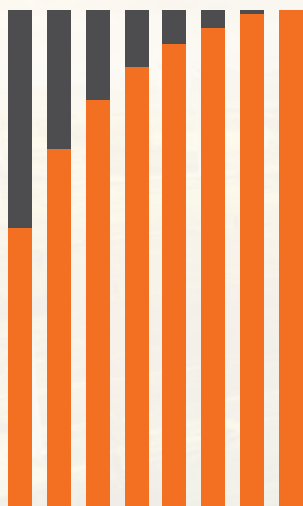




Global energy-related CO₂ emissions grew by 1.4% in 2017, reaching a historic high of 32.5 gigatonnes

THE CBE APPROACH

EXECUTIVE SUMMARY

OVERVIEW

ABOUT ISO 50001

CORE REQUIREMENTS

FAMILY OF STANDARDS

BENEFITS

CONCLUSION

SGS SOLUTIONS

COST-EFFECTIVE AND SUSTAINABLE ENERGY MANAGEMENT WITH ISO 50001

INCREASING ORGANISATIONAL COMPETITIVENESS WITH ISO 50001:2018

AUGUST 2018

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SGS

THE CERTIFICATION AND BUSINESS ENHANCEMENT APPROACH

Organisations today are met with a variety of operational and business challenges. External forces, like competitors and regulatory bodies, also add a secondary level of pressures that must be anticipated. Additionally, both B2B and B2C firms are experiencing a large influx of customer data, across multiple touchpoints. The dividing factor between those who are successful and those who are not, is how they analyse and use that data for business enhancement. At SGS, we have developed a variety of solutions to not only meet these needs, but establish more efficient and profitable ways of working. Using our 140 years of experience and operational data set, we partner with clients to gain intelligent insights into their current business functions while simultaneously strategising for the future. To meet the needs of our current customers and provide effective and modern solutions to current and future business issues, we offer three pillars of insights driven, customisable products and solutions.

SGS BUSINESS BENEFITS



Deliver innovative solutions and services that enhance businesses



Offer customised solutions, driven by proprietary insights



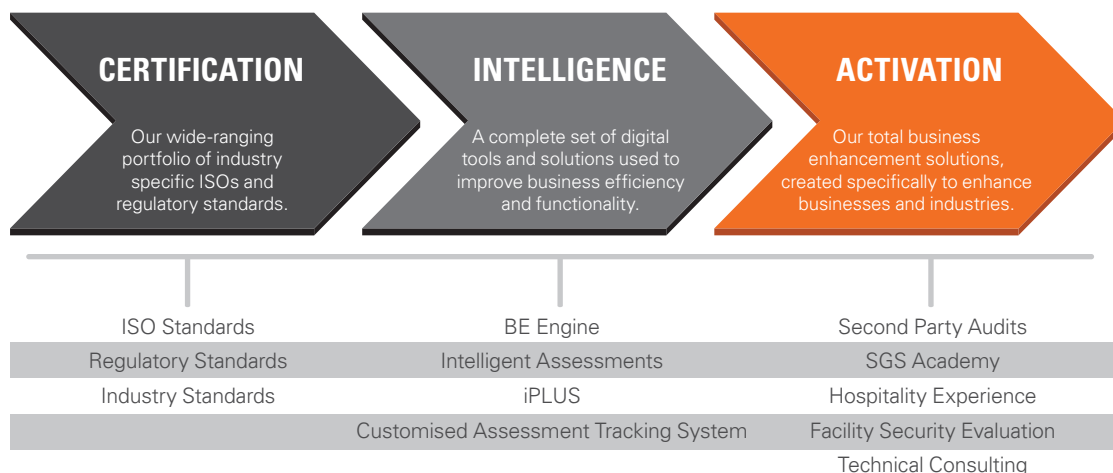
Provide services fundamental to ongoing success and sustained growth



Enable continuous improvement

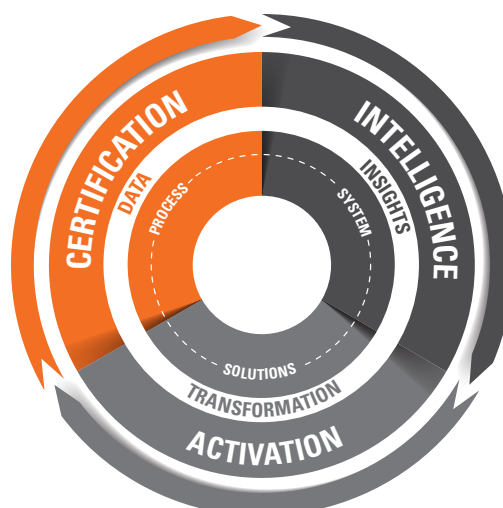


Transform value chains



THE BUSINESS ENHANCEMENT PLATFORM

For decades, SGS has been known as the global leader in certification, working with clients in virtually any sector. This deep and broad experience in quality control management, regulatory compliance, and training has resulted in a staggering array of data points across industries. Utilising this data set, we have evolved our service offerings to include business enhancement – the process of transformation that improves or increases the value of an organisation's people, processes, product or service. Our business enhancement solutions offer the most up-to-date, practical insights to help you achieve your goals and ultimately BE the benchmark.





ABSTRACT

Climate change is impacting every country in the world. Mitigating against the threat from climate change is a priority for many countries. Energy is the fuel that drives the global economy. Organisations need to find ways to strategically improve energy efficiency to lower costs, improve risk management and comply with sustainability targets. The latest version of the ISO 50001 standard helps businesses achieve these goals.

I. EXECUTIVE SUMMARY

Global economies are under strain from the negative effects of climate change. The UN has instigated 17 global goals to help companies and governments combat climate change in a way that promotes sustainability and is economically positive.

Progress must begin with companies, who need to understand the benefits of implementing an energy management system that promotes sustainability and reduces waste.

Launched in 2011, ISO 50001 provides a strategic framework to help companies achieve these goals. It has already helped 20,000 organisations around the world achieve energy savings of, on average, 10% in the first year, with the resultant economic benefits. ISO 50001 also introduces better risk and opportunity management, continuous improvements, and allows the organisation to promote sustainability.

The latest version of ISO 50001 is published in August 2018. This version brings greater clarity to strategic management, leadership and is compatible with Annex SL.

II. GLOBAL ENERGY MANAGEMENT

Climate change is now affecting every country on every continent. It is already impacting public health, food and water security, migration, peace and security. Climate change is disrupting national economies and affecting lives, costing people, communities and countries dearly today and even more tomorrow.

The World Economic Forum (WEF) indicated environment-related risks have grown in prominence over the 13-year history of the Global Risks Perception Survey, released in the 2018 Global Risks Report. Three of the top five greatest risks, in terms of both likelihood and overall impact, relate to the environment. These include extreme weather events, natural disasters and failure of climate change mitigation and adaptation – all of which have steadily risen in the past 10 years. “This follows a year characterised by high-impact hurricanes, extreme temperatures and the first rise in CO₂ emissions for four years. We have been pushing our planet to the brink and the damage is becoming increasingly clear,” wrote the authors.

The impacts of climate change threaten to undo decades of progress on economic development globally. With two-thirds of the world’s greenhouse gas (GHG) emissions relating to fossil fuels, sustainable energy is essential to sustainable development. Energy provides mobility, heat and light; it is the fuel that drives the global economy. But the use of coal, oil and gas causes air pollution and climate change, harming public health and the environment.

INVESTMENT IN SUSTAINABLE DEVELOPMENT WILL HELP ADDRESS CLIMATE CHANGE BY REDUCING GHG EMISSIONS AND BUILDING CLIMATE RESILIENCE

GLOBAL RESPONSE

“Two degrees and the SDGs.” That’s the new sustainable business mantra.

The double-barrel impact of the Paris climate agreement and the United Nations (UN) Sustainable Development Goals (SDGs), both enacted in 2015, is finally being felt, as companies begin to align their sustainability goals and, ultimately, their operations with these global commitments.

The SDGs, officially known as Transforming our world: the 2030 Agenda for Sustainable Development, is a set of 17 ‘Global Goals’ with 169 targets covering a broad range of sustainable development issues. This is a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. These goals build on the successes of the Millennium Development Goals, while including new areas such as combating climate change and improvement in energy efficiency, among other priorities. The SDGs include two that underpin progress on all the others:

- Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all
- Goal 13: Take urgent action to combat climate change and its impacts

Investment in sustainable development will help address climate change by reducing GHG emissions and building climate resilience. Conversely, action on climate change will drive sustainable development. Tackling climate change and fostering sustainable development are two mutually reinforcing sides of the same coin. Sustainable development cannot be achieved without climate action. Many of the SDGs address the core drivers of climate change.

The UN Foundation works with the UN and other partners to help move the world toward a safer, cleaner, more equitable and climate-friendly energy future – by implementing the SDGs and the Paris Agreement on climate change, and by supporting Sustainable Energy for All that balances three global objectives for 2030:

- Ensuring universal access to modern energy services
- Doubling the rate of improvement in energy efficiency
- Doubling the share of renewable energy in the global energy mix

Energy is crucial for achieving almost all the Sustainable Development Goals, from its role in the removing of poverty through improvement in health, education, water supply and industrialisation, to combating climate change. Improving energy efficiency – or energy productivity – is a key pillar of SDG 7.

Reducing the amount of the world energy wastes is the first and best step toward fighting global warming. Improving energy efficiency has the clearest impact on saving money, improving business results and fostering economic growth. The International Energy Agency (IEA) estimates that almost one-half of the necessary climate mitigation will need to come from improved energy efficiency. Eliminating energy waste also provides the financial resources to sustainably grow strong economies around the world. Energy management has an important role in accelerating climate action in support of the first international climate agreement. A lot of organisations have already set energy efficiency as one of the Sustainable Development Goals within their sustainability roadmap.

III. ISO 50001 ENERGY MANAGEMENT SYSTEMS – REQUIREMENTS WITH GUIDANCE FOR USE

ISO 50001, Energy management systems – Requirements with guidance for use, specifies requirements for establishing, implementing, maintaining and improving an energy management system. The aim is to enable an organisation to follow a systematic approach in achieving continual improvement of energy performance, including energy efficiency, use and consumption. ISO 50001 has a critical role in helping meet climate goals. It aims to create a level playing field and provide transparency, reliability and accountability. Broad implementation of the ISO 50001 standard across the commercial and industrial sectors could achieve significant energy savings for individual organisations, while driving progress towards meeting climate actions globally.

Published in 2011, ISO 50001 has gained much importance. In fact, more than 20,000 organisations were already certified against the standard by the end of 2016. The growth of ISO 50001 is expected to accelerate, as an increasing number of companies integrate ISO 50001 into their corporate sustainability strategies and supplier requirements.

ISO 50001 Energy Management Systems (EnMS) is a proven framework, helping industrial facilities, commercial facilities, or entire organisations to manage energy – including all aspects of energy use. After seven years, the time has come to revise ISO 50001 to ensure it remains a useful tool for all types of businesses and organisations.

ANNEX SL

There are many management system standards, covering a wide range of areas such as quality, environment, occupational health and safety, and energy. Over the years, organisations have tried to implement and gain certifications for multiple management system standards (MSS). Their attempts to combine them into one effective and efficient integrated system have not always been easy, since the requirements, terms and definitions, of the various ISO management system standards can be significantly different.

In recognition of this, the ISO Technical Management Board produced Annex SL of the Consolidated ISO Supplement of the ISO/IEC Directives in 2012 (Annex SL), previously ISO Guide 83. The stated aim of Annex SL is to enhance the consistency and alignment of ISO management system standards by providing:

- A unifying and agreed high-level structure
- Identical core text
- Common terms and core definitions

Consequently, Annex SL provides a template or framework for all new and revised MSS. The high-level structure (i.e. major clause numbers and titles) is fixed and cannot be changed, although discipline-specific sub-clauses may be added.

The intention is that all ISO management system standards (MSS) will be aligned and the compatibility of these standards will be enhanced. For example, the major clause numbers and titles in all future ISO MSS will be identical. As a result, all MSS will look very similar. In addition, it is expected that this will lead to less inconsistency, as common terms will all have the same definition. This approach will be particularly useful for those organisations that choose to operate an 'integrated' management system that meets the requirements of two or more management system standards.

Annex SL has already been used as the template for the revisions to ISO 9001 and 14001 and the new Occupational Health and Safety Management standard, ISO 45001.

WHAT IS IN THE NEW VERSION

The new revision incorporates the same high-level structure and common text from the Annex SL High Level Structure that is included in ISO 9001:2015 and ISO 14001:2015. The main changes compared to the previous edition are as follows:

- Adoption of ISO's requirements for management system standards, including a high-level structure, identical core text, and common terms and definitions, to ensure a high level of compatibility with other management system standards
- Better integration with strategic management processes
- Clarification of language and document structure
- Stronger emphasis on the role of top management
- Adoption of context order for the terms and their definitions in Clause 3 and update of some definitions
- Inclusion of new definitions, including energy performance improvement
- Clarification on exclusions of energy types
- Clarification of "energy review"
- Introduction of the concept of normalisation of energy performance indicators [EnPI(s)] and associated energy baselines [EnB(s)]
- Addition of details on the energy data collection plan and related requirements (previously energy measurement plan)
- Clarification of text related to energy performance indicator [EnPI(s)] and energy baseline [EnB(s)] to provide a better understanding of these concepts

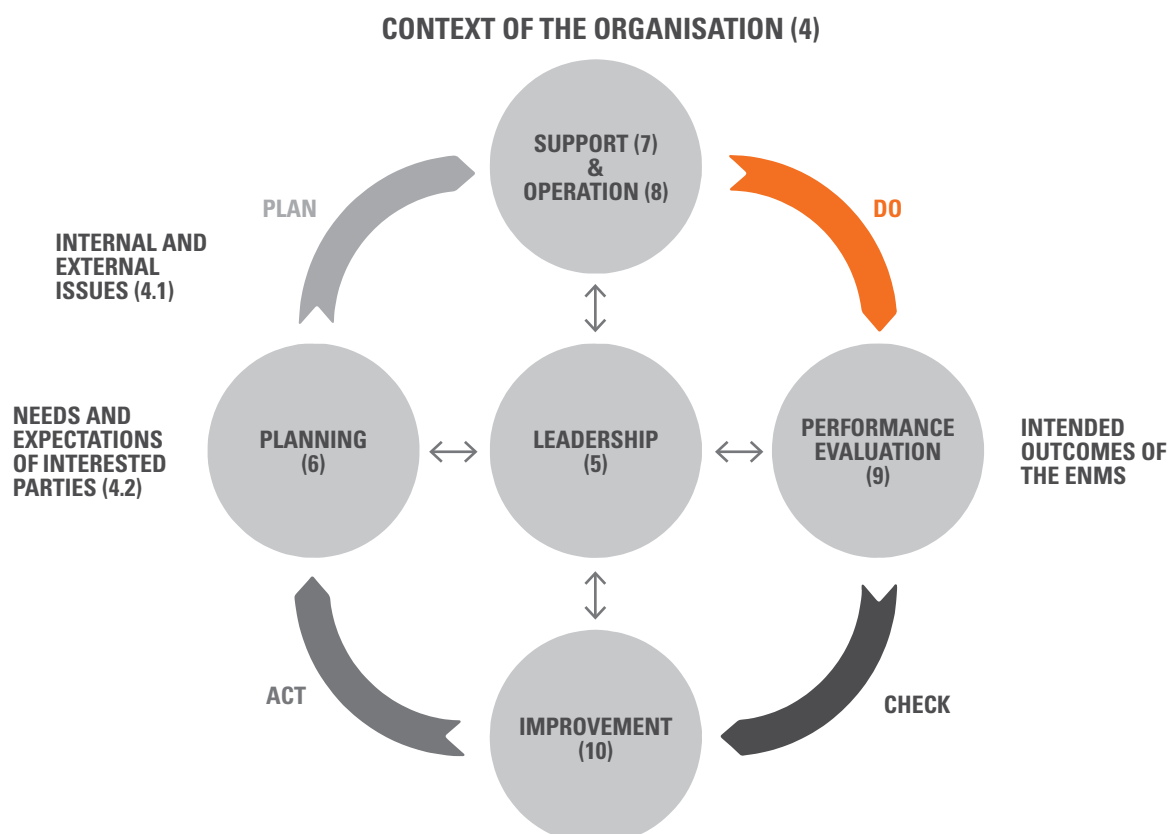
ANNEX SL AND ISO 50001:2018

ISO 50001:2018 uses the Annex SL framework and adopts its high-level structure, core text and common terms and core definitions. This is to ensure that ISO 50001 is aligned with other management system standards. The list of main clauses is now as follows:



By using the Annex SL structure, the intention is to present the requirements in a more consistent, rational manner and not simply offer a template for elements of an organisation's EnMS. This will also ensure the alignment of ISO 50001 with other management systems standards (such as ISO 9001, ISO 14001).

ISO 50001 PDCA



IV. THE CORE REQUIREMENTS OF ISO 50001:2018

Compared to the previous edition, the changes include:

- Adoption of the Annex SL Appendix 2, High Level Structure (HLS) text to ensure a high level of compatibility with other management system standards
- Strategic energy management
- Leadership
- Risk-based thinking
- Identification of risks and opportunities
- Actions to address risks and opportunities
- Better energy understanding/further opportunity identification
- Documentation

CLAUSE 1 SCOPE

The overriding aim or 'scope' of ISO 50001:2018 is to specify the requirements for an EnMS that can be used by an organisation to improve its energy performance in a systematic manner, and to achieve the intended outcomes of its EnMS, by being consistent with its energy policy.

The intended outcomes of an EnMS include:

- Drive cumulative energy savings, sparing energy costs and avoiding CO₂ emissions
- Continually improve energy performance, sustainability and profitability
- Provide a best-practice model and a global benchmark for climate and clean energy action
- Allows organisations to demonstrate and verify to international parties and partners that they are committed to continuously improving energy performance

This standard provides requirements for a systematic, data-driven process, focused on continually improving energy performance. It does not define specific levels for energy performance improvement, but requires demonstration of continual improvement by determination of energy performance.

CLAUSE 2

NORMATIVE REFERENCES

As with ISO 50001:2011, there are no normative references within the 2018 version.

CLAUSE 3

TERMS AND DEFINITIONS

All applicable terms and definitions are incorporated into the ISO 50001:2018. The clause structure and some of the terminology of this standard have been changed to improve alignment with other management systems standards. These terms and definitions will include all those from Annex SL.

Annex SL itself contains 21 terms and definitions that must be included in all MSS. These are the terms and definitions that would naturally be expected to appear in any MSS, irrespective of the discipline addressed by the standard itself.

This standard uses some new terminology. "Documented information" replaces the nouns "documentation," "documents" and "records" used in previous editions of this standard. The phrase "intended outcome" is what the organisation intends to achieve by implementing its energy management system and working toward improved energy performance.



CLAUSE 4**CONTEXT OF THE ORGANISATION**

The organisational context will provide a high-level conceptual understanding of the external and internal issues that may impact, either positively or negatively energy performance and the EnMS of the organisation. This group of clauses is critical to the successful implementation of ISO 50001:2018. Implemented correctly, they will result in an effective EnMS that is bespoke to the needs of that organisation. Although the standard does not specify an order in which to implement the clauses, when taken in isolation, it is hard to see how they can be implemented in any other order than 4.1 to 4.4 as each successive clause requires information from the preceding one.

CLAUSE 4.1**UNDERSTANDING THE ORGANISATION AND ITS CONTEXT**

The 'context' of the organisation (sometimes called its business environment) refers to the combination of internal and external factors and conditions that can have an effect on an organisation's approach to its energy performance. The organisation shall determine external and internal issues that are relevant to its purpose and which affect its ability to achieve the intended outcome(s) of its EnMS and to improve its energy performance. The result of this examination will provide a high-level understanding of the issues that may affect the organisation's energy performance and EnMS.

**EXTERNAL ISSUES**

Issues relating to interested parties such as existing national or sector objectives, requirements or standards

Restrictions or limitations on energy supply, security and reliability

Energy costs or the availability of types of energy

Effects of weather

Effects of climate change

Effect on greenhouse gas (GHG) emissions

**INTERNAL ISSUES**

Core business objectives and strategy

Asset management plans

Financial resource (labour, financial, etc.) constraints affecting the organisation

Energy management maturity and culture

Sustainability considerations

Contingency plans for interruptions in energy supply

Maturity of existing technology

Operational risks and liability considerations

CLAUSE 4.2**UNDERSTANDING THE NEEDS AND EXPECTATIONS OF INTERESTED PARTIES**

An organisation is also required to identify the 'interested parties' (or 'stakeholders') that are relevant to its EnMS. An interested party is defined as a "person or organisation that can affect, be affected by, or perceive itself to be affected by a decision or activity related to the EnMS or energy performance of the organisation".

These interested parties could include the organisation's shareholders, employees, customers, end users, suppliers, regulators, pressure groups, etc.

To determine whether an interested party, or its requirements, are relevant to their EnMS, the organisation must consider whether or not they have an impact on the organisation's ability to consistently improve its energy performance, and whether they meet the requirements of interested parties as well as applicable statutory and regulatory requirements. Organisations will need to be able to demonstrate that they have been through an initial process that identifies who their relevant interested parties are, as well as their requirements and their relevancy to the organisation's EnMS. The risk and opportunities of deviating from energy performance will also need to be determined. The organisation needs to determine which of the identified needs and expectations the organisation will address through its EnMS.

CLAUSE 4.3**DETERMINING THE SCOPE OF THE ENERGY MANAGEMENT SYSTEM**

Building upon the knowledge and requirements gained from clauses 4.1 and 4.2, to fully encapsulate the management system, the organisation will now define the scope and boundaries of the EnMS. This allows the organisation to focus its effort and resources on energy management and energy performance improvement. When defining the scope and boundaries, an organisation should not divide, or exclude, equipment or systems that use energy unless they are separately metered, or a dependable calculation can be made. Over time, the scope and boundaries may change due to energy performance improvement, organisational change or other circumstances. The EnMS should be reviewed and updated as needed to reflect any changes.

The organisation shall have the authority to control its energy use, energy consumption, and energy efficiency within its EnMS scope and boundaries. It is noted that this is the only documented information required by any part of clause 4.

CLAUSE 4.4**ENERGY MANAGEMENT SYSTEM**

It is good practice to keep the EnMS simple and as easy to understand as possible, while still meeting the ISO 50001 requirements. For example, organisational objectives for energy management and energy performance should be reasonable and achievable, and aligned with current organisational or business priorities. Documentation should be straight forward and responsive to organisational needs, as well as easy to update and maintain.



CLAUSE 5 LEADERSHIP

This clause does not simply cover the same areas of policy, organisational roles, responsibilities and authorities as those in clauses 4.2 and 4.3 of ISO 50001:2011 – Management Responsibility and Energy Policy. There is now an emphasis on ‘leadership’ rather than management. Clause 5 now includes specific actions for an organisation’s top management and describes the activities in which they will be personally involved. This does not mean that they must perform all the activities themselves, but they are accountable for ensuring that they are performed. The removal of the need for a specific ‘management representative’ is partly an attempt to ensure that ‘ownership’ of a management system is not focused on one individual. Energy management and energy performance improvement should align with the organisation’s business strategy and long-term planning and resource allocation processes.

CLAUSE 5.1 LEADERSHIP AND COMMITMENT

The organisation’s top management has overall responsibility for meeting the requirements of this document. Responsibilities may be delegated, but overall accountability is retained. Ongoing commitment of top management is a critical factor in the continued success of an EnMS and energy performance improvement.

Top management must demonstrate its commitment through leadership actions, active involvement in the EnMS, and retention of EnMS responsibilities. Actions should be visible to employees across the organisation. Top management should also understand that a fundamental requirement for the demonstration of its commitment is the ongoing allocation of resources. This includes resourcing people to implement, sustain and improve the EnMS and energy performance on an ongoing basis.

One resource area that is often overlooked and must be addressed is the means of gathering and reporting data to support the ongoing maintenance and improvement of the EnMS. When communicating internally, top management can emphasise the importance of energy management through employee involvement activities such as empowerment, motivation, recognition, training, rewards and participation.

CLAUSE 5.2 ENERGY POLICY

The foundation for developing an EnMS and the resultant energy performance targets, an energy policy sets the direction for implementing and improving the EnMS and ongoing energy performance. It also demonstrates the commitment of top management to maintaining and enhancing its efforts to improve energy performance.

Fully integrating the energy policy into the underlying culture of the organisation requires commitment from top management. In reality, the energy policy can be a brief statement that can be easily understood and applied by staff to their work activities.

Once the EnMS is fully implemented and begins to mature, the energy policy could also be made publicly available, as part of an improvement to the system. For example, it could be included in sustainability, corporate social responsibility and other annual reports, the organisation’s website, etc.

ONGOING COMMITMENT OF TOP MANAGEMENT IS A CRITICAL FACTOR IN THE CONTINUED SUCCESS OF AN ENMS AND ENERGY PERFORMANCE IMPROVEMENT

CLAUSE 5.3 ORGANISATION ROLES, RESPONSIBILITIES AND AUTHORITIES

Although this was a part of the 2011 standard, there are some subtle changes. There is no longer a requirement to have an energy management representative. Instead, top management must ensure that responsibilities and authorities for relevant roles are assigned and communicated within the organisation.

Good practice is to have a cross-functional energy management team, of more than one person, which includes representatives from areas that can affect energy performance. This approach provides an effective mechanism to engage different parts of the organisation in the planning, implementation and maintenance of the EnMS. Membership of the team may change over time and should be based on defined roles rather than named individuals.

CLAUSE 6 PLANNING

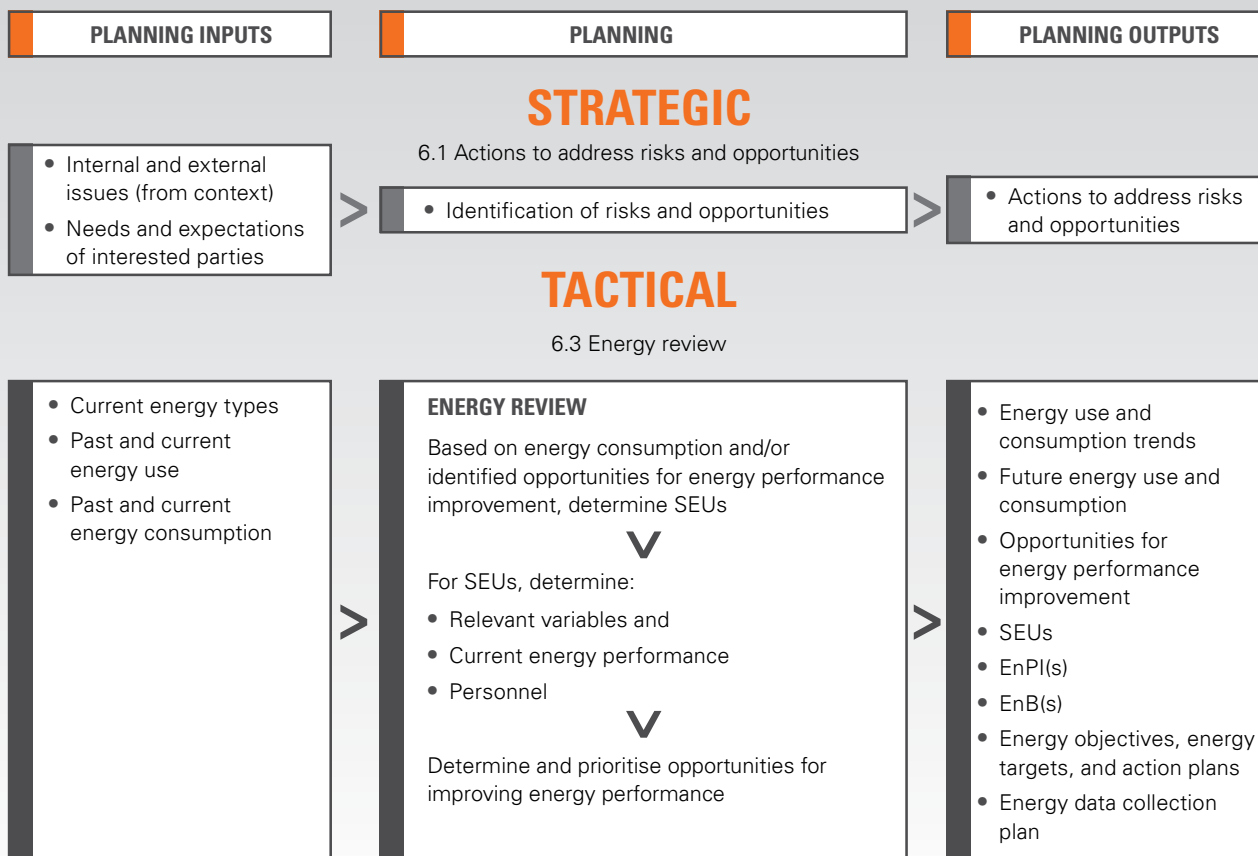
Planning shall consist of a review of the organisation's activities and processes that can affect energy performance, be consistent with the energy policy and lead to actions that result in continual improvement of energy performance.

This clause focuses on the energy performance of the organisation and activities instigated to maintain and continually improve energy performance. Energy planning provides the foundation for developing an EnMS that is based on the understanding of an organisation's energy performance. This is the step where the organisation's analysis of its energy data, along with other energy information, is used to make informed decisions on actions to continually improve energy performance. After an organisation establishes an objective and related target, ISO 50001 imposes associated requirements. When an energy use is determined to be a significant energy use (SEU), additional requirements apply. These include the consideration of SEUs in setting objectives and targets, ensuring competence and training, operational controls, procurement, EnPIs, monitoring, measurement and calibration.

The figure below provides a conceptual diagram to improve understanding of the energy planning process, including strategic and tactical approaches.

In the strategic approach, the organisation needs to identify the risks and opportunities. Input information includes internal and external issues and the needs and expectations of interested parties. The tactical approach requires conduct of a major energy review. The input information is energy data.

ENERGY PLANNING PROCESS



CLAUSE 6.1 ACTIONS TO ADDRESS RISKS AND OPPORTUNITIES

By identifying risks and opportunities to the EnMS, an organisation is able to anticipate potential scenarios and consequences so that undesired effects can be addressed before they occur. Organisations need to look at those risks that could have a direct or indirect impact on their business and define a holistic approach to managing them. The response to those risks identified needs to start at the highest level of an organisation. This means integrating risk management into the strategic planning process.

CONSIDER THE ISSUES REFERRED TO:

Internal and external issues

Needs and expectations of interested parties

The organisation's activities and processes that can affect energy performance

DETERMINE THE RISKS AND OPPORTUNITIES THAT NEED TO BE ADDRESSED TO:

Achieve its intended outcomes(s), including energy performance improvement

Prevent/reduce undesired effects

Achieve continual improvement

AN ORGANISATION SHALL PLAN:

Actions to address the identified risks and opportunities

How to integrate and implement the actions into its processes and evaluate the effectiveness of these actions

SETTING OBJECTIVES AND TARGETS PROVIDES THE MEANS FOR TRANSFORMING THE ENERGY POLICY INTO ACTION

CLAUSE 6.2 OBJECTIVES, ENERGY TARGETS AND PLANNING TO ACHIEVE THEM

The organisation shall establish objectives and energy targets. Objectives can include both overall improvements to an EnMS and specific, measurable energy performance improvement targets. Setting objectives and targets provides the means for transforming the energy policy into action. While some objectives will have quantifiable targets for energy performance improvement, other objectives may be qualitative.

This ensures that the organisation has defined criteria for improving energy performance. Objectives and targets provide the direction for energy performance improvement initiatives, including the allocation of resources. The data analysis and other information outputs from the energy review are used in developing the energy objectives and targets.

When planning how to achieve its objectives and energy targets, the organisation shall establish and maintain action plans. The results of action plans need be evaluated, including the method for verification of energy performance improvement. The results should ensure that actions outlined in the plan were properly executed and achieve the intended outcomes.

CLAUSE 6.3 ENERGY REVIEW

The energy review is the analytical part of the energy planning process. Its quality is influenced by the availability, quality and analysis of the data collected. Developing an understanding of the organisation's energy use and consumption is the first step in an energy review and the resulting information is used to identify SEUs and energy performance improvement opportunities. When implementing an energy review for the first time, the starting point is the available data. The energy review can be improved as the organisation gains more experience with energy data management and decision making based on energy data analysis. It is good practice to use the output of energy audits or engineering studies as part of the energy review.

The next step in the energy review is to link energy sources to energy uses. Energy sources can include, but are not limited to: electricity, natural gas, fuel oil, propane, solar, wind, biomass, cogeneration and recovered waste energy. A single energy source can be associated with multiple energy uses. Once energy uses are identified, evaluate past and present energy use and consumption. A suitable period – one, three, six or twelve months – is established to evaluate historic energy consumption and identify trends. The outputs from this analysis provides a basis for the identification and analysis of SEUs.

SEUs are determined for the purpose of establishing priorities for energy management, energy performance improvement and resource allocation. In identifying areas of SEU, it may be helpful for the organisation to take a holistic view of its use and consumption of energy within the EnMS scope and boundaries. Based on the definition of SEU, the organisation has the flexibility to determine SEUs based on energy consumption, energy improvement opportunity, or a combination of both. Opportunities for improvement can be an input into the determination of SEUs at this point in the energy review process. Analysis of energy uses will result in a list for consideration as SEUs.

Energy consumption is affected by many variables. Data should be collected and analysed to determine the effects of the relevant variables on the SEU.

The identification of opportunities to improve energy performance and a prioritised list of those improvement opportunities is an output of the energy review. The collection and analysis of data forms the foundation for prioritising opportunities for improvement.

CLAUSE 6.4 ENERGY PERFORMANCE INDICATORS

The organisation shall determine EnPIs that are appropriate for measuring and monitoring its energy performance and enable it to demonstrate energy performance improvement. The energy review should provide the information and data needed to establish them. EnPIs and their corresponding energy baselines are metrics defined by the organisation to measure energy performance. EnPIs can be a simple metric, ratio, or a model. An EnPI is not a quantitative value, it is a 'ruler' that is used to compare energy performance before (reference EnPI value) and after (resultant or current EnPI value) the implementation of action plans and other actions.

An EnPI can be at a facility, system, process or equipment level and should have an appropriate baseline at the same level for comparative purposes. EnPIs are typically set at management and operational levels. Management level EnPIs will generally relate to the facility level such as the overall control of SEUs and patterns in organisational energy performance. Operational level EnPIs may relate to specific processes, systems or equipment.

CLAUSE 6.5 ENERGY BASELINE

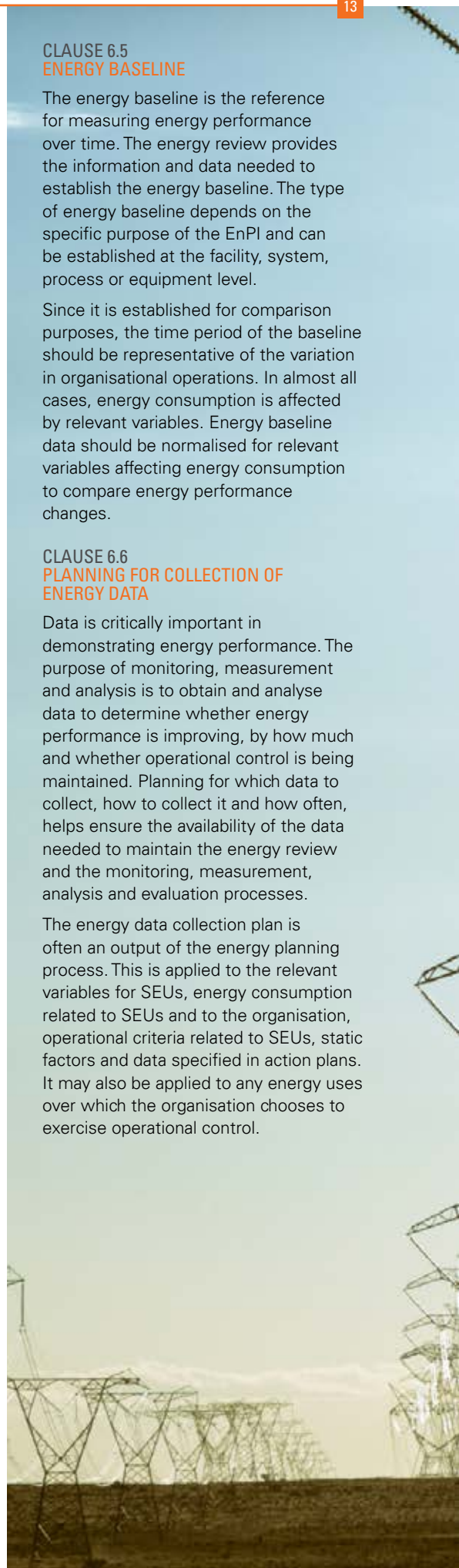
The energy baseline is the reference for measuring energy performance over time. The energy review provides the information and data needed to establish the energy baseline. The type of energy baseline depends on the specific purpose of the EnPI and can be established at the facility, system, process or equipment level.

Since it is established for comparison purposes, the time period of the baseline should be representative of the variation in organisational operations. In almost all cases, energy consumption is affected by relevant variables. Energy baseline data should be normalised for relevant variables affecting energy consumption to compare energy performance changes.

CLAUSE 6.6 PLANNING FOR COLLECTION OF ENERGY DATA

Data is critically important in demonstrating energy performance. The purpose of monitoring, measurement and analysis is to obtain and analyse data to determine whether energy performance is improving, by how much and whether operational control is being maintained. Planning for which data to collect, how to collect it and how often, helps ensure the availability of the data needed to maintain the energy review and the monitoring, measurement, analysis and evaluation processes.

The energy data collection plan is often an output of the energy planning process. This is applied to the relevant variables for SEUs, energy consumption related to SEUs and to the organisation, operational criteria related to SEUs, static factors and data specified in action plans. It may also be applied to any energy uses over which the organisation chooses to exercise operational control.



CLAUSE 7 SUPPORT

This is the group of clauses that define the supplementary 'soft' tools that assist in the delivery of an effective management system. Organisations that have already implemented management systems of any type will be familiar with these concepts as they cover the traditional areas of resources, training, communication, documents and records, but have been repackaged to meet the concepts and themes of the revised standard.

CLAUSE 7.1 RESOURCES

The organisation shall determine and provide the resources needed for the establishment, implementation, maintenance and continual improvement of the EnMS and energy performance. Resources include human resources, specialised skills, technology, data collection infrastructure, and financial resources.

CLAUSE 7.2 COMPETENCE

The organisation shall determine the necessary competence of person(s) doing work under its control that affect its energy performance and EnMS. Competence requirements should be appropriate to the function and level of persons, including top management, doing work that affects energy performance in the organisation and the EnMS. Ensuring competency begins with clearly defining the education, training, skills or experience required for staff and contractors whose activities relate to the organisation's SEUs.

Training is one of the many methods for achieving competency. EnMS team members should be encouraged to demonstrate continual professional development, to maintain and improve knowledge, technical skills and personal attributes. An organisation should review its existing training approach to ensure that it is appropriate to meet the needs of personnel working on its behalf, as related to the identified SEUs.

CLAUSE 7.3 AWARENESS

There is no expectation that every staff member will be able to recite the content of the policy, or give a detailed and technical breakdown of it. Personnel need to be aware of how their activities relate to energy use and consumption, also to understand the consequences when their activities deviate from defined processes, operational or maintenance controls, objectives and targets. This awareness assists organisations in fostering and maintaining an energy conscious culture. The effectiveness of the processes that support ongoing energy awareness can be continually improved by a variety of means.

THE ORGANISATION SHALL DETERMINE THE NECESSARY COMPETENCE OF PERSON(S) DOING WORK UNDER ITS CONTROL THAT AFFECT ITS ENERGY PERFORMANCE AND ENMS

CLAUSE 7.4 COMMUNICATION

Effective communication within the organisation strengthens the commitment of employees to the energy policy and helps to motivate them to contribute to achieving the energy objectives and targets. The organisation shall determine internal and external communications relevant to the EnMS. Communication should be a multi-directional activity. Employees, contractors, or those working on behalf of the organisation should be encouraged to contribute comments and suggest improvements in energy performance and the EnMS. If the organisation decides to communicate externally, the communication strategy should be addressed.

CLAUSE 7.5 DOCUMENTED INFORMATION

The clause combines and simplifies existing clauses relating to documentation and control of documents. Organisations may find that ISO 50001:2018 reduces the extent to which an organisation creates and retains documentation, as it now introduces flexibility for them to determine the extent to which they need documentation. This standard provides details on what documented information is required to be maintained or retained. The organisation may choose to develop additional documented information as it deems necessary to effectively demonstrate energy performance and support the EnMS.

EnMS documentation includes documents and records that the organisation has determined are needed for its EnMS. In making these decisions the organisation should consider modifying existing documentation to address energy management.

CLAUSE 8 OPERATION

This group of clauses are the part of the management system where the organisation manages SEUs and implements action plans. This means establishing connections that allow energy management (SEU) and energy performance improvement (action plans) to be linked to the organisation's business processes (competency, training, communication, operational controls, etc.).

CLAUSE 8.1 OPERATIONAL PLANNING AND CONTROL

Operational and maintenance controls should bring the SEUs and the energy uses related to the energy objectives, targets and action plans, into efficient and sustainable operation. Effective operational control and associated training of relevant personnel often provide considerable energy performance improvement opportunities, typically at low cost. Maintenance is an important and often cost-effective element of operational control. In some cases, it may be possible to reduce variability in energy performance caused by human factors through technical improvements such as automated switching, control system automation, or engine speed limiters for vehicles.

CLAUSE 8.2 DESIGN

Identifying opportunities for the improvement of energy performance at the earliest stages of design and throughout the entire design process typically yields the best results. When designing new, modified or renovated facilities, equipment, systems and processes, the organisation should consider best available energy efficient techniques, practice and emerging technology trends.

However, considering lifetime in ISO 50001 means evaluating the value of energy performance and business benefits against total costs over the lifetime. It does not require a life cycle analysis or life cycle management.

CLAUSE 8.3 PROCUREMENT

Procurement is an opportunity to improve energy performance through the use of more efficient products and services. It is important to consider the effect purchases may have on energy performance. Procurement policy should include a requirement to take energy implications into account in procurement decisions. Organisations should consider energy efficient services, products and equipment.

It is also an opportunity to work with the supply chain and influence its energy behaviour. Procurement specifications, tender and contract documentation should include energy performance criteria, where appropriate, and a requirement to analyse the life cycle costs of purchases.



CLAUSE 9**PERFORMANCE EVALUATION**

Monitoring, measurement, analysis and evaluation for energy performance and the EnMS involves implementation of the data collection plan to evaluate energy performance improvement and the effectiveness of the EnMS.

CLAUSE 9.1**MONITORING, MEASUREMENT, ANALYSIS AND EVALUATION OF ENERGY PERFORMANCE AND THE ENMS**

Effectiveness of the EnMS can be demonstrated by improvement in energy performance and other intended outcomes. Energy performance improvement, with EnPIs as defined by the organisation, can be demonstrated by improvements in EnPIs over time, relative to the relevant EnB. When conducting analysis, ensure that the limitations of the data (accuracy, precision, uncertainty) are taken into account before reaching final conclusions.

The organisation determines when a deviation, a departure from a defined or acceptable level of energy performance, is significant. Deviations can be positive or negative. A positive deviation occurs when energy performance is better than expected or planned. A negative deviation is one that is worse. In either case, a significant deviation requires an investigation that is recorded. An organisation investigating negative deviations should consider whether improved operational controls are appropriate and whether corrective action is needed.

The organisation shall evaluate compliance with legal and other requirements relating to its energy use, consumption, efficiency and the EnMS. It should determine if processes are already in place and whether they can be adapted to address the needs of the EnMS.

CLAUSE 9.2**INTERNAL AUDIT**

An internal audit of an EnMS is an objective, systematic review of all or part of an organisation's EnMS. The purpose of the audit is to determine if the requirements are being met and identify and drive improvements in energy performance and of the EnMS. Internal audits should be prioritised and conducted more frequently for the areas that influence energy performance and areas where important nonconformities have been identified in previous audits. This ensures that the audit process is focused on those areas and processes that assist the organisation in improving its energy performance and the effectiveness of its EnMS.

CLAUSE 9.3**MANAGEMENT REVIEW**

This is a key responsibility of top management. The key value that the management review process provides is to answer the question "Is the EnMS delivering and sustaining the planned energy performance improvements?" Focused on ensuring the ongoing suitability, adequacy and effectiveness of the EnMS, the management review should be a dynamic process of reviews, evaluations, decisions and actions that ensure continual improvement in energy performance and the EnMS. The management review will highlight positive outcomes as well as weaknesses, in order to provide effective recommendations for improvements. Management review should be conducted at a frequency within which corrective actions can be taken and appropriate adjustments to the system can be made.

THE KEY VALUE THAT THE MANAGEMENT REVIEW PROCESS PROVIDES IS TO ANSWER THE QUESTION "IS THE ENMS DELIVERING AND SUSTAINING THE PLANNED ENERGY PERFORMANCE IMPROVEMENTS?"



PREVENTIVE ACTION HAS BEEN REMOVED AS A STANDALONE ENTITY

CLAUSE 10 IMPROVEMENT

Organisations will need to demonstrate that they actively look for opportunities to improve the performance of their EnMS. Preventive action has been removed as a standalone entity as conformance and thorough application of the other clauses should result in a proactive management system that, as a whole, prevents underperformance.

CLAUSE 10.1 NONCONFORMITY AND CORRECTIVE ACTION

Correction and corrective action are the means by which deviations from the requirements of the EnMS can be corrected, and their causes eliminated to prevent recurrence. The organisation may find value in integrating the corrective action process with existing systems. When a non-conformance is detected, the first step is to take action to resolve the immediate situation.

The organisation should perform root cause analysis to determine the causes of non-conformities or potential non-conformities. Without determining the actual root cause, a non-conformity may recur, or potential non-conformities may occur.

Preventive action has been removed due to the requirements in Clause 4.1 to "...determine external and internal issues that are relevant to its purpose and that affect its ability to achieve the intended outcome(s) of its energy management system"; and in Clause 6.1 to "determine the risks and opportunities that need to be addressed to assure the energy management system can achieve its intended outcome(s); prevent, or reduce, undesired effects; achieve continual improvement"; not only addresses preventative action but goes beyond.

CLAUSE 10.2 CONTINUAL IMPROVEMENT

Organisations need to demonstrate that they are using the results from their analysis, evaluation and review processes to identify any needs that must be addressed and opportunities for improvement.

V. ISO 50001 FAMILY OF STANDARDS

A SUITE OF COMPLEMENTARY ENERGY MANAGEMENT SYSTEM STANDARDS

Since publication of ISO 50001 Energy management system – Requirements with guidance for use, in June 2011, the International Technical Committee responsible for developing standards on energy management (ISO/TC 242) has developed a suite of complementary EnMS standards that will guide organisations through the various stages of setting up an EnMS. These consist of:

ISO 50002:2014 ENERGY AUDITS

Requirements with guidance for use

ISO 50003:2014 ENMS

Requirements for bodies providing audit and certification of energy management systems

ISO 50004:2014 ENMS

Guidance for the implementation, maintenance and improvement of an energy management system

ISO 50006:2014 ENMS

Measuring energy performance using energy baselines (EnB) and energy performance indicators (EnPI) – General principles and guidance

ISO 50015:2014 ENMS

Measuring and verification of energy performance of organisations – General principles and guidance



VI. THE BENEFITS OF ENERGY MANAGEMENT SYSTEM

Energy is a critical component to an organisation's operations. ISO 50001 transforms the way organisations manage energy, offering a systematic approach with sustaining results. It is important to realise that energy can be managed and controlled. The standard has value both as a best practice model for strategic management of energy and as a global benchmark for climate and clean energy action. Energy management helps to reduce an organisation's energy costs through improved energy performance and optimised use of energy sources and energy-related assets.

ISO 50001 is a key step to:



Cutting operational costs



Achieving continual operational improvement



Improving risk management



Staying competitive in the marketplace



ACCORDING TO ISO, AVAILABLE EVIDENCE SHOWS THAT ORGANISATIONS ADOPTING THE ISO 50001 STANDARD BENEFIT FROM INITIAL ENERGY IMPROVEMENTS OF 10% OR MORE AND ACHIEVE NET COST SAVINGS, MOSTLY THROUGH LOW COST OR NO COST CHANGES TO OPERATIONS.



VII. CONCLUSION

ISO 50001 offers businesses a framework for achieving sustainability and waste reduction in their energy management system. Energy management is sustainable and most effective when it is integrated with an organisation's overall business processes. The economic benefits for the business directly link to the execution of the UN's Sustainability Development Goals.

Ongoing commitment and engagement by top management is essential to the effective implementation, maintenance and improvement of the EnMS, in order to achieve the benefits in continual energy performance improvement. The successful implementation of an EnMS requires an understanding of the context of the organisation by means of determining external and internal issues that may impact energy performance and the EnMS. Particular focus is on the needs and expectations of interested parties that can affect, or be affected by, the organisation. In this context, the organisation must identify risks and opportunities of deviating from energy performance, significant energy uses, and determine actions to address them within the EnMS.

ISO 50001 can be integrated with other management system standards, such as ISO 9001, ISO 14001 and ISO 45001. Integration can have a positive effect on business culture and business practice, embedding energy management into daily practice, operational efficiency and the operating cost related to the management system. The high-level structure of management system standards enables this integration further.



VII. SGS SOLUTIONS FOR A SMOOTH TRANSITION

As the world's leading certification body and a professional learning and development organisation, we offer you a variety of solutions during the transition process.

ISO 50001:2018 COURSES

CQI/IRCA CERTIFIED TRAINING COURSES

- ISO 50001:2018 Energy Management Systems: Transition Course
- ISO 50001:2018 Energy Management Systems: Internal Auditor Course
- ISO 50001:2018 Energy Management Systems: Lead Auditor Course

SGS APPROVED COURSES

- ISO 50001:2018 Energy Management Systems: Transition Course
- ISO 50001:2018 Energy Management Systems: Internal Auditor Course
- ISO 50001:2018 Energy Management Systems: Lead Auditor Course
- ISO 50001:2018 Energy Management Systems: Introduction Course

ANNEX SL

We help you to understand the high-level structure of the new framework and how integration with other management system standards is becoming more efficient.

RISK-BASED THINKING

This course covers the principles that support the identification of risk and opportunities and the different techniques/methodologies needed to address them.

EMPOWERING LEADERSHIP

A training workshop designed to address the required leadership skills of those operating in quality, environmental, health and safety and energy roles in line with the evolution of MSS within the Annex SL Framework and their related commercial impacts.

GAP ANALYSIS

Our experts can carry out a gap analysis against the new requirements to make your transition smooth and transparent.

This provides your organisation with structured assistance by highlighting the extent that your existing systems and controls cover the requirements of ISO 50001:2018 and by identifying an implementation action plan where you need it.

ISO 50001:2018 CERTIFICATION

SGS will, of course, now be offering ISO 50001:2018 certification to both new and existing clients.

To learn more about SGS Academy Learning and Development Solutions visit www.sgs.com/training or contact train.global@sgs.com



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Eric G.T. Huang has 29 years environmental engineering and management experience in audit, consulting, engineering and operation, specialising in energy, climate change and corporate social responsibility and sustainability reports. He is now responsible for the technical development of SGS's Energy Management Systems certification services, including ISO 50001 and other sustainability services. Eric holds a Master's degree in Civil and Environmental Engineering from Rutgers University, US.

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WHEN YOU NEED TO BE SURE

