



Australian Government

Department of Education, Employment and Workplace Relations

FPIFGM6201A Plan a biochar storage system for carbon capture and storage

Release: 1

FPIFGM6201A Plan a biochar storage system for carbon capture and storage

Modification History

Not Applicable

Unit Descriptor

Unit descriptor

This unit describes the outcomes required to research requirements to confirm feasibility and design, and plan for a bio-char carbon storage system using forest or forestry related biomass

General workplace legislative and regulatory requirements apply to this unit; however there are no specific licensing or certification requirements at the time of publication

Application of the Unit

Application of the unit

The unit involves implementing bio-char storage systems at senior management or project management levels in a variety of work settings including:

- forest/plantation environment
- saw mill
- wood chip mill
- veneer mill
- board/plywood mill
- timber treatment plants
- downstream processing of timber
- timber and wood products production

The skills and knowledge required for competent workplace performance are to be used within the scope of the person's job and authority

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Not Applicable

Employability Skills Information

Employability skills This unit contains employability skills

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Assess bio-char carbon storage system feasibility	1.1. Applicable Occupational Health and Safety (OHS), environmental, legislative and organisational requirements relevant to planning a bio-char system for carbon capture and storage are identified and followed 1.2. Research into bio-char carbon storage systems is undertaken 1.3. Organisational need for a bio-char carbon storage system is explored 1.4. Context for the bio-char carbon storage system is investigated and clarified through consultation with users 1.5. User requirements are identified and documented 1.6. Environmental parameters are identified 1.7. Bio-char carbon storage system options are investigated and installation, operation and maintenance requirements are identified 1.8. Recommendations from the feasibility study are formulated
2. Determine facility requirements	2.1. Feed stock for the bio-char process is selected 2.2. Amount of feed stock that can be obtained for pyrolysis is calculated 2.3. Method of pyrolysis is selected based on feed stock and appropriate outputs 2.4. Cost of transportation of liquid and solid by-products is estimated 2.5. Amount of material to be processed is assessed 2.6. Ability to feed into the power grid is considered 2.7. Process conditions are determined
3. Design a bio-char carbon storage facility	3.1. Facility is designed to provide optimal conditions for carbon storage 3.2. Legal requirements or government regulations impacting on the proposed facility are identified and addressed 3.3. Design specification is documented and relevant information is communicated through plans, standard operating practice (SOP) manuals, records or reports 3.4. Overall operation and output of the proposed facility is reviewed to ensure that it meets the long-term directions and purposes of the organisation and is economically sustainable
4. Plan implementation	4.1. Construction plan is developed according to

ELEMENT	PERFORMANCE CRITERIA
of bio-char carbon storage facility	accepted design principles, organisational requirements and commissioning or start-up SOP
	4.2. Work team's knowledge and skills are evaluated against the construction plan and works schedules, and the requirement for external expertise is determined and obtained
	4.3. Material, resource and supply provision requirements are determined and documented from work plans, schedules and design specifications
	4.4. Labour requirements are estimated based on work plans and schedules
	4.5. Operating expense budget is determined indicating all input and output costs applicable to the proposed facility

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level required for this unit

Required skills

- Technical skills sufficient to implement a bio-char carbon storage system
- Communication skills sufficient to use appropriate communication and interpersonal techniques with stakeholders; utilise technical and theoretical concepts in operational applications
- Literacy skills sufficient to record and report workplace information; maintain documentation and collect data
- Numeracy analytical skills sufficient to analyse relevant workplace information and collect data
- Mathematical skills in relation to estimating volumes (gross and net area volumes), flow rate schedules and product ratios
- Problem solving skills sufficient to identify problems and appropriate response procedures in abstract and applied settings

Required knowledge

- Applicable Commonwealth, State or Territory legislation, regulations, standards, codes of practice and established safe practices relevant to the full range of processes for planning a bio-char storage system for carbon capture and storage
- Environmental protection requirements, including the safe disposal of waste material, the safe use and storage of chemicals, minimising carbon emissions and the cleaning of plant, tools and equipment

REQUIRED SKILLS AND KNOWLEDGE

- Organisational and site standards, requirements, policies and procedures for planning a bio-char storage system for carbon capture and storage
- Environmental risks and hazards
- Minimising environmental impact
- Using energy effectively and efficiently
- Using material effectively and efficiently
- OHS standards for managing a bio-char facility
- Industry standards and codes of practice (including mandated and voluntary)
- Carbon marketing principles
- Environmental protection monitoring systems associated with a bio-char facility
- Quality management systems designed for chemical production
- Fundamental principles of chemistry applied to the nature and stability of bio-char outputs
- Established communication channels and protocols including notification of authorities
- Problem identification and resolution strategies
- Types of tools and equipment, and procedures for their safe use and maintenance
- Procedures for recording and reporting workplace information

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

A person who demonstrates competency in this unit must be able to provide evidence that they can design and plan for a bio-char carbon storage system

Critical aspects for assessment and evidence required to demonstrate competency in this unit

The evidence required to demonstrate competency in this unit must be relevant to, and satisfy, all of the requirements of the elements of this unit and include demonstration of:

- following applicable Commonwealth, State or Territory legislative and regulatory requirements and codes of practice relevant to designing and planning for a bio-char carbon storage system
- following organisational policies and procedures relevant to designing and planning for a bio-char carbon storage system
- determining the feasibility of a bio-char carbon storage facility
- determining bio-char carbon storage facility requirements
- designing a bio-char carbon storage facility
- planning the implementation of a bio-char carbon storage facility

Context of and specific resources for assessment

- Competency is to be assessed in the workplace or realistically simulated workplace
- Assessment is to occur under standard and authorised work practices, safety requirements and environmental constraints
- Assessment of required knowledge, other than confirmatory questions, will usually be conducted in an off-site context
- Assessment is to comply with relevant regulatory or Australian Standards requirements
- The following resources should be made available:
 - workplace location or simulated workplace
 - materials and equipment relevant to undertaking work applicable to this unit
 - specifications and work instructions

EVIDENCE GUIDE

Method of assessment

- Assessment must satisfy the endorsed Assessment Guidelines of the FPI11 Training Package
- Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with application of required knowledge
- Assessment may be by direct observation of tasks, with questioning on required knowledge and it must also reinforce the integration of key competencies
- Assessment methods must confirm the ability to access and correctly interpret and apply the required knowledge
- Assessment may be applied under project-related conditions (real or simulated) and require evidence of process
- Assessment must confirm a reasonable inference that competency is able not only to be satisfied under the particular circumstance, but is able to be transferred to other circumstances
- Assessment may be in conjunction with assessment of other units of competency
- The assessment environment should not disadvantage the candidate
- Assessment practices should take into account any relevant language or cultural issues related to Aboriginality, gender or language backgrounds other than English
- Where the participant has a disability, reasonable adjustment may be applied during assessment
- Language and literacy demands of the assessment task should not be higher than those of the work role

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

RANGE STATEMENT

OHS requirements:

are to be in accordance with applicable Commonwealth, State or Territory legislation and regulations, and organisational safety policies and procedures, and may include:

- personal protective equipment and clothing
- safety equipment
- first aid equipment
- fire fighting equipment
- hazard and risk control
- fatigue management
- elimination of hazardous materials and substances
- safe forest practices including required actions relating to forest fire
- manual handling including shifting, lifting and carrying

Environmental requirements may include:

- legislation
- organisational policies and procedures
- workplace practices

Legislative requirements:

are to be in accordance with applicable Commonwealth, State or Territory legislation, regulations, certification requirements and codes of practice and may include:

- award and enterprise agreements
- industrial relations
- Australian Standards
- confidentiality and privacy
- OHS
- the environment
- equal opportunity
- anti-discrimination
- relevant industry codes of practice
- duty of care

Organisational requirements may include:

- legal
- organisational and site guidelines
- policies and procedures relating to own role and responsibility
- procedural manuals
- continuous improvement processes and standards

RANGE STATEMENT

- OHS, emergency and evacuation procedures
- ethical standards
- recording and reporting requirements
- equipment use, maintenance and storage requirements
- environmental management requirements (waste minimisation and disposal, recycling and re-use guidelines)

RANGE STATEMENT

Bio-char carbon storage system will be based upon pyrolysis and may include requirements for:

- feed stock characteristics
- input volumes
- output characteristics
- harvesting operations
- forest owners
- sawmill operators
- timber processing and manufacturing facilities
- industries supplying feedstock
- agriculturists
- government land managers
- energy consumers
- participants in carbon market markets
- other users of by-products
- neighbours
- government departments and councils
- organisational staff and contractors

Users may include:

User requirements may include:

- by-products of a pyrolysis system
- waste management options
- carbon sequestration priorities
- land management priorities
- development priorities
- investor interests
- financial returns
- environmental outputs
- social responsibility
- sustainability
- input usage

Feed stock may include:

- wood products, including:
 - harvesting residues
 - green mill residue
 - dry mill residue
- residue from other wood fibre processing operations
- agricultural waste
- crops grown for the consumption of bio-char plants
- manure and waste from intensive animal farming systems

RANGE STATEMENT

- municipal waste

Pyrolysis

is the thermochemical decomposition of organic material at elevated temperatures in the absence of oxygen

Method of pyrolysis may include:

- slow pyrolysis
- fast pyrolysis
- intermediate pyrolysis
- carbonisation
- gasification

Process conditions may include:

- temperature
- residence time
- heating rate
- feed stock preparation

Design specifications may include:

- designated component or system number
- size, volume and footprint area
- production requirements, including:
 - tonnage
 - timing
 - production characteristics
- construction materials of the facility
- construction method
- equipment and resources
- location
- budget
- environmental constraints

Construction plan may include:

- designated tasks
- order of activities
- specific structures or components
- location
- date and time tasks are to be undertaken
- expected time required to completed activities
- standard for completed activities
- materials, supplies, tools, equipment or other resources required
- person in charge
- other members of work team and their roles, responsibilities and skills
- preferred supplier list and resources required by external workers or tradespeople
- non-conformance or incident/fault reporting

RANGE STATEMENT

- procedures
- contingency plan to address staffing and equipment supply problems
- costs and budget details
- manufacturers' guidelines or instructions
- maintenance schedule for particular items of equipment
- routine maintenance procedures
- hazard identification, risk assessment and risk control measures
- OHS procedures
- environmental impact control measures
- monitoring and reporting requirements and procedures

Unit Sector(s)

Not Applicable

Competency field**Competency field**

Forest Growing and Management/Sawmilling and Processing and Timber Manufacturing