

North American Energy Management System Implementation

North America

Schneider Electric

The global specialist in energy management

Company Profile

Schneider Electric is the global specialist in energy management and automation. We develop connected technologies and solutions to manage energy and process in safe, reliable, efficient, and sustainable ways. Schneider Electric employs 170,000 people globally delivering innovative solutions in more than 100 countries. We provide transformative solutions to increase connectivity, sustainability, efficiency, reliability, and safety while dramatically reducing power consumption.

“We believe that our decisive actions today can indeed lead to a better tomorrow.”

—Michael Crochon, Executive VP Strategy & Technology



Figure 1 - Schneider Electric's Clovis, CA Facility – an ISO50001 and SEP Platinum certified facility

Business Benefits Achieved

Schneider Electric has realized many benefits from implementation of ISO50001 including:

- Energy Performance Improvement – 25,600 MWh or 11%
- CO₂ Reduction – 9,615 tons or 10%
- Positioning Schneider Electric as the leader in energy management technologies and services
- Utilization of many products and services offered to our customers to implement ISO50001 and realize energy savings
- Positive contribution toward our internal sustainability metric – Planet & Society Barometer
- Positive contribution toward our external energy reduction commitments

Case Study Snapshot	
Industry	Energy and Energy Management Products and Services
Location	North America
Energy Management System	ISO 50001 & SEP
Product/Service	Electrical components, energy controls, and energy management tools and services
Energy Performance Improvement (%)	11%
Total Certified sites in North America	20
Total SEP Certified Sites	Platinum - 6 Gold - 4 Silver - 6
Total energy savings	25,600 MWh

Table 1- Schneider Electric ISO 50001 and SEP Certified Sites

Schneider Electric ISO50001 Certified Site	SEP Certification Level
Lexington, KY	Silver
Oxford, OH	N/A
Seneca, SC	Platinum
Columbia, SC	Gold
Smyrna, TN	Platinum
Clovis, CA	Platinum
Costa Mesa, CA	Platinum
Lincoln, NE	Silver
McLaughlin, Ontario, Canada	N/A
Victoria, British Columbia, Canada	Platinum
West Kingston, RI	Platinum
Columbia, MO	Gold
Tlaxcala, Mexico	N/A
Rojo Gomez, Mexico	Silver
Monterrey, Mexico - Plant 2	Gold
Monterrey, Mexico - Plant 3	Silver
Pacifico, Mexico	Silver
Cedar Rapids, IA	Gold
Peru, IN	Gold
Portland, OR	N/A

“Energy management is part of our DNA at Schneider Electric. We continue to be strongly committed to reduce our energy and CO2 footprints through behaviors, processes, technology and use of our own products. The ISO 50001 and Superior Energy Performance frameworks not only build upon our energy management systems, but also help us drive consistency and performance improvements across our locations.”

- Steve Sacco, Vice President, Safety, Environment & Real Estate

Figure 2 shows a comparison of the energy reduction from a baseline of 2011 for the ISO50001 certified sites and the sites in the Schneider Energy Action (SEA) program that are not ISO50001 certified. The chart shows that both groups of sites have had improvements; however, the slope of the line for the sites with ISO50001 implementation is greater than the non-certified sites. Figure 2 shows the ISO 50001 certified sites have experienced nearly double the savings as non-certified sites over the last 4 years.

Overall, the savings gap between the certified and non-certified sites is increasing over time. Additionally, the influence of ISO50001 practices regarding energy project tracking and follow up implemented to all sites (including those not certified) in 2013 are presumed to cause the sharp break point shown for all sites. The differentiating factor for the ISO50001 certified sites is the involvement from all aspects of the individual site’s decision making driving toward greater efficiency and increased cost savings.

Energy Performance Improvement

To determine energy savings (MWh) and tons of CO₂ reduced as a result of ISO50001 implementation, the energy savings are calculated based on the energy reduction at each of the certified sites since the year of certification. Both energy savings & reduction in CO₂ emissions are also expressed as a percentage of the total energy & emissions of the certified sites’ baselines (corresponding years prior to certification). The energy performance improvement calculation for individual sites is based on the following formula.

$$EPI \% = \frac{\text{Baseline Period Energy Consumption} - \text{Reporting Period Energy Consumption}}{\text{Baseline Period Energy Consumption}}$$

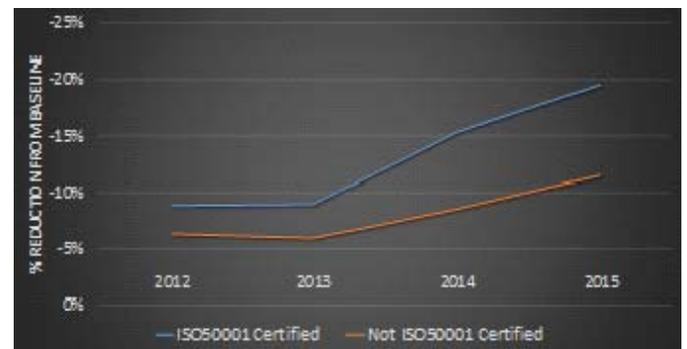


Figure 2 -Percent Reduction at Sites ISO50001 Certified and Sites that are not certified

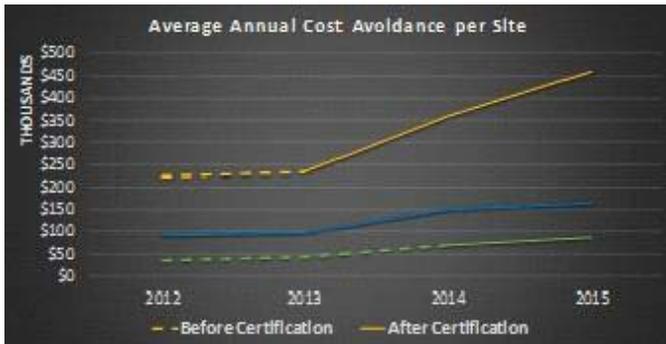


Figure 3 - Cost Avoidance by Implementation Year

Figure 3 shows the influence on annual average energy cost savings of the ISO50001 certified sites. The dashed line represents savings before certification, while the solid line represents savings after certification. The graph shows a noticeable improvement in annual savings after sites implement ISO 50001.

Business Case for Energy Management

Schneider Electric is the Global Specialist in Energy Management and Energy Efficiency is part of the DNA of Schneider Electric.

In 2004, Schneider Electric created the Schneider Energy Action program (SEA). SEA provides Schneider Electric with a platform to pilot new solutions, build engineering expertise, reduce energy consumption and costs. Over the past 11 years, SEA has allowed Schneider Electric to improve energy performance by 40% in North America.

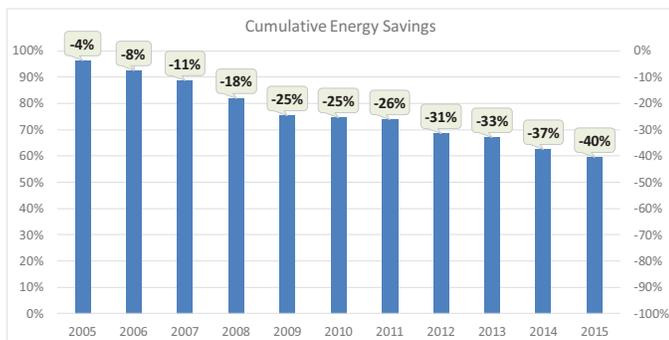


Figure 4 - Overall SEA Program Energy Reduction Results

Schneider Electric enrolled as a Better Building Better Plants Challenge Partner in 2009 as the goals of the Department of Energy aligned with Schneider Electric's goals. The target set by the program is 25% reduction over 10 years. As of the end of 2014, Schneider Electric achieved a reduction of 19%.

As SEA matures, Schneider Electric continues to look for new ways to improve energy performance. ISO 50001 and Superior Energy Performance (SEP) were piloted in 2011 at the Smyrna plant in an effort to increase engagement from employees outside of the core SEA team. The Energy Management System (EnMS) implemented as part of this process provides a platform for Schneider Electric to enhance Energy Performance Indicators (EnPIs), identify savings for Significant Energy Uses (SEUs), and increase visibility for energy performance.

Schneider Electric sees ISO 50001 as the blueprint for continued energy reductions and Superior Energy Performance as recognition for those reductions. The SEP program provides Schneider Electric with motivation to continue to improve energy performance at a very challenging rate.

"We've found that Superior Energy Performance is a great way to drive down energy use and costs across the company," said Dennis Edwards, Schneider Electric's Energy Manager North America. "With each plant, it becomes easier to apply the SEP framework and generate real savings that persist over time."

- Dennis Edwards, Facilities Director North America



Figure 5 – Smyrna, TN Plant Solar Field – an ISO50001 certified and SEP Platinum facility

Keys to Success

The following are keys to success identified for ISO50001 and SEP implementation.

- Enterprise approach is essential to fast track implementation and minimize costs
- Assure implementation support from Top Management at the right organization level for the enterprise approach
- Assure goals for all stakeholders are aligned
 - ISO50001 implementation
 - Energy performance improvement
- Utilize centralized implementation leadership to:
 - Share best practices
 - Promote a collaborative atmosphere
 - Assure implementation is on track
 - Provide continuity for the enterprise approach
 - Track energy project implementation
 - Provide results of the energy management activities
 - Provide engineering guidance and leadership
 - Utilize knowledge gained during certification audits
- Create a standard set of Enterprise wide management system procedures and a simple way to approve documents for use while giving sites flexibility in their approach
- Utilize existing management systems (ISO14001 and OHSAS18001) for ISO50001 to unite and streamline:
 - Local management
 - Internal auditing
 - Management system procedures
 - Management team
- Utilize partnerships with outside groups to share knowledge, supplement efforts and move implementation forward

EnMS Development and Implementation

Schneider Electric has made commitments both internally and externally to improve our energy performance. These commitments drive internal teams to continuously evaluate ways to drive continuous improvement in performance. When the ISO50001 energy management system was evaluated, the core process of the standard (Plan-Do-Check-Act) presented a logical framework to improve our existing SEA energy management program. Based on this framework, ISO50001 and SEP were the chosen as the standard to implement to improve the existing SEA energy management program.

Schneider Electric has developed, through help from internal and external resources, a standard framework and methodology to implement ISO50001 and SEP certification using an enterprise approach. The approach has allowed:

- Reduced implementation time
- Reduced implementation cost
- Increased number of certified sites
- Integration with ISO14001 and ISO18001 management systems

Overall the approach and implementation has allowed Schneider Electric to elevate energy management as a critical factor in enterprise and plant management processes.

Through the enterprise approach, use of a common implementation team, corporate integrated procedures (ISO14001, ISO18001, and ISO50001) and streamlining performance metrics, Schneider Electric has been able to reduce implementation time from 18 months to 6 months.

The enterprise approach has allowed a reduction in both internal staff time and external costs required for implementation and certification. Figure 6 shows a breakdown of the labor used for ISO50001 implementation. The third party certification costs normally range from \$15,000 to \$20,000 per audited site. The external technical assistance relates to

training and certification for the core ISO50001 and energy management team.

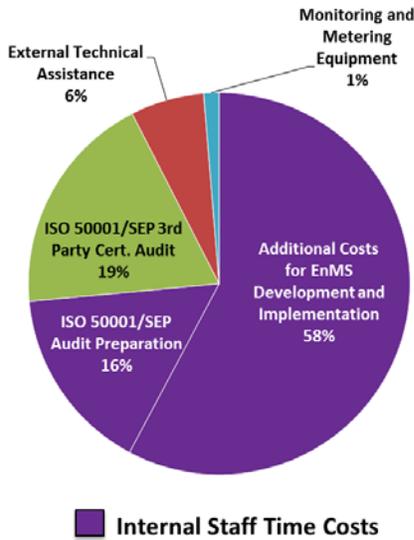


Figure 6 - Breakdown of Implementation Labor

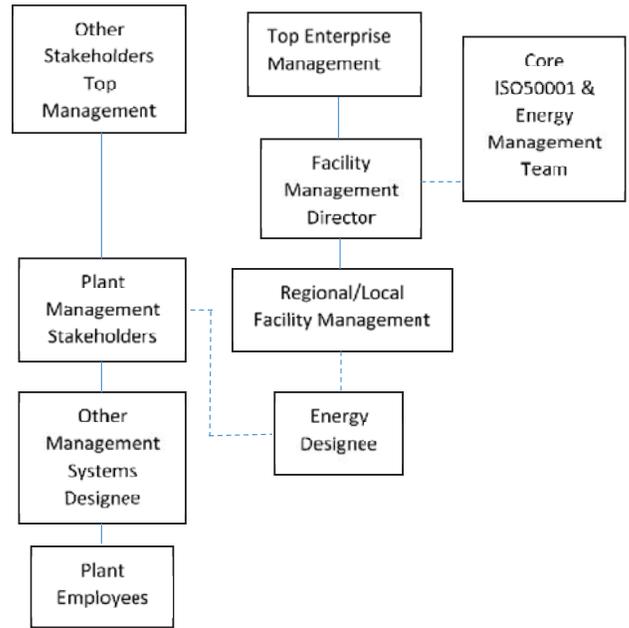


Figure 7 – Typical ISO50001 Implementation Organization Structure

Organizational Structure

The organizational structure is the foundation for successful implementation. Many times implementation involved coordination among different entities located in the same facility. The key to surmounting these hurdles is to identify the stakeholders, explain the business benefits, and explain how ISO50001 is aligned with Schneider Electric’s strategic objectives. To implement ISO50001 using the Enterprise approach Schneider Electric utilized:

- Top Management – Enterprise (1)
- Top Management stakeholders (1-3)
- Facility Management (2-3)
- Energy Designee (1)
- Other management system designees (1-3)
- Local employees

A visual representation of the structure is shown in Figure 7.

Energy Review and Planning

In the Enterprise approach, continuity of planning approach is key. For Schneider Electric, Energy Planning continuity is mainly the responsibility of the core ISO50001 and energy management team. In this capacity the team, composed of energy engineers, is responsible for:

- Setting the energy baseline
- Creating and maintain the performance metrics
- Completing the Energy Reviews
- Maintaining energy project tracking
- Providing other assistance as needed

During the Energy Review, the core ISO50001 and energy management team identifies and analyzes each energy project for the cost benefit merits. Projects meeting payback thresholds are recoded on the energy management action plan for monthly review. The Energy Designees, Facility Managers, and top management are responsible to budget for the projects for immediate implementation. Facility management also maintains a five-year plan for energy projects to provide long term capital planning.

To simplify the approach and streamline reporting, Schneider Electric utilizes an EnPI metric that is common to all facilities. This allows for better performance comparison between sites, a common reporting platform, and less time to establish the metric.

The individual site Energy Designees in combination with the Facility Manager, are responsible for implementing projects identified during the Energy Review. Their duties include:

- Prioritizing and implementing projects
- Securing budgeting for capital projects, near term and five-year planning
- Reporting on the status of implementation
- Following up on significant deviations in energy performance

All energy projects are maintained in a common database that is reviewed with the Energy Designees & Facility Managers on a monthly basis to track performance improvement.

As projects are implemented, their savings are applied to the energy consumption for the facility to determine their impact relative to the modeled energy performance. Deviations in performance are flagged and marked for investigation with the Energy Designee and Facility Manager.



Figure 8 - Schneider Electric's Peru, IN Plant- an ISO50001 certified and SEP Gold facility

Implementation Expertise and Training

To implement the Enterprise EnMS, Schneider Electric utilizes the services of the core ISO50001 and energy

management team. The team is composed of energy engineers who complete the Energy Reviews, SEnPI evaluations, provide EnPI reporting, track energy project implementation, and answer questions from the Energy Designees and the Facility Managers. One energy engineer serves as the overall energy manager to direct activities of the project and ensure continuity.

The approach to Enterprise ISO50001 implementation was guided by Schneider Electric's participation in a gap analysis through a partnership with DOE and Georgia Tech to improve our approach.

Schneider Electric has found effective means to implement training at the certified sites to reduce costs and time. Energy management training is the responsibility of the individual Energy Designees to allow flexibility of approach to meet site needs. The following methods have been implemented to reduce training time:

- Integration of energy management topics in daily production meetings
- Integration of energy management topics in safety and environmental training
- On-line training materials
- Postings of energy performance and energy topics on plant televisions
- E-blasts of energy management topics to all employees

Tools and Resources

To implement the Enterprise EnMS, Schneider Electric built upon the foundation of ISO14001 and 18001 in certified facilities. The procedures for ISO14001 and ISO18001 were the basis for the integrated corporate ISO14001, ISO18001, and ISO50001 procedures. The corporate integrated procedures are essential to quick and consistent implementation of the EnMS. The EnMS also utilized personnel active in the ISO140001 and ISO18001 management systems to assist with integration of ISO50001 at the plants regarding:

- Document Control

- Training
- Internal Auditing
- Management team and stakeholder identification

To execute the EnMS, Schneider Electric has utilized both internal and external tools to maximize performance of the program. The tools and their purpose are:

- Resource Advisor – Track and maintain utility invoices and energy supplier contracts
- EnPI Tool – Energy performance modeling
- Internal Tracking data bases
 - Project implementation and performance tracking
 - Energy performance reporting

Other essential activities instrumental in our ISO50001 implementation and energy performance improvement success include:

- Participation in the DOE Better Building Better Plants Challenge
- Driving sites toward SEP certification
- Use of the SEP Accelerator program to assist with the cost of adding sites to the ISO certification through the enterprise approach
- Completion of a gap analysis by a partnership between DOE and Georgia Tech to assist with the steps to implement the Enterprise Management System



Figure 9 - Schneider Electric's Lexington, KY Plant - an ISO50001 certified and SEP Silver facility

Operational Control and Energy Performance Improvement

To sustain our energy performance improvement, individual sites have implemented targeted work instructions and training to assure the SEU in each facility operates to minimize energy consumption. Additionally, through our core ISO50001 and energy management team, we drive continuous follow up and accountability for:

- Energy project implementation
- Energy performance improvement
- Adherence to corporate standards
- Process and procedure training

Energy Performance Improvement Approach

To determine energy performance improvement, Schneider Electric utilizes a whole facility energy model, similar to the way the EnPI tool is used. The tool utilizes independent variables that are statistically significant from each site and the actual energy consumption to determine the energy performance. Monthly, the core ISO50001 and energy management team meets with the sites to review their performance and project implementation status. To validate results of the identified savings, the modeled savings are compared against the calculated savings for the identified projects that have been implemented. If there is a significant deviation as defined in the EnMS, the cause is investigated and corrected. This helps to assure all energy reduction projects in the plant are identified and accounted in the performance. This method also assures accurate identification of projects for the SEP bottom-up analysis.

Cost Benefit Analysis

Prior to ISO50001, Schneider Electric implemented the SEA program to manage energy. The SEA program has been responsible for approximately 31% energy reduction from 2004 until 2012. In Schneider Electric facilities, implementation of ISO50001 and SEP provides improved energy performance through increased awareness of energy management goals, procedures, and results. The benefits for ISO 50001 and SEP implementation in Schneider Electric facilities are

primarily of qualitative nature. Some of the benefits include:

- Reduced cost to operate facilities
- Alignment with corporate goals
- Alignment with Schneider Electric’s core business
- Opportunity to utilize products and services offered to external customers to conserve energy at our facilities

However, Schneider Electric analyzes every energy project that is identified on a case-by-case basis, and funding must be provided to implement the project based on the benefits to the business.

The simple payback for ISO 50001 based on the quantitative benefits is greater than our standard threshold for a project. Instead of analyzing the simple payback based on quantitative benefits alone, Schneider Electric assessed both the quantitative and qualitative benefits and approaches ISO 50001 as a company initiative with a flat budget year-over-year. This enables us to continue to implement ISO 50001 at more plants as we continue to gain efficiencies.

Lessons Learned

Schneider Electric’s ISO 50001 and Superior Energy Performance program has gone through an evolutionary process with best practices and lessons learned at every step.

Smyrna was the pilot site where many of the difficult lessons were learned. The EnMS team spent 18 months

implementing ISO 50001 and Superior Energy Performance at Smyrna. During the implementation, core skills necessary for future implementations were developed.

After the implementation, a standard implementation process was established. This standard process allowed the next batch of sites to implement an EnMS in six months and less than half of the cost of Smyrna.

The implementation was advanced further with the transition to an Enterprise-Wide Energy Management System. This approach allowed reduced implementation time and accelerated the number of sites implemented annually.

Additional lessons learned include:

- Identify and adequately on-board all stakeholders for the ISO50001 implementation project
- Setting corporate goals applicable and easily transferable to sites is essential to acceptance of overall implementation goals
- Centralization of knowledge, leadership, project identification, project tracking, and energy performance reporting assure continuity of approach and best practices transferal
- Regular collaboration between sites and management system representatives builds a strong foundation for best practice sharing and support for implementation
- Combination of management systems reduces duplication of effort and yields better resource utilization

Through the Energy Management Working Group (EMWG), government officials worldwide share best practices and leverage their collective knowledge and experience to create high-impact national programs that accelerate the use of energy management systems in industry and commercial buildings. The EMWG was launched in 2010 by the Clean Energy Ministerial (CEM) and International Partnership for Energy Efficiency Cooperation (IPEEC).

For more information, please visit www.cleanenergyministerial.org/energymanagement.

