ULO AD-1	TITLE **Plan and develop a waste composting facility**	EQF 6
Work tasks:	**Ensure the planning of an anaerobic digestion facility**	
Assessment criteria:	*1*	

Learning outcomes: LO 1: Review documentation and site plans taking account of the health and safety requirements, and technology options
LO 2: Design of the anaerobic digestion facility

Knowledge *(assimilation of knowledge throughout learning)*	***Skills*** *(Ability to apply knowledge)*	***Competences*** *(Measure of responsibility and autonomy; ability to use knowledge, skills, social abilities)*
1) Review documentation and site plans taking account of the health and safety requirements, and technology options		
• Explain in detail the legislative definition of an anaerobic digestor • Explain in detail the standards/specifications related to an anaerobic digester and equipment • Describe in detail the facility plans/maps/technical information • Explain in detail the principal activities involved in anaerobic digestion operations • Describe in detail the legislation in relation to the specific hazards applicable to the waste composting facility, output materials	• Review relevant documents to identify company constraints and commercial objectives related to compliance requirements and output/product range and specifications (e.g. district and regional plans, resource consents, supplier contracts, quality systems, site plan) • Obtain relevant, current and applicable sources of information • Demonstrate advanced skills by classifying and identifying all site areas in	• Manage the process of implementing proposed amendments to facility plans and documentation in response to identified changes in situation/circumstances • Assume responsibility for ensuring the discussion of an agreement on the objectives and scope of the proposed amendments with the key stakeholders

and residues • Describe in detail the statutory requirements for a safe system of work	relation to health and safety at a specific non-hazardous waste composting facility (e.g. evacuation area, first aid, restricted areas and their respective levels of danger, first aid and emergency facilities, personal protective equipment)	
2) Design of the anaerobic digestion facility / LO2		
• Describe in detail the handling requirements for input materials in accordance with company procedures and relevant legislation • Describe in detail the capacity plant and the potential uses of digestate	• Demonstrate advanced skills by design the areas of the treatment/production site in accordance with the organisational procedures	• Ensure that the design complies with legislative and organisational requirements • Assume responsibility for the negotiation and securing of supply contracts on suitable trading terms in accordance with company practice (equipment, machinery, general materials)

ULO AD-2	TITLE **Manage entering and outgoing waste streams in compliance with the legislation**	EQF 6
Work tasks:	**Ensure on time delivery of waste, plant utilization and evaluate reuse option for outgoing products**	
Assessment criteria:	*2*	

Learning outcomes: **LO1: Ensure waste delivery according to legal regulation and respect of the preliminary procedures**
LO2: Check the system runs according to the authorised purpose and capacity
LO3: Develop possibility concerning reuse of the ending product

Knowledge *(assimilation of knowledge throughout learning)*	***Skills*** *(Ability to apply knowledge)*	***Competences*** *(Measure of responsibility and autonomy; ability to use knowledge, skills, social abilities)*
1) Ensure waste delivery according to legal regulation and respect of the preliminary procedures / LO1		
• Demonstrate an advanced knowledge of the EWC (European Waste Catalogue)	• Carry out preliminary checks to waste transfer/delivery	• Assume responsibility to ensure compliance of incoming waste • Lead the implementation of measures to prevent the onset of problems for health and hygiene
2) Check the system runs according to the authorised purpose and capacity / LO2		
• Demonstrate a critical understanding of the origin, type and characteristics of the waste in terms of volume, mass and weight	• Size the receiving and storage areas on the basis of incoming material • Calculate the remaining treatment capacity	• Manage that the operation are in compliance with the authorised treatment capacity

• Demonstrate an advanced knowledge of the capacity of the plant		
3) Develop possibility concerning reuse of the ending product / LO3		
• Demonstrate an advanced knowledge of the benefits arising from the use of outgoing products, in accordance with potential market for digestate	• Demonstrate advanced skills to identify and classify the outgoing materials • Demonstrate advanced skills to prepare the requested documents	• Assume responsibility of possible use of the outgoing products • Manage differentiate flows and fractions of the outgoing products

ULO AD-3	TITLE Manage the process for anaerobic digestion	EQF 6
Work tasks:	**Oversee the proper functioning of the anaerobic digestion process in order to reach the wanted biogas quantity**	
Assessment criteria:	*2*	

Learning outcomes: LO 1: Provide for waste supply to ensure the continuous operation of the plant
Avoid overload and intermittent operation that prevent gas production
LO 2: Obtain a mix with optimal chemical and physical parameters to be introduced in the digester
LO 3: Optimise the homogenisation in order to increase the hydrolysis efficiency related to the digestion
LO 4: Monitor chemical, physical and biological parameters
LO 5: Check the conditions that help the metabolism of microorganisms
LO 6: Maintain the conditions that help the metabolism of microorganisms
LO 7: Optimise the performance of the digester

Knowledge *(assimilation of knowledge throughout learning)*	***Skills*** *(Ability to apply knowledge)*	***Competences*** *(Measure of responsibility and autonomy; ability to use knowledge, skills, social abilities)*
1) Provide for waste supply to ensure the continuous operation of the plant Avoid overload and intermittent operation that prevent gas production/ LO1		
• Demonstrate an advanced knowledge of basics of chemistry, agronomy, genetics, thermodynamics, biology • Demonstrate an advanced knowledge of the phases of the anaerobic digestion process and the related needs	• Demonstrate advanced skills to provide the requested quantity of waste at the lowest cost • Demonstrate advanced skills to obtain a mix as homogeneous as possible	• Manage the selection process of the best techniques and technologies according to the mixture to be obtained

	• Calculate the waste needed for plant operation	
2) Obtain a mix with optimal chemical and physical parameters to be introduced in the digester / LO2		
• Demonstrate a critical understanding of the main types of physical treatment, chemical and biological principles and their reaction (thermal, mechanical, oxidative and enzymatic) • Demonstrate an advanced knowledge of the most common mixer systems	• Place the mixing unit in an easily accessible location for inspections • Identify the more appropriate type of mixer according to the characteristic to be obtained	• Execute the selection of the equipment, pre-treatment activities and their sequence according to the nature and characteristics of the incoming waste • Assume responsibility to regulate the humidity of the mixture to the optimum value, before sending it to digester
3) Optimise the homogenisation in order to increase the hydrolysis efficiency related to the digestion / LO3		
• Demonstrate an advanced knowledge of the activities about: laceration, metal separation, inert separation, size control	• Demonstrate advanced skills of carrying out the activities (laceration, metal separation, inert separation, size control)	• Assume responsibility of the removing of unwanted components
4) Monitor chemical, physical and biological parameters / LO4		
• Demonstrate an advanced knowledge of the effects of temperature on reaction kinetics • Demonstrate an advanced knowledge of the main parameters of monitoring and management	• Identify strategic activities in order to maintain the required level of parameters when a deviation happens	• Manage the mixing of the substrate in order to promote the contact between substrate and bacteria
5) Check the conditions that help the metabolism of microorganisms / LO 5 Maintain the conditions that help the metabolism of microorganisms / LO 6		

• Demonstrate an advanced knowledge of the main degradation process and their own performance	• Demonstrate advanced skills to maintain optimal and stable operative conditions	• Ensure the most performing bacterial strains for the degradation of incoming mix
6) Maintain the conditions that help the metabolism of microorganisms / LO 7		
• Demonstrate an advanced knowledge of the limiting factors of the bacterial growth and/or the performance of the biogas production • Demonstrate an advanced knowledge of the range of biogas yield, depending on the initial substance	• Demonstrate advanced skills to implement strategies to improve the energetic yield	• Ensure energy yields within the identified range initially

ULO AD -4	TITLE **Store the waste resulting from the treatment process in compliance with the regulations in force**	EQF 6
Work tasks:	**Ensure the usage of septic and equalisation tanks, the characterisation and the direction of residuals**	
Assessment criteria:	*1*	

Learning outcomes: LO1: Provide for adequate pits and tank in order to receive matter
LO2: Ensure the presence of the necessary equipment and guarantee adequate residues characterization
LO3: Direct the residuals of the treatment to the most appropriate place

Knowledge *(assimilation of knowledge throughout learning)*	***Skills*** *(Ability to apply knowledge)*	***Competences*** *(Measure of responsibility and autonomy; ability to use knowledge, skills, social abilities)*
1) Provide for adequate pits and tank in order to receive matter / LO1		
• Demonstrate an advanced knowledge of the parameters related to size and payload of septic or equalisation tanks • Demonstrate an advanced knowledge of the processes for stabilisation of volumes	• Identify the appropriate materials to build tanks	• Verify the security levels of tanks • Monitor water flow and pollutant load
2) Ensure the presence of the necessary equipment and guarantee adequate residues characterization / LO2		
• Demonstrate an advanced knowledge of the principal methods for sampling, preparation and analysis in order to	• Demonstrate advanced skills during the evaluation of the reactivity of residuals	• Assume responsibility of the characterisation of the quality of the residuals according to the specific end

carry out the physical-chemical characterisation of residuals • Demonstrate an advanced knowledge of the limits for parameters to be analysed	• Identify the basic equipment of a laboratory for physical-chemical characterisation of residuals	use
3) Direct the residuals of the treatment to the most appropriate place		
• Demonstrate an advanced knowledge of the plants for the recovery and disposal where outputs and residues can be directed • Demonstrate an advanced knowledge of the amount of residuals produced	• Assess the suitability of residuals to disposal or recovery	• Manage the evaluation and selection of the proper destination on the basis of the characterisation and of the amount of residuals

ULO AD-5	TITLE **Employ the biogas produced**	EQF 6
Work tasks:	**Ensure the biogas production and the aimed biogas quality (purification level)**	
Assessment criteria:	*1*	

Learning outcomes: LO1: Implement BAT for the purification of biogas, in respect of legal limits
LO2: Make compatible biogas production kinetics with use kinetics
LO3: Maximise the use of biogas in terms of economic and energetic aspects, considering the parameters of the produced biogas

Knowledge *(assimilation of knowledge throughout learning)*	***Skills*** *(Ability to apply knowledge)*	***Competences*** *(Measure of responsibility and autonomy; ability to use knowledge, skills, social abilities)*
1) Implement BAT for the purification of biogas, in respect of legal limits / LO1		
• Demonstrate an advanced knowledge of the most common techniques for biogas depuration • Demonstrate a critical understanding of the treatments of desulfurization, CO_2 removal, dehumidification	• Demonstrate advanced skills to size the equipment for the purification of biogas • Choose the best techniques and treatments, taking into account economic aspects	• Ensure compliance with the emission limits imposed by law
2) Make compatible biogas production kinetics with use kinetics / LO2		
• Demonstrate an advanced knowledge of parameters that have been	• Size a storage system based on the plant kinetics	• Manage the determination of pressure and volume of the storage system in

respected in order to safely store the biogas		terms of costs and benefits
3) Maximise the use of biogas in terms of economic and energetic aspects, considering the parameters of the produced biogas / LO3		
• Demonstrate an advanced knowledge of the biological and chemical characteristics of the produced biogas • Demonstrate a critical understanding of the form of incentives and the market for green certificates	• Demonstrate advanced skills to identify the most suitable solutions for energy use and conversion considering the needs of the local context	• Assume responsibility of the calculation of the energetic balance of the plant