

ENERGY CONFERENCE & EXPO

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Making Energy Management Systems Case Studies Easily Searchable and Shareable

Heidi Fuchs, Lawrence Berkeley National Laboratory

50001-based energy management systems (EnMSs) **integrate energy management** into everyday business practices/procedures to save energy and money while helping reach climate goals





50001-based EnMSs achieve persistent average annual energy savings of 3-4% compared to business as usual of 1% per year

Installable Energy Technologies and Assessment K7 (2003) 101286





Deeper and persistent energy savings and carbon dioxide reductions achieved through ISO 50001 in the manufacturing sector

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ARTICLE INFO	ARSTRACT
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The Interpretmental Panel on Climate Change (IPOC) has stated that there is an absolute necessity to limit human-induced global warming to 1.5. °C in order to limit the risks associated with an impeded climate change [10]. These risks include increased heavy precipitation extreme drought, disruption of consystems, ocean acid/fication, ara level rise, and multiple other compounding factors both projected and unforesoes [8]. Aligned with this dictain, the International Energy Agency (IEA) has compiled a Sustainable Development Scenario (SES) with a projection for meeting this goal. In the latent version of the SDS, IEA projects manys efficiency being responsible for over 40% of the emissions abasement needed by 2040 [96]. This nets an ambitious goal of reducing energy intenalty across the economy at the rate of about 1.3%. per year. The American Council for an Emergy Efficient Roseomy (ACRER) has determined a similar goal of 1.7% per year [25]. In addition, the ELA notes that 82% of that energy efficiency potential could be achieved cost effectively and recommends that "glovvenesees abould put in ambitious policy frameworks to promote ... emergy efficiency

ant in the industry sector [17]. These reports highlight the importance of energy efficiency as the first tranche of the drive to decarbonize - reducing emissions and energy cost expenditures, simul tasserously. More tangibly, it provides a target for the rate of energy efficiency improvement, with the implicit understanding that the on ary outsided.

This paper evaluates facility-level annual energy performance in ments associated with adoption of a structured energy managemost system (HaMC), as defined by the International Organization for Standardization (250) 50000 energy management standard. For the purposes of this paper, the terms energy performance and energy efficiency are interchangeable with both convoting the productive use of energy. Pocining on the U.S. manufacturing sector, this paper analytes the energy performance improvement records for facilities that have ented ISO 50001 to show with high confidence that:

1. third party verified energy performance inpe-8. manufacturing plants with an ISO 50001 contified EaddS are

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4% year 1, 3.4% / y (up to 12y)

CEC's Work on Stimulating Uptake of ISO 50001 Energy Efficiency Standard (2015–2018)



4.1% / y for 3–7y

Features and Performance of Energy Management Programs

Ethan Rogers, Andrew Whitlock, and Kelly Rohrer January 2019 Report IE1901

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Old way of searching for EnMS case studies







Energy Management Systems Insights

50001insights.lbl.gov



We employed **user-centered design** and sought input **early** and **often** on database design from dozens of stakeholders



User-friendly interface



328 EnMS case studies



Customizable search criteria

	SEARCH ^	ABOUT 🗸	SUBMIT A CASE STUDY 🗸		
SEARCH FILTERS @	Keyword Filters				
Continent All ~	Sector	Payback Period (years)	Content Tag	js 🕜	
Country All ~	Industry All ~	Energy Performance Improvement Period (yr) 0	; ⊘ □ ; ★ □	llimate :hange/Decarboniza Cross-sector key ene systems	tion rgy
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Publication Year (range) 2015	EnMS Program	Cost to Implement EnMS (USD 1,000) 0 2M+		jovernance (ESG) co Itility/other program nvolvement	mmitments
Annual Energy Performance Improvement (%) 0	Number of Featured Certified Sites Single-site Multi-site Organization	Annual Energy Savings (MWh/yr) 0	□ ♥ ! □ ★ !	ion-energy benefits tenewables	
	Organizations with multiple case studies	Annual CO2 Reduction (MMT/yr) 0 SOK+	Definitions		
SUBMIT SEARCH	RESET FILTERS				
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All case studies reviewed for whether content tags should be applied

ARCH FILTERS	0				
ontinent All	÷	Sector	Payback Period (years)	Content Tags 🔞	
aunty	÷	Industry All -	Energy Performance Improvement Period (yr) 0	Climate change/Decarbonization cross-sector key energy systems	
ate/Province (US & Canada only) All	v	Enterprise Size 🕜	Annual Energy Cost Savings (SUSD/yr) 0 C	Electrification Environment, social and governance (ESG) commitments	
insecution rear (range)	2024+	EnMS Program	Cost to Implement EnMIS (USD 1,000) 0	Utility/other program involvement	
nnual Energy Performance Improvem	ent (%)	Number of Featured Certified Sites Single-site Organization	Annual Energy Savings (MWh/yr) 0 100K+ 4noual CO2 Badection (MRTArd)	 Non-energy benefits Renewables 	
		Organizations with multiple case studies	0 6 50K+	Definitions	



Key testimonials are extracted from all case studies



Results are summarized and visualized





Raw data, case study PDFs, search results, and visuals can be downloaded and easily shared





Qualifying case studies can be easily submitted

Your Full Name (First Last)*

CANCEL

BERKELEY LAB **Energy Management Systems Insights** SEARCH ¥ ABOUT V SUBMIT A CASE STUDY Thank you for your interest in submitting a case study for inclusion in this database. Note that only case studies of 50001-based energy management systems will be considered. Please complete the form below and upload the PDF of your case study. Once Berkeley Lab researchers have reviewed your submission, we will reach out for further details before posting to the database. Through your submission, you acknowledge that you have all the necessary rights to make this submission and that Berkeley Lab and the U.S. Department of Energy have the rights to use it and redistribute it.

SUBMIT A CASE STUDY

Organization/Company Name*	Organization/Company Website*	Phone Number*
'our Role in the Project*	Content Tags 🕜	
The Mark Strategy of the second strategy of the second strategy of the	Climate change/Decarbonization	🔲 🤹 Cross-sector key energy systems
UPLOAD YOUR CASE STUDY (PDF C	Electrification	 Environment, social and governance (ESG) commitments
	Utility/other program involvement	Non-energy benefits
	Renewables	
	Definitions	

Through your submission, you acknowledge that you have all the necessary rights to make this submission and that Berkeley Lab and the U.S. Department of Energy have the rights to use it

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Project Name*

SUBMIT STUDY

Analysis of aggregated case studies data

For illustrative purposes



Most case studies in the database relate to ISO 50001 implementation (from the Energy Management Leadership Awards)





Year

Content tags vary somewhat by sector





Industrial





ESG commitments Non-energy benefits

Utility/other program involvement Electrification

Case studies are mostly from the industrial sector

Industrial							Institutional		
Chemical Manufacturing 33 10%	Food Manufacturing 17 5%	Textile Mills 10 3%	Electrical Equipment, Appliance, & Component Manufacturing 10 3%	Electrical Equipment, Appliance, & Component Manufacturing 10 3%		cturing	Public Administration 18 6%		
	Electric	Paper Manufacturing 8 2%	Retail Trade 7 2%	Fabricate Metal Product Manufact 7 2%	ed turing	Alumina & Aluminum Production & Processing 6 2%	Educational Services 7 2%	Professional Scientific, & Technical Services 4 1%	, Transportation & Warehousing 4 1%
Automotive Manufacturing 20 6%	Power Generation, Transmission & Distribution 16	Transportation & Warehousing 8 2%	Plastics & Rubber Product Manufacturing 6	Machinery Manufactu 5 2% Nonmetallic	uring	Professional, Scientific, & Technical Services 4 1% Leather	Realth Care & Social Assistance 5 2% Commercial	Sewage Sewage 8 Other Systems 2 1%	teria te
Cement	5% Oil	Computer & Electronic Product Manufacturing 7	Water, Sewage & Other Systems 6	Mineral Product Manufacturing 3 1% Beverage 8 Tobacco Product Menufacturing 2	Steel Mills B Ferroalloy Manufacturing 1%	Allied Product Manufacturing 3 1% Wholesale 7 2 2 10/	Retail Trade 7 2%	Finance & Insurance 5 2%	Professional, Scientific, & Technical Services 4 1%
& Concrete Product Manufacturing 17 5%	& Gas Extraction 11 3%	2% Petroleum & Coal Products Manufacturing 7 2%	Transportation Equipment Manufacturing 6 2%	1% Primary Metal Manufacturing 2 1% Printing 8 Related Support Activities 2 1%	Wood Product Manufacturing 2 1%	1 70 ************************************	Accommodation & Food Service 5 2%	Real Estate 2 1% 1% Real 6.30% Containeres, 2 1%	Connete Induct Marchotaring 1 200% Call Connet Call Co

We find no statistically significant difference in annual energy savings by sector or subsector



There is no statistically significant difference in annual energy savings by continent or country





We similarly saw no stat. significant correlations for these metrics



Multi-site implementations cost more to implement but yield higher annual cost savings



cost savings (p = 0.021) and cost to implement (p = 0.017)

In summary, regardless of sector, industry, and location, organizations can reasonably expect ~3% annual energy savings from a 50001-based EnMS

Median annual energy savings for all database case studies is **3.2%**

Analysis of Variance (ANOVA) showed **no statistically significant correlation** between energy savings, CO₂e reduction, cost, or payback period and these parameters: program, sector, industry, location



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