ISO 50001 Energy Management System – Case Study

2024 Argentina

Toyota Argentina S.A. (TASA)

"Our Environmental and Energy Management System is the pathway to our continuous improvement in energy efficiency."

Case Study Snapshot	
Industry	Automotive
Product/Service	Vehicles
Location	Buenos Aires, Argentina
Energy performance improvement percentage (over the improvement period)	20 % improvement over 4 years (2019-2023)
Total energy cost savings (over the improvement period)	USD $1.310.078,72
Cost to implement Energy Management System (EnMS)	USD $ 134.475,26
Total energy savings (over the improvement period)	26.743,19 Mwh
Total CO_2-e emission reduction (over the improvement period)	19.557,5 metric tons

Organization Profile / Business Case

Toyota Motor Corporation (TMC) is a global leader in vehicle manufacturing across more than 170 markets. Our plant in Zárate was the first Japanese investment in the automotive industry in Argentina. From our inception, we have developed a sustainable project with a long-term vision based on investment, growth, and employment. After 27 years in the country, we have accumulated an investment of over USD 2300 million, a production of over 1.8 million units, and have exported more than 1.4 million vehicles to 22 countries in Latin America and the Caribbean. Thanks to a team of 8,500 direct collaborators and over 30,000 indirect ones in the value chain, we manufacture a Hilux pickup or an SW4 every 95 seconds. In 2023, for the third consecutive year, we achieved leadership in production, sales, and exports in the Argentine automotive industry.

Since the beginning of our operations, environmental care has been a key element in our philosophy and way of working. We have an Environmental Management System certified since 1999 with the International Standard ISO 14.001:2015 and, since the beginning of 2022, and an energy one certified with the Standard ISO 50.001:2018. It is based on three pillars: legal compliance, prevention, and kaizen (continuous improvement), the latter being a differentiating aspect and part of our values and corporate culture. Continuous improvement motivates us to constantly exceed environmental and energy requirements.

Additionally, we are committed to the "**Toyota Environmental Challenge 2050" (TEC 2050)**, promoted by our parent company. This initiative, aligned with the Paris Agreement, seeks to reduce environmental impact during manufacturing and throughout the vehicle's lifecycle to address climate change, water scarcity, and depletion of

natural resources. Its focus is on achieving zero emissions in new vehicles, throughout the product lifecycle, and in production plants. To deepen this commitment, it has established **carbon neutrality in production plants by the year 2035**.

In Toyota Argentina, we have an **environmental strategy** aligned with TEC 2050, which crosses all our operations and is implemented through **five-year action plans**, with short and medium-term goals and concrete actions (*figure 1*). Indicators are established for water, energy, carbon dioxide (CO_2), waste, and volatile organic compounds consumption and generation. Currently, the 7th Action Plan is in effect, designed for the period 2021-2025, which sets different objectives, such as reducing natural gas consumption per vehicle by 5 % by 2023 (base year 2019).

The implementation of the ISO 50001 allowed us to further strengthen our environmental management system. Initially, this system covered our industrial plant in Zárate, and over time it expanded to include our commercial offices and the Lexus dealership. In 2018, with a solid and consolidated environmental management system in place, it was the right time to analyze and incorporate the ISO 50.001 standards into the system. Although we were already operating with renewable electricity, we aimed to improve our energy efficiency throughout our production process.

***Figure 1**.– TASA's Environmental Challenge 2050 roadmap.*

" Certification the ISO 50.001 standard is a key initiative in our journey towards carbon neutrality." —Marcelo Catino, Environment Regional Manager

Business Benefits

The implementation of the ISO 50.001 allowed our organization to significantly improve our energy performance while reducing CO_2 emissions, energy costs, maintenance costs, and obtaining additional benefits. Below, we detail the main ones:

Energy savings. We managed to decrease total energy consumption by 20 % equivalent to 26.743,19 Mwh, comparing a year before the implementation of the standard (2019) with the last calendar year (2023). We also achieved a saving in energy costs of USD $1.310.078,72 over the improvement period. The investment for the implementation of the standard was USD $134.475,26, resulting in a payback period of approximately 5 months.

Prioritization of decarbonization. The standard helped highlight the importance of efficiency actions and energy transition on our path to carbon neutrality and TEC 2050. The reduction in CO2 emissions was 19557,46 ton between 2019 and 2023, equivalent to a 58 %.

Alignment with corporate culture. This initiative has allowed us to deepen environmental care values and nurture TEC 2050, promoted by our parent company. This enhances business opportunities collectively. Our plant is one of the 7 Toyota plants in the world with this certification.

Enhancement of the Environmental Management System (EMS). We incorporated the energy dimension into the EMS by identifying significant energy uses. This stage has allowed us to redirect, accelerate, and make energy reduction actions more efficient.

Diagnosis and energy management tools. We have strengthened the energy consumption diagnosis and measurement system by incorporating new tools for fluid, real-time, and comparable data collection between periods.

Deepening sustainability in the value chain. Toyota is committed to the environmental performance of its dealers and suppliers, promoting continuous improvement of their environmental management systems: 100 % of the dealer network has ISO 14.001 certification, as well as 98 % of its direct auto parts and raw materials suppliers. From the application of the standard, we focused our efforts on energy efficiency, implementing specific training and exchanging best practices. Likewise, energy consumption assessments are carried out, and reduction actions are proposed. Some results achieved from these initiatives include:

- 100 % of our auto parts and raw materials suppliers and dealers share their electricity, natural gas, and liquid fuel consumption every six months.
- 73 % of suppliers executed an energy consumption improvement plan, achieving a 11,2 % improvement in 2023 compared to 2019.
- 12 % of the energy consumed by our suppliers comes from renewable sources.
- 20 dealers invested in renewable energy generating 730,391 kWh, equivalent to the consumption of 3.5 dealers.

Engaged collaborators. Thanks to the implementation of the standard, we formed working groups aligned with energy efficiency, reinforcing internal commitment to environmental care.

Commitment to society. By reducing our energy consumption and promoting the use of renewable energies, we not only free up resources for those in need, but also play an active role in Argentina's energy matrix, contributing to a more sustainable future for our community.

Contribution to the 2030 agenda. Through the set of activities developed, we contribute to Sustainable Development Goals 7 (affordable and clean energy), 9 (industry innovation and infrastructure), and 13 (climate action).

Plan

Since 1999 in Toyota Argentina, we have had an EMS certified under ISO 14001. In 2015, with the launch of the TEC 2050 and the goal of **achieving carbon neutrality in our production plant**, we focused on implementing short-term actions related to energy usage. Improvements in meters, installation of LED lighting throughout the plant, energy care patrols during non-productive weekends, and installation of solar panels were some of the initiatives. The objective was to reduce energy consumption and decrease CO_2 emissions.

In 2018, we set out to take a further step: standardize energy efficiency activities and explore the possibility of merging our EMS with a future EnMS with the goal of obtaining certification under the ISO 50.001 standard. Taking into account that ISO 14.001 and ISO 50.001 share almost the same functional structure, we considered that compatibility between both would facilitate a smooth and efficient integration.

The project plan was the guiding tool that allowed us to visualize the purpose of the activity, background (previous experiences), current situation, benefits, objectives, and planning.

To achieve certification, we established 2 specific objectives: a) To have implemented the **Environmental and Energy Management System** by December **2020**; b) To **certify** the ISO 50.001 standard in **2021**.

That same year (2018), we hired an external audit that provided us with a diagnosis of the situation and identified

***Figure 2**.- TASA's Energy Team*

areas for improvement to integrate both systems. In 2019, we planned the steps to follow and began to embark on this challenging journey. Team awareness emerged as a key element of the process. In this way, two face-to-face training sessions were provided, totaling 32 teaching hours, conducted by the Argentine Institute of Standardization and Certification (IRAM) and an external auditor, aimed at 20 collaborators (from the environmental sector and those responsible for the environment in the productive sectors) on the concepts of ISO 50.001. They also received internal auditor training on the standard.

Between 2019 and 2021, we integrated the systems into the procedures manual, adjusting our policy to cover environmental and energy aspects, including legal compliance assessments, and expanding energy management in planning and operational points.

Additionally, we initiated an energy review to allocate resources and prioritize actions. Although the ISO 14.001 provided us with an overview of energy consumption, it was necessary to delve into energy types, equipment, and distribution. Consequently, we classified energy into primary (electricity, natural gas, GLP, liquid fuels) and secondary (compressed air, steam). Afterwards, we evaluated each type of energy, its distribution, use, and consumption both in the past and at present, identifying **significant energy uses (SEUs)** based on relevant variables such as vehicle production, current energy performance. Finally, we defined specific indicators by type of energy per shops, establishing the baseline of our energy performance. An example of this analysis can be seen in *figure 3*.

The adoption of the standard provided us with innovative advancements: we introduced an automatic system to collect and archive electricity and natural gas consumption data, which facilitated tracking and allowed for real-time and historical data monitoring. We created an instruction manual for energy data collection for a clear representation of collection points and reading systems.

"The ISO 50001 has been fundamental for our continuous improvement in energy efficiency. It has allowed us to identify and prioritize Significant Energy Uses (SEUs) and our energy resources, acting as an accelerator to focus our priorities and improve our environmental management process" *—Daniel Valeggia, Plant Director*

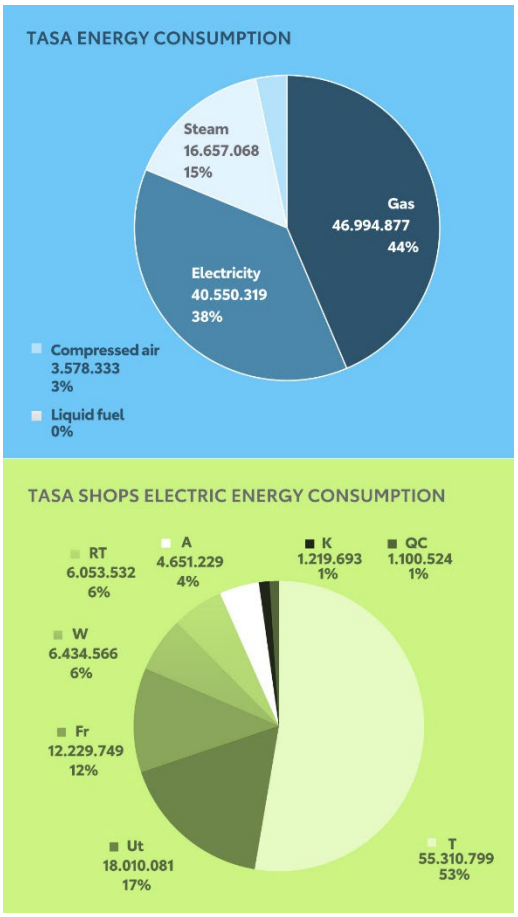


Figure 3*.- TASA's energy consumption distribution.*

A key aspect in the implementation process was the support received within the company both locally and internationally. The proposal garnered support from top management in Argentina, formally approving it at the annual presidency meeting. The corporate culture demonstrates a clear commitment to sustainable development, with the journey to carbon neutrality being part of our President's strategic objectives, aligned with TEC 2050. Subsequently, this commitment is embraced by executives, and efforts are made to raise awareness throughout the organization. The positive results in the adoption of the ISO 14001 standard also served as motivation to progress with this new certification process. It's worth nothing that besides the initial backing, the project received continuous support throughout its execution, formalized through monthly follow-up meetings with the Plant Director.

Furthermore, at the international level, our parent company evaluated this project and approved an investment line aimed at enhancing energy efficiency in our production plant through the implementation of the standard. Additionally, they shared experiences and best practices from other Toyota plants worldwide**.**

Do, Check, and Act

Implementation. With an investment of USD 134.475,26, this was mainly carried out in three major actions:

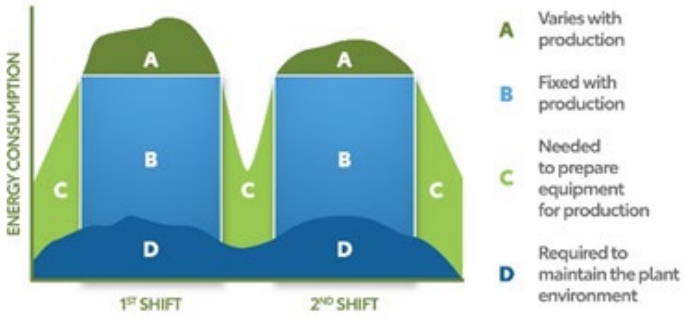
Staff training: the first step was the formation of the ESCO (Energy Saving Collaborators) Team, composed of employees from different areas, who were trained in Japan to become ESCO Masters. They also received training in the standard and as internal auditors. In turn, this team instructed the rest of the staff in Argentina with a focus on continuous improvement in energy efficiency, achieving presence in various industrial processes. This training was encouraged by top management at the plant.

Improvements in measurement: Installation and calibration of flow and power meters and implementation of data analysis software for instantaneous measurements, were developed.

Certification processes: This stage included an external diagnosis audit, internal audits, certification audits phase 1 and phase 2.

Energy optimization actions. We can organize our actions into 2 pillars:

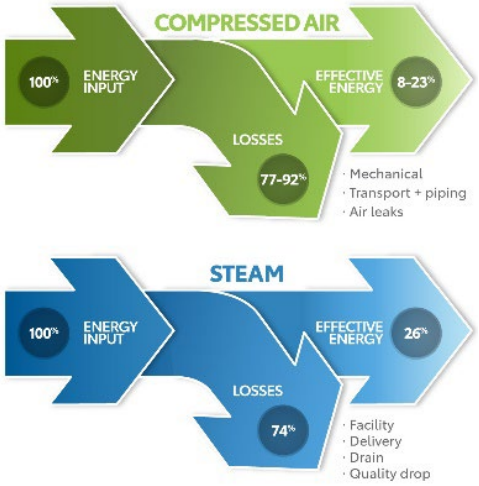
Daily Kaizen (continuous improvements): We developed a detailed scheme on energy use, addressing both productive and non-productive consumption (*figure 4*).



We started with improvements in D and C, such as the replacement of LED tubes, air loss patrols in welding and assembly sectors, adjustment of oven and tank temperatures, automatic shutdown of heating equipment, and reduced compressor pressure on weekends.

***Figure 4**.- TASA's energy consumption pattern.*

Introduction of low CO_2 emission technologies: We aimed to eliminate or reduce secondary energies: compressed air and steam, due to their low energy efficiency (*figure 5*).



For *compressed air*, we changed 2 fixed-speed compressors to variable speed and replaced 11 pneumatic circulation pumps with electric ones, we are changing pneumatic tools to electric ones in welding, assembly, and material handling sectors. Regarding *steam*, we are replacing it with heat pumps in the heating of paint tanks and electric resistors in the chassis shop.

Improvements were also made in primary *natural gas* energy; heating efficiency was improved by upgrading 37 radiant tubes, adding automatic shutdown to 70 tubes, and optimizing consumption, achieving a 30 % saving in injected gas. As for *electricity*, industrial air conditioning units were replaced with inverter technology units.

***Figure 5**.- Energy efficiency for compressed air and steam.*

Energy indicators monitoring. Biweekly analysis of energy consumption is carried out and monthly reports are presented to the Plant Director and General Managers in a meeting, to which all staff related to the system are also invited. These meetings address pending issues, present the status of legal requirements and findings, analyze monthly indicators (*figure 6*), evaluate annual progress, and highlight kaizens implemented in each shop. Monthly energy indicators are also reported to the headquarters.

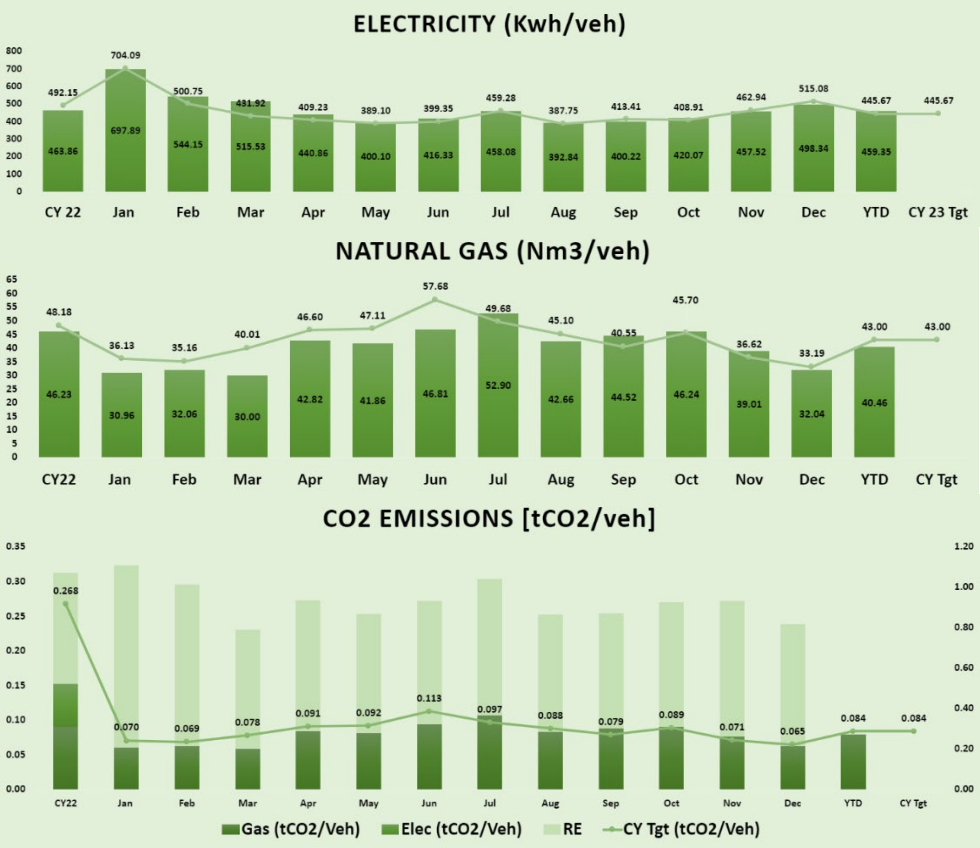


***Figure 6**.- Electricity and natural gas consumption and CO_2 emissions per vehicle indicators throughout calendar year 2023*

Calculation method. To determine energy performance improvement, we used the following calculation:

Energy performance improvement (%) = [(Total energy savings) / (Baseline Period Energy Consumption)] x 100

To calculate energy consumption savings, we used specific electricity and natural gas consumption indicators per vehicle (GJ/vehicle) in the base and reporting years (2019 and 2023). Recognizing the crucial relevance of production in our operation, produced vehicles are an effective normalization method. As a result, we have achieved a 20 % improvement in our performance, equivalent to 26.743,2 MWh during the reporting period.

Operational controls. Following ISO 14.001 standard, we carried out standardized monthly monitoring of operational controls in processes. To merge with ISO 50.001 standard, we established new verification points related to Significant Energy Uses (SEUs) within these controls.

New processes. New chapters were added to our management system manual regarding the design and acquisition of efficient equipment to guide the user in energy aspects. Training and workshops were conducted for plant engineering personnel and the purchasing team. Also, during the purchasing process, an instance was incorporated to verify if the buyer analyzed these new aspects while the development of their task.

External Audit. In October 2021, we requested the external audit for ISO 50.001 certification. First, the certifying body conducted a phase 1 audit, which purpose was to establish the necessary conditions to start the phase 2 audit within 90 days. Therefore, the phase 2 audit was conducted in December 2021, and we obtained the certificate a month later (January 2022).

Transparency

We communicated this achievement both internally and externally. Internally, through the digital employee platform 'One Toyota', office screens for dissemination and daily 5-minute talks for plant employees. Externally, we shared this news through our Sustainability Report prepared in accordance with GRI, on our official website and LinkedIn account. We also informed our headquarters in Japan. This milestone reflects our firm commitment to the quality and sustainability standards that distinguish us.

RS2021: 7540371b-5187-40c9-8543-058bd137b2e3.pdf (toyota.com.ar)

LinkedIn: https://www.linkedin.com/feed/update/urn:li:activity:6876946883542036481/

Web de Toyota: https://toyota.com.ar/descubri/sustentabilidad/sistema-gestion-ambiental-y-energia

With our public communications and our participation in this award, we aim to inspire other companies to implement their own Energy Management Systems. We hope to contribute to enabling others to progress in practices tailored to their contexts and challenges, promoting energy efficiency, and generating a positive impact globally.

What We Can Do Differently

Looking back:

- We acknowledge that we could have adopted the ISO 50001 standard years ago, leveraging the solid foundation of our Environmental Management System certified with ISO 14001. This would have allowed us to reduce energy consumption earlier.
- We should have also implemented the standard before starting the CO_2 emission reduction activities. This way, we could have addressed the root cause, which is energy efficiency, more assertively and as a priority.

Next steps:

- Expanding the implementation of the ISO 50001 standard to new processes, such as our new Hiace Plant.
- Having the data analysis system in each sector, so that data collection becomes the responsibility of each area.
- Our company aspires to promote the adoption of the ISO 50001 standard among our suppliers and dealers to strengthen our value chain and drive widespread adoption of sustainable practices.