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Standards set a common language

By Rajvant Nijjhar, director of iVEES, Independent Verifiers of Energy Efficiency Savings

Standards are important for a number of reasons. Firstly, a standard ensures that we all talk the same common language, as the meaning of key terms is clearly defined. Secondly, they create definitive and repeatable tools, methodologies or approaches, providing a level playing field.

This CPD article discusses the standards making process, followed by an overview of key International Standards related to energy management (below) together with key points of note.

- ISO 50001: Energy Management Systems;
- ISO 50002: Energy Audits;
- ISO 50006: Energy baselines; and
- ISO 50015: Measurement and Verification of energy performance

(Please note abbreviated titles for convenience)

The standards making process for International Standards as set out by the International Standards Organization (ISO) is a tried and tested formal process set within strict rules and directives (www.iso.org/directives) with a voting or balloting process for approval. The various stages are:

1) A New Work Item Proposal (NWIP) is first proposed by a nominating country outlining the scope, the business need and the timescales (between two to four years) to within which they would like to see a new standard published. This is presented to a relevant ISO Technical Committee (TC) and discussed at the next Plenary meeting. A recent example of an NWIP proposed to TC301 on 'Standardization in the field of Energy Management and Energy Savings' is one on Energy Efficiency Financing Tools (full title to be finalised). This is then circulated to each participating country's National Standards Body for further circulation to their mirror committee. After discussion within the mirror committee, a decision to vote 'yes', 'no' or 'abstain' is made within a set balloting period.

Upon majority approval of two thirds 'yes' vote, and at least five participating countries, ISO agree to its development and a convenor(s) is appointed. Participating member countries of that TC can then choose to participate and put forward country experts or simply be involved at the voting stage.

2) Typically, the next stage is a Working Draft (WD) – a document written by an expert in the nominating country (usually the same expert that put forward the NWIP). This is circulated for review, via international meetings or otherwise to the participating countries' mirror committee for comment. The review or feedback is returned in a set tabular format provided by ISO and collated by the appointed convenor of the standard. During international meetings, this is commented upon by the experts sent by the participating country working on that standard. At this stage, the scope and document is being defined and refined; fundamentals are being agreed upon – such as an international view point of the definition of 'energy' or 'energy performance improvement'. It's important to get the vocabulary right from the start. Even if a definition has been previously agreed in a previous standard, this can change or be adapted for the scope and purpose of the new standard being proposed.

3) The review process typically continues on from WD to Committee Draft, (CD). Again, a series of collated comments in set tabular format are disposed of at various meetings. Sometimes these comments can be numerous. The latest TC301 meeting has a Working Group (WG) developing the next revision of ISO 50001 due for publication in Jan 2019. The meeting held in Stockholm, June 2016 had over 900 comments for review, though more commonly, comments are usually in the 400- 600 range. Comments are either then accepted, rejected or modified to ensure a fair and transparent process. The convenor is responsible for managing this and keeping the peace and so must remain neutral!

4) The final few stages - Draft International Standard (DIS) to Final Draft International Standard (FDIS) to International Standard (IS) are then considered to be tweaking rather than any fundamental re-writes.

The standard is now also open for comments by the public. A standard can go from DIS straight to IS if there is a majority two thirds 'yes' vote or no technical changes. At DIS/FDIS, the ISO editing team make final editing changes before the standard is published. Participating countries may adapt the front cover with their own graphics and National Standards Body branding.

A key tenant of the whole ISO approach is the consensus from participating countries. At each stage there is a voting process managed by the National Standards Body of the participating country e.g. BSi in the UK. This enables an international standardised approach to be developed. Although it is not uncommon to have two WDs or CDs, an DIS and FDIS as the various stages, it is possible to go straight from NWIP to DIS ballot for approval to become an international standard if the NWIP written was a very good draft in the first place.

It is worth mentioning at this stage some key differences between a standard and a protocol – not necessarily saying one is better than the other. A standard is established under stricter guidelines such the ISO Directives that focus on the consensus approach with the balloting process ensuring each participating country has a say. A protocol may be written by a committee with their own rules of engagement. For example, the convenor in the development of a standard has to be neutral whereas that for a protocol, they may have overall veto rights. For these reasons, a standard may also take longer to produce than a protocol.

A standard may also have more international input compared to a protocol – for example TC301 has twenty-eight participating member countries with voting rights and several other liaison organisations and ordinary country members with no voting rights. In the development of a protocol, experts might be chosen or selected by the convenor whereas under a standard they are sent to represent expert views by their nominating country standards body.

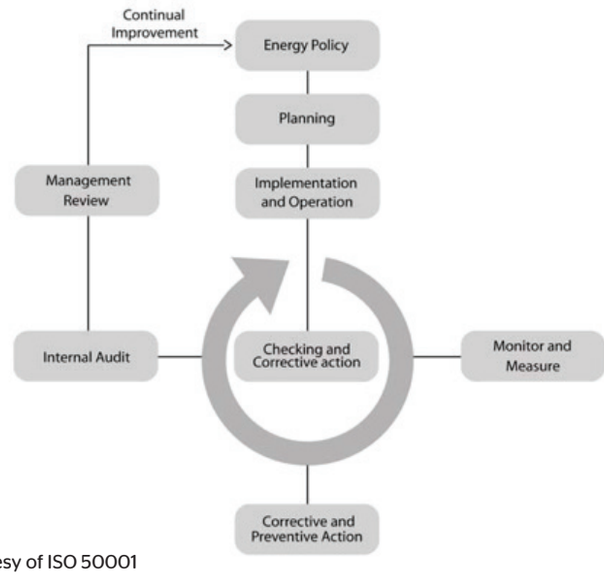
In some sense, a protocol might be more user friendly as this provides more information around best practice examples compared to a standard that hasmore defined statement orientated requirements.

ISO 50000 series of standards

The ISO 50000 series has ISO 50001 on 'Energy Management Systems in organizations' as the Type I requirements or 'thou shall' standard. An estimated 15,000 organisations worldwide are believed to be ISO 50001 certified (Jan 2016 estimation) or to have implemented the standard. Following its publication in July 2011, other Type II guidance or 'thou should' standards have been recently published such as ISO 50002 in Energy Audits, ISO 50003 on Energy Auditors, ISO 50004 on guidance to 50001, ISO 50006 on Energy Baselines and ISO 50015 on M&V principles and guidance. Please note above are all abbreviated titles and the international spelling of the words such as 'organization' etc.

Although these guidance standards are 'thou should' – when an organization is externally audited, the guidance standard tends to become 'thou shall' standard, or good reason needs to be provided to the auditor as to why the organisation has decided not to implement a particular clause.

Fig. 1



Courtesy of ISO 50001

ISO 50001 brief overview

This is the 'Energy management systems' overarching standard that follows PLAN-DO-CHECK-ACT (PDCA) format in line with other management systems standard. In addition, ISO 50001 is also looking for an improvement in your energy performance. To implement the standard, the scope and boundary of the organisation will need to be established. And as a management system standard, each stage in the process will need to be documented.

The process of implementation involves:

- Energy planning: policy development, understanding your significant energy uses (i.e. what equipment or process uses the most amount of energy), and undertaking an energy review that looks at the wider picture, leading to the identification of opportunities. The process involves developing an energy baseline for comparing energy performance before and after implementation of improvement measures and setting objectives and targets for improvement.
- An action plan to achieve these targets is then required to be developed and implemented. Understanding how you will measure and monitor the energy performance is also a requirement. Top management must assign necessary resources.
- Checking that you have met your targets is important to establishing your energy performance improvement.
- Once these results are known, it is necessary to act on any non-conformities or deviations from the expected result before setting new targets for further improvement. This management review need not only occur at the end of the process but top management is expected to review and record the status of the management system during the PDCA cycle to ensure it's working effectively.
- New legislation or other requirements such as better indoor air quality could affect the energy review. This means that you may need to develop new targets and measures and update the energy review. And so continues the cycle of improvement.

The standard maybe summarised in a snapshot as shown in Fig.1 :

KEY POINTS TO NOTE:

- ISO 50001 requires continual improvement in energy performance - a measurable result related to energy use, energy efficiency or energy consumption;
- Requires top management commitment including the provision of resources;
- Is not limited to any one sector or size or shape of an organisation;
- Self-declaration is allowed. However, for ESOS purposes external certification is required;
- The standard is currently being revised to meet the High Level Structure (HLS) - as are other management systems standards; and
- Although the next revision is due for publication in Jan 2019, this will not impact ESOS as a superseded standard may still be used for three years after a revised version is published.

ISO 50002 brief overview

ISO 50002 on Energy audits was adopted and adapted from the European Standard on Energy Audits - EN16247. Sometimes, standards are developed at a European standard and then they are deemed to have international importance and so they are brought into discussion at the ISO TC level and via the NWIP process, they might become an international standard. EN16247 had several parts – e.g. part 1 on general requirements has become ISO 50002 on 'good quality' energy audits, and the remaining parts 2-5 (buildings, process, transport, and competency of energy auditors respectively) are currently still EN standards although they may eventually be developed into International Standards, if they are approved via the NWIP process and taken forward.

As the aim of the standard is good quality audits, the process of implementation for ISO 50002 therefore involves:

- Energy auditor competency – having the right skills and knowledge as well as experience, objectivity or transparency;
- Understanding the aims of the audit, any criteria or timescales to adhere to etc. as well as delivering a sample format report of energy savings;
- Next a start-up meeting with all interested parties is required to discuss a brief about the energy audit objective, scope, boundaries and depth before agreeing the practical arrangements

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for the energy audit;

• Following this meeting, the auditor gathers data for developing an energy baseline from which to assess opportunities for improvement and then carries out a field work exercise to ascertain further data or to take measurements. The field work will comprise of site visits, collecting energy data, understanding if there is a repeating pattern, understanding if there are any relevant variables (factors affecting energy performance that changes on a routine basis), and selecting energy performance indicators;

• Identification and ranking of energy savings opportunities following economic exercise applied to ascertain suitable energy savings measures; and

• Then reporting on the findings to a set content format for rigour, and concluding with a final meeting with the interested parties.

KEY POINTS TO NOTE:

• The quality of energy audits can vary vastly according to the experience and rigour of the auditor. Therefore, this standard is about a standardised and rigorous process of implementation;

• The term 'energy review' is used in ISO 50001 – which differs to an energy audit as it is considered to continually look at the wider landscape and use other tools and techniques such as a Sankey diagram to identify your significant energy uses. An energy audit can be seen to be a specific step in the energy review process; and

• Either way, allocation of energy use to different kinds of application such as ventilation, lighting, heating, cooling can help to identify where the significant opportunities for savings can arise and therefore may aim or direct your audit/review towards these items.

ISO 50006 brief overview

The International Standard on energy baselines provides guidance on how to establish, use and maintain energy performance indicators (EnPIs) and energy baselines (EnBs) as part of the process of measuring energy performance. The standard can be used by any size of organisation in the energy management journey.

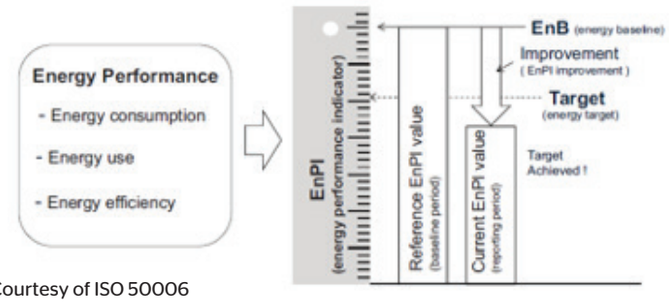
An EnPI is a quantitative value of energy performance – which can be:

• a simple metric – e.g. kWh or kW e.g. absolute energy consumption for lighting;

• a ratio – e.g. energy efficiency kWh/m2 of floor space for lighting intensity;

• or more complex model: e.g. a regression model for energy performance of a hotel with occupancy as a main driving factor

Fig. 2



Courtesy of ISO 50006

The EnB is then considered over a period of time called a baseline period that provides a representative period prior to the implementation of improvement measures.

The relationship between an EnPI and an EnB is illustrated below as Fig. 2

KEY POINTS TO NOTE:

• EnPIs can be used at a facility, system, process or equipment level or for the evaluation of individual energy savings measures;

• From this, an energy baseline should be long enough to ensure that a full process cycle is captured with any adjustments to relevant variables included;

• A great amount of work in ISO standards making is simply about explaining definitions - and this is one area in which consensus was sought from the international community regarding the language around such terms;

• So, in ISO terms, the word normalization is actually adjustments to a relevant variable;

• In IPMVP this means adjustments made to account for long-term averages or normal conditions – such as ten-year Heating Degree Days figures; and

• Non- routine adjustments are then for all other items that may or may not, trigger an engineering calculation to adjust to a baseline – such as, in my baseline period, equipment was broken down, but during my reporting period this was fixed and therefore my facility would have consumed more energy as a result.

ISO 50015 brief overview

This is the international standard on 'Measurement and Verification (M&V) principles and guidelines'. It can be used with or without ISO 50001, for part of, or for all of an organization, for the M&V of energy performance, or energy performance improvement. The standard follows a similar PDCA format and documentation management process as with other standards in general.

The guide provides a process that involves:

1) M&V Planning covering a number of areas such as

• the scope and purpose of the M&V;

• the organization for which M&V is being carried out;

• the reasons for carrying out the M&V;

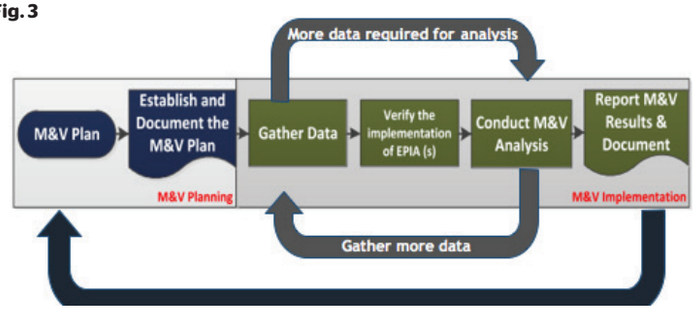
• M&V roles and responsibilities;

• M&V method to be used including the energy baseline and any consequential effects;

• data to be collected and data collection frequency;

• confirmation that the scope is within the capability of the M&V Practitioner etc.

Fig. 3



The M&V implementation phase covers a number of areas such as:

• actually gathering data as defined in the planning stage;

• verifying measures have been implemented;

• checking the M&V results through M&V analysis; and

• finally reporting the M&V results.

The process of M&V planning and implementation may continue, as defined in the earlier in the process, or if the baseline has changed considerably requiring a new plan to be established and documented. As such, the process can be outlined as below in Fig. 3:

KEY POINTS TO NOTE:

The standard is about increasing the credibility of M&V savings and so is quite statement orientated on key M&V principles e.g.:

Statements required on the impartiality and competence of the M&V practitioner

Confirming that the M&V is within capability of M&V Practitioner

Being transparent and have reproducible processes

Having good data management measurement appropriate to the resources etc.

It is method agnostic as there are many methodologies currently in existence albeit with nuances that cannot be standardised easily. A method such as those defined in the International Measurement and Verification Protocol (IPMVP) may be selected although deemed savings may also be used with adequate discussion on uncertainty.

Deemed savings (where no measurements are taken) is a plausible method under this standard – however uncertainty or a plausible range of variations should be discussed. .i.e. my lightbulb has a manufacturers rating of 50 watts, but a plausible range of variation could be +/- 20 watts and therefore equivalent energy savings are X.

Can be used at the organizational boundary level or in retrofit isolation projects as the scope allows for M&V for 'part of an organization'

Uses terminology consistent with ISO 50001 hence refers to EPIAs or Energy Performance Improvement Actions.

Load or peak demand shifting, and time of day use are therefore also considered improvement actions. This differs from IPMVP in terms of an ECM being an Energy Conservation Measure and therefore 'saving' energy.

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CPD SERIES **14** | MODULE **03** | JULY/AUGUST **2016**

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ENERGY MANAGEMENT STANDARDS

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) The minimum number of stages for a standard to be developed (excluding considering IS to be the final stage) is:

☐1 ☐2 ☐3 ☐4

2) Which of the following statements is true?

☐ The convenor(s) has to remain neutral in developing a standard

☐ The convenor(s) decides on the structure of the standard

☐ The convenor(s) is appointed by public ballot

3) Deemed savings are an acceptable method under ISO 50015?

☐ True
☐ False

4) An EnPI of energy consumption per square meter of usable office space for assessing the impact of the lighting retrofit project is used. Is this a valid metric?

☐ Yes
☐ No

5) EnPIs or EnBs can only be used at the facility level.

☐ True
☐ False

6) The boundary of M&V may be different to the boundary of an organization.

☐ True
☐ False

7) For how many years after a revised standard is published, is it generally still in use for?

☐1 ☐2 ☐3 ☐4

8) Which of the following statements are true?

☐ Only participating member countries can vote in ISO balloting process

☐ Only participating member countries and liaison organisations such as EVO or UNIDO can vote in the ISO balloting process

☐ All members – ordinary member countries, participating member countries, and liaison bodies can vote in the ISO balloting process

9) A Sankey diagram can be a useful tool in allocating your significant uses.

☐ True
☐ False

10) One of the main fundamentals of developing the Energy Audits Standards is to have same quality energy audits throughout industry.

☐ True
☐ False

Please complete your details below in block capitals

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

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