

<b>Title</b>	<b>Explain and undertake a mass balance and recommend improvements to resource flows</b>		
<b>Level</b>	<b>6</b>	<b>Credits</b>	<b>10</b>

<b>Purpose</b>	<p>This unit standard is for people who may be working as resource efficiency programme managers and consultants.</p> <p>People credited with this unit standard are able to: explain the concept of mass balance in relation to resource use and waste production; undertake a mass balance analysis; and analyse mass balance findings and recommend improvements to resource flows.</p>
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<b>Classification</b>	Zero Waste > Resource Efficiency
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<b>Available grade</b>	Achieved
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## Guidance Information

### Definitions

The *mass balance* concept is based on the principle that matter can neither be created nor destroyed. Therefore, the mass of inputs to a process, industry or region balances the mass of outputs as products, emissions and wastes, plus any change in stocks, hence the term 'mass balance' is used to describe this type of analysis. When applied in a systematic manner this concept of balancing resource use with outputs can provide a robust methodology for analysing resource flows.

An analysis of *resource flows* aims to quantify the flow of resources, in terms of mass, within a defined geographical area or industry sector over a set period of time. A resource flow analysis can point to opportunities for understanding and managing materials consumption and minimisation.

*Organisation* refers to an entire business entity in the private or public sector or a business unit within the organisation.

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## Outcomes and performance criteria

### Outcome 1

Explain the concept of mass balance in relation to resource use and waste production.

**Performance criteria**

- 1.1 The purpose and principles of a mass balance are explained in terms of its usefulness in quantifying resource consumption and losses, and assessing risk.
- Range principles – inputs, outputs, recycling, reuse;  
risk to – environment, community, business.
- 1.2 The concept of mass balance is explained in relation to defining boundaries and key resources.
- 1.3 Mass balance is illustrated with reference to a conceptual model.
- Range one of – energy balance, water balance, materials balance, process flow.

**Outcome 2**

Undertake a mass balance analysis.

**Performance criteria**

- 2.1 Mass balance analysis is scoped by defining appropriate system boundaries, resource flows, and performance criteria.
- 2.2 Data for a mass balance analysis is collected from organisational documents and monitored to accurately record inputs, outputs, and recycling streams.
- Range documents may include but are not limited to – map, inventory, process diagram, waste records, invoices, gap analysis.
- 2.3 Data collection takes account of any variations in business activities that impact on the amount and type of resource used.
- 2.4 Data collection takes account of any recording variations and where possible generates alternative information.
- Range some data may be unavailable, commercially sensitive, missing, or aggregated;  
some interpretation may be required, if so, any assumptions and interpretations are explained.
- 2.5 A mass balance analysis is recorded that quantifies all stages of resource use and waste production as defined by the scope to a degree of accuracy appropriate for informed decision making.

**Outcome 3**

Analyse mass balance findings and recommend improvements to resource flows.

## Performance criteria

- 3.1 Data is reviewed to identify any errors and omissions, and where necessary, extrapolated, interpolated, aggregated, or subjected to statistical analysis to determine confidence levels for the dataset and the strength and significance of trends and cause-effect relationships.
- 3.2 Significant inputs, outputs, and waste streams and their costs are detailed in the analysis to support a business case for making improvements.
- Range materials may be mapped separately to detail significant losses, itemise the use of a hazardous substance, highlight a high cost item, or distinguish a substance of particular interest to the business.
- 3.3 Any suggested improvements made by participating staff are recorded and acknowledged.
- 3.4 Specific areas of interest that will bring most benefit to the organisation and environment are detailed in the analysis.
- Range areas of interest may include but are not limited to – materials used, processes, operations, water, energy, waste produced.
- 3.5 The analysis details any organisational changes that may result in more efficient resource use.
- 3.6 Recommended improvements are feasible and provide a range of options that are prioritised to assist decision making.
- Range recommendations include those that provide quick economic and environmental benefits to reinforce the improvement process; priorities are based on weightings for technical, environmental, and economic benefits.
- 3.7 Recommended improvements are linked to existing business systems and matched to existing business processes and personnel.
- Range systems include – financial, quality, health, safety, environmental management, procurement, staff training, operating procedures, monitoring programmes.

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<b>Planned review date</b>	31 December 2023
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**Status information and last date for assessment for superseded versions**

Process	Version	Date	Last Date for Assessment
Registration	1	17 June 2011	31 December 2015
Revision	2	21 November 2013	N/A
Rollover and Revision	3	28 June 2018	N/A

**Consent and Moderation Requirements (CMR) reference**

0014

This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

**Comments on this unit standard**

Please contact MITO New Zealand Incorporated [info@mito.org.nz](mailto:info@mito.org.nz) if you wish to suggest changes to the content of this unit standard.