Sustainability Industry Reference Committee

Skills Forecast and Proposed Schedule of Work 2018-2022

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Administrative Information

Name of Industry Reference Committee (IRC):
Sustainability

Name of Skills Service Organisation (SSO):
Innovation and Business Skills Australia (IBSA Manufacturing)

About the Industry Reference Committee

The **Sustainability Industry Reference Committee** comprises eleven members and was constituted in November 2017.

The 2018 Industry Skills Forecast and Proposed Schedule of Work was reviewed and approved by the membership below:

Mr Peter Nemtsas (Chair)

Ms Shauna Coffey

Mr Ian Curry

Mr Daniel Giles

Ms Patricia Caswell

Mr Bradley Anderson

Mr Andrew Petersen

Mr Michael Grogan

Mr Mark Goodsell

Mr Luke McConchie

Ms Meriel Chamberlin

Industry Reference Committee Signoff

This 2018 Sustainability IRC Skills Forecast and Proposed Schedule of Work was approved as the result of a properly constituted IRC decision.

IRC Chair: Mr Peter Nemtsas

Date: May 2018

This IRC Skills Forecast and Proposed Schedule of Work has been prepared on behalf of the Sustainability Industry Reference Committee for submission to the Australian Industry Skills Committee (AISC).

Contents

Executive Summary

The Industry Reference Committee (IRC) Skills Forecast and Proposed Schedule of Work identifies priorities for training package development work to meet the needs of industry. This document is based on research, analysis and consultations with IRC members and other stakeholders and provides evidence of current and emerging industry skills needs.

What is the Sustainability Industry?

Sustainability is not a discrete industry. It is a discipline that underpins or comprises work across a very broad range of industries, making these skills very much cross-sectoral in nature. Three core elements – economic growth, social inclusion and environmental protection – form the foundation of the philosophy and social science of sustainability, underpin the global Sustainable Development Goals and various national and international standards and certification schemes, as well as provide a basis for tackling core global challenges such as climate change, water scarcity, waste management, diversity and inclusion, human rights and modern slavery and the future of work.

Sustainability skills enable businesses across all industries to not only measure, monitor and improve financial/economic performance, but also to measure and monitor social and environmental/ecological performance, in order to improve the value generated by the organisation.

There are currently three areas of focus within the Sustainability Training Package:

- Sustainable Operations

- Competitive Systems and Practices

- Environmental Monitoring and Technology.

Critical Workforce Challenges and Opportunities

Critical workforce challenges and opportunities facing the sectors that may utilise qualifications from the MSS Sustainability Training Package include:

• An increasing focus on the triple bottom line (economic, social and environmental performance) in order to improve productivity and efficiency and to meet consumer demands for more sustainabile outcomes

• The emergence of new business models in which products are bundled with ongoing services, as well as the rise of the 'circular economy' in which products are designed to be durable, reused, recycled or repurposed

• Technology changes, particularly in relation to monitoring, automation and digitalisation

• Major concerns by businesses around energy costs and energy security

• The introduction of new legislation to tackle 'modern day slavery'

• Increasing employer and learner demand for smaller 'chunks' of learning as a means of upskilling, and for the development of generic skills, including Science, Technology, Engineering and Mathematics (STEM) skills

• Projected growth in employment in sustainability-related occupations and industries.

Forecasting Skills Priorities

These workforce challenges and opportunities have implications for skill needs, which have informed the following skill development priorities:

• Energy use management and energy procurement

• Modern approaches to sustainable operations and practices

• Identification, management and reporting of employment practices within supply chains

• Changing skills arising from new forms and uses of technology

• Provision of advice on practices and options for maximising energy efficiency

• Emerging/changing job roles – including data visualisation, maintenance planning, thermal imaging and occupational hygiene

• Upskilling in specific elements of competitive systems and practices and environmental monitoring and technology

• Generic skills needed for changing business models and practices.

Training Package Priorities

In response to these current and emerging skill needs, the IRC have identified a number of training package priorities.

The Proposed Schedule of Work 2018-19 to 2021-22 was developed by the IRC, with support from IBSA Manufacturing, based on identified industry trends. The Schedule lists the priorities over the next four years, the rationale and proposed timeframes for these activities.

The item identified as critical for inclusion as a priority for the 2018-19 schedule of work and a Case for Change included as part of this Skills Forecast is:

- **Energy Management:** Review of current standards/qualifications/skill sets in the areas of energy management and energy procurement, to ensure coverage of the skills and knowledge needed for improving energy performance and/or developing/implementing strategic approaches to energy procurement.

Other items proposed as priorities for 2018-19 and 2021-22 are:

- **Sustainability Practices:** Review of all relevant units of competency to ensure they reflect current terminology and practices in sustainability

- **Modern Slavery**: Scoping of the skill implications of the new legislation for mandatory supply chain reporting in relation to modern slavery

- **Emerging Technological Changes:** Investigation of the implications of emerging technological changes for generic cross-sector job roles and skills, including specific skills for visualisation and communication of data for process and sustainability improvements

- **Competitive Systems and Practices Skill Sets:** Development of skill sets in Competitive Systems and Practices for upskilling purposes

- **Environmental Monitoring and Technology**

    - Consideration of the addition of an **occupational hygiene** stream to the Diploma of Environmental Monitoring and Technology.

    - Consideration of the development of **skill sets around measurement** in environmental monitoring and technology (e.g. water testing, methane measurement, soil absorption).

    - Development of national competency standards and skills sets around the use of **thermal imaging**.

- **Generic Skills:** Review of content associated with growing demand for the integration of generic skills and capabilities such as problem solving, design thinking, customer engagement, leadership, business management, change management and innovation management.

Sector Overview

Industry Snapshot

The Sustainability Training Package is unique in its wide-reaching remit, which is expected to increase over the next decade. It defines the skills and qualifications that are essential to building an inclusive, sustainable and resilient future for our economy, our society and our environment. These skills underpin or comprise work in a wide range of industries and job roles, making the Sustainability Training Package cross-sectoral in nature.

In 2005, the World Summit of Social Development defined three core elements – economic growth, social inclusion and environmental protection – as the foundation of the philosophy and social science of sustainability. These 'pillars' now underpin global Sustainable Development Goals and many national and international standards and certification schemes. They also form the basis of tackling core challenges that the world now faces, including climate change, water scarcity, waste management, diversity and inclusion, human rights and modern slavery and the future of work.

This definition of sustainability is also reflected in the increasing focus of businesses on their 'triple bottom line'. This approach shifts their attention from solely considering financial/economic performance to also measuring and monitoring social and environmental/ecological performance as a means of improving the value generated by the organisation.

Currently there are three areas of focus within the Sustainability Training Package.

1   Sustainable Operations – which focuses on the integration of sustainability principles and practices into business operations and culture to enhance sustainable and competitive advantages and meet legislative requirements. This includes the skills to:

  •   establish and monitor an organisation's own sustainability performance

  •   develop and implement sustainability improvement strategies and practices in their organisation and/or all or part of the value chain

  •   engage with stakeholders, including shareholders, employees, governments, other value chain members and the local and general community.

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2   Competitive Systems and Practices – which focuses on the application of 'lean' and continuous improvement principles across all parts of an organisation's supply and value chain. This includes the skills to:

- reduce waste and inefficiencies (such as wasted time and energy, unnecessary processing and product features, stockpiles of materials and inventory, poor use of human resources and errors/rework)

- identify and analyse problems

- measure and improve performance

- create consistent and integrated systems and processes

- continuously improve productivity and sustainability.

3   Environmental Monitoring and Technology – which focuses on the measurement, monitoring and development of solutions to address impacts on air, water and other environmental elements. This includes skills for technicians and paraprofessionals who:

- collect, analyse and report environmental data

- contribute to the assessment of environmental risks and impacts

- develop and implement policies, management plans and strategies, and work practices associated with sustainable development, environmental management, waste management, pollution control, rehabilitation and restoration

- install, operate, and maintain new 'sustainable' technologies

- monitor and report on environmental and sustainability performance and compliance

- improve the knowledge and skills of workers and community members about environmental management and sustainability.

Business Landscape

Due to the cross-sectoral nature of the Sustainability Training Package, it is not possible to quantify the number of businesses operating in this area. For example, sustainable operations can be a focus for virtually any organisation in any industry sector which is seeking to identify and implement sustainability-related initiatives, to audit and report on their performance in aspects of sustainability, or to meet legislative requirements in relation to sustainability issues. In addition, there is also a range of businesses providing specific consultancy services to assist organisations in meeting these varied sustainability needs.

Similarly, competitive systems and practices can be implemented across any organisation in any industry sector and are commonly used in industries as diverse as manufacturing, financial services, information and communications technology and healthcare services.

Within the environmental monitoring and technology area there are organisations which are focused primarily on the provision of monitoring services (such as air, water or soil testing, or energy auditing) to assist other organisations in meeting legislative requirements and improving their products and services. However, once again, these types of roles are also found in organisations within a range of industries, including manufacturing and mining and within all levels of government.

Given these constraints, it is possible to make some indicative comments about businesses which use the MSS Sustainability Training Package based on the three Australian and New Zealand Standard Industry Classification (ANZSIC) codes covering businesses that specialise in the provision of sustainability and environmental monitoring services. However, it must once again be noted that these organisations account for only a small sub-section of the businesses using the skills covered by the MSS Sustainability Training Package.

The three ANZSIC codes are:

- 6962 – Management Advice and Related Consulting Services

- 7720 – Regulatory Services

- 6925 – Scientific Testing and Analysis Services.

Businesses providing sustainability consulting services account for nearly 10% of the total revenue of the **Management Advice and Related Consulting Services** sector.[1] Of the 64,410 businesses operating in this sector in June 2016, almost all were small and micro (less than 1.5% were medium or large). The number of businesses in the sector grew by nearly 5% between 2015 and 2016.[2]

Of the 346 businesses operating in the **Regulatory Services** sector in June 2016, over 95% were sole traders and small businesses. The small number of businesses in this area and their small size is due to the fact that the majority of regulatory activity is carried out by government departments. The number of businesses in the sector declined by 10% between 2015 and 2016.

Businesses providing pollution monitoring services account for 5% of the total revenue of the **Scientific Testing and Analysis** sector.[3] The large majority (over 95%) of the 3,195 businesses operating in this sector in June 2016 were once again small and micro. The number of businesses in the sector grew by less than 1% between 2015 and 2016.

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1   IBIS World, 2017, IBISWorld Industry Report M6962a: Management Consulting in Australia

2   ABS, 2017, 8165.0 Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016

3   IBIS World, 2017, IBISWorld Industry Report M6925: Environmental Science Services in Australia

Key Industry Stakeholders

There are a number of peak bodies representing sustainability and/or environmental monitoring interests within Australian industry, including:

- Energy Efficiency Council

- Sustainable Business Australia

- Water Stewardship Australia

- Association for Sustainability in Business

- Australian Sustainable Business Group

- Australian Sustainable Built Environment Council

- Facility Management Association

- Association for Manufacturing Excellence

- LEAN Enterprise Australia.

Each state and territory government has environmental protection legislation and standards against which it regulates industry.

The Commonwealth Department of Environment also administers regulation, as do local governments.

There are also numerous non-government organisations (NGOs) at national, state and local levels that advocate for sustainability and environmental issues.

In the competitive systems and practices area, the relevant stakeholders are the peak bodies representing the industries in which these systems and practices are most commonly implemented, including those representing manufacturing (including those focused on Advanced Manufacturing), financial services, information and communications technology and healthcare services.

Training Snapshot

Learner Training Profile

In 2016, a learner enrolled in a qualification from the MSS Sustainability Training Package was most likely to be:[4]

- Enrolled in a Certificate IV in Competitive Systems and Practices

- Studying in Victoria

- In the 40-49 year old age bracket

- Male

- Not in an apprenticeship or traineeship

- Enrolled with a private Registered Training Organisation (RTO).

The overall characteristics of learners enrolled in MSS Sustainability Training Package qualifications are skewed by the predominance of competitive systems and practices enrolments. The Certificate III and Certificate IV in Competitive Systems and Practices accounted for nearly 90% of all enrolments in MSS Sustainability Training Package qualifications in 2016, for over 90% in 2015 and nearly 95% in 2014.

With that in mind, the following observations can be made about enrolments in MSS Sustainability Training Package qualifications:[5]

The largest proportions of enrolments were in Victoria (nearly half in 2016) and Western Australia (over 25% in 2016).

Nearly 75% of learners in 2016 were aged between 30 and 59, which supports the fact that MSS Sustainability Training Package qualifications are generally not entry-level qualifications. It also aligns with the employment profile of occupations related to these qualifications.

Around three-quarters of learners were male.

There are no apprenticeships offered across MSS Sustainability Training Package qualifications, but traineeships are available in nine current qualifications. In 2016, uptake of traineeships occurred only in the competitive systems and practices area. Of the enrolments in competitive systems and practices qualifications in 2016, around 20% of Certificate III, over 35% of Certificate IV and nearly 30% of Diploma enrolments were reported as being under a traineeship.[6]

Appendix A presents a graphical snapshot of enrolment data from the MSS Sustainability Training Package.

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4   VOCSTATS VET Provider Collection. 2016 Government Funded and Total VET Activity Program enrolments extracted September 2017

5   VOCSTATS VET Provider Collection. 2016 Government Funded and Total VET Activity Program enrolments extracted September 2017

6   VOCSTATS VET Provider Collection. 2016 Total VET Activity Course enrolments extracted September 2017

Training Delivery

More than 90% of total Vocational Education and Training (VET) enrolments in MSS Sustainability Training Package qualifications in 2015 and 2016 were with private training organisations, with the majority being government-funded (nearly 60% were government-funded over all training provider types in 2016). This is shown in Table 1 following.

Table 1 – Program enrolments in MSS Sustainability qualifications by Training Organisation type

Training Organisation Type	Government Funded Enrolments	Government Funded Enrolments	Total VET Enrolments	Total VET Enrolments	Percentage Training Organisation Type for Total VET Enrolments
	2015	2016	2015	2016	2016 %
TAFE	518	758	709	960	7%
University	115	165	198	238	2%
Enterprise provider	-	-	-	-	0%
Private training provider	11,215	6,778	16,011	11,882	91%
School	-	-	-	-	0%
Community education provider	7	6	5	1	0%
Totals	11,855	7,707	16,923	13,081	

Source: VOCSTATS VET Provider Collection. 2016 Government Funded and Total VET Activity Program enrolments extracted September 2017. VOCSTATS data are 'randomly' adjusted by small amounts by a data perturbation tool to avoid the release of confidential data. Hence numbers are only approximate. The perturbation impact is negligible for most practical purposes. The effect can be significant and must be considered when interpreting small numbers.

In the area of sustainable operations, there are very few training providers registered to deliver training. In January 2018:

- Four providers were registered to deliver the Certificate IV in Sustainable Operations, three of which had scope to deliver the qualification only in NSW and the others had scope in all states and territories.

- Two providers were registered to deliver the Diploma in Sustainable Operations, both of which were located in QLD and both had scope in all states and territories.

- One provider (TAFE NSW) was registered to deliver the Graduate Certificate in Sustainable Operations and only in NSW.

Providers of qualifications in the environmental monitoring and management area are more numerous and spread more widely. In January 2018:

- Nine providers (all public) were registered to deliver the Certificate IV in Environmental Monitoring and Management, and are spread across metropolitan and regional campuses in NSW, ACT, WA and SA

- Twelve providers (all public) were registered to deliver the Diploma in Environmental Monitoring and Management, and once again are spread across metropolitan and regional campuses in NSW, ACT, WA and SA

- TAFE NSW was the only provider registered to deliver the Graduate Certificate in Environmental Management and only in NSW.

As noted earlier, qualifications in the area of competitive systems and practices account for the vast majority of enrolments in the MSS Sustainability Training Package. Correspondingly, there are many providers delivering these qualifications, with the majority being private providers. In January 2018:

- the largest number of registered providers were delivering the Certificate III in Competitive Systems and Practices (59 providers) and Certificate IV in Competitive Systems and Practices (69 providers). They were spread across metropolitan and regional campuses in VIC, QLD, NSW, WA, TAS and SA

- the less popular qualifications are at the Advanced Diploma and Graduate Certificate levels and had only seven and four providers respectively, but between them had scope in all states and territories

- there were no providers registered to deliver the Graduate Diploma of Competitive Systems and Practices.

Qualifications Available

The following qualifications and skill sets are contained in the MSS Sustainability Training Package:

Sustainable Operations

- MSS40116 Certificate IV in Sustainable Operations

- MSS50116 Diploma of Sustainable Operations

- MSS80116 Graduate Certificate in Sustainable Operations

Competitive Systems and Practices

- MSS20316 Certificate II in Competitive Systems and Practices

- MSS30316 Certificate III in Competitive Systems and Practices

- MSS40316 Certificate IV in Competitive Systems and Practices

- MSS50316 Diploma of Competitive Systems and Practices

- MSS60316 Advanced Diploma of Competitive Systems and Practices

- MSS80316 Graduate Certificate in Competitive Systems and Practices

- MSS80416 Graduate Diploma of Competitive Systems and Practices.

Environmental Monitoring and Technology

- MSS40216 Certificate IV in Environmental Monitoring and Technology

- MSS50216 Diploma of Environmental Monitoring and Technology

- MSS80216 Graduate Certificate in Environmental Management.
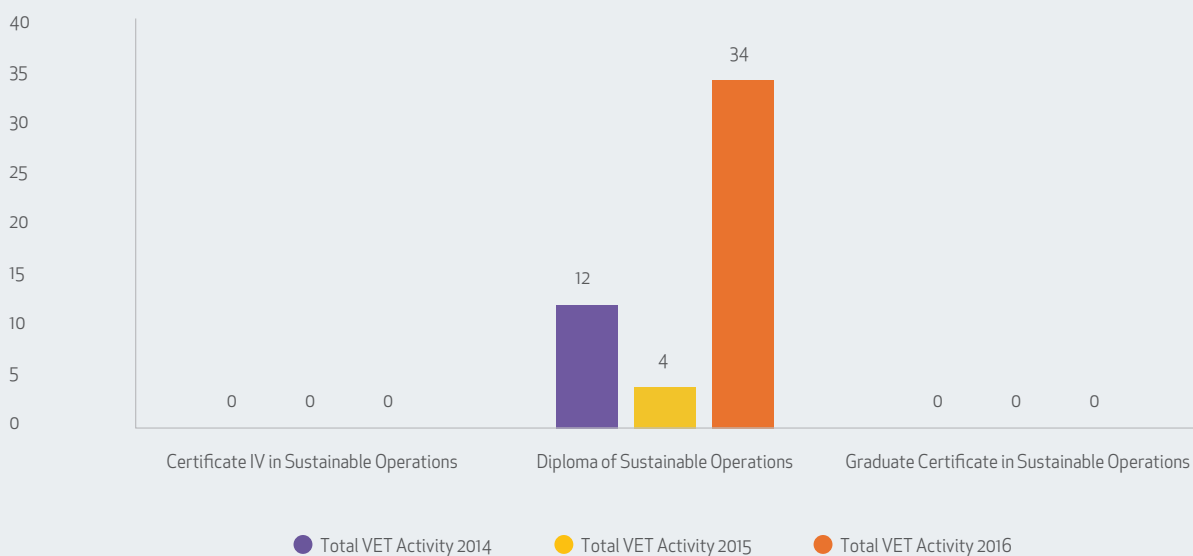
Skill Sets

- MSSSS00001 SS1 Audit energy usage for a work area

- MSSSS00002 SS2 Determine energy usage

- MSSSS00003 SS3 Improve energy usage for a process or organisation

- MSSSS00004 SS4 Improve energy usage for a work area

- MSSSS00005 SS5 Recommend energy improvements

- MSSSS00006 SS6 Reduce sustainability risk.

A new skill set is currently under development, entitled Lead Energy and Greenhouse Gas Improvements. See the section on Training Product Review – Current Activities for details.

Qualification Uptake

The uptake of qualifications in the MSS Sustainability Training Package is illustrated in Figures 1–3 below.

Figure 1 – Enrolments in sustainable operations qualifications
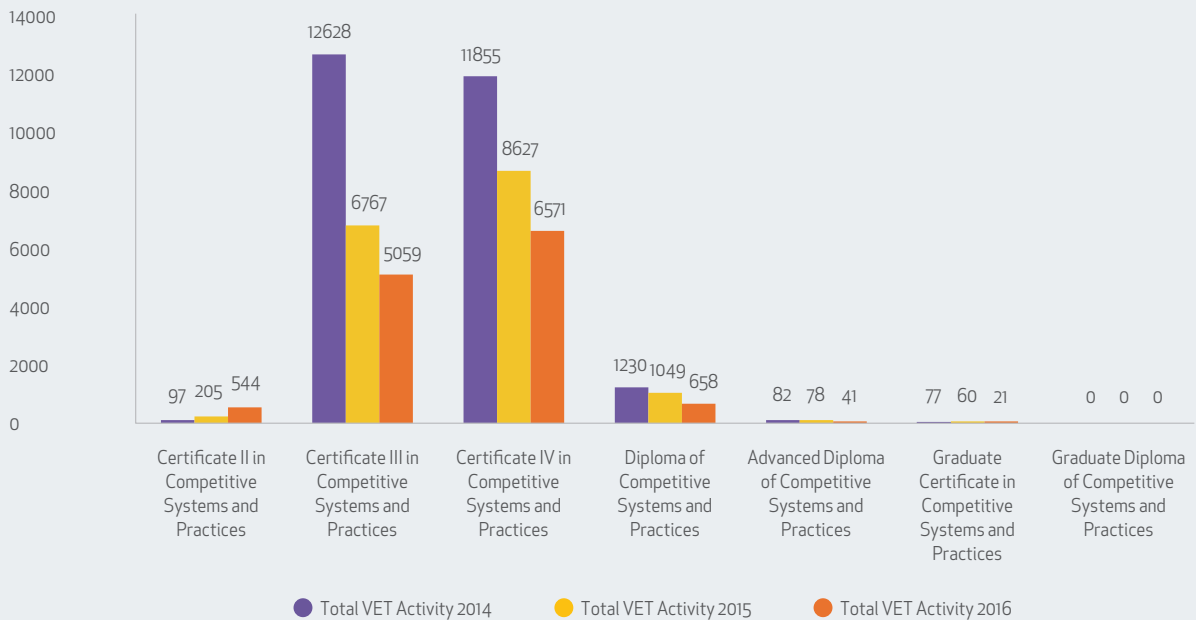

Source: NCVER VOCSTATS, Total VET Activity, extracted 18/9/2017. VOCSTATS data are 'randomly' adjusted by small amounts by a data perturbation tool to avoid the release of confidential data. Hence numbers are only approximate. The perturbation impact is negligible for most practical purposes. The effect can be significant and must be considered when interpreting small numbers.

There were no enrolments in the Certificate IV or Graduate Certificate in Sustainable Operations in the period of 2014–2016.

The only enrolments over this period have been in the Diploma of Sustainable Operations, and all of them have been on a fee-for-service basis.

Consultations suggested that lack of available training provision and lack of government funding may be factors in the very low numbers of enrolments in these qualifications. However, there may also be a lack of awareness of these qualifications.

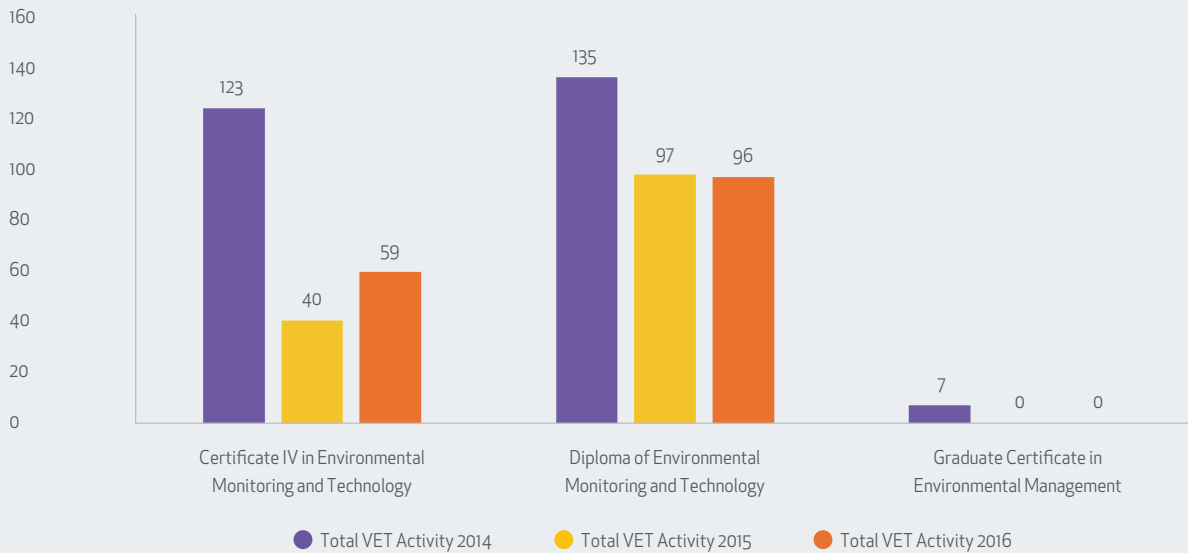## Figure 2 – Enrolments in competitive systems and practices qualifications

Source: NCVER VOCSTATS, Total VET Activity, extracted 18/9/2017. VOCSTATS data are 'randomly' adjusted by small amounts by a data perturbation tool to avoid the release of confidential data. Hence numbers are only approximate. The perturbation impact is negligible for most practical purposes. The effect can be significant and must be considered when interpreting small numbers

As mentioned earlier, the Certificate III and Certificate IV in Competitive Systems and Practices are extremely widely used, accounting for thousands of enrolments each year. Government-funded enrolments account for the large majority of these.

However, the proportions of enrolments that are government-funded have been decreasing over the period of 2014-16, perhaps indicating and increasing willingness for businesses to invest in these qualifications on a fee-for-service basis.

No enrolments were recorded in the Graduate Diploma of Competitive Systems and Practices over this period and in January 2018 there were no providers registered to deliver this qualification.

Figure 3 – Enrolments in environmental monitoring and technology qualifications

Source: NCVER VOCSTATS, Total VET Activity, extracted 18/9/2017. VOCSTATS data are 'randomly' adjusted by small amounts by a data perturbation tool to avoid the release of confidential data. Hence numbers are only approximate. The perturbation impact is negligible for most practical purposes. The effect can be significant and must be considered when interpreting small numbers

While the Certificate IV and Diploma level qualifications in Environmental Monitoring and Technology are moderately used, the Graduate Certificate in Environmental Management has only ever had seven recorded enrolments (all fee-for-service), back in 2014.

Whilst it is difficult to make observations about completion rates in MSS Sustainability qualifications from the available data, it does appear that there are lower levels of completions as a proportion of enrolments in the environmental monitoring and technology area as compared to those in the competitive systems and practices area. Anecdotal evidence from consultations suggests that learners enrolling in the Diploma of Environmental Monitoring and Technology are dropping out of the course after completing the units they need for their job roles (which have tended to be the units on carbon/energy auditing). This has in part contributed to the current work being undertaken to develop the new Lead Energy and Greenhouse Gas Improvements skill set.

Challenges and Opportunities

Megatrends related to sustainability were identified by IRC members in a future skills workshop conducted in 2017 utilising the **Future Skills and Training Resource** commissioned by the Australian Industry and Skills Committee (AISC). A summary of the outcomes of this workshop can be found in **Appendix B**.

More specific challenges and opportunities for the sectors related to the MSS Sustainability Training Package are discussed below.

For Industry and Employers

As the qualifications covered by the MSS Sustainability Training Package are relevant across a wide range of industry sectors, the challenges and opportunities for industry and employers largely arise from developments at a national and international level.

Society and Culture

Consultations suggest that sustainability is becoming a mainstream issue across society, and public perceptions of sustainability performance (i.e. triple bottom line or corporate social responsibility) are now important considerations to businesses. Most large companies now report on sustainability measures of some kind, regardless of whether it is a legislative requirement.

Issues of sustainability and continuous improvement are starting to be considered by organisations as a matter of course in the same way that health and safety issues are. This is creating two levels of skill needs in the sustainability field – those that are needed for specialist roles within sustainability, and those that are needed in a broad variety of roles across all organisations.

Business and Economics

Whilst legislation was initially the key driver for changes in terms of sustainability and the environment, this has now been overtaken by economic drivers, either in terms of improved productivity and efficiency within an organisation, or in terms of meeting consumer demands for more sustainable outcomes. Sustainability and continuous improvement are increasingly seen as strategic concerns, aligned with other aspects of strategic management.[7]

Consultations indicated that the sustainability sector is becoming more sophisticated, which is bringing with it a demand for clear science and economic evidence on which to base decisions, as opposed to 'environmentally friendly' motivations.

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7   McKinsey and Company, 2017, Sustainability's deepening imprint. Available online at <https://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/sustainabilitys-deepening-imprint>

New business models are emerging in which customers are being offered a package of services (e.g. systematic monitoring or ongoing servicing and recycling of equipment), rather than a stand-alone product. This is impacting on product and service design and shifting the focus from producing product lines to meeting individual customer needs. Similarly, the rise of the notion of the circular economy, in which products are created to be durable and able to be easily reused, recycled or repurposed, is creating a need for new ways of thinking about product design (e.g. 'design thinking') for working with customers and collaborating across the whole value chain.[8] Also, more sophisticated forms of interactions with customers, particularly using online channels, are creating new business opportunities and greater levels of efficiency and productivity for organisations.

Technology

Changes in technology, particularly in terms of the use of new technology for monitoring and automation, will increasingly impact on many of the job roles in which MSS Sustainability qualifications are used. This is largely influenced by global trends around the 'Internet of Things', 'Industry 4.0' and the increasing use of automation.

In the Internet of Things, the physical world is becoming an information system through sensors and actuators embedded in physical objects and linked through wired and wireless networks. The name 'Internet of Things' refers to 'a network of internet-connected objects able to collect and exchange data using embedded sensors'.[9]

Industry 4.0 describes the current global trend of automation and digitalisation in manufacturing technologies. This change is being driven by four major disruptions: rising data volumes, computational power, and connectivity; the emergence of analytics and business-intelligence capabilities; new forms of human-machine interaction, and improvements in transferring digital instructions to the physical world. The adoption of information and communication technologies (ICT) in the manufacturing domain specifically will lead to the creation of more sophisticated production systems, and enable the implementation of innovative business models. There is also a move towards the creation of global standards for products and services.[10]

Consultations highlighted that this increased use of digitalisation and automation is seen as the next level in the drive to increase productivity, efficiency and competitiveness within organisations, and is particularly evident in:

- the application of competitive systems and practices in the manufacturing industry, where the automation of processes and use of robotics is increasing productivity and competitiveness

- the environmental monitoring and technology area, where monitoring processes are being automated, and increasingly being conducted remotely, often with real-time data

- monitoring and reporting of data in relation to sustainable operations.

These changes are shifting the focus from the skills needed for collection of information and diagnosis of problems to those needed for interpretation and communication of information and the development of new solutions to problems. Consequently, organisations that are being affected by these changes in technology are increasingly looking for employees with problem-solving, communication and STEM skills.

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8   Hannon, E., Kuhlmann, M and Thaidigsmann, B, 2016, Developing products for a circular economy, McKinsey and Company. Available online at https://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/developing-products-for-a-circular-economy

9   Business Insider, 2016, What is the Internet of Things (IoT)?, available online at http://www.businessinsider.com/what-is-the-internet-of-things-definition-2016-8/?r=AU&IR=T

10   Australian Government Department of Industry, Innovation and Science, Industry 4.0 webpage, available at <https://industry.gov.au/industry/Industry-4-0/Pages/default.aspx>

Consultations identified an example of where a lack of capability in the interpretation and reporting of data is creating challenges for a specific area of technology. The thermography industry uses thermal imaging cameras (also known as infrared cameras) to detect the energy that is produced by an object or animal and turn this into an image, which can be used for analysis, evaluation accuracy and report writing. This technology is used regularly in environmental management (to monitor heat loss and gain), as well as many other industries. As the technology has developed and become more widely and cheaply available, it has become evident that a lack of skill and understanding of how to interpret the information and images is creating significant safety and economic risks for the industries that use thermographic imaging services.

Resources and Environment

Energy security and energy management have been identified as major concerns for businesses. The Australian Institute of Company Directors (AICD) recently identified electricity prices and energy policy as the top two challenges currently facing Australian businesses.[11] The World Economic Forum's proprietary Executive Opinion Survey (EOS) also found that 'energy price shock' was identified by executives in Australia as the biggest risk to doing business in 2017.[12]

This has implications for skill needs in strategic management of energy demand, use of renewable energy, and energy efficiency.

The New South Wales and Victorian governments have adopted long-term objectives of achieving net-zero emissions by 2050 as a means of improving energy productivity. They identify improved energy efficiency within the domestic housing market as key to achieving this target. A variety of 'actors' have been identified, who could influence decisions about energy efficiency within the market. It has been acknowledged that the motivations for influencing decisions are not yet well established and that there are a number of knowledge and skill gaps that would need to be addressed.[13]

Politics and Institutional

Following movements in other parts of the world, Australia is intending to introduce legislation to tackle 'modern day slavery' in which workers are exploited or subjected to forced labour and substandard working conditions – either within Australia, or in overseas countries in organisations that form part of a supply chain. The proposed legislation would involve mandatory supply chain reporting for large businesses in Australia.[14] The potential impacts of this legislation on organisational capability are not yet clear.

11   Australian Institute of Company Directors, 2017, Director Sentiment Index: Research Summary, Second Half 2017

12   Zurich, 2017, Key data points - Global risks of highest concern for doing business in 2017. Available online at <https://www.zurich.com/en/knowledge/articles/2017/09/key-data-points-global-risks-of-highest-concern-for-doing-business-in-2017#country>

13   ACIL Allen Consulting, 2017, Residential Housing Industry Capabilities Analysis of Capability to Support NSW and Victorian Government Energy Efficiency Policies and Programs

14   Parliament of Australia, 2017, Modern slavery and global supply chains, available online at <https://www.aph.gov.au/Parliamentary_Business/Committees/Joint/Foreign_Affairs_Defence_and_Trade/ModernSlavery/Interim_Report>

Supply-side Challenges and Opportunities

The consultations which were undertaken to assist with the development of this Industry Skills Forecast raised few issues related to the supply of skills in sustainability through the training system. The exception was concerns about the lack of funding for training in certain qualifications and inconsistent funding arrangements across jurisdictions. Of particular note was an observation that a lack of funding for qualifications in sustainable operations, and a resulting lack of training providers, is proving to be an impediment to skilling learners in improvements in energy efficiency, with learners finding it difficult to access appropriate training.

For Learners and Training Package Development

As upskilling becomes more important in a shifting labour market, the demand for modular learning is increasing.[15] Smaller 'chunks' of learning (such as skill sets and micro-credentials) are being seen as opportunities for ongoing engagement with learners in the 'lifelong learning' era. Given that the current enrolment patterns within MSS Sustainability Training Package qualifications indicate much greater levels of uptake within older age groups, considerations of how to best support upskilling needs are particularly important.

Generic skills are becoming increasingly valued by employers, and learners who have mastered these skills will be more prepared for potentially multiple career changes over a lifetime.[16]

Cross-Industry Challenges and Opportunities

Given the cross-industry nature of qualifications within the MSS Sustainability Training Package, many of the issues identified above are also relevant to other industries and sectors. These challenges and opportunities include those related to:

- Automation, digitalisation and Industry 4.0

- Energy efficiency and energy management – particularly in the domestic housing market

- Introduction of the Modern Day Slavery Act

- Problem solving and design thinking.

15   Milligan, S., and Kennedy, G., 2017. To what degree? Alternative micro-credentialing in a digital age. Melbourne Centre for the Study of Higher Education: Visions for Australian Tertiary Education , pp. 41-53

16   NCVER, 2017, Focus on Skilling our future workers, available online at http://www.voced.edu.au/focus-skilling-our-future-workers

Employment and Skills Outlook

Employment Outlook

Given the challenges in defining the sustainability sector, it is also difficult to capture the range of occupations in which MSS Sustainability Training Package qualifications are relevant – particularly in the sustainable operations and competitive systems and practices areas, which are relevant to such a wide range of industries and occupations.

There are some job roles, however, that are more likely to include responsibility for aspects of sustainability, such as sustainability officers, occupational health and safety and environment officers, quality managers, environmental assistants, technicians and officers, facilities and procurement managers, team leaders leading competitive systems and practices initiatives and managers or technical specialists designing and/or managing implementation of competitive systems and practices strategies.
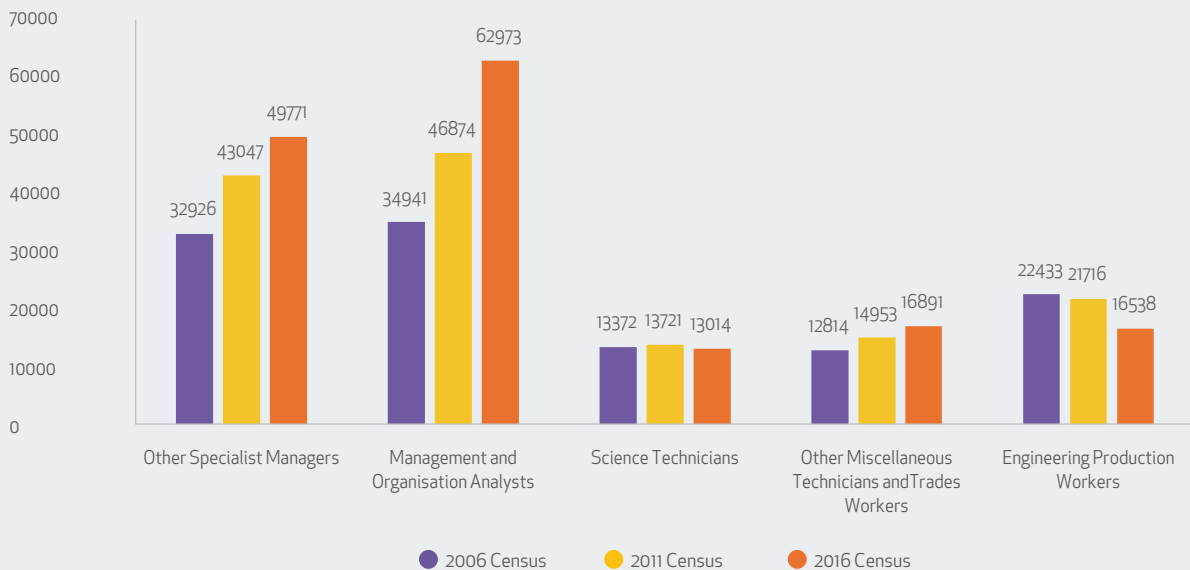
The Australian and New Zealand Standard Classification of Occupations (ANZSCO) and ANZSIC codes that cover employment in these types of roles, along with the related qualifications, are listed in **Appendices C and D**.

Keeping in mind that this data only covers a subsection of the roles that might use MSS Sustainability Training Package-related skills, the following observations can be made.

- Employment across all of the identified occupational categories is largest in the 40-49 and 30-39 year old age groupings, further supporting the fact that qualifications in the MSS Sustainability Training Package area tend to be needed more for upskilling than entry-level worker training. The exception is Miscellaneous Technicians and Trade Workers (to which the Certificate III and IV in Competitive Systems and Practices are relevant), which has a slightly younger age profile.

- Employment in 'Other Specialist Managers' occupations has been increasing steadily from 2006–2016. These are spread across the states and territories in proportions similar to the overall employed population, supporting the fact that these types of roles exist across a wide range of industry sectors.

- There have been significant increases in employment in 'Management and Organisational Analyst' occupations, of which possible sustainable operations and competitive systems and practices-related occupations comprise over 12%. These occupations are more highly concentrated in NSW and VIC in relation to the overall employed population.

- There has been a decrease in employment for 'Engineering Production Workers', of which possible competitive systems and practices-related occupations comprise nearly 100%. This is likely to be indicative of the decline of some parts of the manufacturing industry (particularly related to the mining and automotive industries) and the replacement of lower-level manufacturing jobs by automation. Engineering Production is a male-dominated occupation (over 95% male), with workers tending to be older (more than half in the 40-49 and 50-59 year old age groups) and slightly more concentrated in Queensland and Western Australia (in relation to the overall employed population). Due to industry change and decline, these workers may have an increasing need for upskilling and re-skilling.

- 'Science Technician' occupations (of which possible sustainable operations and environmental monitoring and technology-related occupations comprise nearly 20%), are slightly more female-dominated (53% female). While the largest numbers are employed in Victoria, they are more concentrated in Western Australia in relation to the overall employed population.

Figure 4 – Employment trends across relevant ANZSCO Occupations

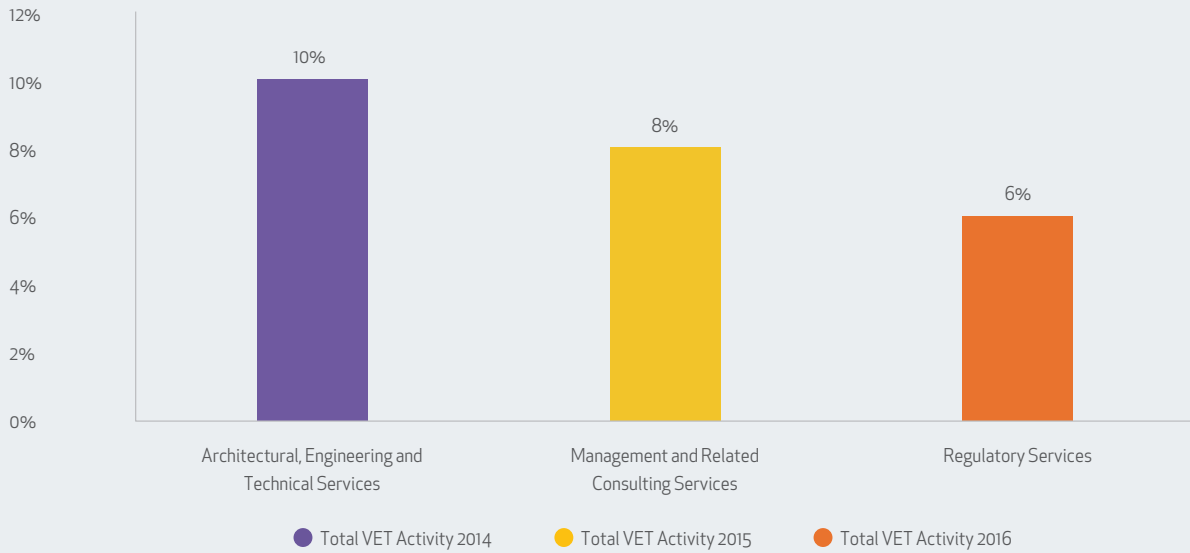Source: ABS 2006, 2011 and 2016 Census of Population and Housing

In relation to the three relevant ANZSIC industry classifications:

For the Architectural, Engineering and Technical Services sector, of which environmental monitoring and technology-related occupations form a small proportion, employment growth is projected at 10% over the next five years.

For the Management and Related Consulting Services sector, of which consultants in sustainability form a small proportion, employment growth is projected at 8% over the next five years.

For the Regulatory Services sector, of which environmental monitoring and technology-related occupations form a small proportion, employment growth is projected at 6% over the next five years.

Figure 5 – Projected employment growth across relevant ANZSIC Sectors 2017-2022

Source: Department of Jobs and Small Business Labour Market Information Portal (LMIP) Industry Employment Projections May 2017 – May 2022

Workforce Supply Challenges and Opportunities

The employment figures and projections outlined above suggest that employment in sustainability-related occupations and industries will continue to be strong over the coming years. However, lower-skilled manufacturing jobs are at risk due to industry change and decline.

The increasing focus on sustainability within organisations might be hampered by the lack of available training, or lack of uptake of training in the area of sustainable operations. The small numbers of enrolments and providers in this area may be a reflection of the fact that this has traditionally been a higher education-dominated field. However, it also might present a significant opportunity for the VET sector and the MSS Sustainability Training Package to take advantage of increasing workforce supply demands by ensuring available qualifications and skill sets are aligned with the more technical aspects of this growth area.

The dominance of higher education qualifications in more technical fields was also raised during the consultations, for example in the area of environmental monitoring and management. The role of occupational hygienist has been identified as one in which various tasks are being undertaken by technicians, and would benefit from the development of VET specialisations to support this.

The impact of automation and digitalisation on employment across all industries is predicted to be significant, and even more so in the manufacturing industry, requiring many workers to switch occupations, to develop new skills and capabilities that enable them to adapt to the rise of more sophisticated machines, and to develop skills in areas that are difficult to automate, such as social and emotional skills, creativity and higher-level cognitive capabilities.[17]

Consultations identified that workers with the necessary underpinning STEM skills, problem-solving skills and communication skills are difficult to find and highlight the need for the development of generic skills within the workforce.

Consultations have identified a potential 'future' job role in the sustainability sector, the need for which is emerging from the increasing levels of available monitoring data. This role would centre around 'data visualisation', which involves interpreting the available data and presenting and communicating it in a way that is understandable to a specific audience and able to be acted upon within an organisation.

Another emerging/growing job role that has been identified through consultations is in the area of planning and scheduling of maintenance tasks in industrial environments. There is a growing demand for people who can manage maintenance needs of organisations in a way that maximises the efficiency and effectiveness, and therefore the sustainability, of this area of operations.

Skills Outlook

Demand for skills in sustainable operations and environmental monitoring and technology will continue to grow, driven by legislation and consumer demands, while the need for greater efficiency, productivity and sustainability in organisations will continue to drive demand for skills in competitive systems and practices.

In the area of sustainable operations, the increasing level of sophistication and reliance on strong scientific and economic evidence is driving a need for a more sophisticated and strategic skills base including skills, knowledge and understandings such as science-based targets, triple bottom lines, governance, leadership and management, data interpretation and communication.

In the area of competitive systems and practices, organisations in the manufacturing sector are seeking a combination of trade skills and skills, knowledge and understanding of competitive systems and practices. There may be opportunities to develop skill sets in certain improvement practices and processes like 5S and Kaizen, to upskill those with existing qualifications. The availability of skill sets may also make the uptake of competitive systems and practices more accessible/affordable for small organisations.

Consultations suggest that there is ongoing demand for generic underpinning skills around problem solving, innovation, design thinking, leadership, management, and STEM skills.

A number of the challenges and opportunities identified earlier in the report also have implications for the skills outlook.

- Changes in business models are changing the ways in which organisations interact with customers, driving the need for skills in online and face-to-face customer engagement, communication, and product and service design.

- Changes in career and employment patterns are impacting on the demand for learning and the ways in which training is offered. As qualifications in the MSS Sustainability Training Package appear to be predominantly used for upskilling or re-skilling, the opportunity for undertaking smaller chunks of learning, like skill sets, may enhance the level of uptake of training.

- The impact of increasing levels of automation and digitalisation are likely to further drive the demand for upskilling and re-skilling, as well as for new skills that enable people to work effectively alongside machines.

IRC members ranked the importance of key generic workforce skills for people undertaking qualifications from the MSS Sustainability Training Package as indicated in the right-hand column of Table 2 below. Where there were only certain parts of the skill grouping that were considered important, these parts have been bolded.

Sustainability IRC members identified that many of these skills are interlinked. For example, systems thinking, leadership and problem-solving skills are all a part of sustainability skills, while environment skills are closely aligned with STEM skills, and information literacy is essential for data analysis. They also clarified that while Language, Literacy and Numeracy (LLN) skills are vitally important, it is assumed that people working in these areas will already have these skills as part of their technical/professional foundation.

Table 2 – Key Generic Workforce Skills

Combined Manufacturing IRCs		Sustainability IRC	
1	Design mindset/Thinking critically/Systems thinking/Solving problems skills	1	Design mindset/Thinking critically/**Systems thinking/Solving problems skills**
2	Technology use and application skills	2	Communication/Collaborations including virtual collaboration/Social intelligence skills
3	Learning agility/Information literacy/Intellectual autonomy and self-management skills	3	Data analysis skills
4	Communication/Collaborations including virtual collaboration/Social intelligence skills	4	Managerial/**Leadership skills**
5	Science, Technology, Engineering and Mathematics (STEM) skills	5	Science, Technology, Engineering and Mathematics (STEM) skills
6	Language, Literacy and Numeracy (LLN) skills	6	Environmental and **Sustainability skills**
7	Data analysis skills	7	Financial skills
8	Managerial/Leadership skills	8	Technology use and application skills
9	Customer service/Marketing skills	9	**Learning agility**/Information literacy/Intellectual autonomy and self-management skills
10	Environmental and Sustainability skills	10	Language, Literacy and Numeracy (LLN) skills
11	Entrepreneurial skills	11	Customer service/Marketing skills
12	Financial skills	12	Entrepreneurial skills

Key Drivers for Change and Proposed Responses

The challenges and opportunities and the employment and skills outlook described in this report indicate the need for skill development solutions in a number of priority areas. These are outlined in Table 3 below.

Table 3 – Priority skills and key drivers for change

Priority Skills	Key Driver for Change	Proposed Response
Regulatory/Legislative		
Identification, management and reporting of practices within supply chains	Proposed introduction of Modern Slavery legislation, which would require mandatory supply chain reporting	Investigate the potential for training package solutions to the likely skill requirements for supply chain reporting. Will be relevant to occupations related to sustainability reporting and supply chain management in large organisations and is therefore likely to also impact on other training packages (such as MST – Textiles, Clothing and Footwear). The impact of potential solutions on stakeholders will be determined as part of the investigation.
Industry Specific		
Sustainable operations	Increasing sophistication of practices in the area of sustainability	Review all units of competency in the sustainable operations area to ensure they reflect current thinking, practices and terminology (note that many units are currently being redeveloped under current Activity Orders. So this work will only need to address any remaining units that have not been reviewed under existing work). Will be relevant to all occupations with responsibility for management of sustainability within organisations. Will increase the relevance of qualifications to employers and employees, with the intention of improving demand for and supply of training in these qualifications. The impact of changes on other stakeholders will be determined as part of the scoping of the work. Sustainable Operations qualifications may become irrelevant if they are not updated.

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Priority Skills	Key Driver for Change	Proposed Response
Energy Use		
Energy use management and energy procurement	Significant business concerns about energy security and energy management	Review current standards/qualifications/skill sets to determine where gaps exist.
		Will be relevant to all occupations with responsibilities for management or procurement of energy.
		The impact of changes on stakeholders will be determined as part of the scoping of the work.
		As energy security and energy management are currently the most significant priorities and concerns for businesses, lack of skill development in these areas poses significant risk for ongoing business viability.
Provision of advice on practices and options for maximising energy efficiency	State government targets for improving energy productivity	Monitor action around this policy area for potential levers for increased demand for skills in this area in the future.
		Relevant occupations will include all those related to the domestic housing market (e.g. building trades, design, drafting, real estate).
Technology		
Changing skill needs arising from new forms of human–machine and machine–machine interaction	The rise of automation, digitalisation and Industry 4.0	Investigate the extent to which the skill implications of these changes are generic and sustainability-related and therefore relevant to the MSS Sustainability Training Package.
		Will require cross-sector collaboration as a wide range of occupations are potentially affected.
		The potential impact on stakeholders will be determined as part of the investigation.
		If the potential skill needs of these changes are not identified, VET qualifications will become irrelevant to organisations trying to remain competitive in a rapidly changing environment.
		There are potentially large numbers of workers who are at risk of unemployment as a result of these changes if they cannot be upskilled or re-skilled.

Priority Skills	Key Driver for Change	Proposed Response
Emerging/changing job roles		
Data visualisation	Increasing need for reporting and communication of data to support process and sustainability improvements	Investigate the need for specific units/skill sets/qualification as part of investigations in implications of changing technology, as detailed above.
Maintenance planning	Need for more efficient and effective management of maintenance processes in industrial environments	Scope the role of maintenance planners and identify any gaps that might be addressed within the MSS Sustainability Training Package. Will be relevant to occupations related to maintenance management as covered by the new ISO55000 Asset Management Standards. Is likely to have impacts on qualifications in other areas such as local government, resources, utilities, aviation and defence.
Occupational hygienist	Existing and potential use of technicians to perform aspects of this role	Investigate the potential for an occupational hygiene stream within the Diploma of Environmental Monitoring and Management. Is relevant to environmental technician occupations. Industry and higher education support already exists but would need to have support from the peak body for this occupation, Australian Institute of Occupational Hygienists Inc.
Generic skills		
Problem solving, design thinking, leadership, management, STEM and customer engagement	Changing business models and practices	Monitor the need for these skills and the extent to which they are being addressed through ongoing cross-sector projects.
Demand for upskilling		
Specific components of competitive systems and practices and environmental monitoring	Demand for upskilling in specific techniques and practices	Consider the development of skill sets in specific aspects of competitive systems and practices and in environmental measurement.

Training Product Review – Current Activities

2016-17 Activities

In February 2017, IBSA Manufacturing were commissioned to undertake training package development work on behalf on the Sustainability IRC on the MSS Sustainability Training Package. The training package review and development work focused on the following 6 qualifications:

- MSS40116 Certificate IV in Sustainable Operations

- MSS40216 Certificate IV in Environmental Monitoring and Technology

- MSS50116 Diploma of Sustainable Operations

- MSS50216 Diploma of Environmental Monitoring and Technology

- MSS80116 Graduate Certificate in Sustainable Operations

- MSS80216 Graduate Certificate in Environmental Management.

The work examined a number of units in these qualifications to ensure there is adequate content to meet the growing demand for integrated skills and capabilities associated with project management and leadership across the sustainability discipline.

In addition, the training package was also reviewed to ensure there is adequate content associated with the skills and capabilities required for Carbon Auditing. To meet this requirement, a new skill set has been developed – **Lead Energy and Greenhouse Gas Improvements**. This skill set is for individuals who are responsible for identifying opportunities to manage and improve energy and greenhouse gas (GHG) reduction processes within an organisation across any sector. The individual will be responsible for project managing the audit and procuring specialised technical experts as required. One new unit was also developed as part of the skill set.

This project is due for submission to the Department of Education and Training in June 2018 for AISC consideration.

2017-18 Activities

In order to build on current training package development activities and to gain further holistic improvements to the training package components, a Case for Change was developed and submitted to the Department in December 2017.

The focus of the Case for Change is to extend skills for sustainability job roles to reflect the increasing importance of organisations' need to meet 'Corporate Social Responsibility' expectations. These include adherence to national and international standards related to carbon, energy, and greenhouse gas reduction.

The Case for Change recommends revising a number of units and the existing skill set MSSSS00006 Reduce Sustainability Risk, and developing a new unit 'Interpreting and applying standards relating to corporate social responsibility'.

The Case for Change was approved by the AISC in February 2018.

AISC Cross-Sector Projects

The AISC identified a number of emerging cross-sectoral themes in previous IRC Skills Forecasts. The AISC sought to strategically address these common skills issues and commissioned nine cross-sector projects. The aim of the projects is to address changing skills needs across industries in a coordinated and efficient way and, where opportunities exist, to create flexible and transferable training package components that will benefit industry, learners and the broader VET sector.

There are a number of cross-sector projects that will potentially directly impact upon the MSS Sustainability Training Package:

- The **Digital Skills** Cross-Sector Project, initially focused on the need for coding skills in manufacturing and related training packages, was subsequently expanded to focus on a broader set of skills related to coding and programming, CAD/CAM/CAE, and additive manufacturing/3D printing, as well as the digital analytical/diagnostic skills needed to analyse and respond to data provided by machines in the workplace. Outcomes of the project may result in recommendations for updated content for at least seven units of competency in the MSS Sustainability Training Package.

- The **Automation Skills** Cross-Sector Project focused on current and emerging developments in automated processes to determine the cross-sector skills which are required to use robotics, drones and remote operation systems. Outcomes of the project may result in recommendations for updated content for at least two units of competency in the MSS Sustainability Training Package.

- The **Environmental Sustainability Skills** Cross-Sector Project focused on identifying environmental sustainability skills that are shared by multiple industry sectors and recommended training package developments and modifications that will enable the use of training products across multiple industries, thus reducing duplication and enhancing skill transferability. Outcomes of the project may result in recommendations for at least four units of competency and a skill set from the MSS Sustainability Training Package to be reviewed, with potential for replacement by a cross-industry unit and skill set.

- The **Supply Chain Skills** Cross-Sector Project investigated cross-sector skills to support industries seeking to increase efficiencies and meet consumer demands to become more competitive across supply chains. Outcomes of the project may result in recommendations for at least one unit of competency from the MSS Sustainability Training Package to be included in a cross-industry skill set.

- The **Big Data** Cross-Sector Project focused on the increased importance of capturing and interpreting data and reviewed new and emerging roles and skills required to analyse data and make decisions based on that analysis. Outcomes of the project may result in recommendations that at least one unit of competency from the MSS Sustainability Training Package be reviewed, with potential for replacement by a cross-industry unit.

Training Product Review – Priorities 2018-2022

Following consideration and analysis of the industry challenges and opportunities, current and emerging skills needs and the key drivers for change, the Sustainability IRC have identified a number of areas for training product development. These training priorities are outlined in the IRC Skills Forecast and Proposed Schedule Work 2018-19 to 2021-22 table which lists the priorities for the next four years. This table also provides a rationale for the priorities, proposed scope and timeframes for these activities.

Items Identified as Time Critical and to be Considered by the AISC as Part of the 2018 Industry Skills Forecast and Proposed Schedule of Work

The IRC identified the following training priority as critical and request proposed for inclusion as a priority for the 2018-2019 schedule of work:

Energy Management: Energy price shock has been identified as a leading issue for both enterprises and the residential market. This project will focus on the review of current standards/qualifications/skill sets in the areas of energy management and energy procurement, and if required, updating or development of new content to ensure coverage of the skills and knowledge needed by individuals with responsibilities for improving energy performance and/or developing/implementing strategic approaches to energy procurement. Such content may also be valuable additions to the elective bank for use in other training packages such as Electrotechnology (for use by electricians) and Business Services (for use in business management).

A Case for Change has been prepared and included as part of this document. The Case for Change provides further information on the industry imperatives, consultation plan and proposed scope of the project.

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Items Identified as Important and to be Included in the Priorities for 2018-19

The item identified as important and proposed for inclusion as a priority for the 2018-19 schedule of work is:

- **Sustainability practices:** Review of all relevant units of competency to ensure they reflect current terminology and practices in sustainability. This work would follow on from the current work around Corporate Social Responsbility, by updating any remaining units of competency that have not been covered by the earlier work. Alternatively, it may be linked to the work being undertaken in the Environmental Sustainability cross-sector project.

A separate Case for Change will be prepared and submitted to the AISC for consideration.

Items Identified as Priorities Over the Next Three Years

The IRC identified the following training priorities to be considered over the next three years.

2019–2020

- **Modern Slavery:** Scoping of the skill implications of the new legislation for mandatory supply chain reporting in relation to modern slavery

- **Emerging technological changes:** Investigatation of the implications of emerging technological changes for generic cross-sector job roles and skills, including specific skills for visualisation and communication of data for process and sustainability improvements

- **Competitive Systems and Practices Skill Sets:** Development of skill sets in Competitive Systems and Practices for upskilling purposes.

2020–2021

- **Environmental Monitoring and Technology**

  - Consideration of the addition of an **occupational hygiene** stream to the Diploma of Environmental Monitoring and Technology

  - Consideration of the development of **skill sets around measurement** in environmental monitoring and technology (e.g. water testing, methane measurement, soil absorption)

  - Development of national competency standards and skills sets around the use of **thermal imaging**.

2021–2022

Generic skills: Review of content associated with growing demand for the integration of generic skills and capabilities such as problem solving, design thinking, customer engagement, leadership, business management, change management and innovation management.

Future Priorities 2023 Onwards

In their analysis of the industry challenges and opportunities, current and emerging skills needs and the key drivers for change, the Sustainability IRC identified the following areas for future training product development:

- **Sustainability in the domestic housing market**: Investigation of the intersection between sustainability skills and other qualifications related to the domestic housing market, including building trades, design, drafting, real estate. Progress of the New South Wales and Victorian governments' long-term objectives and strategies for achieving net-zero emissions by 2050 may create some policy and legislative drivers for greater engagement of 'influencers' in the domestic housing market in increasing energy efficiency and sustainability within this sector.

Proposed Schedule of Work 2018-19 to 2021-22

Sustainability Industry Reference Committee (IRC)

MSS Sustainability Training Package

Contact details: Mr Peter Nemtsas, IRC Chair

Date submitted to Department of Education and Training: May 2018

Year	Items to be included in National Schedule of work

2018-19

Energy Management

This project will focus on the review of current standards, qualifications and skill sets in the areas of energy management and energy procurement, and if required, updating or development of new content, to ensure coverage of the skills and knowledge needed by individuals with responsibilities for improving energy performance, and developing and implementing strategic approaches to energy procurement.

Rationale

Energy price shock has been identified as a leading issue and risk for both enterprises and the residential market (see discussion under Challenges and Opportunities).

Training products impacted:

- MSS40116 Certificate IV in Sustainable Operations
- MSS50116 Diploma of Sustainable Operations
- MSS80116 Graduate Certificate in Sustainable Operations
- SS1 Audit energy usage for a work area
- SS2 Determine energy usage
- SS3 Improve energy usage for a process or organisation
- SS4 Improve energy usage for a work area
- SS5 Recommend energy improvements.

This project was identified as time critical and that training package development work be approved as part of this submission.

Further information on the industry imperatives, consultation plan and proposed scope of the project is provided in the Case for Change following the proposed schedule of work.

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Year	Items to be included in National Schedule of work

2018-19 ## Sustainability Practices

Review of all relevant units of competency to ensure they reflect current terminology and practices in sustainability.

Rationale

Increasing levels of sophistication in the approach to sustainability, underpinned by scientific and economic drivers, are changing the ways in which sustainability practices are described and undertaken (see discussion under Challenges and Opportunities).

Training products impacted:

A list of training package components impacted will be provided at a later date.

This work would follow the current work around Corporate Social Responsbility, by updating any remaining units of competency that have not been covered by the earlier work. Alternatively, it may be linked to the work being undertaken in the Environmental Sustainability cross-sector project.

2019-20 ## Modern Slavery

Identification of the skill implications of the new legislation for mandatory supply chain reporting in relation to modern slavery and updating of current units of competency or development of new standards to support this.

Rationale

The Australian Government intends to introduce new legislation that would require large businesses to report on modern slavery risks in their supply chains (see discussion under Challenges and Opportunities).

Training products impacted:

A list of training package components impacted will be provided at a later date.

This work may be impacted by the Supply Chain cross-sector project.

2019-20 ## Emerging Technological Changes

Identify the skill implications of the emerging technological changes related to the Internet of Things and Industry 4.0 in relation to generic cross-sector job roles and skills. This will include identification of the skill needs of an emerging job role around data visualisation and communication for process and sustainability improvements, and the development of new units, skill sets and qualification as needed.

Rationale

New forms of human–machine and machine–machine interaction are emerging as part of the next wave of innovation and process improvements leading to more sustainable and competitive business operations (see discussion under Challenges and Opportunities and Workforce Supply Challenges and Opportunities).

Training products impacted:

A list of training package components impacted will be provided at a later date.

This work may be impacted by the Digital Skills, Automation and Big Data cross-sector projects.

Year	Items to be included in National Schedule of work

2019-20

Competitive Systems and Practices Skill Sets

Consider the development of skill sets in Competitive Systems and Practices to enable skilled workers to implement specific initiatives and practices including 5S and Kaizen.

Rationale

Manufacturing businesses are increasingly seeking employees who possess trade or other vocational skills, as well as knowledge and understandings of competitive systems and practices. The availability of skill sets in specific practices may enable businesses to upskill their entire workforce by implementing organisation-wide competitive systems and practices initiatives.

Training products impacted:

- MSS30316 Certificate III in Competitive Systems and Practices
- MSS40316 Certificate IV in Competitive Systems and Practices
- MSS50316 Diploma of Competitive Systems and Practices.

2020-21

Environmental Monitoring and Technology

Update and develop new units, skill sets and qualifications as needed to support emerging job roles around occupational hygiene, environmental measurement and thermal imaging. This will include:

- Consideration of the addition of an **occupational hygiene** stream to the Diploma of Environmental Monitoring and Technology
- Development of national competency standards and skills sets around the use of **thermal imaging**
- Consideration of the development of **skill sets around measurement** in environmental monitoring and technology (e.g. water testing, methane measurement, soil absorption).

Rationale

Many of the technical tasks (such as dust, vapour and fume exposure monitoring, asbestos inspection and air monitoring, and hazardous substances risk assessments) in occupational hygiene are currently conducted by environmental technicians. Establishment of an occupational hygiene stream would help to facilitate the establishment of technical roles in this area, and create pathways into higher education.

There are currently no standards for appropriate and accurate conduct, interpretation and reporting of thermographic testing, which is increasingly being used in sectors such as Environmental Management, Recycling and Waste, Plumbing, Electrical, Pest Control, and Building industries to create a thermal profile to identify heat loss and heat gain (see discussion under Challenges and Opportunities).

Increasing demands for 'smaller chunks' of learning and the rise of niche market service providers are driving a demand for upskilling in specific environmental monitoring techniques.

Training products impacted:

- MSS40216 Certificate IV in Environmental Monitoring and Technology
- MSS50216 Diploma of Environmental Monitoring and Technology
- MSS80216 Graduate Certificate in Environmental Management.

Year	Items to be included in National Schedule of work
2021-22	Generic Skills

Review content associated with growing demand for the integration of skills and capabilities associated with:

- Problem solving

- Design thinking

- Business management

- Leadership

- Change management

- Innovation management

- Customer engagement (especially via online methods).

Rationale

Generic skills are becoming increasingly valued by employers because of their role in enabling workers to be adaptable and to apply their technical skills in increasingly varied and changing environments and business models. Learners who have mastered these skills will be more prepared for any future multiple career changes, which is particularly important within the rapidly shifting labour market.

Generic skills also support the growing employer and learner preferences for modular or 'chunks' of learning by providing a foundation for ongoing learning and upskilling.

Training products impacted:

A list of training package components impacted will be provided at a later date.

This work may be impacted by a number of cross-sector projects including Consumer Engagement via Online and Social Media.

2018-19 Case for Change

Sustainability Industry Reference Committee (IRC)

MSS Sustainability Training Package

Contact details: Mr Peter Nemtsas, IRC Chair

Date submitted to Department of Education and Training: May 2018

Energy Management

Description:	This project will review and update current training package components in the areas of energy management, including energy procurement, to ensure coverage of the skills and knowledge needed by individuals with responsibilities for improving energy performance and/or developing/implementing strategic approaches to energy management.
Rationale:	Energy price shock has been identified as a leading issue and risk for both enterprises and the residential market, and was identified by CEOs in Australia as the biggest risk to doing business in 2017.

Whilst many larger organisations often have access to the internal or external expertise needed to develop a strategic approach to energy management, this is not a viable option for all. Demand for courses being offered outside of the VET system (such as those run by the NSW Government Office of Environment and Heritage) demonstrates a growing interest in and demand for skills and strategies for managing energy costs in a way that requires little capital investment. This includes skills for tasks such as:

- Understanding energy consumption
- Interpreting energy data
- Identifying potential areas of energy savings
- Developing and implementing energy management systems, policies and plans
- Engaging decision makers and other organisation stakeholders
- Negotiating energy supply contracts
- Identifying and procuring alternative energy options.

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Energy Management

Rationale:	Demand for these skills is coming from representatives of a wide range of industries and occupations, from electricians and energy consultants, through to those with responsibilities for managing facilities, environment and sustainability, financial and other aspects of business operations.

A lack of capability and skills within organisations for managing and procuring energy in an efficient and sustainable way poses significant risk for the ongoing viability of Australian businesses and is increasing the risk of whole industry sectors moving offshore. This makes the development of new training products to address these skills a high priority.

The training products to be developed and updated through this project will be relevant to a wide range of occupations with responsibilities for management or procurement of energy within any industry that is being impacted by rising energy costs. The cross-sectoral nature of the MSS Sustainability Training Package makes it an ideal home for these products.

Ministers' Priorities Addressed:	The case for change addresses the following Ministers' Priorities:

Obsolete qualifications removed from the system

Sustainable Operation qualifications have a history of low enrolments. This project is likely to result in new units of competency and a new stream within these existing qualifications, which will increase their relevance to industry and thereby likely increase their usage.

More information about industry's expectations of training delivery is available to training providers to improve their delivery and to consumers to enable more informed choices

Updates to the Companion Volume after this work will provide training providers with clarity on vocational outcomes and pathways and discussions with industry will provide the opportunity to promote these vocational pathways.

The training system better supports individuals to move more easily between related occupations

The training products to be developed through this project will be relevant to a very wide range of occupations and industries, supporting tranferability of skills and mobility of skilled workers both within and across industry sectors.

Improved efficiency of the training system through units that can be owned and used by multiple industry sectors

New or updated units of competency may be valuable additions to the 'elective bank' for use in other training packages such as Electrotechnology (for use by electricians) and Business Services (for use in business management).

Foster greater recognition of skill sets

A number of skill sets will be revised as part of this project, increasing their relevance and visibility to industry and consumers.

Energy Management

Consultation Plan:

IBSA Manufacturing Training Development Projects follow the Training Package Development and Endorsement Process Policy and use a five-phase methodology. An IBSA Industry Manager will coordinate the project on behalf of the IRC.

Phase 1 – Initial research and analysis

Establishment of a Technical Advisory Committee (TAC) to validate the project scope and plan, contribute to further industry research and assist in determining industry needs and job role functional analysis.

The IRC will appoint the Technical Advisory Committee/s to inform this work. The TAC will have current skills and knowledge of the broad range of job roles covered by this project and also include industry and member associations, licensing and regulatory authorities.

Proposed membership will include representatives from:

- Energy Efficiency Council

- Sustainable Business Australia

- One or more organisations who have successfully implemented energy management initiatives

- One or more energy management practitioners/subject matter experts

- Specialist training organisation in energy management.

Phase 2 – Draft 1 and public consultation

Develop first draft of training package components for feedback from the TAC and then the broader industry and RTOs.

Phase 3 – Draft 2 and public consultation

Respond to feedback and develop second draft of training package components. Feedback to be sought from the broader industry and RTOs.

Phase 4 – Approval process

Adjust training package components in response to further feedback and seek approval from respective committees, namely the TAC and IRC and endorsement from state training authorities.

Phase 5 – Submission to Department

Submit to the Department of Education and Training for AISC approval.

Energy Management

Consultation Plan:	**Consultation Plan**

IBSA will create a project web page to provide project updates, gather feedback from stakeholders and validate training package components.

Proposed consultations include:

- Government bodies responsible for energy regulation, energy management policy and programs
- Accredited organisations providing energy management advice
- Industry representatives and employers to identify the industry and job requirements and trends and work opportunities including:
  - Energy Efficiency Council
  - Sustainable Business Australia
  - Organisations who have successfully implemented energy management initiatives
  - Energy management practioners/subject matter experts
  - Specialist training organisations in energy management
- RTOs with the qualifications on scope and recent or current students if accessible to gain feedback on the actual qualifications and employment outcome
- Other Industry Reference Committees with relevant energy efficiency and management units under their remit
- State Training Authorities to ensure all jurisdictions are engaged.

Scope of Project

Timing	**Estimated Project Duration:** 12 months
	Anticipated Start Date: September 2018
	Anticipated Completion Date: Case for Endorsement to be submitted to the Department September 2019
Training Package	**Training Package to be developed/revised:** MSS Sustainability Training Package

Energy Management

Qualifications	A total of **3-4 qualification**s to be revised/developed as part of this project.
	3 existing qualifications to be revised, with the potential for an Energy Management stream to be incorporated into one of more of these:

- MSS40116 Certificate IV in Sustainable Operations
- MSS50116 Diploma of Sustainable Operations
- MSS80116 Graduate Certificate in Sustainable Operations.

In addition to the review of existing qualifications, a review will be undertaken to determine the feasibility and need for an additional qualification in Energy Management. However, preliminary investigations have identified 2 qualifications from the UEE Electrotechnology Training Package, 1 qualification from the CPP Property Services Training Package and 2 accredited courses as listed below. These will be reviewed for relevance.

- UEE43111 Certificate IV in Energy Efficiency and Assessment
- UEE41011 Certificate IV in Energy Management and Control
- CPP51012 Diploma of Residential Building Energy Assessment
- 22453VIC Course in New Energy Technology Systems
- 22311VIC Course in Retrofitting for Energy and Water Efficiency.

Energy Management

Skill Sets	A total of **6 Skill Sets** be developed/updated as part of this project.

1 new skill set to be developed:

- Energy Management.

5 existing skill sets to be updated:

- SS1 Audit energy usage for a work area

- SS2 Determine energy usage

- SS3 Improve energy usage for a process or organisation

- SS4 Improve energy usage for a work area

- SS5 Recommend energy improvements.

The following 8 skill sets will also be reviewed as part of this project for relevance:

- Business Services Training Package

  - BSBSS00060 Energy Efficiency in Business Skill Set.

- Electrotechnology Training Package

  - UEESS00102 Sustainable - Energy assessment of commercial facilities

  - UEESS00103 Sustainable - Energy Assessment of industrial properties and enterprises

  - UEESS00104 Sustainable - Energy assessment of residential, office and retail premises

  - UEESS00105 Sustainable - Energy Efficiency Auditor

  - UEESS00106 Sustainable - Energy Efficiency Systems Designer

  - UEESS00107 Sustainable - Energy Efficiency Systems Developer

  - UEESS00108 Sustainable - Energy Efficiency Systems Integration Sustainable

  - UEESS00109 Sustainable - Identify Energy Efficiency Strategies.

Energy Management

| Units of Competency | A total of **25 units of competency** to be developed/revised as part of this project. |

Potentially **3 new units** of competency to be developed related to the following areas:

- analysing energy consumption and interpreting energy data

- negotiating energy procurement

- estimating future energy use.

22 existing units of competency to be revised:

- MSS014001 Improve sustainability through readily implementable change

- MSS014002 Evaluate sustainability impact of a work or process area

- MSS014003 Optimise sustainability of a process or plant area

- MSS014004 Develop team strategies for more sustainable use of resources

- MSS014005 Apply proactive maintenance strategies to sustainability

- MSS014006 Contribute to sustainability related audits

- MSS015002 Develop strategies for more sustainable use of resources

- MSS015003 Analyse product lifecycle for sustainability

- MSS015005 Develop required sustainability reports

- MSS015008 Develop strategic sustainability plans

- MSS015011 Conduct a sustainability energy audit

- MSS015015 Evaluate sustainability impact of a process

- MSS015017 Develop regulated sustainability reports

- MSS015018 Inform and educate organisation and community representatives on sustainability issues

- MSS017002 Determine process loss through mass or energy balancing

- MSS024001 Work and communicate effectively as an environmental technician

- MSS027003 Provide environmental advice to clients

- MSS027005 Contribute to improving environmental performance

- MSS405070 Develop sustainable energy practices

- MSS407001 Prepare for and implement change

- MSS407004 Facilitate improvements in the internal value stream

- MSS407013 Review continuous improvement processes.

Energy Management

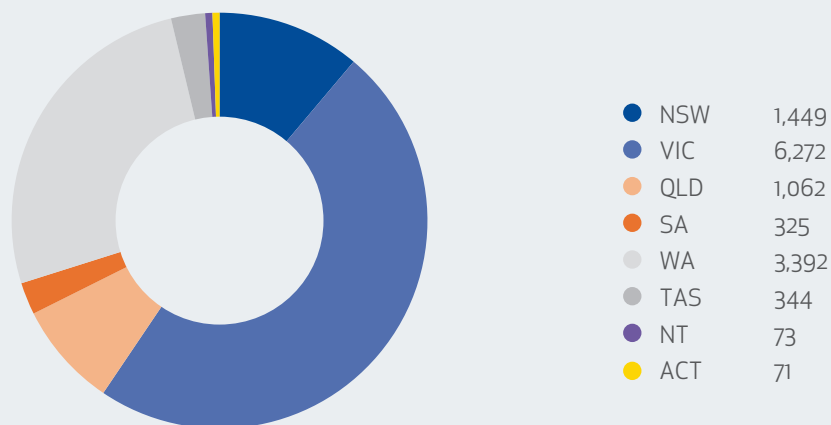| Units of Competency | A number of units of competency were also identified across the national training system in relation to energy efficiency and management. These include units from: |

- AMP Australian Meat Processing Training Package

- BSB Business Services Training Package

- CPC Construction, Plumbing and Services Training Package

- CPP Property Services Training Package

- FWP Forest and Wood Products Training Package

- MEM Metals and Engineering Training Package

- UEE Electrotechnology Training Package

- UEP Electricity Supply Industry - Generation Sector Training Package

- UET Transmission, Distribution and Rail Sector Training Package.

These components will also be considered as part of this project to confirm if they meet industry needs and minimise duplication of units across the national training system.
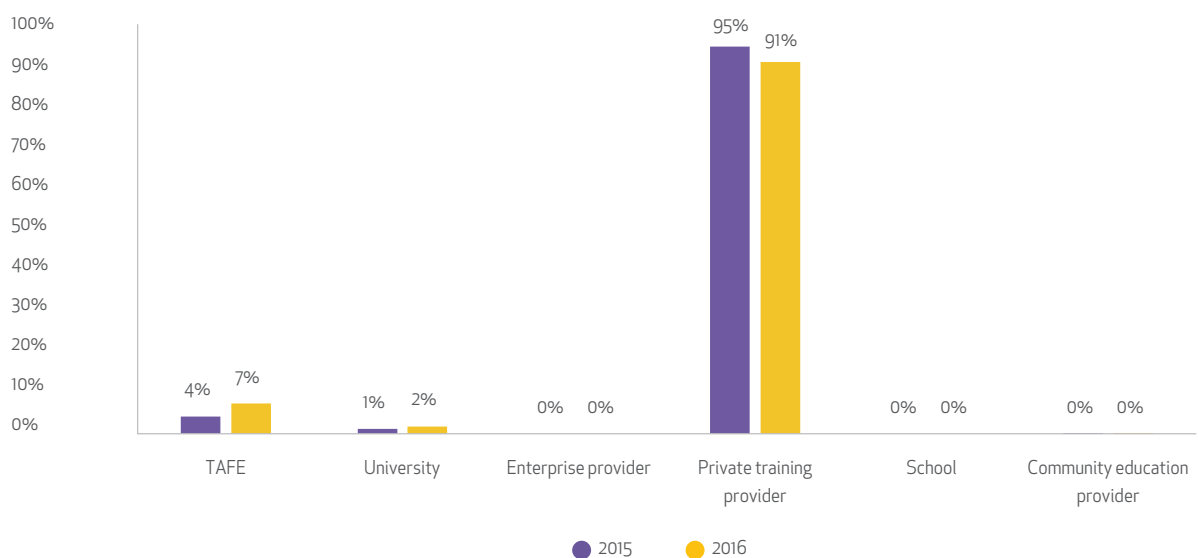
Appendix A: Training Package Enrolment Snapshot

Program enrolments in MSS Sustainability qualifications by State/Territory of student residence

2016 Total VET Activity

●	NSW	1,449
●	VIC	6,272
●	QLD	1,062
●	SA	325
●	WA	3,392
●	TAS	344
●	NT	73
●	ACT	71

Program enrolments in MSS Sustainability qualifications by Training Organisation Type

Percentage of 2015-2016 Total VET Activity

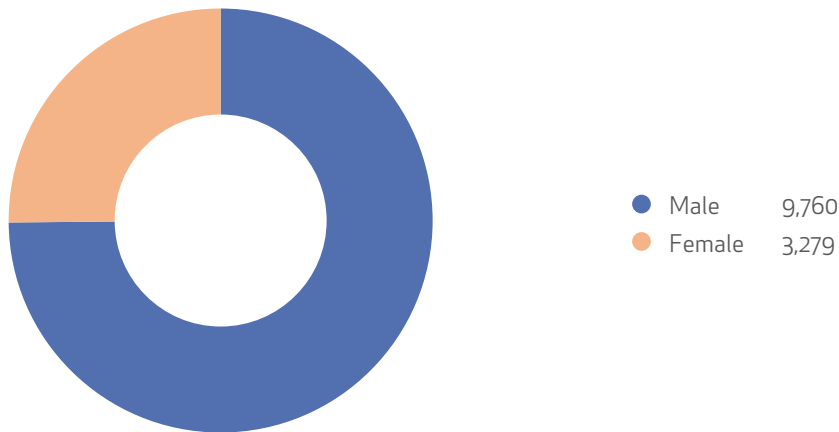|	TAFE	University	Enterprise provider	Private training provider	School	Community education provider
2015	4%	1%	0%	95%	0%	0%
2016	7%	2%	0%	91%	0%	0%

● 2015 ● 2016

Program enrolments in MSS Sustainability qualifications by Age Group

2014 - 2016 Total VET Activity

	2014	2015	2016
19 years and younger	1,354	362	197
20 to 24 years	2,790	1,556	982
25 to 29 years	3,153	2,179	1,480
30 to 39 years	6,318	4,491	3,405
40 to 49 years	6,391	4,370	3,618
50 +	7,523	4,818	3,388

● 2014   ● 2015   ● 2016

Program enrolments in MSS Sustainability qualifications by Sex
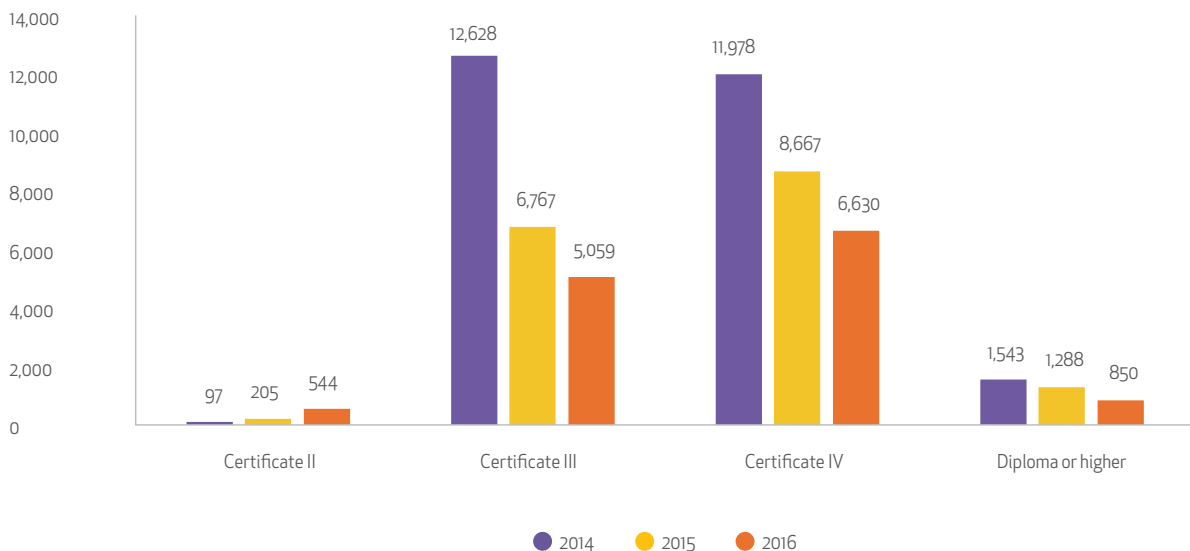
2016 Total VET Activity

● Male   9,760
● Female   3,279

Program enrolments in MSS Sustainability qualifications by Apprentice/Trainee status of student

2014 - 2016 Total VET Activity

● Apprentices and trainees undertaking off-the-job training   ● Not an apprentice or trainee

Program enrolments in MSS Sustainability qualifications by qualification level

2014 - 2016 Total VET Activity

● 2014   ● 2015   ● 2016

All data in this Appendix is sourced from the VOCSTATS VET Provider Collection. 2016 Government Funded and Total VET Activity Program enrolments extracted September 2017

VOCSATATS data are 'randomly' adjusted by small amounts by a data perturbation tool to avoid the release of confidential data. Hence numbers are only approximate. The perturbation impact is negligible for most practical purposes. The effect can be significant and must be considered when interpreting small numbers.

Appendix B: Future Skills Workshop Outcomes

The Australian Industry and Skills Committee (AISC) commissioned the Future Skills and Training Resource which summarises data on current and future Australian and international megatrends, to support Industry Reference Committees (IRCs) in developing their Industry Skills Forecasts and Proposed Schedules of Work.

The following trends and considerations are based on Sustainability IRC discussions. This appendix presents the preliminary thinking of IRC members in order to stimulate broad discussion in industry.

Trends

Society and Culture

The key trends affecting the Sustainability discipline and related sectors are:

The 17 Sustainable Development Goals established by United Nations in 2015 in a global effort to end poverty, protect the planet and ensure prosperity for all, reflect the global social and cultural trend of increasing demand for better stewardship of environmental, social and economic wellbeing.

This in turn is influencing business practices, political and institutional behaviour and environmental and resource management – with technology providing the major platform through which change is taking place.

Changing work and career values, particularly amongst younger generations, are leading to more people working for themselves. However, this can in turn lead to **workforce vulnerability** and fewer opportunities for workers to become skilled.

Increased participation by women in the workforce is having the effect of reorienting the commercial hubris toward a sustainable leading edge.

Business and Economics

The key trends affecting the Sustainability discipline and related sectors are:

Behavioural economics and psychology: The value chain is shifting from competitors to **empowered customers**. Consumer demands and improved economic outcomes have now overtaken regulation as the key drivers of change in sustainable practices.

Different business models are emerging as a result of customer demand for ongoing service, in place of one-off sale of products, as well as for products that are designed to be returned to the manufacturer to be re-used or re-purposed.

Consumer expectations have changed as society becomes more self-aware and there is a trend towards expenditure in ethical investments. Trades people are increasingly becoming the experts in the domestic housing sector, advising consumers of different products and materials so that they can make more informed decisions.

High speed/online competition is enabling manufacturers and traditional trades to become more viable.

Network working and producing: Niche manufacturers are working together in different ways and enabling small-scale entrepreneurs in the industry.

The impact of skills mismatch is greater in the Australian manufacturing sector than it is globally.

Political and Institutional

The key trends affecting the Sustainability discipline and related sectors are:

Innovation ahead of regulation: Policy is sometimes hampering innovation, such as the case of rules that guard against monopolies, even though they might be the most viable business option in new, emerging areas.

Innovation is important for industry and organisational sustainability and needs to be taught, particularly where it relates to improving a business and making it sustainable.

Public relations issues, such as environmental disasters, have a major impact on the profile and stability of governments and organisations.

Resources and Environment

The key trends affecting the Sustainability discipline and related sectors are:

Energy price increases, driven in part by restriction of available energy choices, are having a major impact on business decisions, prompting calls for government responses to ease the impact.

Access to quality internet: There is an expectation that data be available in real time for reporting on environmental monitoring, which relies on country-wide high-speed/quality internet access.

Climatic weather shifts: Government, industries and employers often underestimate the impact of changes in weather patterns on jobs.

International sustainability action: Industry is looking at ethical supply chains and responding to modern slavery practices ahead of anticipated international legislative frameworks. Changes occurring in the EU in relation to sustainability standards and legislation will increasingly impact upon Australian businesses contributing to global supply chains.

Changes in sustainable practice are more likely to be adopted when evidence of financial viability is provided.

Technology

The key trends affecting the Sustainability discipline and related sectors are:

Cross-disciplinary science: Industry and sectoral boundaries are becoming blurred; e.g. Where does farming end and manufacturing begin? The bespoke approach to producing goods and services is also becoming repeatable with material and technological advances. Science and economic skills are increasingly needing to be combined.

Digitisation and big data are providing the basis for improved monitoring and reporting (increasingly in 'real time'), which in turn is driving improvements in sustainable practices.

Implications for Training

Employers / Industry

Australian businesses and the manufacturing industry need to be ready to respond to government regulation – particularly in relation to international sustainability action. Larger organisations often react to international competitors but opportunities exist for Australian business to take the lead on sustainability issues.

Organisations need to be able to undertake a self-evaluation in relation to sustainability. Training should be available to assist industries, organisations and people better understand what being sustainable means and how it affects the triple bottom line of reputation, financial resources, and the environment.

Organisations may be reluctant to train employees due to financial constraints, but evidence is available of the value of training to an organisation when it is structured and managed carefully.

Learners / Workers

The communication of data and sustainable products is an emerging trend. Training needs to include how to influence and inform the consumer.

The 'just in time' approach that has become a predominant way of doing business, along with increasing casualisation and sub-contracting of the workforce, contraction of business sizes and financial constraints for businesses are all contributing to a demand for smaller chunks of learning and training for workers (as seen in the trend for 'micro-credentials').

The rise of niche market organisations is having the effect of greater specialisation for some job roles, which is also driving demand for skill specialisations or for greater customisation of training to enable organisations to differentiate themselves – sometimes at the expense of broad occupational skilling.

Government

Governments should consider how to respond to the impact of fluctuating energy prices on rural communities.

Education and Training

Educators should consider how to encourage learners to embed innovative practices in their workplace.

Appendix C: Occupation Classifications

For the purposes of analysing employment trends, the following occupation classifications have been used.

ANZSCO Classifications

ANZSCO Code 4-digit classification	ANZSCO Code 6-digit classification	Related MSS Sustainability Training Package qualifications
1399 Other Specialist Managers	139912 Environmental Manager	• Graduate Certificate in Environmental Management
1399 Other Specialist Managers	139913 Laboratory Manager	• Environmental Monitoring and Management (qualification match not specified in training.gov.au)
1399 Other Specialist Managers	139914 Quality Assurance Manager	• Sustainable Operations • Competitive Systems and Practices • (qualification matches not specified in training.gov.au)
1399 Other Specialist Managers	139999 Specialist Managers not elsewhere classified	• Sustainable Operations • Competitive Systems and Practices • Environmental Monitoring and Management • (qualification matches not specified in training.gov.au)
2247 Management and Organisation Analysts	224712 Organisation and Methods Analyst	• Graduate Certificate in Sustainable Operations • Diploma of Competitive Systems and Practices • Advanced Diploma of Competitive Systems and Practices • Graduate Certificate in Competitive Systems and Practices
3114 Science Technicians	311413 Life Science Technician	• Certificate IV in Sustainable Operations • Diploma of Sustainable Operations • Certificate IV in Environmental Monitoring and Technology • Diploma in Environmental Monitoring and Technology
3999 Other Miscellaneous Technicians And Trades Workers	399999 Technicians And Trades Workers not elsewhere classified	• Certificate III in Competitive Systems and Practices • Certificate IV in Competitive Systems and Practices
7123 Engineering Production Workers	712311 Engineering Production Worker	• Certificate II in Competitive Systems and Practices

For 'Other Specialist Managers' (of which possible sustainability-related occupations comprise up to 95%):

- there has been a steady increase in total employment from 2006–2016

- more males than females are employed in these occupations (60% and 40% respectively in 2016)

- the largest proportions are in the 40-49 and 30-39 year old age groups (31% and 27% respectively in 2016)

- most are employed in NSW (33% in 2016), followed by VIC (27%) and QLD (17%), which is roughly similar to the respective proportions of the overall employed population.

For 'Management and Organisation Analysts' (of which possible sustainable operations and competitive systems and practices related occupations comprise 12%):

- there have been significant increases in total employment from 2006–2016 (see Figure 4 above)

- more males than females are employed in these occupations (58% and 42% respectively in 2016, which is similar to the proportions in full-time employment across all occupations)

- the largest proportions are in the 30-39 and 40-49 year old age group (30% and 27% respectively in 2016)

- most are employed in NSW (37% in 2016) and VIC (32%) which is higher than the overall employed population.

For 'Science Technicians' (of which possible sustainable operations and environmental monitoring and technology related occupations comprise 17%):

- total employment figures have remained quite stable from 2006–2016

- the occupation is more female-dominated (53% female and 47% male in 2016)

- there are roughly equal proportions across the 20-29, 30-39, 40-49 and 50-59 year old age groups (between 21% and 23% in 2016)

- more are employed in VIC (27%) than any other jurisdiction, while WA has higher and NSW has lower employment percentages than the overall employed population.

For 'Miscellaneous Technicians and Trade Workers' (of which possible competitive systems and practices related occupations comprise 22%):

- there has been a steady increase in total employment from 2006–2016

- more males than females are employed in these occupations (61% and 39% respectively in 2016, which is similar to the proportions in full-time employment across all occupations)

- there are roughly equal proportions across the 20-29, 30-39 and 40-49 year old age groups (around 23% in 2016)

- most are employed in NSW (33% in 2016), followed by VIC (24%) and QLD (19%), which is similar to their respective proportions of the overall employed population.

For 'Engineering Production Workers' (of which possible competitive systems and practices related occupations comprise 99%):

- there has been a marked decrease in total employment from 2006–2016, which is likely to be indicative of the decline in the manufacturing industry and of lower-level manufacturing jobs being replaced by automation

- the occupation is male-dominated (96% male and 4% female in 2016)

- the largest proportions are in the 40-49 and 50-59 year old age groups (26% in each in 2016)

- while most are employed in NSW and VIC, these state proportions are lower than for the overall employed population. The proportions employed in QLD, SA and WA are slightly higher than for the overall employed population.

Appendix D: Industry Classifications

For the purposes of analysing the business landscape, the following industry classifications have been used.

ANZSIC Classifications

ANZSIC Code 4-digit classification	ANZSIC Code 6-digit classification	Related MSS Sustainability Training Package areas
696 Management and Related Consulting Services	6962 Management Advice and Related Consulting Services	• Sustainable Operations • Environmental Monitoring and Technology
772 Regulatory Services	7720 Regulatory Services	• Environmental Monitoring and Technology
692 Architectural, Engineering and Technical Services	6925 Scientific Testing and Analysis Services	• Environmental Monitoring and Technology

Business Landscape

Management Advice and Related Consulting Services Sector

According to IBIS World, those businesses providing sustainability consulting account for 8.5% of the total revenue for the sector.

Businesses in this sector are predominantly small and micro. According to ABS data, of the 64,410 businesses operating in this sector in June 2016 (includes only those registered for GST), 60% were non-employing (i.e. sole traders), 39% were small (i.e. fewer than 20 employees) and less than 1.5% were medium or large.

Most of these businesses are located in NSW (36%), followed by VIC (27%), QLD (18%) and WA (9%), with the total number of business in the sector growing by 4.6% between 2015 and 2016.

Regulatory Services Sector

No information is available as to the proportion of businesses within this sector that are providing regulatory services related to the environment and sustainability.

According to ABS data, there were only 346 businesses operating in the sector in June 2016 (includes only those registered for GST), which represents a decline of 10% in business numbers since 2015. This is consistent with the fact that the majority of regulatory activity is carried out by government departments.

The majority of these businesses are sole traders (53%) and small businesses (43%), and are predominantly located in QLD (28%), VIC (27%) and NSW (26%).

Scientific Testing and Analysis Sector

According to IBIS World, those businesses providing pollution monitoring services account for 5% of the total revenue for the sector.

According to ABS data, there were 3,195 businesses operating in this sector in June 2016 (includes only those registered for GST), which represents growth of less than 1% since 2015.

Again, the majority of these businesses are sole traders (50%) and small businesses (46%), and are predominantly located in NSW (24%), QLD (23%), VIC (21%) and WA (21%).