

Investment Grade Energy Auditor Certification

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SUSTEMY
SUSTAINABILITY EDUCATION ACADEMY

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What is an Investment Grade Energy Audit and Who Needs One?

An energy audit is an assessment of a facility to identify how much energy it uses, where energy is used, and to present a business case for undertaking upgrades that reduce energy use. Typically, the whole site is assessed, with multiple savings opportunities identified across all areas of energy usage.

An **Investment Grade (Energy) Audit** (IGA) is one in which the business case in the audit is sufficiently comprehensive and robust that it can be trusted when making an investment decision. An IGA may also be known as **Detailed Feasibility Study** (DFS).

An IGA is central to an Energy Performance Contract (EPC). In an EPC, an Energy Services Contractor (ESCO) delivers guaranteed energy savings in return for a fixed investment. The ESCO will undertake an IGA or DFS, and use this as the basis of their guarantee, and to determine the investment requirement.

Reducing Investment Risk

An IGA performed of a commercial or industrial facility, and following a proven process, can be used to reduce investment risk.

A bank or finance corporation, looking to finance energy efficiency upgrades, would expect any energy audit undertaken to be of an investment grade standard.

Anyone wanting reasonable assurance that an energy audit provides a trustworthy business case that de-risks investments to reduce energy costs and greenhouse gas emissions can benefit from an investment grade energy audit undertaken by a proficient auditor.

Benefits of Investment Grade Energy Auditor Certification

An Investment Grade Energy Auditor (IGEA) goes through comprehensive and rigorous training and assessment. A IGEA is certified as having demonstrated the ability to deliver an energy audit that can be trusted by facility owners and financial institutions to deliver the expected financial savings and greenhouse gas abatement. This reduces risk, providing greater certainty of the outcome of energy efficiency upgrades. And ultimately this leads to increased investment in energy efficiency, which in turn leads to increased financial and carbon savings.

How these benefits are provided

Benefits are provided through comprehensive training and a robust assessment process that evaluate knowledge across multiple areas of competency.

Investment Grade Energy Auditor Competencies

The **key competencies** of an Investment Grade Energy Auditor are:

1. Can assess an energy users' approach to energy management within the facility being audited and advise on an appropriate scope of audit.
2. Can identify energy sources and quantify annual energy usage, costs and energy related greenhouse gas emissions.
3. Can develop an energy use breakdown and identify major energy uses.
4. Can apply a systematic process to identify a comprehensive range of feasibly energy savings opportunities.
5. Has knowledge of the energy usage characteristics and savings opportunities with systems and technologies in common use, including lighting, heating, ventilation, air-conditioning and domestic hot water.
6. If auditing industrial facilities has knowledge of the energy usage characteristics and savings opportunities with electric motor, steam, refrigeration, and compressed air systems.
7. Can quantify energy savings costs and benefits to a level of accuracy that is acceptable for investment purposes.
8. Can create an energy audit report that clearly advises an energy user how much energy is used, where it is used, what the energy savings opportunities are and on what the energy users next steps should be.



The Comprehensive Investment Grade Energy Auditor Training

In pursuit of their certification and to be able to develop the necessary competencies a student aspiring to achieve IGEA certification completes two sets of training modules.

The first set of training modules is focussed on undertaking an energy audit. There are four modules in this set.

The second set of training modules is focussed on a technical understanding of common energy using technologies and systems. There are also four modules in this set.

Across the total of eight training modules there are a total of 177 lessons, which vary in duration from a couple of minutes up to fifteen minutes. The training is not passive, each student is required to respond to a minimum of 214 questions in order to be able to progress through the training.

Training Set One – Undertaking An Energy Audit.

This is a series of four, online, on-demand modules and assessments, covering:

Commissioning and Managing an Energy Audit, is primarily aimed at energy users, but every energy auditor should also undertake this course to be able to see the audit from the other side of the fence, and thus improve their ability to effectively engage with energy users.

Process of Undertaking a Successful Audit, presents a process, that when followed, results in successful audits being delivered. This process can be applied to deliver an Investment Grade Audit (IGA) / Detailed Feasibility Study (DFS) in which the energy user can have confidence in the estimates of costs and benefits.

Energy Fundamentals for Energy Auditors. In this course, students learn the key concepts from physics and engineering that energy auditors must know.

Tools for Energy Auditors. This course introduces energy auditors to tools, both essential and nice-to-have, for undertaking energy audits.

Module Name:	Lesson Names:
Commissioning, Managing and Reviewing an Energy Audit	<ul style="list-style-type: none"> ➤ Introduction ➤ Getting your organisation ready ➤ Define exactly what you want from the audit ➤ Learn about energy audits and what the audit gives you ➤ Should I commission an energy audit? ➤ Alternatives to an energy audit ➤ Scoping your energy audit ➤ Managing energy audit risk ➤ How much does an audit cost? ➤ Winning organisational support ➤ Assessing energy audit proposals ➤ Managing and assisting the energy audit ➤ Assess the audit ➤ Implement the audit's recommendations ➤ Review achievements after implementing recommendations ➤ Module summary
Process of Undertaking an Energy Audit	<ul style="list-style-type: none"> ➤ Introduction - what is a successful audit ➤ The 6 principles that when applied will help ensure your audit is a success ➤ Audit safety - avoid a sore head, hearing loss and death. ➤ How to understand and educate your client ➤ How to prepare an audit quotation. ➤ Communicate clearly what you need (and why this is important) ➤ Set expectations at the start to avoid explosions later ➤ Develop a timetable ➤ Who to engage with? ➤ Workshops, meetings, phone calls, emails - more than nice to have.

	<ul style="list-style-type: none"> ➤ Why you need data. ➤ Data needed for baselining and an energy use breakdown ➤ Should I use data loggers and temporary meters? ➤ Data needed to identify savings opportunities ➤ Baseline using billing data analysis ➤ How to determine tariff rates to apply to savings ➤ Example bill analysis - Australia ➤ Benchmarking energy use - clients love this! ➤ Determining drivers of energy use so you know where the big fish are. ➤ Interval data analysis to find quick wins. ➤ How to extract useful information from plans ➤ Managing missing data ➤ Preparing an energy use breakdown (you want to be accurate, right?) ➤ Overview of what the business case requires ➤ Applying the energy efficiency hierarchy to identify energy savings ➤ How to get input from site users ➤ How to quantify energy savings ➤ How to identify and quantify non-energy savings ➤ How to verify that savings opportunities are reasonable ➤ How to determine the costs of the energy savings measures. ➤ Estimating uncertainty to better manage risk ➤ How to estimate emissions savings ➤ Preparing and tabulating the business case ➤ Present the economic benefit in 3 different ways ➤ After all the work you're now on stage - the energy audit presentations ➤ Preparing the energy audit report ➤ Follow up if you want energy to be saved ➤ Identifying the savings achieved (and losses avoided!) ➤ Congratulations on completing this module!
Tools for Energy Auditors	<ul style="list-style-type: none"> ➤ Introduction ➤ What characterises a good measurement tool ➤ Types of tools needed by an energy auditor ➤ Tools for electricity measurement ➤ Water flow and thermal metering ➤ Illumination measurement ➤ Temperature measurement tools ➤ Air flow and differential pressure measurement tools ➤ Other measurement tools ➤ Data logging ➤ Accessing logged data and getting it into a useful format ➤ Demonstration of getting data in a useful format ➤ BMS and SCADA systems - potentially lots of good data ➤ Spreadsheets ➤ Dedicated energy audit software ➤ Apps ➤ Visual communication tools ➤ Module summary

Energy Fundamentals for Energy Audits

- Introduction
- Your best friend - the first law of thermodynamics
- Introduction to energy calculations
- Characteristics of water
- Characteristics of air
- Characteristics of fuels and combustion
- Electricity and its characteristics
- AC power
- DC power
- Losses in electricity transmission and distribution
- AC Voltage and equipment efficiency
- Heat Transfer
- How to avoid the easy-to-make mistake even the smartest auditors make
- Module summary



Training Set Two - Energy Using Technologies and Savings Opportunities.

This is a series of four, online, on-demand modules and assessments, covering:

Energy Efficient Lighting. Learn the fundamentals of energy efficient lighting in this course, and save more lighting energy!

Fundamentals of Energy Efficient HVAC. Knowing how to minimize HVAC energy use is core knowledge every energy manager, energy auditor, HVAC contractor or consultant needs.

Fundamentals of Energy Efficient Domestic Hot Water & Water. This course covers both domestic hot water and water use more broadly.

Introduction to Energy Efficiency in Industrial systems. Covers electric motors, compressed air, refrigeration, steam and this course provides an introduction to these technologies and energy efficiency opportunities.

Module Name:	Lesson Names:
Energy Efficient Lighting	<ul style="list-style-type: none"> ➤ Introduction to how lighting works ➤ Light fundamentals and daylight ➤ Artificial Light and its characteristics ➤ Introduction to Components of Lighting Fixtures ➤ Housing ➤ Power Supply or Ballast ➤ The Light Source ➤ The Optics which Direct the Light from the Light Source ➤ A Lighting Sankey Diagram ➤ Develop an EE Hierarchy for Lighting ➤ The EE Hierarchy applied to Lighting ➤ Daylighting and controls, occupancy sensing and LED lighting efficiency ➤ Assess the Existing Lighting ➤ Interactive Effects ➤ Preparing the Business Case for a Lighting Upgrade
Fundamentals of Energy Efficient HVAC	<ul style="list-style-type: none"> ➤ Introduction to HVAC systems ➤ Thermal Comfort ➤ Degree days as a rough indicator of climate ➤ Heating ➤ Introduction to the Vapour Compression Cycle ➤ How the Vapour Compression Cycle works ➤ Coefficient of Performance ➤ Improving the efficiency of the Vapour Compression Cycle ➤ The Vapour Compression Cycle for Heating ➤ Simultaneous heating and cooling ➤ Heat exchange ➤ Refrigerants

	<ul style="list-style-type: none"> ➤ Types of Vapour Compression Systems ➤ Cooling - Air Movement and Evaporation ➤ Ventilation ➤ Filtration ➤ Heat Recovery Ventilation ➤ Air handling, conditioning and distribution systems ➤ Non-air systems ➤ Fans and Pumps ➤ Control Systems ➤ Sankey Diagram for HVAC ➤ Develop a EE Hierarchy for HVAC ➤ EE Hierarchy ➤ Passive measures to reduce HVAC load ➤ Optimising the Existing System ➤ System Replacement ➤ Preparing the Business Case for a HVAC Upgrade
<p>Fundamentals of Domestic Hot Water and Water</p>	<ul style="list-style-type: none"> ➤ Introduction ➤ Energy Required to Heat Water ➤ Water, Bacteria and Legionnaires' Disease ➤ Electric Storage, Resistive and Heat Pumps ➤ Solar Systems ➤ Gas Storage Systems ➤ Calorifiers ➤ Storage Tank Pressurisation, Stratification ➤ Storage System Losses and Inefficiencies ➤ Continuous Flow / Instantaneous / Tankless hot water heaters ➤ Instantaneous System Losses and Inefficiencies ➤ Hot Water Distribution Systems and Losses ➤ Water Uses, Water Leaks ➤ Taps and Showers ➤ Toilets, Cisterns and Urinals ➤ Domestic Machines, Cooling Equipment, Garden ➤ Rainwater ➤ Sankey Diagrams for Domestic Hot Water ➤ Develop an Energy Efficiency Hierarchy for Domestic Hot Water ➤ An Energy Efficiency Hierarchy for Domestic Hot Water ➤ Practical Considerations for Domestic Hot Water Savings
<p>Introduction to Energy Efficiency in Industrial Systems</p>	<ul style="list-style-type: none"> ➤ Introduction ➤ How motors use energy ➤ Motor efficiency and opportunities ➤ Electric motor Sankey diagram ➤ Your turn to develop a Sankey diagram for motors ➤ Sankey diagram solution for motors ➤ Motor system opportunity analysis summary ➤ Introduction to compressed air systems ➤ Compressed air efficiency and opportunities ➤ Sankey diagram for compressed air ➤ Your turn to develop a business case for a compressed air project

- Compressed air business case solution
- Compressed air opportunity summary
- Introduction to steam
- Steam energy efficiency and savings opportunities
- Steam System Sankey Diagram
- Your turn to try by developing an Energy Efficiency Hierarchy for Steam.
- My Energy Efficiency Hierarchy for the example hospital steam system
- Steam System Opportunity Analysis Summary
- Introduction to Refrigeration.
- Refrigeration savings opportunities.
- Refrigeration system Sankey Diagram review
- Your turn to try by developing an Energy Efficiency Hierarchy for Refrigeration.
- My Energy Efficiency Hierarchy for the example supermarket refrigeration systems.
- Refrigeration Opportunity Analysis Summary
- Industrial Systems Module Summary



A robust blended assessment process

The IGEA certification is based on a blended assessment process that tests both for knowledge with questions – and provides feedback on student responses to those questions, whilst also requiring an actual energy audit of a real site the examinee is familiar with. Such an approach assesses both underlying knowledge and the skills needed to actually undertake an Investment Grade Energy Audit.

Additionally, certification entails attending an interview, and the submitted energy audit is accompanied with a reference check.

The three steps to full certification are:

1. Complete the IGEA training and pass the assessments in each training module.
2. Attend an interview; pass the interview and obtain **Investment Grade Energy Auditor - Provisional (IGEAprov)** certification.
3. Complete and submit an Investment Grade Energy Audit; pass the assessment of the audit and the referee check and obtain full **Investment Grade Energy Auditor (IGEA)** certification.

Assessments in the IGEA training

The eight individual training modules that need to be completed before undertaking and submitting the IGA have questions throughout them, which students must answer in order to progress, and with feedback provided immediately to students. The testing throughout the eight individual modules is not, however, limited to just multiple-choice questions. There are a variety of other question types, including free text entry for numerical questions. In this case there is no element of chance, you either enter the correct number or not.

In fact, there are many more assessment questions across these eight modules than there are in other energy efficiency certifications based on a high-pressure exam environment after an intense training program.

The competencies addressed by each of the training modules are listed in the following table.

Competency	Details
Can commission, manage and review an energy audit.	<ul style="list-style-type: none"> ➤ Plan for an energy audit. ➤ Scope the energy audit. ➤ Identify the resources required to act on the audit's recommendations. ➤ Manage the audit and assist the energy auditor. ➤ Review the audits findings and decide on the energy savings measures to implement.
Follows a systematic process when undertaking an energy audit.	<ul style="list-style-type: none"> ➤ Engage effectively with the energy user. ➤ Develop an energy use baseline. ➤ Develop a breakdown of site energy use. ➤ Accurately identify tariffs to apply to savings calculations. ➤ Benchmark site energy usage. ➤ Follow a systematic process to identify & quantify savings and costs.
Uses energy audit tools effectively.	<ul style="list-style-type: none"> ➤ Select tools that are fit for purpose. ➤ Extract data from tools and convert into a form suitable for analysis. ➤ Identify common problems with the use of tools and how to avoid them. ➤ Layout an energy audit spreadsheet. ➤ Value the importance of communication and presentation tools.
Understands the fundamental physics and thermodynamics of energy use and conversion.	<ul style="list-style-type: none"> ➤ Apply the first law of thermodynamics. ➤ Determine the overall efficiency of a process or system. ➤ Determine energy use associated with mass transfer. ➤ Calculate electrical and thermal energy transfer. ➤ Apply characteristics of water and air to energy calculations. ➤ Understand the impact of AC voltages and power factor.
Understands the fundamentals of energy efficient lighting.	<ul style="list-style-type: none"> ➤ Identify energy inefficiencies in a lighting system. ➤ Evaluate lighting control systems for effectiveness in saving energy. ➤ Assess daylighting systems for energy saving impact. ➤ Understand efficiencies of different light sources and expected future efficiency improvements of LED lighting. ➤ Consider desirable and undesirable co-benefits associated with a lighting upgrade. ➤ Calculate expected annual and lifetime savings from a lighting upgrade.
Understands the fundamentals of energy efficient HVAC	<ul style="list-style-type: none"> ➤ Identify energy inefficiencies in a HVAC system. ➤ Evaluate HVAC control systems for effectiveness in saving energy. ➤ Understand the vapour compression cycle and what determines the energy usage of the vapour compression cycle. ➤ Analyse a HVAC system and calculate its overall efficiency. ➤ Identify and understand the energy impact of technologies used for heating, cooling, ventilation, and air filtration. ➤ Develop a business case for measures that reduce HVAC energy usage.

<p>Understands the fundamentals of domestic hot water and water usage in buildings</p>	<ul style="list-style-type: none"> ➤ Identify energy inefficiencies in a domestic hot water system. ➤ Calculate energy and water savings from lowering flow rates. ➤ Assess direct flow and ring-main systems for savings opportunities. ➤ Understand the energy using characteristics of instantaneous and storage hot water systems, including natural gas systems, electric resistive, electric heat pump, and solar hot water systems. ➤ Calculate expected savings from a domestic hot water upgrade.
<p>Has an introductory understanding of energy efficiency in Industrial Systems</p>	<ul style="list-style-type: none"> ➤ Understand the basic energy using characteristics of industrial systems covering electric motors, compressed air systems, steam systems and refrigeration. ➤ Calculate simple efficiency parameters of industrial systems. ➤ Apply the energy efficiency hierarchy to industrial systems to identify energy savings opportunities. ➤ Identify more energy efficient alternatives to highly inefficient industrial systems. ➤ Calculate expected savings from simple industrial system upgrades

Interview

The interview can be attended after successfully passing all modules in the IGEA training and providing certificates of competency for each module.

In the interview, conducted live (virtually), the candidate needs to be able to demonstrate the ability to be able to quickly recall areas of knowledge associated with each of the key competencies.

Candidates are provided written feedback after the interview.

Energy audit submission and referee check

The assessment of the energy audit submitted by the student, and accompanying referee check, are used to assess that the auditor has the ability to be able to undertake an energy audit and engage with the energy user. It also assesses that the audit satisfactorily identifies and quantifies all energy sources and where energy is used, in addition to identifying a comprehensive set of savings opportunities that have costs and benefits estimated to an investment grade level of accuracy.

Written feedback is provided to the candidate.

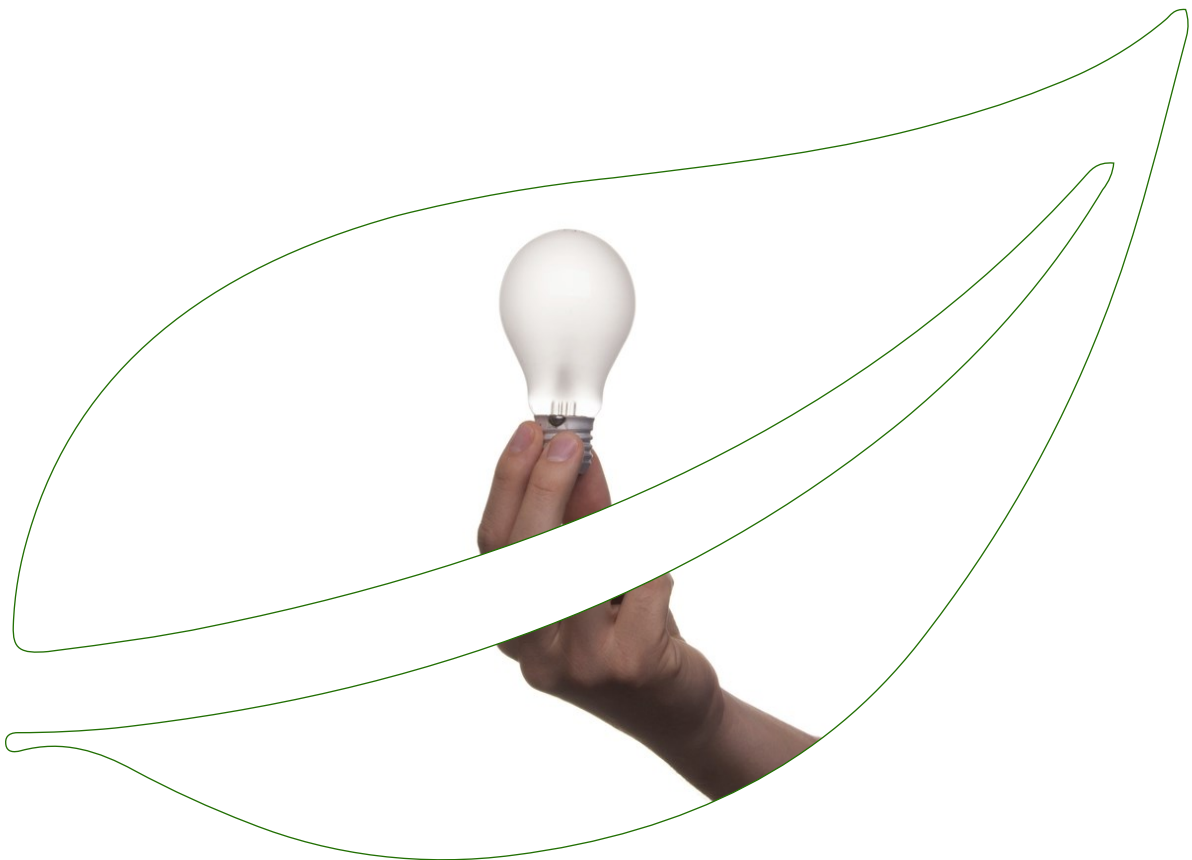
How to be certified as an Investment Grade Energy Auditor

Candidates wishing to achieve the IGEA certification need to

1. Complete all eight modules in the IGEA training and pass the assessments in each module.
2. Attend an interview; pass the interview and obtain **Investment Grade Energy Auditor - Provisional (IGEAprov)** certification.
3. Complete and submit an Investment Grade Energy Audit; pass the assessment of the audit and the referee check and obtain full **Investment Grade Energy Auditor (IGEA)** certification.

Documentation requirements

Candidates need to provide proof of identification, and the investment grade audit when submitted needs to be submitted with evidence that the audit is the work of the candidate.



Timing

It takes around 4 to 7 months to become an IGEA, as tabled below.

Component	Time required (if the IGEA certification is your full time focus)	Suggested duration for a student taking the course whilst also working full time
Four online, on demand training modules and assessments: undertaking an Energy Audit	1 week	6 weeks
Half day live session on Undertaking an Energy Audit*	4 hours	4 hours
Four online, on demand training modules and assessments: Energy Using Technologies	1 week	6 weeks
Half day live session on Energy Using Technologies*	4 hours	4 hours
Interview	1 hour	1 hour
Section 3 - Prepare and submit an investment grade Energy Audit	3 - 6 weeks + 3 to 4 weeks for the audit to be assessed and undertake a referee check	3 months + 3 to 4 weeks for the audit to be assessed and undertake a referee check
Overall time required to become an IGEA	4 months	7 months

*As may be optionally provided by a Sustainability Education Academy training partner.

Benefits of IGEA training and assessment to candidates

The world is crying out for more people with energy efficiency expertise. Yet it is not easy to get this expertise, and much of the certification associated with improving the energy efficiency of existing facilities is based on a [weak assessment process](#) that does not thoroughly establish competency.

Benefits of IGEA training and assessment include:

- If you already know it you can skip ahead and save time.
- You don't have to forget about your work to be certified.
- Not a high-pressure exam environment.
- Failure is not final.

Already know it? Skip ahead and save time

Some candidates may already have considerable experience and knowledge. Whilst all eight training modules do need to be satisfactorily completed prior to submission of the IGA, modules can be satisfactorily completed by passing the assessments, without needing to complete all the lessons.

If a candidate jumps straight into an assessment without completing the preceding lesson, and fails the assessment, the candidate can then review the lesson before retaking the assessment.

You don't have to forget about your work to be certified

The Sustainability Education Academy certification can be completed as you have time available, at your own pace, with it's on-line on-demand modules available 24/7.

Alternate "cram plus exam" certifications require students to set aside up to a week of their time to take the course and sit the exam. For many people, finding this time is not easy.

Not a high-pressure exam environment

Students going through the IGEA training and assessment aren't assessed in a high pressure, limited time exam setting.

In a high pressure limited time exam setting you aren't only being tested for your knowledge. You are also being tested on your "exam craft" skills, and ability to manage time in an exam setting. This is not a skill energy auditors should be assessed against!

Failure is not final

Many energy efficiency certifications delivered in a “cram plus exam” environment are expensive, and the results are final. Fail to pass the exam, and you’ve lost a lot of money - not to mention time away from work.

Across the eight training modules that comprise the IGEA certification, failure is not final. Fail an assessment, and:

1. You are provided feedback on each wrong answer.
2. You are free to take the assessment again, immediately, at no extra charge.

Questions are randomly drawn from a large pool of questions so as to not ask the same set of questions again. And providing feedback immediately will enhance learning and knowledge retention.

If you still don’t get the answers right you won’t pass, but will get additional feedback. By providing fast feedback and a “safe” learning environment, students can learn from their mistakes, and provided they do so, will be able to eventually pass a module.

Learning from our mistakes is one of the best ways to learn. With over 200 questions in the IGEA assessment you are sure to make some mistakes - but you’ll get expert feedback straight away - and thus learn.

Additionally you get notes from your assessor on the interview you attend and the investment grade energy audit you submit - notes which will help you recognize what you are good at, and where you can improve.

If you fail the interview or audit submission, you can pay the applicable fee and reapply for the interview and audit submission at any time. The feedback provided can be used to help ensure you don’t repeat your earlier mistakes.

Proof of certification

The certificate issued to a candidate has a QR code linking to a database on the Sustainability Education Site, proving its validity.

Additional benefits of enrolling through a training partner

When enrolling in the training through one of the Sustainability Education Academy’s exclusive training partners you are optionally (depending on the training partner) provided with two half-day face to face sessions, delivered using video-conferencing online.

Training partners deliver the IGEA over a seven month period to a batch of students.

The two face to face sessions enable engagement with other students and your instructor. The first session is on the process of undertaking an energy audit, and the second session on energy using technologies.

These sessions compliment the on-demand lessons, bringing to students the best of both on-demand self-paced training and live interaction with other students and the instructor.

How to get started?

Either purchase all courses in the series (including the individual course assessment and final assessment) and get 20% off;

Investment Grade Energy Auditor Certification

or enrol in the first module of the series:

Commissioning and Managing an Energy Audit.

About the Sustainability Education Academy

Our purpose is sustainability skill building. With massive pressures on our natural



environment due to human activity, the world is crying out for people with the skills and knowledge needed to enable us all to live long and healthy and creative lives but without compromising the biosphere for our children and future generations.

The purpose of the Sustainability Education Academy is to make it easy for both those already working sustainability and those wanting to work in sustainability to quickly learn and get better at transforming our economy to one with zero emissions and zero environmental harm.

www.sustainabilityeducationacademy.com