"Energy in Buildings and Industry and the Energy Institute are delighted to have teamed up to bring you this Continuing Professional Development initiative"

MARK THROWER MANAGING EDITOR

Starting out in energy management training

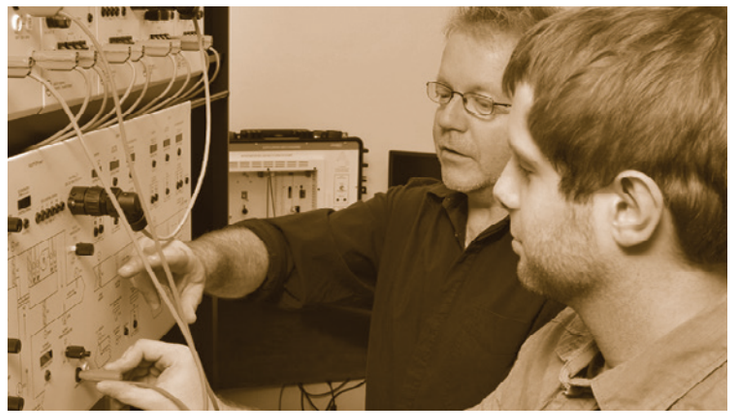
by Will Sadler, training team manager at the Energy Institute

The last 20 years have seen a dramatic shift in the role of the energy manager. The belt-and-braces, boiler room engineer that was traditionally associated with the role has transformed into a multi-disciplinary project manager, required to plan, communicate and lead across organisational teams. The skills required to manage energy successfully have shifted accordingly, with a broad range of financial and managerial skills required.

In 2016, the Energy Institute (EI) reviewed its Level 2 Energy Management Professional qualification. This process involved updating its structure to reflect the skills requirements of a modern energy manager, and therefore at the outset meant that these requirements had to be defined. This article will summarise the outcomes of this process. It will also cover how to perform a Training Needs Analysis (TNA) to help understand organisational skills requirements in energy management.

The viability of energy management as a career choice has been boosted by numerous professional qualifications and recognition opportunities that have developed in recent years as well as evolving organisational needs. Chartered Energy Manager, for example, provides evidence of a certain qualification and experience level and means that employers, clients, regulatory and insurance bodies have confidence in the individuals capability to manage energy use, legal compliance, investment programmes and to manage the associate risk. As professional grades and qualifications become more established, the recognition of energy management as a profession in its own right has also grown.

No individual leaves university with the full set of skills and required of a professional energy manager. It is important, either for yourself or your team, to go through the process of assessing your skills and where gaps may exist. The nature and scope of energy management roles is varied, so gaining a broad understanding of the field will support employability as well as confidence, reputation and skills.



Energy managers' backgrounds

Professional energy managers tend to come from one of two backgrounds: engineering or commercial/managerial. It is important to recognise the skill-sets each will provide.

For those with an engineering/technical background these gaps are likely to centre upon the managerial, financial or project management aspects of the role. These skills are increasingly essential for a modern energy manager who has to make sense of large quantities of data, report their conclusions effectively and use their analysis to build business cases for new projects.

Conversely, energy managers with a commercial or management background will often have less confidence with the technical aspects of an energy efficient project. This can result in over-reliance on suppliers or consultants when building cases for new projects, meaning that there is a risk of losing independence when analysing cost/benefits of certain solutions.

With these potential gaps in mind, the core skills and knowledge requirements for professional energy managers have been laid out below:

To fully understand energy consumption and have a full consideration of organisational risks, energy managers should understand the global implications of energy use, including climate change and the international response, as well as energy security issues.

It is also important to understand relevant environmental, health and safety and energy efficiency regulations that impact on your organisation. The EI has developed a policy milestone calculator as a tool to help review existing and upcoming legislation (available at https://knowledge.energyinst.org).

The ability to measure energy use precedes all subsequent efforts to improve efficiency; as Lord Kelvin famously said, "If you cannot measure it, you cannot improve it". The first energy management requirement of an organisation is therefore to have effective energy monitoring systems in place.

For an energy manager, this means understanding what metering systems

will be most appropriate for their organisation, how to use monitoring to effectively establish the existing pattern of consumption, and the ability to identify a level of energy consumption which can be set as a goal for any energy management programme (Targeting). Energy managers should be confident in each of the four stages of the monitoring and targeting process:

• data collection: how to collect effective energy consumption data;
• data analysis: checking for accuracy, completeness and quality, before interpreting data using various methodologies (e.g. profile analysis, degree day analysis, linear regression analysis and CUSUM);•reporting: Providing reports on energy consumption analysis to management as well as individuals responsible for particular areas of energy use. These should be tailored depending on the audience; and• action: ensure a management structure exists that helps make effective use of M&T reports.

Completing an audit

All energy managers should be competent in completing and reporting an energy audit. These could be of varying degrees of complexity depending on the site or business requirements, but should always be reported effectively. The ability to structure and write an audit report that is concise, clear and relevant to the reader is a skill that often takes training, experience and support to perfect, and is central in demonstrating the value of energy management activities to management.

Energy managers should be able to complete an audit in a methodical way, in line with energy auditing best practice (the BS EN 16247 standard is commonly used here). The key outcome from any energy audit is the identification of energy saving opportunities, which should be listed as prioritised recommendations, showing energy and cost savings along with payback period. It is not possible to conduct a successful energy audit without some understanding of the technologies that are being assessed.

Depending on their working environment, energy managers will be exposed to a wide range of technologies. In order to operate successfully, they will need a reasonable understanding of those they have in place (meaning that they should be able to have informed conversations with suppliers and specialists), as well as any technologies that may be

adopted in the future.

Example of key technologies include:

• motors and drives: due to long operating hours of motors and their high energy intensity, there is often a large potential for cost-effective energy saving opportunities to be identified. As a minimum, energy managers using motors should understand the use and basic operation of common types of motors, as well as how and where energy losses can occur and the international classification system for motors and drives. They should also be able to identify where variable speed drives could be used to reduce energy usage and other opportunities for improving efficiency, like maintenance and operational controls;• lighting: lighting is a key energy consumer in almost all organisations and therefore is a responsibility of most energy managers. It is important to understand the various artificial lighting options, their individual characteristics, and how best to form a business case for an energy efficient lighting solution. There is also a design aspect involved in lighting, involving minimising electricity consumption while meeting Health and Safety and environmental requirements and without compromising the quality of light output;• HVAC: heating, ventilation and air conditioning (HVAC) is designed to provide a comfortable and healthy indoor environment for building occupants. Energy managers must understand how to meet this aim as well as where efficiency can be achieved. This includes being able to calculate ventilation and air change requirements, understanding the characteristics of heating systems and how the various boiler types fit in, as well as where opportunities for efficiency can be made; and• controls: most energy efficient technologies have a control element, meaning that it is possible to in some way influence their behaviour. Effective use of controls is a fundamental part of managing energy usage, and these controls are quickly becoming more sophisticated. Many organisations already have a building management system (BMS), which forms a centralised network to communicate with and control various items of electrical and mechanical equipment. Energy managers should at a minimum understand the control features of each item of equipment installed and how to organise building operation so that controls are used effectively. In order to use a BMS effectively, control theory should be applied, and the energy manager should be able to carry out a feasibility study into which BMS to install.

Funding for projects is currently particularly tight within many UK organisations. For energy managers, this means that the ability to build effective business cases and to communicate these to the board is ever more important. Despite COP 21 throwing a global spotlight on climate change, for energy managers, cost will be the principal driver for investment decisions. It is important for energy managers to have confidence in how to identify and use the most appropriate financial tools for evaluating the benefits and risks of a project; most energy efficiency projects will now be presented in terms of life cycle cost.

Energy managers should also understand energy procurement, in terms of identifying and managing risks when buying energy utilities, which can be particularly pertinent due to market volatility. Energy managers should be able to clearly set out the potential impacts on an organisation of prices exceeding defined tolerances. This could include the requirement to map out a plan for buying and using energy over a longer term, incorporating risk mitigation strategies. Procurement of either energy or technology often involves negotiation, which is a particular skill that often requires both some technical understanding of the item being purchased, as well as experience in handling negotiations. This is one area that mentoring or shadowing can be particularly useful in terms of building a skill-set.

Organisational risks

A key consideration when setting out a business case for a project is the organisational risks associated with implementation. For energy projects, a risk assessment matrix is a simple tool to analyse technical and commercial risks, and knowledge and understanding of financial vehicles such as Energy Performance Contracts will help to give a full picture of possible funding options.As discussed previously, energy managers from commercial or managerial backgrounds are often less confident when analysing energy efficient technologies or performance from a technical point of view. With this in mind, it is particularly important for energy managers without a scientific or engineering background to learn the core engineering theory that acts as a basis for energy management.

The principles of heat transfer, for example, are integral to the use of HVAC and building physics. Energy managers should understand the fundamental terms of heat transfer such as work and heat as well as the laws of thermodynamics. Heat flow, including knowledge of the principles behind conduction, convection and radiation are central to how heating and cooling systems function. Although for most energy managers there is no need to know these subjects in detail, a grasp of the key concepts mean that all calculations or project planning will be grounded in engineering realities.

One of the key responsibilities of energy managers is to manage the consumption of various common energy sources such as fossil fuels , bio-fuels and renewables . To extract useful energy from fossil and bio-fuels, a combustion process needs to take place and the energy manager's role is to ensure this happens in an energy efficient and environmentally friendly manner.

Developing a good grasp of combustion chemistry and technology is essential firstly for understanding whether an organisation is burning its fuels in an energy efficient and environmental friendly manner, and

energy institute
For details on how to obtain your **Energy Institute CPD Certificate, see entry form and details on page 32**

secondly for identifying opportunities for improvement.

It is important to understand energy management as a long term process of improvement, rather than a series of quick wins. Ensuring that energy is managed in a systematic way is fundamental to achieving this, and energy managers should understand the principles of an energy management system, of which ISO 50001 is the key international standard.Energy management is a cross-organisational discipline which relies on collaboration to secure buy-in from stakeholders at various levels of an organisation. Energy managers should be seen as the leader of the energy efficiency agenda, including establishing the organisation's energy strategy (in conjunction with related areas such as sustainability), setting its energy policies and identifying internal support and barriers.

An energy manager is, as a core part of their role, constantly pushing to justify their own worth within their organisation, and as such have to be skilled at communicating their activities and projects. An experienced energy manager should be comfortable presenting their cases at board level and should understand how to achieve buy-in for energy efficiency across their organisation.

Changing behaviour of staff members is one of the key challenges of the modern energy manager. Increasing awareness through innovative programmes and campaigns, raising the profile of energy in meetings and publishing material on energy conservation are all tangible tools which help drive efficiency through an organisation. Setting targets for staff, letting them know how they can help save energy and, most importantly, keeping them informed about progress and successes, can provide significant savings. Communication, people, project management and finance skills are all required.

Skills for the team

An energy manager should be responsible for their own development as well as ensuring that any wider energy team has the required skills to operate successfully. The process of completing an internal training needs analysis has been included below.

A training needs analysis (TNA) is defined as "identification of training requirements and the most cost-effective means of meeting those requirements". TNAs should ideally be carried out at regular intervals, but particularly whenever skills gaps or performance problems have been identified, with the anticipated introduction of a new system, task or technology, or if an opportunity has been identified that could bring a desired benefit for the organisation. They can either be implemented within your energy team, or on an individual basis in order to identify your own knowledge and skills gaps.

There are 9 key steps in conducting a training needs analysis. During each stage, seek to collect information from a variety of sources as appropriate for your organisation. Most importantly, consult with your staff through interviews and questionnaires, but you should also gather further information by evaluating job descriptions, appraisals, company policy and, of course, your own observations.

STEP 1: Determine your desired business outcomes. Analyse your core business objectives to determine which areas would be improved upon by professional development of staff.

STEP 2: Link desired business outcomes with employee behaviour. Determine what is keeping staff from reaching these objectives. Employees must 1) know what to do, 2) have the capability to do it, and 3) have the motivation to do it. Consider these factors and determine a set of desired critical competencies. Prioritise this list by level of importance to successful job performance (1=not at all, 2=a little, 3=somewhat, 4=considerably, 5=extremely), and focus the rest of your analysis on the competencies that rank at 4 or 5.

STEP 3: Identify trainable competencies. It may be impractical to try to improve on certain critical competencies through professional development, particularly in cases where extensive training beyond professional development courses is required, on in cases where the competency is strongly based on personality. Leave these out of the rest of your training needs analysis in favour of determining alternative ways to develop in these areas, such as hiring staff with stronger academic backgrounds in the subject area or more of the desired character traits to fill roles that require them.

STEP 4: Evaluate competencies. Determine the extent to which staff have room to develop in each critical competency required. This can be done through qualitative analysis but competency evaluations, tests or assessments can be particularly useful during this stage.

STEP 5: Determine performance gaps. Think about what constitutes a skills gap in your organisation (will vary based on standards expected in your organisation) and analyse aggregate results from step 4 to determine the number of staff that you consider to have a skills gap and are therefore in need of development. Do this for each critical competency.

STEP 6: Prioritise needs. Consider the competencies with the most extensive skills gaps against the importance of the competency to determine key areas for professional development.

STEP 7: Consider professional development options. For each need determined in step 6, consider what form of development would work best. Training is an obvious choice but may not be the best fit. Consider on-the-job training, mentoring/coaching, free online/print resources, and conferences as alternatives that may prove more time and cost efficient.

For training courses, consider the type of course - public courses are often the best option for one or two delegates, however if you have multiple staff members requiring the same training, commissioning in-house training can be the best value option and will allow for content to be bespoke to your individual needs. Alternatively, online and distance-learning courses allow for staggered training throughout your team, eliminate travel and subsistence expenses and allow for maximum flexibility around busy work schedules.

STEP 8: Conduct a cost-benefit analysis. Consider the costs associated with each professional development method. Cost factors include: required training time, content development if designed in-house, cost of training if purchased, lost productivity from time spent on training, and travel and logistical expenses. Also consider what method will lead to the greatest retention of information as this will affect value for money. Retention is about 75 per cent where staff are able to perform the task as they learn. Other forms of learning retention are: 1) discussion group – 50 per cent, demonstration – 30 per cent, audio-visual – 20 per cent, reading – 10 per cent., and lecture – 5 per cent.

STEP 9: Plan for evaluation. Decide how you will measure the results of training determine effectiveness. Bear this in mind during the training acquisition/development process.

Once your TNA is complete, you should have a good idea of the areas in which you can look to develop, either for yourself or your team.. Professional development should be completed with long term goals in mind, such as meeting the competencies for Chartered Energy Manager, to ensure you progress efficiently and effectively in your future career.

Will Sadler is the training team manager at the Energy Institute, the chartered professional membership body for energy, which works to support energy professionals by sharing knowledge and developing skills. He has been instrumental in developing the UK's framework of professional energy management training qualifications, including leading the conception and development of the EI's new online Level 2 Energy Management Professional qualification, and developing various online energy management tools such as the EI's EnergyAware online staff awareness tool.

• For further information on how the EI supports energy management professionals please visit www.energyinst.org/energy-management, contact Will at wsadler@energyinst.org or call 0207 467 7135.

For details on how to obtain your **Energy Institute CPD Certificate, see entry form and details on page 32**

CPD SERIES **14** | MODULE **06** | NOV/DEC **2016**

ENTRY FORM

TRAINING FOR ENERGY MANAGEMENT

Please mark your answers on the sheet below by placing a cross in the box next to the correct answer. Only mark one box for each question. You may find it helpful to mark the answers in pencil first before filling in the final answers in ink. Once you have completed the answer sheet in ink, return it to the address below. Photocopies are acceptable.

QUESTIONS

1. What of the below is not a methodology for interpreting energy data?

- ☐ CUSUM
- ☐ Degree day analysis
- ☐ Net Present Value
- ☐ Linear regression analysis

2. Which standard is commonly used for energy auditing best practice?

- ☐ BS EN 16247
- ☐ ISO 50001
- ☐ ISO 14001
- ☐ BS EN 100025

3. Which of the below falls outside what energy managers would typically need to know in relation to motors?

- ☐ How and where to use Variable Speed Drives
- ☐ The international classification system for motors
- ☐ The common motor types
- ☐ A detailed technical specification of every type of motor

4. Where might an energy manager with a management background typically need professional development support?

- ☐ Building a business case
- ☐ Communication
- ☐ Technical theory
- ☐ Procurement

5. Which of the below is a control technology?

- ☐ Halogen bulb
- ☐ Building Management System (BMS)
- ☐ ISO 50001
- ☐ CUSUM

6. What financial tool will most energy managers use to make the case for energy efficiency projects?

- ☐ Life Cycle Cost Analysis
- ☐ Energy Performance Contracting
- ☐ Linear regression analysis
- ☐ Cash flow analysis

7. Which of the below engineering principles are most useful for energy managers to understand?

- ☐ The laws of thermodynamics
- ☐ The Casimir effect
- ☐ The Complementarity Principle
- ☐ Murphy's law

8. What four stages are often used for monitoring, targeting and analysing data?

- ☐ Collection, analysis, reporting, action
- ☐ Plan, Do, Check, Act
- ☐ Preparation, incubation, illumination, verification
- ☐ Identify, prioritise, accomplish, maintain

9. Which of the below skills is least applicable to managing a successful behaviour change campaign?

- ☐ Communication
- ☐ Project management
- ☐ Negotiation
- ☐ People skills

10. When conducting a Training Needs Analysis, what should you do as a first step?

- ☐ Evaluate staff competencies
- ☐ Determine your desired business outcomes
- ☐ Determine gaps in staff performance
- ☐ Determine what staff competencies are trainable

Please complete your details below in block capitals

Name ..... (Mr. Mrs, Ms) .....

Business .....

Business Address .....

.....

.....

..... Post Code .....

email address .....

Tel No. .....

Completed answers should be mailed to:

The Education Department, Energy in Buildings & Industry, P.O. Box 825, GUILDFORD, GU4 8WQ

CPD **fundamentals**

THE CONTINUING PROFESSIONAL DEVELOPMENT PROGRAMME

How to obtain a CPD accreditation from the Energy Institute

Energy in Buildings and Industry and the **Energy Institute** are delighted to have teamed up to bring you this **Continuing Professional Development** initiative.

This is the sixth module in the fourteenth series and focuses on **Training for Energy Management**. It is accompanied by a set of multiple-choice questions.

To qualify for a CPD certificate readers must submit at least eight of the ten sets of questions from this series of modules to EiBI for the Energy Institute to mark. Anyone achieving at least eight out of ten correct answers on eight separate articles qualifies for an Energy Institute CPD certificate. This can be obtained, on successful completion of the course and notification by the Energy Institute, **free of charge** for both Energy Institute members and non-members.

The articles, written by a qualified member of the Energy Institute, will appeal to those new to energy management and those with more experience of the subject.

Modules from the past 13 series can be obtained free of charge. Send your request to editor@eibi.co.uk. Alternatively, they can be downloaded from the EiBI website: www.energyzine.co.uk

SERIES 13

MAY 2015 - APR 2016

1 Heat Pumps
2 Industrial CHP
3 ESOS
4 Compressed Air
5 Refrigeration
6 Shading Systems
7 Transformer Technology
8 Solar Thermal Energy
9 Fuel Cells
10 District Heating

SERIES 14

MAY 2016 - APR 2017

1 Biomass
2 Behaviour Change
3 Energy Management Standards
4 Air Conditioning
5 Internet of Things
6 Training for Energy Management
7 Data Centre Management*
8 Metering & Monitoring*
9 Boilers & Burners*
10 Demand-Side Management*

** ONLY available to download from the website after publication date*

The Energy Institute (EI) is the professional body for the energy industry, developing and sharing knowledge, skills and good practice towards a safe, secure and sustainable energy system. The EI supports energy managers by offering membership and professional registrations including Chartered Energy Manager, as well as workshops, events, training and networking opportunities across the UK and overseas. It also produces a number of freely available knowledge resources such as its online Energy Matrix and energy management guide.

energy institute