



NORTHWEST
STRATEGIC ENERGY MANAGEMENT
COLLABORATIVE

The Northwest Roots of Strategic Energy Management

OCTOBER 2022



Introduction

The Northwest has been at the forefront of strategic energy management for more than 15 years. Through collaboration and active practice, utilities and other energy efficiency program administrators, implementers, evaluators, researchers, regulators and industrial and commercial businesses have helped to standardize and streamline SEM best practices to further a regionwide commitment to energy conservation and efficiency.

Following a brief introduction to SEM, this document summarizes how the region's clean energy stakeholders worked together in the Northwest SEM Collaborative and beyond to help lead the way in SEM innovation. By understanding where we've been and how we've arrived at the present, we hope to help the next generation of SEM practitioners build upon and advance the important work that's been accomplished to date.

The "Northwest Roots of SEM" was conceived and created in 2022 by members of the NW SEM 101 Working Group. Kim Crossman of Great Work Energy led the effort, with co-authors Suzi Asmus of NEEA, Ed Birch of Strategic Energy Group, Anna Kelly of Power TakeOff and Tina Schnell of Ask Energy.



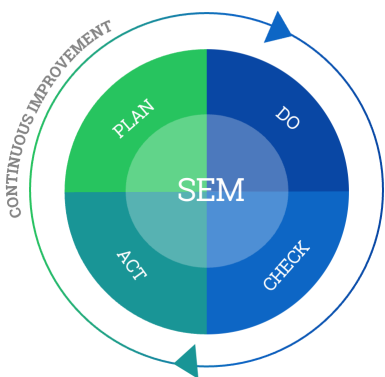
Introduction

Strategic Energy Management

SEM is a continuous improvement process that drives deep, lasting change in the ways that businesses use energy. SEM practices improve an organization's ability to manage their own energy performance and costs on an ongoing basis. To do this, SEM emphasizes a structured approach to increasing organizational commitment, improving planning and implementation of energy saving projects and measuring energy performance outcomes.¹



For additional information on the foundational aspects of SEM, visit [SEMHub's SEM 101 page](#) to browse a curated collection of tools and training materials. SEM 101 materials include the [SEM 101 Kick-Start Guide](#), a user-friendly visual guide to the SEM journey tailored to first-year SEM participants.



SEM Programs

While organizations can implement SEM on their own to improve their energy performance, many have found value in leveraging outside assistance. SEM specialists provide training, coaching and technical services to support a business' adoption of SEM. They may be directly contracted by the business or, more commonly, serve as an implementer of a utility or government SEM program.

- **Private companies** may provide SEM services to their customers as a dedicated consulting engagement. Other companies integrate SEM concepts into their more traditional energy engineering, energy planning, or energy project implementations.
- **Government agencies** around the world may deploy taxpayer-funded SEM programs to increase competitiveness of the businesses within their borders, to improve energy efficiency and/or to address climate and other environmental priorities.
- **Energy utilities in the U.S. and Canada** may administer ratepayer-funded SEM programs or deploy SEM components within other programs to support utility Demand Side Management (DSM) goals, in pursuit of cost-effective electrical or gas savings.

Introduction

SEM Program Design & Strategy

The following table outlines common characteristics of SEM program design and strategy which, when combined, distinguish SEM programs from other types of energy efficiency (EE) programs. Many of these strategies had been applied successfully in other types of EE programs—for example, in utility programs pursuing custom process efficiency projects, those promoting building retro-commissioning, and federal programs such as ENERGY STAR® providing public recognition for demonstrated energy performance. But only in SEM are the program design elements and strategies below combined into one, ongoing and holistic practice.

SEM Program Design	Rationale
<i>Establish executive commitment</i>	Executive commitment is essential to the near and long-term success of a cross-functional organizational change initiative.
<i>Build organizational capacity for EE</i>	It's important to assign and develop the internal staff resources needed to better manage energy use. SEM programs train and support the staff responsible for SEM efforts (i.e., the assigned Energy Champion and/or Energy Team).
<i>Engage employees and tenants</i>	Operator and occupant behaviors can help or hurt EE efforts. Fostering an organizational culture of energy management deepens savings outcomes and helps these savings persist.
<i>Identify and prioritize savings opportunities on an ongoing basis</i>	Establishing a structured approach to identifying and reducing energy waste supports continuous improvement and reduces backsliding that can occur due to changes in business operations, new products, processes, and technologies.
<i>Model and report energy performance at the whole building level</i>	Models that normalize energy savings as a function of weather, production, and other business critical variables allow participants to visualize and better understand the quantifiable benefits of energy management over time.

SEM Program Strategies

1 Reduce energy waste by focusing on low and no cost operations and maintenance (O&M) measures.

For participants, focusing on O&M provides rapid savings opportunity with minimal capital investment. Achieving quick wins reinforces their commitment to continue and go deeper. For programs, SEM provides a persistence strategy for O&M measures, unlocking a major, new source of savings.

2 Teach them to fish.

The main objective of SEM Coaches is to train and equip the participant to understand and manage their own energy use.

3 Deliver the program to groups of participants (a “cohort”) or one-on-one.

Training a group of participants together reduces program training costs, while leveraging the power of peer-to-peer learning and influence. Single-site delivery allows for a fully customized approach to site engagement, processes and technology, but may be more suitable for very large participants.

4 Employ top-down or bottom-up program saving analysis.

Top-down models (IPMVP Option C) allow programs to quantify O&M savings more cost-effectively than measure isolation methodologies. Bottom-up analysis of individual measures (IPMVP Option B) is a good option if a reliable model cannot be developed, or if claiming savings based on whole-building analysis is not supported by regulators.



The Northwest SEM Collaborative

The Region's SEM Nexus

The Northwest (NW) SEM Collaborative has served as a catalyst and guiding force for SEM advancement in the NW region of the US and Canada. The Collaborative convenes diverse perspectives on the developing field of Industrial and Commercial SEM, including program administrators, implementers, evaluators and researchers. With a commitment to bringing SEM to scale in the region, the organization and its members work together to accelerate learning and develop solutions to technical, market or policy challenges.

Guided by a voluntary Leadership Team, the NW SEM Collaborative has facilitated broader adoption of SEM in the region through:



Strategic Planning

Providing long-term direction for the NW SEM community.



Program Innovation

Increasing the reach of Industrial and Commercial SEM programs.



Solution Improvement

Enhancing the efficiency and effectiveness of SEM offerings.



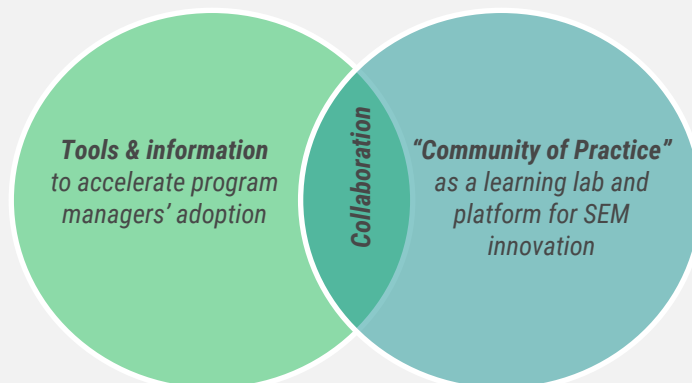
Knowledge Transfer

Broadening and deepen the extended SEM community's capabilities and skillsets.

To help guide the strategic direction of the NW SEM Collaborative, the Leadership Team has worked to develop consensus on priorities among the group and the broader region, while supporting the Collaborative's organizational development and growth.

The NW SEM Collaborative established and has fostered several ways for members to convene, collaborate and learn. Members participate in regional working groups and at an annual workshop. The Collaborative thrives when members bring their ideas, propose topics, share challenges and contribute their unique perspectives.

Collaborating for Change



- Technical systems focused
- Value placed on hard deliverables
- More organization & structure

- Human systems focused
- Value placed on soft deliverables
- Less organization & structure



The Northwest SEM Collaborative

Events, Resources and Activities

NW SEM Collaborative Workshop

Beginning in 2011, the NW SEM Collaborative has convened an annual regional SEM workshop. The workshop aims to support the Collaborative in advancing the adoption of SEM and serve the mission of the Collaborative to enhance effectiveness of SEM offerings, air diverse perspectives, accelerate learning, tackle barriers and challenges, advance tactics and strategies, and share cross-cutting opportunities and solutions. Find the date of the next workshop at semhub.com/events.

Online Tools and Resources

SEMHUB.com is a searchable resource library with tools, reports, white papers and other relevant work products from NEEA, the NW SEM Collaborative and its Working Groups. Members and colleagues from the region and beyond also capitalize on the site as a community library for relevant SEM publications from its members and larger networks. Examples of SEMHub tools include:

- **Energy Talk Cards** are engaging graphical tools that make it easy to stimulate energy efficiency conversation and learning among facility staff.
- **Online Courses** provide video training courses to help site Energy Champions and their teams identify and implement energy saving opportunities.
- **Energy Management Assessment (EMA) Tool** is a survey tool offering a strategic and confidential analysis of an organization's current energy management business practices and specific areas of opportunity.
- **Case Studies** offer insights into how utilities have implemented successful strategic energy management programs.
- **Customer-Facing Resources** are also available on SEMHub's sister site, BetterBricks.com, with customer-facing explanations of SEM topics and links to the most valuable SEM resources.



The Northwest SEM Collaborative

NW SEM Collaborative Working Groups

Working Groups

Regional SEM Working Groups provide Collaborative members a forum and opportunity to work with peers on shared challenges in SEM program management. Working Groups are all volunteer. With a focus on shared learning and creating tangible work products ranging from white papers, one-page guides and presentations, each working group blends theory and practice to consider and document emerging best practices within our professional community. Examples of current and past Working Groups include:

Beyond the E: Identifies the additional benefits (engagement, customer service, non- energy specific resource conservation) that SEM brings to energy management and develops regional resources to support communication and delivery of these benefits.

Measurement & Verification: Confronts challenges, finds opportunities and shares insights on how to make projects more effective, including regression modelling practices, alternative approaches, standardization, savings persistence and more.

Small and Medium Businesses: Explores the opportunities and constraints to expanding SEM program delivery to new markets.

Below is a comprehensive list of all NW SEM Collaborative working groups and the years each was active since 2013. Also noted are working groups that have changed names (indicated by blue text/dots) over time while remaining focused on similar topics and initiatives.

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Benchmarking SEM (formerly Market Analysis)	●	●	●	●		●	●	●		
M&V (formerly Energy Tracking & Savings Protocol)	●	●	●	●	●	●	●	●	●	●
Small-Medium SEM (formerly Small to Medium Industrial Solutions)	●	●	●				●		●	
Wikipedia SEM				●	●		●	●		
Integrating SEM into EE Programs							●	●		
Beyond the E (formerly SEM Challenges & Opportunities)				●	●	●	●	●	●	●
Emissions Reduction									●	
DEI									●	
NW SEM 101										●

A Brief History of SEM in the NW

Background: A Strong Policy Foundation for EE Innovation

In the Northwest region of the US and Canada, utilities, regulators, policy makers and ratepayers have maintained a deep and long-standing commitment to energy conservation and efficiency as the lowest cost and lowest emissions energy resource available. Ambitious regional power system and conservation potential assessments and targets updated every five years by the Northwest Power Planning Council drive Bonneville Power Administration and regional consumer-owned utilities (COUs) to ongoing investment in customer efficiency. State regulators encourage investor-owned utilities (IOUs) and other regional EE Program Administrators such as the Energy Trust of Oregon to pursue all cost-effective efficiency in their territories.

This consistent policy, planning and regulatory support for maximizing energy efficiency in the Northwest has promoted innovation and collaboration. It has supported regional market transformation efforts through the Northwest Energy Efficiency Alliance (NEEA) and driven significant, relatively consistent funding of energy efficiency resource programs in the region for more than 25 years.

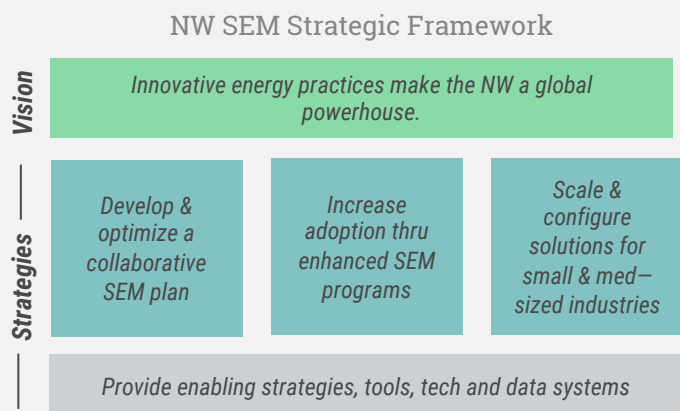


Savings goals increase over time, and it can be challenging for mature, well-established EE programs to achieve the next increment of additional, cost-effective savings. In active pursuit of new sources of savings, ratepayer-funded energy efficiency programs in the Northwest were the vanguard of SEM program development and deployment.

Developing and Defining SEM

By the end of 2010, NEEA, Energy Trust of Oregon and Bonneville Power Administration were all implementing their own Industrial SEM programs. NEEA called their SEM offering Continuous Energy Improvement (CEI), Energy Trust called their first SEM program Industrial Energy Improvement (IEI), and BPA named their SEM offering High Performance Energy Management (HPEM).

From the beginning, these regional programs communicated with each other, sharing lessons and honing best practices as they went. Over time, programs and organizations across the U.S. and Canada turned to the Northwest to help develop, implement or optimize their own SEM programs. To do so effectively, and to support market transformation, we needed a common language to describe what we were doing.



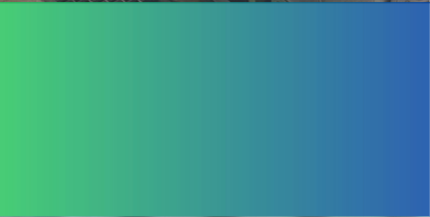
In 2012, a well-attended NW SEM Roadmap Workshop helped to focus and prioritize SEM development efforts in the region and beyond.



A Brief History of SEM in the NW – Cont.

In 2012, administrators from SEM programs met at a Consortium for Energy Efficiency (CEE) meeting and determined that they would call this new approach “Strategic Energy Management”. In 2013, NEEA, Energy Trust, BC Hydro and administrators from other programs continued to work toward a collective definition of SEM. These efforts led to the 2014 publication of CEE’s SEM Minimum Elements.

Since then, groups like CEE, NEEA and the NW SEM Collaborative and events like the SEM Summit have helped to entrench “SEM” as the standardized term. Many SEM programs still go to market with their own unique, branded program name, as this is a common practice in all types of energy efficiency programs. But the growing community of SEM practitioners in North America is not struggling with basic nomenclature anymore. These are SEM programs, and our customers are learning and practicing SEM.



Influencing SEM Adoption Outside the Region

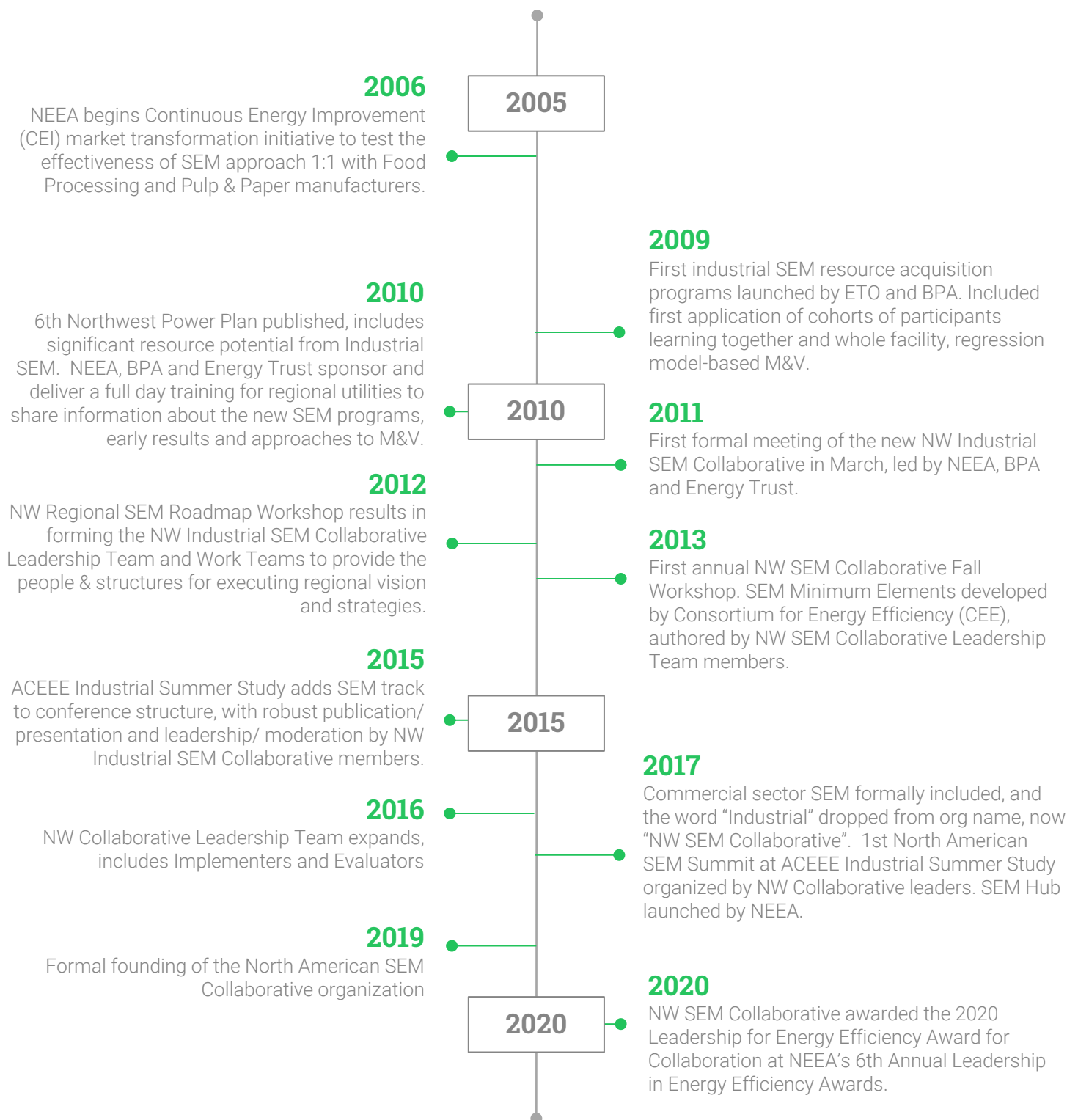
The Northwest’s collaborative efforts have had an outsized influence across the continent. National EE organizations, including the US Department of Energy, US Environmental Protection Agency and Natural Resources Canada, along with extra-regional program administrators, regulators and advocates, have regularly participated in and contributed to annual workshops and working groups in the NW. This growing interest and activity within and outside the region prompted our regional leaders to convene the first North American SEM Summit in 2017, which led to the formation of the North American SEM Collaborative in 2019.



Additionally, regional leaders have been active contributors to the development of national and global energy management standards, including ISO 50001 and US DOE’s Superior Energy Performance (SEP) program. Northwest implementers have also been early adopters in piloting and integrating resources such as US DOE’s 50001 Ready into their SEM programs.

A Brief History of SEM in the NW

Milestones in Regional Collaboration





The Northwest SEM Collaborative

SEM Evaluation and Research

With the large number of SEM programs and practitioners concentrated in the NW, there has been a continual outpouring of scholarly and evaluation activity that has provided direction and advice to the SEM industry at large. In recent years, there has been activity in and outside the region to streamline evaluation and modeling methodologies, identify program design components necessary for energy management to be strategic, and investigate the cost effectiveness and persistence of SEM.

The direction of the research shows the overall shift in priorities over the last several years. Initially, the programs needed evaluation activities and design assessments to standardize components of SEM that were being offered in the marketplace and educate implementers and evaluators on how to approach SEM. More recently, there has been a shift towards more research into SEM cost effectiveness and persistence, scaling SEM, and more focused assessments into design. Continuing to track the research activities coming out of the NW and elsewhere will enable the industry to move forward collectively.

Scholarly Activity Surrounding SEM Methods and Design

Year	Publication	Topic
2011	Jones, T., Crossman, K., Eskil, J., & Wallner, J. (2011) The Evolution of Continuous Energy Improvement Programs in the Northwest.	<i>SEM Design</i>
2013	Gardels, A., & Mcrae, M. (2013). Keeping Pace with Innovative Industrial Programs: Assessing Complex Program Deliveries and Strategic Energy Management Programs. In <i>International Energy Program Evaluation Conference</i> .	<i>SEM Design</i>
2014	Consortium for Energy Efficiency. (2014). CEE Strategic Energy Management Minimum Elements.	<i>SEM Design</i>
	Energy Trust of Oregon. (2014). 2014 Energy Trust Workshops on Strategic Energy Management Impact Evaluation: Report on Key Outcomes.	<i>Impact Evaluation</i>
2015	Ochsner, H., & Kociolek, E. (2015). Improvements in SEM Program Impact Evaluation Methods: Lessons Learned from Several Recent Projects.	<i>SEM Design</i>
2016	Commonwealth Edison and Nicor Gas. (2016). ComEd and Nicor Gas Strategic Energy Management (SEM) Evaluation Report.	<i>Impact Evaluation</i>

Scholarly Activity Surrounding SEM Methods and Design – Cont.

Year	Publication	Topic
2017	Gage, L., Analytics, A., Amundson, T., Administration, B. P., Stewart, J., Bernath, A., & Baker, M. (2017). Growing Pains: Lessons from the Edge of SEM Program Evaluation. In International Energy Program Evaluation Conference.	Scaling SEM
	Degens, P. (2017). Strategic Energy Management Modeling: What's good enough? In International Energy Program Evaluation Conference.	Modeling and M&V
	Dias, S. (2017). California Industrial SEM Design Guide. 1–67. http://www.neep.org/sites/default/files/CA_Ind_SEM_Design_Guide_v1.0.pdf	SEM Design
	Bernath, A. (2017). Estimating Energy Savings Resulting from Strategic Energy Management Programs: Methodology Comparison. In International Energy Program Evaluation Conference.	Modeling and M&V
2018	NREL (National Renewable Energy Laboratory). (2018). Chapter 24: Strategic Energy Management (SEM) Evaluation Protocol. May 2017.	Evaluation Protocol
2019	Kociolek, E., & Fraser, J. (2019). Looking Beyond Operational Savings: Quantifying Strategic Energy Management's Influence on Capital Efficiency Projects. In International Energy Program Evaluation Conference.	SEM Design
	Rogers, E., Whitlock, A., & Rohrer, K. (2019). Features and Performance of Energy Management Programs. American Council for an Energy-Efficient Economy, January. https://www.aceee.org/sites/default/files/publications/researchreports/ie1901.pdf	SEM Design
2020	DNV GL. (2020). Industrial O&M Persistence Study	Cost Effectiveness and Persistence
2021	Bailey, D. (2021). Is it Magic? What SEM can teach us about energy efficiency in the industrial sector.	SEM Design
	Podell-Eberhardt, Z., Bachman, J., Shimojima, K., & Energy Allen Deyton, C. (2021). SEM at Scale: OMG, My Cohort Has 142 Facilities!	Scaling SEM
	Therkelsen, P., Fuchs, H., Miller, W., Whitlock, A., & Rightor, E. (2021). Strategic Energy Management Program Persistence and Cost Effectiveness.	Cost Effectiveness and Persistence

