

ANSI-accredited Plant Energy-Efficiency Certification Program Plan

September 22, 2008

The Plant Energy-Efficiency Certification Program (Plant E² Certification) is a voluntary certification program being developed by industry and government. The purpose of the Plant Certification program is to promote greater energy efficiency in U.S. manufacturing plants by making energy management an integral part of industrial operating practices. The Plant E² Certification Program provides a mechanism to help plants maintain their focus on energy efficiency improvements. The program will also provide the certified plant with verification of its E² results and public recognition for its energy efficiency performance.

The Superior Energy Performance (SEP) partnership steering committee (see text box) is guiding the development of the Plant Certification program. The Superior Energy Performance (SEP) partnership is a collaboration of industry, government, and non-profit organizations that seeks to improve the energy intensity of U.S. manufacturing through a series of initiatives, most notably, by developing the market-based Plant Certification program. The Plant E² Certification Program will contribute to the accomplishment of the national energy efficiency goal of reducing industrial energy intensity by 25% over a decade.

Vision

Create an ANSI-accredited, voluntary, self-supporting program that will provide certification of any U.S. industrial facility's continual improvement of energy efficiency. This certification is recognized and valued by industry, the financial community, utilities, local communities, and state and federal governments. Support the harmonization of ISO and ANSI energy management related standards so that benefits to industrial plants being certified for energy efficiency worldwide significantly outweigh the costs.

Market-Based Goals

- Certify the first manufacturing plant(s) by February 2010 (pilot plants)
- Certify 1,500 manufacturing plants by end of 2013
- Certify 5,000 manufacturing plants by end of 2016

Superior Energy Performance Steering Committee

The SEP steering committee currently consists of active representatives from the following organizations: 3M Company, Cargill, Dow Chemical, Eastman Chemical, Ford Motor Company, IPSCO Steel, Frito Lay (tentative), National Institute of Science & Technology (NIST) Manufacturing Extension Partnership Program, Owens Corning, PPG, Rohm and Haas, Sunoco, Toyota, US Department of Energy Industrial Technologies Program (DOE/ITP), US Environmental Protection Agency (EPA) ENERGY STAR program, Weyerhaeuser

The American National Standards Institute (ANSI) is supporting the committee as needed with guidance on the requirements of the standards development and certification process. The American Society of Mechanical Engineers is providing oversight for the development of system assessment standards.

Lawrence Berkeley National Laboratory (LBNL), Oak Ridge National Laboratory (ORNL) and Georgia Institute of Technology (GaTech) are providing technical expertise on standards development activities.

The Texas Industries of the Future is conducting a cost-shared pilot to field test the elements of plant certification in Texas.

Background

In order for U.S. industry to make significant gains in energy efficiency, there must be greater awareness and knowledge sharing about programs, resources, and practical methods that can help industrial plants identify, develop, and document energy efficiency (or intensity) improvements. Historically, energy saving efforts have been delegated to plant engineers, frequently with assistance from consultants or suppliers with highly specialized technical skills. Quantifying results and measuring progress relies heavily on the presence of individual energy efficiency “champions” within a company and their access to consultants or suppliers with substantial expertise and experience. Drawbacks to this approach are that achievements are often not well understood by those without specialized expertise, replication occurs quite slowly in the market, and benefits may disappear if the champion leaves the company or is relocated.

The Plant Certification program creates a framework for fostering energy-efficiency at the plant level and a methodology for measuring and validating energy efficiency/intensity improvements in a process that is voluntary, performance-based, and technically sound. The proposed approach can be integrated into existing corporate management systems, such as ISO 9001:2000 and 14001:2004. Certification will also position plants to be recognized by the financial community for superior energy management practices and their contribution to climate change mitigation. The strategic goals of plant certification are:

1. To foster an organizational culture of continuous improvement in energy efficiency;
2. To develop a transparent system to validate energy intensity improvements and management practices; and thus
3. Create a verified record of energy source fuel savings and carbon emission reductions with potential market value that could be widely recognized both nationally and internationally.

Need and Value to Industry

Many industrial firms operate in an environment of maximizing productivity, throughput and first-pass quality while eliminating waste and non-value-added activities through the application of lean manufacturing principles. Managers operating in this environment are always seeking ways to automate and streamline operations and reduce the costs of everything required to support production, including: materials, labor, processing, packaging, and shipping. The cost of purchasing the energy needed for production is viewed as managed input and typically receives significant attention, while the use of that energy once it is inside the factory fence is often viewed as simply the cost of doing business. While this is not true in all industrial facilities, experience has shown that unless the facility actively manages energy use and has a written plan for doing so, these facilities are significantly less energy efficient than they could be.

Industrial facilities have not fully optimized energy use due to a series of reinforcing barriers that are institutional and behavioral, rather than technical. The fundamental problems include: lack of awareness of the energy efficiency opportunities by industry, consultants, and suppliers; lack of understanding on how to implement energy efficiency improvements, and, most importantly, the lack of a consistent organizational structure within most industrial facilities to effectively manage energy use. Industry is also reluctant to install new, energy efficient technologies due to risk aversion and difficulties in making the business case for energy efficiency projects which must compete with other priorities for capital. Energy use is rarely measured at the system level, so there is little available data. Without performance

indicators that relate energy consumption to production output, it is difficult to document improvements in energy intensity.

Many U.S. industrial firms have already established internal goals to reduce energy consumption and greenhouse gas emissions; this industry-designed certification program will offer a practical and transparent approach for achieving and validating these efforts. The value proposition to U.S. industry for Plant Certification also includes the following benefits:

- Increases a plant's and company's ability to replicate and document their energy management successes;
- Provides greater assurance that system assessment recommendations are sound and will produce predicted results;
- Provides a mechanism for communicating to stakeholders about energy management progress;
- Provides national recognition by a third party of the site's leadership in energy management;
- Helps a company manage risk and cost associated with energy supply and use, at its facilities and through its supply chain;
- Puts into place a process of continuous improvement of energy use per product output over time;
- Provides the opportunity for a manufacturing facility to receive preferred supplier status; and
- Provides improved opportunities for utility and state financial incentives for energy efficiency as a result of using recognized assessment practices and measurement and verification (M&V) protocols.

Program Overview

Certifying industrial plants for energy efficiency introduces a standardized approach to identifying, developing, documenting, and reporting on energy efficiency progress that does not currently exist. Figure 1 shows the Proposed Plant Certification Framework with Energy Management standards, System Assessment standards, and the Measurement and Verification (M&V) protocol as the three main "building blocks" of Plant Certification. Also, the framework includes a proposed third-party certifying organization structure that will provide ANSI-accredited certification to U.S. manufacturing facilities. In addition, an ANSI-accredited organization or organizations will administer a process to certify a variety of energy professionals to become Certified Practitioners for specific system types (initially compressed air, pumping, process heating, and steam), in energy management, and in measurement and verification.

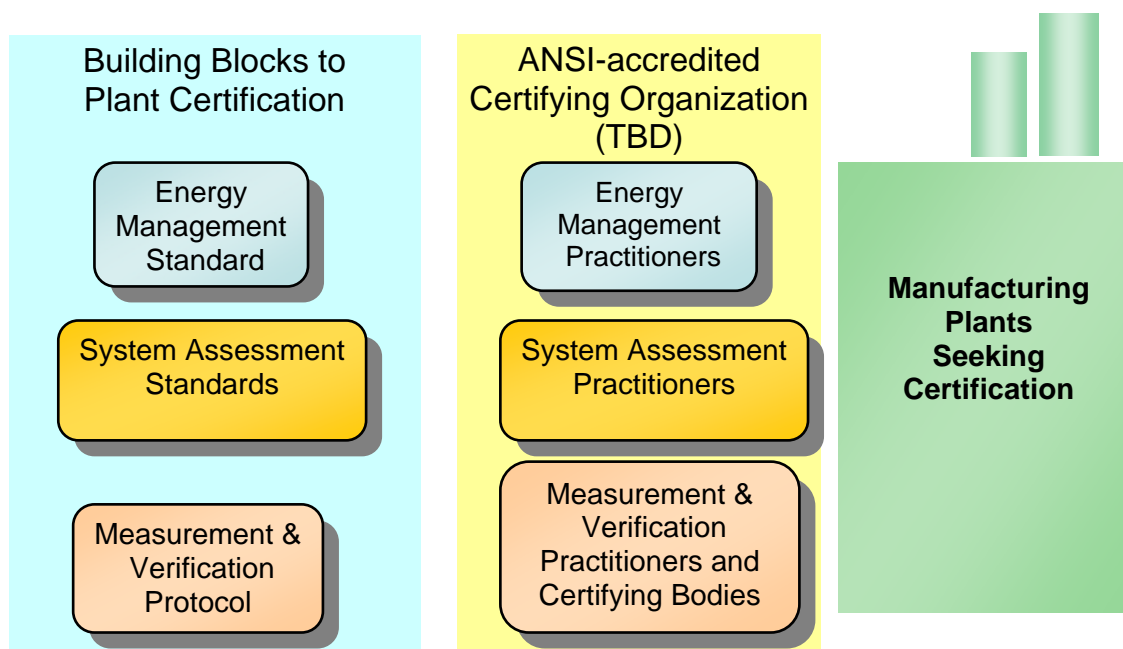


Figure 1. Proposed Plant Certification Framework

Proposed Certification Criteria

The following criteria for certification will be part of the evaluation process during a pilot program to be conducted in Texas during 2008-2009 and represents the proposed criteria for Plant Certification as of January 2008.

For **initial certification**, the plant:

1. Complies with the energy management standard, ANSI/MSE 2000 and
2. Achieves validated energy intensity performance by:
 - a) Demonstrating energy intensity improvement of >5% over the previous 24 month period OR
 - b) Assessing any energy system which uses greater than 10% of total plant energy use (not including feedstocks) and demonstrating that the plant has:
 - I. Implemented >30% of total Btu energy savings opportunities that meet the company's internal rate of return (IRR) and are identified through application of system assessment standards, OR
 - II. Met or exceeded the Energy Management Best Practice threshold* for systems for which Best Practices exist.

* Energy Management Best Practice threshold is still to be defined

For **re-certification** at three year intervals, the plant demonstrates:

1. Continued compliance with the energy management standard AND
2. Achievement of validated energy performance through:
 - a) Demonstration of an energy intensity improvement of 12.5% or greater over the previous 5 year period; OR
 - b) Demonstration that its energy intensity is within the top 25 percent of its sector (example: Btu/pound of product) OR

- c) Documentation that any energy system which uses greater than 10% of total plant energy use (not including feedstocks), and for which a Best Practice threshold exists, meets the Best Practice threshold.

Program Design, Development, and Organization

The development of the Plant Certification Program is being supported and facilitated through the Superior Energy Performance partnership. The partnership is a cooperative effort that brings together the respective strengths of industry, standards-making bodies, several federal agencies, national laboratories, universities, and technical experts to initiate the program. The SEP Steering Committee includes three Working Groups, shown in Figure 2. The SEP steering committee provides peer review of all of the program activities and products.

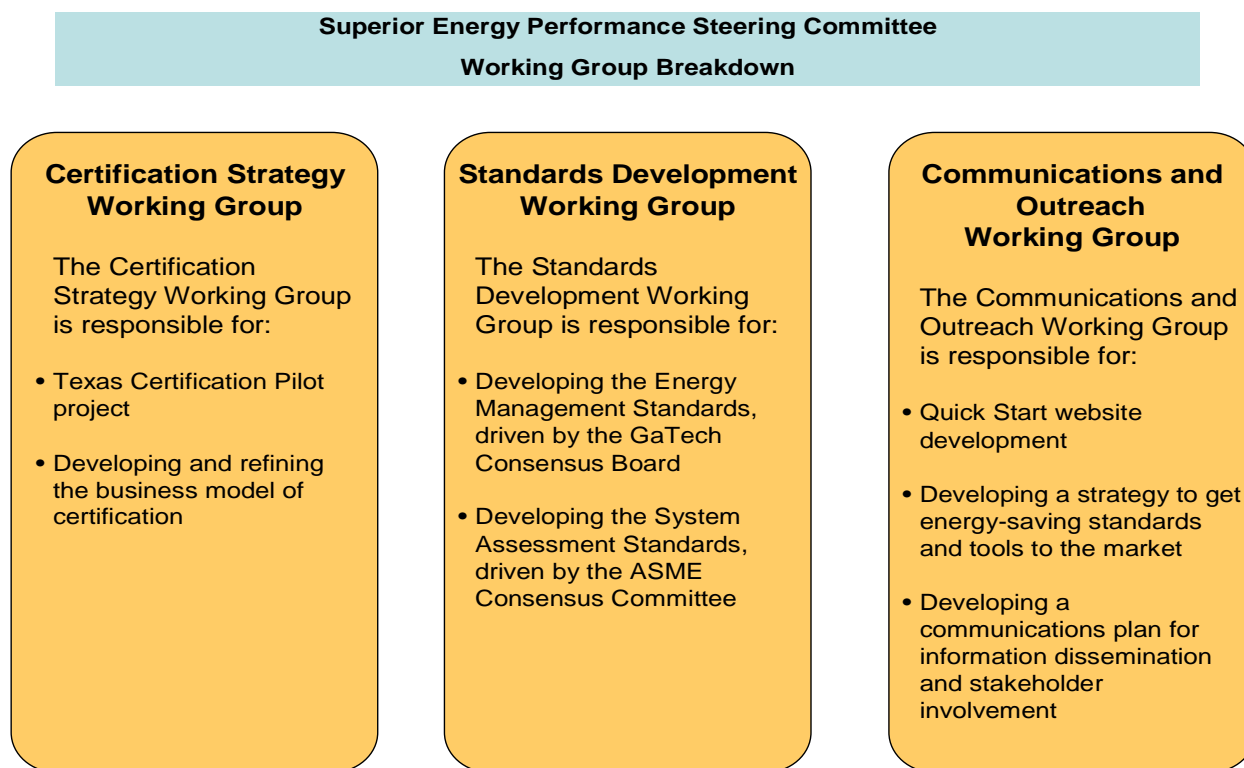


Figure 2. SEP Steering Committee Organizational Structure

While the DOE/ITP Save Energy Now program is providing substantial funding to support the development of this important initiative, the critical contributions of many others are essential for its success.

- Industry representatives are contributing practical advice and valuable experience to shape a successful program through their active participation. Industry is also fostering communication and cooperation with the National Association of Manufacturers (NAM).
- ANSI is championing U.S. leadership for an International Standards Organization (ISO) energy management standard and is providing valuable guidance concerning the standards and certification process.
- EPA is contributing an extensive body of information related to energy management through its ENERGY STAR® for Industry program.

- NIST is contributing both their experience with small to medium size firms through the Manufacturing Extension Partnership (MEP) as well as the outreach capabilities of the MEP for future program implementation.
- Lawrence Berkeley National Laboratory (LBNL) and Oak Ridge National Laboratory (ORNL) are providing key roles in many technical aspects of program design and development.
- Georgia Institute of Technology (GaTech) is providing leadership and technical expertise on energy management in industry.
- The Texas Industries of the Future is conducting a cost-shared pilot to field test the elements of plant certification in Texas.

Finally, several dozen energy managers, technical experts from industry, equipment suppliers, and consultants are volunteering their time to serve on the project teams charged with developing system standards and guidance.

The program will seek input from a wide stakeholder base, including, for example, state agencies, utilities, not-for-profit organizations, trade associations, and equipment and service providers. Example approaches to stakeholder participation in the SEP partnership could include the following:

- Registration of interest on the SEP and QuickStart websites;
- Presentations on the status of the program to interested groups such as National Association of Manufacturers, Grocery Manufacturers Association, Hydraulic Institute, California Public Utilities Commission, etc.;
- Regular webcasts, beginning in May 2008, open to all website registrants with updates and presentations from outside experts on related activities (e.g., WalMart presenting their supply chain certification process);
- Tailored outreach to those states and regions with extensive existing energy efficiency programs (i.e. Wisconsin, Pacific Northwest, California, New England), and
- Periodic updates in the DOE-ITP E-Bulletin and other organization newsletters.

The key steps for creating a certification program for energy efficiency include the following:

1. Revising the existing ANSI Energy management standard, ANSI/MSE 2000 (underway)
2. Creating ASME system assessment standards (compressed air, pumping, steam, process heating) (underway)
3. Defining the requirements a plant must fulfill to become certified (underway)
4. Creating the measurement and verification methodology to attain and maintain certification (to begin May, 2008)
5. Conducting the pilot program in Texas to field test the standards, certification requirements, and measurement and verification methodology (to begin May, 2008)
6. Selecting the third party certifier(s) (February, 2009)
7. Defining the business model for the certification program to ensure certification value outweighs participation costs (to begin May, 2008)
8. Create program to train and qualify Certified Practitioners (to begin February, 2009)

While the Texas pilot proceeds during 2008-2009, the SEP Certification Strategy Working Group will complete work on a viable business model for the program, in cooperation with the selected third-party certifier(s). This model will:

- Establish the public identity for the certification program via a label or mark;
- Establish criteria for use of the label or mark;

- Finalize the criteria for industrial plants to become certified and re-certified, including associated fee structures;
- Finalize the M&V protocol for validating plant energy intensity improvements and reported energy savings;
- Establish qualifications for who is permitted to apply the M&V protocol;
- identify qualified certifying bodies (these may be regional under the auspices of a national organization); and
- Identify a permanent organizational home for each type of Certified Practitioner, which will be based on approval of a written professional certification plan that includes the qualifying process, ongoing professional enrichment, and fee structure.

The end goal of this effort is developing a self-sustaining plant certification program (without Federal government financial assistance) by September 2011. At this point the program would be transitioned to a fee-based program administered by a non-governmental, not-for-profit entity. Program design will introduce a standardized approach to identifying, developing, documenting, and reporting on energy efficiency progress that does not currently exist. The Steering Committee will provide guidance to DOE and other Federal and State agencies in providing resources to organize, design, and deploy the program elements.

Program Elements

Energy Management Standard

Georgia Institute of Technology developed the first comprehensive, ANSI-compatible energy management standard (MSE 2000) for industry in 2000. Although the standard was approved by ANSI as an American National Standard, it has not received widespread use in the U.S. due to lack of supporting program policies to provide incentives for its use. Revising the ANSI energy management standard and incorporating it as a key element of the overall plant certification scheme will give the standard a heightened level of visibility and encourage much broader acceptance throughout industry.

ANSI Management System for Energy (MSE) represents a standardized approach to manage energy supply, demand, reliability, purchase, storage, use, and disposal (applies to both primary and secondary energy sources). MSE can be used to control and reduce an organization's energy costs and energy-related environmental impact.

To become certified, a plant would have to demonstrate compliance with the ANSI MSE through an accredited certifier. It is expected that plants would re-certify themselves to the energy management standard every three years. This standard will be piloted in Texas during 2008-2009. The revised ANSI MSE is one of the inputs being presented to a newly formed ISO committee (ISO Project Committee (PC) 242) for the development of an international standard, which is projected to be available in late 2010. Therefore, the initial U.S. plants certified for energy efficiency will necessarily use the soon-to-be revised ANSI MSE.

System Assessment Standards

The purpose of System Assessment Standards is to provide guidance on how to conduct an energy-efficiency assessment at a facility for a specific system type (initially pumps, compressed air systems, steam, and process heating). A large body of expert knowledge exists on the most effective way to conduct assessments of industrial systems such as compressed air, fan, pump, motor/drive, process heating, and steam systems. These assessment techniques have been further refined in recent years by

DOE's Save Energy Now and Industrial Assessment Center Programs, the Compressed Air Challenge™, and state/regional energy efficiency initiatives. The System Assessment Standards will codify the existing knowledge and techniques into a standard that is easier for industry to use to save energy.

Use of the System Assessment Standards is not required for certification, but the standards clearly define a pathway for quickly achieving energy savings. Guidance documents will also be developed that provide technical background and application details to support the understanding of the System Assessment Standards. It is expected that the DOE Save Energy Now software tools, training, and assessment services, as well as other industry energy efficiency information will be complementary and supportive to the System Assessment Standards, but not a requirement of meeting the standards.

The existence of the System Assessment Standards will also assist in the training of graduate engineers and others desiring a higher level of skill in the area of system optimization for energy efficiency. The initial four standardized system assessment standards are being developed by project teams with the American Society of Mechanical Engineers (ASME) serving as the ANSI-Accredited Standards Developer. They will become American National Standards sponsored by ASME, an ANSI-Accredited Standards Developer, which will ensure that a technical working group is tasked with periodic updates to maintain their applicability. End-user training for the system assessment standards will also be developed in early 2009.

Measurement and Verification Protocol

An essential element of certifying plants for energy efficiency is validating plant performance through measurement and verification (M&V). The M&V protocol will offer a best practice methodology to 1) verify the results and impact from energy-efficiency projects, 2) specify parameters required to quantify the energy efficiency of a facility, and 3) track how much energy efficiency/intensity changes over time for the overall plant or from a specific measure or project.

Separate classes of experts who can maintain independence during the verification process are required for this activity. While this area is still under development, based on other certification models, a two-part system is anticipated:

- Individuals who are certified to validate performance for a plant seeking certification (M&V Certified Practitioners), and
- ANSI-accredited organization(s) legally qualified to issue a certification to the plant based on the reported and validated energy intensity improvement and energy management processes.

Resources that will be used to inform development of the M&V protocol include: the International Performance Monitoring and Verification Protocol (IPMVP), recognized experts in applying M&V techniques for utility energy efficiency incentive programs, the emerging requirements for renewable portfolio standards and white (energy efficiency) certificates, OSHA Star, and the structure of the ISO 9000/14000 programs.

The M&V process to certify plants for energy efficiency is challenging due to the need to balance assurance of performance with the M&V cost to the industrial facility. Inadequate M&V will compromise the value of the reported energy savings and reduce the potential to link reported savings to incentive programs, emissions trading schemes, and other initiatives that value energy savings or carbon emission reductions. On the other hand, if M&V requirements become too costly or onerous for industrial facilities, industry will simply opt out of participating in the certification program. The M&V protocol will be designed to document normalized key performance indicators such as Btu/pound of

product and to validate energy savings so that reported savings can be used to determine carbon impact. The protocol will be developed and piloted in Texas in 2009.

Certified Practitioners

Experiences in the U.S. and other countries have shown that the appropriate application of the energy management standard and system assessment standards will require significant training and skill. For this reason, a program to certify practitioners via a professional certification program is planned. It is anticipated that these practitioners will be either plant personnel, consulting professionals, or service providers with the appropriate technical experience in industrial systems. Candidates will be subject to a rigorous qualification exam and, once certified, periodic professional enrichment requirements.

For energy management, an existing body of knowledge from GaTech, the EPA ENERGY STAR[®] program, and countries with active programs based on energy management standards, specifications or tools will be used as resources to create a training program for certified practitioners in energy management. For system assessment, a program can be built on a foundation that includes the DOE Qualified Specialist and Save Energy Now Energy Expert initiatives, as well as a large network of system assessment professionals active in the Compressed Air Challenge[™], Steam Best Practices, and the Process Heating Steering Committee.

Over time, DOE expects to transition from the Qualified Specialist and ESA Experts to this new initiative of Certified Practitioners for specific system types. A company or industrial plant may use the Energy Management Standard or System Assessment Standards on their own without engaging a Certified Practitioner. However, using a qualified individual adds a level of assurance for the plant that standards will be properly applied.

A certification program will also be developed for application of the M&V Protocol. It is anticipated that use of a Certified M&V Practitioner will be required to validate energy savings in a plant seeking to certify or re-certify performance. These practitioner certification programs, which will include training and an exam, will be developed starting in 2009.

Key Milestones and Overall Schedule

The Key Milestones of the Plant Certification Program are as follows:

- **May 2008:** Texas Pilot project begins field testing revised ANSI energy management standard and system assessment standards
- **Feb. 2009:** Select third-party certifying organization(s)
- **May 2009:** Begin field testing plant certification requirements with measurement and verification protocol in pilot plants
- **Dec. 2009:** Begin training and certifying practitioners in energy management and system assessments
- **Feb. 2010:** First plants are certified for energy efficiency by an ANSI-accredited certifier.
- **Sept. 2010:** National launch of third-party certification program
- **Dec. 2010:** ISO energy management standard published to replace ANSI standard
- **Sept. 2011:** Third party fee-based, certification business model established

Figure 3 shows the schedule and supporting milestones of the Plant Certification program elements.

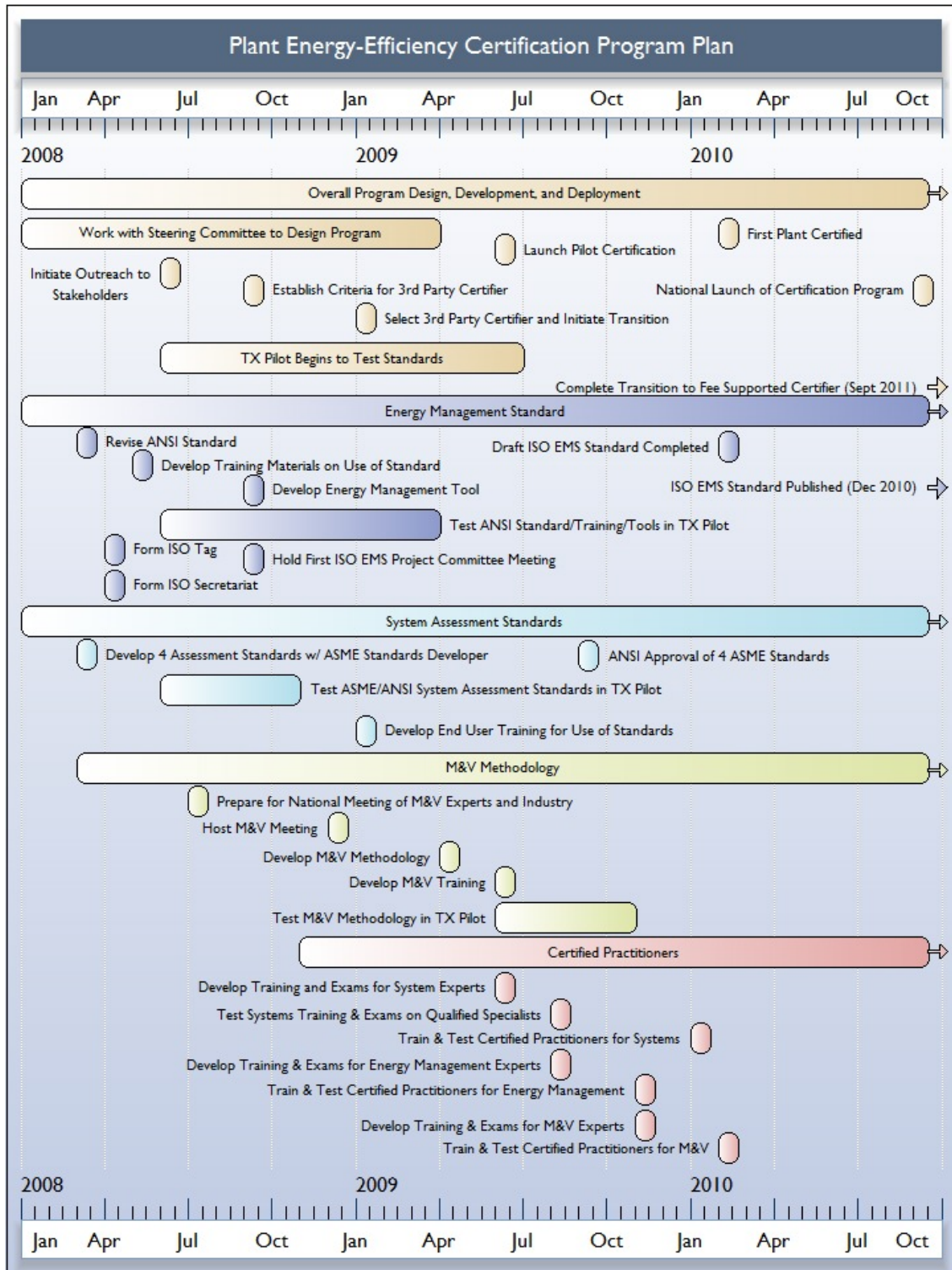


Figure 3. Plant Certification Schedule

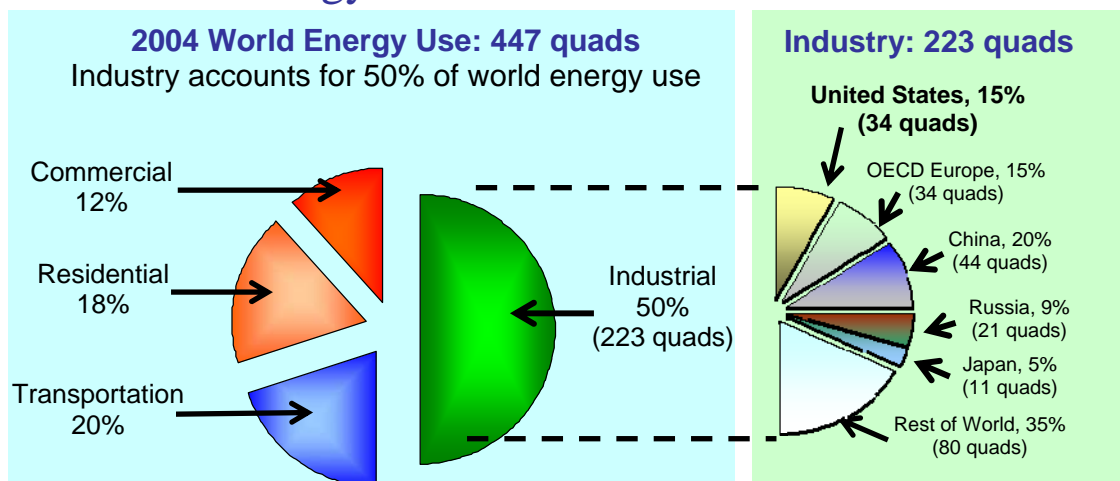
Strategic Outcomes

A desired outcome of the certification program is that it will be compatible with existing management systems, including ISO 9001:2000 and 14001:2004. The long term goal of this voluntary, industry-designed certification program is to develop a transparent, globally accepted system for validating energy efficiency projects and management practices. This system will create a verified record of energy savings with potential market value.

Since many US industrial companies have facilities worldwide, they appreciate common international standards to avoid the added costs of adopting multiple national standards. Towards the end of creating a unified global standard, ISO has initiated an ISO energy management standard development process through ISO Project Committee (PC) 242. The US, through ANSI, is supporting the ISO PC 242 activity and will serve as the Secretariat with the Brazilian standards organization ABNT.

Figure 4 illustrates how a portfolio of robust and credible ISO energy management standards could incent industrial energy efficiency improvements throughout the world and potentially impact 50 percent or more of the world's energy demand. This energy demand accounts for more than 80 percent of the world's carbon emissions. It is the desire of the Superior Energy Performance partnership to harmonize the ISO energy management standards (or other future related ISO standards) and the ANSI-accredited Plant Certification program to the maximum extent possible so that benefits to industrial plants certified for energy efficiency worldwide significantly outweigh the costs.

Plant Certification standards can potentially affect reductions in industrial energy use worldwide



15% of industrial energy is consumed in the United States

Source: EIA/International Energy Outlook 2007

Figure 4. Global industrial energy use in context to overall total energy demand

For more information about the Plant Energy-Efficiency Certification Program, visit:
www.superiorenergyperformance.net