

# **Energy Management (ISO 50001): The Most Vital, but Missing, Link in the Energy Saving Chain**

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## **ABSTRACT**

Energy Management provides the overarching framework from which all energy initiatives from energy efficiency and conservation, to renewable energy technology implementation, to energy fuel sourcing / diversification, to design, procurement and day to day operations should emanate. It is this overarching framework that is most missing in organizations, not only in Jamaica but seemingly worldwide and therefore the net effects of various initiatives are undermined. Both developed and developing countries had realized this and to this end some had independently produced national energy management guides. The global organization “The International Organization for Standardization” (ISO) undertook to develop a worldwide guide applicable to all businesses regardless of size and independent of culture. This was introduced in June 2011 "The ISO 50001 International Standard – Energy Management Systems – Requirements with guidance for use" and it is currently available. It allows industrial and commercial enterprises and government agencies to plan and apply all the necessary systems, structures and procedures to make better energy decisions. From governments planning what fuel diversification strategy to employ, to businesses contemplating renewable technology or mechanisms to conduct a conservation and efficiency program are covered in the application of this program.

This program if applied within the context outlined, has the potential to revolutionize the adopting firms in a manner almost impossibly copied and yielding continual returns (ISO 2011) that are truly unique to the recipient organization. The implementation of the ISO 50001 energy management program has the potential to transform both corporations and nations.

## **Introduction**

To minimize energy consumption and to maximize energy performance (measureable results related to a company’s energy efficiency, use and consumption) (ISO 2011) companies must learn how to “synergize” their operations. Unlike several other entities and resources, (financial, human, etc.) for which a single department or unit can lead, and in some respects dictate policy and procedures which are then followed efficiently and effectively within the corporate structure, the matter of energy performance does not lend itself to such ease of assimilation. Each and every stakeholder associated with a company potentially can affect its overall energy performance and can have a harmful effect that negates other constructive measures. The necessity of identifying what each stakeholder contributes to the energy consumption / performance and then to determine what measures will be most effective in curtailing / minimizing and enhancing their energy output can be a formidable task if it is at all recognized as needed. Furthermore due to the complex nature of the operations of any manufacturing, industrial, commercial or government enterprise, the nature of how each aspect of the operations affects energy performance is not always understood. Energy accounting in establishments is also another factor that weighs in the analysis. In many companies the energy

consumers are not the persons who are billed for their respective use. This leads to finance / accounting personnel receiving the billing information while the engineering / facility personnel who are the ones considered the main consumers of energy are in several entities not exposed to the billable information. With the failure to analyze the relative energy contributions of all entities within the company, their practices either go unchecked or with haphazard monitoring with the net result being a lack of accountability regarding energy. This type of environment would not be allowed to operate in the financial aspect of a business. Strict accountability is taken as a norm in this area with identifiable systems put in place to address the inputs, outputs, and deviations with forecasting, budgeting and planning being a regular part of day to day operations. Similarly with another resource considered paramount namely that of the human resource, structures and systems are put in place that can be extremely elaborate to ensure the protection of the worker and ultimately to create an environment that allows the employee to operate with maximum efficiency and effectiveness. The diversity of the types of energy, its ubiquitous nature, its meaning various things to various entities / stakeholders and its spanning at least two critical disparate functions namely financial and physical plant /engineering resulted in the requisite unique structure that would normally be required to monitor such an important resource not being developed. For many years this situation went unnoticed due to the financial / accounting and human resource systems being seen as those that bear most heavily on the financial bottom line of companies (Dobbs et al. 2011). However, as world energy prices began to increase and as the net contribution / effect of energy to companies and countries balance sheets began to balloon it was necessary for measures to be initiated. These took the form of energy audits, energy diversification, conservation and efficiency measures, new technologies, energy awareness campaigns etc. yielding positive results. Each of these provided real benefits to the respective companies, governments, local populations and regional economies. When countries decided to diversify, they escaped the gauntlet of high oil prices and were able to provide a level of security to their fragile economies. With energy conservation and efficiency came the mindset of increased productivity (a lowering of operational cost is akin to an increase in revenue) and incidentally the lowest cost of energy generation (Lazard 2009).

The advent of renewable energy sources also provided a new level of security to economies (especially those who primarily imported their main energy resource) that preferred knowing that they could provide themselves with a level of immunity to worldwide energy shocks by having the ability to generate energy locally. However there came an undeniable fact with all the measures. What a company, industry or country could do was relatively easily applied elsewhere with the same or relatively equivalent benefits being derived. So while it was true that the benefits were tangible and real and affected the company's / country's etc bottom line, with such gains being easily replicated there was no net competitive advantage unless entities unwisely chose to not enact any of these measures. This situation therefore led to a new thrust on how best to manage energy as the discrete measures were not of themselves making the respective entities more competitive. The thrust towards energy management therefore took birth and culminated in June 2011 with the promulgation of the ISO 50001 energy management standard, a standard that is directed to all organizations (companies, corporations, firms, enterprises, governments, authorities or institutions) irrespective of size or location. Companies can voluntarily adopt the standard to their operations. This presented a game changer as there was now a single document that captured the best practices in energy management (not in prescriptive form but which detailed the necessary components) for any organization on the planet to implement. With it organizations can now determine in a pragmatic and systematic

matter what is best suited for the respective entity at their particular timeframe and under their particular conditions. The ability to deviate from the cookie cutter approach and to embrace a holistic pattern of examination and analysis to what has now become the important resource of energy allows a sharp and distinct differentiator to appear in the dynamics of company profitability, competitiveness and internal efficiency and effectiveness that transcends the concept of energy to the well being of the entire company. This is where a juncture of two symbiotic forces met though undeclared but yet seeking to achieve a similar outcome as it relates to minimizing energy consumption / increasing energy performance and increasing competitiveness. For just as the components for minimizing energy consumption individually were seen to exhaust their potential a recognized phenomenon of synergy came to the fore though unannounced until recently in the advent of intelligent efficiency (Elliott, Molina & Trombley 2012). The realization was that as discrete entities the various measures will only yield results to a certain degree but when evaluated and combined through a strategic, systematic and pragmatic manner, the sum total of their effect exceeds the discrete parts (increasing competitiveness). This is the missing link filled by the ISO 50001 standard but for which full expression depends on how it is incorporated in the respective organization. The rest of this paper will focus on the current dynamics that operate within companies, how the ISO 50001 program can add value and how an expansive view should be taken with regard to its implementation to fully maximize the transformation that its adoption can / will bring to the respective company and that it is this new modus operandi of harnessing the power of synergy that will separate the winners from the also-rans in the years and decades to come and why this can only be achieved through the ubiquitous entity of energy which alone transcends the remaining silos of communication and which when bridged effectively and efficiently (which is unique to the respective organization) will propel the respective entities results in a manner not easily (if not impossibly) copied.

## **The Evolution of the Current Energy Framework**

The prominence of energy as a global concern occurred in the 1970s in response to the Organization of Petroleum Exporting Countries (O.P.E.C.) oil embargo (Dobbs et al. 2011). As a precaution against future imbalances several countries diversified from a predominant reliance on oil to other natural resources such as coal, natural gas, hydroelectric etc. Some countries for whatever reason did not do so and remained predominantly dependent on oil. Several countries in the Caribbean were in the latter group. Through market forces and prevailing economic and social conditions the price of oil underwent periods of stability, but on occasions due to either perceived or real imbalances would undergo wild fluctuations a relatively recent episode being in 2008 when for a brief moment the price of oil exceeded U.S. \$150 per barrel. In the subsequent decades several measures along with diversification were embarked upon, the most notable being energy conservation and efficiency and the use of renewable energy. The latter came into prominence when it was realized that the burning of fossil fuels produced gases that were reputed to be injurious to the atmosphere resulting in the phenomenon of global warming. Non fossil burning energy generating resources as wind, solar photovoltaic, ocean currents, etc. were investigated with the view of expanding / diversifying the resource base of the respective countries as well as reducing the generation of greenhouse gases.

Because energy from its source, to its generation, distribution, and finally its consumption is such a vital commodity to daily life as we know it and as it touches almost every

sphere of life, it is understandable to see the diverse structures that were developed as a result. Competencies had to arise to manage this entity and as oil was traditionally the starting point, many of the structures and processes followed the dictates of what was required to bring that commodity from source to market. As does often times occur in the evolution of these structures, an examination of what already exists is borrowed and where there was an absence new structures were invented. Two predominant core areas quickly became obvious in its being harnessed for use around which other subsidiary structures developed,

- The need for an engineering structure
- The need for a financial structure

These structures not only came about in the agencies and companies directly related to energy but also were aligned with companies and institutions generally who one way or the other had to purchase and use energy. Therefore without even a concerted effort to formalize in one way or another, the structure of how to handle energy, systems were developed for which we all mostly accepted and took for granted. They became the norm. These systems went to a large extent unexamined and unchanged simply because they accomplished what it was they set out to do even if not in the most effective and efficient manner. There was no significant capital cost attached to them either as other more notable, established and prominent systems were seen to bear more heavily on capital and therefore received greater attention, these were primarily the human and the financial resources. This environment for the most part fulfilled its purpose unfettered through largely the black hole of overhead. Apart from strictly energy based companies, those for whom it was a secondary and /or tertiary resource found it unnecessary to establish or even investigate a separate, unique and / or distinct accounting structure because it was not economically feasible to do so.

As the various energy shocks arose, the responses aligned themselves within the prevailing framework that had been unconsciously established. Therefore, there was the drive towards energy conservation and efficiency largely achieved by developing newer, better, more efficient machines, technologies etc, allowing the same if not more output at a fraction of the original energy supply. This had a net benefit on the bottom line of the respective entity whether it was government, institutional or consumer. However, as resources depleted or became more difficult to harness as well as and if not more importantly adverse effects to the environment were reported by the fuels being used, entire new areas and concerns previously not considered had to now be factored in the existing , “system(s)”. In addition as the price of the commodity itself rose to levels considered previously unthinkable the weighting attached to energy became heavily skewed in the favour of the possible development of its own “system” and processes aligned toward its own unique framework and not trying to borrow from any existing framework. This ultimately led to the dawn of the energy management framework and in due course to the promulgation of ISO 50001.

## **Barriers to the Implementation of the “New System” In Its Own Right**

Without a conscious effort, there can be an inherent bias against the acceptance of a “new” program within a prevailing environment especially if it is viewed as an affront to an accepted tradition / practice / bureaucracy that seemingly has worked and stood the test of time. Why have to learn a new system? Why have to embrace at the core a new language, new

concepts, new principles, isn't this a waste of time? Even possibly more damaging is trying to adopt this new way of thinking by framing it into what already exists so ending up with a monster of a structure which goes undetected because of how the systems themselves had developed. Expressed differently it is quite possible and possibly the norm rather than the exception to overlay the new upon the old rather than seek to define it on its own merit. The end in this case is worse than the beginning. It is important therefore to dissect the old to determine where the points of intersection and / or conflict occur and then to determine how best to solve them or at least improve them.

Firstly the standard is requiring the meeting of two disparate functions viz. engineering and financial (even if not overtly expressed) because at the heart of it is reducing energy consumption to save money through the reduction of costs. Both the engineering and financial arms adopted energy within their own language not seeking to determine how the other handled it or what its (energy's) own requirements were. It is important to realize that practitioners in the fields of finance and engineering may have been subconsciously drawn to these respective areas because of the very ideals that they espouse. A language and a domain all to themselves, a defined end and a defined beginning with an understood, somewhat rigid, somewhat predictable structure with recognized inputs, outputs, processes and results that are within recognized parameters (finance and engineering alike). However, they are in practice very dissimilar but both applied their own structures to energy. This resulted in a comfort zone for the respective practitioners (through their individual and independent systems / structures for energy accounting) and it was adequate when the prevailing conditions allowed. It is to be noted that with energy they are addressing an entity which is almost ubiquitous and they are affecting institutions which are to some, near sacred (financial and engineering). These are core structures and now with energy management the core structures are being asked to examine how they processed energy throughout all these years. This invites resistance. However, as will be expounded upon later, if this approach to the challenge is not taken (the development of the new energy system), the company would have seceded its competitive advantage to another because had it been properly, strategically and systematically managed it could bring about significant advantages that transform the entity at its core and align it to meet all present and future prevailing forces with a nimbleness and precision hitherto unrealized because it would have taken the time to "re-find" itself and therefore know itself and such a process when complete would have resulted in an almost unstoppable entity. If circumvented (overlay new system on existing structures), they would have aborted the process and be left with suboptimal results which could potentially be worse than the prior state as the workforce is left (possibly without realizing it) confused and not fully understanding what the "new" environment is and therefore no longer knowing how to process changes and other vagaries which the company's culture previously supplied which can be dangerous. However the notion to not do anything can be equally as dangerous as in due course you may be faced with a company which has the tenacity, the vision and the will to address what must be done and then you find that what previously was a profitable, successful company facing oblivion.

Another barrier which is slightly more subtle but stems from the same origin is the exposure that this program lends to the practitioners within the respective areas (engineering and financial) of the respective organization. For the financier this can translate to more work, and more for which they are being held accountable. Having the notion of having to learn a new system, a new process, a new structure adds to what can be seen as an already overburdened workload and a further exposure to scrutiny. Who will be the new auditors? What will they be

basing their audits on? What cycles do they operate on? What are the inputs and the necessary outputs? What safeguards will be needed to be put in place to ensure that they are being kept abreast of the developments that are taking place? Auditing and audit structures are well entrenched in financial circles and cycles and any new processes / programs elicit real concerns on what they mean for their ultimate responsibility. At this many may balk and say that they will not take on any added responsibility whether individually or corporately as they simply do not want it said at any level or stage that they are responsible.

For the engineer their own apprehension barometer can kick in. Formerly theirs was a domain relatively immune to scrutiny within a certain ambit that allowed them comfort for what they were masters of. To them belonged the language and the domain and measurement and verification to a large part were dependent on them and reported by them in a way that guaranteed a level of assurance and control in what was being measured and in what was being stated. With a program that by its very nature allows for objective analysis of the entity that drives almost all of their systems, processes and equipment (namely energy), it opens them to a level of exposure that can leave all but the most confident and assured vulnerable. Energy in this case can best be compared with blood to the human body. The blood of the human body affects all organs, systems, structures etc. It is what is common throughout the diversity of the human body. On examining it, while it may not give you the solution, it almost invariably will give indications that there is a problem somewhere and it is then for the respective medical specialist to identify and rectify the ailment. This is what energy is to the organization and to the engineer and when it is up for scrutiny like the blood analysis it may not be able to directly identify what the problem is however it is able to demonstrate a problem, a deviation or the lack of achievement of a certain goal / target and that is all that is necessary to demonstrate that the efforts of the engineer are not as was expected. The opening of this type of “independent” analysis to “outsiders” changes the locus of their control to other agents and that can instantly lead to apprehension, fear, subtle rejection and at its ultimate, rebellion.

However, for the astute, when they realize what this implies, it can well be appreciated why this program has the potential to revolutionize organizations of all types, sizes and wherever located. The very challenges and fears it elicits in an organization speaks to its ability to transform the mindset, the culture and the operational atmosphere at its core, allowing a rebirth based on factual and objective analysis involving all systems, processes, procedures, structures and stakeholders and therefore bringing about lasting, transformative and continually improving results.

## **Benefits in Implementing an Energy Management Program (ISO 50001)**

Some of the benefits in implementing the ISO 50001 energy management program are:

- The organizations vision and goals are held paramount in the planning and decision making process.
- Energy saving techniques, technologies, processes and systems are examined and ranked for effectiveness in relation to the company’s goals and objectives.
- Measurement and verification systems in line with the company’s operations and processes are developed.
- The entire company (as per the Scope) is involved with necessary training and awareness.

- Inherent accountability and transparency
- Synergy

At all times the company is held in focus, not a technology, not a vendor, not a manufacturer / supplier, not a position, not a title, not a department, not a person. This type of analysis benefits the company as it puts it where it should be at the locus of control of all the surrounding events. This adds to the concept of transparency, accountability and thoroughness. It is well known that within companies there are several biases, what the energy management program does is remove the human subjectivity (at least to an appreciable extent) and lay a framework for analysis and deliberation at the end of which will be a trail of why certain decisions were made which can be useful during lessons learned analysis.

As was mentioned in the evolution of the current energy framework several measures have been used to minimize energy costs and improve energy performance in companies. What this management program accomplishes is to allow any organization to be able to identify the areas that should be considered in the energy analysis and to prioritize and structure them in light of the organizations goals and objectives. Without directly naming the alternatives e.g. combined heat and power or solar photovoltaic, it takes the company down a path that directs them to consider the options available to them. For example under the section “Energy Review” it states in section 4.4.3 (c) that ... “identify, prioritize and record opportunities for improving energy performance” with a note indicating that options can include potential energy sources, use of renewable energy or other alternative energy sources as waste energy (ISO 2011). It is therefore not prescriptive but it outlines to the adopter what they should be considering as they formulate their program and therefore leaves open the possibility for out of the box ideas to be generated as well as reviewing existing technologies and practices. It also allows the organization to identify what areas it may need assistance in or others where in-house capabilities are sufficient.

Measurement and verification are important in any area. This is one of the particular areas where the engineering fraternity held sway over others because of the parlance that is used, kilowatt-hour, kilovolt ampere, the watt etc. but these very terms have disengaged persons from this area. While not explicitly mentioning these terms and their definitions what the program does is highlight the importance of determining those energy consuming items (equipment, processes, systems, personnel etc) and designating them as “Significant Energy Uses (SEUs)” as well as the need for “Energy Performance Indicators” which associate the energy consumption with an operational metric. Without being prescriptive the standard outlines to the user what are the necessary structures and systems. Where the company feels competent they can formulate these for themselves, if deficient they can employ external sources. In either case the user / customer is left with the knowledge of why the component is needed and what it is expected to contribute and achieve for the overall efficacy of the program. This information is what is important and what empowers the program’s user for whether done in-house or by a consultant they know what the results are to accomplish and this as in other areas is where the transparency, accountability and vulnerability lie.

The comprehensiveness of the program (as defined by the Scope) towards the company’s operations is amply demonstrated by the thoroughness required in the training (for those associated with SEUs) and the awareness of all the company stakeholders including all working for or on its behalf. The relative contribution of each stakeholder is taken into account and those that either consume significant energy or offer a good energy saving opportunity are highlighted. This level of engagement serves many advantages and ideally should be capitalized upon. As

everyone identifies with energy and its utility, it is a commodity that can be used to communicate several concepts that can be aligned to its substance. The relevance of it to every sphere of operation allows an integration of organization personnel that no other medium or concept may allow. This potential must be fully maximized and will be further elaborated upon under synergy.

The inherent accountability and transparency relates to the objectivity of the program, the measurement and verification processes that are embed in its implementation, the requirements for record and document keeping, the required periodic auditing process and the obligation that the company abides by all legal requirements and those voluntarily entered into. This has far reaching implications for the implementation of this program in various regions throughout the world. In countries where there are allegations of corruption and misuse or mismanagement of public funds, the introduction of this program lends to a culture of responsibility and accountability. This is opposed to their being an external agency assigned such tasks. This results in not only their being derived energy reductions with associated cost reductions but a multiplier effect that at present may go unmeasured that relates to the inbred safeguards. This mentality when extended from individual projects and companies to entire nations has the potential impact that the total quality movement had for countries such as Japan. This has the possibility of bringing about economic revitalization and lifestyle transformation for nations and regions around the world.

The concept of synergy when applied to the ISO 50001 energy management program is best compared to an object that almost everyone readily identifies with that being the ubiquitous automobile.

The automobile is comprised of various interconnected systems, they include the following (Sengerandu's 2013):

- Power plant
- Drive train
- Steering
- Braking
- Suspension
- Electrical
- Ignition
- Misc/Others

Though separate they are all to some extent interdependent possibly some more than others. In addition if any one of the systems is not operating optimally the net result is that the overall performance of the car suffers. You may have a perfect braking system however if the air or gas filter is dirty (parts of the power plant) it affects the fuel economy (energy performance). Similarly if the power plant is perfect but the transmission (part of the drive train) is faulty, again fuel economy is compromised and the same can be said of any grouping of these systems. It is therefore necessary if overall excellent performance is required, to ensure that all systems are working harmoniously with their respective counterparts. It is therefore necessary to know what are the linkages between the various systems, how do they impact each other? How are they dependent on each other and what if any are the respective inputs and outputs that occur between them? The relative importance also is needed so that concentration will be paid to those areas that have the greatest impact on performance and which yield the greatest “bang for the buck”. In all of this it is necessary to ensure that all legal obligations are being met. All the above speaks to



the benefits of Synergy. These facts are taken for granted for the automobile and are experienced on a day to day basis. An area to highlight is that the perfection of all these systems can come to naught if the operator of the vehicle is not adequately trained in its proper operation and has learned good driving techniques. It is unfortunate therefore to find that this concept (Synergy) has been one of the least applied principles with regard to energy until now with Intelligent Efficiency and Energy Management. It is interesting that a dichotomy of sorts exists. For while as separate units the various coping measures (e.g. efficiency, renewable, diversification) have seen significant and measurable advances (one only has to see the advances in lighting technology to see this in action) the same has not been extended in embracing this paradigm (synergy) in the interaction of these working arms within the corporate framework. It is almost as if a separate notion kicks in when there is a need to go beyond a comfort zone, a known sphere and to interact on a basis that demands a new language, a new symbiotic relationship that is possibly completely outside of the realm and culture of what is the custom. So by nature there are specializations and within the areas of specialty there are further distinctions for example in medicine there is the dentist, the ophthalmologist, the cardiologist, the neurosurgeon etc. However due to a recognized need two disparate fields were forced to collaborate (medicine and engineering) to develop a common language and by such inaugurate a new field to both namely biomedical engineering.

The challenge however is that the comparison with the current environment (of rising / unpredictable energy costs and the diversity of coping measures) of what is presented and what is the required outcome is far more nebulous and therefore the optimum solution far more difficult to communicate let alone act upon and because of this often times or more times than not the choice taken is to revert to the status quo trying to develop new technologies or refine old ones to achieve the ever demanding and ever increasing goals and objectives for lower and more cost effective unit energy costs and higher energy performance. However if one were able to carefully examine and see the forces at work and what has happened in the past and the barriers that were conquered when there was a focused response with a clear objective and outcome, when we reverse engineer our current environment in light of what has occurred in other spheres we would come to the conclusion that what has been the most vital but missing link in the drive to increased efficiencies and performances within companies has been the absence of effective and efficient synergy brought about through energy management. It had almost gone unnoticed because though there was a clear need for it, the effects of the solution could be derived and devised through suboptimal measures that achieved results demanded from the true / best solution and so there was never a continual force to come to terms with the true solution until now(due to higher costs). In other words the field of medicine and engineering could not half bake the outcome. There had to have been a melding of the minds to form the symbiotic branch of biomedical engineering. This was not the case for energy management. We could make better light bulbs, develop new clean energy solutions in alternative / renewable energy sources etc. which decrease costs for a time, however at the end of it wonder why the efforts have not fully solved the problem. When we reverse engineer our medical example to see what were the challenges and why the solution (biomedical engineering) was more effective than a simple continuance of disparate arms then a full appreciation of the potential of taking a path for the solution to the energy challenges that may at times seem uncomfortable, unneeded or even inefficient, realizing however that the net outcome can be truly transformational and exceedingly rewarding will result in the ultimate answer being seen as energy management.

This is therefore why energy management is the missing but most vital link in the energy saving chain. However, what makes this all the more different and transformational is that this commodity (energy) affects every entity within the sphere of the organization and every single stakeholder though in a way unique to their respective operations. This therefore gives the energy management program when exercised in this light, the potential to become the ultimate game changer. This all expansive view then becomes for the company that employs it a complete renaissance and one that cannot be copied by any competitor because every company's energy signature is unique. The challenge therefore is not about adopting a principle, a technology or even a program. It is about reevaluating and reinventing oneself to come to the maximum of what the organization was intended to be. That can only be replicated when another company chooses to do the same for its own self, it cannot be copied and herein lies the potential of this energy management program when rolled out (developed and implemented) within the respective organization. This mentality can extend to a complete nation and fully transform them as occurred with Japan and the Total Quality Movement. The rest of this article will give a brief description of the components of the management program.

## **ISO 50001 Energy Management Program**

The ISO 50001 energy management standard contains seven (7) core areas that give direction to the development of an energy management program. It follows the Plan-Do-Check-Act cycle. These are:

- General requirements
- Management responsibility
- Energy policy
- Energy planning
- Implementation and operation
- Checking
- Management review

A brief synopsis follows.

### **General Requirements**

The standard outlines some general expectations of the organization with regards to the implementation of the program including its responsibility to continually improve both the energy performance of the organization and the energy management system itself, and to define the scope and the boundaries of the energy management program.

### **Management Responsibility**

The standard places significant emphasis on the role of senior management for the success of implementing the standard. It requires that top management develops and implements an energy policy, appoints a management representative and an energy team, and provides the necessary resources for the development and implementation of the energy management program. In addition it expects top management to communicate the importance of energy

management throughout the organization, ensure the establishment of objectives and targets, make sure that performance indicators (metrics) are appropriate to the organization, make certain that strategic planning includes discussions on energy performance and that they conduct periodic reviews.

### **Energy Policy**

The energy policy delineates the purpose and direction of the company as it relates to its energy performance. The standard requires that it be appropriate for the organization, that there be a commitment to the continual improvement of energy performance and the provision of necessary resources, that the company adheres to all legal requirements and others to which it subscribes, that it provides direction on the setting and reviewing of objectives and targets, that the company supports the purchase of energy efficient products and includes enhancing energy performance in all plant designs, that the policy be communicated throughout the organization and that it be reviewed regularly and updated as required.

### **Energy Planning**

The energy planning component of the standard seeks to ensure that all energy related plans of the organization are in accordance with the energy policy, that legal and other requirements are factored into the implementation of the energy management program, that it includes guidelines in conducting an energy review including the necessity of setting a baseline and the setting of appropriate metrics (Energy Performance Indicators), that appropriate objectives and targets be set, and that the company documents and establishes appropriate action plans to accomplish its targets.

### **Implementation and Operation**

This part of the standard gives the necessary guidelines in “operationalizing” energy management for the respective organization and includes the need to ensure that the necessary operational and maintenance controls are in place to achieve the objectives and targets according to the action plans and that energy performance is factored in all designs where such activity can influence the energy performance of the company, the same being true in the procurement of equipment, services and energy. Guidelines on document requirements and their control are also given.

### **Checking**

Following the Plan-Do-Check-Act cycle this part of the standard gives the necessary components for an effective monitoring and measuring program including the necessity of monitoring those entities found to either consume significant quantities of energy or hold good potential for performance improvement (referred to as significant energy uses), that an energy measurement plan be formulated, and that an internal audit be conducted at a predetermined interval.

## Management Review

At predetermined intervals senior management are to conduct a formal review of the Energy Management System to “ensure continuing suitability, adequacy, and effectiveness (ISO 2011).” Inputs to this review process will include reviews of the energy policy, energy performance and energy performance indicators, the status on the achievement of objectives and targets, and energy audit results. Outputs will include actions and decisions related to the energy policy, energy performance, objectives, targets, energy performance indicators (metrics), or other parts of the energy management system or in the allocation of resources.

## Conclusion

In closing we have a choice of at least three paths. Do we take the normal road, most traveled, adhering to old discrete practices and gaining suboptimal results, or, following the standard to the letter as described above, going through the routines, the structures and the procedures regimentally, possibly even yielding admirable results (yet still suboptimal) or do we take the unexplored path, unlocking a potential hidden in the standard and which remains hidden in almost every enterprise but for which this standard in its relatively simple construction allows to be manifest and for the organization to find and evaluate its true potential. It is important to note that companies may choose to self report rather than spend the costs for ISO certification and they may also choose to use the standard as a guide to best practices and implement stages of the program as their resources allow. With the prevailing global environment it is worth the time and effort for companies to make this investment and reap the commensurate rewards.

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