

ISO 50001 Energy Management System – Case Study

2023

India, China, Latin America, United States, United Kingdom

Cummins Inc.

Cummins achieves ISO 50001 certification in 45 sites.



Newly trained Energy Champions in the US, ready to improve energy performance (June 2019)

Case Study Snapshot

Industry	Engine and related technology manufacturing
Product/Service	Design, manufacture, install, service and distribute diesel engines, natural gas engines, electric and hybrid powertrains, powertrain-related components including filtration, aftertreatment, turbochargers, fuel systems, controls systems, air handling systems, automated transmissions, electric power generation systems, batteries, electrified power systems, hydrogen generation and fuel cell products.
Location	US: 16; LATAM: 4; India: 9; UK: 4; France: 2; China: 11
Energy performance improvement percentage* (2018 baseline year to 2021 improvement year)	9% absolute energy improvement; 18 % GHG improvement over 4 years
Total energy cost savings (total savings for 45 sites)	\$ 183,775,216
Cost to implement Energy Management System	\$6,985,850
Total energy savings*	655032 MWh (2,235,061 MMBTU)
Total CO₂-e emission reduction*	2,297,587 Metric Tons

*LATAM: Latin America; *over the improvement period.*

Organization Profile / Business Case

With 61,600 people, Cummins Inc., a global power leader, is a corporation of complementary business segments that design, manufacture, distribute and service a broad portfolio of power solutions. The company's products range from diesel, natural gas, electric and hybrid powertrains, and powertrain-related components including filtration, aftertreatment, turbochargers, fuel systems, controls systems, air handling systems, automated transmissions, electric power generation systems, batteries, electrified power systems, hydrogen generation and fuel cell products.

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In 2016, Cummins won the CEM Award of Excellence for its nine certified sites. This has now expanded to 45 sites, exceeding the 2020 goal of having 40 certified sites. This application focuses on the 45 EnMS certified facilities. While 45 of the sites have been certified to the International Energy Management standard ISO 50001, 10 sites are both ISO 50001 and Superior Energy Performance (SEP) certified.

Motivation/drivers for energy efforts

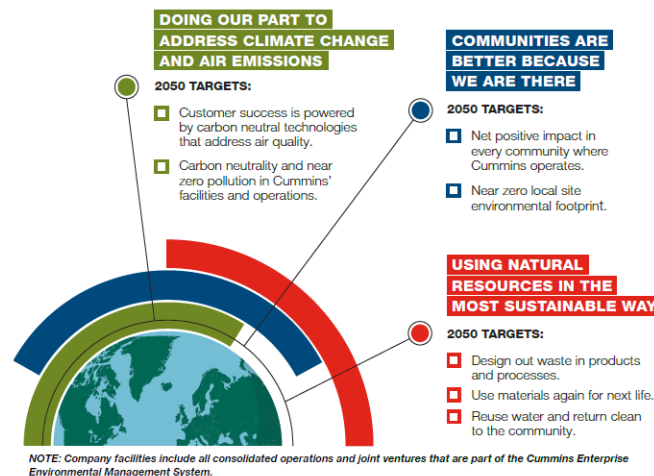
The company's Energy Management System is incorporated into its Environmental Management System. Cummins' active pursuit of energy management programs and certifications has multiple drivers, including ambitious corporate environmental goals, high energy bills, and meeting regulatory requirements. With Cummins' decision to incorporate procedures into the HSEEnMS, that conform to the ISO 50001 Energy Management Standard developed in 2012, the company has again taken the opportunity to leverage its strength in management systems to deliver a common approach for energy efficiency across the Enterprise. Having largely eliminated non-fuel process sources for GHG emissions, Cummins GHG footprint is very closely correlated with energy use. Cummins' actions to address risks and opportunities to the business related to climate change are now focused on energy efficiency.

Business strategy and framework on climate change, sustainability and/or decarbonization

Cummins' approach to sustainability aligns with the company's mission to make people's lives better by powering a more prosperous world. Its efforts to measure its global footprint highlighted opportunities to reduce its impacts and contribute to the bottom line through energy efficiencies.

In 2017, Cummins pledged to develop targets within the SBTi framework to reduce their emissions in line with climate science. In 2019, the company announced two goals aligned to the framework—one for newly sold products and the other for facilities and operations. In 2019, as part of Cummins' 100th anniversary, PLANET 2050 was launched. This is the company's environmental sustainability strategy that sets eight quantifiable goals for 2030 along with visionary longer-term aspirations timed to 2050. PLANET 2050 is a long-range business strategy with an environmental lens that uses actions, advocacy, and partnerships to do our part to drive change for a healthy planet. By 2050, Cummins' aspirational targets include carbon neutrality, to waste nothing and have a net positive impact in every community in which we operate. The PLANET 2050 goal for 2030 shifted from the company's 2020 goal based on an energy intensity measure to an absolute greenhouse gas (GHG) reduction.

CUMMINS' 2050 ASPIRATIONAL TARGETS



NINE 2030 GOALS

SCIENCE-BASED TARGETS	2030 GOALS
	1. Reduce absolute greenhouse gas (GHG) emissions from facilities and operations by 50%.
	2. Reduce Scope 3 absolute lifetime GHG emissions from newly sold products by 25%.
	3. Partner with customers to reduce Scope 3 GHG emissions from products in the field by 55 million metric tons.
	4. Reduce emissions of volatile organic compounds from paint and coating operations by 50%.
CIRCULAR ECONOMY	5. Create a circular lifecycle plan for every part to use less, use better, use again.
	6. Generate 25% less waste in facilities and operations as a percent of revenue.
	7. Reuse or responsibly recycle 100% of packaging plastics and eliminate single-use plastics in dining facilities, at employee events and as amenities.
	8. Reduce absolute water consumption in facilities and operations by 30%.
	9. Produce net water benefits that exceed Cummins' annual water use in all Cummins regions.

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Cummins GHG Goal Strategy

The company’s efforts to measure and manage energy positioned it well to comply with developing energy/carbon related regulatory requirements and reach its facilities GHG goal. Cummins has committed to setting Science Based Targets (SBT) through the Science Based Targets Initiative (SBTi). A 50% absolute carbon emissions reduction by 2030 from a base year of 2018 is a target consistent with the level of decarbonization required to keep global temperature increase to below 1.5°C compared to pre-industrial temperatures. Achieving reductions has required an all-of-the-above approach, guided by eco-efficiency principles, and leveraging our experience obtained over three previous generations of goals.

Implementation Approach

- Provide 24% renewable electricity for Cummins through offsite power purchase agreements (16% footprint reduction)
- Reduce absolute energy consumption in facilities by 12% through efficiency upgrades (12% footprint reduction)
- Provide 10% renewable electricity through onsite solar PV (6% footprint reduction)
- Reduce production hot test fuel consumption by 80% (5% footprint reduction)
- Install regen dynos and load banks at existing HHP Engineering test cells and all new/renovated Engineering test cells (5% footprint reduction)
- Install energy storage if unable to export excess test power to neighboring site or grid.
- Replace legacy transfer lines with flexible machining centers (5% footprint reduction)
- Reduce Engineering hot test fuel consumption by 10% (1% footprint reduction)
- Replace selected leased and owned executive cars, service, and yard vehicles with EVs; install EV charging stations (1% footprint reduction; 20% of fleet)

To achieve the GHG goals in facilities and operations, focus areas known as Critical X’s were identified for each goal with leaders to drive the execution of each focus area. Roadmaps were developed for each Critical X. These roadmaps will define our investment and resource requirements, which will be substantial. This has been an excellent cross functional engagement with different organizations within the company, including but not limited to Manufacturing, Global Integrated Services/Facilities, Tech, New Power, Distribution, Sales, and Services, etc.



2030 Goals	Critical X
Facilities Water: 30% absolute reduction by 2030	Wastewater Reuse
	Facility Leaks
	Fire System Test Water Reuse
	Irrigation
Facilities GHG: 50% absolute reduction by 2030	Energy Efficiency & Capital Management
	Production Hot Test
	Engineering Hot Test
	Compressed Air elimination
	Advanced Manufacturing Technology
	Industry 4.0 Environmental Monitoring
	Onsite Renewables
	Offsite Renewables
	Fleet & Employee Electric Vehicles
Facilities Waste: 25% reduction as percent of revenue	Packaging
	Manufacturing & Service Process Waste
	Circular Lifecycle Plan for Every Part
Facilities VOC: 50% reduction	Single Use Plastics elimination
	Paint & Coating VOCs

Note: Baseline is Full Year 2018

In 2021, Cummins launched its Destination Zero strategy that focuses on moving to zero emissions across Cummins products by 2050. Cummins is embracing the opportunity to be part of the solution to climate change by pursuing reductions of GHGs from both internal combustion engines and new technologies. Cummins recently announced it is

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combining its zero emissions programs into a new brand called Accelerera under the New Power business unit. The new Accelerera by Cummins brand combines various zero-emissions solutions offerings, including hydrogen-producing electrolyzers, battery and fuel cell power solutions, e-axles, and traction systems. The goal is to provide Cummins solutions to decarbonize industries and their equipment, including buses, trucks, trains, construction equipment, stationary power, and industrial processes.

“Not only has the company obtained real cost savings and CO₂ reductions... the Enterprise-wide approach makes the ISO 50001 EnMS implementation much more efficient and supports our progress towards Corporate Energy Goals.”

—Sylvie Doré, Director- Facility, Environmental Centre of Excellence.

Awards and Recognition

In 2016, Cummins won the Award of Excellence in Energy Management from the Clean Energy Ministerial. In 2019, the Global ISO 50001 Implementation Toolkit project was awarded a Cummins Chairman’s Impact Award under the Environmental Impact focus area. The objective of this project was to create a common approach to site level energy management system implementation and energy efficiency improvements. This Toolkit provides sites with 1) an analysis of the ISO 50001 requirements, 2) a comparison between ISO 50001 and ISO 14001, 3) practical steps to ensure ISO 50001 compliance, and 4) examples of tools and procedures from earlier Cummins’ experiences with SEP. The Toolkit continues to be used by certified sites and non-certified sites to identify areas of energy improvement. This was recognized as a Best Practice tool by the US Department of Energy and shared by them through their Better Plants and Superior Energy Performance programs.

Business Benefits/Impacts of implementing ISO 50001

All Cummins ISO 50001 certified sites are on the same Global Enterprise certificate which helps create common tools to ensure global consistency. Our Enterprise approach includes an auditor certification and audit reciprocity program, in addition to the external audits conducted by our certification body. The Internal Audit Reciprocity program has resulted in a cost savings of more than \$9M between 2004 and 2021 in Global HSEEnMS external audit costs. Non energy/other benefits include increased standardization and efficiencies across all our sites including those not certified, compliance with local legislations (EU directive: Energy audit every 5 years), gain a competitive advantage by being a certified company, lower energy costs lead to lower operating cost and higher profit margin (benefit for our stakeholders) or lower sales prices (benefit for our customers). It is also valuable in supply chain engagements through the design and procurement of energy efficient equipment. The requirements from the standard can be easily followed by suppliers to improve energy use in the suppliers’ operations.

The 45 ISO 50001 certified sites represent 80% of the CMI Energy Footprint and a total of \$6,985,850 was spent to implement their Energy Management System. The EnMS implemented at these sites has led us to a total annual cost savings of approximately \$184 million and 655032 MWh, which represents 2,297,587 metric tons of CO₂e reduction from 2018 to 2021. Several of our certified Sites benefited from the Cummins energy efficiency capital plan.

In 2018, Cummins invested \$15 million in 140 energy efficiency and onsite solar photovoltaic capital projects towards achieving its energy and GHG goals. Global campaigns were launched for LED lighting and compressed air efficiency to develop and deploy common solutions for common opportunities. Cummins invested \$34 million, in 342 emission reduction activities and renewable energy projects in 2019 toward achieving its energy and greenhouse gas (GHG) goals. Absolute energy use steadily decreased during 2019 for the first time since Cummins began actively tracking it

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in 2006. Cummins significantly increased its use of renewable wind and solar energy by 2020 and the company also increased high efficiency LED lighting coverage to about 85%. Over the past five years, Cummins invested \$65 million in energy improvements, saving about \$19 million per year. In 2021, the company worked on 20 solar projects at these sites.

Cummins has been a part of and learned much from five main energy management programs: U.S. Environmental Protection Agency’s (EPA) Climate leaders' program (joined in 2006); U.S. Department of Energy’s (DOE) Save Energy Now LEADERS program (joined in 2009); the DOE’s Better Buildings, Better Plants Challenge program (joined in 2011); DOE Superior Energy Performance program (joined in 2012, first SEP certified site in 2013); DOE Low Carbon Pilot program in 2021 and the DOE Better Climate Challenge 2022.

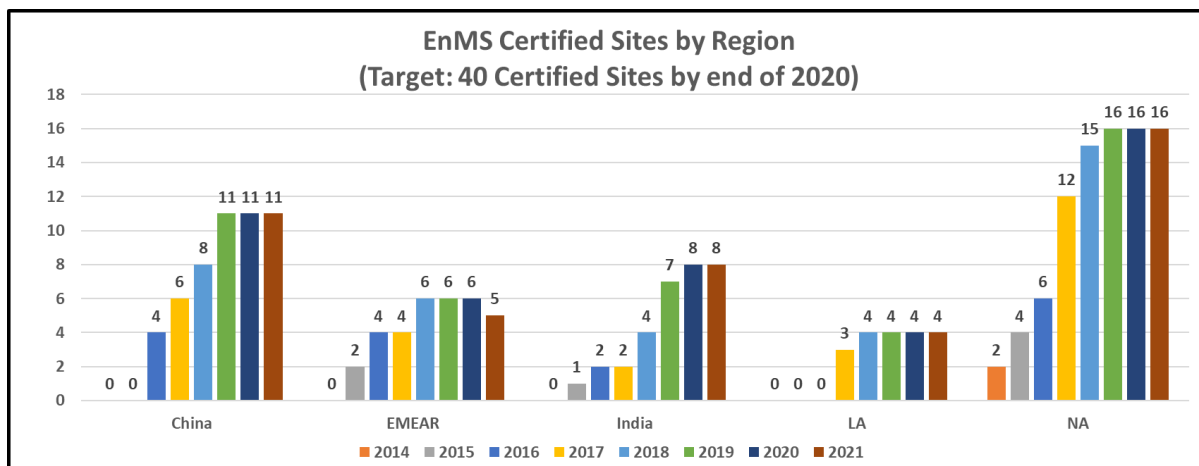


Figure 1: Implementation of ISO 50001 certification at its sites by region.

Plan

Management and Employee Involvement

The Cummins Environmental Centre of Excellence leadership identified the need for Corporate Enterprise approach, using the existing Environmental Management System procedures to integrate the requirements of ISO 50001. The Regional Operating Leaders for each of the regions extract and upload energy data from the company sustainability data reporting system (Enablon) into the Energy Review Tool to speed the process, eliminating site level data entry and ensuring accurate and consistent data use within the tools. The corporate HSEMS manager’s role was expanded to include the EnMS. As the company deployed those tools and achieved ISO 50001 certifications, employees rallied around the effort due to continued success in driving efficiency and reducing operating cost and risk. The PLANET 2050 Influencer program was also designed to ensure every employee is part of achieving the PLANET 2050 strategy and goals. There are currently 530 Influencers making strides to meet sustainability goals and bettering the company and communities.

Understanding energy consumption and use

Cummins developed an Energy Review Tool that provides step-by-step approaches for meeting Energy Review, Energy Baseline, and Energy Performance Indicator requirements outlined in ISO 50001. The tool contains reliable, historical energy consumption data provided by each site and verified by the Regional Operating Leaders. Identifying the relevant variables affecting energy performance helps to uncover opportunities for improvement. These opportunities are then documented and prioritized within the tool; the resulting action plans are integrated into the site’s HSEMS to track progress. The Energy Review Tool provides the site energy teams with a standardized approach for analyzing energy performance prior to, during, and after implementation of the ISO 50001 EnMS. This approach helps simplify the

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process at the site-level and enables corporate staff to compare and aggregate energy performance data for analysis and reporting.

A databased approach was used to determine the Critical Xs for the achievement of the PLANET 2030 goals, by analyzing the energy use data and the site energy review tools which identified SEUs the team was able to develop the strategy and focus areas. The Energy Review tool SEUs were specifically rolled up to the corporate level as a cross check to ensure the Critical Xs are in fact the areas that impact the energy footprint the most.



Figure 2: Summary of all site SEUs by % of energy used. **Figure 3:** Expanded Machinery & Equipment SEUs

Financial Commitments

Energy efficiency improvements have been fully supported by Cummins leadership since the first energy reduction goal for the company was set in 2006. Projects have been funded within the various business units with project delivery support from both facilities and environmental team on site in support of the ISO 50001 energy management program. In 2020, funding for ECO Efficiency projects, including energy, water, and waste, was pulled centrally at the corporate level. Centralizing the funding has several benefits, the first being that projects are not competing for funding with manufacturing projects, the second is the projects are prioritized against all project submissions to ensure the best projects are funded. Scoring criteria were developed that consider energy and GHG savings as well as payback and investment per mtGHG reduced. The Cummins leadership team has increased this funding amount over the last few years to ensure the 2030 goals are met. In 2019 the company changed the organizational structure for the HSE group which aligned the resources into Regional Operating Teams who provide front line support to the sites. The corporate Environmental Center of Excellence supports these regional teams with tools, standards, and regional project campaigns. The Environmental center of Excellence has increased headcount since 2020 to fully support the Regional Operating Teams in implementing the Energy Management System at the site level.

Do, Check, and Act

Sites use tools to measure and verify their energy performance, including a Cummins Energy Review Tool or the US DOE Energy Performance Indicator Tool. These tools use data from utility bills, meters, submeters and building management systems from selected sites. To achieve continual improvement of the site's EnMS, available resources focus on the identified areas with the highest energy consumption. Sites use several approaches to maintain operational controls and sustain energy performance. Some examples of these include BMS/EMS or metering systems, lighting system controls, compressed air leak management program, boiler systems, chillers, and cooling equipment as well as unplugged / power down programs. Relevant variables that may affect Significant Energy Uses are identified and documented based on the relevancy to the site. Based on their activities and geographical location, some use

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production, Heating Degree Days, Cooling Degree Days, Test run Hours and weather conditions. Our Energy Review Tool builds analytical graphs to check the relevancy of each variable. At the Corporate level, hours worked have been used as the variable for normalizing the energy consumption at the sites. From 2019, with the focus on achieving PLANET 2030 goals, the company energy consumption is now measured on an absolute basis.

On a regular basis (quarterly as a minimum), sites review and monitor energy use data with site leadership and Management review committees. Work instructions are documented and integrated into Preventative Maintenance software to ensure that energy-related operational controls become part of daily operations. In addition, an energy component has been added to the site-specific Management of Change procedures to ensure continuity over time. Energy performance is assessed at all levels so that any gaps or deviations in performance are noted and addressed proactively. Cummins Enterprise EnMS is also supported by an internal audit reciprocity program to validate its energy performance improvement.

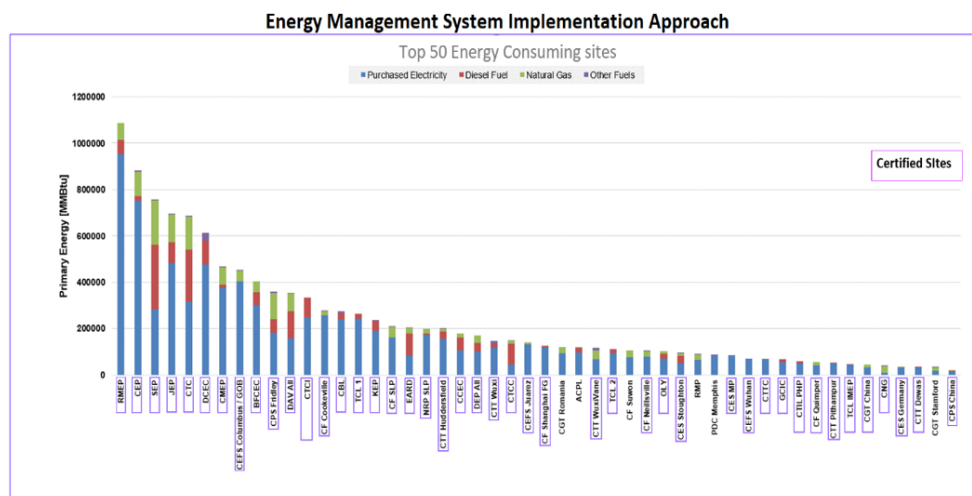


Figure 4: ISO 5001 site Implementation by Cummins carbon footprint.

Energy performance improvement calculation:

$$\frac{\text{Total Energy Savings}}{\text{Baseline Period Energy Consumption}} \times 100$$

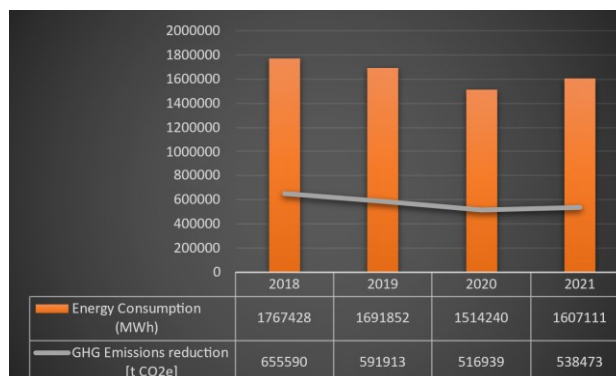


Figure 5: Total Energy consumed and GHG emissions reduction from the ISO 50001 certified sites from baseline year of 2018 till 2021.

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The energy baseload at the certified sites is very site-specific. Five of the sites have 1 shift, 14 have 2 shifts, 23 have 3 shifts and 4 sites operate in 4 shifts. Some sites will therefore consume energy during night and weekend operations. All sites will have emergency lights, lights outdoors, vending machines, or even equipment that stays powered on all week as the energy needed to switch it off and back on is much higher. When measuring unplugged or shutdown reductions on the off shifts or holiday periods, the baseload is measured to ensure the maximum reduction is being achieved when the sites are able to power down.

Energy Training and Communication

The Energy/Environmental Champions program ensures that employees have the skills and tools needed to effectively manage energy and identify opportunities for improvement. A total of 359 employees from all global regions completed the training in 2021, 192 employees from 81 priority sites attended a live, virtual site level training. Leveraging standard tools/templates and sharing best practices expedited the implementation process and alleviated resource stress at the sites.

Transparency

Jennifer Rumsey, the Cummins CEO, at the Awards ceremony of the Clean Energy Ministerial, announced the company goal to certify 40 sites to ISO 50001 by 2020. The Cummins Sustainability Progress Report shows the company's progress toward its mission by environmental reporting. Cummins strives to be consistent with the reporting structures established by the Global Reporting Initiative (GRI), Carbon Disclosure Project, the Sustainability Accounting Standards Board (SASB) and the Taskforce for Climate-related Financial Disclosures (TCFD). Cummins commitment to certify 40 sites to ISO 50001 energy standard by 2020 and its current state is depicted in the CDP Climate Reports.

What We Can Do Differently

An area of improvement is in the purchasing of energy services, products and equipment that may have an impact on Significant Energy Users from suppliers. Although this is defined, communicated, and documented in the equipment purchasing specifications, making a conscious effort to inform vendors/suppliers on the importance of energy efficient products would be crucial in energy performance improvement. The company is also working on increasing the involvement of non-HSE functions (Facilities, Manufacturing, Engineering etc.) in the implementation of EnMS at the sites. The PLANET 2050 Influencer program and Environmental Champions program are steps in the right direction.

Future Plans

Currently the next phase of the journey to energy efficiency is the Solutions Approach and is being driven through the 2023 HSEEnMS Objectives and Target. The most impactful Solutions for each Critical X, outlined previously in the PLANET 2050 Strategy, have been developed and piloted at several sites. These solutions will be implemented in the regional campaign approach, allowing efficient use of people and financial resources. In 2023 the Solutions Deep Dives will be conducted at all priority sites, most of which are the ISO 50001 sites. The objective for 2023 is to complete the Deep Dive at all priority A sites and most of priority B sites. Once completed, this will give the sites a full 7-year plan for projects needed to meet the 2030 energy and GHG goals, including funding and resources to implement. Building a multi-year and multi-site that can be managed centrally and deployed regionally will allow for adequate planning for the needed funding and resources. The Solutions Approach will also identify gaps in the strategy to meet the goal early on such that mitigation plans can be investigated. Cummins also plans to further expand its Enterprise-wide EnMS to certify more sites beyond the manufacturing sites with the largest carbon footprint.



The Energy Management Leadership Awards is an international competition that recognizes leading organizations for sharing high-quality, replicable descriptions of their ISO 50001 implementation and certification experiences. The Clean Energy Ministerial (CEM) began offering these Awards in 2016. For more information, please visit www.cleanenergyministerial.org/EMAwards.