



RP2.3-04: Gasfitting practices for future fuels: Opportunities for training and upskilling in Victoria and South Australia

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Gasfitting practices for future fuels: Opportunities for training and upskilling in Victoria and South Australia

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Table of Contents

| | |
|--|-----------|
| Project Information | 4 |
| Table of Contents | 5 |
| Summary of Report..... | 7 |
| 1. Introduction | 9 |
| 2. Method | 10 |
| 3. Case studies and findings..... | 11 |
| 3.1. Case study summary: Electricians (Victoria) | 12 |
| 3.1.1. Key findings | 13 |
| 3.2. Case study summary: Nurses (Australia) | 13 |
| 3.2.1. Key findings | 13 |
| 3.3. Case study summary: Financial advisers (Australia) | 14 |
| 3.3.1. Key findings | 15 |
| 3.4. Case study summary: Architects (Victoria) | 15 |
| 3.4.1. Key findings | 16 |
| 3.5. Case study summary: Aircraft maintenance engineers (Australia) | 16 |
| 3.5.1. Key findings | 17 |
| 3.6. Case study summary: Refrigeration mechanics (Victoria) | 17 |
| 3.6.1. Key findings | 18 |
| 3.7. Case study summary: Aged care workers (Australia) | 18 |
| 3.7.1. Key findings | 18 |
| 3.8. Case study summary: Automotive mechanics (New South Wales) | 18 |
| 3.8.1. Key findings | 19 |
| 3.9. Case study summary: Builders (New South Wales) | 19 |
| 3.9.1. Key findings | 20 |
| 3.10. Case study summary: Building surveyors (Tasmania) | 20 |
| 3.10.1. Key findings | 21 |
| 4. Insights for training and upskilling for Future Fuels | 22 |
| 4.1. Initial training | 22 |
| 4.2. Additional training | 23 |
| 4.3. Regulatory frameworks and training | 25 |
| 4.4. Informal learning | 26 |
| 4.5. Summary | 26 |

| | |
|--|-----------|
| 5. Next steps and future works..... | 28 |
| 6. Appendices..... | 29 |
| 6.1. Trades training regime case study details..... | 29 |
| 6.1.1. Electricians (Victoria)..... | 29 |
| 6.1.2. Nurses (Australia) | 31 |
| 6.1.3. Financial advisers (Australia) | 35 |
| 6.1.4. Architects (Victoria)..... | 38 |
| 6.1.5. Aircraft maintenance engineers (Australia) | 42 |
| 6.1.6. Refrigeration mechanics (Victoria) | 45 |
| 6.1.7. Aged care workers (Australia) | 48 |
| 6.1.8. Automotive mechanics (New South Wales) | 49 |
| 6.1.9. Builders (New South Wales) | 53 |
| 6.1.10. Building surveyors (Tasmania)..... | 57 |
| 7. References | 61 |

Summary of Report

Appropriately trained gasfitters are critical to the transition to hydrogen as a future fuel within the domestic energy market. This report, drawing from ten other industries, explores and makes recommendations about the type of training, upskilling, continuing professional development (CPD) and associated licensing requirements gasfitters could undertake to safely work with hydrogen. The research specifically focuses on relevant legislation and regulatory bodies, licensing and training requirements, changes in industry and the associated training and licensing in response to the following occupations:

1. Electricians
2. Nurses
3. Financial advisers
4. Architects
5. Aircraft engineers
6. Refrigeration mechanics
7. Aged care workers
8. Automotive trades (mechanics)
9. Builders
10. Building surveyors

These occupations were selected because they had experienced technical and/or regulatory change, provide services to the public and are licensed or registered. This selection criteria ensured that the case studies provide insights into training regimes applicable to gasfitting practice.

The report presents a summary of each case study, noting the key characteristics of the training and/or upskilling approaches taken. Key findings from the case studies can be grouped into four themes that provide opportunities for training approaches or requirements to ensure new and existing gasfitters develop the future competencies needed including: Initial training and upskilling, ongoing training and upskilling, regulatory frameworks and competencies and informal learning.

Initial training and upskilling

The case studies show that accredited training is important for initial training and upskilling and that this is usually achieved by updating the relevant National Training Package. Updated training packages also provide for single units of competency that can be undertaken by existing trades practitioners to upskill. The national accreditation offered by the training packages can also support workforce mobility depending on state regulations.

Updates to the gasfitting training package (the Construction, Plumbing and Services Training Package) to include hydrogen are underway. However, the case studies illustrate that such updates are often implemented in response to the introduction of new technologies which differs to the pre-emptive update to the plumbing training package for hydrogen. The absence of market driven training presents challenges for incentivising gasfitters to pursue training opportunities; however, this also allows time to consider and assess the best approaches to implement hydrogen training.

The case studies also indicate that specialist training and adequately qualified trainers must be available in the regions where the skills will be needed. Additionally, it is important that there is a consistent delivery of standardised training across the country and that national, state and association training requirements align to avoid conflicting or diverse training pathways.

Ongoing training and upskilling

An absence of formal CPD for gasfitters does not preclude upskilling as hydrogen training can be required as part of licensing renewal as needed. However, CPD is advantageous for ongoing updates as the industry evolves. The case studies reflect various approaches to CPD requirements with differing learning outcomes.

Regulatory frameworks and competencies

In all case studies, regulation requires completion of initial qualifications to begin practicing in the occupation and some also require formal upskilling for undertaking certain types of work. The case studies show that this regulation can be at a national level and/or state level and highlights the ways in which a national framework of regulation or a national association to assist in managing training requirements across the states and territories can be used. Such frameworks can also be used to serve the purpose of supporting workforce mobility. While implementing a national regulatory framework for plumbing/gasfitting has been the subject of much debate across the jurisdictions, some case studies show how a specific aspect of work practice can be nationally regulated or coordinated. In the context of gasfitting, nationally regulating or coordinating hydrogen work and associated training/training requirements may be useful for ensuring consistency of competency and workforce mobility as well as being more feasible than nationally regulating the broader scope of all plumbing/gasfitting work.

Informal learning

Informal learning plays a role in gasfitters learning, and while the case study review does not provide examples of CPD programs that capture such learning, it is important to consider that ongoing learning can be facilitated by a range of stakeholders outside of formal training programs. This should be considered when developing a holistic approach to supporting gasfitters in a transition to hydrogen.

The case studies illustrate different approaches to training and associated licensing to ensure competent and capable professionals and practitioners in their respective evolving roles. The report concludes with a summary of key insights for training and upskilling gasfitters for hydrogen, including initial training, ongoing training (skills maintenance and upskilling) and an exploration of the regulatory frameworks that underpin such training.

1. Introduction

Significant changes are facing Australia's domestic energy sector however, to date, much of the planning has focused on technology requirements. In order to successfully transition to a new energy future, skilled trades practitioners are essential (AIS, 2019). While hydrogen as a future fuel will require skilled professionals and practitioners across the hydrogen supply chain, the potential use of hydrogen as a future fuel in Australian households means that gasfitters working downstream of the meter on household gas and appliance installations, servicing and maintenance and conversion, are an essential trade as part of the transition to hydrogen. Gasfitters are also seen as a trusted source of information for consumers and play a key role in consumer uptake of new technology. Given the potential disruption of well-established work practices, a planned response to future fuel transition is needed that considers the new and evolving knowledge base, associated competencies, and resourcing level required to support hydrogen in gasfitting work. This not only applies to emerging tradespeople but also registered gasfitters already practising, training apprentices and advising customers. It is essential to, firstly, determine the capacity of the existing gasfitter workforce to meet the increased workload generated by transition to a hydrogen fuel economy, and then, ascertain how to best manage the change process to train and upskill gasfitters to develop the required competencies to work with hydrogen. This research project, therefore, aims to understand:

- the skills requirements for Type A gasfitting for hydrogen;
- the capacity of existing training structures to support the development of hydrogen competencies;
- the capacity of existing gasfitters to upskill;
- the amount of work the change will generate and the ability of the existing gasfitter (after upskilling) to complete this work;
- the need to train additional plumbers as gasfitters; and,
- the support mechanisms in place to help the industry address the new work environment as the transition occurs.

To address these questions, this research has so far investigated the status and structure of gasfitter training in Victoria and South Australia, including the current systems for training and ongoing learning for gasfitters, and the resourcing level and evolving knowledge base required for gasfitting for future fuels. A desktop review of relevant literature and regulation has been undertaken, complemented by interviews with key stakeholders including training, industry and government organisations, and gasfitters themselves in Victoria and South Australia. These findings are available in Interim Reports 1 and 2. This third interim report adds to the developed knowledge base and presents the results of a desktop review of ten training regimes in occupations other than gasfitting. Such a review facilitates an understanding of how to train, upskill and support gasfitters in a fuel transition. This knowledge is important as while there is literature that describes reskilling approaches for whole industries and regions in low carbon transitions, for example from coal fired electricity to renewable energy (for example see Gambhir, Green, & Pearson, 2018), there is minimal literature describing the best ways to upskill members of existing occupations as a result of emerging practices and technologies.

Furthermore, the research on ongoing learning within different industries focusses on professional development within large organisations rather than smaller businesses engaged in self-employed or sub-contracting, reflective of the construction industry. Almost all gasfitters are self-employed and/or work as part of a small business (50 per cent sole traders/partnerships, 48.6 per cent less than 20 employees) (Kelly, 2020) and are responsible for their own ongoing learning to maintain their 'industry currency' to perform work to standard. This remains the case also for those who undertake subcontracting roles in the construction industry. As such, limited research exists on how to ensure sole traders and small businesses engage in meaningful training and learning activities for upskilling and the best approaches to regulate such activity. Consideration of other training regimes in different sectors is also valuable as it allows for the identification of the benefits and challenges experienced by different approaches.

This report, consequently, presents the key features of initial and ongoing training programs in ten other occupations and explores the insights that these cases offer for upskilling gasfitters to work with hydrogen. The report commences with a description of the method used to review the ten case studies in Section 2. Section 3 then presents a summary of each case study, noting the key characteristics of the training and/or upskilling approaches and then key findings regarding training and upskilling for each case. Section 4 summarises key insights for gasfitter training and upskilling for hydrogen in light of the examples of training regimes provided by the case studies and Section 5 identifies the next steps in this research project.

2. Method

A desktop review was undertaken on ten occupations and their training regimes. A desktop review is a form of literature review that involves the collection and analysis of academic and publicly available materials such as reports, websites, policy and other sources useful for developing an understanding of what research has been undertaken, key policy shifts and governance frameworks and requirements. This desktop review, importantly, provides an overview of existing frameworks for training and upskilling, registration and licensing in the ten occupations. This review focused on occupations which draw some similarities to the business structure and/or working environment of gasfitting. In this context, this review sought to focus on initial training and professional development activities in occupations with the following characteristics:

- Significant technology and/or regulatory change in the last decade
- The provision or sales of services to public
- The occupation is licensed and, or registered

Members of some of the selected occupations work in either contracting, casual or employee roles. For example, nurses can work as either as an employee in a health service provider such as a hospital and/or can work for themselves in an agency contracting arrangement. The aim of the research was to capture examples of initial and ongoing training and associated licensing requirements in occupations where the individual is largely responsible for their own learning.

This training regime review was informed by case studies of the following occupations:

1. Electricians
2. Nurses
3. Financial advisers
4. Architects
5. Aircraft engineers
6. Refrigeration mechanics
7. Aged care workers
8. Automotive trades (mechanics)
9. Builders
10. Building surveyors

A template was developed to collect information about each case. This included a description of each occupation, relevant legislation and regulatory bodies, licensing and training requirements and changes in the industry and the training and licensing response. Based on the collected information, analysis and key findings were identified that address the research aims. A key focus was the identification within the identified training structures of initiatives that would support a) the development of hydrogen competencies with gasfitters and b) the training support mechanisms needed to help industry transition. The following section summarises key details collected for each case study and findings; the complete case studies are included in Appendix 6.1.

3. Case studies and findings

This section provides a summary of the key characteristics of each of the ten case studies reviewed (see Table 1), followed by a descriptive summary and insights for training and upskilling gasfitters for Future Fuels. Appendix 6.1 provides detailed information about each case study.

Table 1 Key characteristics of each case study

| | Jurisdiction | Technology change | Type of training in response to changes | Registered/ licensed | Qualification requirement | CPD requirement |
|---------------------------------------|---------------------|---|---|--|--|--|
| Electricians | Victoria/ Australia | Solar PV in addition to ongoing regulatory and technology change | Upskilling and skills maintenance/industry currency | Yes, state system + national system for PV | Certificate III/ Certificate IV | Yes, 'skills maintenance' CPD requirement beginning in 2023 and 'upskilling' CPD requirement in 2028 |
| Nurses | Australia | Ongoing regulatory and technology change | Skills maintenance/industry currency | Yes, national system | Diploma/bachelor's/master's degree | Yes, 20 - 40 hours recorded in journal and audited at request of regulator |
| Financial advisers | Australia | Ongoing regulatory and technology change | Skills maintenance/industry currency | Yes, national system | Bachelor's degree | Yes, 40 hours per year self recorded and also facilitated by employer's (if any) CPD policy. Audited upon request by regulator |
| Architects | Victoria | Ongoing regulatory and technology change | Skills maintenance/industry currency | Yes, state system | Bachelor's degree | Yes, 20 hours including 10 hours of formal training per year. Self recorded and audited upon request by regulator |
| Aircraft maintenance engineers | Australia | Internet of Things (IoT) and use of sensors and automated maintenance | Skills maintenance/industry currency | Yes, national system | Diploma for licensing, with minimum years experience | No regulatory requirement |
| Refrigeration mechanics | Victoria/ Australia | Phasing out of Hydrofluorocarbons (HFCs) | Upskilling | Yes, state + national system for refrigerant handling licence | Certificate III/ Certificate IV | No regulatory requirement |
| Aged care workers | Australia | COVID-19 | Skills maintenance/industry currency, some upskilling | No, however aged care providers must comply with legislation and standards with regards to having adequately experienced and qualified staff | Certificate III | No direct requirement, however aged care providers ensure they have adequately experienced and qualified staff which includes ongoing training |

| | | | | | | |
|-----------------------------|-----------------|---|--------------------------------------|-------------------|--|--|
| Automotive mechanics | New South Wales | Electric and hybrid vehicles | Upskilling | Yes, state system | Certificate III | No regulatory requirement |
| Builders | New South Wales | Updated regulations and sustainable building practices and technologies | Skills maintenance/industry currency | Yes, state system | Certificate IV or Bachelor degree | Yes, 15 points in the year prior to licensing renewal |
| Building surveyors | Tasmania | Updated regulations and sustainable building practices and technologies | Skills maintenance/industry currency | Yes, state system | Degree for an open licence and a Diploma for a limited licence | Yes, 30 points per year or 90 points over a 3 year period. |

3.1. Case study summary: Electricians (Victoria)

Electricians design, assemble, commission, install, diagnose, repair and maintain electrical systems, networks, appliances, equipment, components and facilities for domestic, commercial and industrial uses, and also can repair and service escalators, lifts, and associated equipment (ABS, 2021). Electricians may work on individual dwellings or be employed in a subcontracting arrangement on multiple dwellings or for body corporate or rental agency work. In Victoria, electrical work is a licensed/registered trade which requires completion of a Certificate III combined with an apprenticeship. In addition, licensing requires the successful completion of a series of assessments, the Licensed Electricians Assessment (LEA). Electrical work in Victoria is regulated at a state level with the addition of a national framework of certification and regulation of Solar PV work. To receive customer financial rebates and incentives from the Australian and Victorian governments for Solar PV installation, the electrician undertaking the work must be certified with the Clean Energy Regulator.

A key change in the electrical industry is the expanding rooftop solar photovoltaic (PV) market which has seen 'unprecedented growth' over the last decade (Clean Energy Regulator, 2021). According to the Clean Energy Regulator, 'the total annual installations of rooftop solar PV systems has increased from 750 megawatts (MW) across 133,000 installations in 2016 to an expected 2,900 MW across 370,000 installations in 2020' (Clean Energy Regulator, 2021). In response to the increase of photovoltaic systems across Australia, the training package for electricians, UEE30820- Certificate III in Electrotechnology, has been updated to include non-compulsory units of competency for solar installation and maintenance, while two Certificate IV qualifications on renewable energy and photovoltaic systems have been added to the electrical training package. To ensure that electricians installing rooftop solar systems are adequately trained, the national Clean Energy Council (CEC) accredit businesses that sell and install solar systems. This is regulated at the national level due to Commonwealth renewable energy legislation and schemes. To have an accreditation as a solar installer with the CEC, an electrician must be appropriately qualified, hold an unrestricted electrical licence and have attained the additional national units of competency in the Certificate IV qualifications (noted above).

In addition to initial training and upskilling requirements for the installation of Solar PV, Victoria has recently introduced continuing professional development (CPD) requirements for the renewal of electrical licenses. Two types of CPD have been introduced:

- Skills maintenance, starting from 2023 (so electricians must have completed the course if renewing the license from this time)
- Skills development, starting from 2028

The skills maintenance CPD requires the completion of an eight hour course within two years prior to licensing renewal. This non-accredited course is free and has been designed to cover four areas: responsibilities (including to apprentices); major changes to standards and regulations; safe isolation, and; mandatory testing. The last two areas involve practical training. The skills development CPD requirement will be mandatory; however, the structure is still in the design and consultation phase.

3.1.1. Key findings

Like the proposed introduction of hydrogen and implications for upskilling gasfitters, the installation and maintenance of Solar PV has required electricians to upskill. Regulation of practice sits at the state and federal level and auditing of work is undertaken by the state-based regulator. ESV regulates general electrical work, and the Clean Energy Regulator randomly audits solar PV installations.

Ongoing training for electricians is required as part of ongoing CEC accreditation and will be as part of CPD in Victoria. As a result, mechanisms to maintain up to date technical and regulatory knowledge are becoming slowly embedded in the electrical occupation in Victoria. Despite the increased training requirements for solar installation and two levels of associated regulatory oversight, sub-standard work resulting in unsafe rooftop installations have been noted. National and state-based reviews of the Solar PV industry have identified lack of compliance as a key issue¹. In response, the Clean Energy Regulator, in 2022, will become responsible for accreditation and auditing of all Solar PV installations, and increased auditing and penalties will be put in place. State based regulation is also being updated led by ESV to address some safety issues with Solar PV installations (i.e., DC isolators). Newly introduced Victorian CPD requirements aim to inform existing electricians of such updates to regulation and standards. It is anticipated these changes will improve industry practice.

A key issue in the transition to solar energy provision is compliance, which is being proactively addressed to ensure the safety of work undertaken. The need for additional auditing with the emerging field of practice and task specific regulation is an important action for those involved in the training and regulation of a future hydrogen industry.

3.2. Case study summary: Nurses (Australia)

In Australia, nursing is one of 16 registered health professions. The job title is protected by law; therefore, one must meet certain requirements to be called a nurse. In Australia, there are three types of nurses; an enrolled nurse, a registered nurse and a nurse practitioner. Nursing is regulated at a national level, and nurses must register with the Nursing and Midwifery Board of Australia (NMBA) to practice. Nurses work in various health care settings, including public and private hospitals, emergency care, aged care, general practice clinics, community health services, schools and rural and remote communities (Department of Health, 2021). Casual employment plays a vital role in the provision of nursing in health settings in Australia. A nurse can work for multiple agencies and pools and are paid by the agency or pool rather than the health care provider they are casually working for.

A range of requirements must be met to be eligible for registration as a nurse. An Enrolled Nurse must hold a Diploma of Enrolled Nursing, a Registered Nurse must hold a Bachelor of Nursing, and a Nurse Practitioner must hold a Masters degree in their specialist nursing area. Depending on the registration type, 20 to 50 hours of CPD per year must also be completed by a nurse to enable the renewal of their registration. Nurses can select their CPD activities and must show how these activities relate to their work practices. Such CPD is used as a way to ensure that nurses maintain currency of skills and knowledge as technology and practice within the health care professions constantly evolve.

3.2.1. Key findings

While a segment of the nursing workforce is employed by one health care provider, many nurses hold multiple roles working with multiple agencies as casual, on-demand staff or hold a permanent part-time position registered with agencies for additional shifts. As a result, a large percentage of the nursing workforce work at multiple locations in a given period. Nurses are responsible for ensuring they meet their yearly CPD requirements, including the associated time and cost. For those working in permanent roles at public hospitals, CPD training opportunities and compensation for their time and/or the training costs are provided. Australian Nursing and Midwifery Federation and the Australian College of Nursing offer free CPD to members and some free CPD to non-members. However, opportunities to access CPD as facilitated by the employer are not guaranteed for those working with an agency. The ability to undertake CPD in this context is problematic for those casually employed and an important consideration for the gas sector, given many gasfitters are casually employed or engaged in sub-contracting work.

¹ The differences between states (if any) regarding the percentage of unsafe or substandard solar PV work undertaken is not publicly available.

CPD and its requirements are an integrated part of the governance framework for registered health practitioners because the healthcare industry recognises that technology, standards, health risks and associated skills and knowledge requirements are constantly evolving. However, the responsibility for CPD lies with the individual nurse to undertake and adequately record, which *may* be audited by the national regulator. Based on this literature review, it is currently unclear how many CPD records are audited by the regulator each year. In addition, levels of compliance with CPD requirements are not publicly reported. As with gasfitting, and perhaps even more so, there are complex health safety risks to the public and practitioners if up-to-date knowledge and skills are not maintained. Regulation of emerging practice is vital to ensure compliance; however, auditing of practice for gasfitting work may require more than self-regulation and written evidence of CDP endeavours as it currently the case with nursing.

While the employment context for nurses differs to that of the predominantly sole trader or small business context of gasfitters, there are some similarities in terms of ensuring access and completion of CPD for a very mobile nursing workforce. Nursing has a similar CPD framework to that proposed for gasfitting/plumbing. In both instances, attaining and providing evidence of CPD is the responsibility of the licensed or registered practitioner as part of their license/registration renewal process. Similarly, a significant percentage of nurses work for agency or hospital pools and therefore share some similarities to the sub-contracting work undertaken by gasfitters. Agencies and hospitals do facilitate CPD opportunities for their nurses however they do not have to verify that nurses are meeting their CPD requirements. This is a key limitation in applying the reflective journaling approach to record and learn from CPD activities. Key challenges for using a journaling type approach, with nurses deciding their own goals and reflecting on their own learning is, how do you know what your skills needs are to set your own goals, who assesses the quality of reflection on learning? Who monitors and enforces such practices? These are also important considerations for CPD programs for gasfitting.

To ensure consistency across states, nursing, along with the 15 other registered health care professions, is regulated at a national level, with additional relevant legislation in each state. The national law enacted by each state means that changes to requirements at a national level are automatically reflected in state based requirements. In addition to the national regulator, each registered health care profession is governed by their respective health care body. For nursing, this is the NMBA. The NMBA is then responsible for setting registration standards for nursing which include recency of practice requirements, criminal checks and language proficiency, along with CPD requirements. This differs to the state based licensing structure for plumber gasfitters, where achieving consistency across states and implementing a system of mutual recognition of the various qualifications and experience requirements across the states has been challenging in the past. For gasfitters trained in hydrogen, ensuring consistency and ability to work across states, as is the case with nursing, would allow those with the skills to work in areas where hydrogen is being introduced. This would allow a mobile hydrogen gasfitter workforce to transition appliances and associated domestic fittings in different regions in Australia as the transition takes place.

The framework governing nurses has a number of additional aspects to consider for governing a skills transition in gasfitting for hydrogen and maintaining adequate competencies as the industry continues to evolve. Firstly, the recency of practice requirement ensures that any nurses that have not been actively practicing for five years, must undergo a period of additional training to update their knowledge and skills. This ensures that they are supervised while gaining an understanding of the changes that have occurred and the associated knowledge and skills sets since they last practiced. The interview data reported in Interim Report 1 and 2, indicated concerns from experienced gasfitters and industry stakeholders that hydrogen may encourage plumbers who held licenses that allowed for gasfitting work, and who had not been actively working in gasfitting, to undertake hydrogen gasfitting work, despite not having up-to-date skills or knowledge to work safely with gas. The nursing registration requirements address such issues in the context of health care and provides an example of how this issue could be addressed for gasfitting.

3.3. Case study summary: Financial advisers (Australia)

A financial adviser provides personal and general advice on investments, superannuation and life insurance. Regulation of financial advisers occurs at a national level, and they must be licensed and/or registered with the Australian Securities and Investment Commission (ASIC). The financial services sector has undergone significant regulatory reform over the past decade to improve the sector and ensure that it operates in the clients' interests. In 2017, reforms were introduced via the Corporations Amendment (Professional Standards of Financial Advisers) Act 2017 'to raise the education, training and ethical standards of financial advisers'.

Regulation changes have aimed to better support the clients' interests in financial service provision and professionalise financial advisory work with the introduction of registration requirements, professional standards and codes of practice. The phasing in of new professional requirements is still in progress. The professionalisation of financial advisers has advanced with the introduction of Professional Standards of Financial Advisers in 2017, which has created the legal protection of the name and function of financial advisers, university qualification requirements, a national exam for registration introduced in 2019 and mandatory CPD.

To be licensed and/or registered to practice as a financial adviser, an approved university qualification must be completed generally in commerce or business/financial planning, along with at least 1,500 hours of work activities and 100 hours of structured training. Once completed, prospective financial advisers must complete an exam, and as part of ongoing practice, individuals must participate in 40 hours of CPD per year to maintain their licence/registration. Only qualifying activities can count towards the 40 hours of CPD. CPD activities must be:

- in one of five learning areas,
- have 'sufficient intellectual and practical content',
- deal with 'matters related to the provision of financial product advice, financial advice services and financial advice business',
- be conducted by those with appropriate understanding, expertise, academic qualifications and/or practical experience, and
- serve to enhance the licensee or representative's 'knowledge and skills in areas that are relevant to the provision of financial product advice and financial advice services'

("Corporations (Relevant Providers Continuing Professional Development Standard) Determination," 2018).

These CPD requirements apply to all existing and new licensed or registered financial advisers regardless of their role as licensees or their representatives.

3.3.1. Key findings

The initial training requirements for registration/licensing of financial advisors are similar to that of plumbing/gasfitting with the completion of a qualification, work practice and an exam. The key points of difference are the ongoing requirements for adherence to professional standards including a Code of Ethics and CPD. While each registered financial adviser is required to undertake CPD as part of their ongoing registration requirements, the framework is set up to ensure that Australian Financial Services (AFS) licensees, which are businesses of varying sizes, plan and manage the completion of CPD of all those working under their licence in line with the legislated professional standard requirements. The criteria for qualifying CPD activities are defined under legislation and associated standards and a policy must be developed by each licensee that aligns with these requirements. Financial advisors working under the licence must plan and meet these requirements. Most CPD activities must be facilitated by a person with relevant qualifications and experience and self-reading can only make up ten per cent of the annual CPD requirements. CPD as an ongoing licensing requirement is the only formal way that financial advisers learn about updates in industry regulation, standards and practices. Given the additional knowledge and skills required for hydrogen, this approach to CPD alone may not develop and assess the necessary competencies for working with hydrogen as it does not assess overall competency as a result of undertaking the required annual hours of CPD. Furthermore, much of the CPD is facilitated and self-regulated by the AFS licensee, a system which may not apply to sole traders and partnerships but could suit larger plumbing businesses with more than two people where a business CPD policy could be advantageous in supporting ongoing learning of employed gasfitters.

3.4. Case study summary: Architects (Victoria)

Architects undertake a range of activities, including consultancy, design, drafting and town planning for buildings and landscapes. Architecture in Australia is a regulated profession requiring individuals to be registered to use the title. Architecture is regulated at a state level in Australia and is governed by state based registration boards. However, the Architects Accreditation Council of Australia (AACA) represents and coordinates architect registration boards around Australia. In all states, provisions exist within legislation and/or regulations to require compliance with a Code of Conduct. The Code of Conduct includes requirements for certain behaviour and completion of specified activities, such as CPD.

Approved degree qualification and the completion of the Architectural Practice Exam (APE) set by the AACA are required to become a registered architect in Australia. AACA owns the National Standard of Competency for Architects (NSCA), which 'provides the benchmark for the Architects Accreditation Council of Australia assessment programs' and underpins qualification accreditation, registration requirements and assessment processes (Architects Accreditation Council of Australia, 2021a, p. 2). CPD is required in some states, including Victoria, where 20 hours, including ten hours of formal training, must be completed each year. Such activities are self-recorded and audited upon request by the regulator.

Updates to environmental performance requirements and building codes, client expectations regarding efficiency and quality, along with technological advancements such as Building Information Modelling (BIM), smart building technology, and new low carbon energy and appliances and design innovations are examples of how architecture must adapt to evolving regulatory and technology requirements and market expectations.

3.4.1. Key findings

A key feature of the architecture training regime is the national competency framework used to inform requirements for initial and ongoing education programs. While this framework is non-integral to day-to-day practice, it is used for mutual recognition purposes and to guide university education programs and CPD. The national competency framework resembles the units of competency framework within the National Training Package system in place for VET sector learning which specifies the standard of performance required in the workplace for members of different occupations, including gasfitting. Also, like plumbing and gasfitting, architecture has a state based registration system with varying requirements across jurisdictions including for CPD, although initial registration requirements (accepted qualifications and completion of the exam) are consistent across the states and territories.

Limited research exists on the effectiveness of the approach taken to CPD for achieving ongoing learning and industry currency. Unlike CPD requirements for nurses and financial advisers, architects have a formal learning requirement, which according to the Victorian Government, typically involves 'education you undertake with a clear learning outcome assessed at the end of the activity. This type of learning typically involves interaction between you and the presenter, trainer or instructor'. This requirement for at least ten hours of assessed activity provides an external assessment of the learning outcomes achieved for such activities, which differs from the self-assessment/reflection in nursing. This formal learning system could be valuable to ensure competencies are maintained or attained in regard to gasfitting currently and in the future when working with hydrogen.

3.5. Case study summary: Aircraft maintenance engineers (Australia)

Aircraft maintenance engineers (AMEs) undertake a number of roles that are responsible for the maintenance of aircraft. According to Hampson and Fraser (2016, p. 342) aircraft maintenance engineers are 'a class of highly skilled technicians who play a vital role in the aviation safety system by performing aircraft maintenance and certifying that aircraft are safe to fly afterwards'. In 2017 there were 920 businesses that provided aircraft maintenance and repair services in Australia with most of these located within or nearby airports. There are both licensed and unlicensed roles in this occupation with unlicensed AMEs working under the supervision of licensed AMEs (LAMEs). The LAME role is gradually becoming professionalised in Australia (Hampson & Fraser, 2016). The pathway to becoming an AME is usually through an apprenticeship or traineeship. After attaining an AME trade certificate and work experience, further training can be undertaken to gain licensing as a Licensed Aircraft Maintenance Engineer (LAME) (Good Universities Guide, 2022). There are different licensing categories depending on the type of work that is undertaken. Work experience must align with the type of work that one is seeking licensing in and one can have a range of licence types to work on different aspects of aircraft maintenance (Hampson & Fraser, 2016).

The Civil Aviation Safety Authority (CASA) is the Australian Government regulator for aviation safety. CASA was previously responsible for assessing competency for licensing however, this responsibility has shifted to private training organisations and employers with regulation and training reforms over the past two decades (Hampson & Fraser, 2016). Prior to the 1990s, AME training and licensing was the responsibility of the regulator, the employer and the training organisation. This system allowed for the assessment of capability beyond competency needed for the kinds of problem solving required for the role. The introduction of the competency based training system and market based training provision reduced the role that the regulator played in assessing competency and capability and gave this responsibility to private training organisations called Maintenance Training Organisations

(MTOs). ASQA, under the National Vocational Education and Training Regulator Act 2011, are also responsible for overseeing the delivery of training for nationally recognised qualifications. As a result, there are two training pathways in aircraft maintenance training, 'each with their own suite of requirements' (Innovation and Business Skills Australia, 2019, p. 21).

Based on this desktop review, there are currently no ongoing learning or training requirements beyond the initial qualification and experience requirements to gain licensing across the various licensing categories. It is unclear how skills and knowledge 'currency' is maintained.

Recent technology changes include the use of Internet of Things (IoT) which allows sensors installed on different plane components to communicate with tablets used by AMEs to identify components that need repair or maintenance within the aircraft system. The sensors can also be used by suppliers to ensure that aircraft parts are available as needed. The changes to technology, such as on-board digital automation and production methods have been noted by CASA to pose a change to the aviation industry in the short to medium term due to associated skills needs.

3.5.1. Key findings

In order to meet rising demand for air travel, along with the technical advancement of aircraft and production processes, the aviation industry is challenged to keep up with the requirements for skilled and licensed AMEs. The industry is similar to that of domestic hydrogen in regard to the specialised training facilities and experienced trainers required to provide such training. Such facilities and experience make it difficult to scale out provision of training that meets regulatory requirements for licensing. This is creating a shortfall in skills and lack of uptake of appropriate training in the qualifications leading to licensing.

Such a scenario is possible for hydrogen training and uptake. Lessons from this case study include the need to harmonise or align the licensing requirements for working with hydrogen with what will be delivered in the national training package and to ensure that there are sufficient training facilities and key locations with the necessary equipment to provide training. This will assist the ease of uptake of such training and ensure that completion of qualifications result in licensing for working with hydrogen.

3.6. Case study summary: Refrigeration mechanics (Victoria)

Refrigeration and Air-conditioning 'includes the installation, maintenance and repair of both domestic and commercial refrigeration and air-conditioning' (Australian Industry and Skills Committee, 2021). In Victoria, those working as a Refrigeration and Air-conditioning practitioner must be registered/licensed. A Refrigerated Air-conditioning licence is a class of plumbing licence that the VBA issues. Interestingly, one must also hold a restricted electrical worker's licence, regulated by ESV, to gain licensing. To work with handling refrigerants, you must hold a national Australian Refrigeration Council licence for the type of work being undertaken. Anyone working to instal or replace air conditioners in Victoria must have the following:

1. A plumbing licence and registration from the VBA.
2. A refrigerant handling licence issued by the Australian Refrigeration Council.
3. A electrician's licence (A grade) or alternately they must engage a Registered Electrical Contractor (REC) licensed by Energy Safe Victoria (ESV, 2022a).

As such, there are three separate training/qualification components to Refrigeration and Air Conditioning Technician/Mechanic/Tradesman licensing in Victoria, including plumbing qualification, Restricted Electrical Licence training and requirements for a Refrigerant Handling Licence; however, these align with the VBA's requirements for a Refrigerated Air-conditioning licence.

A key technological transition in the industry with implications for licensing is the transition from using ozone depleting refrigerants. In 1995, Australia banned the importation and use of CFCs, except for essential uses. Since this time, CFCs have been phased out and HCFCs are almost phased out. These refrigerants are being replaced with synthetic and natural refrigerants that are better for the environment; however, these new refrigerants also require upskilling for their safe use.

The UEE Electrotechnology Training Package Release 2 will contain updated Refrigeration and Air Conditioning qualifications, Skill Sets and Unit of Competencies that cover alternative refrigerants. As of 2022, the updated training package is currently in the process of being implemented by registered training organisations (RTOs).

3.6.1. Key findings

This case study is of particular interest for working with hydrogen fuel cells and the dual qualifications that are likely required across plumbing and electrical work. Similar to the licensing of electricians working with Solar PV, a national licensing system exists in addition to the state based system to regulate a specific aspect of work practice (working with refrigerants) with the broader scope of work still regulated by the states. This could potentially be viable for gasfitting, with a national licence/registration system and associated qualifications specifically for hydrogen regulated by a national body and then referred to in state based gasfitter licensing.

3.7. Case study summary: Aged care workers (Australia)

The aged care sector supports older people with everyday living and other needs. Aged care workers can be employed in different types of aged care settings, including care in the home, residential care in aged care homes, and short-term care i.e., respite care. Aged care is primarily funded and regulated at a national level in Australia. Aged care work is not a registered health profession; therefore, one does not have to be registered or licensed to become an aged care worker. That said, under federal legislation, aged care providers are responsible for employing appropriately skilled and qualified staff to provide aged care services.

For entry into aged care work, initial qualification includes a Certificate III in Individual Support (CHC33015), which can be completed as a stand alone course or as part of a traineeship. For ongoing training, aged care providers are expected to provide training for employees under the Aged Care Quality Standards. Aged care providers are required to meet these standards under the *Aged Care Act 1997* as a condition of federal funding. Under the Aged Care Quality Standards: Standard 7, Human resources, an aged care service provider must demonstrate the workforce is qualified and able to provide quality and safe care and that the workforce receives ongoing training, professional development, supervision and feedback (Aged Care Quality and Safety Commission, n.d-b). As a result, aged care providers require staff to complete ongoing training modules that refresh and update knowledge to inform work practices. These training modules can be online or practical based modules delivered face to face, such as manual handling and CPR, usually offered at the aged care facility.

COVID required upskilling of aged care workers regarding infection control knowledge and practices (White & Rittie, 2022). Aged care providers incorporated updated knowledge in their professional development programs that predominantly consist of online training modules. With this framework of ongoing training in place, aged care facilities could incorporate new procedure training into the learning systems already in place.

3.7.1. Key findings

Aged care workers undertake ongoing training to maintain skills. Training modules, once completed, provide refreshers and updates to existing practice and knowledge. Changes to the protocol as part of regular practice updates or in response to significant changes, such as COVID, are included in these training modules. Such training is provided and facilitated by an employer and required as part of their compliance responsibilities, rather than this being the individual responsibility of the aged carer. This approach to CPD is similar to the requirements of the financial services sector, with licensees responsible for the adequate training of employees/those working under the licensees. The responsibility for CPD on the employer is not wholly applicable to the business structure of most gasfitters; however, as stated in the review of financial advisers, it may be useful for small to medium enterprises to support their employees in upskilling and skills maintenance programs as the hydrogen industry evolves.

3.8. Case study summary: Automotive mechanics (New South Wales)

Auto mechanics work on light and heavy vehicles in the general motor mechanic area or specific areas such as gas fuel systems, electronics, air conditioning and panel beating. Because vehicles, both light and heavy, carry significant safety risks and must be designed, repaired and maintained to safety standards, auto mechanics are a certified or licensed trade in some states in Australia. According to the NSW licensing regulator, Fair Trade NSW, 'in NSW, repairers must be licensed and employ certified tradespeople to do any repairs that affect the safety or performance of a vehicle' (Fair Trading NSW, n.d-c). In NSW, there is a range of licenses required for

mechanics. This case study is explicitly focused on the Motor Vehicle Repairer's Licence, which has a range of licence categories depending on the work undertaken. Each category has different qualification requirements. Required qualifications all sit within the national Automotive Retail, Service and Repair Training Package. Generally, for a Motor Vehicle Repairer's Licence you must complete a Certificate III qualification with an RTO accompanied by an apprenticeship.

Electric vehicles are a significant change in the automotive industry. According to SafeWork NSW, there are important hazard considerations when working with EVs that necessitate some upskilling and the skills and knowledge needed to work with electric vehicles. At a national level, the need for automotive skills to work with electric vehicles has been recognised and the national training package has been updated to include:

1. a new Certificate III level course in electric vehicle maintenance and repairs; and,
2. the addition of units of competency that can be added to other qualifications in automotive training.

PWC, the Skills Service Organisation for the Automotive Retail, Service and Repair Training Package, introduced the Case for Change in 2020 to update the existing training package to include electric vehicle skills and content. As a result of the Case for Change, the AUR32721 Certificate III in Automotive Electric Vehicle Technology was introduced in 2022 to provide a skill set to work with electric and hybrid vehicles (PwC, 2022). This qualification is currently not offered at NSW RTOs. While there have been updates to the national training package to deliver electric vehicle skills, TAFE NSW has also developed a set of micro-credentials called the Electric Vehicle Training Solution in consultation with industry. While new qualifications and units of competency have been introduced to national training frameworks and there is some activity in regard to upskilling mechanics, particularly to work on electric buses, in a licensing context, SafeWork NSW states that 'There are currently no specific licence classes for workers undertaking work on EVs, but competency may be achieved by supplementing existing knowledge and experience with relevant technical training'. As a result, upskilling specifically to work on electric vehicles is not part of any licensing requirement, nor are there any existing ongoing training requirements in NSW for automotive mechanics.

3.8.1. Key findings

This is an interesting case study in upskilling in response to the transition to low or zero emissions vehicles. Mechanics, however, differ in business structure from gasfitters in that they undertake specific work in electric vehicles for car manufacturers or large service companies. These companies provide internal training to upskill mechanics to work with electric vehicles. In this regard, ensuring the upskilling of motor mechanics for electric vehicles through licensing systems requirements is less critical than in the gasfitting trade, where tradespeople are primarily self-regulated and responsible for their own upskilling and maintenance. Larger car manufacturers are bound by different legislative frameworks regarding the manufacturing of vehicles. They have the financial capital to provide upskilling training to mechanics in their electric vehicle technology to meet consumer demand and service the vehicles they manufacture and sell. Regardless, the automotive industry has welcomed the addition of the new electric vehicle qualification to the national training package to provide initial training for apprentice mechanics to work with electric vehicles and additional competencies to support upskilling. Such standardised units of competency are essential for the mobility of the workforce to be employed by different service companies and hold nationally accredited training. The use of micro-credentials to introduce the automotive industry to essential components and concepts of electric vehicles is an approach that could also be used for hydrogen as a preliminary introduction for gasfitters which could then be followed by formal upskilling training.

Interestingly, in Victoria, the Victorian Government have implemented a program to upskill 500 electricians in automotive electrical technology, led by the Electrical Trades Union and delivered by training provider The Centre for U (the ETU training centre located at Holmesglen) and Holmesglen TAFE. This initiative illustrates the overlap in pathways to work on electric vehicles, particularly as charging stations are included in the scope of work (Tierney, 2022).

3.9. Case study summary: Builders (New South Wales)

In NSW, residential builders undertake, co-ordinate or supervise any work on houses. A building licence is required for any person undertaking residential building work valued at more than \$5000 (Fair Trading NSW, n.d-)

a). NSW Fair Trading is responsible for the regulation of licensing in the building industry and regulation of building practices. NSW Fair Trading is also responsible for administering and monitoring the CPD requirements.

There are two forms of licensing and certification for building work: a contractor licence and a supervisor certification. To get a licence you need to have the equivalent of two years' site based full-time work experience, either a Certificate IV in Building and Construction or a degree in building, construction, construction management, construction project management, construction economics, applied science (building) or quantity surveying and a current carpentry or bricklaying contractor licence or qualified supervisor certificate or Diploma of Building and Construction (Building). In addition to initial qualification requirements, NSW requires licensed builders to undertake CPD as part of a requirement for licensing renewal. The CPD program in NSW has been in place since 2004 and requires builders to complete 12 points of CPD each 12 months prior to licence renewal. The Building Commissioner has the power to set the CPD topics and any mandatory training.

Like architecture, builders must be aware of and have the capability to work with or respond to a range of new technologies such as building information modelling, and design standards such as evolving energy efficiency and sustainable design standards which are updated periodically at a state level i.e., the BASIX tool and at a national level through the National Construction Code and the requirements for building performance i.e., from 6 stars to 7 star requirements.

3.9.1. Key findings

This case study is interesting as residential builders have a similar small business structure to gasfitters and are licensed. Builders in NSW are required, however, to complete ongoing training to renew their licenses. This system has been in place for nearly two decades, since 2004. Interestingly, CPD is not required for holders of trade licences such as plumber/gasfitters in NSW.

A notable aspect of the CPD program is the required focus areas that guide the selection of training. While the framework allows the licensee to select their own training, the framework guides this training to specific areas which can be updated based on regulatory, technology or market need at the discretion of the Commissioner. Based on the current list of topic areas provided, you can see how this CPD program intends to provide new knowledge and skills around changes in technology and requirements for the transition towards sustainability in the built environment. It is more targeted at updating skills in response to industry changes and market demands than CPD programs in other professions reviewed in this report. That said, this desktop review has not been able to find any evaluation of the effectiveness of the NSW CPD program in terms of industry outcomes.

Another noteworthy aspect of the CPD program is the inclusion of units of competency from the national training package. Therefore, the framework provides for attaining nationally accredited training and lends itself well to upskilling. In the case of gasfitters upskilling for Future Fuels, this type of framework could provide the opportunity to require the completion of specific units of competency in the national training package, such as hydrogen skills, which would be particularly beneficial if all gasfitters are required to upskill.

3.10. Case study summary: Building surveyors (Tasmania)

Building surveyors play an important independent role in ensuring that a building has been constructed according to the National Construction Code and other standards and in line with state regulations. A building surveyor assessment is a key part of the building approval process. Building surveyors have the power to certify that buildings have been constructed as safe to use. Therefore, their role carries significant responsibilities to public safety and the built form's quality. As such, building surveying is a licensed practice. Building surveyors can work either privately for the property owner or a government authority such as a local council. The integrity of private building surveyors and their role in enforcement has come under scrutiny over the past decade because of their role in the enforcement of regulations and standards and the commercial relationships that 'form between private building surveyors and those seeking their services' (Australian Building Codes Board, 2021, p. 2).

In Tasmania, there are two licence classes for building surveyor, an open licence and a limited licence. To hold an open licence, one must have a degree level qualification (AQF7) in building surveying, along with 3 years of relevant experience within the scope of work for a building surveyor. A diploma level qualification (AQF6) and 3 years of experience are needed for a limited licence (Consumer Building and Occupational Services, 2022b). Ongoing CPD is also a licence renewal requirement in Tasmania for building surveyors, along with registration with the Australian Institute of Building Surveyors (AIBS) or Royal Institute of Chartered Surveyors (RICS). For

licensing in Tasmania, 90 points (approximately 90 hours) of CPD must be completed every three years as a requirement of licensing renewal. The licensee can select CPD activities; however, the regulator must approve them based on their criteria.

As assessors of statutory compliance with regulations and standards, changes in building surveying reflect the changes in the building industry more broadly. Technology in the design and construction of buildings is advancing, along with environmental design and efficiency requirements. Building surveyors must also be up to date with evolving product and design requirements in their respective jurisdictions.

3.10.1. Key findings

A notable aspect of this case study is the CPD program and the number of CPD hours required each year. While the framework allows the licensee to select their own training, the framework guides this training to specific areas and, like builders in NSW, CPD includes units of competency from the national training package. There are no requirements to complete specific courses to upskill as part of the CPD program; however part of the CPD activity approval process involves assessing content, objectives, learning outcome/s, practical application and assessment of learning. It is the responsibility of the regulator to determine if these aspects of each activity are sufficient to count towards CPD. Such assessment criteria can work to ensure that only meaningful activities are included in the CPD points and may be useful for ongoing skills and knowledge maintenance for gasfitting as the industry evolves or to ensure adequate training activities are being undertaken if CPD is used as a vehicle for upskilling.

Interestingly, while the state regulator audit licensees, Australian Institute of Building Surveyors (AIBS), has also recently introduced a program to audit members. This shows that it is possible for oversight by other key stakeholders such as membership organisations, including associations and, where relevant, unions.

4. Insights for training and upskilling for Future Fuels

The ten case studies reviewed in Section 3 show various approaches to training and associated licensing to ensure that professionals and practitioners are competent in working in their respective roles. This section will discuss these approaches and summarise the insights for training and upskilling gasfitters for hydrogen. This section begins with approaches and insights for initial training, followed by ongoing training and then explores the regulatory frameworks that underpin such training.

4.1. Initial training

All case studies reviewed required some qualification and associated training to work in the respective roles. Training develops the 'knowledge and skills required by individuals to perform effectively in the workplace' (ASQA, n.d) and can be delivered in various ways. Training is an intentional and constructed experience to support learning for work practice and can be categorised into three different types:

- **Accredited training** refers to a program of training leading to vocational qualifications and credentials that are recognised by the attainment of a formal qualification or award. This can include whole courses or selected modules of a course.
- **Unaccredited training** refers to a program of structured training or instruction that does not lead to the attainment of a formal qualification or award, for example, short courses, product-specific training and industry or organisation-specific training.
- **Informal training** refers to unstructured training that usually occurs on the job through interactions with co-workers as part of the day-to-day work, for example, on-the-job coaching, mentoring or reading on the internet' (White & Rittie, 2022, p. 11). While 'informal', these learning experiences are intentional to develop work practice skills and competencies, and therefore, can be considered a form of training.

In terms of initial qualifications for entry into the occupations reviewed and because nine of these occupations were licensed or registered, the completion of an accredited qualification is required. From the case studies, particularly the professional occupations (nurses, financial advisers, architects, and building surveyors) but also for the building trade, initial training to enter the occupation involved nationally accredited university qualifications, while for other trades based occupations and aged care work, required qualifications were provided through nationally accredited VET sector certificates. While still accredited with the national tertiary education regulator, university qualifications provide less standardised curriculum than that found in the VET sector which predominantly delivers courses from the National Training Packages, along with some non-accredited training. As a result, a national competency framework for architecture is used to inform requirements for initial and ongoing training programs. While this framework is noted to be non-integral to day-to-day practice, it is used to ensure that the skills and knowledge requirements for architects, who are regulated at the state and territory level, are consistent nationally for mutual recognition purposes to guide university education programs and CPD. An industry based national competency framework, like that found in Architecture, is not necessary for VET sector qualifications as the national training frameworks provide for standardised competencies, although the delivery of training packages can vary between RTOs.

Another way to ensure that competency to practice is attained is through an end of qualification exam required as part of licensing and registration. This is a requirement for some professions and trades reviewed including electricians, financial advisers, architects and refrigeration mechanics (for registration as plumbers). The exam requirement allows an external organisation, usually acting on the behalf of regulator, to assess the competencies that should have been developed through the required accredited training provided by an RTO. This is also useful for where there is a work experience or informal training requirement as part of registration or licensing or to obtain a qualification, as is the case many occupations reviewed here. An exam can provide an external assessment of the cumulative knowledge and skills developed through both formal accredited training and on the job learning experiences.

The attainment of an accredited qualification, completion of on the job experience, along with a final exam is the current training and qualification approach in plumbing/gasfitting around Australia for initial licensing/registration. What is of particular importance for gasfitting is the provision of accredited hydrogen training, given the safety risks associated with hydrogen and gasfitting. When new skills requirements emerge, these generally trigger the process to update a training package to include new skills and knowledge requirements. This process varies in

complexity and can take months or years to review and complete. Interim Report 2 describes these processes in detail. Electrical trades, auto and refrigeration mechanics are examples of trades for which training packages have been updated in response to changes in industry and associated skills and knowledge requirements. National training packages for each trade have been updated to include solar PV, electric vehicle requirements and less greenhouse gas intensive refrigerants, respectively. These new skills and content areas have been included as additional units of competency in the case of electricians and solar PV installation and maintenance, a separate qualification and additional units of competency for electric vehicles and added content and skills areas in existing units of competency for refrigeration and air conditioning mechanics. It is important to note that generally, such training updates have occurred in response to market changes and the introduction of new technologies rather than in anticipation of such changes. It means that electricians and auto mechanics can work on these new technologies without any accredited training. The extent to which licencing of these trades requires these additional qualifications or units of competency to practice in these areas differs and is explored further in Section 4.3. Such a situation with gasfitters working with hydrogen without accredited training is not desirable given the safety risks, and already we see the national training package being updated to include hydrogen competencies. The pre-emptive update to the Construction, Plumbing and Services Training Package to include hydrogen does however pose challenges for developing training for practice with technology that is still largely unknown, along with an absence of consumer demand to motivate gasfitters to upskill. On the other hand, developing training now provides time to learn from other examples and consult to ensure training options will meet stakeholder and competency needs.

Licensing for the above three professions generally aligns with the national training packages offered by the VET sector. Challenges arise, however when training requirements for licensing differ to that offered through national accredited tertiary education. Aircraft Maintenance Engineers are an example of a licensed occupation with two training pathways. Originally, the regulator assessed the competencies and work experience of those seeking an aircraft maintenance engineer licence. However, the introduction of the national training system and market-based training provision reduced the role that the regulator played in assessing competency and capability, giving responsibility to private training organisations. For aircraft maintenance engineering, these training organisations are called Maintenance Training Organisations and operate under industry regulation, separate from the national training framework and regulations that govern RTOs. There are, however, certificates offered in aircraft maintenance engineering by RTOs as part of the national training framework. As a result, there are two training pathways in aircraft maintenance under separate systems of regulation. The issue here is that only training provided by Maintenance Training Organisations leads to licensing. This dual system has been criticised for its complexity and should be avoided when updating licensing and training requirements for gasfitters for hydrogen.

Another relevant challenge noted for training sufficient aircraft maintenance engineers to meet growing skills demand is the need for specialist training facilities (and also qualified trainers) for aircraft work. A similar situation can occur with hydrogen training, whereby practical training is challenging to deliver due to access to technologies and fuels in training facilities. This difficulty prevents training from being offered at a range of locations to meet skills demands depending on the roll-out of hydrogen. The constraints around the delivery of hydrogen training have implications for not just initial training but maintenance and upskilling training described in the following section.

4.2. Additional training

Training in addition to, or post, initial qualification can take many forms, as shown in the case studies reviewed. Additional training can be part of:

- a licensing or regulatory requirement for a 'one off' training activity;
- a standalone training requirement to upskill practitioners or ensure that existing practitioners are up to date with changes in regulations and so on; or,
- ongoing requirements, often referred to as CPD.

This section explores these different approaches found in the case studies drawing on additional literature to better understand the types of approaches taken and their value for gasfitting.

Eight of the ten case studies had formal requirements for completing ongoing training as part of licensing requirements referred to as CPD that is a 'career-long process that requires practitioners to enhance their

knowledge, acquire new skills and build on existing ones' (Wallace & May, 2016, p. 515). CPD is commonly used in occupations as a way to continuously ensure the competence of practitioners and professionals as work practices and sectors evolve. According to Grant (2011, p. 4), globally, there is a range of approaches taken to CPD in terms of:

- 'Whether CPD is mandatory or not
- Which authority regulates CPD
- The way in which compliance is counted and monitored (CPD credits which tend to be counted as hours are the most common framework)
- The implicit model of learning
- What activities are recognised for CPD purposes
- Whether CPD providers and events are accredited or formally approved
- The consequences of complying or not complying with any CPD targets
- Relationship to relicensure or revalidation of registration' (Grant, 2011, p. 4).

While the term 'professional' implies development programs for professional roles, as the case studies show, the term is applied more broadly to non-professional occupations such as trades. CPD programs generally take the view that learning involves 'training' rather than the broader concept of learning inclusive of all experiences, intentional and unintentional (such as day to day work practices) that result in a change in behaviour and/or knowledge. CPD programs are commonly built on the assumption that learning consists of 'discrete finite episodes with a beginning and end' (Webster-Wright, 2009, p. 704) and involve 'supplementary' learning experiences such as lectures, conferences and workshops with a requirement to count hours or points doing a CPD activity (Wallace & May, 2016, p. 515). This understanding is exemplified by the majority of the CPD programs found in the case studies, where professional development consisted of completing discrete learning and/or training experiences and recording these activities to be audited by a regulator at their discretion. CPD in this manner, therefore, accounts for accredited, unaccredited and informal training experiences rather than ongoing learning, as discussed later in Section 4.4.

All the CPD programs found in the case studies resemble an 'input' approach with requirements that focus on the types of activities completed rather than the learning outcomes achieved. An outcomes based approach has been argued to be better at ensuring that genuine learning occurs through CPD activities, however, this requires the assessment of outcomes, which 'is complicated and requires more time and resources than with an input-based scheme' (Wallace & May, 2016, p. 515). Despite this, some CPD programs have a formal or accredited learning component that aims to ensure that learning is assessed at the completion of the training program. For example, architects have a formal learning requirement, which according to the Victorian Government, typically involves 'education you undertake with a clear learning outcome assessed at the end of the activity. This type of learning typically involves interaction between you and the presenter, trainer or instructor'. This requirement for at least ten hours of assessed activity provides an external assessment of the learning outcomes achieved for such activities. For builders in NSW, the commissioner sets and regularly updates CPD requirements which can and do include the completion of accredited training such as units of competency within the national training package. Like architects, this ensures that training outcomes are assessed as part of the CPD activity. The licensee can select CPD activities; however, the regulator must approve them based on their criteria. In Tasmania, building surveyors are required to self-select their CPD activities; however, the regulator must approve these activities based on their criteria, including the type of learning activities, learning outcomes and assessment involved with each self-selected activity. These requirements allow various regulators to set standards and specific course requirements, including accredited courses, that ensure certain learning outcomes are met. This differs from the CPD programs found in nursing, which are self-selected with little oversight over learning outcomes achieved from such activities.

An important point to note when considering CPD as a vehicle to either upskill or maintain industry currency for gasfitters to work with hydrogen is that traditional CPD approaches have been critiqued as being 'a 'check box list' of required measures', rather than 'a holistic, contextual approach' to learning that recognises 'an interlocking host of elements, including legal, educational, economic, institutional, socio-cultural and psychological factors' that support work practice integrity and competence (Hugh & Charles, 2017, p. 385). The case studies, however, illustrate a range of variations in traditional CPD approach that work to strengthen the learning outcomes.

Another important point to consider about additional and ongoing training is whether the purpose is to upskill or maintain skills. Skills maintenance involves ongoing training to support the currency of skills and knowledge

“industry currency”. Note that ‘current’ implies that skills and knowledge are updated as these requirements standards and practices evolve so that work practice remains current. Upskilling differs from skills maintenance, it involves the attainment of additional skills and/or knowledge to work with new technologies or practices in one’s same employment position or occupation/industry. ‘Upskilling is often seen as a consequence of technological change that creates a demand for higher skills’ (Aspøy, 2020, p. 229). Upskilling expands one’s abilities/competencies within the same role/occupation/industry. Upskilling ‘is an increase in skill level resulting from technical change or job redesign and the associated training’ (Heery & Noon, 2017).

The case studies demonstrate examples of CPD programs designed for skills maintenance and CPD programs for upskilling. Aged care practitioners, financial advisers and nurses have CPD programs that emphasise skills maintenance but allow for upskilling; however, they do not include mandatory formal or accredited training requirements. Despite this, formal and accredited training does count towards CPD for these occupations. In terms of CPD for upskilling, NSW builders stand out as having a system in which the regulator/commissioner has the discretion to include specific formal and accredited training that can be used to upskill existing practitioners as needed. Electricians in Victoria are an example of a CPD program that explicitly focuses on both skills maintenance, through a prescriptive eight hour training course, and upskilling whereby electricians can select from a range of areas in which to gain additional skills as part of the CPD program.

The case studies show that for many, CPD is an accepted and embedded part of ongoing licensing or registration and can be used for both skills maintenance and upskilling, provided adequate frameworks are in place to specify the type of training required.

Critical to note however is that CPD is not a requirement for upskilling. Electricians who undertake Solar PV work must have additional training to be nationally accredited and for their customers to receive federal and state financial rebates and other incentives for their Solar PV installations. In this case, the national training package has been updated along with licensing requirements to facilitate the upskilling process. In the context of gasfitters, with a similar business structure to electricians, the availability of accredited hydrogen training through the national training package coupled with mandatory training as part of licensing requirements would likely be the most successful approach to upskilling.

Auto mechanics in NSW do not have any licensing requirement for CPD; however, they have upskilled as needed to service electric vehicles. These requirements have been driven by market demand for electric vehicles and the training that car manufacturers have provided, rather than any updates to national training packages. Micro-credentials have also been developed by government and education providers to raise awareness and knowledge of electric vehicles amongst mechanics working in the public transport industry on buses. Micro-credentials can provide a way to share general information about technology and regulatory changes and can be included in CPD, however, are not able to provide practical training that is delivered by RTOs.

4.3. Regulatory frameworks and training

In each case study occupation, licensing or registration of either the practitioner or the employer plays a key role in ensuring that requisite qualifications and ongoing training are attained. Each occupation reviewed has evolved over time, including the regulatory frameworks linked to training and competency requirements. For occupations such as aged care, nursing, financial advisers and aircraft maintenance engineers’ consistency in licensing/registration and associated qualification and ongoing training requirements exists Australia-wide. This national alignment also allows practitioners to work in, or across, different states under the one licensing framework and could be considered for gasfitters working with hydrogen where a mobile workforce may be necessary to allow practitioners to travel to regions where hydrogen conversion work is needed as the roll out of hydrogen takes place across Australia.

While the remaining case studies were regulated at a state level, some had additional national licensing, and associated qualification requirements at a federal level and some had national coordinating bodies or professional associations that aim to provide consistency across states and require additional training to that specified by the states. For example, the Architects Accreditation Council of Australia (AACA) play an active role in providing a National Standard of Competency for Architects (NSCA) that is used to accredit degree programs, manage the professional code of conduct and also require the completion of CPD as part of membership. The Australian Institute of Building Surveyors (AIBS) also requires completing CPD as part of membership. As a result, these national associations work to provide some level of consistency in the state based licensing system

of both these occupations. This also assists with mutual recognition of licensing and qualifications in state based licensing systems, such as with gasfitting.

Another approach seen for state-based licensing systems with additional requirements of national significance is an additional level of national licensing and oversight, as with electricians and air conditioning mechanics. The national framework established in these case studies is designed to regulate a specific aspect of work, such as solar PV for electricians and dealing with refrigerants for refrigeration mechanics, while the broader scope of work remains regulated at a state level. Each of these occupations requires licensing at both state level with the existing licensing system and at a national level in order to undertake certain work. The national Clean Energy Regulator provides accreditation to work with Solar PV for existing licensed electricians and the national refrigerant regulator provides licenses to handle refrigerants for existing mechanics. Both systems evolved out of a national recognition of the need to license/accredit some aspects of practice and is potentially a valuable model to standardise licensing requirements for gasfitters to work with hydrogen across Australia.

Auditing of work plays an important role in monitoring compliance and competency of practice. Most regulators undertake auditing work in some form, and the auditing of CPD activities where this is a licensing requirement. The electrical trade is an interesting example from our case studies that are audited by multiple bodies for work undertaken involving Solar PV. For Victorian electricians, such work is audited by ESV, the Victorian State Government and the national clean energy regulator. Despite the additional regulatory oversight, compliance issues have been noted in the installation of Solar PV, which indicates that either more oversight is needed or the addition of other mechanisms to ensure competent practice is needed, such as additional training programs. This is an important case study to note and follow for insights that can inform training approaches for gasfitters to work with hydrogen and ensure compliant work on hydrogen installations in the home.

Finally, in addition to licensing, professional standards or codes of practice seen in nursing, aged care, architecture and financial advice are being used to introduce certain qualification requirements and also CPD skills maintenance programs. The professional standards/codes, given power by regulations, are where requirements for adequate initial and ongoing training are established for these occupations.

4.4. Informal learning

This review does not address the role of informal learning outside of these planned and discrete training programs/activities and the role this plays in building competency amongst the occupations reviewed. This research can conclude that the dominant approach to ensuring and developing skills and knowledge is based on the assumption that learning occurs in intentional and often formal training experiences. No approaches have been reviewed to harness and capture the informal learning that occurs outside of discrete training activities. An exception can be CPD programs that allow journaling to reflect on learning from practice which occurs somewhat as part of nursing CPD. This distinction between learning and training is essential when considering how to build skills and knowledge amongst gasfitters who, as shown in interim reports 1 and 2, learn through daily practice and formal training. Webster, Walker, and Brown (2005) summarise that broadly, learning within small businesses is characterised by 'opportunistic' learning to address immediate business problems and not via formal training or the pursuit of qualifications. As a result, small businesses learn through skills and knowledge sharing between peers and key stakeholders within their networks (Gibb, 1997) while large businesses will 'engage in externally-provided training which leads to formal qualifications' (Webster et al., 2005, p. 553). The interviews undertaken for interim reports 1 and 2, along with the national survey of gasfitters to be presented in Interim Report 4 can shed light on these informal learning processes for the gasfitting trade.

4.5. Summary

The case studies provide insights and opportunities into practices that support initial training and competency development and ongoing training and upskilling for consideration when exploring how to suitably skill gasfitters to work with hydrogen. Key findings from the case studies can be grouped into four categories that provide opportunities for training approaches or requirements to ensure new and existing gasfitters develop the future competencies required including: Initial training and upskilling, ongoing training and upskilling, regulatory frameworks and competencies and informal learning. The key learnings from the case studies within each category includes:

- Initial training and upskilling:

- Accredited training requirements provide a mechanism to ensure those entering the trade have the necessary qualifications to work with hydrogen. The national training framework can be updated to include units of competency for hydrogen that can be included in initial training and also to upskill existing gasfitters to work with hydrogen. The national accreditation offered by the training packages can also support workforce mobility depending on state regulations. The training package updates within the different sectors represented in the case studies were often in response to changing market demands. The update of the Construction, Plumbing and Services Training Package to include hydrogen units of competencies differs to the case study examples in that the changes are pre-empting market demand for hydrogen skills. This makes it difficult to create training for practice with technology that is still largely unknown, along with an absence of consumer demand to motivate gasfitters to upskill. On the other hand, developing training now provides time to learn from other examples and consult to ensure training options will meet stakeholder and competency needs.
- Training in response to the development of new technologies requires the need for new specialist training facilities (and qualified trainers). New facilities are required to not only allow for skill development but to ensure access is geographically dispersed to adequately meet demand where it is needed for skills and training.
- Some case studies highlighted the resultant complexity of training and regulatory requirements that existing at both the state and national level. Care should be taken to align any future hydrogen training requirements imposed by national, state and industry bodies or associations to avoid conflicting or non-complementary training pathways.
- Ongoing training and upskilling:
 - The absence of formal CPD for gasfitters does not preclude upskilling, however, CPD is advantageous for ongoing updates as the industry evolves. Eight of the ten case studies had such a system in place that allowed the members of the occupation to upskill (to varying degrees) in response to industry changes.
 - CPD programs vary in delivery and outcomes. Based on a number of examples provided here, often CPD is self-assessed by the practitioner and randomly audited by a regulatory body. This approach, referred to as an 'input' approach, does not ensure that CPD activities achieve desired learning outcomes and can be a 'tick the box' activity.
 - The case studies demonstrate examples of how the regulator can play a greater role managing the type of learning undertaken and the learning outcomes achieved in CPD programs, providing for more of an 'output' approach to CPD by: setting prescriptive content when needed; requiring the completion of accredited courses; requiring CPD is delivered by adequately qualified trainers, and; ensuring that the content and structure allows for meaningful learning to occur.
- Regulatory frameworks and competencies:
 - Some case studies show how a national framework is used to assist with ensuring national consistency for the regulation of practice, or a specific aspect of practice, and to support workforce mobility.
 - An alternative to a national regulator is a national body with responsibilities for supporting consistency of competencies across the states and territories and to work with state based stakeholders and industry groups to do so.
 - Observation of the CPD implementation process and regulatory reforms of Solar PV work in the electrical trade in Victoria is of particular value for providing useful insights for the regulation of gasfitters working with future fuels.
- Informal learning:
 - Informal learning plays a role in gasfitters' ongoing learning (as shown in Interim Reports 1 and 2); however, the case studies do not provide any examples of mechanisms to formally document or assess such learning, with the exception of a reflective journal approach in nursing.
 - The literature on small business learning has found that ongoing learning can be facilitated by a range of stakeholders outside of formal training programs. This should be considered when developing a holistic approach to supporting gasfitters in a transition to hydrogen.

5. Next steps and future works

This Interim Report 3 will be followed by Interim Report 4 which will present the findings from a national survey of gasfitters and their training practices, awareness and views on upskilling for hydrogen. A final report will follow that summarises key findings from each report and makes final recommendations for consideration by industry.

6. Appendices

6.1. Trades training regime case study details

6.1.1. Electricians (Victoria)

Occupation description

Electricians design, assemble, commission, install, diagnose, repair and maintain electrical systems, networks, appliances, equipment, components and facilities for domestic, commercial and industrial uses, and also can repair and service escalators, lifts, and associated equipment (ABS, 2021). According to Energy Safe Victoria (ESV), electrical installation work is predominantly undertaken by small businesses, the majority (96 per cent) of which are sole traders or businesses with fewer than 20 employees. Electricians may work on individual dwellings or are employed in a subcontracting arrangement on multiple dwellings or for body corporate or rental agency work. In Victoria in 2018-19, there were more than 47,000 Licensed Electrical Workers (LEWs) and registered electrical contractors (RECs), who undertook out work on over 768,000 electrical installations (Regulatory Impact Solutions Pty Ltd, 2020).

Relevant legislation and regulatory bodies

ESV regulate the technical and licensing aspects of electrical work undertaken in the state of Victoria. Electrical work is governed by the Electricity Safety Act 1998 and the Electricity Safety (General) Regulations 2019. ESV's role includes licensing Victoria's electrical workers, issuing and auditing Certificates of Electrical Safety (COES), making sure electrical (and gas) appliances are approved and safe for use, investigating incidents, and educating the community about energy safety.

In addition to the role that ESV play in governing electrical workers, for the installation of solar panels, the national Clean Energy Regulator also undertakes auditing of some work and accredits solar system installers and designers. These audits are undertaken under the national Renewable Energy (Electricity) Act 2000. The Victorian state government agency, Solar Victoria, also audits solar installations.

Licensing and training requirements

In Victoria, there are two main categories of licensing for electrical workers and contractors; Licensed Electrical Workers (LEWs) and registered electrical contractors (RECs).

To become a LEW, generally a person must have completed:

- A Certificate III in Electrotechnology
- The Licensed Electrician's Assessment (LEA) conducted by an assessment centre approved by ESV, within five years of application
- A four-year apprenticeship as an electrician, with at least 12 months' experience carrying out electrical installation work

The LEA involves a series of three assessments including Licensed Electricians Theory (LET), Licensed Electricians Practice (LEP) and the Safe Working Practice (SWP).

To be paid for electrical work, an electrician must also hold a Registered Electrical Contractors (REC) license. To obtain this license, one must be a LEW and have undertaken the Registered Electrical Contractors Course or engaged an 'appropriate business supervisor', that can ensure 'the business is managed in a satisfactory manner' (ESV, 2022b).

Victoria has recently introduced CPD requirements for the renewal of electrical licenses which is commencing in 2022 in a staged roll out. Two types of CPD being introduced:

- **Skills maintenance**, requirement starting from 2023 (so electricians must have completed the course if renewing the license from this time)
- **Skills development**, starting from 2028

CPD is targeted at those practitioners who do not usually seek training or maintain industry currency. The skills maintenance CPD requires 8 hours of learning within the 2 years prior to licensing renewal. The CPD course is prescriptive and covers four areas: responsibilities (including to apprentices); major changes to standards and

regulations; safe insulation, and; mandatory testing. The last two areas involve practical training. The non-accredited free course is delivered currently by 11 RTOs and is separate to the national electrical training package. The course was designed for ESV by Future Energy Industry, a not-for-profit organisation led by the Electrical Trades Union (ETU) and National Electrical Communications Association (NECA). Future Energy Industry designed the content and contracted another company to design the Learning Management System (LMS).

The skills development CPD requirement will be mandatory however the structure is still in the design and consultation phase. ESV intends to focus training on upskilling in a range of areas including business, digital literacy and health. It is envisaged that ESV will develop a criteria of acceptable courses that electricians can participate in to meet licensing requirements and therefore will be less prescriptive than the skills maintenance course.

Changes in the industry and response: Solar PV

A key change in the electrical industry is the expanding rooftop solar photovoltaic (PV) market which has seen 'unprecedented growth' over the last decade (Clean Energy Regulator, 2021). According to the Clean Energy Regulator, 'the total annual installations of rooftop solar PV systems has increased from 750 megawatts (MW) across 133,000 installations in 2016 to an expected 2,900 MW across 370,000 installations in 2020' (Clean Energy Regulator, 2021). Electricians are the trade that is licensed to undertake the installation of solar PV. This technological transformation driven by rising costs of energy and carbon reduction goals, has required that electricians upskill to undertake such work.

In response to the increase of photovoltaic systems across Australia, the training package for electricians, UEE30820- Certificate III in Electrotechnology, has been updated to include units of competency for solar installation and maintenance. These units however are not compulsory at the Certificate III level. There are two Certificate IV level qualifications however that provide skills in photovoltaic systems where these units are also included:

- UEE41920- Certificate IV in Electrical - Renewable Energy
- UEE42020- Certificate IV in Electrical - Photovoltaic systems

The Certificate IV in Electrical - Photovoltaic Systems was introduced in 2009 and has since been updated several times. The Certificate IV in Electrical - Renewable Energy certificate was also introduced around the same time in 2012.

To ensure that electricians installing rooftop solar systems are adequately trained, the national Clean Energy Council (CEC) accredits businesses that sell and install solar systems. This is regulated at the national level due to Commonwealth legislation, the Renewable Energy (Electricity) Act 2000, and schemes to support carbon reduction including the Renewable Energy Target and associated Small-scale Renewable Energy Scheme (SRES) that enables the generation of small-scale technology certificates (STCs) for the installation of rooftop solar PV across Australia. Policy incentivising solar also exists at a state level and is managed by Solar Victoria, however this state-based agency relies on CEC accreditation to ensure rooftop systems are installed by competent professionals.

To have an accreditation as a solar installer with the CEC you need to be appropriately qualified. Qualifications for CEC accreditation for installation (not design) include having an unrestricted electrical licence and the completion of additional national units of competency². Note these also include battery systems. The additional units of competency are included in the Certificate IV in Electrical - Renewable Energy and Certificate IV in Electrical - Photovoltaic systems, noted above. In all states, solar PV must be installed by a registered/licensed electrician that is CEC accredited. In this way, there are two levels of regulatory oversight for this at the state level by state-based regulators that issue registration/licenses and at a national level by the CEC and audited by the Clean Energy Regulator. State based regulators also audit some work.

CPD is also a part of CEC accreditation to make sure technical knowledge stays up to date. According to the CEC, 'all CEC-accredited installers and designers must earn 100 CPD points annually to renew their

² The following document provides a list of the units required for CEC accreditation as a solar PV installer <https://assets.cleanenergycouncil.org.au/documents/Accreditation-Pathways.pdf>

accreditation. For newly accredited people, training is split into two categories, Core and Elective. A minimum of 60 points must be obtained from Core training. The remaining points can be earned from either category' (Clean Energy Council, 2018).

While there exists multiple levels of regulatory oversight for the installation of rooftop solar PV, non-compliant installations have been recorded to the extent that the Clean Energy Regulator, and the National Audit Office have undertaken reviews on the safety and compliance of installations (Australian National Audit Office, 2018; Clean Energy Regulator, 2021). Both these reviews have noted widespread compliance issues with the installation of solar PV.

The Clean Energy Regulator is required under the Renewable Energy (Electricity) Act 2000 (the Act) to arrange inspections of a statistically significant selection of small generation units that are installed each year for conformance with Australian standards and any other relevant requirements. According to a 2019 review of the Renewable Energy Target by ANAO, 'Over the period 2011 to 2015 inclusive, 'unsafe'-rated installations averaged 4.2 per cent each year, before decreasing in 2016 and 2017, to 2.5 and 1.9 per cent, respectively, then increasing in 2018 to 2.7 per cent. Analysis by the regulator in 2015 indicated that 80 per cent of the 'unsafe' installations since the inspection program commenced were caused by water ingress in direct current (DC) isolator enclosures on rooftops that created an electrical safety risk' (Australian National Audit Office, 2018, p. 51). There are however a larger number identified 'sub-standard installations' where rectification work is needed.

There have been calls for more auditing and stricter penalties for non-compliant work. The Clean Energy Regulator notes that 'Any market growing this strongly has the potential to attract some poor performing participants and result in quality and other issues for consumers and integrity issues for the Small-scale Renewable Energy Scheme (SRES)' (Clean Energy Regulator, 2021, p. 4). The Regulator notes a number of issues in their 2021 review, including:

'A material number of CEC accredited installers have signed written statements for eligibility of systems for STCs when they had not been onsite during installation and this has led to compliance action by the Regulator and the CEC. The Regulator has also found evidence that some installations may have been undertaken by persons undertaking electrical work without a relevant electrical licence as required under state and territory laws'.

In response, starting in 2022, the Clean Energy Regulator will take responsibility for accreditation. When the scheme finishes at the end of 2030, the additional integrity requirements imposed on rooftop solar PV systems claiming STCs will no longer apply, and the only requirements will be those covered by state and territory electrical safety laws.

6.1.2. Nurses (Australia)

Occupation description

In Australia, nursing is one of 16 registered health professions. The job title is protected by law and therefore one must meet certain requirements to become a nurse. In Australia, there are three types of nurses, an enrolled nurse, registered nurse and a nurse practitioner. Nurses work in a range of health care settings including public and private hospitals, emergency care, aged care, general practice clinics, community health services, schools and rural and remote communities (Department of Health, 2021). In 2017, there were 374,216 practising general/provisional registrations. 89% of those practising are female (Department of Health, 2017). Table 2 shows the number of nurses working in different places of employment in Australia in 2017.

Table 2 Place of employment Australia 2017

| Principal work setting | Head- count |
|------------------------------------|-------------|
| Hospital | 198,287 |
| Residential health care facility | 41,587 |
| Community health care service | 23,609 |
| General practitioner (GP) practice | 12,208 |
| Outpatient service | 11,033 |
| Other | 9,971 |
| Independent private practice | 5,694 |
| Other private practice | 3,776 |
| Tertiary educational facility | 3,709 |

| | |
|---------------------------------------|-------|
| Other government department or agency | 3,109 |
| Correctional service | 1,720 |
| Aboriginal health service | 1,597 |
| School | 1,545 |
| Defence forces | 1,341 |
| Commercial/business service | 1,308 |
| Other educational facility | 957 |
| Group midwifery practice/caseload | 794 |
| Hospice | 715 |
| Specialist (O&G) practice | 162 |
| Locum private practice | - |

(Department of Health, 2017)

Nurses work in a range of employment types including casual and permanent roles. Casual employment plays a key role in provision of nursing in health settings in Australia. According to Wang and Geraghty (2017, p. 439), 'A casual nurse is either employee of a labour hire agency or a hospital pool (Roche, Duffield, Homer, Buchan, & Dimitrelis, 2015, p. 357). The nurse can work for multiple agencies and pools and is paid by the agency or pool, rather than the health care provider they work at. The agency or the hospital pool decide the nurses pay rate and charge an additional fee for allocating the nurse.

Another key characteristic of nursing is the high turnover rate in permanent employment (Roche et al., 2015), accompanied by staff shortages. 'In speciality areas of nursing such as emergency departments (ED), high nursing turnover is an ongoing and escalating problem' (McDermid, Judy, & Peters, 2020, p. 390). In addition, 'recent Australian workforce planning projections forecast that, in the medium- to long-term, demand for nurses will significantly exceed supply, with a projected shortfall of 85 000 by 2025, and 123 000 by 2030' (Cosgrave, Maple, & Hussain, 2018, p. 3). Staff shortages impact nurses working within health care settings, contributing 'to occupational stress, burnout, compassion fatigue, and posttraumatic stress disorder (PTSD) or secondary traumatic stress' (McDermid et al., 2020, p. 390). In rural health care settings, access to CPD, along with workplace conditions, have been found to affect nursing retention (Cosgrave et al., 2018).

Relevant legislation and regulatory bodies

The law governing nursing in Australia is called the Health Practitioner Regulation National Law (the National Law), which is a national law that was enacted by each state and territory in 2009 and 2010. This allows for a national registration and accreditation scheme for health practitioners, including nurses. In Australia, there are 16 national bodies governing the various registered health professions such as nurses, dentists, pharmacists and doctors etc. The law gives power to the 16 national bodies to develop and recommend registration standards regarding insurance, CPD, recency of practice, English literacy and criminal history requirements for registration (Queensland Government, 2009).

The body governing nursing is the Nursing and Midwifery Board of Australia (NMBA) which registers nurses as part of their role as a national body under the national law. The NMBA works with the Australian Health Practitioner Regulation Agency (Ahpra), the Australian health practitioner regulator, to govern the nursing profession. Ahpra was established under the national law in 2008 by the Council of Australian Governments (COAG) as the single national regulatory body for all registered health professions (National Health Practitioner Ombudsman, 2021). Along with the NMBA, Ahpra works with the 15 other boards governing various health professions.

In 2020-21, 2,080 notifications/complaints about nurses were lodged with Ahpra, which is approximately 0.5% of the profession (Ahpra and National Boards, 2021).

Licensing and training requirements

Globally, the history of licensing/registration in nursing has 'always been connected to education and to the routes of entry into nursing' (Stievano et al., 2019). Nurses must be registered with the NMBA and meet the registration standards to practise in Australia. Registration types include:

- general registration
- limited registration
- non-practising registration (see fact sheet to the right of the page)
- student registration

- provisional registration

A range of requirements must be met to be eligible for registration. 'Registration standards define the requirements that applicants for registration or renewal of registration need to meet to be registered' (Nursing and Midwifery Board of Australia, 2022). In addition to qualification requirements, CPD is also required as part of registration as well as recency of practice. In addition, if a nurse has not practiced between 5 and ten years, they must apply for provisional registration and undertake 12 months of supervised practice before becoming registered again.

Training process

Initial training for nursing begins with the completion of a formal qualification. An Enrolled Nurse must complete a Diploma of Enrolled Nursing which involves 1.5 years full-time or part-time equivalent study, and a Registered Nurse requires the completion of a Bachelor of Nursing that involves 3.5 years full-time or part-time equivalent study. A Nurse Practitioner requires the completion of an additional Masters degree in a specified nursing area which enables them to 'work autonomously and collaboratively' in an advanced clinical role (Wang & Geraghty, 2017, p. 437).

CPD is a requirement of nursing registration. It is argued by many that CPD is 'key in defining nurse professionalism' (Mlambo, Silén, & McGrath, 2021, p. 8). Table 3 presents the required annual CPD hours for each registration type specified by the NMBA.

Table 3 Type of nursing registration and hours of annual CPD required

| Type of Registration | Minimum Hours | Total Hours |
|--|--|-------------|
| Registered nurse or Enrolled nurse | <ul style="list-style-type: none"> • 20 hours | 20 hours |
| Midwife | <ul style="list-style-type: none"> • 20 hours | 20 hours |
| Registered nurse and midwife | <ul style="list-style-type: none"> • Registered nurse - 20 hours • Midwife - 20 hours | 40 hours |
| Enrolled nurse and midwife | <ul style="list-style-type: none"> • Enrolled nurse - 20 hours • Midwife - 20 hours | 40 hours |
| Nurse practitioner | <ul style="list-style-type: none"> • Registered nurse - 20 hours • Nurse practitioner endorsement – 10 additional hours relating to prescribing and administration of medicines, diagnostics investigations, consultation and referral | 30 hours |
| Midwife practitioner | <ul style="list-style-type: none"> • Midwife - 20 hours • Midwife endorsement - 10 additional hours relating to context of practice, prescribing and administration of medicines, diagnostics investigations, consultation and referral | 30 hours |
| Registered nurse with scheduled medicines endorsement (Rural and remote) | <ul style="list-style-type: none"> • Registered nurse - 20 hours • Scheduled medicines endorsement - 10 additional hours relating to obtaining, supplying and administration of scheduled medicines | 30 hours |
| Midwife with scheduled medicines endorsement | <ul style="list-style-type: none"> • Midwife - 20 hours • Scheduled medicines endorsement - 10 additional hours relating to context of practice, prescribing and administration of medicines, diagnostics investigations, and consultation and referral | 30 hours |
| Registered nurse and midwife with scheduled medicines endorsement | <ul style="list-style-type: none"> • Registered nurse - 20 hours • Enrolled nurse - 20 hours • Midwife - 20 hours • Scheduled medicines endorsement - 10 additional hours relating to context of practice, prescribing and administration of medicines, diagnostics investigations, consultation and referral. | 50 hours |

(Nursing and Midwifery Board of Australia, 2016)

To complete the required CPD hours, nurses must engage in their own CPD opportunities. The NMBA does not determine what CPD includes and allows the individual nurse to determine their 'developmental needs and seek out the CPD that addresses those needs and is relevant to his or her practice' (Summers, 2015, p. 337). In doing so, 'Consideration needs to be given to the health care location and setting, characteristics of the patient population cared for, focus of care provided, complexity and autonomy of practice, and the access to resources' (Summers, 2015, p. 337). Nurses are required to keep a record of their CPD activities. There is no mandated tool provided to keep records however evidence of CPD must be collected and demonstrate that the nurse has:

- identified and prioritised their learning needs, based on their self-reflection and evaluation of their practice against the relevant competency or professional practice standard;
- developed a learning plan based on identified learning needs;
- participated in effective learning activities appropriate to their learning needs, and
- reflected on the value of the learning activities or the effect that participation will have on their practice. (Bryce, Foley, & Reeves, 2017)

Each year, nurses are required to make a written declaration that they have met the registration standards when renewing their registration. The NMBA audit the records of a percentage of nurses (and midwives) each year to determine if CPD requirements are being met (Nursing and Midwifery Board of Australia, 2021). The CPD requirements are managed between the nurses and Apha, with no oversight required for the completion of CPD requirements from the nurses employers.

Health care providers and agencies also provide or facilitate CPD opportunities for staff. Agencies can partner with training organisations to facilitate agency nurses to meet CPD requirements, for example see (VNS Nursing Agency, 2022). Hospitals have in house specialist nurse educators who hold a Masters in nursing and a Certificate IV in Training and Assessment that provide training services on demand for hospital staff. According to Berndt, Murray, Kennedy, Stanley, and Gilbert-Hunt (2017, p. 2), 'CPD is typically offered via educational meetings that are either interactive or didactic [including] conferences, lectures, workshops, seminars, symposia and courses'. CPD can also include reading relevant research literature. In addition, health care facilities such as hospitals and aged care facilities have mandatory online compliance modules for the areas of OH&S, infection control, discrimination etc that must be completed by staff. These can count towards a nurse's CPD requirements.

Research has noted that casual employment as well as rural and remote health care settings can impact on nurses' ability to complete their CPD requirements. For example, Becker, McCutcheon, and Hegney (2010, p. 48) note that 'Keeping up to date with contemporary practice can be problematic for nurses who work as casuals as they may not be integrated into an organisation's staff development opportunities' (Becker et al., 2010, p. 48). Casual nurses can be hired to fill in for permanent staff in hospitals while these staff complete their CPD training sessions (Birmingham, Mortel, Needham, & Latimer, 2019). While CPD is also challenging for nurses in rural and remote areas that do not have access to the same learning opportunities as those in metropolitan areas without significant travel time (Berndt et al., 2017). Internationally, other factors impacting the uptake of CPD include:

- Unsuitable conference dates
- Lack of time or personal commitment
- Cost
- Location and distance to travel
- Past experience of inadequate CPD
- Lack of support or guidance from the manager or employer. Staff shortages
- Lack of interest in the topics
- Lack of available CPD activities, especially in rural areas (Summers, 2015)

According to Summers (2015, p. 338), 'because nurses in Australia are mandated to undertake CPD, the various state and territory governments have incorporated different levels of entitlement for CPD leave and pay awards for nurses. This is either in the form of paid time off, a monetary reward, or both'. However such benefits are 'available only to those nurses who work in the public service' and those that are casually employed or work in the private sector are not eligible for these benefits. Furthermore, benefits are allocated on a pro-rata basis despite all nurses, regardless of employment type, being required to undertake the same amount of CPD. Nurses that do have to fund their own CPD are eligible for tax deductions from the Australian Tax Office (Summers, 2015).

Technical or regulatory changes in the industry and response

Technology and practice within the health care professions is constantly evolving. With regards to technology Bailey (2021) summarises aspects of nursing practice which have been affected by technological change as shown in Table 4.

Table 4 Technology and its effect on nursing

| | |
|-----------------------|---|
| Monitoring | Portable monitors give nurses the freedom to check on patients quickly, even when occupied with other tasks. The devices provide data on vitals, such as respiratory rates, electrocardiography, and oxygen levels. Nurses receive an alert if a patient needs urgent attention, which significantly reduces response times. |
| Medications | Nurses in most healthcare settings no longer need to "make rounds" to monitor patients' IVs, as smart pumps allow for the more accurate and efficient administration of medication and fluids. Nurses use this technology to set how much each patient should receive, while alerts notify them of low levels, poor patient reactions, or issues with tubing. |
| Health Records | Through the use of EMRs, nurses and other medical professionals can quickly access critical patient information and reduce or eliminate the need for paperwork. EMRs give nurses current data that notifies them as a patient's condition changes and whether a patient has allergies to certain medications. |
| Beds | Smart beds allow nurses to monitor patients weight, movement, and vitals, which can help prevent bedsores, injuries, and misdiagnoses. Technology-enhanced beds also reduce the amount of time nurses spend on adjusting equipment and supplies for safety reasons. In addition to hospitals, increasing numbers of nursing homes use smart beds. |
| Reduced Errors | Technology considerably reduces the likelihood of error in logging patient information like allergies to medications, medical history, and health conditions and illnesses. Apps make the administration of medication much less confusing or prone to human error. This, in turn, improves health outcomes and reduces hospital readmission rates. |
| Communication | Today's nurses use team collaboration tools, instant messaging, and headsets that allow them to communicate with their colleagues in real time. These tools make coordinating care much easier, as they reduce the time required to access test results, along with identifying and diagnosing illnesses. Improved communication also provides for more efficient patient handover between departments. |
| Telehealth | Patients can increasingly access medical professionals, including nurses, from the comfort of their homes, thanks to mobile apps. Nurses advise patients on many health concerns, while patients update their own data to the apps so that medical professionals can best monitor their conditions and overall health on a regular basis. |

(Bailey, 2021)

In addition to technological changes, knowledge and practice requirements are constantly evolving in response to new ways of managing health risks and patient care and associated practices.

6.1.3. Financial advisers (Australia)

Occupation description

According to the ASIC (2021a, p. 85) 'The financial advice sector includes [Australian Financial Services] AFS licensees and their representatives that provide personal advice to retail clients on financial products, general advice, and personal advice to wholesale clients'. In Australia, there is a high demand for financial adviser services with 2.6 million Australians using these services in 2020 (Weiping & Han-Wei, 2021).

A financial adviser provides personal and general advice on investments, superannuation and life insurance. Personal advice is advice based on the specific circumstances of a person, while general advice does not take personal circumstances into consideration. According to Hugh and Charles (2017, p. 387) 'financial advising is not a profession. However, the sector interrelates with other established professions like law, accounting, estate planners, and auditors, and some commentators are willing to say that the occupation is, at least, 'in a process of professionalization'. Since 2017 the professionalization of financial advisers has advanced with the introduction of Professional Standards of Financial Advisers in 2017, including the legal protection of the name and function of financial advisers, university qualification requirements and a national exam for registration which have been introduced since 2019 as a result of legislative reforms in 2017.

Licensing and training requirements

Regulation of financial advisers occurs at a national level. The Australian Securities and Investment Commission (ASIC) is the national body that regulates financial advisers, along with corporations, markets, consumer credit and other financial services. ASIC oversees the registration and compliance of financial advisers, while the public register of financial advisers is available on the government website 'Money Smart'.

All financial advisers providing personal advice and most who provide general advice are required to be registered by the Australian Securities and Investment Commission (ASIC). Financial advisers can work for themselves or work in organisations including banks and other financial service businesses. Financial services businesses generally need to be authorised under an AFS licence. As an AFS licensee, the business can employ representatives to work under the AFS licence. All financial advisers, as stated, whether they are licensees or representatives however must be registered. Those studying to become a financial adviser and working for an AFS licensee are provided with provisional registration until they can meet the registration requirements.

There are three registers related to financial advisers, the AFS Licence register, the Financial Adviser Register, and the Authorised Representatives Register. As of June 2022, there were 6,321 AFS licensees (ASIC, 2022b), 17,163 financial advisers (ASIC, 2022c) and 54,702 authorised representatives (ASIC, 2022a) registered and currently operating in Australia. There is however some overlap in where financial advisers register depending on their role and responsibilities. According to the ASIC (2021b):

A financial adviser who has their own AFS licence is listed on:

- the Financial Advisers Register, and
- the AFS Licensees Register.
- A financial adviser who is also an authorised representative is listed on:
 - the Financial Advisers Register, and
 - the Authorised Representatives Register.
- Advisers who do not meet the 'financial adviser' definition above are not on the Financial Advisers Register. For example, the following people are not on the Register:
 - a person who provides general advice
 - a person who provides personal advice on products that are not relevant financial products, such as general insurance, consumer credit insurance or basic banking products...

If this person is an authorised representative for an AFS licensee, then they are listed on the Authorised Representatives Register.

If an AFS licence is held by a company, the company is not listed on the Register. Only individual financial advisers with their own AFS licence or authorised as a financial adviser under an AFS licence are listed.

An authorised representative typically are separate businesses to that of the AFS licensees, not employees, but work under the 'umbrella' of the licensee, with the licensee's authorisation. The purpose of this system of licensing and authorisation is to ensure that the licensee is responsible for all the financial services that are provided under their licence and for the licensee to ensure that the 'representatives' working under their licence comply with financial laws, standards and training requirements. When an authorised representative is a company, they may also sub-authorise representatives with the permission of the licensee under which they operate (Holley, 2020).

Responsibility for any civil penalty action of employees working directly for a licensee, lies with the licensee, however, if the action concerns employees of an Authorised Representative, the responsibility lies with the authorised representative, rather than the licensee. Regardless, licensees must take reasonable steps to ensure that all financial advisers, authorised representatives and other representatives operated comply with relevant laws and standards. If it is found they the licensee has not taken reasonable steps to ensure this, then they may be held responsible for noncompliance under the Corporations Act 2001 (Holley, 2020).

The Australian regulatory framework concerning financial advice has evolved over time (Weiping & Han-Wei, 2021). Over the last decade regulatory reforms have aimed to address some key issues identified in financial advice services. According to Hugh and Charles (2017, p. 387):

many of the major scandals concern signature professional issues such as conflicted interests (through secret commissions and employer relationships), and the lack of a fiduciary-like duty and independence on the part of the service provider. From July 2013, legislation stemming from the Future of Financial Advice reforms took aim at these specific concerns, altering the status of commissions and 'conflicted remuneration', and setting down (quasi-professional) requirements to act in and to prioritise clients' interests.

Recent legislative reforms introduced in 2017 and 2019, described below, have responded to these concerns in the Australian financial services industry by introducing standards, registration, qualification and CPD requirements to practice.

Training process

Financial advisers must be licensed and/or registered with the Australian Securities and Investment Commission (ASIC). In 2017, reforms were introduced via the Corporations Amendment (Professional Standards of Financial Advisers) Act 2017 'to raise the education, training and ethical standards of financial advisers'. The implementation of associated requirements are still being phased in. As a result of these reforms, as of 2019, financial advisers are required to adhere to professional standards. All individuals that are:

- a financial services licensee; or
- an authorised representative of a financial services licensee; or
- an employee or director of a financial services licensee; or
- an employee or director of a related body corporate of a financial services licensee; and
- is authorised to provide personal advice to retail clients, as the licensee or on behalf of the licensee, in relation to relevant financial products ("Corporations Amendment (Professional Standards of Financial Advisers) Act," 2017).

must comply with the standards including minimum qualifications, experience and CPD requirements that are set out in the Corporations Amendment (Professional Standards of Financial Advisers) Act 2017. The professional standards require financial advisers to:

- have an approved qualification
- pass the financial adviser exam
- participate in 40 hours of continuing professional development (CPD) each year
- comply with the Financial Planners and Advisers Code of Ethics 2019 (Code of Ethics) – a set of principles and core values in the areas of ethical behaviour, client care, quality process and professional commitment. (ASIC, 2022d)

In addition, to become a financial adviser, a full-time professional year that includes at least 1,500 hours of work activities and 100 hours of structured training must be completed.

The approved qualification for new financial advisers is a bachelor level degree generally in commerce or business/financial planning. See Australian Government (2021) for a full list of approved degree programs. Existing financial advisers can undertake bridging courses depending on their level of experience and prior qualifications.

For the CPD requirement, a financial adviser (or their AFS licensee) must undertake 40 hours of CPD a year. There are different responsibilities regarding CPD depending on if you are a licensee or an authorised representative. Licensees must develop their own CPD policy to be followed by all representatives under their licence and be made publicly available. The policy must do the following:

- a) specify the licensee's CPD year;
- b) set out the licensee's overall approach to its CPD obligations and the CPD obligations of relevant providers for whom it is responsible licensee;
- c) describe how the licensee will:
 - i. if required by section 11—assess and approve CPD plans of relevant providers; and
 - ii. monitor the implementation of CPD plans of relevant providers; and
 - iii. assess and approve activities for the purposes of section 8, and attribute hours to them; and
 - iv. ensure that the relevant providers for whom it is the responsible licensee meet the requirements of subsection 9(3); and

- v. check compliance with the CPD policy and with this determination by itself and the relevant providers for whom it is the responsible licensee; and
- vi. record and maintain evidence of completion of, and the outcomes of, qualifying CPD activities; and
- vii. ensure that records required by this determination are completed and maintained ("Corporations (Relevant Providers Continuing Professional Development Standard) Determination," 2018).

All those working under a licence, including the licensee, must prepare a CPD plan that is updated annually to 'identify areas for improvement in, and development and extension of, the provider's [financial adviser or representative] competence, knowledge and skills and describe the qualifying CPD activities the provider will complete during the CPD year to achieve those improvements' ("Corporations (Relevant Providers Continuing Professional Development Standard) Determination," 2018). The licensee must monitor the implementation of the plan. Upon request, a copy of the plan and records of implementation must be provided to the licensee.

Licensees are responsible for selecting 'at least' 70 per cent of the CPD activities they undertake in their businesses for the 40 hour annual CPD requirement for licensees and their employed representatives. Only qualifying activities can count towards the 40 hours of CPD. These activities must be in one of five learning areas (described further below), have 'sufficient intellectual and practical content', deal with 'matters related to the provision of financial product advice, financial advice services and financial advice business', conducted by those with appropriate understanding, expertise, academic qualifications and/or practical experience, and serve to enhance the licensee or representative's 'knowledge and skills in areas that are relevant to the provision of financial product advice and financial advice services' ("Corporations (Relevant Providers Continuing Professional Development Standard) Determination," 2018). Qualifying activities also include undertaking an approved degree or qualification or training with a professional association. There are minimum hour requirements across four learning areas including:

- Technical – five hours
- Client Care and Practice – five hours
- Regulatory Compliance and Consumer Protection – five hours and
- Professionalism and Ethics – nine hours (Department of the Treasury, n.d)

'Professional reading' can only make up a maximum of four hours annually. The remaining hours must include 'qualifying continuing professional development' as stated in the Corporations (Relevant Providers Continuing Professional Development Standard) Determination and described above. Licensees are able to determine how record keeping of continuing professional development (CPD) activity is maintained, including developing templates and systems if required.

Technical or regulatory changes in the industry and response

The financial services sector has undergone significant regulatory reform over the past decade to improve the sector and ensure that it operates in the clients' interests. Changes to regulation have aimed to better support the clients' interests in financial service provision, and as part of this, professionalise financial advisory work with the introduction of registration requirements, professional standards and codes of practice. In acknowledgement of the need to upskill existing financial advisers as the industry's regulatory environment evolves, CPD has been introduced as part of the reforms, along with an exam that must be completed by all existing and new licensed or registered financial advisers regardless of their role as licensees or their representatives. In addition to regulatory changes, there are ongoing changes to financial products and technologies and associated regulations that a financial adviser must keep pace with in order to provide quality service and meet their professional requirements.

6.1.4. Architects (Victoria)

Occupation description

Architecture in Australia is a regulated profession meaning that you must be registered in order to use the architect title. Architects undertake a range of activities including consultancy, design, drafting and town planning for buildings and landscapes. When conducting work, 'Architects are expected to exhibit acceptable standards of professionalism, integrity, skills and aptitudes that are essential to the sustainable development of the built environment and the welfare of their societies and cultures in order to be considered competent in practice' (Amos-Abanyie, Ayebeng Botchway, & Kwofie, 2014, p. 11). In 2017, there were approximately 11,800 registered

practising architects in Australia (Architects Accreditation Council of Australia, 2018). According to data published by Ibis World, in 2021 in Australia there were 12,935 businesses offering architectural services (Baikie, 2021). As of 2021, 'approximately 98.0% of firms in the industry employ less than 20 people' and therefore are considered small businesses according to the ABS definition of a small business. The remaining 2 per cent of larger firms offer a range of services including architecture.

Licensing and training requirements

Architecture is regulated at a state level in Australia and is governed by state based registration boards. The Architects Accreditation Council of Australia (AACA), however, represents and coordinates architect registration boards around Australia. In addition to AACA, the Australian Institute of Architects is the peak body for the architectural profession, representing 13000 members in professional practice and education (Australian Institute of Architects, n.d).

As shown in Table 2, each state and territory in Australia has a registration board that is given powers under state based legislation. While each state registers and regulates architects individually, they all rely on the AACA accreditation of qualifications and the national exam for registration. As a result, competency requirements are consistent across Australia, although there are some differences in registration type and requirements state by state.

Table 5 State and territory registration bodies and regulation

| State | Registration Body | Legislation and regulation |
|-------------------|---|---|
| ACT | Australian Capital Territory Architects Board | Architects Act 2004 (ACT) |
| NSW | NSW Architects Registration Board | Architects Act 2003 (NSW); Architects Regulation 2017 (NSW) |
| NT | Northern Territory Architects Board | Architects Act 1963 (NT); Architects Regulations 1965 (NT) |
| Queensland | Board of Architects of Queensland | Architects Act 2002 (QLD); Architects Regulation 2019 (QLD) |
| SA | The Architectural Practice Board of South Australia | Architectural Practice Act 2009 (SA) |
| Tasmania | Board of Architects of Tasmania | Architects Act 1929 (TAS) |
| Victoria | Architects Registration Board of Victoria | Architects Act 1991 (VIC); Architects Regulation 2015 (VIC) |
| WA | Architects Board of Western Australia | Architects Act 2004 (WA); Architects Regulations 2005 (WA) |

In all states and territories, with the exception of the NT, provisions exist within state legislation and/or regulations to require compliance with a Code of Conduct and a professional Code of Conduct has been adopted in all jurisdictions except ACT and NT. The Code of Conduct is developed by the states however AACA provide an exemplar that can be followed. The Code of Conduct includes requirements for certain behaviour and completion of specified activities, such as CPD and insurance requirements.

AACA also owns the National Standard of Competency for Architects (NSCA) which 'provides the benchmark for the Architects Accreditation Council of Australia assessment programs' and underpins qualification accreditation, registration requirements and assessment processes (Architects Accreditation Council of Australia, 2021a, p. 2). Registration categories differ between states and territories, however all rely on the AACA Competency Standards, approved qualifications and exam as part of registration requirements. All states require registration for full or practising architects, while some offer partial or provisional registration and non-practising registration in addition (Architects Accreditation Council of Australia, 2021b).

Training process

To become a registered architect in Australia, an approved degree qualification is required along with the completion of the Architectural Practice Exam (APE) set by the AACA. The system of registration based on approved qualifications and examination has existed for some time in Australia. Efforts to standardise requirements across all states and territories and align with international requirements began in the 1960s in Australia (Orr, 2015). Over the last 4 decades there has also existed an ongoing campaign to nationalise registration of architects.

For ongoing competency, only some states require CPD. The ACT and NT do not require any ongoing learning to maintain registration as an architect. In NSW, Queensland, Victoria, Tasmania, SA and WA, the respective registration boards require the completion of CPD as part of registration and for registered architects to either sign a declaration of completion or report on the CPD activities undertaken annually. NSW, Queensland, SA, Victoria and Tasmania require the completion of 20 hours of CPD, with ten hours of formal CPD per year, while WA have a points based system. Formal CPD is defined as learning activities that occur outside of day-to-day work (Architects Registration Board of Victoria, n.d). An example of activities included as formal CPD in the state of Victoria include:

- Activities delivered by a provider which include a structured assessment task that tests participants' understanding of content
- Activities delivered by a provider which include significant interaction between the presenter and participants, such as a structured workshop where participants are required to complete an individual or group task
- Preparation and delivery of CPD activities for other architects
- Activities related to the teaching of architecture at a tertiary level and which involve significant preparation and/or scholarship – for example, the development of new course or curriculum
- Structured training activities delivered by architect registration boards and the Architects Accreditation Council of Australia for examiners and assessors who are engaged in the assessment of candidates of the various pathways to registration or in the assessment of providers of accredited architecture programs
- Writing articles, books, papers for publication (Architects Registration Board of Victoria, n.d)

Informal CPD activities in the state of Victoria include:

- Reading practice note and technical/professional journals.
- Listening to podcasts.
- Attending talks and presentations presented by your peers.
- Attending design lectures and seminars.
- Participating in structured visits to building sites, buildings and exhibitions.
- Attending conferences (note: some conferences offer formal CPD activities, but these must meet the criteria outline under 'Formal CPD activities' above).
- Involvement in mentoring programs.
- Tutoring in architecture at a tertiary level where there is no significant preparation and/or involvement in the development of new content or curriculum – for example, design studio tutoring, where you are not required to prepare.
- Marking work produced by architecture students at a tertiary level – for example, as a guest critic or tutor.
- Participating as an examiner or assessor for the Architectural Practice Examination or any other pathway to registration.
- Participating in professional practice committees and advisory groups through professional associations, regulatory authorities, or government bodies such as Standards Australia. (Architects Registration Board of Victoria, n.d)

Underpinning qualification requirements, assessment and ongoing learning activity requirements is the NSCA. According to AACA, 'The NSCA sets out a clear roadmap for the development and assessment of competency at key milestones over the course of a career in architecture – from graduation, through the registration process, to ongoing practice after registration' (Architects Accreditation Council of Australia, 2021a, p. 2). The NSCA is not an aspirational document, rather it describes the performance criteria needed in day-to-day practice (Orr, 2018). The framework is designed to account for non-linear learning across an architect's career and both formal and informal learning that occurs. The NSCA has three components that include:

- Professional Capabilities
- Competency Profiles
- Units of Competency

Associated with each component are performance criteria. Together, the NSCA is designed to support 'the development of professional competency over time' (Architects Accreditation Council of Australia, 2021a, p. 2).

The NSCA professional capabilities 'encapsulate the knowledge, skills and attributes that underpin professional education in architecture and practice as an architect in Australia' (Architects Accreditation Council of Australia, 2021a). These are grouped into three core areas:

- Professionalism
- Communication
- Environmental Practice

Along with the professional capabilities, there are four Units of Competency. These include:

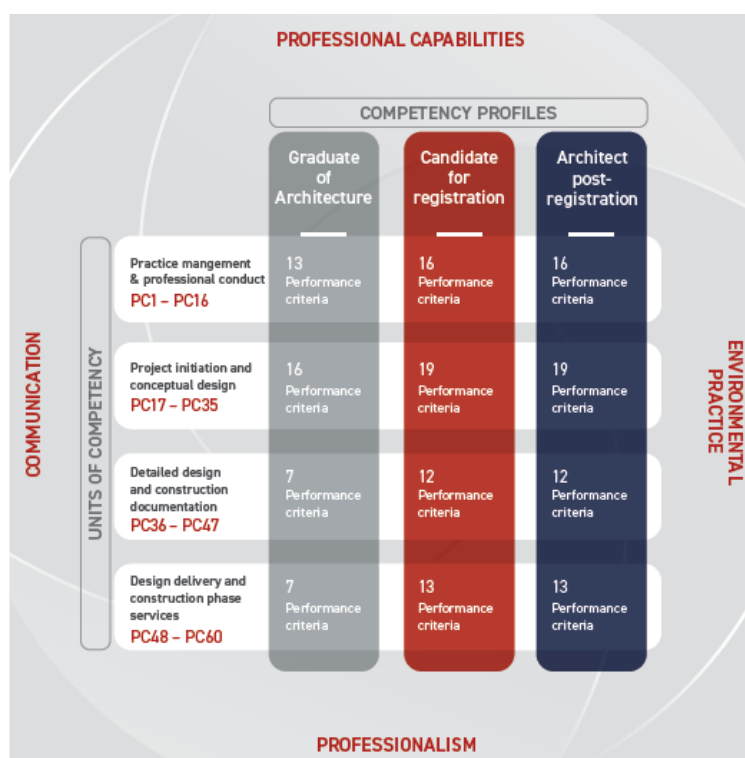
- Practice Management and Professional Conduct
- Project Initiation and Conceptual Design
- Detailed Design and Construction Documentation
- Design Delivery and Construction Phase Services

The NSCA then maps the professional competency expectations at three levels, including:

- Graduate of architecture
- Candidate for registration as an architect
- Architect post-registration

There are 60 performance criteria across the four units of competency which describe 'discrete aspects of architectural practice'. Figure 1 NSCA Framework how the NSCA components combine as part of the competency system.

Figure 1 NSCA Framework



The NSCA was first introduced in the early 1990's, titled the National Competency Standard for Architects (NCSA), for the purposes of mutual recognition of architecture qualifications within Australia and from overseas. According to Orr (2015, p. 7):

The idea behind national competency standards for the Australian professions was that they would increase competition, increase mobility by removing state and territory barriers, open occupations to

skilled migrants, promote Australian participation in international trade in services, and protect the public and the professions by maintaining professional standards.

Since the introduction, the NSCA has been reviewed and updated in 2001, 2008, 2015 (when its name changed to the NSCA) and in 2021. While the NSCA exists to provide a framework to guide industry competency and associated learning activities across an architect's career, it has been noted that it is rarely referred to or used in day-to-day practice by architects (Orr, 2018). It is argued by the Australian Institute of Architects that the NSCA does not address the changing nature of the architecture profession. However, Orr (in Orr, 2018) notes that the NSCA has improved over the years to streamline repetitious and redundant aspects of the NSCA, provide clarity and context for different levels of learning and can align better with university capability learning outcomes.

Technical or regulatory changes in the industry and response

Updates to environmental performance requirements and building codes, client expectations regarding efficiency and quality, along with technological advancements such as Building Information Modelling (BIM), smart building technology, and new low carbon energy and appliances and design innovations are examples of the way in which architecture must adapt to evolving regulatory and technology requirements and market expectations. 'The advent of new digital design tools, construction technologies, building procurement practices, innovative materials and alternative ways of thinking' are challenging architectural practice and roles (Orr, 2015, p. 12). This is accounted for somewhat by CPD however research on the effectiveness of CPD for keeping architects updated on such changes is limited. It has been noted that 'the available body of knowledge concerning the CPD of architects is largely based on the reports of professional institutions, which generally focus on short-term practical concerns' (Yalçinkaya Çalışkan & Acar, 2016, p. 381), rather than investigations into the engagement with and effectiveness of CPD.

6.1.5. Aircraft maintenance engineers (Australia)

Occupation description

Aircraft maintenance engineers (AMEs) include a number of roles that are responsible for the maintenance of aircraft. In May 2018 there were 10,900 aircraft maintenance engineers employed in Australia (Innovation and Business Skills Australia, 2019). The aircraft services industry is highly regulated (Innovation and Business Skills Australia, 2019) and expanding, with Airbus, Boeing and the International Civil Aviation Organization predicting that the global commercial aircraft fleet will double over the next 20 years (Yiannakides & Sergiou, 2019).

'In 2016–2017, the Australian aviation sector:

- facilitated almost 118 million domestic passenger movements and almost 39 million international passenger movements.
- facilitated 8 million international tourist trips to Australia, which contributed \$27 billion of international tourism spending to the Australian economy. This is estimated to have contributed \$21.6 billion in total added value to the national economy (equivalent to 1.3%), and supported 218,500 jobs, equivalent to 1.8% of the total employment in Australia.
- transported 450,000 cargo tonnes domestically and over a million tonnes internationally of low-density, high value and time-critical goods, such as eCommerce parcels, perishable food, and medical items' (Innovation and Business Skills Australia, 2019, p. 3).

In 2017 there were 920 businesses that provided aircraft maintenance and repair services in Australia. Most of these services are located with airports. In Australia there are approximately 155 airports along with 2,000 smaller airfields and landing strips. 75 per cent of these airports are located in rural or remote areas, however the largest ten airports service about 90 per cent of passenger traffic based on 2017 data. Of the 920 aircraft maintenance and repair service businesses in Australia, half 'were non-employers and only eight employed 200 employees or more' (Innovation and Business Skills Australia, 2019, p. 5). According to Yiannakides and Sergiou (2019, p. 1), 'aircraft engineers frequently work under harsh conditions to the utmost of their physiology and mental capacity by undertaking tasks in complex systems under accumulated workload and pressure, knowing that a single error may deny the delivery of an airworthy aircraft'.

To meet demand for a growing industry over the next two decades it is anticipated that, globally, more than 600,000 aircraft engineers will need to be trained (Yiannakides & Sergiou, 2019). The challenge to meet such demand is compounded by the limited skills capacity of new aircraft maintenance engineers (Yiannakides & Sergiou, 2019). According to Yiannakides and Sergiou (2019, p. 3), this is being driven by the efforts of training

organisations to 'satisfy the demand for aircraft engineers, and due to the fact that the current training system is not as standardised as it should be'.

According to Hampson and Fraser (2016, p. 342) aircraft maintenance engineers are 'a class of highly skilled technicians who play a vital role in the aviation safety system by performing aircraft maintenance and certifying that aircraft are safe to fly afterwards'. AMEs are 'generally recognised as working at the advanced trade or technician level' (Hampson & Fraser, 2016, p. 343). There are both licensed and unlicensed roles in this occupation. Both licensed and unlicensed AME's work includes maintaining light aircraft, rotorcraft (for example, helicopters) and large commercial aircraft. Both licensed and unlicensed AMEs undertake inspections, maintenance and repairs of structures, engines and mechanical, electrical and avionics systems on these aircraft types (Civil Aviation Safety Authority, 2022a). However, unlicensed AMEs must work under the supervision of licensed AMEs (LAMEs). The LAME role is gradually becoming professionalised in Australia (Hampson & Fraser, 2016). The pathway to becoming an AME is usually through an apprenticeship or traineeship. After attaining an AME trade certificate and work experience, further training can be undertaken to gain licensing as a Licensed Aircraft Maintenance Engineer (LAME) (Good Universities Guide, 2022). There are different licensing categories depending on the type of work that is undertaken. Work experience must align with the type of work that one is seeking licensing in and one can have a range of licence types to work on different aspects of aircraft maintenance (Hampson & Fraser, 2016).

Relevant legislation and regulatory bodies

The Civil Aviation Safety Authority (CASA) is the Australian Government regulator for aviation safety. CASA's responsibilities include licensing of pilots and other practitioners working in the aviation industry, including AMEs. CASA also oversee and promote safety more broadly in the industry and ensure that Australian airspace is managed safely. CASA is given powers under the *Civil Aviation Act 1988* which also provides the foundation for regulation of civil aviation safety in Australia. The Civil Aviation Safety Regulations also include an associated Manual of Standards, guidance materials and requirements for different licensing categories of AMEs (Civil Aviation Safety Authority, 2022b). CASA was previously responsible for assessing competency for licensing however this responsibility has shifted to private training organisations and employers with regulation and training reforms over the past two decades (Hampson & Fraser, 2016).

ASQA under the National Vocational Education and Training Regulator Act 2011 are also responsible for overseeing the delivery of training of nationally recognised qualifications.

Licensing and training requirements

Requirements for licensing are set out in Part 66 Manual of Standards (MOS) made under regulation 66.015 of the Civil Aviation Safety Regulations 1998. The MOS 'sets out the requirements for the issue of an aircraft engineer licence and other requirements or privileges associated with the licence' (Civil Aviation Safety Authority, 2014, p. 1). In addition, the national VET training framework also provides a range of qualifications under the national MEA Aeroskills Training Package. As explored further below, these two separate systems do not align to provide qualifications leading to licensing.

The CASA LAME licence categories include:

1. Category A
2. Category B1
3. Category B2
4. Category C

For each of these categories there are a number of subcategories that allow one to work on specific aspects of aircraft. These are specific and carry a range of conditions which will not be explored in detail for the purposes of this case study. It is important to note that CASA, in Appendix I: CASA knowledge syllabus Part 66 MOS, provides a syllabus or competency framework for licensing which must be followed by the Maintenance Training organisation (MTO), which are training organisations that are recognised by CASA under Part 147 of the Civil Aviation Safety Regulations 1998 to undertake the required training and assessment of LAME applicants. To become licensed in one of the above categories you must have undertaken required training and examination as well as assessment of practical experience. This assessment is the responsibility of the MTO. An applicant for an aircraft engineer licence must have also acquired the practical experience and qualifications shown in Table 6. The experience is ideally gained through an apprenticeship or traineeship.

Table 6 Amount of practical experience and qualifications required for each licence type

| Licence category | Amount of practical experience | Qualification |
|---|--------------------------------|--|
| A licence | 2 years | Certificate II in Aircraft Line Maintenance |
| B1.2 or B1.4 licence | 3 years | Diploma of Aeroskills (Avionics or Mechanical) |
| B1.1 or B1.3 licence or B2 licence | 4 years | |

A Certificate IV level qualification in Aeroskills is required to work as an unlicensed AME under the supervision of a LAME and leads to into the diploma qualification.

Prior to the 1990's, CASA regulated the training and assessment of LAMEs, along with the subsequent licensing system, however since national VET sector reforms in the 1990s in Australia, responsibility for training and assessment has shifted to mostly private sector RTOs. The reforms over the past two decades to the national training framework, the introduction of the MEA Aeroskills Training Package and the effect this has had on AME training has been critiqued. Hampson and Fraser (2016) argue that prior to the 1990s, AME training and licensing was the responsibility of the regulator, the employer and the training organisation. This system allowed for the assessment of capability beyond competency needed for the kinds of problem solving required for the role. The introduction of the competency based training system and market based training provision reduced the role that the regulator played in assessing competency and capability and gave this responsibility to private training organisations, MTOs. In effect, this has resulted in a privatised system of training and assessment, with a role for CASA to audit these organisations. MTOs must also be registered training organisations (RTOs) resulting in dual systems of regulation between that of the VET system and aviation safety with CASA. Much of the MEA Aeroskills Training Package introduced with the VET sector reforms does not lead to licensing as a LAME (Innovation and Business Skills Australia, 2019) and enrolments in qualifications have been declining. 'The qualification with the highest enrolments was the Certificate IV, which leads to employment as an Aircraft Maintenance Engineer (AME); however, enrolments for this qualification declined between 2014 and 2017 by 52%. Diploma level and higher qualifications also declined by 22% from 2014 to 2017. In this industry, the Certificate III offers few employment outcomes' (Innovation and Business Skills Australia, 2019, p. 12). In addition to declining enrolments, it has been observed by industry stakeholders that the quality of training and performance of recently qualified AMEs has deteriorated. This is concerning in an occupation 'where human error, and human factors in general, has strong safety implications' (Hampson & Fraser, 2016, p. 343).

Based on this desktop review, there are currently no ongoing learning or training requirements beyond the initial qualification and experience requirements to gain licensing across the various licensing categories. It is unclear how skills and knowledge 'currency' is maintained.

Training process

The training process to become a AME and then LAME is complex. RTOs offering training must be recognised by CASA as MTOs for their qualifications to lead to licensing. Currently, there are two pathways in engineering maintenance training 'each with their own suite of requirements' (Innovation and Business Skills Australia, 2019, p. 21). These two pathways or 'training streams' include the Certificate IV qualification resulting in an AME qualification and a diploma level qualification, resulting in a LAME qualification. Both courses are audited by ASQA under the National Vocational Education and Training Regulator Act 2011, and by CASA under the Civil Aviation Act 1988 and Civil Aviation Regulations 1988, however 'CASA only audit MTOs delivering qualifications with licence outcomes' (Innovation and Business Skills Australia, 2019, p. 21). Courses are therefore audited against two different sets of criteria or regulatory requirements and one can meet the requirements under one set of regulators but not the other. Currently, the 'Certificate IV course, which is provided by RTOs (including state-based TAFEs), is not aligned to CASA's Part 66 maintenance regulations' (Innovation and Business Skills Australia, 2019, p. 21). As a result:

Unless training is delivered by a CASA-approved Part 147 training organisation, students who graduate from courses through non-approved organisations obtain qualifications that do not match CASA's licensing requirements and the needs of the industry (as described in CASA Part 66). As a result, they require retraining and reexamination to gain their licence.

(Innovation and Business Skills Australia, 2019, p. 21)

RTOs, that are not MTOs recognised by CASA who offer qualifications from the MEA Aeroskills Training Package are not required to disclose that their qualifications will not result in licensing. This results in the need for students enrolled in non-MTO RTOs to duplicate training in order to become licensed at additional cost to the students. The diploma level qualification for licensing as a LAME is 'urgently needed' in Australia to meet skills shortages however such training is difficult to access due to locations and limited numbers of MTOs. These challenges are argued to be contributing to skills shortages in qualified licensed AMEs (Innovation and Business Skills Australia, 2019). Aviation Maintenance, Repair and Overhaul (MRO) service companies including Boeing, Airbus and BAE systems providing services to airlines such as Qantas, Virgin, Tiger and Jetstar, creates challenges for on-the-job training that requires supervision, workplace assessment and gaining a range of workplaces experiences. 'For apprentices and trainees, challenges include isolation and lack of peers and mentors, particularly in regional and remote locations' (Innovation and Business Skills Australia, 2019, p. 5).

Technical or regulatory changes in the industry and response

Recent changes to technology include the use of Internet of Things (IoT) that allows sensors installed on different plane components to communicate with tablets used by AMEs to identify components that need repair or maintenance within the aircraft system. The sensors can also be used by suppliers to ensure that aircraft parts are available as needed. The changes to technology such as on-board digital automation and production methods have been noted by CASA to pose a change to the aviation industry in the short to medium term due to associated skills needs. 'Technology-based solutions and more automated maintenance are expected to increase demand for analytical skills, digital literacy, information management and the development and implementation of mobile applications' (Innovation and Business Skills Australia, 2019, p. 19). The way that data is being used is changing the aviation industry and the way that aircrafts perform. The ability to work with data and make 'data-based decisions' will be important in the future 'Industry 4.0' and dependant on capabilities in complex problem solving and critical and creative thinking in order to work with such data in a way that computers cannot (Innovation and Business Skills Australia, 2019).

6.1.6. Refrigeration mechanics (Victoria)

Occupation description

Refrigeration and Air-conditioning 'includes the installation, maintenance and repair of both domestic and commercial refrigeration and air-conditioning' (Australian Industry and Skills Committee, 2021). In Australia, refrigeration and air-conditioning practitioners are mostly employed in the Construction Services and Repairs and Maintenance industry (approximately 37% and 35% respectively). According to the Australian Industry and Skills Committee (2021), 'the employment level for Air-conditioning and Refrigeration Mechanics almost doubled between 2001 and 2021' with an increase from 25,400 in 2018 to 36,400 in 2019' (Australian Industry and Skills Committee, 2021). In Victoria, those working as a Refrigeration and Air-conditioning practitioner must be registered/licensed. A Refrigerated Air-conditioning licence is a class of plumbing licence which is issued by the VBA. Interestingly, however, to gain licensing one must also hold a restricted electrical worker's licence, regulated by ESV, and to work with handling refrigerants you must hold a national Australian Refrigeration Council licence for the type of work being undertaken. All air conditioning installation and maintenance work requires two separate compliance certificates on completion, an ESV Certificate of Electrical Safety and a VBA Plumbing Compliance Certificate (ESV, 2022a).

Relevant legislation and regulatory bodies

The VBA issue licenses to plumbers in Victoria and regulate compliance, audit a percentage of work undertaken and managing the self-certification of work undertaken. ESV are responsible for issuing the restricted electrical licence required for licensing in the Refrigerated Air-conditioning class of plumbing. ESV are also responsible for ensuring compliance and managing the self-certification of electrical work. In addition, at a national level, in 1995 Australia introduced the Federal Ozone Protection and Synthetic Greenhouse Gas Management Regulations and created the Australian Refrigeration Council (ARC) to issue licences to work with refrigerants. The council and licensing system was created because most refrigerants used in split systems are CFCs' or HFC's which deplete the Ozone Layer and contribute to global warming. In addition to working with refrigerated air-conditioning equipment in buildings, the ARC also regulates and issues licences for working with refrigerants in the automotive industry. A separate set of qualification requirements are associated with this, compared to handling refrigerants in buildings. Units of competency for handling of refrigerants in vehicles are included in the AUR - Automotive Retail, Service and Repair Training Package (Australian Refrigeration Council Ltd, n.d-a).

Licensing and training requirements

Anyone working to instal or replace air conditioners in Victoria must have the following:

- A plumbing licence and registration from the VBA
- A refrigerant handling licence issued by the Australian Refrigeration Council
- A electrician's licence (A grade) or alternately they must engage a Registered Electrical Contractor (REC) licensed by Energy Safe Victoria (ESV, 2022a).

For the refrigerant handling licence from the Australian Refrigeration Council, there are a number of different licence types. Table 7 presents the licence types and details.

Table 7 Australian Refrigeration Council Licence types

| Licence name | Description |
|--|--|
| RAC01 - Refrigerant handling licence – qualified persons (Full refrigeration and air conditioning licence: 2 & 3 years) | To handle a refrigerant for any work in the refrigeration and air conditioning industry, other than the automotive industry. |
| RSS03 - Refrigerant handling licence – qualified persons (Restricted heat pump – split systems – installation and decommissioning licence: 2 & 3 years) | To handle a refrigerant for the installation and decommissioning of any of the following: <ul style="list-style-type: none">• a single-head split system air conditioner of less than 18kW• a 2-part hot water heat pump of less than 18kW• a 2-part swimming pool heat pump of less than 18kW |
| RDR04 - Refrigerant handling licence – qualified persons (Restricted domestic refrigeration and air conditioning appliances licence: 2 & 3 years) | To handle a refrigerant for either or both of the following: any work on domestic refrigeration or air conditioning equipment; domestic refrigeration or air conditioning equipment means refrigeration or air conditioning equipment that: <ul style="list-style-type: none">• is designed primarily for household use; and• is designed not to be permanently connected to the power supply of the premises where it is installed; and• does not require the installation of pipework to enable the movement of refrigerant. Note: This definition does not cover split system air conditioners. any work on commercial stand alone refrigeration equipment. commercial stand-alone refrigeration equipment means refrigeration equipment that: <ul style="list-style-type: none">• is designed primarily for commercial use; and• is designed not to be permanently connected to the power supply of the premises where it is installed; and• does not require the installation of pipework to enable the movement of refrigerant. |
| AAC02 - Refrigerant handling licence – qualified persons (Automotive air conditioning licence: 2 & 3 years) | To handle a refrigerant for any work on air conditioning equipment fitted to the cabin of a motor vehicle. |
| Trainee licences | To handle a refrigerant while undertaking training and/or assessment in a classroom setting and at your work place under supervision. |
| Restricted licences | For Aviation, Marine, transport and decanting cylinders |
| Refrigerant recovery licenses | To recover and handle refrigerant while decommissioning equipment in different settings |

Adapted from the Australian Refrigeration Council Ltd (n.d-b)

Training process

There are three separate training/qualification components to Refrigeration and Air Conditioning Technician/Mechanic/Tradesman licensing in Victoria, including plumbing qualification, Restricted Electrical

Licence training and requirements for a Refrigerant Handling Licence, however these align with the VBA's requirements for a Refrigerated Air-conditioning licence.

- Plumbing qualification

You become qualified for a Refrigerated Air-conditioning plumbing licence class through a plumbing apprenticeship and the completion of either a Certificate III in Plumbing and a Certificate III in Air Conditioning and Refrigeration or through the Certificate IV in Plumbing and Services, with completion of class specific units of competency from:

- Certificate III in Air Conditioning and Refrigeration
- Certificate IV in Air Conditioning and Refrigeration Servicing
- Certificate IV in Refrigeration and Air Conditioning Systems

Note that these class specific units of competency and Certificates sit within the UEE – Electrotechnology Training Package.

- Restricted Electrical Licence training

For registration in Refrigerated Air-conditioning class of plumbing, you also need a restricted electrical licence issued by ESV which requires:

- Successful completion of the Restricted Electrical Worker's licence course conducted by a Registered Training Organisation
- Successful completion of an independent practical assessment conducted by an assessment centre approved by ESV

The Restricted Electrical Worker's licence course includes one of the following national units of competency:

- Disconnect – reconnect electrical equipment connected to low voltage (LV) installation wiring
- Restricted – Disconnect/Reconnection of fixed wired low voltage electrical equipment (skills set which includes UEERL0004 and its prerequisite unit)
- Disconnect/reconnect fixed wired equipment up to 1000 volts a.c./1500 volts d.c. (ESV, 2022c)
- Refrigerant Handling Licence

A Refrigerant Handling Licence (RHL) is needed to handle fluorocarbon refrigerant which is issued through the Australian Refrigeration Council (ARC). The requirements for licensing at a national level are the completion of the Certificate III or Certificate IV in Air Conditioning and Refrigeration. Therefore, this national licensing requirement aligns with those of the VBA for licensing in the Refrigerated Air-conditioning class of plumbing.

Technical or regulatory changes in the industry and response

A key technological transition in the industry with implications for licensing is the transition from using ozone depleting refrigerants. 'Hydrofluorocarbons (HFCs) are a group of synthetic greenhouse gases (SGGs) that are primarily used as refrigerants in refrigeration and air conditioning equipment, replacing chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs)' (Department of Climate Change, 2021). In 1995, Australia banned the importation and use of CFCs, with the exception of essential uses. Since this time CFCs have been phased out and HCFCs are almost phased out, 'with a long term target of reducing HFCs by 85% by 2036' (Australian Industry and Skills Committee, 2021). These refrigerants are being replaced with synthetic and natural refrigerants that are better for the environment however these new refrigerants also require upskilling for their safe use. According to the Australian Industry and Skills Committee (2021):

These new refrigerants are potentially more flammable and toxic to humans and operate at higher pressures than HFCs, creating demand for new knowledge and skills in safely using these substances within the Refrigeration and Air-conditioning workforce.

The UEE Electrotechnology Training Package Release 2 will contain updated Refrigeration and Air Conditioning qualifications, Skill Sets and Unit of Competency that covers alternative refrigerants. As of 2022, the updated training package is currently in the processes of being implemented by RTOs.

6.1.7. Aged care workers (Australia)

Occupation description

Aged care provides support to older people to help them with everyday living and other needs. Tasks and duties can include feeding, showering, dressing and administering medications; preparing meals and drinks; tidying and cleaning, including sanitising activities; engaging with family members to offer observations, instructions and updates; assisting with mobility, providing transport to and from medical appointments and light physiotherapy exercises; providing social support, such as escorting the client on outings to cafes, shops and going on excursions and following health and safety guidelines (Seek, n.d). Aged care workers can be employed in different types of aged care settings including:

- Care in home
- Residential care in aged care homes
- Short-term care i.e., respite care

In 2020, there were 146,378 personal care workers employed in residential aged care services (Department of Health, 2020).

Relevant legislation and regulatory bodies

Aged care is primarily funded and regulated at a national level in Australia by the Aged Care Quality and Safety Commission. The commission is given powers by the Aged Care Quality and Safety Commission Act 2018 and the Aged Care Quality and Safety Commission Rules 2018 (Rules). The overarching legislation that outlines the obligations and responsibilities of aged care providers who receive subsidies from the Australian Government is the Aged Care Act 1997 (Aged Care Quality and Safety Commission, n.d-a). According to the Victorian Government, 'As a condition of recurrent commonwealth funding, all residential aged care services must achieve Commonwealth aged care accreditation. Aged care accreditation emanates from a regulatory model, legislated through the Act, and has been mandated in all residential aged care services in Australia since 2000'. (Victorian Government Department of Health, 2010)

Licensing and training requirements

Aged care work is not a registered health profession and therefore one does not have to be registered or licensed to become an aged care worker. That said, under federal legislation, aged care providers have a responsibility to employ appropriately skilled and qualified staff to provide aged care services.

Due to widespread issues in the aged care sector, a Royal Commission into Aged Care Quality and Safety was established on 8 October 2018. The Royal Commission into Aged Care Quality and Safety made a number of recommendations including recommendations in relation to training and access to ongoing training. The Commission made the following recommendation:

'From 1 July 2021, the Australian Government and the States and Territories, through the Skills National Cabinet Reform Committee, should fast-track the development by the Australian Industry and Skills Committee of accredited, nationally recognised short courses, skills sets and micro-credentials for the aged care workforce. The courses should be designed to: a. improve opportunities for learning and professional development, and b. upgrade the skills, knowledge and capabilities of the existing workforce'. (Royal Commission into Aged Care Quality and Safety, 2021, p. 262)

While the Commission recommended access to training including nationally accredited short courses for the aged care workforce, no recommendations regarding registration or mandatory training were made.

Training process

For entry into aged care work, initial qualification includes a Certificate III in Individual Support (CHC33015) which can be completed as a stand alone course or part of a traineeship. Specialisations of the Certificate III also exist including a Certificate III in Individual Support (Ageing) (CHC33015) or a Certificate III in Individual Support (Ageing, Home and Community) (CHC33015). According to the 2020 Aged Care Workforce Census:

In 2020, facilities reported that 66 per cent of PCWs held a Certificate III or higher in a relevant direct care field, and another two per cent were studying for a Certificate III or higher. PCWs without a response are assumed not to hold or not currently be studying for a Certificate III in a relevant direct care field and account for 26 per cent of all PCWs. The qualifications of the remaining seven per cent were reported as unknown by their employer. (Department of Health, 2020, p. 19)

For ongoing training, aged care providers are expected to provide training for employees under the Aged Care Quality Standards. Aged care providers are required to meet these standards under the Aged Care Act 1997 as a condition of federal funding. Under the The Aged Care Quality Standards: Standard 7, Human resources, an aged care service provider must demonstrate the following:

- a) The workforce is planned to enable, and the number and mix of members of the workforce deployed enables, the delivery and management of safe and quality care and services.
- b) Workforce interactions with consumers are kind, caring and respectful of each consumer's identity, culture and diversity.
- c) The workforce is competent and members of the workforce have the qualifications and knowledge to effectively perform their roles.
- d) The workforce is recruited, trained, equipped and supported to deliver the outcomes required by these standards.
- e) Regular assessment, monitoring and review of the performance of each member of the workforce (Aged Care Quality and Safety Commission, 2019)

Under requirement C, the Standards state that:

It's expected that members of the workforce receive the ongoing support, training, professional development, supervision and feedback they need to carry out their role and responsibilities. Organisations need to review the training, learning and development needs of the workforce regularly and when practices change. It's expected that organisations support members of the workforce to take up training, learning and development opportunities, so they can meet the needs of their role (Aged Care Quality and Safety Commission, n.d-b).

As a result, aged care providers require staff to complete ongoing training modules that refresh and update knowledge to inform work practices. These training modules can be online or practical based modules delivered face to face, such as manual handling and CPR, usually offered at the aged care facility.

Technical or regulatory changes in the industry and response

COVID required upskilling of aged care workers in regard to infection control knowledge and practices (White & Rittie, 2022). In response to the need for COVID safe business practices, most industries used informal in-house or external training however, 'the aged care sector was the exception, where some accredited training occurred, especially in infection control. This tended to be provided online by private RTOs and was either self-funded or paid by employers' (O'Dwyer, 2021, p. 7). In addition, aged care facilities also incorporated updated knowledge in their existing professional development programs that predominantly consist of online training modules. With this framework of ongoing training in place, aged care facilities were able to incorporate new procedure training into the learning systems already in place.

6.1.8. Automotive mechanics (New South Wales)

Occupation description

Auto mechanics work on light and heavy vehicles in the general motor mechanic area or specific areas such as gas fuel systems, electronics, air conditioning, panel beating, and so on. In Australia there are currently around 79,000 people employed in motor vehicle engine and parts repair and maintenance. As of December 2021, there were 32,490 apprentices in training enrolled in the Automotive Retail, Service and Repair Training Package.

Because vehicles, both light and heavy carry significant safety risk and must be designed, repaired and maintained to safety standards, auto mechanics are a certified or licensed trade in some states in Australia. A licence is required to operate a motor vehicle repair business in WA, ACT and NSW, a vehicle testing licence is required in Victoria to test roadworthiness of vehicles and an auto-gasfitting licence is required in Tasmania. Based on this desktop review however, NSW and WA are the only states that require general auto-mechanics, referred to as motor vehicle repairers, to be certified with the relevant authority. According to the NSW licensing regulator, Fair Trade NSW, 'in NSW, repairers must be licensed and employ certified tradespeople to do any repairs that affect the safety or performance of a vehicle' (Fair Trading NSW, n.d-c). This case study focuses specifically on NSW for this reason, along with recent state policies regarding electric vehicles and programs to support upskilling.

Relevant legislation and regulatory bodies

Fair Trade NSW regulate the licensing of motor vehicle repairers under the Motor Dealers and Repairers Act and subordinate regulation. The regulation includes 'information on licensing, record keeping and reporting requirements, fees, and business conduct' (Fair Trading NSW, n.d-d). Other government departments are also involved in regulating other aspects of the industry including Transport for NSW, that regulate the Vehicle Safety Compliance Certification Scheme (VSCCS) Certifier's Licence, required to act as an inspector of non-standard vehicles, and the Department of Planning and Environment, that regulate vehicle inspections regarding emissions.

Licensing and training requirements

In NSW there are a range of licenses required for mechanics. These include the following:

New South Wales - Department of Customer Service

- **Motor Vehicle Repairer's Licence:** You will require this licence if you intend to undertake the business of carrying out repair work on motor vehicles in New South Wales. Repair means to examine, detect faults in, adjust, carry out maintenance on, overhaul, replace,
- **Motor Vehicle Tradesperson Certificate:** You will require this certificate if you intend to work as a tradesperson who carries out repair work on motor vehicles. This certificate specifies the class or classes of repair work you are authorised to undertake on motor vehicles.

Transport for NSW

- **Vehicle Safety Compliance Certification Scheme (VSCCS) Certifier's Licence:** You will require this licence if you intend to act as an inspector of non-standard vehicles. Non-standard vehicles that may require certification include significantly modified vehicles, individually constructed vehicles, and certain imported vehicles.

Department of Planning and Environment

- **Approved Inspection Station - Vehicle Inspection Reports:** You will require this approval if you intend to use a premises for the purpose of carrying out tests or inspections on excessively noisy motor vehicles.
- **Approved Mechanic - Vehicle Inspection Reports:** You will require this approval if you are a trained mechanic and you intend to undertake environmental tests or inspections on excessively noisy motor vehicles at approved inspection stations.

This case study is focused specifically on the Motor Vehicle Repairer's Licence, which has a range of licence categories depending on the work undertaken. Each category has different qualification requirements. Required qualifications all sit within the national Automotive Retail, Service and Repair Training Package. Table 8 shows the different qualification requirements depending on the category of work.

Table 8 Different Motor Vehicle Repairer's Licence qualification requirements

| Work category | Description | Required qualification |
|--|--|--|
| Automotive electrician | Installs or repairs electrical equipment, systems, or circuits in motor vehicles. | Certificate III in Automotive Electrical Technology |
| Body Maker | Makes or repairs motor vehicle bodies (excludes manufacturing whole new motor vehicles). | Certificate III in Automotive Manufacturing Technical Operations – Bus, Truck and Trailer or Certificate III in Engineering - Fabrication Trade |
| Electrical accessory fitting work | Installs, assembles, services, or removes electrical accessories in or from motor vehicles, such as vehicle lighting systems and security components. This does not include work on hybrid or electrically powered motor vehicles or work that involves cutting, splicing, or altering wiring harnesses. | Certificate II in Automotive Electrical Technology and must complete the 'repair wiring harness and looms' elective unit |

| | | |
|---|--|---|
| Exhaust repair work | Fabricates, modifies, services, or repairs the exhaust systems of motor vehicles. Does not include work on the chassis of a motor vehicle. | Certificate II in Automotive Underbody Technology including the Exhaust Repair specialist elective units |
| Gas Mechanics | Compressed natural gas mechanic: Installs or repairs compressed natural gas (CNG) equipment in motor vehicles. Liquefied natural gas mechanic: Installs or repairs liquefied natural gas (LNG) equipment in motor vehicles. Liquefied petroleum gas mechanic: Installs or repairs liquefied petroleum gas (LPG) equipment in motor vehicles. | Compressed natural gas mechanic: Certificate III in Automotive Alternative Fuel Technology, including the CNG specialist elective units Liquefied natural gas mechanic: Certificate III in Automotive Alternative Fuel Technology, including the LNG specialist elective units Liquefied petroleum gas mechanic: Certificate III in Automotive Alternative Fuel Technology, including LPG specialist elective units |
| Glazing work | Installs, repairs or removes windscreens or other glass in or from the bodies of motor vehicles. | Certificate III in Automotive Glazing Technology, or Certificate II in Automotive Body Repair Technology |
| Motor mechanic | Service and repair the engines or transmissions or the fuel, induction, exhaust, electrical, steering, suspension, cooling, or braking systems of motor vehicles. | Certificate III in Light Vehicle Mechanical Technology, or Certificate III in Heavy Commercial Vehicle Mechanical Technology |
| Motorcycle mechanic | Service and repair the engines or transmissions or the fuel, induction, exhaust, electrical, steering, suspension, cooling, or braking systems, or remove or replace wheels or tyres of motorcycles only. | Certificate III in Motorcycle Mechanical Technology |
| Panel beater | Repairs the structural components, frames, or panels of motor vehicles. | Certificate III in Automotive Body Repair Technology |
| Radiator repair work | Repairs the radiator, heating equipment, thermostats or fuel tanks of motor vehicles. Does not include work on hybrid or electrically powered motor vehicles. | Certificate II in Automotive Underbody Technology (Radiator and Cooling System Repair) |
| Steering suspension and wheel alignment work | Services or repairs the steering or suspension of motor vehicles or aligns the wheels of motor vehicles. Does not include work on hybrid or electrically powered motor vehicles. | Certificate II in Automotive Steering and Suspension System Technology |
| Trailer and caravan mechanic | Repairs the underbody of a trailer or towable recreation vehicle. | You do not need a qualification so long as the work is being done at a licensed repair premises and the work is only done on trailers or towable recreational vehicles |
| Transmission specialist | Repairs the gears, clutches, drive shafts, and differentials of motor vehicles. | Certificate III in Automotive Drivetrain Technology |
| Underbody work | Repairs underbody systems of motor vehicles, including brake equipment or systems, exhaust systems, or steering or suspension systems. Does not include mechanical systems or electrical equipment, systems, or circuits. | Certificate III in Automotive Underbody Technology, or Certificate III in Light Vehicle Mechanical Technology |
| Vehicle painter | Paints motor vehicles. | Certificate III in Automotive Refinishing Technology |

Tale adapted from (Fair Trading NSW, n.d-b)

Training process

Generally, for a Motor Vehicle Repairer's Licence you must complete a Certificate III qualification with an RTO accompanied by an apprenticeship.

Technical or regulatory changes in the industry and response

Electric vehicles are a significant change in the automotive industry. According to IBISWorld's Motor Vehicle Engine and Parts Repair and Maintenance in Australia report:

Due to the increasingly sophisticated technology in new cars, industry firms have boosted expenditure on equipment that collects electronic data to diagnose faults. Many larger industry operators have quickly adopted technology changes and have trained their mechanics accordingly. As such, higher skill bases and employment growth have driven wages higher as share of revenue over the period (Treisman, 2022).

In 2001 the NSW Government released the Electric Vehicle Strategy, which includes working to 'identify skills needs and opportunities for NSW workers to take up the EV jobs of the future' (Department of Planning Industry and Environment, 2021). The Government is also investing \$318 million in skills to develop the transport sector. Along side these initiatives the NSW Government has also announced specialised training to support the introduction of electric buses in New South Wales, as part of a partnership between TAFE NSW and Volvo Bus Australia. According to the Department of Planning, Industry and Environment, this will 'involve short courses to help mechanics upskill in EV technologies, such as working safely with high voltage systems' (Department of Planning Industry and Environment, 2021).

According to SafeWork NSW, there are important hazard considerations when working with EVs that necessitate some upskilling. The regulator states that electric vehicles key safety risk is in regards to the much higher voltage at which the vehicles operate compared with established battery vehicles such as golf carts (SafeWork NSW, n.d).

Table 9 Hazards and potential harms for working on electric vehicles compared with combustion vehicles

| Hazard | Potential harm |
|--|---|
| Stored or generated electrical energy | Workers and others may receive an electric shock if they come into contact with components of the electrical system. Even when working on other parts of the vehicle (not involving the electrical system) there may be a risk of shock if the isolation between the electrical system and the vehicle chassis has been compromised. Some EVs also generate electricity when the wheels are rotated. If the EV is moved by pushing the vehicle (such as in a workshop or after an accident), sufficient electrical energy may be produced to cause electric shock or arcing. Arc flash may cause burns directly to the worker or through ignition of other materials. |
| Battery Electrolyte | Battery electrolyte can cause injury through skin or eye contact, ingestion or inhalation of vapours. This is particularly relevant following collisions or when dismantling vehicles. |
| Powerful magnets contained within EV components | Some EVs contain powerful magnets. If a person who is wearing a pacemaker or other medical device is close to these parts, the medical device may be affected by the magnets. Such persons shall not perform work on the vehicle. |

Table adapted from (SafeWork NSW, n.d)

At a national level, the need for automotive skills to work with electric vehicles has been recognised and the nation training package has been updated to include a new Certificate III level course in electric vehicle maintenance and repairs and the addition of units of competency that can be added to other qualifications in automotive training. PWC, the Skills Service Organisation for the Automotive Retail, Service and Repair Training Package introduced the Case for Change in 2020 to update the existing training package to include electric vehicle skills and content. The Case for Change stated that:

- There have been significant advancements in technology in the industry that have not been reflected in native AUR or imported units of competency. In addition to creating new career opportunities within the automotive industry, technological advancements have created new skills needs in the past two to five years which has resulted in skills that are unrepresented in the AUR Training Package.
- Rapid pace of technological advancements has led to emerging safety requirements relating to new technologies, which need to be reflected in the training package to ensure the safety of automotive workers, as well as consumers of automotive products and services.
- There are currently limited options for qualified individuals to gain skills in additional specialist areas, limiting options for upskilling and reskilling, particularly in instances where organisations look to expand their service offerings in response to market demand, or to transition to different types of automotive repair work due to technological advancements. (PwC, 2020)

As a result of the Case for Change, the AUR32721 Certificate III in Automotive Electric Vehicle Technology was introduced in 2022 to provide a skill set to work with electric and hybrid vehicles (PwC, 2022). This qualification is currently not offered at NSW RTOs.

While there has been updates to the national training package to deliver electric vehicle skills, TAFE NSW has also developed a set of micro-credentials called the Electric Vehicle Training Solution in consultation with industry. The aim is to upskill existing workers in the bus transport industry to support the introduction of 8,000 electric buses by 2030. The TAFE NSW Electric Vehicle Solution, 'is now being used to upskill drivers, existing mechanics, and auto electricians, and provide brand-specific, digitally enabled training for specialist technicians involved in repairs' (TAFE NSW, 2022b). The module is targeted predominantly at bus drivers, however the micro credentials include the 1.5 hour 'Module 1: Introduction to electric vehicles, systems and components' (TAFE NSW, 2022a), which as stated above, is being used to upskill existing mechanics, and auto electricians (TAFE NSW, 2022b). NSW Government are also working to upgrade existing TAFE campuses to deliver training in electric vehicles through the purchase of electric vehicles to train with (Boulous, 2021).

While new qualifications and units of competency have been introduced to national training frameworks and there is some activity in regard to upskilling mechanics, particularly to work on electric buses, in a licensing context, SafeWork NSW states that 'There are currently no specific licence classes for workers undertaking work on EVs, but competency may be achieved by supplementing existing knowledge and experience with relevant technical training. This may include:

- completing a training course provided through a registered training organisation, or
- undertaking product specific training provided by an Original Equipment Manufacturer (OEM), or
- a combination of both the above.' (SafeWork NSW, n.d) <https://www.safework.nsw.gov.au/hazards-a-z/electric-vehicles>

As a result, upskilling specifically to work on electric vehicles is not part of any licensing requirement, nor are there any existing ongoing training requirements in NSW for automotive mechanics. However, it is important to note that car manufacturers also provide internal training to mechanics on the vehicles that they service and repair when working with electric vehicles. Therefore, if mechanics are employed by a car company that sells and services electric vehicles then it is likely they will receive internal upskilling to work on such vehicles.

6.1.9. Builders (New South Wales)

Occupation description

In NSW, residential builders undertake, co-ordinate or supervise any work on houses. According to the Home Building Act 1989, residential building work can include:

- a) the construction of a dwelling, or
 - b) the making of alterations or additions to a dwelling, or
 - c) the repairing, renovation, decoration or protective treatment of a dwelling.
- (2) Each of the following is included in the definition of residential building work:
- e) roof plumbing work done in connection with a dwelling,
 - f) specialist work done in connection with a dwelling,
 - g) work concerned in installing in a dwelling any fixture or fixed apparatus that is designed for the heating or cooling of water, food or the atmosphere or for air ventilation or the filtration of water in a swimming pool or spa (or in adding to, altering or repairing any such installation) (NSW Government, 1989).

Relevant legislation and regulatory bodies

NSW Fair Trading is responsible for the regulation of licensing in the building industry and regulation of building practices. NSW Fair Trading is also responsible for the administration and monitoring of the CPD requirements. Section 40 of the Home Building Act 1989 allows the relevant Secretary/Commissioner to 'approve further education courses, or other training, that must be completed by specified persons before an application for renewal or restoration of an authority can be accepted' (Fair Trading NSW, 2021).

Licensing and training requirements

A building licence is required for any person undertaking residential building work valued at more than \$5000 (Fair Trading NSW, n.d-a). Class 2 building work falls under different legislation in NSW and is regulated separately to residential building work under the Design and Building Practitioner scheme. This case study focuses on residential building work.

For building work there are two forms of licensing and certification, a contractor licence and supervisor certification:

- A contractor licence that allows one to contract and advertise to do work and can be issued to individuals and to companies and partnerships.
- A qualified supervisor certificate that allows one to supervise and do the work described on a certificate. These certificates are only issued to individuals and does not allow one to contract for work (Fair Trading NSW, n.d-a).

Both these sit within the broader framework of licensing for practitioners and trades in the built environment. There are four classes of contractor licence or supervisor certification for those working in the built environment:

- General building work (any work that is residential building works);
- Other building work (eg. kitchen, bathroom and laundry renovations);
- Specialist work (eg. air-conditioning and refrigeration); and
- Trade work (eg. bricklaying, carpentry, excavating) .

This case study focuses on general building work. To obtain a licence or certification you need to have the following:

- equivalent of two years' site based full-time work experience
- either a Certificate IV in Building and Construction or a degree in building, construction, construction management, construction project management, construction economics, applied science (building) or quantity surveying.
- a current carpentry or bricklaying contractor licence or qualified supervisor certificate or Diploma of Building and Construction (Building)

In addition to initial qualification requirements, NSW requires licensed builders to undertake CPD as part of a requirement for licensing renewal. The CPD program in NSW has been in place since 2004. Since this time, requirements have changed in response to government reviews of the program (Fair Trading NSW, 2009, p. 2). The NSW builders CPD program focuses on developing two aspects of practice:

- 'improving knowledge, skills and practice across industry in identified areas of marketplace concern; and
- maintaining or improving levels of competence, customer service and business management skills in the industry as a whole' (Fair Trading NSW, 2021).

Training process

Because builders have a supervisor role and do not undertake the work of a licensed trade themselves, unless they themselves are licensed in that trade, i.e., plumbing, they do not require the completion of an apprenticeship to attain a contractor licence or a supervisor certificate. Licensed builders or certified supervisors need the skills to manage licensed contractors on a site and therefore, the required qualifications include either the Certificate IV in Building and Construction or a degree in building, construction, construction management, construction project management, construction economics, applied science (building) or quantity surveying. Both of these pathways can be completed at a TAFE or University RTO. Two years practical workplace experience is also required in addition to one of these training pathways.

Post initial training, licensed builders (contractor licence) are required to complete 12 points of CPD in each 12 month prior to licence renewal. Additional CPD points can be carried forward into the next renewal period. Points are allocated as shown in Table 10.

Table 10 CPD points for different activities

| | |
|---|--|
| Learning Category 1: 1 point per hour | An activity with an identifiable learning outcome. The training must be delivered by interactive training such as workshop, web-based tool, forums or conference presentation. |
| Learning Category 2: 2 points per hour | Structured learning with an assessed learning outcome linked to either a relevant Australian University qualification or a relevant national Training Package outcome delivered by a registered training organisation. |
| Additional information | <p>A total of 4 points can be claimed in a single year comprising any or all of the following:</p> <p>One point each year can be claimed by the builder or swimming pool builder for each person employed under a formal training arrangement such as an apprenticeship or traineeship.</p> <p>Where a partner or associate of the builder or swimming pool builder undertakes continuing professional development learning on behalf of the business, points can be earned as if undertaken by the licensees.</p> |

Adapted from Fair Trading NSW (2021)

The Building Commissioner provides the following topics to guide the selection of CPD activities. According to the Commissioner, CPD must relate to one of the topics shown in Table 11. 'These broad learning areas may be based on, but not limited to, elements or outcomes of the relevant units of competency from an endorsed training package' (Fair Trading NSW, 2021). Because the Home Building Act 1989 gives discretion to the Secretary to make and amend CPD requirements, the topic areas and requirements for compulsory training are updated each year.

Table 11 Learning areas and example topics for CPD

| Broad learning area | Example topics: |
|---|---|
| Sustainability | <ul style="list-style-type: none"> • BASIX • waste management • green building • water management • accessible buildings (training could be based on PRDAC401A – Apply disability awareness to assessing access situations or PRDAC403A – Assess construction plans) |
| Compliance obligations (occupational health and safety included - see also Safety below) | <ul style="list-style-type: none"> • your obligations for home warranty insurance • revise and update about changes to legislation • where to find information • application of the Building Code of Australia. E.g. training could be based on but not limited to: • BCGSV5011A - Apply building codes and standards to residential buildings, or • 12828SA - Building Code of Australia application, or |

| | |
|--|---|
| | <ul style="list-style-type: none"> PRDAC503A – Apply building codes and standards to accessible large scale buildings |
| Communication techniques and skills (also relates to Disputes below) | <ul style="list-style-type: none"> concepts of fairness and reasonableness mediation and negotiation skills mediation and negotiation to achieve better outcomes dispute resolution quality of advice |
| Disputes: how to handle complaints, how to avoid and how to resolve disputes (also includes Communication techniques above) | <ul style="list-style-type: none"> true and false representations avoiding misrepresentation |
| Contractual issues in a building business (also may include Compliance obligations above) | <ul style="list-style-type: none"> contract terms |
| Safety (also may include Compliance obligations above) | <ul style="list-style-type: none"> asbestos removal small business safety safety at heights (e.g. training could be based on but not limited to BCPRF2001A - Work safely on roofs) |
| Building - technical issues (may also relate to Sustainability above) | <ul style="list-style-type: none"> waterproofing – external (balconies and planter boxes) or internal (bathrooms) and interaction with other trades masonry Code – articulation joints, slip joints, weepholes, provision for frame shrinkage at openings ceramic tiling Code – use of flexible sealants at wall/wall and wall/floor intersections strip timber flooring – adequate material acclimatisation sealing of timber doors aspects of multi-storey construction |
| Business management practices | <ul style="list-style-type: none"> time management new technology – using IT to improve your business running a business / core business skills supervision and project management <p>Training could be based on but not limited to:</p> <ul style="list-style-type: none"> BSBSBM401A Establish business and legal requirements, or BSBSBM402A Undertake financial planning, or PSPGOV407A Prepare a quotation |

Adapted from (Fair Trading NSW, 2021)

As explained previously, such training aims to improve knowledge and skills in the industry in areas of marketplace concern and maintain skills and competency (Fair Trading NSW, 2021).

Technical or regulatory changes in the industry and response

Following repeated failures in design and construction processes for residential apartment buildings, the NSW Government introduced key reforms to lift building standards and restore confidence in the NSW construction sector. (Abadee, 2021, p. 80). Such changes were focused on improving the design and construction of class 2 buildings (apartments) and therefore, not directly relevant to general residential builders. From the description of the required CPD topics, you can see however that ensuring quality and safety of work is a priority for residential builders as well. In addition to quality and safety concerns and regulatory reforms in the built environment in

NSW, technologies in the construction industry are also evolving. According to (Adepoju, Aigbavboa, Nwulu, & Onyia, 2022, p. 5) modern technologies shaping the future of construction that require upskilling include:

“Building information modelling (BIM), Big data, Internet of things and services, unmanned aerial vehicle (UAV), additive manufacturing (3D printing), modular prefabricated Construction, 3D scanner, cloud computing, Augmented reality (AR)/ Virtual reality (VR)/ Mixed Reality (MR), simulations of virtual robotics/ autonomous vehicle, GPS, Artificial intelligence, sensors and actuators, cyber-physical systems and Radio-Frequency Identification (RFID)’ (Adepoju et al., 2022, p. 5).

Alongside, and supported by these changes in technology, are evolving energy efficiency and sustainable design standards which are updated periodically at a state level i.e., the BASIX tool and at a national level through the National Construction Code and the requirements for building performance i.e., from 6 stars to 7 star requirements. Builders must be aware of such changes and be equipped with the know-how to adapt and guide practices in line with updating requirements.

6.1.10. Building surveyors (Tasmania)

Occupation description

According to Consumer, Building and Occupational Services (CBOS) Tasmania, ‘Building surveyors provide independent supervision of buildings and building work throughout the construction process and upon completion of construction to ensure that buildings are safe for use’ (Consumer Building and Occupational Services, 2022b). Building surveyors play an important independent role to ensure that a building has been constructed in accordance with the National Construction Code and other standards and also in line with state regulation. A building surveyor assessment is a key part of the building approval process across all states and territories in Australia. Building surveyors have the power to certify that buildings have been constructed as safe to use and therefore their role carries significant responsibilities to public safety as well as quality of the build form. As such, building surveying is a licensed practice in each state and territory in Australia, including Tasmania.

In Australia, building surveyors can work either privately for the owner of a property or for a government authority such as a local council. Over the past two decades, the work of building surveyors has shifted from the public sector with surveying carried out by government surveyors on private building work, to the private sector with owners and builders engaging a private surveyor to check building work undertaken. ‘To varying degrees, all jurisdictions rely on private building surveyors as part of their building approvals process’ (Australian Building Codes Board, 2021, p. 2). A building surveyor is defined by the Australian Building Codes Board, (ABCB) as someone ‘that provides statutory building surveying services whilst not employed by a local council or state government’. With this shift to the private sector for statutory building work, the motivation for building surveyor work has shifted from the public regulation of building work to ensure public safety, to providing a business service to the industry for profit. The integrity of private building surveyors and their role in enforcement has come under scrutiny over the past decade because of their role in enforcement of regulations and standards and the ‘commercial relationships form between private building surveyors and those seeking their services’ (Australian Building Codes Board, 2021, p. 2). Maintaining building surveyors’ integrity in enforcing regulations and standards has been one focus of government inquiries into problems with the quality and safety of buildings, particularly Class 2 apartment buildings in Australia. However, issues are noted across a range of residential and non-residential building types.

Relevant legislation and regulatory bodies

In Tasmania, building surveyor work is carried out under the Building Act 2016, along with the National Construction Code (NCC). Building surveyors are regulated in Tasmania by CBOS who regulate both the licensing and work carried out. In addition to the state regulator, building surveyors also can be members of the Australian Institute of Building Surveyors (ABIS) or the Royal Institute of Chartered Surveyors (RICS). In some states including ACT, QLD and SA, it is a licensing requirement to hold ABIS or RICS membership.

Both professional associations support members and provide CPD activities which are a requirement in both organisations for membership. Recently, the AIBS has begun its Professional Audit Program that ‘applies to all practicing members of AIBS regardless of whether they work in the public or private sector.’ This program has two aims:

'The first is to enhance the standing of the building surveying profession with government regulators, insurers and the community by demonstrating that building surveyors are applying consistent levels of technical knowledge and professionalism when performing statutory building surveying and certification functions. Alongside this, is the additional aim of identifying ways in which members can improve the standards of their work and to encourage and support them to make those improvements' (Australian Institute of Building Surveyors, n.d).

There are two parts of the planned auditing process, a general compliance audit that will randomly select a percentage of members each year to audit and targeted auditing, whereby members will be audited based on the following:

- 'The time within which they are required to undergo an audit has elapsed; or
- The area of practice the member participates in has been identified as an area of focus for additional audit activity
- The member proactively volunteers themselves for audit to suit their business needs
- The member has been subject to disciplinary action by a State/Territory Government Regulator
- Identified matters from previous audits' (Australian Institute of Building Surveyors, 2021, p. 7).

In addition to this newly introduced auditing scheme by ABIS, CBOS also audit work undertaken as part of their role as regulator.

Licensing and training requirements

In Tasmania, there are two licence classes for building surveyor:

- Building Surveyor - Open
- Building Surveyor - Limited

In order to hold an open licence, one must have a degree level qualification (AQF7) in building surveying, along with 3 years of relevant experience within the scope of work for building surveyor. A diploma level qualification (AQF6), along with 3 years of experience is needed for a limited license (Consumer Building and Occupational Services, 2022b). Ongoing CPD is also a licence renewal requirement in Tasmania for building surveyors.

Training process

Building surveyors are required to complete a degree level certificate in surveying or construction for an open licence. These degrees are commonly available at Australian Universities. For a limited licence, an Advanced Diploma of Building Surveying or Diploma of Building and Construction fit the qualification requirements for licensing.

While building surveyors are a licenced occupation in each state and territory in Australia, CPD is required only in Tasmania (90 CPD points in a 3 year period) and Queensland (4 points each year), however Queensland, ACT and South Australia require building surveyors to be licensed with either the Australian Institute of Building Surveyors (AIBS) or Royal Institute of Chartered Surveyors (RICS). Both of which have mandatory CPD programs. ABIS professional development requires the completion of 90 points of CPD over a 3 year period or 20 points per year which requirements for different types of activities that make up these point totals (Australian Institute of Building Surveyors, 2022) and RICS requires the completion of at least 20 hours of CPD activities each year (Royal Institution of Chartered Surveyors, 2022).

Table 12 shows the CPD activity requirements for licensing renewal in Tasmania

Table 12 CBOS CPD activity requirements

| | |
|-------------------|---|
| Activities | <ul style="list-style-type: none"> • trade events designed to update you on new technologies or new methods of work • conferences - industry specific • forums or workshops • face-to-face classroom style events • online/e-learning programs • webinars • tool box meetings which include skills updates |
|-------------------|---|

| | |
|------------------------------|--|
| | <ul style="list-style-type: none"> • journals |
| Subject areas | <ul style="list-style-type: none"> • Technical courses - Certificate, Diploma or Degree units and revising/updating of these • Related Technical Skills - waterproofing, rendering, excavator or fork-lift driving. (if applicable) • Business Topics - Management, Financial Planning, Strategic Planning, Succession Planning, Taxation Laws • Health and Safety Issues - OH&S laws, First Aid training, focus on a specific risk such as asbestos • Personal Development - Leadership, Assertiveness, Dealing with Bullying, Conflict Resolution and Communication |
| Approval requirements | <ul style="list-style-type: none"> • Content: Are the topic aims and/or outcomes identified? • Objectives: Have the objectives been identified? This is what you what you will cover in the training session. This should be in alignment with the departmental objectives for CPD, as set out by the Administrator (if applicable) eg. The attendee will be able to identify... . • Learning Outcome/s: Has the learning outcome been identified? This is what the attendee must be able to do at the conclusion eg the attendee will be able to demonstrate... . • Practical application: Will the attendee be provided with opportunities to practice what they have learnt? • Assessment: ways to check for understanding e.g. questioning opportunities, handout notes and quick quiz (exit tickets) |

Adapted from Consumer Building and Occupational Services (2022a).

All CPD activities must first be approved by CBOS and records of the activities must be kept by the individual, if self-employed, or by the employer and the individual, if working for someone else. The rationale for CPD being the employers responsibility is stated as follows:

The Occupational Licensing Act 2005 makes both practitioners and contractors responsible for ensuring work is carried out competently. If there is a defect, it is the contractor who must make sure it is fixed. This means the contractor/employer has a responsibility to ensure that their employees are competent and have the necessary skills required to carry out their job (Consumer Building and Occupational Services, 2022a).

Points are awarded based on the hours spent on different activities. Table 13 shows how these are calculated.

Table 13 Activity and CPD points awarded

| Type of Activity | How to measure CPD points |
|---|---|
| Training or briefing delivered by or on behalf of this office (CBOS) | 1 point per hour |
| Successfully completed nationally accredited training as delivered by an RTO e.g. Certificate IV in Building & Construction | 1 point per nominal hour (6 points per day and up to 36 points during the licence period) |
| Trade Journals (including CBOS monthly newsletter) | 1 point per journal (max 3 points per year) |
| Membership of a professional organisation e.g. HIA, MPAT, MEA, NECA | 1 point per organisation per year (max 2 points per year) |
| Endorsed on-line courses e.g. Pointsbuild, ABCB | 1 point per hour |

Taken from Consumer Building and Occupational Services (2022a).

Technical or regulatory changes in the industry and response

As assessors of statutory compliance with regulations and standards, changes in building surveying reflect the changes in the building industry more broadly. Technology in design and construction of buildings is advancing, along with environmental design and efficiency requirements. Building surveyors must also be up to date with evolving product and design requirements in their respective jurisdictions. Whilst not upskilling, building surveyors need to maintain and further develop their existing skill set over their career. CPD has been introduced in Tasmania in acknowledgement of the need to maintain and develop knowledge, skills and competence 'in

today's ever changing environment' (Consumer Building and Occupational Services, 2022c). This is important to ensure 'a higher standard of service to consumers and assist you in regulatory compliance' (Consumer Building and Occupational Services, 2022c).

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