Justification Study for a new work item proposal for a Energy Management Standard and Guidance Document

1. Overview

Proposals for new management systems standards (MSS) or proposals for amendments / revisions to existing MSS must following the publication of ISO Guide 72:2001 *Guidelines for the Justification and development of management system standards.*

This paper presents a Justification Study from ANSI, the United States Department of Energy (DOE) and the Georgia Institute of Technology (GT) for a proposal for a new field of technical activity and a new work item proposal, in accordance with the ISO Guide 72 justification process.

The ISO/TMB/WG / ISO/TC will be requested to review this Justification Study, and to present its decisions in a Recommendation Report, in accordance with the ISO Guide 72 justification process.

ISO Guide 72 recommends that a Justification Study should be based on annex C of the ISO/IEC Directives, Part 1, 2001, and the general principles stated in ISO Guide 72, clause 5. Additionally, ISO Guide 72, annex A, lists a set of questions that have been developed from annex C of the ISO/IEC Directives, Part 1, and from the principles in ISO Guide 72 clause 5. ISO Guide 72 recommends that these questions should be used as the criteria for justifying and assessing a proposed project. This Justification Study follows these recommendations.

The principles given in ISO Guide 72, clause 5, are as follows:

Market relevance	Any MSS should meet the needs of, and add value for, the primary users and other affected parties.
Compatibility	Compatibility between various MSSs and within an MSS family should be maintained.
Ease of use	It should be ensured that the user can easily implement one or more MSS.
Topic coverage	An MSS should have sufficient application coverage to eliminate or minimize the need for sector-specific variances.
Flexibility	An MSS should be applicable to organizations in all relevant sectors and cultures and of every size. An MSS should not prevent organizations from competitively adding to or differentiating from others, or enhancing their management systems beyond the standard.
Technically sound basis	An MSS should be based on proven management practices or existing scientifically validated and relevant data.
Easily understood	An MSS should be easily understood, unambiguous, free from cultural bias, easily translatable, and applicable to businesses in general.
Free trade	An MSS should permit the free trade of goods and services in line with the Principles included in the WTO Agreement on Technical Barriers to Trade.
Applicability of conformity	The market need for first-, second- or third-party conformity assessment, or any assessment combination thereof, should be assessed. The resulting MSS should clearly address the suitability of use for conformity assessment in its scope. An MSS should facilitate joint audits.
Exclusions	An MSS should not include directly related product (including services) specifications, test methods, performance levels (i.e. setting of limits) or other forms of standardization for products produced by the implementing organization.

The approach taken in preparing this Justification Study has been to address each of the questions in Annex A followed by the principles and items from Annex C of ISO/IEC Directives Part 1. Note that the Annex A questions are given within a grey-shaded background, with the answers following, outside of the shading

Section 2 presents the "Basic information" required by the initial Annex A questions.

The entire Annex A questions has been addressed.

2. Basic information

ISO Guide 72, Annex A; A.2.1 Basic information on the MSS proposal

A.2.1a) What is the proposed purpose of the MSS?

The purpose of the MSS is to provide organizations with an International Standard Specification and Guidance Document in the area of Energy Management. The energy management standard will address strategic management of energy to include: energy supply, procurement practices for energy using equipment and systems, energy use, and any use-related disposal issues. The standard will also address measurement of current energy usage, and implementation of a measurement system to document, report and validate continuous improvement in the area of energy management. The energy management Specification will provide a practical approach to improving energy efficiencies, reducing costs and improvements in the environmental footprint of the implementing organizations by combining both the technical aspects of energy management and the strategic management aspects as indicated in Table 1 below:

Table 1: Energy Management Process

Managerial	Technical
Create Policy	Monitor & Measure
Establish Goals	Develop Energy Profile
Identify Targets	Conduct Energy Assessments
Managerial and Technical lead to:	
Prioritization of Energy Improvement Actions	
Implemented Energy Efficiency Projects	
Measured & Verified Project Results	
Verified Results Provide Feedback Mechanism for Energy Efficiency Continuous Improvement	

The Guidance Document will provide specific information on meeting the requirements of and implementing the energy management standards

A2.1 a) What is the scope of the MSS?

The proposal is for the development of a Specification and Guidance Document within this subject area. The energy management standard will address strategic management of energy to include: energy supply, procurement practices for energy using equipment and systems, energy use, and any use-related disposal issues. The standard will also address measurement of current energy usage, and implementation of a measurement system to doument, report and validate continuous improvement in the area of energy management.

The Standard will build on the framework of ANSI MSE 2000:2005 and other National Standards and Specifications. This Specification will provide a Plan-Do-Check Act framework to:

a) Help ensure the strategic energy management decisions and informational needs are addressed;

b) Prioritize and manage the technical aspects of energy management such as assessments and assessment results, the energy/utility profile, asset management;

c) Assist management in developing a comprehensive perspective on energy management that includes supply, demand issues, storage, and disposal as well as appropriate selection of goals and projects, and

d) Ensure that any energy efficiency improvements made are sustained by the implementing organization and these improvements capture the full range of cost-effective opportunities available within a facility or organization.

The related Guidance Document will be designed to help those with responsibility for energy management to effectively develop, maintain, and improve their internal system for managing energy by giving guidance on:

a) The design and implementation of energy management systems for improving energy efficiency;

b) The connections between the technical aspects of energy management and the strategic management of the organization;

c) The use and need for metrics and key performance indicators generally and in selection of projects and strategic decision making;

d) The evaluation of effective management and continual improvement using documentation acquired through the monitoring and measurement system;

e) The relationships to and comparison of an energy management system with other management systems standards, including potential integration opportunities, and

f) Review of continual improvement opportunities for the system.

1.2 Application

All requirements in the Specification and information in the Guidance are generic and are intended to be applicable to all organizations, regardless of type and size. The application of the Specification and Guidance should be proportional to the circumstances and needs of the particular organization. Each organization will have the opportunity to choose how to apply the Energy Management System Specification through the establishment of an organizational scope.

A.2.1b) Would the proposed MSS work item result in an International Standard (IS), an ISO(/IEC) Guide, a Technical Specification (TS), a Technical Report (TR), a Publicly Available

International Standard and Guidance Document

A.2.1c) Does the proposed purpose or scope include product (including service) specifications, product test methods, product performance levels, or other forms of guidance or requirements directly related to products produced or provided by the implementing organization?

No, the Specification and Guidance document focus on issues related to strategic management of the energy supply and energy uses within an organization through verified measurements and continual improvement.

A.2.1d) Is there one or more existing ISO technical committee or non-ISO organization that could logically have responsibility for the proposed MSS? If so, identify.

There is currently no Technical Committee (TC) within ISO that could logically have responsibility for the proposed Energy Management System Specification and Guidance Document. Given the growing global constraints on energy supply and the significance of energy efficiency in mitigating

greenhouse gas (GHG) emissions, energy management is an important topic in its own right. Since effective energy management is largely operational, it requires a unique combination of strategic planning at the organizational level and technical guidance to implement new procedures and projects. Given the current volatile nature of energy supply and costs, it has created a focus within organizations on energy management; that is, management within the context of strategic organizational objectives of energy related issues, not just minimization. Energy efficiency has long been recognized as a separate discipline from environment, quality assurance, or other management concerns. Existing ISO Technical Committees have insufficient expertise in both the technical aspects of system energy efficiency and the required organizational management of energy to complete the development of this standard and associated guidance. These Technical Committees may address the technical issues concerning an energy using component or subsystem, or management systems that have a different purpose, but not the integrated approach required for energy management. A Technical Committee dedicated to energy management would attract the participation by well-informed experts in the field and would be prepared to address both technical and management aspects of the standard as well as alignment with other management system standards, thus encouraging integration and best practices.

A.2.1e) Have relevant reference materials been identified, such as existing guidelines or established practices?

Yes, the following relevant reference materials have been identified:

Existing National Energy Management Standards

1. Denmark DS 2403:2001 Energy Management-Specification
2. Denmark DS/INF 136:2001 Energy Management-Guidance on Energy Management
3. Ireland IS 393:2005 Energy Management Systems-Specification with Guidance for Use
4. Ireland Energy Management Systems IS 393:2005 Technical Guideline (December 2006)
5. Sweden SS 627750:2003 Energy Management Systems-Specification
6. United States ANSI/MSE 2000:2005 A Management System for Energy

Existing Energy Management Specifications

1. Australia AS3595-1990 Energy Management programs -Guidelines for financial evaluation of a project
2. Australia AS 3596-1992 Energy Management programs -Guidelines for definition and analysis of energy and cost savings
3. Australia/New Zealand AS/NZS 3598:2000 Energy audits
4. Canada PLUS 1140:1995 A Voluntary Energy Management Guideline
5. China GB/T 15587:1995 Guides for energy management in industrial enterprise
6. Germany VDI 4602 Blatt 1:2006-04 Energy Management - Terms, definitions
7. Japan JIS Z 9211 (1982-02-01) titled Technical terms used in energy management (Note: Approved 2003-05-20)
8. Japan JIS Z 9212 (1983-01-01) Technical terms used in energy management (Note Approved 2003-05-20)
9. Korea B 0071 (1985) Technical terms used in energy management (No. 2)
10. Netherlands Energy Management System Specification with Guidance for Use, June 2004 publication of SenterNovem

11. United Kingdom BIP 2011:2003 Continual Improvement through auditing (Integrated Management Systems Series)
12. United Kingdom HB 10190:2001 The Framework (Integrated Management System Series)
13. United Kingdom HB 1091:2002 Implementing and operating (Integrated Management System Series)
14. United Kingdom PASS 55-1:2003 Specification for the optimised management of physical infrastructure assets
15. United Kingdom PASS 55-2:2003 Guidelines for the application of PASS 55-1.
16. United States ANSI 739:1995 IEEE Recommended practice for energy management in industrial and commercial facilities

Developing National Energy Management Standards

1. China Management System for Energy – in development, China Standard Certification Center, China National Institute of Standardization
2. EU European Committee for Standardization (CEN) harmonized EU standard – in development

Other Relevant Documents

United Nations Industrial Development Organization (UNIDO) issues paper on energy management and outcomes of 21-22 March 2007 Experts Group Meeting http://www.unido.org/doc/64561

A.2.1f) Are there technical experts available to support the standardization work? Are the technical experts direct representatives of the affected parties from the different geographical regions?

This is a well-developed international subject; therefore, there are many experts world-wide that are experienced in this field. Based on the past meetings with UNIDO it is clear that there will be sufficient international experts willing to participate in the process from different geographical regions including but not limited to Brazil, Canada, China, Denmark, Ireland, Korea, Netherlands, Spain, Sweden, Thailand, and the United States.

A.2.1g) what efforts are anticipated as being necessary to develop the document in terms of experts needed and number/duration of meetings?

The type of expertise that will be required internationally to develop this standard will include:

- ✓ Energy managers from industry (large and medium size companies), large commercial organizations, and governmental facilities to provide insights concerning how the MSS for energy management could benefit and affect their companies or organizations;
- ✓ National standards organizations to provide a national perspective in the use and applicability of the MSS for energy management;
- ✓ National energy/environmental standards developers to provide practical guidance on the consistency of the MSS with related standards and on the ability to audit for standards conformance;
- ✓ Energy management experts to provide experience from developing and implementing energy management standards and specifications in their respective countries;
- ✓ National and international energy management and efficiency organizations to provide perspective on how the MSS can be used to develop an objective and sustainable approach to

energy management that can be promoted and profiled to different sectors of the economy worldwide;

- ✓ Private and public sector procurement officials have an interest in developing an MSS for energy management that represents a documented, repeatable strategy for procurement of energy and energy management resources. The MSS will define a cost effective, risk reducing process for procurement of energy in any economic sector;
- ✓ Other non-governmental energy efficiency organizations will introduce discussion concerning how the MSS for energy management will address energy use, storage and disposal and green procurement practices.
- ✓ Suppliers to organizations likely to use the MSS for energy management have an interest in ensuring that the energy management system will accommodate and encourage the purchase of energy efficient goods and services.
- ✓ Consultants providing energy management services to provide practical experience with organizational practices and institutional structures that encourage or impair the adoption of energy management systems;
- ✓ Manufacturers and vendors of energy-using equipment to ensure compatibility between the MSS for energy management and existing equipment standards, emerging technologies, and best practices;
- ✓ Utilities and other providers of energy services interested in the security of the energy supply and involved in providing incentives to promote the adoption of more energy efficient practices. The contribution of the MSS for energy management to these activities will be of high interest.
- ✓ MSS Service providers will have an interest in how the MSS for energy management could provide additional means to serve existing clients and to reach out to a new client base.

In terms of the number of meetings required:

A draft document that identifies the strengths and weaknesses of the identified national standards on energy management will be reviewed and issues for the draft Specification and Guidance Documents identified. This will be accomplished through the experts meeting groups and the first meeting of the new committee. Anticipated timeframe is June of 2008.

A Working Draft for the Specification will be developed and reviewed with opportunities and issues identified. This consensus process is anticipated to take eight months with the anticipated timeframe of June 2008 to January 2009.

The ISO Standards Development Process uses certain terms to represent the progress through the consensus building and voting on an MSS as it progresses through the process. These terms are presented below to assist the reader with the terminology used in this process.

Table 2: ISO Standards Development Terminology

STAGE	TERM	MEANING
CD	Committee Draft	A draft document for review by the committee, the main purpose of which is to obtain consensus between the experts, technical committee members and subcommittee members
DIS	Draft International Standard	A draft document for review by the ISO member bodies and the ISO Central Secretariat changes are still possible based on comments.

FDIS	Final Draft International Standard	A draft document for review by the ISO member bodies and the ISO Central Secretariat minor edits are still possible based on the comments.
IS	International Standard	Document released for use publication.

The voting on the committee drafts (CD) would occur during January 2009 until May 2009. The Draft International Standard (DIS) will be developed from the Committee drafts and reviewed to provide the first draft DIS for vote in the following six months from May 2009 until October 2009. The vote on the DIS version would be conducted from October 2009 until March 2010. This process would then be followed by the development of a Final Draft (FDIS) during the months of March 2010 to August 2010, followed by a voting period on the FDIS from August 2010 to October 2010. The results of any comments would be addressed in the published document of the International Standard (IS) produced between October 2010 and December 2010.
Any issues appropriate for the Guidance Document will be updated during this time in parallel with the development of the Specification.

It is anticipated that there will be two to three meetings of the Technical Committee per year, and an additional three meetings per year of any Working Groups created, over a three year period, with additional meetings to be scheduled at the Committee's discretion.

A.2.1h) What is the anticipated completion date?

Assuming a start time of June 2008, the anticipated completion date for the Specification and guidance documents would be the end of 2010 based on the time table below:

SCHEDULE	**DESCRIPTION**
June 2008	First meeting of new committee
June 2008 to January 2009	Development of working drafts
January 2009 to May 2009	Voting on Committee Drafts (CD)
May 2009 to October 2009	Preparation of Draft International Standards (DISs) text based on CD voting results
October 2009 to March 2010	Voting on DISs
March 2010 to August 2010	Preparation of Final Draft International Standards (FDISs) text based on DIS voting results
August 2010 to October 2010	Voting on FDISs
By end of 2010	Publication of ISO Standards

ISO Guide 72, Annex A; A.2.2 Affected parties

A.2.2a) Have all the affected parties been identified? For example:

1) organizations (of various types and sizes): the decision-makers within an organization who approve work to implement and achieve conformance to the MSS;
2) customers/end-users, i.e. individuals or parties that pay for or use a product (including service) from an organization;
3) Supplier organizations, e.g. producer, distributor, retailer or vendor of a product, or a provider of a service or information;
4) MSS service provider, e.g. MSS certification bodies, accreditation bodies or consultants;
5) regulatory bodies;
6) non-governmental organizations.

1. Organizations of various types and sizes and the decision-makers within an organization who approve work to implement and achieve conformation to the MSS and include *energy managers and procurement officials*. These representatives have been identified through voluntary participation in stakeholder meetings in the United States and through supply chain contacts for multi-national organizations who expressed interest in this MSS. It is anticipated that additional organizations will be identified by countries participating in the Technical Committee.
2. Customers/ end-users are essentially the same as those listed in (1) above- *energy managers and procurement officials* and the companies that they represent.
3. Supplier organizations include *suppliers to organizations likely to use the MSS, consultants providing energy management services, manufacturers and vendors of energy-using equipment, and utilities and other providers of energy services*. These organizations have been identified through direct outreach, professional and trade associations, and International meetings; additional supplier organizations will be sought out from other participating national organizations.
4. MSS Service providers were contacted on a more limited basis and include Det Norske Veritas Certification (DNV), Orion, NSF International Strategic Registrars (NSF), Underwriters Laboratories (UL) and Intertek and identified through the ANSI-ASQ National Accreditation Board web-site. http://www.anab.org/.
5. Regulatory bodies include *national standards organizations and national energy/environmental standards developers*. These organizations have been identified for Brazil, Canada, China, Denmark, Ireland, Korea, Netherlands, Spain, Sweden, the United States and a number of other countries who have expressed interest but have not yet initiated energy management standards.
6. Non-governmental organizations (NGOs) include *national and international energy management and efficiency organizations and other non-governmental energy efficiency organizations*. A number of international, regional, and national NGOs have been identified through meetings, conferences, and direct outreach; additional NGOs will be sought out from other participating national organizations. NGOs benefit from their participation in this development due to the improved information available, the improved communication, and improved practices.
7. Energy management experts have been identified in the Brazil, Canada, China, Denmark, Ireland, Korea, Netherlands, Spain, Sweden, Thailand, the United Kingdom, and the United States, and through the European Committee for Standardization (CEN). Additional *energy management experts* and affected parties would be identified through consensus-building as part of the ISO Standard Process.

A.2.2b) Is the MSS intended to be a guidance document, contractual specification or regulatory specification for an organization?

The proposed MSS is intended to be a family represented by a Specification and related Guidance document, and definition document.

ISO Guide 72, Annex A; A.2.3 Need for an MSS

A.2.3a) What is the need? Does the need exist at a local, national, regional or global level? Does the need apply to developing countries? Does it apply to developed countries? What is the added value of having an ISO document (e.g. facilitating communication between organizations in different countries)?

The need exists at local, national, regional and global levels, and in both developed and developing countries. The most immediate benefit from energy management standards is in industrial facilities that are already well-acquainted with ISO 9001 and 14001 policies and procedures. While the text that follows is specific to industry, critical services such as hospitals, water and wastewater

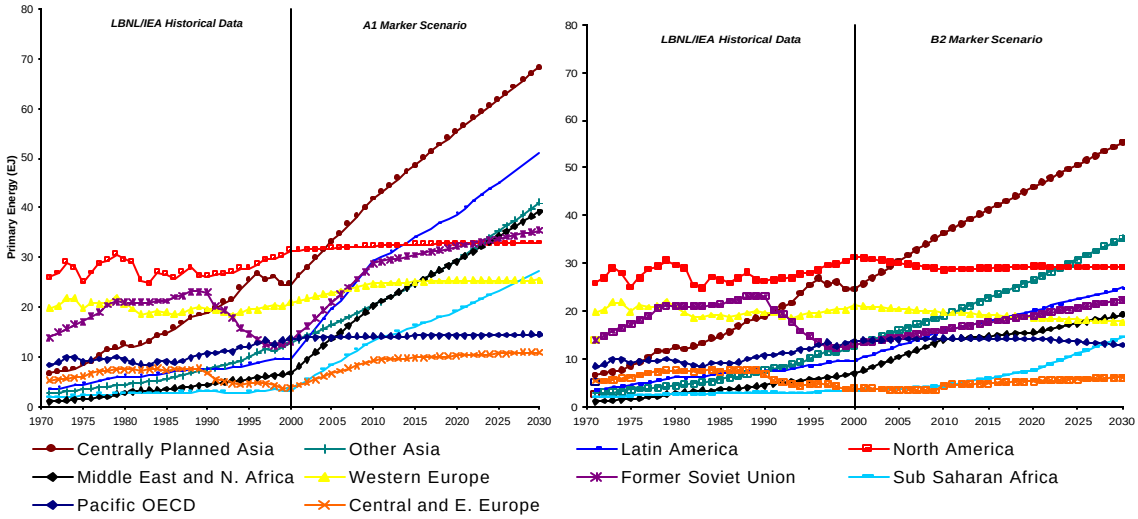
treatment, and other essential community support services have similar needs. The same issues of complexity and frequent changes in energy demand and requirements for uninterrupted supply that apply to many industries also apply to these facilities. This demonstrates the commonality of need for energy management in many types and sizes of organizations.

The industrial sector represents more than one third of both global primary energy use and energy-related carbon dioxide emissions.[1] In developing countries, the portion of the energy supply (excluding transport) required for industry is frequently in excess of 50% and can create tension between economic development goals and a constrained energy supply. Further, developing countries with emerging and expanding industrial infrastructure have a particular opportunity to increase their competitiveness by applying energy efficient best practices from the outset in new industrial facilities, rather than following the slower path to implementation that occurs in existing industrial facilities in more developed countries.

Figure 1 shows the historical and projected trends in primary energy in the industrial sector for ten world regions based on two scenarios of the Special Report on Emissions Scenarios (published by the Intergovernmental Panel on Climate Change (IPCC) in 2000. The A1 scenario storyline describes a future of very rapid economic growth, low population growth, and the rapid introduction of new and more efficient technologies. The B2 scenario storyline describes a world with an emphasis on economic, social, and environmental sustainability, especially at the local and regional levels. It is a world with moderate population growth, intermediate levels of economic development, and less rapid and more diverse technological change.[2]

Both scenarios forecast most growth to occur in the developing countries due to the energy required to fuel their growing economies. In general, the A1 scenario envisions more intensive growth in the developing countries than the B2 scenario. The Centrally Planned Asia region is the region that is expected to have the highest growth by far, reaching an energy consumption level of 68 EJ in the A1 scenario and 55 EJ in the B2 scenario by 2030.[3]

Figure 1. Historical and Projected Industrial Sector Primary Energy, 1971-2030 (EJ)



Source: Price et al. (2006)

[1] Price, L., S. de la Rue du Can, J. Sinton,, and E. Worrell., 2006. Sectoral Trends in Global Energy Use and Greenhouse Gas Emissions. Berkeley, CA: Lawrence Berkeley National Laboratory.

[2] Nakicenovic, N., J. Alcamo, G. Davis, B. de Vries, J. Fenhann, S. Gaffin, K. Gregory, A. Grubler, T.Y. Jung, T. Kram, E.L. La Rovere, L. Michaelis, S. Mori, T. Morita, W. Pepper, H. Pitcher, L. Price, K. Riahi, A. Roehrl, H-H. Rogner, A. Sankovski, M. Schlesinger, P. Shukla, S. Smith, R. Swart, S. van Rooijen, N. Victor, and D. Zhou, 2000. *Special Report on Emissions Scenarios: Report of Working Group III of the Intergovernmental Panel on Climate Change*. London: Cambridge University Press.

[3] Price, L., S. de la Rue du Can, J. Sinton,, and E. Worrell., 2006. Sectoral Trends in Global Energy Use and Greenhouse Gas Emissions. Berkeley, CA: Lawrence Berkeley National Laboratory (LBNL-56144)

Industrial energy efficiency is frequently overlooked by policy makers concerned about energy supply and use. The common perception holds that energy efficiency of the industrial sector is too complex to be addressed through public policy and, further, that industrial facilities will achieve energy efficiency through the competitive pressures of the marketplace alone. Neither premise is supported by the evidence from countries that have implemented industrial energy efficiency programs.

Companies that have made the shift in organizational culture required to effectively manage energy report many benefits in cost savings, productivity, and operational efficiency. Results reported and documented by multi-national companies with company-level target-setting programs and energy management programs are impressive. Dow Chemical set a target to reduce energy intensity (btu/lb product) from 1994-2005 by 20% and actually achieved 22% ($4B in savings); their energy intensity reduction goal for 2005 to 2015 is 25%. 3M Corporation has reduced its corporate energy consumption by 30% since 2000 through its global energy management program. DuPont has achieved $2B in energy savings since 1990 as part of a corporate goal to achieve a 65% reduction in GHG emissions below 1990 levels by 2020.

Because industrial production is so closely linked to economic growth and prosperity, energy efficiency policy is accompanied by some inherent, although entirely manageable, risk. Industrial energy efficiency is dependent on operational practices, which change in response to variations in production volumes and product types.

The key to effective industrial energy efficiency policy is consistency, transparency, engagement of industry in program design and implementation, and, most importantly, allowance for flexibility of industry response. When these criteria are met, industry has shown that it can exceed expectations as a source of reductions in energy use and corresponding GHG emissions, while continuing to prosper and grow. These requirements would be met by an international energy management standard, as represented by this Specification and Guidance Document.

A.2.3b) Does the need exist for a number of sectors and is this generic? If so, which ones? Does the need exist for small, medium or large organizations?

The need exists for all sectors, all sizes of organization and is generic. All sectors and organizations use energy to be productive and provide an acceptable environment for conducting business.

A.2.3c) Is the need important? Will the need continue? If yes, will the target date of completion for the proposed MSS satisfy this need? Are viable alternatives identified?

The energy savings potential remains largely unrealized among organizations because it is deeply embedded in operational and management practices. Energy systems are omnipresent, but the design and use are highly varied by sector and organization. System optimization and efficiency improvements cannot be achieved through component standards or one-size fits all approaches. An approach that engages management in the active management of energy, such as the Specification and Guidance Document is needed. The reasons for the need will continue due to the underlying reasons for the difficulty experienced by most organizations currently working on energy issues. These include, but are not limited to 1) a management focus on production as the core activities, not energy efficiency and 2) the existence of a budgetary disconnect in facility management between capital projects (including equipment purchases) and operating expenses 3) incentive structures within companies that reward lowest first cost rather life cycle cost purchasing practice. As a further driver for continuing need, experience has shown that most optimized systems lose their initial efficiency gains over time due to personnel and product/service changes. Since system optimization

knowledge typically resides with an individual who has received training, detailed operating instructions are not typically generated.

The targeted dates for the development of the proposed specification and guidance documents are:

SCHEDULE	DESCRIPTION
June 2008	First meeting of new committee
June 2008 to January 2009	Development of working drafts
January 2009 to May 2009	Voting on Committee Drafts (CD)
May 2009 to October 2009	Preparation of Draft International Standards (DISs) text based on CD voting results
October 2009 to March 2010	Voting on DISs
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Viable alternatives consist of national energy management standards and specification. An analysis of five countries with standards or specifications and one engaged in developing standards was conducted during the first quarter of 2007 by Lawrence Berkeley National Laboratory for the United Nations Industrial Development Organization[4]. The results of this analysis are summarized below.

A successful program in energy management begins with a strong commitment to continuous improvement of energy efficiency. A first step once the organizational structure (energy coordinator, management team) has been established is to conduct an assessment of the major energy uses in the facility to develop a baseline of energy use and set goals for improvement. The selection of key performance indicators and goals help to shape the development and implementation of an action plan. An important aspect for ensuring the successes of the action plan is involving personnel throughout the organization. Personnel at all levels should be aware of energy use and goals for efficiency. Staff need to be trained in both skills and general approaches to energy efficiency in day-to-day practices. In addition, performance results should be regularly evaluated and communicated to all personnel, recognizing high achievement. The use of energy monitoring and process control systems can play an important role in energy management and in reducing energy use.

Table 3 compares the elements of the energy management standards in the countries studied. For all five countries with existing energy management standards (or specifications), the standard has been developed to be entirely compatible with the ISO quality management program (ISO 9001:2000) and environmental management program (ISO 14001). In the case of Denmark, Ireland, and Sweden, the assumption is that industrial facilities participating in ISO 14001 will integrate the requirements of the standard into their existing management documentation and procedures.In the five countries studied, the energy management standards are designed to be applicable to all types and sizes of companies; however, in each instance, the largest, most energy intensive industries are the focus of additional programs and initiatives. By concentrating efforts on these large energy users, policy makers seek the greatest reduction in industrial energy consumption and overall GHG emissions.

United States

Georgia Institute of Technology (Georgia Tech) first developed a comprehensive energy management standard for industry in 2000 that has served as a model for several

[4] McKane, Aimee, 2007, Industrial Energy Management: Issues Paper, prepared for UNIDO Experts Group Meeting: Using Energy Management Standards to stimulate persistent application of Energy Efficiency in Industry, Vienna, Austria, 21-22 March 21. http://www.unido.org/en/doc/61189

subsequent national standards and has been adopted by the American National Standards Institute (ANSI).

Since 1993, the US Department of Energy (USDOE) has been developing and offering an extensive array of technical training and publications to assist industrial facilities in becoming more energy efficient through its BestPractices program. In October 2005, USDOE initiated a program to offer an Energy Saving Assessment (ESA) demonstration for steam or process heating systems in 200 plants with an annual energy use of 1TBtu or higher. Eight months after completion of the assessments, 134 plants had reported almost $222 million worth of energy savings recommendations either completed, underway, or planned. Based on the success of the first year, the program was expanded in 2006 to include motor systems.

In 2002, the US Environmental Protection Agency (USEPA) began a voluntary program, Climate Leaders, which works with companies to develop long-term comprehensive climate change strategies. Using the GHG emissions protocol developed by the World Resources Institute and the World Business Council for Sustainable Development, 59 companies have set and report progress on a corporate-wide GHG reduction goal to be achieved over 5 to 10 years. These goals are evaluated against the projected performance of the relevant sector. In 2003, the USEPA began offering information on energy management guidelines and benchmarking as part of its ENERGY STAR for Industry program. The program also includes energy performance indicators for selected industries that companies can use to benchmark their performance, gaining recognition if they are in the upper quartile.

Collectively, these activities encourage companies to manage energy, but do not explicitly encourage use of an energy management standard. However, recently USDOE and USEPA have joined together to develop a collaborative program to certify plants for energy efficiency that implement energy management standards, based on an updated version of the Georgia Tech/ANSI energy management standard. This program is expected to greatly increase use of the standard by US industries.

Table 3: Energy Management Standards, Details

Participating Countries	Management Commitment Required	Develop energy management plan	Establish energy use baseline	Identify Energy Coordinator	Establish Cross- Divisional Implementation Team	Emphasis on Continuous Improvement	Document Energy Savings	Establish Performance Indicators & Energy Saving Targets	Document & Train Employees on Procedural/ Operational Changes	Specified Interval for Re-evaluating Performance Targets	Reporting to Public Entity Required	Energy Savings Validated or Certified	Year Published	Approx Market Penetration by Industrial Energy Use
Existing														
Denmark	yes	yes	yes	yes	yes	yes	yes	yes	yes	suggests annual	yes	optional[1]	2001	60%[2]
Ireland	yes	yes	yes	yes	yes	yes	yes	yes	yes	industry sets own	yes	optional[1]	2005	25%
Netherlands[3]	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	optional[1]	2000	20-90%[4]
Sweden	yes	yes	yes	yes	unclear	yes	yes	yes	yes	yes[1]	yes	optional[1]	2003	50%elect
United States	yes	yes	yes	yes	yes	yes	yes	yes	yes	industry sets own	no	no	2000	<5%[5]
Under Development														
China	yes	yes	yes	yes	yes	yes	yes	yes	yes	industry sets own	not avail	not avail		

1 Certification is required for companies participating in voluntary agreements (also specified interval in Sweden). In Denmark, Netherlands & Sweden linked to tax relief eligibility.

2 As of 2002, latest date for which data is available

3 Netherlands has an Energy Management System, not a standard, per se, developed in 1998 and linked to Long Term Agreements in 2000.

4 800 companies representing 20% of energy use have LTAs must use the Energy Management System. The 150 most energy intensive companies, representing 70% of the energy use, have a separate, more stringent, bench marking covenant and are typically ISO 14000 certified, but are not required to use the EM System.

5 To date, the US government has encouraged energy management practices, but not use of the standard, therefore market penetration has been very limited. Program policies new in 2007 are designed to address this.

Table 4 provides a review of the ANSI MSE2000:2005 and the ISO 9001:2000 Quality Management Standard and ISO 14001:2004 Environmental Management standards. This comparison provides information showing the areas in which the MSS are aligned and where they are not currently aligned. It also provides some insight into the potential integration opportunities for the various MSS within an organization.

TABLE 4: Comparison of MSS

ISO 14001 Reference	Criteria	MSE Reference	Criteria	9001 Reference	Criteria	Comments
4	Environmental management system	4	Energy management system	4	Quality management system	Information on alignment of the standards and differences between the standards.
Plan						
4.1	General requirements	4.1	General Requirements	4.1	General requirements	This provides for the implementation and maintenance of the system and it's improvement over time
4.2	Policy	5.2	Energy Policy	5.3	Quality policy	The requirements for the policy are similar including the need for continual improvement. There are some differences to allow for the focus of the three standards, such as quality, energy, and environment. The environmental policy is required to be public. The other two standards do not require the policy to be public.
		5.3	Strategic Planning			Energy information is provided for strategic planning purposes, although planning is addressed in all three standards only energy addresses the strategic planning processes.
				5.4.2	Quality Planning	Quality planning is carried out in order to ensure proper system integrity
4.3.1	Environmental Aspects	6.1	Energy Profile			The planning elements are slightly different due to the different focus of the three standards. The environmental standard provides for an environmental risk analysis, and evaluation of legal requirements. The energy standard provides for information on the energy profile, significant energy users within the system, and key performance indicators.
		6.1.1	Utility Tracking			Provides information on utilities use within the organization
		6.1.2	Significant Energy Uses			Provides information on the items that are significant energy uses within the organization.
		6.1.3	Key Performance Indicators			Provides key performance indicators for utility use within the organization based on the data from the utility tracking and significant use.

ISO 14001 Reference	Criteria	MSE Reference	Criteria	9001 Reference	Criteria	Comments
		6.2	External Information			Provides information on items such as tariffs, alternative energy sources, and other information to assist in the planning process.
		6.3	Energy Assessment			This provides for the collection of information on the current state of equipment, processes, storage, use and disposal of utilities.
4.3.2	Legal and Other					The environmental standard requires the identification of the legal and other requirements that apply to the system.
4.3.3	Objectives, targets and programme(s)	6.4	Goals and Targets	5.4.1	Quality objectives	All three standards require the identification of goals and targets.
4.3.3	Objectives, targets and programme(s)	7.3.1	Energy management projects purpose			The programs and projects are established to meet the targets.
4.3.3	Objectives, targets and programme(s)	7.3.2	Energy management projects - project selection			The programs and projects are established to meet the targets with responsibility assigned and reviewed based on criteria.
4.4.1	Resources, roles, responsibility, and authority	5.1	Management Commitment	5.5.1	Management Commitment	Resources for the system are to be provided
		5.1	Management Commitment	5.1	Management Commitment	The organization shall continually improve the system
		5.4	Responsibility and authority	5.2	Customer focus	The energy standard uses an energy team that is appointed, a cross-functional team or team approach is not required by the other two standards. The quality standard provides for the determination of customer focus by management.

ISO 14001 Reference	Criteria	MSE Reference	Criteria	9001 Reference	Criteria	Comments
4.4.1	Resources, roles, responsibility, and authority	5.4	Responsibility and authority	5.5.2	Management Representative	The standards provide for a management representative or coordinator to be established with the responsibility for establishing, implementing and maintaining the system.
4.4.2	Competence, training, and awareness	7.6	Training, competence and awareness	6.1 6.2	Provision of resources Competence awareness and training	All three standards require the organization to determine competence and to provide training for employees. The standards then focus on the topic represented. The quality standard requires thos e affecting quality, environmental standard requires those affecting the environment, and the energy standard requires those who purchase, use, store or dispose of energy or related to a significant use be trained. All the standards require records of training. Only the environmental standard requires that the person trained understand the consequences of departure from the established process.
		7.3.3	Project Implementation			Requires that as projects develop that training is included as necessary for the project.
4.3.3	Communication	7.5	Communication	7.2.3	Communication	Both the quality and the energy standard focus on internal communication. The environmental standard does include both internal and external communication processes.
4.4.4	Documentation	4.2.1	General Requirements	4.2.1	General requirements	The documentation requirements for the three standards are aligned with the environmental standard incorporating the requirements for the manual into the section identified as documentation rather than a separate section.
4.4.5	Control of documents	4.2.2	Energy manual	4.2.2	Quality manual	
		4.2.3	Control of documents	4.2.3	Control of documents	
				6.3	Infrastructure	The quality standard includes the requirements to provide appropriate infrastructure necessary for product conformity
				6.4	Work Environment	The quality standard includes the requirements to provide appropriate work environment necessary for product conformity

ISO 14001 Reference	Criteria	MSE Reference	Criteria	9001 Reference	Criteria	Comments
DO						
4.4.6	Operational control	7.2.2	Control of equipment and process	7.1.1	Planning of product realization	These sections of the standards are aligned in regards to operational controls necessary for the processes and equipment. The focus of the quality standard is on the processes related to providing the product. The environmental standard focus is on the significant aspects identified in the system. The energy standard focus is on the equipment and processes related to energy management.
				7.5.1	Control of product and service provision	
				7.2.1	Determination of requirements related to product	The quality standard requires the organization to determine the requirements of the product.
				7.2.2	Review of requirements related to product	The quality standard requires the organization to review the requirements of the product.
4.4.6	Operational control	7.1	Purchasing	7.4.1	Purchasing process	The quality standard requires that the purchasing process be defined, including criteria for suppliers, review/inspection of the purchased items. The environmental standard requires that suppliers be made aware of significant aspects. The energy standard requires that the organization consider items that will have lesser or reduced impact on humans and that green purchasing be considered.
				7.4.2	Purchasing information	
				7.4.3	Verification of purchased product	
		7.4	Control of outsourced energy processes	4.1	General requirements	The quality and energy standards require that the organization have processes in place to address and manage any outsource processes or energy sources. The two standards are aligned. The environmental standard does not address this requirement.

ISO 14001 Reference	Criteria	MSE Reference	Criteria	9001 Reference	Criteria	Comments
		7.1.2	Energy equipment and systems			In addition to operations and maintenance costs, the organization shall consider energy efficiency, recyclables, durability, etc in the selection process for purchases of equipment and systems related to significant energy uses.
		7.2.1	Commissioning, Recommissioning, and Continuous Commissioning			Direct and indirect costs and benefits when commissioning, re-commissioning or implementing continuous commissioning of new existing facilities, central energy plants, and individual energy systems shall be recorded and retained.
4.4.7	Emergency preparedness and response					The environmental standard requires the process for managing and periodically testing emergency response processes.
				7.5.2	Validation of process for product realization	The quality standard requires that processes that can not be otherwise verified.
				7.5.3	Identification and traceability	The quality standard requires that product and parts be identified as appropriate throughout the process. It also requires that traceability where required be controlled.
				7.5.4	Customer property	The quality standard requires the organization to identify, verify and protect customer property
				7.5.5	Preservation of product	The quality standard requires the organization to preserve the product and parts as appropriate.
4.3.1	Environmental aspects	6.4	Goals and targets	7.3	Design	The quality standard establishes the requirements for those organizations that are design responsible. The goals and targets in the energy standard require new facilities issues to be identified and managed, the environmental aspects section of the standard require that new developments be managed.

ISO 14001 Reference	Criteria	MSE Reference	Criteria	9001 Reference	Criteria	Comments
Check						
4.5.1	Monitoring and measurement	8.1.1	Energy monitoring	8.1	Monitor and measurement	The standards require that the system monitor and measure key characteristics - quality on processes and products, environmental impacts for the environmental standard, and energy and key performance indicators for energy. The requirements are aligned but with a different focus.
				8.2.3	Monitor and measurement of process	The quality standard requires the organization to monitor and/or measure the processes identified by the organization in the planning activities.
				8.2.4	Monitor and measurement of product	The quality standard requires the organization to monitor and/or measure the product at various stages to ensure it meets requirements.
				8.4	Analysis of data	The quality standard requires that data provided by the system is analyzed for determining possibilities for continual improvement.
				8.2.1	Customer satisfaction	The quality standard requires that data on customer satisfaction be reviewed and monitored.
				8.5.1	Continual improvement	The quality standard requires that the organization to consider a variety of information in order to generate continual improvement of the system.
4.5.1	Monitoring and measurement	8.1.3	Calibration	7.6	Control of monitoring and measurement devices	The three standards all address calibration. The quality standard provides the most detail in terms of what actions are necessary, the environmental standard and energy standard simply indicate appropriate level of calibration. The quality and environmental standards also require records of calibration.
				8.3	Control of nonconforming product	The quality standard requires the proper control and management of any products or parts that are determined to be nonconforming.
		8.1.2	Energy measurement and verification			The energy standard requires that data be collected to verify the progress toward targets.

ISO 14001 Reference	Criteria	MSE Reference	Criteria	9001 Reference	Criteria	Comments
4.5.1	Evaluation of compliance					The environmental standard requires the evaluation of the legal requirements identified during the planning stages.
4.5.2	Evaluation of other requirements					The environmental standard requires the evaluation of the other requirements identified during the planning stages.
4.5.3	Nonconformity, corrective, and preventive action	8.3.1	Corrective action	8.5.2	Corrective action	The three standards are aligned in the requirements for corrective action although the environmental and energy standard do require the actions taken to be reviewed for effectiveness while the quality standard does not.
4.5.3	Nonconformity, corrective, and preventive action	8.3.2	Preventive Action	8.5.3	Preventive Action	The quality and energy standards clearly separate out the concept for actions necessary for evaluation of trends or proactive type actions from those that are corrective in nature; however, they do not require a separately documented procedure for corrective and preventive actions. The environmental standard combines the concepts of nonconforming, corrective and preventive actions into one section of the standard requirements.
4.54	Records	4.3	Recordkeeping	4.2.4	Control of records	The three standards are aligned in the requirements for records - for the purpose of providing evidence of implementation, maintenance, and continual improvement of the system.
4.5.5	Internal Audit	8.2	Internal Audit	8.2.2	Internal Audit	The three standards are aligned in the requirements for internal audits. All require a process to be defined, the auditors to be independent of the areas they are auditing, and for the audits to be planned. The focus of the audit systems differs based on the standard, the quality standard focus is on the activities related to quality, the environmental standard is related to environmental impacts, and the energy standard is related to energy use.

ISO 14001 Reference	Criteria	MSE Reference	Criteria	9001 Reference	Criteria	Comments
ACT						
4.6	Management Review	9	Management Review	5.6.1	Management Review	All three standards require the review of the system and system performance with top management. They are aligned in the use of a management review with inputs that provide information on which to base decisions on changes, improvements and resource allocation.
				5.6.2	Management Review inputs	
				5.6.3	Management Review Outputs	

China

The China Standard Certification Center (CSC) has been authorized by the Chinese government to develop a series of national energy management standards. Three standards are planned for release by March 2008-- Management System for Energy –Requirements, Management System for Energy- Guidelines for performance, and Management System for Energy- Guidelines for Auditing. The draft Requirements standard has much in common with the other energy management standards in use elsewhere.

In 2005, the Chinese government announced a plan to reduce energy consumption per unit of GDP by 20% over 2005 levels by the year 2010. A major initiative included in this plan is Monitoring and Guiding of Energy Efficiency Improvements of Top 1000 Energy-Consuming Enterprises in China. A total of 1000 large energy using enterprises from nine sectors have been selected for participation. Their estimated 2004 final energy use was 673 Mtce or 18.7 Quads which represents almost 50% of China's industrial energy consumption and 30% of China's total final energy use. The total energy reduction goal for these enterprises after five years is 100 Mtce (2.8 Quads).

Under the plan, the enterprises participating in the Top 1000 Energy-Consuming Enterprises program are required to report annually on energy use, and, within the first five years and every five years thereafter, conduct an energy audit, develop an energy conservation plan, formulate energy efficiency goals and adopt energy conservation measures. It is assumed that the planned energy management standards will be linked to these program activities, once they become available.

Europe

The European Committee for Standardization (CEN) and the European Committee for Electrotechnical Standardization (CENELEC) have formed a task force and undertaken development of a set of three European standards related to energy management including: energy service companies – ESCOs, energy managers and experts, and energy management systems. The Task Force 189- Energy Management convened in November 2006 with 24 participants from 10 countries, and decided to create three ad hoc Project Teams to develop the standards. The standard on energy management systems has been assigned to Sweden and will be a simple compilation of existing Danish, Swedish and Irish Standards and the Dutch Specification, conform to the ISO 14001 structure and requirement. It will also take in account the German VDI Specification on EMS and the US ANSI MSE 2000. A draft is expected by October 2007.

Based on this review the alternatives are a series of national standards, all slightly different, causing unnecessary complexity and expense for companies operating in today's global economy. This complexity could adversely affect voluntary adoption of energy management standards and impede improved energy efficiency worldwide. This is especially true in developing countries with few resources to create and support their own national energy management standards.

A.2.3d) Describe how the need and importance were determined. List the affected parties consulted and the major geographical or economical regions in which they are located.

UNIDO organized at the end of March 2007 an international Experts Group Meeting (EGM) on Industrial System Optimization and Energy Management Standards in Industry. The EGM participants reached a consensus that the timing is favourable to move forward with the international harmonization of standards for Energy Management. Currently, four countries have standards for Energy Management (USA, Denmark, Sweden, and Ireland), several have standards under development (China, Spain), and others have expressed interest in and willingness to start the

process of developing national energy management standards. Affected parties consulted included experts from Denmark, Ireland. Sweden, Spain, Netherlands, and other EU Members; the United States; Canada; Brazil; Ukraine; China; Thailand, Vietnam , Indonesia, Malaysia, the Philippines; South Africa, Egypt; and many other countries.

UNIDO plans to establish an International Working Group (IWG) of international and national industrial energy efficiency experts, energy management and standards experts, policy makers and regulators, with China providing the IWG chair. The purpose of the working group is to contribute to the dialogue for international harmonization of energy management standards from a developing country perspective.

A.2.3e) Is there known or expected support for the proposed MSS? List those bodies that have indicated support. Is there known or expected opposition to the proposed MSS? List those bodies that have indicated opposition.

Support is expected from the countries and multi-national corporations who either have or are planning energy management standards and who are seeking a common international standard for energy management. The International Energy Agency and World Bank have been positive to date as have UNIDO as indicated by recent conferences. Opposition may be expected from the Members of the Industrial Cooperation on Standards and Conformity Assessment (ICSCA). This group has indicated opposition to any additional MSS at this time.

ISO Guide 72, Annex A; A.2.4 Sector-specific MSS proposals

A.2.4a) Is the MSS for a single specific sector?

No, the Specification and Guidance Document will be generic, addressing all sectors. Unlike quality or environmental management systems energy management is not specific to sectors and would not require sector specific documents.

A.2.4b) Will the MSS reference or incorporate an existing, non-industry-specific ISO MSS

Yes - The Specification will build on the framework of the continual improvement cycle Plan-Do-Check –Act and the Guidance Document will provide a bridge between the existing ISO 9001 and ISO 14001 standards, meaning that the ISO 9001 and ISO 14001 standards will be incorporated via reference in the Guidance Document. Additionally, energy stability is of great concern and considered to be a matter of national security by many countries, which may provide a connection to the ISO 28001 document. The exact nature of this reference would be explored during the development process. It is anticipated that the auditing of the standard would reference the ISO 19011 auditing standard by reference as well.

A.2.4c) What steps have been taken to remove or minimize the need for particular sector-specific deviations from a generic MSS?

Several countries have already successfully implemented energy management specifications and guidance that are not sector-specific. The country with the longest experience with a national energy management standard is Denmark. Their standard has been applied successfully to a range of industrial, commercial, and governmental organizations without the need to develop any sector-specific deviations. Similarly, Ireland and Sweden are already applying their national energy management standard to a broad range of industrial sectors. Experience has shown that there is no need for sector-specific deviations, as that would increase costs and complexity with little if any corresponding benefit. The goal is a single, international standard that is sufficiently flexible to adapt to the requirements of the implementing organization.

Energy systems are prevalent in all sectors, whether commercial, industrial, or institutional and governmental. In fact, many of these systems are in common use by all sectors. All of these systems need to be optimized and require strategic management that will lead to continual improvement and sustained savings. The Specification and Guidance Document will provide a sufficiently broad framework to be applicable to all energy systems and will not exclude any systems that might be peculiar to a certain sector.

ISO Guide 72, Annex A; A.2.5 Value of an MSS

A.2.5.1 Value to an organization implementing the MSS

A.2.5.1a) What are the expected benefits and costs to organizations, differentiated for small, medium and large organizations if applicable?

The main benefits from the proposed Specification and Guidance Document include but are not limited to:

- Provides organizations and facilities (industrial, commercial, governmental) with a well-tested framework for integrating energy efficiency into their management practices
- Offers organizations with operations in more than one country a single, harmonized standard for implementation across the organization
- Provides a logical and consistent methodology for identifying and implementing energy efficiency improvements that contribute to continuous improvement of energy efficiency in these facilities
- Assists participating organizations in better utilization of existing energy consuming assets, thus reducing costs and/or exanding capacity with existing assets
- Offers guidance on baselining, measuring, documenting, and reporting energy intensity improvements and their projected impact on reductions in GHG emissions.
- Creates transparency and standardization in the management of energy that currently doesn't exist, facilitating recognition of energy management best practices by outside organizations, thus reinforcing the value of energy managing behavior.
- Assists facilities in evaluating and prioritizing new energy efficient technologies
- Provides a framework for organizations to encourage suppliers to manage their energy, thus multiplying the energy intensity reduction from each participating organization
- Facilitates the use of energy management as a trade mechanism that contributes positively to GHG emissions reductions
- Expands the market for energy efficient services

The costs to organizations in using the specification would include:

- Typical implementation costs for any MSS.
- Cost related to energy activities and projects identified by the organization.

These benefits and costs are applicable to all sizes of organization. It is not anticipated that the costs to implement the proposed Specification and Guidance Document will be high, but any financial costs incurred will be outweighed by the proposed benefits that would result from the implementation.

A.2.5.1b) Describe how the benefits and the costs were determined. Provide available information on geographic or economic focus, industry sector and size of the organization. Provide information on the sources consulted and their basis (e.g. proven practices), premises, assumptions and conditions (e.g. speculative or theoretical), and other pertinent information.

The benefits and costs were determined over several years of study by Lawrence Berkeley National Laboratory in consultation with energy management experts in the U.S., Europe, and elsewhere. These studies included a literature search of existing standards and related professional papers and case studies, discussions with representatives from organizations responsible for developing and/or implementing the standards, and meetings in the U.S. with multi-national organizations who have developed their own internal systems for managing energy. Those contacted to determine the benefits and costs include: end-users, consultants, energy supply organizations, MSS service providers, regulatory bodies, key decision makers for manufacturing organizations, public and private sector purchasing agents, equipment vendors, and government facilities in countries where energy specifications and guidance documents already exist. In addition, there have been numerous discussions with UNIDO and consultations with CEN, China Certification Center, Vietnam, South Africa, Nigeria, Brazil, Spain, and REEP.

A.2.5.1c) Will the MSS allow an organization competitively to add to, differentiate or encourage innovation of its management system beyond the standard?

Yes, the five countries studied with previous experience in implementing energy management standards or specifications have documented a range of performance among participating companies. This range of performance is affected by many elements external to the standard or specification, including the overall commitment of the company to be a leader in energy efficiency, the proportional share of the company's budget spent on energy, the current economic climate for the business, etc. Companies can, and have, shown great innovation in applying the principles of the standards and specifications. In many instances, the collateral benefits in reduced maintenance, greater utilization of existing equipment assets, and improved quality control are substantial. The organizational discipline required to establish an energy management plan for continuous improvement and to train staff to execute it can have a dramatic impact on the overall competitiveness of the company. The Energy Management Specification and Guidance Document provide the basic framework to assist a company in embarking on a path to greater energy efficiency; the success of that endeavour will rest in the overall effectiveness of the company's leadership. The Specification would allow organizations to be more competitive due to improved life cycle costs as well as the cost savings achieved through the energy projects and improved efficiencies. The Specification could also be integrated with existing management systems to encourage consideration of energy in the design of the organization's product or service providing a potential differentiation of new products for the organization.

A.2.5.1d) If the intended use is for contractual or regulatory purposes, what are the potential methods to demonstrate conformance (e.g. first party, second party or third party)? Does the MSS enable organizations to be flexible in choosing the method of demonstrating conformance, and to accommodate for changes in its operations, management, physical locations and equipment?

Organization certification schemes would be through first party self-declaration, second party audits or third party certification. Third party certification is not a requirement of the Specification or the Guidance Document. It is anticipated that third party audits could be conducted in conjunction with other third party assessments. The scope of the system would allow organizations flexibility to add, remove or modify operations, locations, equipment, processes, or other issues as appropriate to their situation and agreed scope. Audit Guidance would be provided as one of the Guidance Documents and would complement ISO 19011 Guidance for Quality and Environmental Audits. The standardization of the audit process could potentially help provide incentives for development in adopting countries.

A.2.5.1e) If third-party registration/certification is a potential option, what are the anticipated benefits and costs to the organization? Will the MSS facilitate and joint audits with other management standards or promote parallel assessments?

Third-party registration/certification is an option. The anticipated benefits to this registration/certification include but are not limited to:

- a means to verify the achieved energy savings that may be used to assign a monetary value to those savings for trading purposes (carbon, white certificates, etc)
- a potential benchmark with other organizations
- a means to demonstrate commitment to the local and regional community in which the organization is located
- a means to demonstrate a competitive advantage within the supply chain
- a means to demonstrate effective management of assets to investors

The energy management system Specification and Guidance Documents would provide for the flexibility to be included in parallel assessments with other MSS.

A.2.5.2 Value to other affected parties

A.2.5.2a) What are the expected benefits and costs to other affected parties (including developing countries)?

UNIDO plans to conduct sector studies and market surveys in selected regions (Southeast Asia, Africa, Eastern Europe, Latin America) to identify issues and barriers to EMS in preparation of discussion for harmonization.

It is anticipated that any affected parties not previously identified will have the same benefits when implementing the Specification and Guidance Document as those that have been identified in previous sections. Developing countries such as India and China were included in the original review of benefits and potential acceptable standards to be used for the MSS.

Developing countries could especially benefit from the Specification and Guidance Document because the portion of the energy supply (excluding transport) required for industry is frequently in excess of 50% and can create tension between economic development goals and a constrained energy supply. Developing countries with emerging and expanding industrial infrastructure have a particular opportunity to increase their competitiveness by applying energy efficient best practices from the outset in new industrial facilities, rather than following the slower path to implementation that occurs in existing industrial facilities in more developed countries.

A.2.5.2b) Describe how the benefits and the costs were determined. Provide any information regarding the affected parties indicated.

Stakeholder meetings and discussions have already been hosted by UNIDO and other interested parties to develop a consensus concerning benefits and costs, including but not limited to Brazil, China, Denmark, Ireland, Korea, Netherlands, Spain, Sweden, Thailand, and the United States. It is expected that this dialogue will continue under the aegis of the planned UNIDO activities previously described.

A.2.5.2c) What will be the expected value to society?

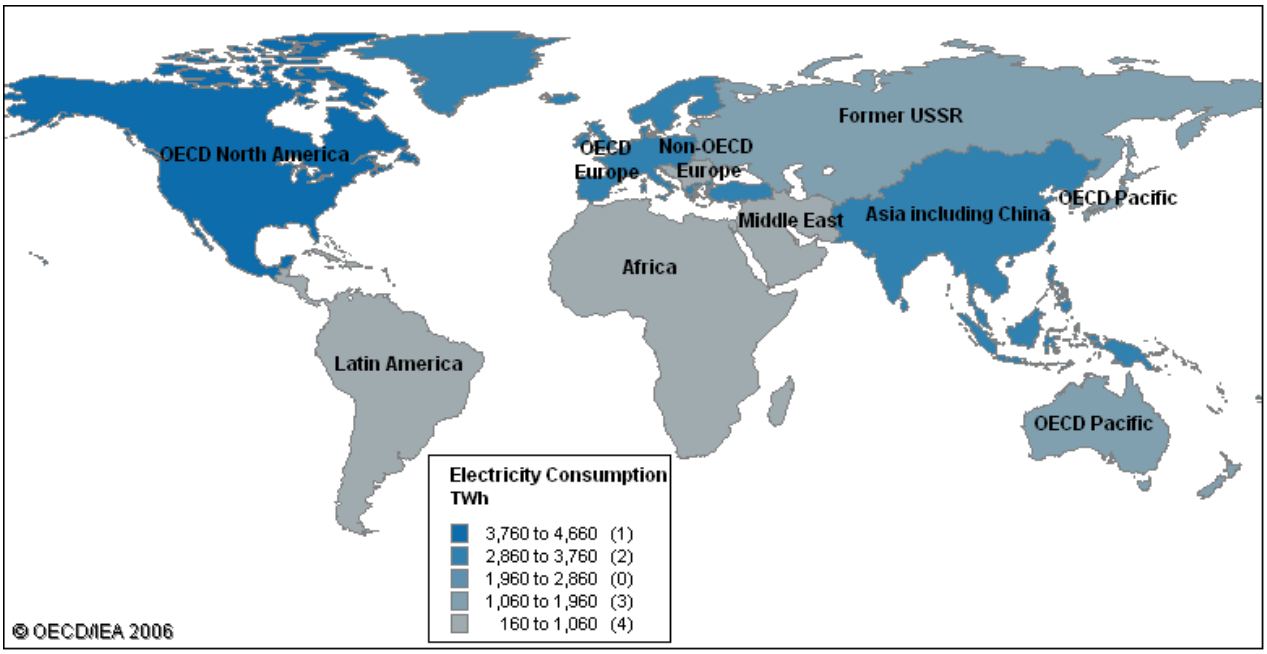
The value to society includes:

- Provides a recognized means to enable organizations to demonstrate commitment to energy management practices in the most cost effective manner;
- Enables organizations to protect their brand equity and improve their organizational footprint;
- Provides a consistent measurement tool to demonstrate effectiveness of programs such as energy efficiency credits;
- Creates a standard that is based on a time proven model of continual improvement, already adopted by many organizations;
- Results in reconciliation of global principles and harmonization of national and cultural standards within an international framework, thus helping organizations address the high cost of responding to a proliferation of standards;
- Facilitates global trade by providing a standard for joint venture and other business partners to meet, and

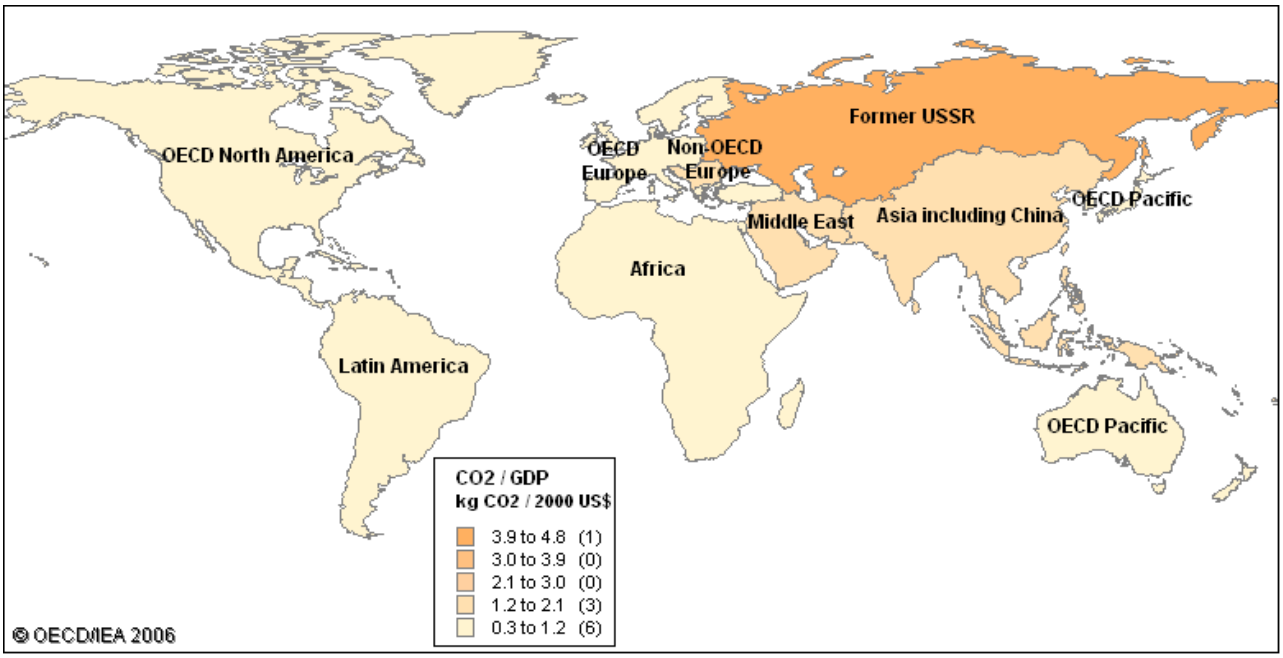
- Provides an additional mechanism for consumers, investment fund managers, and others to evaluate companies for investment purposes.

In addition to the basic list provided above, there are a few points that warrant additional attention, namely the strong correlation between the availability of a reliable energy supply and economic development. The figure below shows the predicted growing need for energy based on time series data from 1960 to 2003 using indicators for 2004. This need, along with the prediction that the majority of growth in need will come from the developing countries (See Figure 1), establishes the importance of energy in economic growth as it relates to energy use.

Map Energy Indicators - World - Electricity Consumption



Map Energy Indicators - World - CO_2 / GDP



ISO Guide 72, Annex A; A.2.6 Risk of trade barriers

A.2.6a) How would the MSS facilitate or impact global trade? Could the MSS create or prevent a technical barrier to trade?

ISO has published ***The ISO Survey of Certifications – 2005***, which sheds light on the roles played in globalization by ISO's standards for quality and environmental management systems. Below is a quote from www.ISO.org website indicating a selection of the key findings in the report:

• Global Trade

ISO 9001:2000 is now firmly established as the globally accepted standard for providing assurance about the quality of goods and services in supplier-customer relations. Up to the end of December 2005, at least 776 608 ISO 9001:2000 certificates had been issued in 161 countries and economies, an increase of 18 % over 2004, when the total was 660 132 in 154 countries and economies.

• Sustainable business

Similarly, ISO 14001 confirms its global relevance for organizations wishing to operate in an environmentally sustainable manner. Up to the end of December 2005, at least 111 162 ISO 14001 certificates (1996 and 2004 versions consolidated) had been issued in 138 countries and economies, an increase of 24 % over 2004, when the total was 89 937 in 127 countries and economies.

• Unifying base and supply chains

The status of ISO 9001:2000 as a unifying base for the quality requirements of specific sectors and its use to qualify suppliers in global supply chains is illustrated by the growth of ISO/TS 16949:2002 certification in the automotive sector. Up to the end of December 2005, at least 17 047 ISO/TS 16949:2002 certificates had been issued in 80 countries and economies, an increase of 70 % over 2004 when the total was 10 019 certificates in 62 countries and economies.

• Technical support for regulation

The use of ISO 9001:2000 as a technical support in the regulated area is illustrated by the growth of certification to ISO 13485:2003, for which it provides the core, in the medical device industry. Up to the end of December 2005, at least 5 065 ISO 13485:2003 certificates had been issued in 67 countries and economies, an increase of 111 % over 2004 when the total was 2 403 in 55 countries and economies.

• Tools for new major players

The strong performance of China, which is again in the top 10 countries for growth in both ISO 9001:2000 and ISO 14001 certification, and of India, which is again in the top 10 for ISO 9001:2000 growth and enters the top 10 for ISO 14001 growth, is no doubt partly linked to their increasing participation in global supply chains, in export trade and in business process outsourcing.

•Rise of services

The rising importance of services in the global economy is borne out by the survey – nearly 33 % of ISO 9001:2000 certificates and 31 % of ISO 14001 certificates in 2005 went to organizations in the service sectors. The latter statistic also illustrates that good environmental management is not just for "smoke stack" industry – and that service providers are accepting their social responsibilities in this area.

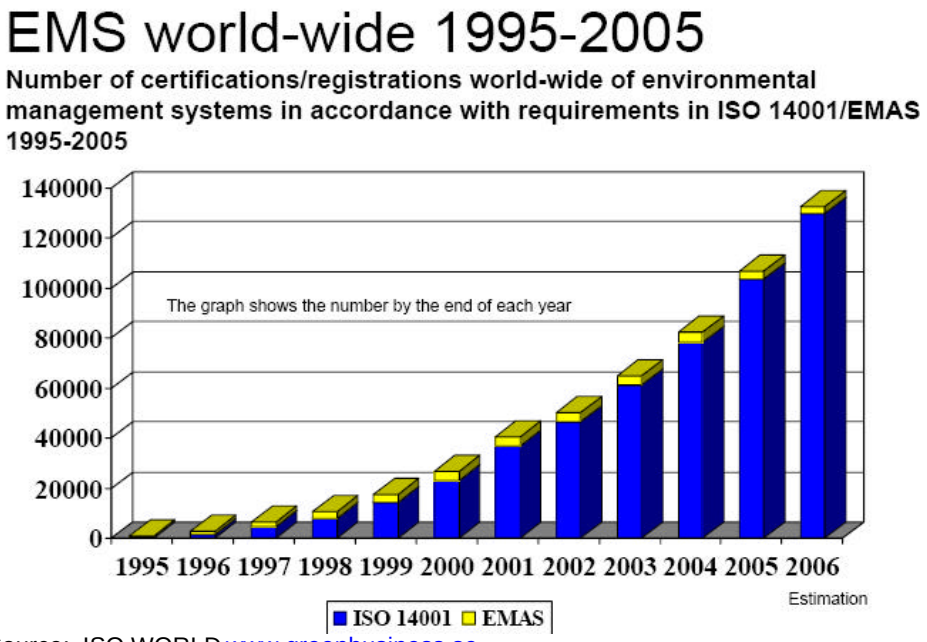
Based on the past experience of the global community with MSS, it is anticipated that the MSS for energy management would facilitate global trade and create trade as well as prevent technical barriers to trade.

A.2.6b) Could the MSS create or prevent a technical barrier to trade for small, medium or large organizations?

The MSS for energy management should create trade for small, medium and large organizations. It could be used to provide a means for benchmarking and for organizations to demonstrate the effectiveness of their energy management program and/or as a standard for business partners or supply chains to meet. The improvement in efficiencies and cost savings should in fact make the organizations more cost competitive and better able to compete in the global marketplace.

A.2.6c) Could the MSS create or prevent a technical barrier to trade for developing or developed countries?

By looking at the data for the growth and development of ISO 14001 it can be inferred that the Standard has created trade for developing countries as well as small, medium, and large organizations. This growth curve clearly shows that organizations in developing countries have not been impeded by the standard, and in many cases the level of adoption in developing nations is as high if not higher than some of the developed nations. This allows us to clearly demonstrate that the developed nations are not negatively impacted by the use of MSS but rather the opposite--it is helping to support the supply chain represented by developing nations. In this sense the MSS are serving as trade facilitators. The data regarding adoption also supports the adoption issue with incentives noted in the review of existing standards above. For example, Sweden has a higher rate of adoption than the United States.



Source: ISO WORLD www.greenbusiness.se

A.2.6d) If the proposed MSS is intended to be used in government regulations, is it likely to add to, duplicate, replace, enhance or support existing governmental regulations?

As a voluntary Specification it is not expected to add to or duplicate government regulations. It is hoped that it will be adopted as a national standard in many countries in lieu of separate development of national standards. In addition, it is expected to support existing government regulations in several cases. For example, countries which have active trading of renewable energy credits (RECs) or energy efficiency credits (EECs) to meet regulated air emission requirements, a performance-based energy management system would help to demonstrate an organization's progress in meeting air emission regulations by equating energy efficiency reductions to GHG emissions reductions.

ISO Guide 72, Annex A; 2.7 Risk of incompatibility, redundancy and proliferation

A.2.7a) Is there potential overlap or conflict with other existing or planned ISO or non-ISO international standards, or those at the national or regional level? Are there other public or private actions, guidance, requirements and regulations that seek to address the identified need, such as technical papers, proven practices, academic or professional studies, or any other body of knowledge?

The creation of an ISO MSS for Energy Management would provide an opportunity to harmonize current standards. There are not any current standards or planned ISO standards that address the technical aspects and strategic management aspects of energy management. This MSS would be complementary to existing ISO standards for energy-using equipment. In terms of non-ISO standards, several countries are in process of developing national standard, including China. All standards developers consulted to date have indicated support for an effort to harmonize these standards internationally. There are public and private guidance documents on equipment component management, energy efficiency practices, and tools for use with specific energy-using systems, but not on the systemic energy management approach proposed here. There are also several professional associations that address this body of knowledge and academic areas of study in this body of knowledge. The presence of this body of knowledge does not represent a risk of incompatibility or redundancy. A committee is needed to address the role of effective energy management in mitigating global greenhouse gas emissions. Additionally, the unique combination of strategic planning issues, and technical issues related to the operational side of the organization requires an approach that accounts for the organizational strategic objectives not just efficiency or reduction goals. It is not uncommon for the cost of energy to represent the largest uncontrolled cost in a facility, which can influence the organization's competitive position in the marketplace.

A.2.7b) Is the MSS or the related conformity assessment activities (e.g. audits, certifications) likely to add to, replace all or parts of, harmonize and simplify, duplicate or repeat, conflict with, or detract from the existing activities identified above? What steps are being considered to ensure compatibility, resolve conflict or avoid duplication?

Multinational organizations have indicated that in terms of supply chain issues as well as site issues an international standard provides a better means to manage their concerns than a combination of national or regional standards. Typically, small and medium-sized organizations do not possess the core competency to manage the technical and strategic issues related to energy. However, energy management is of vital competitive and strategic importance to all organizations. The intention of this proposal is to provide a framework that allows organizations to be successful with energy management by addressing the technical, economic, and strategic nature of the system. This will require the use of innovative approaches in order to meet the challenge. The steps under consideration include techniques that address the innovation needs, and include but are not limited to:

- Stakeholder meetings to review approaches

- Stakeholder meetings to review terminology
- Electronic support to provide Stakeholders alternative means to provide input and time to process information as well as outreach means to stakeholders not available at the time of the meetings.
- Creation and review of a Strength Weakness and Opportunities analysis of existing national and regional standards
- Conducting of limited pilots during the Specification development process to evaluate for potential requirements the benefits and barriers experienced by organizations.
- Active World Café type discussions to improve feedback and involvement
- Requirement mind mapping activities designed to generate potential issues with implementation, maintenance, improvement and strategic planning to generate new approaches

The transparency of the process and voting comments provided by the ISO process will also help ensure resolution of conflict. The common elements of ISO MSS and use of the proven continual improvement philosophy behind PLAN-DO-CHECK-ACT will ensure a flexible framework.

A.2.7c) Is the proposed MSS likely to promote or stem proliferation of MSSs at the national or regional level, or by industry sectors?

The creation of this Specification and Guidance Document are likely to stem proliferation at the national and regional levels. As stated earlier, there are several countries that are in the process of developing national energy Specifications. An international MSS, properly developed with input from all stakeholders in developed as well as developing countries will harmonize existing standards and provide a proven management framework to prevent duplication and the proliferation of energy management standards. At this time, sector specific documents are not anticipated to be an issue.

ISO Guide 72, Annex A; A.2.8 Other risk factors

Have any other risks been identified (e.g. timeliness or unintended consequences to a specific business)?

At this time, there are no other risk factors that have been identified that would create an unintended consequence to any particular business or sector. However, proper project management dictates that this risk analysis be updated and expanded as necessary throughout the MSS for energy management development process to ensure an effective program.

3. Principles

Principle 1

Market relevance	**Any MSS should meet the needs of, and add value for, the primary users and other affected parties.**

"Market relevance" of the development of an International Specification and Guidance Document on Energy Management

Energy management standards provide a viable policy mechanism for encouraging energy efficiency in organizations. Several energy management system standards currently exist and others are planned. The development of International Standards should provide a collaborative effort that ensures countries are implementing and working towards a similar goal of energy efficiency, verification and measurement validation that provides a combination of technical management and strategic management of energy.

Principle 2

Compatibility	**Compatibility between various MSSs and within an MSS family should be maintained.**

The compatibility between the MSS for energy management and other MSS documents such as ISO 9001 and ISO 14001 will be ensured through the use of the Plan-Do-Check-Act approach common to these other standards. Attention will be given to areas of alignment between these systems during the MSS development process.

Principle 3

Ease of use	**It should be ensured that the user can easily implement one or more MSS.**

The concepts will be addressed in simple to understand units such as data, purchasing, strategic management decisions, organizational integrations, and operation and maintenance, allowing an organization to master the necessary issues given that this is typically not the core competency.

Principle 4

Topic coverage	**An MSS should have sufficient application coverage to eliminate or minimize the need for sector-specific variances.**

It is intended that the Specification and Guidance Document will be generic and applicable to all sizes and types of organizations in any sector and thus sector specific variances will not be appropriate.

Principle 5

Flexibility	**An MSS should be applicable to organizations in all relevant sectors and cultures and of every size. An MSS should not prevent organizations from competitively adding to or differentiating from others, or enhancing their management systems beyond the standard.**

"Flexibility" of the proposed Standard

The flexibility of the Specification is demonstrated in a number of ways. For example:

- the implementing organization determines the application of the Specification
- the implementing organization determines the key performance indicators to be used
- the implementing organization determines the priorities that will be established and executed as a part of the MSS.

It is intended that the Standard will be generic and applicable to organizations in all relevant sectors and cultures and of organizations of every size. Enhancing an energy management system to go beyond the MSS would be actively encouraged and there would be no limitations on such activities – continual improvement is an essential element.

Principle 6

Technically sound basis	**An MSS should be based on proven management practices or existing scientifically validated and relevant data.**

"Technically sound basis"

The MSS will be based on sound practices and existing scientifically validated and relevant data from a number of countries including but not limited to the United States, Canada, China, Ireland, Germany, Netherlands, Sweden, and Denmark. These communities have long established practices and data to support the development of this Specification and Guidance Document.

Principle 7

Easily understood	**An MSS should be easily understood, unambiguous, free from cultural bias, easily translatable, and applicable to businesses in general.**

"Easily Understood"

Leveraging the review process and experience of the experts, the MSS documents will be developed so they can be easily adopted, easily understood, unambiguous and free from cultural bias. This intent is specified in the development process when the existing national standards are compared and ideas generated for the development of this MSS ensuring that multiple needs, views, and general business applicability is considered and addressed. Attention to the terms used and their meanings in the initial development stage of these documents will help ensure translation issues are addressed.

Principle 8

Free trade	**An MSS should permit the free trade of goods and services in line with the principles included in the WTO Agreement on Technical Barriers to Trade.**

"Free trade"

The MSS for energy management provides the means to support free trade and help reduce technical barriers to trade by supporting economic development, increased opportunities for flexible manufacturing/operations and allowing the organizations to establish the key performance metrics against which they are evaluated. As previously mentioned the harmonization facilitates trade and reduces the need for additional regulatory development.

Principle 9

Applicability of conformity	**The market need for first-, second- or third-party conformity assessment, or any assessment combination thereof, should be assessed. The resulting MSS should clearly address the suitability of use for conformity assessment in its scope. An MSS should facilitate joint audits.**

"Applicability of conformity"

The use of first, second or third party conformity assessment was assessed. The MSS would improve the ability of the energy community to evaluate the validity of systems participating in the trading of energy efficiency credits. It would also provide a means to support the policy level incentives of many countries through a validation of the systems in place ensuring that the energy "savings" were actually achieved and could be maintained. A site certification process would also support many existing programs offered through the supply side, regulators, and community recognition programs.

Principle 10

Exclusions	**An MSS should not include directly related product (including services) specifications, test methods, performance levels (i.e. setting of limits) or other forms of standardization for products produced by the implementing organization.**

"Exclusions"

The MSS would not incorporate directly any related product or service specifications, test methods, performance levels or other forms of standardization for products or services produced by the implementing organization. The MSS would instead provide an approach, including the establishment of goals for continuous improvement, which could be reached through a variety of means, including the use of energy efficient products and services. The requirements of the management system would apply within the scope as defined by the implementing organization. The organization would justify exclusions to the system taking into consideration the direct and indirect energy systems and the interdependency of those systems. This justification of exclusions would support the flexible nature of the MSS.