ISO 50001 Energy Management Systems standard certification

Chrysler Group LLC's Brampton assembly plant

First automotive assembly plant in Canada to achieve ISO 50001 saves millions in energy costs.

About CAN/CSA-ISO 50001 Energy Management Systems standard certification

ISO 50001 provides organizations with a structured framework to manage energy in such a way that it can increase energy efficiency, reduce costs and improve energy performance. This standard is based on the common elements found in all the ISO management systems standards, assuring a high level of compatibility with ISO 9001 (quality management) and ISO 14001 (environmental management). It integrates energy efficiency into management practices by making better use of existing energy-consuming processes. Based on the Plan-Do-Check-Act cycle, this standard integrates both technical and managerial activities.

Natural Resources Canada (NRCan) through its ecoENERGY Efficiency for Industry program is offering cost-shared assistance to industrial companies to implement energy management projects, including CAN/CSA-ISO 50001 Energy Management Systems standard pilots. The program will provide financial assistance of up to **50 percent** of eligible costs to a maximum of **$40,000.**

CASE STUDY SNAPSHOT

Industry: Automotive

Energy management system (EnMS) guidance/standard: ISO 50001 – the first Canadian automotive assembly plant to be ISO 50001 certified

Key driver for an EnMS: Cost reduction and environmental benefits

Improvement focus: Energy efficiency for production and building operation processes

Location: Brampton, Ontario, Canada

Product: Automotive vehicles

Annual energy cost savings: More than $2 million

Employees: More than 3,400

Energy sources: Electricity and natural gas

Energy reduction goal: 2020 target – 30 percent fewer gigajoules produced per vehicle compared to the 2010 baseline (corporate-wide, Fiat Chrysler assembly and stamping plants)

Photo: Roger Matte, a plant electrician, wrote a program that starts the exhaust fans sequentially and automates a scheduled shutdown. These and other energy-saving ideas from Roger have saved the plant more than $100,000.

Canadian Industry Program for Energy Conservation
CIPEC

Canada

Business benefits achieved

The Brampton assembly plant's achievements in energy management range from lighting control projects to heating and ventilation management. Plant electricians developed and installed lighting control systems that are expected to save $110,000 in annual electricity costs. An automated heating and ventilation management system and scheduler will deliver estimated savings of almost $2 million annually in electricity and natural gas costs while also reducing cold air infiltration caused by excess negative exhaust by 1.2 million cubic feet per minute.

The plant achieved ISO 50001 certification and has a well-established energy management system that encourages continual improvement practices. Most recently, control panels were replaced with smart systems that improved heating, ventilation and exhaust systems throughout the plant. These efforts reduced the gigajoules per heating degree day (HDD) by 27 percent and improved space heating efficiency by 9 percent.

> "I am extremely proud of the staff at the Brampton assembly plant who worked tirelessly to help us achieve ISO 50001 Energy Management standards certification," says Dan Omahen, plant manager, Brampton assembly plant, Chrysler Group LLC. "This experience has proven that when employees rally together and work alongside management and agency partners, sustainable solutions can be identified that help us improve energy optimization and reduce greenhouse gas emissions."

CIPEC Leadership Award

In 2014, the Brampton assembly plant was awarded the Canadian Industry Program for Energy Conservation (CIPEC) Leadership Award for Corporate Stewardship. The award is for the promotion of energy efficiency at the corporate level, such as the creation and engagement of an energy management team or the development of a corporate energy management plan. CIPEC is an NRCan program.

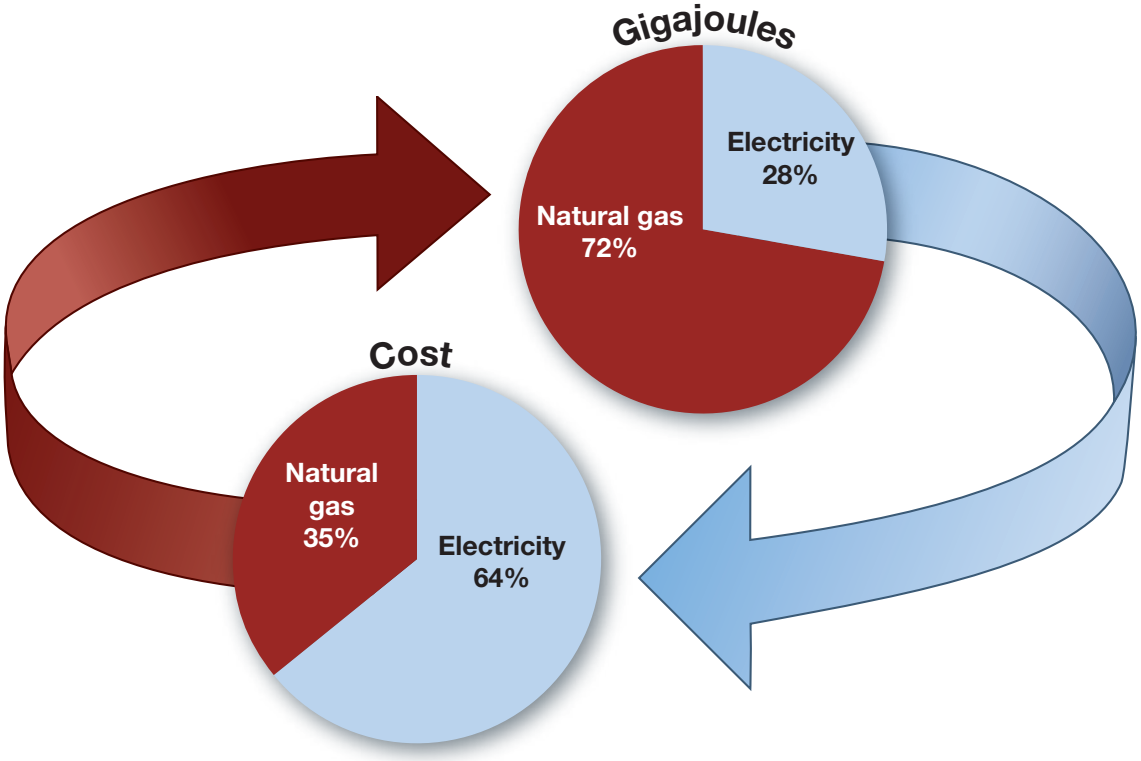
- Annual energy savings have exceeded $2 million since 2013.
- The Energy Management Team is supported by full-time specialists at the Chrysler Group headquarters in Auburn Hills, Michigan.
- The Brampton plant served as the pilot plant for ISO 50001 certification among Chrysler Group's North American automotive assembly plants.
- All Chrysler Group manufacturing plants plan to be certified.

Company profile

Chrysler Group LLC was formed in 2009 to establish a global strategic alliance with Fiat S.p.A. It designs, engineers, manufactures, distributes and sells vehicles under the Chrysler®, Jeep®, Dodge®, Ram® and Fiat® brands and the SRT® performance vehicle designation. The company also distributes the Alfa Romeo 4C and Mopar® products. Chrysler Group's 37 manufacturing facilities include 23 in the United States, 6 in Canada, 7 in Mexico and 1 in Venezuela.

Fiat Group is an international automotive group engaged in industrial activities in the automotive sector. The integration of Fiat and Chrysler confirms the group's strength and competitiveness as a leader in innovation with a global presence and comprehensive product range. With annual shipments of more than 4.4 million vehicles and revenues of more than $127 billion, the numbers speak for themselves. The group's technological edge is a major component in its sustainability strategy. In 2013 alone, it invested about $5 billion on research and development aimed at implementing some of the most innovative and advanced processes and products in the world.

The Brampton assembly plant produces the Chrysler 300, Dodge Charger, Dodge Challenger and Lancia Thema. The plant covers 274,000 square metres on a 108-hectare campus. More than 3,400 employees work in the plant, which features almost 33 kilometres of conveyors and 581 robots. Brampton is a suburban city west of Toronto.



Plant energy consumption profile and overall cost breakdown

Dow Jones Sustainability Index World

In September 2014, Fiat was confirmed in the prestigious Dow Jones Sustainability Indices (DJSI) World for the sixth consecutive year. This result places Fiat Group's economic, environmental and social performance among the world's leading companies. The DJSI admits only those companies judged best-in-class in the sustainable management of their business.

Business case for energy management

The Brampton assembly plant operates in a wider global corporate culture that promotes and expects a commitment to sustainability. Energy efficiency plays a central role. Fiat S.p.A. has been included in the prestigious DJSI World for six consecutive years. All participating companies receive a RobecoSAM Company Benchmarking Scorecard that compares their sustainability performance against the global industry average and that of their industry peers. Many companies find that participating in the assessment leads to external recognition for their efforts and helps them identify ways to further improve their sustainability strategies.

The company has reduced the carbon dioxide (CO_2) emissions per vehicle produced by more than 15 percent over the past four years. At Fiat and Chrysler plants worldwide, they have also achieved 99 percent reuse of water in the manufacturing cycle, representing savings of more than 2.1 billion cubic metres of water in 2013.

Across Fiat Chrysler, the company uses a manufacturing system called World Class Manufacturing – a methodology encompassing all plant processes that focuses on reducing waste, increasing productivity, and improving quality and safety in a systematic and organized way. During 2013, energy-related projects developed as part of World Class Manufacturing contributed to eliminating about 180,000 tonnes (t) of CO_2 emissions.

In Brampton, a major contribution also came from organizational measures, including process redesign, improving the use of the plant operating capacity, operational changes and changing employee behaviour

through heightened energy awareness. These activities resulted in total savings of about 2,000 terajoules and avoidance of 85,000 t of CO_2.

Energy management system implementation

Chrysler Group's employees, plant managers and corporate leaders all deserve credit for the success of the EnMS implemented at the Brampton assembly plant. Chrysler Group LLC began operations in June 2009 as a new entity, with Fiat as its global alliance partner. This partnership came with a vision for a sustainable enterprise, which involved establishing a corporate sustainability team, establishing metrics to measure progress on material issues and committing to communicate transparently about progress.

The energy team focused on four key areas:

- Engaging management in a discussion about energy costs. The team told management that about 40 percent of the energy bill was due to loss, not use.
- Engaging the workforce in addressing the loss through training and awareness campaigns.
- Engaging the significant energy users by involving them in the projects initiated in their areas.
- Engaging the energy team itself to improve the team's technical capabilities.

In March 2013, the plant started the formal approach to certification in order to be an early adopter. The company's corporate management group played a key role in moving the certification forward, as did the energy team. After a thorough gap analysis, stage 1 of implementation started with a document audit in October 2013. A month later, during stage 2, a week-long audit was conducted with successful results and final certification.

Company-wide gains

Because of its continued focus on environmental performance, all of the company's plants are already certified to ISO 14001, an international standard for environmental management. Since 2010, the company has reduced CO_2 emissions by 15.5 percent and energy consumption by 14.2 percent. Water consumption in 2013 was reduced 27.1 percent per vehicle produced compared with 2010.

Key to success

The EnMS for the Brampton assembly plant bears all the hallmarks of a successful system. It includes a strategic plan for energy efficiency that requires measurement, management and continuous improvement. The EnMS is championed by a cross-divisional team that includes a range of employees and managers. The EnMS also has clear policies and procedures.

Brampton served as the pilot plant for ISO 50001 certification for all Chrysler Group's North American automotive assembly plants. All facilities are expected to be certified. Brampton had previously achieved certification for several international standards, among them ISO 9001 Quality and ISO 14001 Environmental Management.

Energy teams

The energy team at the Brampton plant includes 14 electricians, millwrights and other key trades and is led by the facility engineering manager, Bill Craig, and environment specialist Josh Orentlicher. The team meets weekly with skilled trade workers and engineers from each functional department to review energy losses and the progress being made on energy efficiency projects currently underway. The team also oversees energy efficiency training.

The Brampton energy team is supported by the Chrysler Group sustainability team based in Auburn Hills, Michigan. "The Auburn Hills team is trusted on the corporate finance side. What they say carries weight, and it can help local energy teams like ours get things done," Orentlicher says. He adds that having a central corporate resource means local teams do not have to relearn everything from scratch.

Energy review

One step in the journey to ISO 50001 certification was the energy review. A duct survey formed the backbone of the energy review. This survey enables the plant to track energy use in its energy management information system with better accuracy. The energy review was the

In 2014, the Brampton plant was awarded the CIPEC Leadership Award for Corporate Stewardship. (left to right: Josh Orentlicher, environmental specialist [Chrysler Canada Inc.]; Bill Craig, Facility Engineering Manager [Chrysler Canada Inc.]; Andy Mahut, Executive Board President [CIPEC])

portion of Brampton's ISO 50001 certification that was funded in part by NRCan. It was completed as part of the energy cost deployment process as defined by Chrysler Groups' World Class Manufacturing system. In addition to the duct survey, the process called for a complete inventory of equipment and for developing a comprehensive model based on existing metering and data collected during the energy review.

Energy policy

The energy policy commits to achieving continuous improvement in energy performance while adhering to applicable legal and other requirements, including energy use, consumption and efficiency. The energy policy also commits to ensuring information and necessary resources are available to achieve objectives and targets.

Plant energy policy SAVES

Strive for continual energy improvement.

Always comply with all requirements.

Verify our energy objectives and targets.

Educate and inform so we can reach our objectives.

Support energy-efficient products, services and design.

Keys to success

The energy policy is the framework for setting and reviewing energy objectives and targets. It is communicated to everyone at the plant so they are aware of their individual obligations to improve energy performance. The policy also supports purchasing energy-efficient products and services and designing for energy performance improvement. It is reviewed at least once a year to ensure that the policy remains relevant and appropriate.

Regression analysis tool

EnPI uses a Microsoft® Excel® add-in to perform regression analysis. The add-in uses the equations listed below to predict the energy consumption based on the independent variables entered by the user. Regression analysis is a statistical method of predicting the behaviour of a dependent variable based on independent variables. Learn more at ecenter.ee.doe.gov/EM/tools/Pages/EnPI.aspx.

Management review

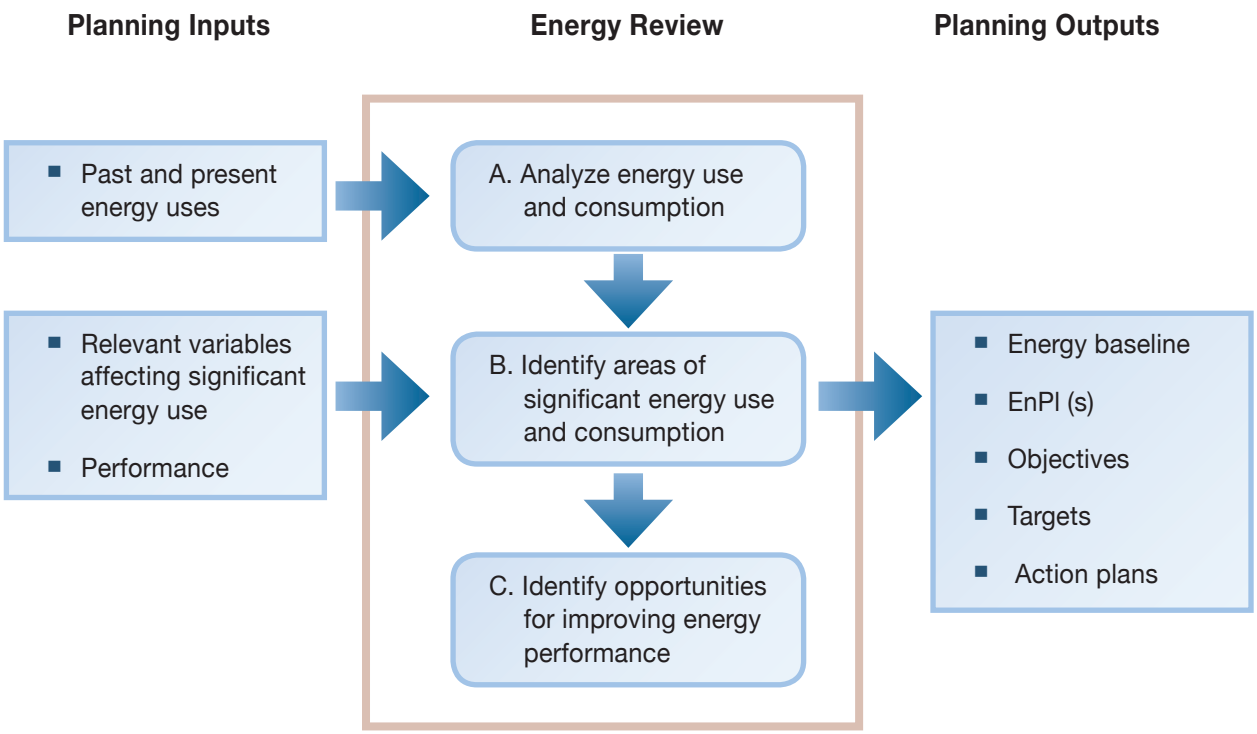
On July 12, 2013, an Energy Management Representative was selected. Roles and responsibilities were discussed along with the elements of the standard.

Energy performance indicators

The Brampton plant adopted the energy performance indicator tool EnPI V3.0 as its method of establishing a baseline, tracking energy data, and setting objectives and targets.

EnPI V3.0 is a regression analysis-based tool developed by the U.S. Department of Energy. Plant and corporate managers use it to establish a normalized baseline of energy consumption and track the annual progress of intensity improvements, energy savings, superior

Energy Planning Process



Better data, better decisions

The energy review is an important keystone aspect of the ISO 50001 standard because it enables better and more sophisticated energy decisions to be made from the better and more sophisticated data that it generates.

energy performance EnPIs, and other EnPIs that account for variations that are due to weather, production and other variables.

Energy planning

The Brampton assembly plant conducted a gap analysis and started the energy planning process in 2012 and then started to implement ISO 50001 the next year. They followed the energy planning process described in the ISO standard and as illustrated in the following figure.

The utility data (electricity and natural gas) and production data are tracked on a monthly basis (at a minimum). Natural gas is metered at the utility level, and the electricity is metered at a cost-centre level, such as stamping and compressors. Natural gas submetering at each cost centre is proposed and may be installed in the near future. Metered data is collected and analyzed during the energy planning process. In addition, the relevant variables affecting significant energy use, such as HDDs, may be reviewed and analyzed to validate and/or update the energy baseline during the energy review process. Energy performance is recorded and reviewed throughout each energy review cycle (monthly, quarterly and annually) as part of cost deployment. The aim of cost deployment is to precisely measure and attribute costs to energy losses and then transform them into gains.

Partners help maximize energy saving potential

The Brampton assembly plant received funding and expertise from government agencies and utilities. NRCan supports the plant through the Office of Energy

The paint shop staff and the energy team were recognized by Hydro One for saving $295,587 by reducing the energy used by a paint sludge pump.

Efficiency and CIPEC. By joining CIPEC, Chrysler Group has gained access to energy conservation tools and services and become a CIPEC Leader. Plant staff have participated in NRCan's Dollars to $ense Energy Management workshops.

The plant also receives support and guidance from Ontario Hydro. The plant's paint shop and energy team were recognized with almost $300,000 in Ontario Hydro incentives after upgrading recirculating pumps with variable frequency drives. The upgrade saved more than 290,000 kilowatt-hours annually without impacting the production process.

Barriers

The Brampton assembly plant encountered few barriers to ISO 50001 certification. The plant had previously achieved certification for several international standards, among them ISO 9001 for quality and ISO 14001 for environmental management.

"Our previous certifications and 100 percent support from management meant we were able to proceed with ISO 50001 fairly efficiently," Orentlicher says.

Lessons learned

"Our core lessons learned during the implementation of ISO 50001 were on the organizational side," Orentlicher says. "Technology is not enough to solve energy issues; it also takes high-level corporate support, senior management buy-in and targeted employee engagement."

The importance of formalized training has also emerged as a key lesson learned. While all employees have already received introductory energy awareness training, the company is developing computer-based energy management training for more in-depth instruction. Specific employee positions associated with high-energy-use equipment, such as powerhouse operating engineers, electricians and millwrights, will receive specialized energy training.

> Orentlicher also cautions energy teams to not rely too heavily on consultants. "It's better to do much of the work yourself. That way you build up internal expertise."

Results

Orentlicher notes that there are numerous projects planned for the future, including a major lighting retrofit, optimization process ventilation and participating in an electricity demand response program. Although the metering capability on electrical systems is very good, he says that monitoring systems need to be improved to enable better measurement and management of natural gas use. "You need to start at the low cost, no cost solutions and build up to capital projects. Every year you need to go back and look at where you can make an impact at the low cost, no cost level. You need to get the people with passion engaged. Start with the people on the floor who know the equipment."

Projects that were part of the certification process included installing a programmable logic controller for the paint shop's lighting and implementing a Siemens Demand Flow® system that improves the efficiency of the facility's chilled water system.

Keys to success

Before ISO 50001 certification, key performance indicators (KPIs) were tracked by different people using different methods. Now Brampton has a formal, centralized database-driven system. This has encouraged transparency and collaboration on energy management issues. Orentlicher says that ISO 50001 certification will drive further engagement: “It has become a part of how we do business.”

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Aussi disponible en français sous le titre : Norme ISO 50001 sur les systèmes de gestion de l’énergie - Usine d’assemblage de Chrysler Group LLC de Brampton

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