



Energy Auditor Pathway to Certification

Project to scope a national energy auditor professional pathway to certification

Consultation Document (v 1.1)

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Executive summary

About the project

Australia's energy sector is in a profound period of change. Electricity and gas customers are facing increasing price volatility, creating investment uncertainty and challenging the competitiveness of Australian enterprises. Coming from a position of consistently low energy prices meant that generally only the largest and most energy intensive businesses built deep capacity in energy management. Now a whole new tranche of businesses is seeking options to reduce energy cost and energy use.

Developing energy service professionals is essential to improve the capacity of all sectors to better manage their energy needs because the capacity of the energy efficiency sector to provide the services that will underpin this transformation relies on having a growing pool of professionals with relevant knowledge and skills.

An 'Australian Energy Professional' development and certification pathway would upskill energy professionals that are already in the industry, and train new energy professionals that will enter the industry as demand for energy efficiency products and services grows.

Energy audits are a key step in the energy management process. They provide essential information to determine how efficiently and where energy is being consumed, identify energy and cost saving opportunities and highlight potential process and productivity improvements (for industrial and related activities), or improvements in building services and occupant comfort (for commercial buildings). In most cases, implementing energy audit recommendations saves money and lowers greenhouse gas emissions, but the benefits of energy efficiency go well beyond this. The ability to deliver an effective energy audit would be a key element of any overarching energy professional certification.

A major new update of the Australian/New Zealand Standard for energy audits was released in 2014. The new standards are a significant departure from the previous standard, AS/NZS 3598:2000. They are outcomes-based, with more rigorous technical requirements for data collection and analysis than their predecessor (see Box 1 for further information).

Yet consumers of energy auditing services have had experiences of highly variable quality of energy audits and at present, there is no mechanism for clients to easily identify appropriately qualified and experienced suppliers of energy auditing services to suit their industry and equipment. Many are also uncertain of the energy audit process and what outcomes they can expect from a quality process. These challenges and uncertainties often leads to a lack of action.

Both the lack of recognition and professional development pathway are limiting the "professionalisation" of the energy auditing industry.

Establishing a national professional pathway to certification for energy auditors is a way of addressing all these issues and laying the foundation for an 'Australian Energy Professional' professional development and certification pathway.

In this project, the NSW OEH, Sustainability Victoria and the EEC are working together to determine the potential for a training and certification pathway for Australia's energy auditors. If a need is established, further work on the specifics of certification scheme design and mechanisms for addressing any training gaps in the professional pathway will follow.

It is envisaged that the pathway would establish the required competencies at each career stage of an energy auditor, including mechanisms for assessment, and ensure access linked training and professional development to build these competencies (Figure 1).

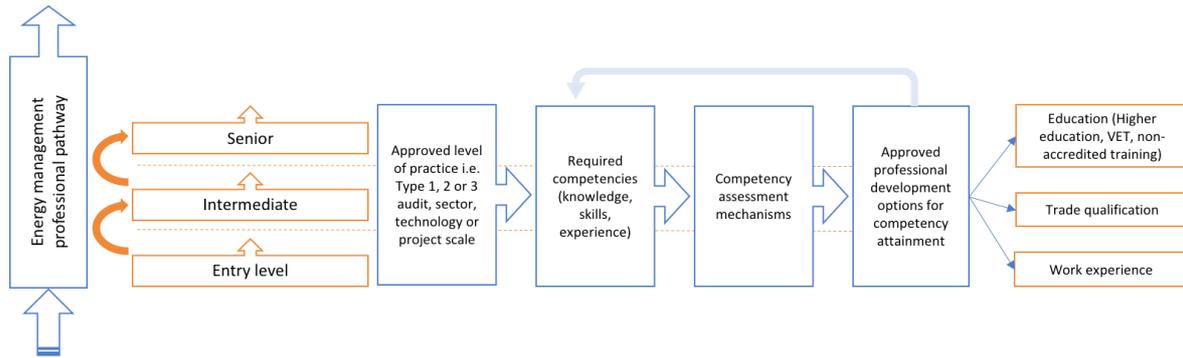


Figure 1: Vision for a staged energy auditor professional development and certification pathway.

Using this consultation document

This consultation paper aims to seek feedback from key stakeholders on a vision for a training and certification pathway for Australia's energy auditors.

You may be particularly interested in providing feedback if you are an:

- Energy auditor who may apply for accreditation under the proposed pathway;
- A commercial or industrial business owner or operator who regularly procures energy audit services or may do so in the future;
- A student with an interest in pursuing a career in energy auditing;
- A government representative involved in energy efficiency programs, which may involve procuring energy efficiency auditing services or endorsing suppliers for government projects;
- A training provider that has a current or potential role in the provision of energy auditing competency related training;
- A professional association with a member base that may apply for accreditation or procure energy audit services.

To assist you in providing feedback, in the box below are all key questions included in the paper for consideration.

Vision for a pathway

1. Do you support this vision for a national energy auditor professional pathway?
2. Should the national energy auditor professional pathway be part of a broader 'Australian Energy Professional' pathway?
3. What do you think will be the likely demand for energy audit services over time? Will the type of audit service change over time?
4. Is a national certification program supported by a professional pathway the most effective way to build the quality and capacity of energy audit providers in Australia?

Considerations for the model

5. Is there a need to deliver industry sector and technology type differentiated training and certification? If so, do you prefer a 'shared' energy auditor fundamentals certification with capstone specialisations, or two separate certifications?
6. Can each sector (industrial and commercial) be managed as one, or is further segmentation to sub-sectors required?
7. What do you consider to be the priority sub-sectors? Do you think the certifications should be developed sequentially, or concurrently?

8. What do you consider to be the priority technologies?
9. Which capabilities are required beyond those detailed in the standard and described in section 4?
10. How could an auditor ensure they are able to adapt to different and new technologies?

Training needs

11. What do you consider to be the gaps in the energy auditor training?
12. Are there education resources not identified here?
13. What existing resources can be adapted into the professional development pathway?
14. Where is there a need for new resources and education?

Participants

15. Have all the potential participants been identified?
16. Have their potential roles been appropriately described?

The closing date for feedback will be COB on Friday 29 September 2017. Feedback can be provided to the Energy Efficiency Council in writing to: Energy Efficiency Council Level 1, 490 Spencer Street, West Melbourne, VIC, 3003 or shauna.coffey@eec.org.au. You may also request a private feedback meeting with the project team.

Key contacts

We look forward to working with you in scoping a training and certification pathway for Australia's energy auditors that adds value to service providers and their clients and assists us all in achieving our energy productivity potential.

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Box 1: The Australian/New Zealand Standard: Energy audits (AS/NZS 3598)

In 2014, Standards Australia released new standards for undertaking energy audits - the AS/NZS 3598 series. The series, replacing AS/NZS 3598:2000 Energy audits standard, now has standards to cater for different types of activity:

- AS/NZS 3598.1: 2014 Energy audits – Commercial buildings
- AS/NZS 3598.2: 2014 Energy audits – Industrial and related activities
- AS/NZS 3598.3: 2014 Energy audits – Transport related activities

Clear definition of best practice energy audit process

The Standard defines clear expectations for each audit type, covering:

- What data is needed
- What analysis is required
- The necessary level of detail and accuracy in identified energy efficiency measures
- The information that needs to be presented in the report so that the audit recipient can make investment decisions

The establishment of clear best-practice processes ensures auditors undertake an appropriate level of investigation and analysis, which helps ensure the quality of the audit's recommendations. Audit customers are also able to compare like-for-like offers from energy auditors during the procurement process.

Clearly defined choices of audit type

The Standard defines three types of audits and provides guidelines about the best application of each. Each audit type has clear attributes so audit users can determine which type is best suited to their needs.

Type 1 - Basic energy audit

A simple, cost effective, broad brush energy audit. Best utilised for small sites with limited analysis budget. Calculations and estimations rule of thumb, generic, indicative, not necessarily customised to site conditions. Recommendation in the form of a brief summary only.

Type 2 – Detailed energy audit

The standard 'go-to' for a site-wide energy audit where investment decisions require recommendation based on specific financial criteria. It will provide specific comments and recommendations with a medium level of accuracy reconciled to available site data.

Type 3 - Precision subsystem audit

A specialised audit to take a 'deep dive' on a particular sub-system on a site, typically to support major investment in that subsystem.

Outcomes focussed

A Standard compliant audit will identify opportunities for improvement that fit within the audit users budget, timelines and business objectives.

The three energy audit standards documents can be purchased from the SAI Global website.

1 The context

1.1 Energy uncertainty and increasing demand for support

Australia's energy sector is in a profound period of change. Electricity and gas customers are facing increasing price volatility, creating investment uncertainty and challenging the competitiveness of Australian enterprises. Coming from a position of consistently low energy prices meant that generally only the largest and most energy intensive businesses built deep capacity in energy management. Now a whole new tranche of businesses is seeking options to reduce energy cost and energy use.

1.2 A need to develop Australia's energy professionals

Developing Australia's energy professionals is essential to improve the capacity of all sectors to better manage their energy needs because the capacity of the energy services sector to provide the services that will underpin this transformation relies on having a growing pool of professionals with relevant knowledge and skills.

Several initiatives (Box 2, p15) have defined essential competencies for Australia's energy professionals that can be grouped into four common areas:

1. Project planning and management
2. Business and innovation
3. Communication and stakeholder engagement
4. Energy technology and industry specific knowledge

An 'Australian Energy Professional' professional development and certification pathway would upskill energy professionals that are already in the industry, and train new energy professionals that will enter the industry as demand for energy efficiency products and services grows.

1.3 Energy auditing – a stepping stone

Energy audits are a key step in the energy management process. In 2014, Standards Australia released a major new update to the Australian/New Zealand Standard for energy audits. The update – led by a highly skilled panel of energy auditors and energy users with expertise across all sectors – focused on upgrading the Standard to ensure it supports the delivery of consistent, high quality audits that support businesses to make informed decisions on energy efficiency.

To achieve this, the Standard is now presented in three parts

- 3598.1 Energy audits – Commercial buildings
- 3598.2 Energy audits – Industrial and related activities
- 3598.3 Energy audits – Transport related activities

The new standards are a significant departure from the previous standard, AS/NZS 3598:2000. They are outcomes-based, with more rigorous technical requirements for data collection and analysis than their predecessor.

Over the past 18 months, the Energy Efficiency Council (EEC) and the NSW Office of Environment and Heritage (OEH) have disseminated information and provided education on the standard to audit providers and clients.

This includes *A Quick Reference Guide to Energy Auditing* to assist audit clients to procure a standards-compliant energy audit that meets the needs of their business.

The EEC has also delivered the *Energy Auditing to the Australian Standard* training program to over 100 participants. This one day training course is focused on the commercial and industrial standards, and gives audit providers the information they need to undertake an energy audit that is compliant with the new standard.

This training does not address the full range of knowledge, skills, experience and processes that an auditor requires to undertake a robust audit. Developing these competencies is generally the outcome of years invested in ad hoc education and on the job experience.

There is currently no mechanism to acknowledge and reward the investment made by experienced individuals in developing these competencies, nor a recognised career pathway to guide new and developing service providers through the range of education, training and professional development options they need to engage with to achieve an expert level.

Businesses seeking options to reduce energy cost and energy use face a significant hurdle in identifying the most appropriately qualified and experienced supplier of energy auditing services to suit their industry and equipment. This uncertainty often leads to a lack of action.

Connecting businesses to skilled energy efficiency service providers is critical for developing energy solutions for business that incorporate cost effective energy efficiency.

Establishing a national professional pathway to certification for energy auditors is a way of addressing all these issues and laying the foundation for an 'Australian Energy Professional' development and certification pathway.

2 Project overview

2.1 Scope

The NSW Office of Environment and Heritage and Sustainability Victoria have contracted the Energy Efficiency Council to define a professional development pathway for Australia's energy auditors and establish an appropriate model for an auditor certification scheme.

If a need is established, further work will follow on the specifics of certification scheme design and mechanisms for addressing any training gaps in the professional pathway.

The scoping study is limited to commercial and industrial sectors, as the requirements and processes for 3598.1 (Commercial buildings) and 3598.2 (Industrial and related activities) are very similar. 3598.3 (Transport related activities) takes a fundamentally different approach, and would require a separate scoping process. This may be addressed as part of a future study.

This project commenced in June 2017 and is due to be completed in October 2017.

2.2 Objective

To define the professional development pathway and establish a preferred certification model that meets the desired outcomes, extensive consultation is being undertaken on the following key design areas:

The vision

What does a future optimal state look like, and how does this differ from the business-as-usual market situation?

Considerations for the model

What types of capability are required to meet auditing needs – how does this vary between project scale, technology types and industry sectors?

Training needs

What are the current training resources and do they meet the needs of current and future energy auditors?

Pathway participants

Who are all the stakeholders from industry, federal and state government, service providers, education and training providers, and others that should be involved? What would be their role in the design, development, implementation and ongoing management of the auditor professional pathway and certification scheme?

2.3 Consultation process

Extensive consultation is fundamental to designing an effective training and certification scheme, to ensure the professional pathway addresses a genuine market need, and to demonstrate that development of the pathway including any certification schemes was transparent. The consultation strategy involves three different elements:

Steering Group

A project Steering Group has been established and is responsible for establishing the goals for the project, approving the project plan, monitoring progress and signing off on consultation documents and the certification scheme recommendations.

The Steering Group is comprised of representatives from federal, state and local government, experts from the demand and supply sides of the energy efficiency auditing 'industry', and education and training providers (Table 1).

Table 1: Energy Auditor Pathway to Certification Steering Committee members

Stakeholder group	Organisation	Participant
Federal Government	Department of the Environment and Energy	Albert Dessi
State Government	NSW Office Environment and Heritage	David Malicki
	Sustainability Victoria	Jamie Wallis
	Department of State Development (SA)	Pei Ru Chao
Local government	City of Sydney	Esther Bailey, City of Sydney
Education and training	QUT	Cheryl Desha
Energy users	NSW Irrigators	Stefanie Schulte
	Dairy Australia	Catherine Phelps
Service providers	Energy Action	Paul Bannister,
	Northmore Gordon	Craig Morgan

Public consultation paper

This public consultation paper has been prepared as the basis for broad engagement. It will be widely disseminated through industry and government networks and public forums. Written responses are encouraged from all interested stakeholders.

Targeted stakeholder engagement

In addition to the broad dissemination of the public consultation paper, experts and representatives of key organisations will be invited to meetings to provide input into the development of the certification scheme.

2.4 Output

The Steering Group will review and consider the outcomes of the consultation process and prepare a report and recommendations for a professional development pathway for Australia's energy auditors. If supported by the projects findings, they will also recommend an appropriate model for an auditor certification scheme, potentially within the context of a broader Australian Energy Professional' development and certification pathway.

The outputs of this project will inform the need for a follow-on project on the mechanisms for addressing any training gaps in the professional pathway, and the specifics of certification scheme design.

3 Vision for a pathway

What does a future optimal state look like, and how does this differ from the business as usual market situation?

3.1 The current situation

Increasing energy prices and consumer uncertainty

Australia's energy sector is in a profound period of change. Electricity and gas customers are facing increasing price volatility, creating investment uncertainty and challenging the competitiveness of Australian enterprises. Coming from a position of consistently low energy prices meant that generally only the largest and most energy intensive businesses built deep capacity in energy management.

Now a whole new tranche of businesses are seeking options to reduce energy cost and energy use, but they face a significant hurdle in identifying the most appropriately qualified and experienced supplier of energy auditing services to suit their industry and equipment.

Diversity of service provider and audit quality

There is great diversity in the structure of businesses providing energy efficiency services. There is a cohort of businesses and professionals for whom energy efficiency is a core service and identity for the enterprise. Many businesses providing energy audit services fall into this category. For others, the energy efficiency service offering, including energy auditing, is only part of the enterprise's broader services, perhaps integrated within a product offering or advisory service, without necessarily being core to their identity (Figure 2).

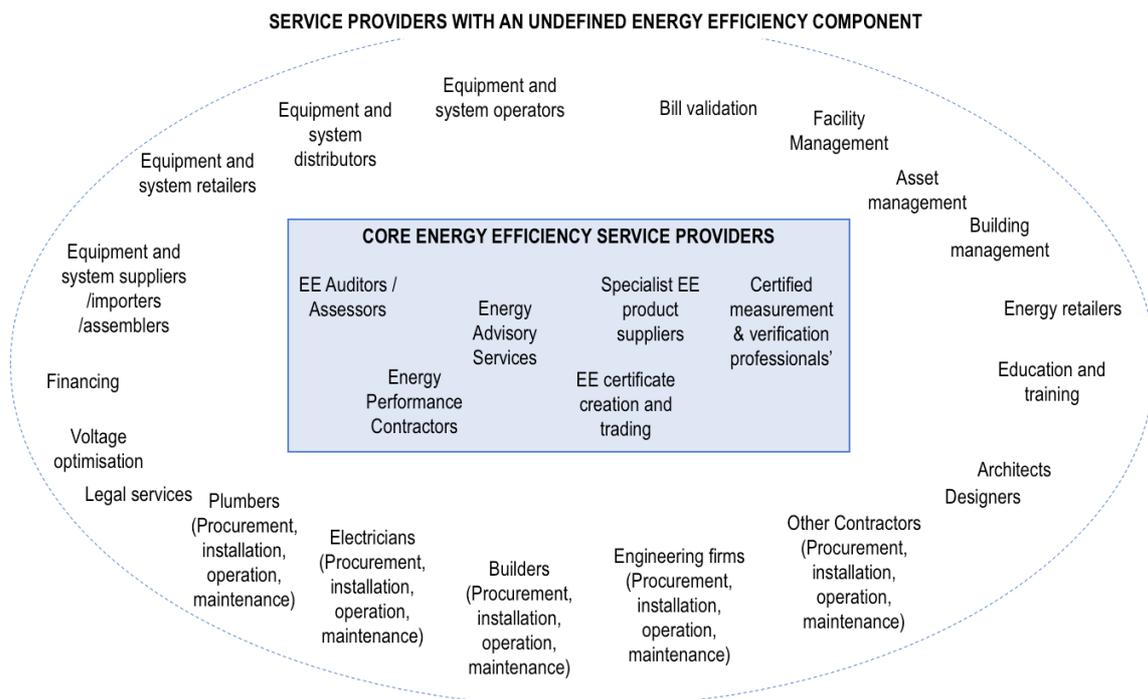


Figure 2: Defined and undefined participants in the energy efficiency services market (EEC produced)

Anecdotally, consumers of energy auditing services experience highly variable quality in services provided, and contend with a huge range of knowledge and expertise among professional auditors. When consumers report dissatisfaction with audit quality, they commonly cite a lack of a consistent, effective process, limitations in industry or site specific technical understanding, poor communication of technical information, poor quality data analysis, or an inability to appropriately link their findings to the financial and strategic drivers of the client.

At present, there is no mechanism for clients to easily identify audit providers that have the necessary competencies required to conduct an effective audit within their sector. This uncertainty can be a barrier to taking action to procure an audit, the first step to reducing energy costs.

Lack of professional recognition or a professional training and development pathway

The energy auditing industry also lacks a recognised career pathway to guide new and developing individuals. Existing training is ad-hoc, not clearly connected with career progression and of uncertain consistency and quality. Many professionals report the need for clear competency expectations at agreed career milestones, coupled with advice on the range of education, training and professional development options to achieve each stage of professional competency.

There is currently no mechanism to acknowledge and reward the investment made by experienced individuals in developing the competencies essential to the delivery of a robust, standards compliant audit. Developing these competencies is generally the outcome of years invested in ad hoc education and on the job experience.

Both the lack of recognition and professional development pathway are limiting the “professionalisation” of the energy auditing industry. Some professionals claim this results in people leaving the industry for better recognition and reward elsewhere, and a failure to attract new practitioners into the profession.

3.2 The ideal future situation

Businesses reducing energy costs and increasing energy productivity

Energy audits are an integral part of the energy management process. They provide essential information to determine how efficiently energy is being consumed, identify energy and cost saving opportunities and highlight potential process and productivity improvements (for industrial and related activities), or improvements in building services and occupant comfort (for buildings).

In most cases, implementing energy audit recommendations saves money and lowers greenhouse gas emissions, but the benefits of energy efficiency go well beyond this. The International Energy Agency (IEA) has identified at least 15 distinct benefits of energy efficiency, from health and well-being to improved industrial productivity (Figure 3). This list is not exhaustive, but represents some of the most prominent benefits of energy efficiency identified to date.



Figure 3: The multiple benefits of energy efficiency improvements (International Energy Agency, 2014, pp 28)

There is a significant body of research describing Australia's potential to nearly double its energy productivity by 2030 (Climateworks, 2015; Stadler *et al*, 2014, The Climate Institute, 2013) with energy efficiency a primary strategy to realise this potential.

The global drive towards net-zero emissions driven by the Paris Climate Change Agreement will also see considerable focus on energy efficiency. The NSW, Victoria, South Australia, Queensland and the ACT Governments have all announced net-zero emissions by 2050 targets. At the local government level, organisations pursuing a net zero target include the City of Melbourne, City of Sydney and Adelaide City Council. The Australian Government is expected to significantly increase its emissions reduction ambitious in line with Paris commitments.

An ideal future situation would see businesses and other energy users responding to price rises, environmental imperatives (including emissions reduction targets) and stakeholder expectations, taking control of their energy use and realising their full energy productivity potential. In-house energy management capacity and governance would be high, and they would confidently call on the services of a large, expert cohort of energy auditors with relevant industry knowledge, that can help them deliver robust energy audits that support their business decision making.

Government and private market demand drives demand for certification and linked training

Clients would select their energy auditors based on the appropriateness of their expertise for the site or business audit requirements. They would determine the appropriateness of professional expertise based on the type and level of professional energy auditor certification, and this would be easy to understand and procure.

In Federal, state and local governments, programs such as NSW Government Resource Efficiency Program and the Victorian Green Government Buildings Program would demand professional certification to help manage procurement risk.

As awareness of, and demand for, professionally certified auditors grows in the market, the drive amongst energy auditors to become certified would increase. Professionals seeking certification, or to advance through levels of certification, have a clear understanding of the required competencies at each career stage and can access linked training and professional development to build these competencies (Figure 4).

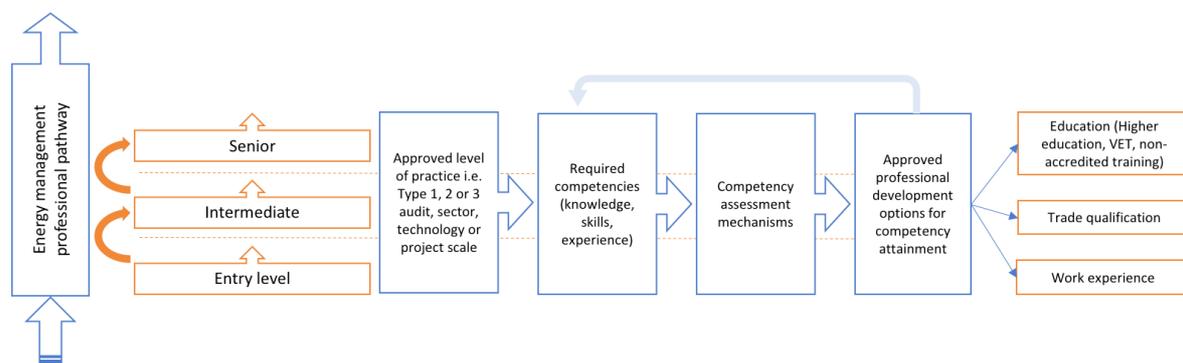


Figure 4: Vision for a staged energy auditor professional development and certification pathway.

The high level of demand for training means that high quality, standardised energy efficiency training is offered through a wide variety of training providers.

Consistent, high quality energy audits across all service types of providers

It is important that energy efficiency competency continues to grow in both core energy efficiency service providers as well as those in industries or roles with some energy efficiency component. Diversity of service providers is generally valued by consumers, and will likely support greater market penetration of energy audit services.

With a clear understanding of the required competencies, and good availability of training pathways for development of these competencies, high-quality energy auditing services are consistently delivered by all practitioners.

Energy auditing is a recognised and valued energy professional competency

Energy auditors are recognised for their ability to deliver a wide range of highly valuable business benefits. Students with the appropriate aptitude are encouraged to pursue energy auditing as a valuable career option and others are transferring into the industry as demand drives an opportunity for career advancement.

Questions

1. Do you support this vision for a national energy auditor professional pathway?
2. Should the national energy auditor professional pathway be part of a boarder 'Australian Energy Professional" pathway?
3. What do you think will be the likely demand for energy audit services over time? Will the type of audit service change over time?
4. Is a national certification program supported by a professional pathway the most effective way to build the quality and capacity of energy audit providers in Australia?

4 Considerations for the model

What types of capability are required to meet auditing needs – how does this vary between project scale, technology types and industry sectors?

4.1 Sector differentiation

This scoping study is limited to commercial and industrial sectors, as the requirements and processes for 3598.1 (Commercial buildings) and 3598.2 (Industrial and related activities) are very similar. 3598.3 (Transport related activities) takes a fundamentally different approach, and would require a separate scoping process which may be addressed as part of a future study.

Appendix E of AS/NZS 3598.1:2014 and AS/NZS 3598.2:2014 detail general areas of competency for energy auditors as well as competencies relating to specific building systems and specific industrial systems.

Thought must be given on how best to structure the training pathway and certification to reflect industry sector and technology differences. One approach may be a 'shared' energy auditor fundamentals certification that addresses the general competencies as set out in the standards. Participants could then choose capstone specialisations that reflect the specialist competencies of their chosen sector or technology.

Alternatively, commercial and industrial could be separate specialisations throughout the training and certification pathway which may require people who want to service both sectors to obtain two certifications.

Assuming a differentiated approach, a certification could be developed for one sector, with the other developed subsequently. Or the two certifications could be developed concurrently.

4.2 Types of capability

In addition to general and industry specific competencies described in Appendix E of AS/NZS 3598.1:2014 and AS/NZS 3598.2:2014, the AS/NZS 3598 standards also recognise that Type 2 and Type 3 audits require higher competency levels than Type 1 audits due to the increased level of detail and analysis involved.

Type 1 audits require the auditor to have competency in energy uses that contribute 20 per cent or more of energy consumption, whereas Type 2 and Type 3 audits require competency in all energy uses audited. Type 3 auditors are also expected to have knowledge of energy data acquisition and measurement.

The Industrial standard (AS/NZS 3598.2:2014) includes additional specific competencies relating to occupational health, safety and hygiene requirements, ability to quantify the energy savings, costs and benefits obtainable from the industrial processes being audited and knowledge of the whole system and system integration.

Several initiatives (Box 2) have defined essential competencies for Australia's energy professionals as detailed in Table 2) that can be grouped into four common areas:

1. Project planning and management
2. Business and innovation
3. Communication and stakeholder engagement
4. Energy technology and industry specific

Table 2: Comparison of essential competencies identified across integrated building energy retrofits, implementation of energy management systems and energy efficiency assessments

	Project planning and management	Business and innovation	Communication and stakeholder engagement	Energy technology and industry specific
EECS	<p>Area 1: Leading and managing IBERs - Ability to effectively lead and manage an IBER project in its entirety, from scoping through to completion.</p> <p>Area 9: Risk management - Ability to effectively manage the risks associated with an IBER</p>	<p>Area 4: Business case development and project justification - Ability to undertake cost benefit analyses and develop business cases</p> <p>Area 5: Client procurement options for IBERs - Ability to advise clients on the procurement models available, and the most appropriate model for a given project.</p>	<p>Area 10: Stakeholder engagement - Ability to effectively manage the stakeholders associated with an IBER</p>	<p>Area 2: Energy consumption, assessments and analysis - understanding of energy consumption, collection, billing, modelling and analysis, and ability to oversee energy assessments and audits.</p> <p>Area 3: Measurement and verification of energy savings - Ability to oversee a robust process for measurement and verification of energy savings.</p> <p>Area 7: Energy efficiency and generation technologies - Understanding of energy efficiency and generation technologies, systems and processes</p> <p>Area 8: Commissioning and tuning - Ability to ensure equipment is appropriately commissioned and tuned.</p> <p>Area 6: Interdependencies between building systems and managing operational impacts - Ability to ensure integration between building systems whilst managing the operational impact of an IBER</p>
GSAP	Management skills	Financial and accounting skills Analysis Critical thinking skills	Communication and interpersonal skills	Energy management knowledge Energy assessment and opportunity identification Knowledge of regulations, standards, and best practices Building and facility knowledge

	Project planning and management	Business and innovation	Communication and stakeholder engagement	Energy technology and industry specific
EEO	Project Planning and Management - Ability to direct and guide a group in completing tasks and attaining goals of energy efficiency assessment	Identifying Potential Opportunities – Ability to think strategically and creatively Decision Making – Ability to develop and assess business cases for implementation of energy efficiency opportunities	Communication Planning and Implementation – Ability to exchange, engage, convey, and express knowledge and ideas in an energy efficiency assessment context	Understanding Energy Use – Ability to arrange and retrieve data, knowledge and ideas, research and investigation of specific technical and financial knowledge Monitoring and Investigation – Ability to install appropriate monitoring equipment and develop analysis systems Legal or compliance requirements

Box 2: Skills analysis studies

- i. The Global Superior Energy Performance Partnership (GSEP) *Knowledge and Skills Needed to Implement Energy Management Systems in Industry and Commercial Buildings* (2013) sought to establish the full range of workforce knowledge required to effectively implement an energy management systems in commercial buildings as well as industry (GSEP, 2013). Essential knowledge and skills across the workforce were classified into nine general categories (GSEP, 2013, pp 7).
- ii. *The Long Term Training Strategy for the Development of Energy Efficiency Assessment Skills* (GHD, 2010a) sought to determine the functional skills required to undertake energy efficiency assessments in line with Energy Efficiency Opportunities (EEO) program requirements (Australian Government, 2010, pp 1). The project identified 33 functional skills used when conducting energy efficiency assessments that were grouped into six broad categories (GHD, 2010a, pp25).
- iii. The Energy Efficiency Certification Scheme (EECS) certifies professionals that have the skills and experience to lead and manage all types and scale of building energy upgrades, up to and including a complex Integrated Building Energy Retrofit (IBER) and to work effectively with their clients. EECS assesses professionals against ten areas of required competency

Consideration must be given to the need to reflect these competencies within the energy auditor competency requirements.

It will be important that the training pathway and certification reflect the requirements for various competency levels, whilst ensuring it does not result in unreasonable barriers to new entrants to the energy auditing profession.

There may also be a need to establish expectations of capabilities beyond those established in the Standards.

Questions

5. Is there a need to deliver industry sector and technology type differentiated training and certification? If so, do you prefer a 'shared' energy auditor fundamentals certification with capstone specialisations, or two separate certifications?
6. Can each sector (industrial and commercial) be managed as one, or is further segmentation to sub-sectors required?
7. What do you consider to be the priority sub-sectors? Do you think the certifications should be developed sequentially, or concurrently?
8. What do you consider to be the priority technologies?
9. Which capabilities are required beyond those detailed in the standard and described above?
10. How could an auditor ensure they are able to adapt to different and new technologies?

5 Training needs

What are the current training resources and do they meet the needs of current and future energy auditors?

5.1 Competency focus

Recent work by the Energy Efficiency Council (EEC, 2017) has established that professionals enter the fields of energy efficiency and energy productivity from a range of backgrounds including engineering, financial management, organisational change, stakeholder engagement and organisational excellence / process optimisation.

Thus a wide range of career paths that can lead to a specialisation in energy efficiency or energy productivity. Further, no individual will be an expert in all aspects of the field, even within a specific sector of the economy such as manufacturing. This reality underlines the importance of multi-disciplinary teams in driving an optimal energy productivity outcome.

In light of this, policymakers, industry bodies, employers and others seeking to boost energy efficiency and energy productivity skills in the economy should avoid prescriptiveness about the pathway taken by individuals, instead focusing on the destination – identifying and supporting the development of the range of competencies necessary to deliver an energy efficiency or energy productivity outcome in target economic sectors.

5.2 Current training

The 2012 Allan Consulting review of skill requirements across key occupations and industries responsible for the delivery of energy efficiency improvements included analysis of the key higher education, nationally accredited vocational education and training (VET) courses and other non- accredited courses available to address energy efficiency advisor skill requirements (Table 3).

Table 3: Education courses for energy efficiency advisors (EEC analysis, Allen Consulting Group, 2012, 129).

Higher education	Bachelor of Science Bachelor of Engineering Master of Engineering Master of Science (Environmental Engineering) Master of Design Science (Sustainable Design / Building Services)
Vocational education and training	Advanced Diploma of Engineering Technology - Air- conditioning and Refrigeration Advanced Diploma of Engineering Technology - Electrical Advanced Diploma of Sustainable Building Design Cert IV Home Sustainability Assessments Diploma of Carbon Management Vocational Graduate Certificate in Sustainable Operations
Other courses	Energy Auditing Levels 1-3 Infrared Thermography Levels 1-3 Course in Carbon Accounting Short Course - Air Barrier Technology

Higher education

The choice of higher education courses has expanded in recent years. A current search for ‘energy’ related courses on online education guides including ‘Learning and Teaching for Sustainability’ (www.sustainability.edu.au), the ‘Good Universities Guide’ (www.gooduniversitiesguide.com.au) identified 27 undergraduate and 43 post graduate courses (Appendix A). These are courses comprised of many more related courses or units.

VET

The 'MySkills' website (www.myskills.gov.au) identified 19 energy and sustainability related VET courses (Appendix A). However, not all of these courses are accessible. The presence of a qualification within the VET Australian Quality Framework and inclusion on the MySkills website is not an automatic indication of availability via TAFE and other Registered Training Organisations (RTOs).

For example, two qualifications likely to be relevant the development of energy service professional, the Certificate IV in Energy Efficiency and Assessment and the Certificate IV in Energy Management and Control are not currently offered by any Registered Training Organisation in Australia.

Some units of competency within these qualifications are offered as skills sets; packages of competencies not leading to a formal qualification. The 'Sustainable - Energy Efficiency Systems Designer' skill set has prerequisites of a degree in Electrical Engineering, an Advanced Diploma or Diploma of Electrical Engineering or an electrical trade qualification from the Electrotechnology Training Package or equivalent and is offered by several registered training organisations in NSW and Victoria.

In a positive step, Melbourne Polytechnic, in partnership with Energy Skills Australia, has recently secured a Sustainability Victoria Energy Efficiency Capability Grant to develop and pilot the Certificate IV in Energy Management and Control. The course will then be available at other training organisations around Victoria (Victorian Government media release, 16 June 2017).

Other non- accredited courses

Up-skilling of the current workforce can also be undertaken through non-accredited short courses offered by RTOs, professional associations, industry groups, employers and government including

- NSW Office of Environment and Heritage
- Engineers Australia
- Energy Efficiency Council
- Facility Managers Association of Australia
- Australian Institute of Refrigeration Air Conditioning & Heating
- Property Council of Australia
- Master Plumbers' & Mechanical Services Association of Australia
- National Electrical Contractors Association
- Moreland Energy Foundation
- National Electrical and Communications Association
- Pointsbuild
- Energy Skills Australia

The *Energy Auditing to the Australian Standard* training program delivered by the Energy Efficiency Council with the support of the NSW OEH has reached over 100 participants. This one day training course is focused on the commercial and industrial standards, and gives audit providers the information they need to undertake a standards compliant energy audit.

Training is often developed as partnerships between industry bodies and registered training organisations with the financial and technical support of government. Amongst its many higher education, VET and industry sector outcomes, the NSW Office of *Environment and Heritage Energy Efficiency Training Program* funded the development of 30 new industry training courses developed and delivered in partnership with business.

Many of these training materials are still accessible, but it is not known how well the resources are currently utilised and their applicability to the development of energy efficiency competencies.

International programs of note include the UK Energy Managers Association's Junior Energy Management Apprenticeship Programme and the UK Energy Institute's portfolio of energy management training.

Consulting firm Energetics partners with the Association of Energy Engineers (AEE) to host the four and a half day Certified Energy Manager® (CEM®) training program and certification exam.

Many employers are investing directly in in-house education and training to develop their employees. This may range from consulting skills and customer management, through to technical product installation or operation training.

5.3 Certification of energy efficiency competencies

As a relatively new professional segment, professional certifications in the energy service sector are not well developed, yet certification can play a central role in helping businesses identify trusted professionals.

The EEC has worked with state and federal governments to develop the Energy Efficiency Certification Scheme (EECS), a professional certification for the individuals that lead comprehensive energy performance upgrades of commercial buildings.

Other professions, trades and roles have voluntary professional accreditations that have good coverage in their sectors. These include:

- Engineers Australia provides a range of professional accreditations such as Chartered Professional Engineer (CPEng)
- Facility Management Association of Australia (FMA) provides Certified Facility Manager (CFM) and Facility Management Professional (FMP) accreditations
- Green Building Council of Australia provides Green Star Associate and Green Star Accredited Professional accreditations

Internationally, the American Association of Engineers (<https://www.aeecenter.org>) has 20 certifications for energy professionals including options for recognition at different career stages:

- Energy Efficiency Practitioner
- Energy Manager in Training
- Certified Energy Manager®
- Certified Energy Auditor™
- Certified Business Energy Professional

At an organisational level, the US Department of Energy undertakes accreditation of Energy Service Companies (ESCOs) to ensure that they have the appropriate financial, technical and management capabilities. Accredited ESCOs are then added to a Qualified List of Energy Service Companies (ESCOs) and able undertake Energy Savings Performance Contracts for the Federal Government. Although there is no legal requirement for any other level of government or commercial company to use ESCOs that are on the qualified list, research demonstrated that other levels of government and organisations use the Qualified List of ESCOs as a benchmarking tool or requirement in their selection and procurement of ESCOs. ESCOs must re-certify every year to remain on the Qualified List.

5.4 Gaps in training

While a detailed mapping of course learning outcomes against energy auditor competency requirements has not been undertaken, the restricted availability of some relevant courses and on-going anecdotal evidence of gaps in energy auditor competency indicate that gaps in training remain.

However it has been identified that technical training in specific skill areas is more likely to achieve high up-take, particularly when linked to professional development or registration requirements (Allen Consulting Group, 2012, 61).

Questions

11. What do you consider to be the gaps in the energy auditor training?
12. Are there education resources not identified here?
13. What existing resources can be adapted into the professional development pathway?
14. Where is there a need for new resources and education?

6 Project participants

Who are all the stakeholders from industry, federal and state government, service providers, education and training providers, and others that should be involved? What would be their role in the design, development, implementation and ongoing management of the auditor professional pathway and certification scheme?

There are a wide range of actors in the energy audit process and we seek to engage them all in this process.

Participant	About	Potential role/s
Energy auditors	Providers of energy auditor services to commercial and industrial sector clients, both individuals and organisations that employ individual auditors	<ul style="list-style-type: none"> • Participants in training pathway and seekers of certification. • Promotion of the certification to clients.
Energy users	Commercial and industrial sector organisations that engage, or may seek to engage, the services of energy auditors	<ul style="list-style-type: none"> • Consumers of certified energy audits. • Employers of certified energy auditors for internal program management.
Regulators and policy makers	Government bodies responsible for the development and delivery of energy efficiency policy and programs.	<ul style="list-style-type: none"> • Support for the development of, and ongoing management of the pathway elements. • Adoption of certification requirements in programs and general procurement activities.
Industry bodies and professional associations	Organisations representing key stakeholders in the energy audit process.	<ul style="list-style-type: none"> • Development and administration of accreditation • Input to the design of training programs to address training gaps. • Delivery of training and other CDP options for ongoing professional development. • Promotion of the training and certification pathway to members and the broader industry.
Education and training providers	Providers of higher education, nationally accredited vocational education and training (VET) courses and other non- accredited courses available to address energy service advisor knowledge and skill requirements	<ul style="list-style-type: none"> • Design and delivery of training programs to address training gaps.

Questions

15. Have all the potential participants been identified?
16. Have their potential roles been appropriately described?

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Appendices

A: Training resources

Postgraduate

Graduate Certificate in Carbon Management, Bond University
Graduate Certificate in Energy and Resources - Policy and Practice, University College London
Graduate Certificate in Energy Studies, Murdoch University
Graduate Certificate in Lighting (on-shore), Queensland University of Technology
Graduate Certificate in Mineral and Energy Economics, Curtin University
Graduate Certificate in Renewable Energy and Power Systems, University of Tasmania
Graduate Certificate in Sustainable Energy, University of Queensland
Graduate Certificate in Urban Development and Sustainability, Bond University
Graduate Diploma of Energy and Resources - Policy and Practice, University College London
Graduate Diploma of Energy and Resources Law, University of Melbourne
Graduate Diploma of Energy and the Environment, Murdoch University
Graduate Diploma of Energy Law, University of Western Australia
Graduate Diploma of Energy Studies, Murdoch University
Graduate Diploma of Sustainable Energy, University of Queensland
Master of Asset & Facilities Management, Bond University
Master of Carbon and Energy Management, University of Queensland
Master of Climate Change, Australian National University
Master of Electronic and Computer Engineering / Master of Electronic and Energy Engineering, Griffith University
Master of Energy and Resources Law, University of Melbourne
Master of Energy Change (Advanced), Australian National University ANU
Master of Energy Efficient and Sustainable Building, RMIT University
Master of Energy Systems, University of Melbourne
Master of Engineering - Sustainable Energy, RMIT University
Master of Engineering (Energy and Sustainable Systems), University of South Australia
Master of Engineering in Renewable Energy, Australian National University ANU
Master of Engineering, Deakin University
Master of Environment, Australian National University
Master of Environment, Macquarie University
Master of Environmental Law, Macquarie University
Master of Environmental Planning, Macquarie University
Master of Laws, Macquarie University
Master of Mining and Energy Laws, University of Western Australia
Master of Renewable Energy, Murdoch University
Master of Science - Mineral and Energy Economics, Curtin University
Master of Science in Energy and Resources Management, University College London
Master of Science in Renewable Energy, Murdoch University
Master of Sustainable Energy, University of Queensland
Master of Urban and Regional Planning, University of South Australia

Postgraduate Diploma in Asset & Facilities Management, Bond University
 Postgraduate Diploma in Energy and the Environment, Murdoch University
 Postgraduate Diploma in Energy Studies, Murdoch University
 Postgraduate Diploma of Energy and Environment - Global Warming and Climate Science, Open Universities Australia (OUA)
 Postgraduate Diploma of Energy Studies, Open Universities Australia (OUA)

Undergraduate

Bachelor of Agricultural Science, University of Tasmania
 Bachelor of Applied Science (Agriculture), University of Tasmania
 Bachelor of Civil Engineering, La Trobe University
 Bachelor of Construction Management, University of Western Sydney
 Bachelor of Engineering - Electrical and Electronics, Deakin University
 Bachelor of Engineering - Electrical and Renewable Energy (Honours), Edith Cowan University (ECU)
 Bachelor of Engineering - Mechanical and Sustainable Energy (Honours), University of Adelaide
 Bachelor of Engineering - Photovoltaics and Solar Energy (Honours), UNSW Sydney
 Bachelor of Engineering - Renewable Energy Engineering (Honours), Murdoch University
 Bachelor of Engineering (Advanced Studies - Sustainable Energy Systems Engineering), Griffith University
 Bachelor of Engineering (Environmental Engineering)/Bachelor of Business Management, Griffith University
 Bachelor of Engineering (Mechatronics), Edith Cowan University
 Bachelor of Engineering (Optical and Electronic), University of South Australia
 Bachelor of Engineering (Sustainable Energy Systems), Griffith University
 Bachelor of Engineering in Renewable Energy Engineering, Murdoch University
 Bachelor of Engineering, Curtin University
 Bachelor of Environmental Science (Sustainability Science), Bond University
 Bachelor of Environmental Science, Charles Sturt University
 Bachelor of Housing, University of Western Sydney
 Bachelor of International Relations, La Trobe University
 Bachelor of Natural Science, University of Western Sydney
 Bachelor of Planning, Macquarie University
 Bachelor of Science - Energy and Advanced Materials, Flinders University
 Bachelor of Science - Energy Geoscience, University of Adelaide
 Bachelor of Science in Climate Change Management, Murdoch University
 Bachelor of Science in Sustainable Energy Management, Murdoch University
 Bachelor of Technology - Renewable Energy Systems, University of Newcastle

Vocational

Advanced Diploma of Engineering Technology - Renewable Energy
 Advanced Diploma of Renewable Energy Engineering
 Associate Degree in Applied Engineering - Renewable Energy Technologies, TAFE NSW
 Certificate II in Sustainable Energy (Career Start)
 Certificate III in Renewable Energy - ELV
 Certificate IV in Air-conditioning Systems Energy Management and Control
 Certificate IV in Electrical - Renewable Energy

Certificate IV in Energy Efficiency and Assessment
Certificate IV in Energy Management and Control
Certificate IV in Renewable Energy
Certificate IV in Sustainable Operations
Diploma of Carbon Management, Swinburne University of Technology
Diploma of Renewable Energy Engineering
Diploma of Residential Building Energy Assessment
Diploma of Sustainability, TAFE NSW
Diploma of Sustainability, Tropical North Queensland TAFE
Diploma of Sustainable Operations
Graduate Certificate in Education and Training for Sustainability, TAFE NSW
Graduate Certificate in Sustainable Operations

Other short courses

Education and Training at the National Centre for Sustainability, Swinburne University of Technology
Efficiency in the Water Sector, University of New South Wales
Electrical Power Management and Sustainability, Federation University Australia
Energy Storage and Alternative Generation, University of New South Wales
Home Sustainability Assessment, Federation University Australia
Home Sustainability Assessment, Victoria University
Integrated Design Studio for High Performance Buildings, University of New South Wales
Introduction to Carbon Accounting, Federation University Australia
Introduction to Climate Change, Federation University Australia
Introduction to Sustainability at Work, Federation University Australia
Introduction to Sustainable Living, Federation University Australia
Operational Energy Efficiency, University of New South Wales
Sustainable Energy Centre, University of South Australia
Sustainable Energy Policy and Practice, RMIT University
Understanding Your Ecological Footprint, Federation University Australia
Introduction to the Energy Savings Scheme, NSW OEH
Voltage optimisation, NSW OEH
Battery storage for business, NSW OEH
Building the business case, NSW OEH
Introduction to energy management, NSW OEH
Advanced energy management, NSW OEH
Lighting, NSW OEH
Heating, ventilation and air conditioning, NSW OEH
Commercial refrigeration, NSW OEH
Cogeneration feasibility, NSW OEH
Project impact assessment, NSW OEH