover significant energy streams; ○ With qualified subjects who provide companies with intermediation and commercial services for the optimal placement of the waste produced.
Other links	https://www.itstec.it/corsi/green.html

	2
Title	Operator for the treatment, recovery and disposal of waste
Public vs. Private	Public
Educational level (university, vet, etc..)	VET certification
Accreditation level (EQF)	3
Entry requirements	Possession of an obligatory secondary school diploma
Modality (f2f, Online)	Mixed (f2f + online)
Duration	600h
Main training modules	<ul style="list-style-type: none"> ○ Production of compost ○ Treatment and disposal of other non-hazardous waste ○ Treatment and disposal of hazardous waste - Recovery and preparation for recycling of waste and scrap metal ○ Recovery and preparation for recycling of plastic material for the production of plastic raw materials, synthetic resins ○ Recovery and preparation for recycling of solid urban and industrial waste and biomass
Key competences	<ol style="list-style-type: none"> 1. Operation of plants for waste separation, sorting and recovery operations 2. Identification and evaluation of the different types of waste (urban and special) 3. Management of waste treatment and disposal facilities 4. Support for the operation of landfills for urban and special waste

Syllabus/Curriculum/ Program	http://repertorioqualificazioni.regione.campania.it/Allegati/docs/userupload/PUBLIC-UTILITIES/Operatore%20per%20il%20trattamento%20e%20il%20recupero%20dei%20rifiuti.pdf
Possible Work Placement:	Not found
Other links	https://capire.regione.campania.it/rrtq/public/GeneraPDF/313

	3
Title	Waste recovery and disposal technician (Tecnico per il recupero e lo smaltimento dei rifiuti)
Public vs. Private	Public
Educational level (university, vet, etc..)	VET education
Accreditation level (EQF)	4
Entry requirements	Possession of a secondary school diploma.
Modality (f2f, Online)	The course will take place in the classroom or in Blended mode (FAD+CLASSROOM) for the theoretical part and in classroom/practical mode for the practical training part of the training course.
Duration	600h
Main training modules	<ul style="list-style-type: none"> ○ Production of compost ○ Treatment and disposal of other non-hazardous waste ○ Treatment and disposal of hazardous waste ○ Recovery and preparation for recycling of waste and scrap metal ○ Recovery and preparation for recycling of plastic material for the production of plastic raw materials, synthetic resins ○ - Recovery and preparation for recycling of solid urban and industrial waste and biomass
Key competences	<ul style="list-style-type: none"> ○ Management of monitoring and maintenance of machinery and plants for the recovery and disposal of waste ○ Analysis of the characteristics of the territory and support for the design of waste recovery and disposal plants ○ Organization and coordination of waste recovery and disposal activities ○ Organization and coordination of interventions for the treatment of hazardous waste
Syllabus/Curriculum/ Program	https://capire.regione.campania.it/rrtq/public/stampa/sp/323 https://www.networkgic.it/wp-content/uploads/2020/07/Corso-di-formazione-Tecnico-per-il-recupero-e-lo-smaltimento-dei-rifiuti.pdf
Possible Work Placement:	Employees of local public companies or private waste treatment companies in the production department of the different segments of municipal and industrial solid waste management.

Other links	
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	4
Title	Superior Technician for Collection Systems and Waste Disposal (Tecnico Superiore Per I Sistemi Di Raccolta E Smaltimento Dei Rifiuti)
Public vs. Private	Public
Educational level (university, vet, etc..)	HIGHER EDUCATION INSTITUTE PEACE DEL MELA
Accreditation level (EQF)	Not found
Entry requirements:	They must have an upper secondary education diploma (preferably in commerce, tourism or the humanities) and basic linguistic and IT knowledge.
Modality (f2f, Online)	F2F
Duration	1200 hours, of which 360 are reserved for company internships
Main training modules	<ul style="list-style-type: none"> ○ First reception - Socialization - Orientation to the labour market ○ Labour laws ○ Foundation in mathematics, chemistry and physics ○ Environmental impact ○ Disposal of municipal waste ○ Disposal plants ○ Legislations ○ Planning of systems for integrated waste ○ Communication and relational skills
Key competences	<ul style="list-style-type: none"> ○ Knowledge of landfills ○ Site maintenance and recovery ○ Special waste pre-treatment stations (hazardous and non-hazardous) and leachate ○ Purification systems ○ The sewage systems (wastewater collection) ○ The punctual collection systems and techniques and their maintenance.
Syllabus/Curriculum/ Program	Not available
Possible work placement	The Senior Technician for waste collection and disposal systems can carry out both self-employment and employee work, finding employment both in the production/service provision area and in the maintenance and quality control and logistics sector.
Other links	http://www-old.unime.it/ateneo/bandiconcorsi/ifts/bandi%20iffts2007/Bando_0291.pdf

	5
Title	Environmental Operator Course (Corse Operatore Ambientale)
Public vs. Private	Private (140€)

Educational level (university, vet, etc..)	Online Academy
Accreditation level (EQF)	Not found
Entry Requirements	The course to become an Environmental Operator does not include any specific entry requirements, however a good knowledge of the Italian language is recommended for a full understanding of the topics covered.
Modality (f2f, Online)	Online
Duration	200
Main training modules	<ul style="list-style-type: none"> ○ Care of aspects relating to safety at work ○ Preparation of material and equipment ○ Collection and cleaning with mechanical means ○ Signalling of alert situations ○ Adoption of procedures for the collection of hazardous waste and the safety of contaminated sites
Key competences	<ul style="list-style-type: none"> ○ Knowledge of the different types of waste ○ Regional, national and European sector legislation ○ Reporting of alert situations ○ Procedures for the collection of hazardous waste
Syllabus/Curriculum/ Program	https://fiorerosalba.b-cdn.net/wp-content/uploads/2014/programma_corsi/professionali_online_microdesign/Corso%20Operatore%20ambientale.pdf
Possible Work Placement:	Works in waste management companies, liaising with the other team operators for collection and mechanized sweeping activities
Other links	<ul style="list-style-type: none"> ○ https://www.fiorerosalba.com/corso/operatore-ambientale/ ○ https://lnx.microdesign.tv/corsi-online-a-frequenza-libera/corso-online-operatore-ambientale-200-ore

GERMANY

	1
Title	Circular and waste management professionals / Experte für Kreislauf- und Abfallwirtschaft
Public vs. Private	Public waste management authority Remuneration* (gross) <ul style="list-style-type: none"> ○ 1st year approx. €1018.26 ○ 2nd year €1068.20 ○ 3rd year €1114.02
Educational level (university, vet, etc..)	VET training

Accreditation level (EQF)	EQF 4
Entry requirements	Good grades in Math, physics and chemistry
Modality (f2f, Online)	Dual training - f2f in the classroom + company training
Duration	3 years (39h/week)
Main training modules	<ul style="list-style-type: none"> ○ Operate main recycling plants, monitor and wait ○ Advising and informing customers, e.g. about separating waste ○ Drive a forklift ○ Organize onward transport of waste (e.g. hazardous waste) ○ Chemical analysis of rubbish and waste
Key competences	<ul style="list-style-type: none"> ○ Ability to grasp complex and dynamic legislation ○ Capacity to explain, apply and monitor such legislation ○ Effective communication skills, both oral and written ○ Patience and resilience ○ Analytical, problem-solving and decision-making skills ○ Leadership and management qualities ○ Good organizational and administrative skills ○ An interest in, and understanding of, environment and sustainability issues ○ Good IT and general office skills
Syllabus/Curriculum/program	No access
Possible Work Placement:	Not found.
Other links	https://gab-umweltservice-karriere.de/das-leistet-die-gab/ https://gab-umweltservice-karriere.de/ausbildungsplaetze/fachkraft-fuer-kreislauf-und-abfallwirtschaft-m-w-d/

	2
Title	Professional driver
Public vs. Private	Private
Educational level (university, vet, etc..)	Company Training
Accreditation level (EQF)	Not found
Entry requirements	<ul style="list-style-type: none"> ○ 18 years old ○ Possession of a category B driver's license ○ Recognized school-leaving certificate with satisfactory results in German and math ○ Skilled craftsmanship ○ Responsible behaviour on the road ○ customer focus

Modality (f2f, Online)	Dual training (in company - theory + practice)
Duration	3 years
Main training modules	<ul style="list-style-type: none"> ○ Transporting the waste and recyclables bins from their location to the waste collection vehicle via sidewalks, stairs and landings as well as through basements and corridors ○ Loading the bins into the waste collection vehicle and their proper return ○ Collection and disposal of bulky waste, including from basements, attics or apartments ○ Ensuring the disposal service in all seasons and weather conditions ○ Instructing waste collection vehicles on the road ○ Checking the pitches and bins, e.g. for functionality of the bins and locking systems as well as soiling and littering of the pitches ○ Creating reports and documentation of defects on site using forms and digital media (e.g. smartphone or tablet) and planning garbage tours ○ Proper completion of the tour documents and negative feedback ○ Communicate and coordinate with customer service and work preparation
Key competences	<ul style="list-style-type: none"> ○ Carry out start preparations ○ Drive vehicles ○ Vehicle loading and unloading, taking into account the optimal and safe use of the cargo space ○ Planning economic routes ○ Carrying out maintenance and care work ○ Elimination of simple defects and malfunctions on the vehicle
Syllabus/Curriculum/Program	https://ausbildung.bsr.de/berufskraftfahrer-in-560.html
Possible Work Placement:	Waste truck driver
Other links	https://www.bsr.de/muellwerk-30707.php

	3
Title	Specialist for Recycling and Waste management - focus on waste disposal and treatment, waste recycling and treatment, logistics, collection and distribution (training)
Public vs. Private	Public
Educational level (university, vet, etc..)	Vocational education - 3 years
Accreditation level (EQF)	EQF 4
Entry requirements	Entry requirements are not governed by legislation; as a rule, young people are admitted after completing (nine or ten years of) general education.
Modality (f2f, Online)	Dual training
Duration	36 months (3 years)

Main training modules	<ul style="list-style-type: none"> ○ Planning an environmental concept ○ Dealing with microorganisms ○ Use environmental chemicals ○ Operate piping systems ○ Examine water and waste content fabrics ○ Operate and maintain machines and equipment ○ Collect and transport waste ○ Treat waste chemically and mechanically ○ Treat waste biologically ○ Dispose of waste ○ Examine waste ○ Processing waste ○ Eliminate waste
Key competences	<ul style="list-style-type: none"> ○ Identifying, examining and declaring waste ○ Assigning waste to disposal systems ○ Disposing of containers and vehicles taking into account occupational safety regulations, controlling and controlling technical processes ○ Operating, monitoring, inspecting, maintaining and repairing waste recycling, waste treatment and waste disposal systems ○ Determining costs and calculating services ○ Compiling warehouse inputs and outputs taking into account quality and quantity information ○ Carrying out resource planning and participating in route optimization, Documenting and evaluating work and operational processes, ○ Recognizing operational disruptions and reacting independently, Customer-oriented action and using appropriate information and communication technologies ○ Working in a cost-conscious, environmentally friendly and hygiene-conscious manner, applying specialist legal regulations, technical rules and occupational safety regulations, taking into account the quality management ○ Independently carrying out the work on the basis of technical documents and rules as well as legal bases ○ Obtaining information, planning and coordinating the work ○ Documenting the services and taking measures for quality assurance, safety, health and environmental protection at work.
Syllabus/Curriculum/ Program	https://www.bibb.de/dienst/berufesuche/de/index_berufesuche.php/profile/ap_prenticeship/87998897
Possible Work Placement:	Specialists in recycling and waste management work in disposal companies, recycling and disposal plants, such as glass and paper recycling, landfills, composting plants, and chemical-physical treatment plants.
Other links	https://www.bibb.de/dienst/berufesuche/de/index_berufesuche.php/profile/ap_prenticeship/87998897

	4
Title	Master craftsman for recycling waste management and city cleaning (IHK)
Public vs. Private	Public
Educational level (university, vet, etc..)	No certification as this is a formal training. IHK qualification. (Master craftsman's diploma)

Accreditation level (EQF)	Level 6 according to the German Qualifications Framework. (Bachelor Professional)
Entry requirements	<p>1) Admission to the examination in the examination section "Basic Qualifications" shall be granted to those who can prove the following:</p> <ol style="list-style-type: none"> 1. a successfully passed final examination as a specialist in recycling and waste management, as a supply and disposal worker and then at least one year's professional experience, or 2. a successfully completed final examination in another recognised training occupation followed by at least two years of professional experience, or 3. at least five years' professional experience. <p>(2) Anyone who can prove the following shall be admitted to the examination in the "Action-specific qualifications" examination section:</p> <ol style="list-style-type: none"> 1. passing the "Basic Qualifications" part of the examination no more than five years previously, and 2. at least one additional year of professional practice in addition to the periods of practical experience specified in Paragraph 1 Nos. 1 to 3. <p>(3) The professional practice pursuant to subsections (1) and (2) shall be substantially related to the tasks of a certified master craftsman/woman for recycling and waste management and urban cleaning pursuant to section 1 subsection (3).</p> <p>(4) In deviation from the requirements stated in subsections (1) and (2) No. 2, admission to the examination in the examination sections may also be granted to persons who, by submitting certificates or by other means, credibly demonstrate that they have acquired knowledge, skills and experience which justify admission to the examination</p>
Modality (f2f, Online)	Students can choose to attend the course in-person, hybrid or online, whereby online means being connected to the live class.
Duration	The part-time course with exams lasts two years and the full-time course approx. 10 months.
Main training modules	<ul style="list-style-type: none"> ○ Waste treatment ○ Treatment of Municipal waste ○ Treatment of Hazardous waste ○ Types of waste and substances ○ Analysis of waste balances ○ Waste management concepts ○ Material flows and cycles ○ Commissioning and decommissioning of systems ○ Monitoring and control of plant operation ○ Control of outdoor facilities ○ Control of substances produced ○ Requirements of maintenance ○ Repair plants and documentation
Key competences	Not found
Syllabus/Curriculum/ Program	https://www.avt-bildung.de/meister-f%C3%BCr-kreislauf-abfallwirtschaft-und-st%C3%A4dtereinigung
Possible Work Placement:	Not found
Other links	

	5
Title	Apprenticeship as a specialist in recycling and waste management – focus on waste recycling and treatment
Public vs. Private	Private company
Educational level (university, vet, etc..)	VET
Accreditation level (EQF)	EQF 4
Entry requirements	Secondary school certificate / secondary school leaving certificate
Modality (f2f, Online)	Dual education
Duration	3 years
Main training modules	Not found
Key competences	<ul style="list-style-type: none"> ○ Acceptance, identification, sampling, storage, treatment and recycling of waste ○ Carrying out incoming inspections, sample preparation and laboratory tests ○ Maintenance of machines, installations and equipment for waste treatment ○ Monitoring the recycling process (process control station) ○ Wastewater treatment
Syllabus/Curriculum/ Program	Not found
Possible Work Placement:	Not found
Other links	https://www.aubi-plus.de/ausbildung/wrc-world-resources-company-gmbh-fachkraft-fuer-kreislauf-und-abfallwirtschaft-wurzen-238374/

NETHERLANDS

	1.
Title	Sustainable Integrated Waste Management Training
Public vs. Private	Private (\$315)
Educational level (university, vet, etc..)	Not found
Accreditation level (EQF)	Not found
Entry requirements	No prior knowledge of waste management is needed Good internet connection

Modality (f2f, Online)	Online live. The training is carried out through a virtual classroom.
Duration	3 days
Main training modules	Fundamentals of solid waste management, focusing on the best practices to reduce, reuse, recycle and manage waste to mitigate climate change, pollution and reduce volumes of waste. The course covers all the main elements of reduction, collection, composting, recycling and waste disposal.
Key competences	<ul style="list-style-type: none"> ○ Assess local conditions and needs ○ Identify waste problems ○ Know which solutions to choose to solve identified waste problems ○ Understand the most important elements of integrated sustainable waste management ○ Understand the main phases of a solid waste system and the actors involved ○ Understand the main drivers steering solid waste policy development ○ Design and carry out your own training of trainers: this training will cover the basics of how to deliver waste management training to other trainers or community members
Syllabus/Curriculum/ Program	https://docs.wixstatic.com/ugd/dd1098_312e8b9b3332450d82f9eaa4d7ebded9.pdf
Possible Work Placement:	Not found
Other links	https://www.maximpact.com/waste-management-training/

	2.
Title	Online course Solid Waste Management
Public vs. Private	Public - Institute for international education
Educational level (university, vet, etc..)	University (5 ECTS credits)
Accreditation level (EQF)	Information not available
Entry requirements	Information not available
Modality (f2f, Online)	Online
Duration	4 months, 8 hrs/week study with a study load of. 140 hours
Main training modules	<ul style="list-style-type: none"> ○ Treatment and disposal ○ Re-use and recycling ○ Generation and prevention.
Key competences	<ul style="list-style-type: none"> ○ Sources, classification, prevention, reuse and recycling, and collection of waste; ○ Source separation and waste collection; ○ Composting, landfills (processes, technology-/design), incineration, and mechanical biological treatment;

	<ul style="list-style-type: none"> ○ SWM planning; ○ Role of the informal sector and global aspects of solid waste.
Syllabus/Curriculum/Program	Not available
Possible Work Placement:	Not found
Other links	https://www.studyinnl.org/dutch-education/studies/online-course-solid-waste-management-8892

	3.
Title	Lost Harvest and Wasted Food
Public vs. Private	Private (4560€)
Educational level (university, vet, etc..)	Private institution - no specifications
Accreditation level (EQF)	Not found
Entry requirements	-
Modality (f2f, Online)	Blended
Duration	6-8 weeks (15-20h/week)
Main training modules	<ul style="list-style-type: none"> ○ Reduce food loss and waste (FLW). ○ Analyse the crop supply chain, look beyond the symptoms of FLW, and design for strategies to contribute to a more sustainable food system. ○ Drivers of FLW, the business case to reduce it, simple and advanced technologies, and the economic impact of food loss and waste reduction. ○ Role and responsibilities of the various stakeholders will be addressed, the difficulty of consumer behaviour change ○ How to create a conducive policy environment and an actively involved private sector.
Key competences	<ul style="list-style-type: none"> ○ Understand the link between primary production, post-harvest management, the supply chain and food security ○ Be familiar with alternative uses of food waste ○ Have insight into the public and private responsibilities in the supply chain for post-harvest handling and food waste management ○ Be able to design solutions for minimizing the amount of 'missing food', from smallholders to multinational retailers
Syllabus/Curriculum/Program	Not available
Possible Work Placement:	Not found
Other links	https://www.wur.nl/en/show/lost-harvest-and-wasted-food.htm https://www.wur.nl/en/show/course-details-lost-harvest-and-wasted-food-

	1.htm
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	4.
Title	Course on Solid Waste Management (Online)
Public vs. Private	Private (€ 1065 excl. VAT)
Educational level (university, vet, etc..)	VET/university
Accreditation level (EQF)	Certificate of course completion issued by IHE Delft. In addition, passing the on-line course examination results in receiving 5 ECTS (European Credit Transfer System).
Entry requirements	Not found.
Modality (f2f, Online)	Online. Participants complete the course on a part-time basis, distance learning mode over a period of 16 weeks. They spend about 9 hours per week reading, listening to voice recordings, watching video clips, participating in (a-)synchronous discussions, obtaining advice and guidance from the mentors and teacher and working (jointly) on assignments. Learning is with and from each other.
Duration	142 hours (equivalent to 3 weeks full-time)
Main training modules	<p>The course includes the following topics:</p> <ul style="list-style-type: none"> ○ Introduction to Solid Waste Management: waste quantity and quality, generation of waste per capita and region; composition of waste; small scale industry waste, organic agricultural waste (some specific cases as examples); ○ Waste Collection & Transport: collection of mixed waste or of source separated waste, collection logistics, transfer stations; machine park planning; Sub-contractors; ○ Treatment/disposal Technologies: dumping, sanitary landfills, mechanical-biological treatment, incineration, anaerobic digestion, composting; recycling of plastics, batteries, e-waste, Greenhouse Gas emission and emission modelling, CDM, energy recovery; ○ Financial, Social and Institutional aspects: costs of collection, separation, management; equipment costs; social costs, stakeholders, scavengers, public health issues, policy and legislation.
Key competences	<ul style="list-style-type: none"> ○ Conceptually design waste conversion/treatment processes ○ Present an overview of the steps of SWM from waste generation to final use/disposal ○ Develop innovative solutions of SWM in urban areas ○ Select the most suitable SWM options in a specific local context ○ Assess the environmental impact of SWM options and criticize the results ○ Assess the economic impact of SWM options and criticize the results
Syllabus/Curriculum/ Program	https://www.un-ihe.org/courses/online/online-course-on-solid-waste-management
Possible Work Placement:	Course participants are typically employed by government departments, private companies, NGOs, universities, research institutions, aid agencies or

	international bodies such as WHO, UNICEF or UNDP.
Other links	https://www.un-ihe.org/courses/online/online-course-on-solid-waste-management

	5
Title	Waste Management & Sustainability
Public vs. Private	Private (\$1,750)
Educational level (university, vet, etc..)	Private course
Accreditation level (EQF)	-
Entry requirements	No special requirements
Modality (f2f, Online)	Online - The seminar is designed as a blended environment of presentation; workshops; group work; practical exercises; field application/ analysis; and general discussions
Duration	15 days
Main training modules	<ul style="list-style-type: none"> ○ Introduction to Waste Management & Environmental Management System ○ Hazardous Waste & Materials Handling ○ Your Role in Contamination and Pollution Prevention ○ Waste Disposal & Treatment Methods ○ Recycling Technology & Circular Economy
Key competences	<ul style="list-style-type: none"> ○ Gain Knowledge in sustainable waste & environmental management system ○ Understand different types of waste, their handling, storage, disposal requirements, and their potential effect on the environment. ○ Understand and apply the waste management hierarchy for sustainable development ○ Insight on roles of various personnel in Contamination and Pollution Prevention ○ Understand modern waste disposal & treatment methods ○ Identification of waste minimization and recycling ○ A better understanding of the environmental impact of waste ○ Identification of the cost-effectiveness of managing waste efficiently ○ Gain insight into new recycling technologies & circular economy ○ Identification of legislation and ensuring compliance with waste regulations ○ Improve system thinking skills for global and regional waste management sustainability
Syllabus/Curriculum/ Program	https://www.promisetrainingglobal.com/courses/waste-management-and-sustainability-training-course/
Possible Work Placement:	Not found
Other links	https://www.promisetrainingglobal.com/courses/waste-management-and-sustainability-training-course/