Skills for Sustainability

Manufacturing Skills Australia


# Assessment Guide:

## MSS015002A Develop strategies for more sustainable use of resources


This project is supported by the Australian Government
through the Clean Sustainable Skills Package

# Assessment Guide

**MSS015002A Develop strategies for more sustainable use of resources**


# About the assessment guide

## Aim of the guide

The Sustainability Skills assessment guide will assist Registered Training Organisations (RTOs) to plan and design their assessment activities and evidence requirements for the unit of competency **MSS015002A Develop strategies for more sustainable use of resources**.

In particular the guide demonstrates how:

- **Assessment methods can be chosen to suit the learner**, for example, if a learner has existing skills and experience in the unit of competency a portfolio of evidence is more useful than direct observation.
- **Assessment methods can be chosen to suit the industry context**, for example, where a work place has established sustainability policies and procedures direct observation and work place documentation / records could be used.
- Specific types of evidence can be identified that relate to the unit requirements and the industry context, for example, if the company has weekly production meetings minutes of these might provide evidence of making recommendations.

These decisions are used to design the assessment activities. For example a work place project might be developed around the aspects of the unit that can be applied and/or demonstrated in the workplace. Portfolio requirements might be designed around evidence that can be found, or generated, from typical day to day activities. An interview or test might be designed around aspects of the unit where knowledge needs to be tested because it is not clearly demonstrated in the practical activities or to test an individual's knowledge in a team environment.

The guide also provides examples that show how:

- **a contextualised workplace project can be developed** that demonstrates relevant aspects of the unit
- **questions can be identified** to assist in the authentication of evidence and show understanding of the application of the concepts of sustainability.

The assessment guide uses a fictional scenario as the basis for demonstrating one approach to developing an assessment tool for this unit of competency.

**Note** that the guide should be read in conjunction with the unit of competency (see training.gov.au).


## What the guide does not provide

The guide focuses on selecting assessment methods and evidence and does not provide a complete or validated assessment instrument. It is for guidance only; there are others ways that the unit could be assessed and many ways that an assessment can be contextualised. None of the processes or ideas in this guide is mandatory.

It does not cover everything that an RTO must address to deliver an assessment and meet compliance. For example the RTO will need to address:

- development of assessment instruments and documentation
- validation of assessment tools, processes and outcomes
- consulting with industry and developing a training and assessment strategy
- how the assessment will be 'delivered', for example, scheduling the activities, monitoring and providing support to the learner, and engaging input from enterprise managers
- full mapping of evidence to units of competency.

Each RTO will need to decide whether to follow any of the processes demonstrated here. If so, the RTO will need to amend the evidence and other details to reflect the characteristics of their learner/s and the context of their assessment. This should be based on their consultations with industry and clients, and the other information within their training and assessment strategy.

## Focus of the guide

### *MSS11 Sustainability Training Package Assessment Guidelines*

The Assessment Guidelines in MSS11 state that "*assessment should be conducted in the workplace or in a in a work-like environment. Many of the units also require the measurement of environmental and other indicators over a period of time and for this reason project based assessment is also preferred*."

This unit of competency states that "*Assessors must be satisfied that the candidate can competently and consistently apply the skills covered in this unit of competency in new and different situations and contexts.*"

In addition the Sustainable Operations qualifications are designed for workers experienced in their industry who require an 'overlay' of skills to improve the sustainability of the business.

Therefore the assessment guides focus on assessment methods for experienced workers and workplace assessment.


### *Contextualising*

The guide focuses on contextualising assessment to the participants / learners and the workplace context. It demonstrates how the context of the assessment can be analysed and used to select assessment methods and evidence to meet the requirements of the unit of competency.

Typically the context comprises information about:

- industry or enterprise systems, practices and documentation
- characteristics of the learner/s
- mode of delivery of any training.

The guide outlines one approach to planning and designing assessment activities and evidence that are contextualised.

There are many ways that an assessment can be designed to meet the context and the unit requirements. The approach outlined in this guide is just one way. If an RTO follows this approach they should amend the activities, evidence and other details to reflect the characteristics of their learner/s and the context of their assessment.

Contextualising for different sectors is critical. The sustainability issues that are significant to one industry sector or process might not be found in another. For example the casting and forging sectors use large amounts of energy and produce emissions such as dust and greenhouse gases (GHGs). However, one of the key sustainability issues in furniture manufacture may be sourcing plantation timber.

Additional information is available on the Skills for Sustainability website at http://www.sustainabilityskills.net.au including information about this unit of competency and information about sustainability issues in different sectors.

The website also has information about contextualization, understanding sustainability issues within different sectors, designing an assessment, developing workplace projects and using simulated workplace environments.


## What's in the assessment guide

This guide provides:

- a scenario outlining the RTO, learner and enterprise context
- key points drawn out from the scenario
- checklists to help link the context to the assessment methods and evidence:
    - checklists relating to the context for the assessment
    - checklists relating to assessment methods, and methods of collecting and submitting evidence
- an evidence planning table, linking the scenario context with evidence and the unit of competency
- a work-based project based on the scenario and unit of competency and contextualised using the identified evidence
- questions based on the scenario and unit of competency and contextualised using the identified evidence.


## Assessment planning and design

Planning every aspect of an assessment is a broad process that requires many steps and sources of information. Arguably it can start with industry consultation and developing the training and assessment strategy; and conclude with the assessment decision and feedback to the learner.

This guide focuses on a small section of the process. It targets the steps of analysing the unit of competency and the context of the assessment in order to select appropriate assessment activities and evidence collection. These steps are represented in the flow chart at Figure 1.

Typically the context comprises the industry or enterprise systems, practices and documentation and characteristics of the learner/s and mode of delivery of any training. As an RTO you will collect much of this information from your industry consultation and discussion with clients, and capture it in your training and assessment strategy.

In this guide the context is described in a scenario which includes a fictional RTO, learner profile and an industry sector or enterprise context. It uses this information to identify suitable assessment methods and available evidence that are aligned to the unit of competency. These are used to design the assessment activities linked to the unit requirements.

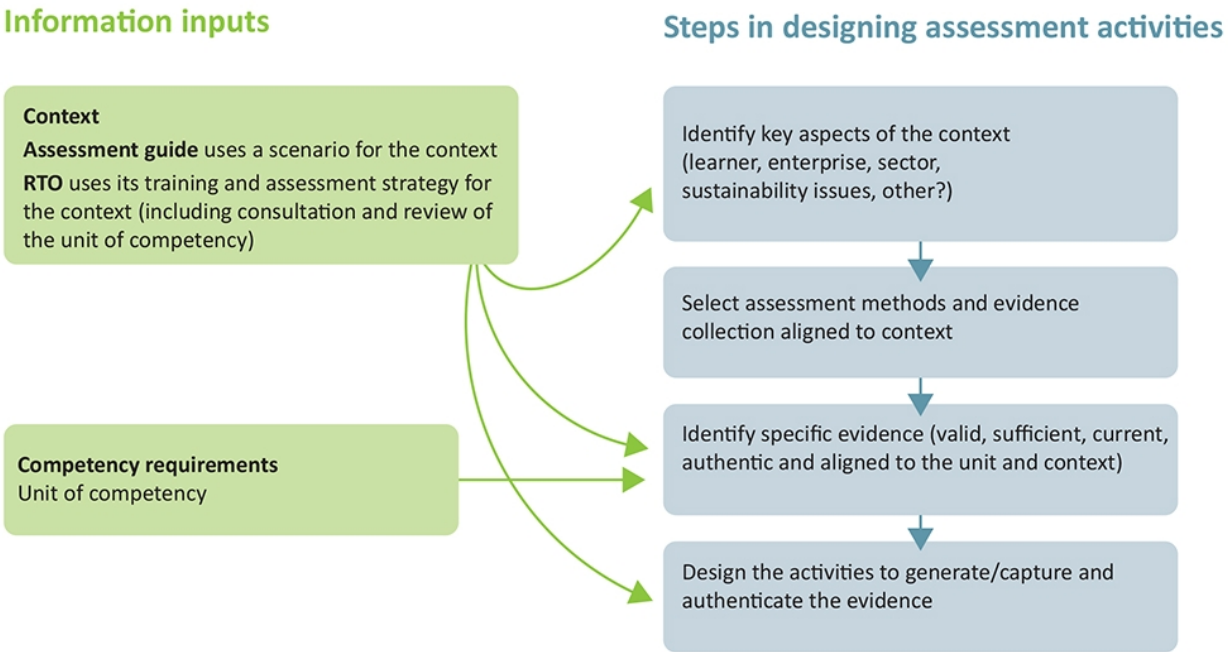


**Figure 1 Designing assessment activities**


## Context: The scenario

### *The RTO*

Sea Cement is a large national cement and lime production company and an enterprise RTO. It has added the sustainable operations qualifications to its scope of registration as a response to managing the *Clean Energy Act 2011*.

Harry is the senior trainer and assessor. He has a group of ten learners, one from each of ten production facilities across Australia.

Harry is required to provide training and assessment that integrates the company policies and procedures with the national competency standards. Harry is keen on using an action learning approach – getting the guys to learn by doing. He holds weekly webinars and video links with the technical managers to discuss their progress and share information about what they are doing, for example, methods of material balancing.

At the end of the program Harry will get the technical managers to present their findings at a webinar and get them to answer written questions which he will then give feedback on.

The technical managers are enrolled in MSS50112 Diploma of Sustainable Operations and are up to the core unit MSS015002A Develop strategies for more sustainable use of resources.

### *The learners*

The learners are a group of experienced cement manufacture technicians, technical managers/specialists and site managers from the company's ten sites (we'll call them technical managers). The sites operate as 'mini-businesses' so each manager or technician has responsibility to decide how their site will deliver, in line with the company's goal to use resources more sustainably. So far the technical managers have been improving process control management systems and installing pollution control devices, such as electrostatic precipitators or bag houses.

The technical managers know each other and have worked with one another cooperatively in the past in other professional development programs and on solving technical problems of mutual interest. This professional development program is about the consumption of resources; finding out the amount used, the amount wasted and how to reduce waste. The technical managers may find out for themselves (do measurements and calculations) or seek the information from other sources, and will probably need to a mixture of both.


### *The enterprise context*

The resources used in the cement manufacturing process include:

- raw materials substitution and additives, such as iron ore, fly ash and slag
- electricity for kiln motors and ancillaries
- energy, such as fuel for the kiln
- fuel for trucks and transport
- raw materials, such as limestone and clay
- water.

Key sustainability issues for the cement industry include:

- emissions to the air such, as carbon dioxide ($CO_2$), exhaust gases, particulate matter, nitrogen oxides ($NO_x$), sulphur dioxide ($SO_2$), and heavy metals
- energy use
- health and safety
- material substitution rates
- noise
- solid waste disposal
- wastewater disposal.

The company uses the term ‘loss/waste’ instead of ‘emission’ to clarify the difference between emissions to air and emissions as loss/waste of any kind.

The Board of Directors has set some broad goals to improve these sustainability impacts and is committed to using resources more sustainably and reducing the company obligation under the *Clean Energy Act 2011*. The company has IS0 14001 Environmental management systems, is part of the World Business Council for Sustainable Development – Cement Sustainability Initiative, and it participates in Asia Pacific Partnership on Clean Development and Climate program.

The company has completed sustainability audits for carbon, water, energy, emissions and transport and wants to use the data to develop recommendations for the reduction of these footprints. The company has engaged technical experts from a consulting company to advise the technical managers on best practice approaches to reducing waste and using resources more sustainably.


### *Key points from the scenario*

- The industry sector is cement manufacture.
- The technical managers know the processes well, understand the broad company sustainability goals and have access to technical experts.
- The company has completed audits of carbon, water, energy, emissions (mass balancing) and transport.
- The technical managers now need to quantify the overall resource consumption and loss/waste and develop strategies for more sustainable resource use.
- As the technical managers will be using an action learning approach a workplace project is an appropriate assessment method.

### *What does the scenario tell us about the context for the assessment?*

❑ Classroom based
☑ Existing worker in this field
❑ Not currently employed in this field
❑ Off the job learning
☑ On the job implementation
❑ RPL
❑ Simulated workplace environment
☑ Single unit of competency
❑ Skill cluster
❑ Whole qualification
☑ Workplace based


### *Which assessment methods are suitable?*

Direct observation, for example;
- ❑ Practical demonstration in the workplace
- ☑ Real work/real time activities in the workplace
- ❑ Work activities in a simulated workplace environment

Structured activities, for example;
- ❑ Activity sheets
- ❑ Presentation to colleagues
- ❑ Scenario based project
- ❑ Simulation exercises such as hypotheticals and role plays
- ❑ Work based case study
- ☑ Work based project (and documentation)

Questioning, for example;
- ❑ Oral or written examinations (may be applicable at higher AQF levels)
- ❑ Questionnaires
- ❑ Self assessment
- ☑ Verbal questioning / discussion / interview
- ❑ Written questions

Portfolios of evidence, for example;
- ❑ Authenticated prior achievements
- ❑ Collection of work samples compiled by the learner
- ❑ Evidence of training courses attended
- ❑ Historical evidence
- ❑ Information about life experience
- ❑ Journal or log book
- ❑ Photographs or video
- ❑ Product with supporting documentation
- ❑ Verified workplace history/CV
- ☑ Workplace documentation / records

Third party feedback, for example;
- ❑ Interview with employer, supervisor, or peer
- ❑ Letter of support from a work place
- ❑ Testimonials and reports from employers and supervisors
- ❑ Third party report from supervisor or technical expert


### *How will evidence be collected or submitted?*

☑ Documents - electronically / in person / mail
❑ Data capture - video / audio / notes /smart pen by assessor / 3rd party / candidate
❑ Data submission - web upload / mail (USB drive / SD card / disc etc)
❑ Online real time - Skype, web conference
❑ Online self paced – online tests, interactive simulation

## Evidence: What will be available and suitable?

The evidence planning table shows one way of linking the context of the scenario with the unit of competency. It examines the unit of competency, the context and the selected assessment method in order to identify appropriate assessment evidence.

Based on the scenario, the learner and the context identified above, the following evidence could be expected to be available as part of the assessment. Keep in mind that some evidence might apply to several aspects of the unit or even several units.

In the scenario used in this guide the learners work in different production facilities. So the RTO would need to adapt the evidence to reflect each context and learner.

### *Evidence planning table*

This table provides an example of identifying evidence that is available in the workplace. The evidence listed here has been selected so that it covers the required skills, required knowledge and critical aspects of assessment for this unit, however, this has not been shown in the table.

The table is not intended as a format for mapping to meet compliance requirements and each RTO needs to determine the type of mapping that may be required by its registering body.


| Element | Performance Criteria | Evidence |
|---|---|---|
| 1 Quantify resource consumption | 1.1 Identify all significant resources used by process<br>1.2 Identify consumption measurements available for each resource<br>1.3 Determine consumption for each resource | ☑ **Work-based project (and documentation)**<br>• Work plan and schedule identifying the boundaries of the part of the value chain being studied<br>• Process map for the work or process area identifying the resources used for each step of the value chain<br>• Spreadsheet of the value chain for the process showing actual consumption for each significant resource<br>☑ **Workplace documentation/records**<br>• Examples of direct measurements of resource use, such as readings from meters, records of diesel fuel purchased and amount of raw product used<br>• Examples of indirect measurements of resource use, such as calculations of resource consumption per unit, mass balance calculations done by a chemical engineer, materials/mass/energy balancing calculations completed by the learner or by someone else<br>☑ **Collection of work samples compiled by the learner**<br>• Sustainability audits for carbon, energy, water, emissions and transport<br>☑ **Verbal questioning in a discussion or as an interview**<br>• Interview by the assessor about the work-based project |
| 2 Quantify resource loss | 2.1 Determine theoretical consumption of each resource<br>2.2 Compare theoretical consumption with actual consumption<br>2.3 Determine loss (emission) for each resource | ☑ **Work-based project (and documentation)**<br>• Spreadsheet of the value chain for the process showing actual consumption for each resource, theoretical consumption for each resource, and calculation of the loss for each resource<br>☑ **Workplace documentation/records**<br>• Examples of calculations of theoretical resource use per unit of product unit, such as weight of final product, amount of heat to melt 1 kg of metal, time taken to do a job, number of pages in a report, and amount of fuel required to ship a container<br>☑ **Verbal questioning in a discussion or as an interview**<br>• Interview by the assessor about the work-based project |


| Element | Performance Criteria | Evidence |
|---|---|---|
| 3 Recommend strategies for reducing waste | 3.1 Short list high emission process steps<br>3.2 Analyse process to identify emission steps or locations<br>3.3 Determine root cause of emission<br>3.4 Investigate methods for reducing emission<br>3.5 Develop strategies and recommendations for improvement | ☑ **Work-based project (and documentation)**<br>• Short list of high emission process steps<br>• Notes from team meeting/s about the root cause of the high loss/waste process steps, methods of reducing the emissions and recommendations<br>☑ **Verbal questioning in a discussion or as an interview**<br>• Interview by the assessor about the work-based project |
| 4 Prepare resources use audit | 4.1 Identify purpose of report and key stakeholders<br>4.2 Compile data, implications and recommendations<br>4.3 Consult with stakeholders as appropriate<br>4.4 Draft and present report | ☑ **Work-based project (and documentation)**<br>• A resources use audit report, including the drivers for using resources more sustainably and a justification of the recommendations<br>☑ **Workplace documentation/records**<br>• Database/list of technical experts, and internal and external stakeholders consulted<br>• Notes of discussion and meetings with process workers, environmental managers and the logistics manager about draft recommendations<br>• Recommended preferred solutions for presentation to the team members and management (this could be notes, a PowerPoint presentation or a formal report depending on the organisational procedures and protocols)<br>☑ **Real work/real time activities in the workplace**<br>• Observation of the learner presenting the findings of the resources use audit, for example, to an enterprise sustainability committee<br>☑ **Verbal questioning in a discussion or as an interview**<br>• Interview by the assessor about the work-based project |


## Assessment activity: Work based project

The work based project defines a project that the learner can do in the work place. This might be part of their normal activities or it could be an additional activity. In this example there is a clear relationship between the unit of competency and a work place activity to 'develop strategies for more sustainable use of resources'.

So, for this unit, the outline of the project can come from the unit itself. The details of the project can be designed by bringing together the context with the evidence that is available in the work place (or that can be generated by the project). The evidence that has been identified in the evidence planning table helps to define the project.

### *A work based project for technical managers from Sea Cement*

The project is to prepare a sustainability audit report for the consumption of resources at the site and to make recommendations for improvements.

The audit includes identifying the different resources used, the amount of resources used and the amount wasted. This is used to identify options for improvements that address the root cause/s of waste; the project includes reporting the data and preferred options.

Learners will need to complete the following:

1. Develop a work plan and schedule of how they will go about determining resource use and wastage and developing strategies to improve resource use. Learners will need to include the following in their work plan:
    - a description the cement manufacturing process at their site and the boundaries of the value chain that they will be examining
    - the drivers for the company to use resources more sustainably, with reference to ISO 14001 Environmental management systems and the industry sustainability initiatives
    - who the key stakeholders are and how they will communicate with them
    - methodology
    - timeline
    - the significant resources that are to be audited, such as raw materials, fuel and labour
    - what existing data they have, such as key sustainability indicators, direct and indirect measurements, and sustainability audits.


2. A process map for the portion of the value chain being audited and the resources that are used.
3. Determine the actual consumption of resources per tonne of Portland cement produced and any assumptions used for estimates.
4. Determine the theoretical consumption of resources per tonne of Portland cement produced.
5. Quantify the resource loss per tonne (net consumption) of Portland cement produced by subtracting the theoretical from the actual consumption for each process step and resource.
6. Short list the process steps with the highest losses.
7. Analyse the process to determine the root cause of the waste (using muda and the 7 wastes, as a guide).
8. Investigate methods for reducing the waste (talking to the technical experts from the consulting company may be useful here).
9. Recommend strategies for reducing the waste.
10. Prepare a resources use audit report documenting strategies to use resources more sustainably by reducing waste, including data, implications and recommendations.

## Assessment activity: Questions

In this assessment, questioning is used to assess required knowledge and aspects of competency which are difficult to assess in other ways, for example, testing the application of the concepts to the project activities. The questions also help to authenticate the evidence.

Based on the scenario, Harry, the assessor, will discuss these questions with the technical managers at pre-determined points during the project, as part of his monitoring and mentoring responsibilities.

### *Questions for technical managers from Sea Cement*

How did you define the part of the value to audit for resource use?

What criteria did you use to determine which resources were significant? Examples of criteria include cost, environmental sensitivities, and largest by volume or weight.

Were you able to estimate the resource consumption for each process step, or did you have to lump some of the steps together?

What sources of information were available to quantify the resource consumption? Did you need to make calculations, read meters or seek information from other sources?

If you had to estimate some of the resource loss, what assumptions did you have to make?

Why did you choose some methods for reducing waste over others?


Give an example of where you considered several options to reduce waste, and explain why the final recommendation was made.

Who were the people that you consulted with? Why was it important to consult with them?

Did you do this work as part of a team? If so outline what your role was.

Would the process you have gone through to audit the resource use apply to other parts of the value chain, such as delivery?

Why have you made the recommendations you have made? What criteria were used to rank the recommendations?

Are there alternative ways of reducing waste that could be used?

How do the recommended solutions relate to ISO 14001 Environmental management systems?

What existing workplace processes, data and documentation were you able to use?

What will happen next?