



Annual Cost of Energy Management Systems for Enterprises

BACKGROUND

This memo reviews various cost scenarios reported by companies that have implemented energy management systems (EnMS). Costs include ISO 50001 certification investments as well as the costs of cultivating an energy team, supporting data collection efforts and providing employee training. This information will help executive teams from other companies to weigh potential investment costs before committing to implementing an EnMS.

KEY POINTS

- The cost accounting method used by enterprises implementing EnMS depends on how the enterprises view EnMS. Some enterprises assign no specific costs to EnMS implementation, because it is viewed as just a part of overall management improvement efforts. Other enterprises keep track of costs and consider them a type of investment in energy cost savings, which must be weighed against actual energy cost benefits achieved to assess the program's effectiveness. There is not a "right" or "wrong" way to view the costs.
- Most EnMS implementation costs are internal costs, consisting mainly of staff time and data collection costs. Some enterprises hire consultants to help, or allocate money for training. If an enterprise decides to pursue ISO 50001 certification (to enhance its reputation or receive other benefits), this effort brings significant external costs. ISO 50001 certification costs are substantially lower for enterprises that have already received certification for another ISO management standards (e.g. 9001 etc.) Not all enterprises choose to pursue certification.
- In the cases where data was readily available in North America (from research so far), EnMS implementation costs were about USD \$30,000–\$60,000 per year, including mostly internal staff costs. Implementation costs during the first and second year are substantially higher than in subsequent years.
- Implementation of EnMS has significant benefits for enterprises in China, considering that the enterprises are already required by the Energy Conservation Law to hire energy managers and collect and report energy data. In fact, EnMS is a systematic framework for energy managers to achieve best results for their companies, because it helps the managers to organise their work, set goals, organise implementation, complete audits, install meters, collect data and report to management. In this way, coordination of EnMS activities by energy managers helps to yield the results that the enterprise wants the most, rather than limiting the work of energy managers to providing reports to the government.



- In China, costs to enterprises of implementing EnMS, excluding certification, are likely to be quite small. The main cost – assignment of an energy manager – is already required, and the Energy Conservation Law is increasingly being enforced. Other key costs associated with EnMS, including completion of an energy audit and collection of energy-use statistics, are also already required by government regulations. Except for certification, the remaining main costs for companies are some technical consulting work, where necessary, and staff EnMS training.

ENMS COST SCENARIOS

Adopting an energy management system, whether it is the ISO 50001 standard or an EnMS approach customized for a facility, can yield significant benefits in cost reduction, operational efficiencies and risk management. Executive support and commitment are necessary to chart a successful EnMS implementation path, including a comprehensive understanding of the range of resources needed to achieve persistent energy savings. This support includes establishing positions within the enterprise such as “energy champion”, or a seasoned engineer chosen by the executive team to provide dedicated support to the enterprise’s energy program. To be successful, the energy champions require consistent authority, responsibility and resources, especially as they educate and guide cross-divisional energy team members who provide facility-specific, bottom-up resources, input and feedback regarding energy-reduction efforts.

This memo reviews various cost scenarios reported in EnMS implementation, from ISO 50001 certification investments to the costs of cultivating an energy team, supporting data collection efforts and providing employee training. The factors described in these scenarios can help executive teams weigh potential investment costs before committing to an EnMS plan.

Based on a review of data collected over the past five years from facilities actively charting EnMS adoption progress within North America, few cost accounting best practices emerge. Instead, enterprises tend to characterise EnMS investment in a variety of ways. This lack of uniformity may be a result of ad hoc EnMS adoption, which originally focused on equipment upgrades, with no formal processes in place. Over time, the enterprises developed an energy management system, with enterprisewide integrated energy-saving programs producing results.

For example, the categories listed below illustrate different “entry points” identified by enterprises characterising their EnMS investment. Each profile exhibits a unique approach to characterising their costs.

Facility cost scenarios include:

- Built-in Cost Philosophy:** By adopting a performance metric tied to its energy consumption baseline, this multifacility enterprise (enterprise #1) frames EnMS investment as an investment in improving on existing management and operational processes. Details of estimated cost-per-facility include costs of an energy team, corporate support and an energy “champion”.
- Cost Reduction Goal:** By assuming production levels remain the same year-over-year to normalise any production changes not related to energy use, this multifacility enterprise (enterprise #2) calculates its EnMS investment by time and market hourly rate against pre-set cost reduction goals. Details of estimated cost-per-facility include facility cost reduction goal (including “stretch” goals or objectives that promote a more long-term view of the enterprise) compared to energy savings to date.
- Industry Goal Setting:** USD \$2 billion in annual sales anchors this enterprise (enterprise #3) as



one of the largest and most influential entities to adopt an industry goal of 25% energy intensity reduction over ten years. Costs reflected in its enterprise facility investment include the energy team, an energy “champion”, a corporate energy champion and a food group champion.

ENTERPRISE #1: BUILT-IN COST APPROACH TO ENMS COSTS

Enterprise Overview

Corporate Energy Goal: In 2010, each facility identified a 3% energy intensity (BTU/pound of product produced) goal. The baseline for this goal is the average energy intensity from 2007 to 2009. For all enterprise #1 facilities, energy intensity is determined by total energy usage (kWh and therms) at the site utility meter(s) divided by total production pounds processed at each facility. This data is tracked on a weekly basis by corporate management and facility operators, though some facilities are more diligent than others. Corporate management tracks all data to disseminate enterprisewide. Enterprise #1 uses the calendar year to measure its year-to-date savings. It tracks several targets against unique baselines: its own EnMS target and the Northwest Food Processing Association (NWFPA)¹ target, each with adjusted baselines.

Enterprise #1 estimated cost to implement ENMS:

Enterprise #1 characterises its EnMS cost as “zero,” because it assumes EnMS implementation is part of its existing business improvement process, and costs are calculated as a **built-in cost**. That being said, considering energy team members and the corporate group involved in implementing EnMS, the annual cost of EnMS is about the same at each of the enterprise #1 six facilities. The corporate sponsor’s (e.g. executive team member responsible for supporting EnMS efforts) time is based on a USD \$100k annual salary split between the six facilities and an USD \$80k salary split between the six facilities (or, about USD \$16,500) at 25% of their time a month for two executive team members (or, about USD \$6,500). The energy team’s time is calculated by multiplying the energy team members by USD \$50 an hour, at an hour a month; the energy champion’s time is calculated in the same way, with the addition of an extra two hours per month.

Role	Responsibility	Estimated Cost per Facility (USD)
Corporate Sponsor	Executive team member responsible for allocating resources and providing executive support for EnMS efforts.	\$23,000
Energy Champion	Manager who provides dedicated support to the enterprise’s energy program and guides energy team members across multiple facilities. Is supported by the corporate sponsor.	\$1,200
Energy Team Members	Cross-divisional energy team members who provide facility-specific, bottom-up resources, input and feedback regarding energy-reduction efforts.	\$23,000

¹ The energy intensity baseline sets the point against which NWFPA measures progress toward the 25% energy intensity reduction goal adopted by NWFPA members. NWFPA is obtaining energy use and production data from NWFPA member facilities. From this data, energy intensity is calculated (amount of energy in BTUs used per unit in pounds of output) for each facility. The individual facility energy intensities are then combined to produce an NWFPA memberwide energy intensity number.



Total Annual Costs / Facility	\$29,000
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ENTERPRISE #2: COST REDUCTION APPROACH TO ENMS COSTS

Enterprise Overview

Corporate Energy Goal: For 2010, enterprise #2 had an enterprisewide energy cost reduction goal of USD \$90,000 and a stretch goal (goal beyond what was expected) of USD \$135,000, split evenly among four facilities. The corporate engineer set the targets, which were measured in yearly therm savings (against 2009 baseline), resulting from energy-saving project implementation. Progress is reported using metered data (meters at process equipment where energy efficiency projects were completed) by the corporate engineer on a monthly basis. Goals are revised annually, and the baseline year has been adjusted during the program based on previous year's results. 2009 data was used as a baseline for 2010 targets.

ENTERPRISE #2 estimated cost to implement EnMS:

The corporate engineer's role focuses on managing energy-reduction efforts across all four facilities, based on an estimated USD \$100k salary split between the four facilities. EnMS investment by time and market hourly rate against pre-set cost reduction goals include calculating the energy team's time multiplied by the team members by (estimated) USD \$50 an hour; the energy champion's time is calculated in the same way, with the addition of an extra two hours per month.

Enterprise #2 recognises that operations and maintenance (O&M) projects also contribute to harnessing the energy-saving potential of its facilities' industrial equipment. Resources are dedicated to enhance staff ability to monitor equipment energy usage and make adjustments that optimize performance. Increased O&M cost, such as training, repairs or improving control systems, varies between roughly USD \$5,000 and \$25,000.

- USD \$5k: The corporate engineer accounts for this on the low end with facilities' smaller repair projects and the labor associated with more frequent maintenance as a result of implementing ENMS.
- USD \$25k: The high end is described by the corporate engineer as "more of an aberration" — larger O&M projects and associated labor that do not fall under its capital budget.

The annual estimated cost of ENMS is about the same at each of the four enterprise #2 facilities:

Role	Responsibility	Estimated Cost per Facility (USD)
Corporate Engineer	Enterprisewide leader who manages energy-reduction efforts across all facilities.	\$25,000
Energy Champion	Manager who provides dedicated support to the enterprises' energy program and guides energy team members across multiple facilities. Is supported by the corporate sponsor.	\$1,200
Energy Team Members	Cross-divisional energy team members who provide facility specific, bottom-up resources, input and feedback regarding energy reduction efforts.	\$6,000



Operations	Formalised operations and maintenance plan directly contributing to energy-reduction efforts.	\$5,000 - \$25,000
Total Annual Costs / Facility		\$37,000 - \$52,000

ENTERPRISE #3: INDUSTRY GOAL APPROACH TO ENMS COSTS

Enterprise Overview

At the start of fiscal year (FY) 2009, Enterprise #3 committed to 25% energy-intensity reduction over ten years (using FY 2008 as baseline year: energy intensity 2.78 MMBTU/1000 lbs). At Enterprise #3, energy intensity is measured as MMBTU/1,000 lbs of shippable product produced (combined kWh and Therm). Goal setting mirrors the US Department of Energy (DOE) Industrial Technologies Program and NWFPA industrywide 25% energy-intensity reduction goal. Enterprise #3 uses its fiscal year (August – July), to track its targets.

Enterprise #3 estimated cost to implement ENMS:

The Northwest Energy Efficiency Alliance (NEEA) advisor² estimates that energy team meetings take 1.5 hours, plus 1 hour for preparation and follow-up for **each team member** (at USD \$50/hour). The facility energy champions spend an additional 2 hours for preparation and follow-up. Because of the culture and level of integration of EnMS into its enterprise, Enterprise #3 indicates no additional O&M cost to implement EnMS; rather, a deeper level of awareness of energy goals provides context (and productivity) to assigned energy reduction efforts. The enterprise recognizes that, if equipment and processes are not operating at optimal efficiency, this inefficiency ultimately hurts the bottom line.

Multiple corporate energy champions operate across multiple business units – the food group unit is just one of many business units supporting EnMS. The corporate champion is dedicated full-time to oversee the energy champions of all major business units. The food group and agriculture business units have champions (so-called food group champions) who are 100% dedicated to energy, but half of their time is subsidised by the US Department of Energy (DOE) (salaries estimated at USD \$80k). The calculation for the food group champion is salary minus DOE subsidy, divided by the 8 food group plants and divided by 2 to reflect the NEEA plants.

For brevity, estimates include the corporate champion's time with four NEEA food group facilities at USD \$20,000 annually.

The cost calculated below reflects time spent for energy team meetings and corporate champions' salaries spread among eight facilities with the totals for four NEEA facilities parsed out.

Role	Responsibility	Estimated Cost per Facility (USD)
Corporate Energy Champion	Full-time resource dedicated to oversee the energy champions of all major business units.	\$20,000

² NEEA funds a resource to help advise and lend efforts in Enterprise #3's EnMS adoption efforts. Often a single consultant is assigned to an enterprise, and participation in energy team meetings is common. The enterprise welcomes outside resources because participation allows the enterprise to tap into expertise and receive third-party perspectives on current efforts.



Food Group Champion	Full-time business unit resource dedicated to energy reduction and is 50% subsidised by US DOE. Works closely with corporate energy champion.	\$10,000
Energy Champion	Facility-specific dedicated resource responsible for facility energy reduction efforts and leading facility energy team. Works closely with business unit resource (<i>i.e.</i> food group).	\$1,800
Energy Team Members	Cross-divisional energy team members who provide facility specific, bottom-up resources, input and feedback regarding energy-reduction efforts.	\$12,000
Total Annual Costs / Facility		\$43,000

ISO 50001 CERTIFICATION

For enterprises seeking ISO 50001 certification without previous ISO certification history, costs are assessed based on on-site consultant time, dedicated internal support, training and certification maintenance. Costs are dependent upon assessor's market rates. Number of hours required for the ISO certification process are noted below.

Audits	Specific Area Audit: 4 hours Compliance Audit: 4 hours Certification Maintenance: Specific Area Audit: 4 hours Compliance Audit: 4 hours
Energy Manager	1 FTE / Six Months Certification Maintenance: .25 - .33 FTE
Energy Team	8 hours / month Certification Maintenance: 2 hours / month
Training	Awareness: 1 hour / person Energy Team: 2 - 4 hours Staff: 1 - 8 hours Top Management: 1 - 2 hours
Management Review	2 - 4 hours Certification Maintenance: 4-6 hours / year
Consulting	150 hours (optional)
Certification	Assessor: USD \$6,500 - \$9000 / day Initial Certification = 6 - 9 days Certification Maintenance: 1.5 - 2 Days Re-Certification Audit: 3 - 5 days, 2 Assessors
Total hours	First-time Certification: <u>107 hours</u> ; not including 150 optional consulting hours + 1 FTE for six months Certification Maintenance <u>61 hours</u> including 3 audit days; not including .25 - .33 FTE



FINDINGS

Because enterprise budget and fiduciary activities are often viewed internally, a standardised way for enterprises to calculate EnMS costs is lacking. There is no “best practice”. As a result, EnMS costs are characterised in a variety of ways and are more reflective of enterprise management strategy and decision-making processes. Moreover, EnMS efforts are more difficult to characterise and justify than growth-oriented investment (*e.g.* increased production capacity), suggesting energy efforts may happen more by chance than by deliberate effort³.

THOUGHTS ON IMPLEMENTATION COSTS IN CHINA

Unless certification (which can cost anywhere between USD \$18,000 for certification renewal and USD \$81,000) is required or pursued, costs to enterprises of implementing EnMS (excluding certification) are likely to be quite small in China. The main cost – assignment of an energy manager (and potentially of assistants if the enterprise is large) – is already required by the Energy Conservation Law. This law is increasingly being enforced. Other key associated costs, including completion of an energy audit and collection of energy-use statistics, are also required by government regulations. The main costs for companies in China that do not pursue certification are, therefore, likely to be for technical consulting work where necessary and staff training in EnMS implementation.

Implementation of EnMS has significant benefits for enterprises in China, considering that the enterprises are already required to hire energy managers and collect and report energy data. In fact, EnMS is a systematic framework for energy managers to achieve the best results for their companies, because it helps managers to organise their work, set goals, organise implementation, complete audits, install meters, collect data and report to management. In this way, coordination of EnMS activities by energy managers helps to yield the results that the enterprise wants the most, rather than limiting the energy manager’s work to providing reports to the government.

³ Christopher Russell, *Understanding Industrial Investment Decisions*, October 2012.