

ISO 50001 Energy Management System at TECNOLOGICO NACIONAL DE MEXICO

2020

México

TECNOLOGICO NACIONAL DE MEXICO

A multi-site group with 16 Technological Institutes certified in ISO 50001:2011.



ISO 50001: 2011 Certificate Reception

Organization Profile & Business Case

TECNOLOGICO NACIONAL DE MEXICO (TecNM), was created by Mexico Government in 1948 with the purpose of promoting the regional science and technology. Since July 23th, 2014, it is a deconcentrated body of the SECRETARIA DE EDUCACION PUBLICA (SEP) and it is integrated by 254 institutes, attending more than 600 thousands bachelor's and master's students through all the country, including Mexico City.

Out of the 254 institutes, 248 are dedicated to educational process, four of them are Regional Centers of Optimization and Equipment Development (CRODE), one Interdisciplinary Investigation and Technical Education Center (CIIDET) and one National Investigation and Technological Development Center (CENIDET).

The TecNM's mission is to offer quality education services, with national, relevant and equitable coverage, which contributes to the formation of a just and humane society, with a sustainability perspective.

Case Study

Industry	Education
Product/Service	Bachelor's and master's education process.
Location	Av. Universidad 1200, 5° Piso, Col Xoco C.P. 03330 Alcaldía Benito Juárez CDMX México
Energy management system	ISO 50001
Energy performance improvement period, in years	2017-2019
Energy Performance Improvement (%) over improvement period	38.5%
Total energy cost savings over improvement period	22,410.35 \$USD
Cost to implement EnMS	13093.5 \$USD
Total Energy Savings over improvement period	19,800 GJ
Total CO₂-e emission reduction over improvement period	2551.197 Ton CO ₂

Business Benefits

The main qualitative benefits obtained as a result of the implementation of the Energy Management System (SGen) at TECNOLOGICO NACIONAL DE MEXICO have been the development of the culture of rational usage of energy by students, teachers, workers, customers, providers and all the interested parts in the educational process.

The common purpose of this system is to improve the energy efficiency, therefore, after the first year of the implementation of activities related to the established goals, the total annual energy saving obtained by the multi-site group was of 18,900 GigaJoules, between electricity, fuel and gas.

This energy savings caused also cost savings that allowed us the reorientation of our budget to do equipment acquisitions in benefit of students and infrastructure availability, such as computers, interactive smart blackboards, led lamps, financial support to investigation projects, among others.

The TecNM not only has received economic benefits by having this Energy Management System implemented and certified, but it also has been recognized by the governmental organization SECRETARIA DE ENERGIA (SENER) and National Commission for the Efficient Use of Energy (CONUEE) as the first organization in Mexico of the educational sector that acquired the commitment to the environment, within the celebration of the event “Recognition 2019 to the Energy Efficiency in the Public Federal Administration” (see image No. 2)



Image No. 2: Special Mention to TecNM by SENER

“The multi-site group of the Tecnológico Nacional de México, is committed to improve its energy performance, having the firm commitment of caring the environment and mitigating the impact generated by CO2 emissions derived from the educational process that is carried out in the Technological Institutes”

-María Luisa Lopeandía Urbina, Quality Assurance Manager.

Plan

The multi-site project for this Energy Management System initiated when an open invitation was sent to the 254 institutes of TecNM. This invitation mentioned the goal of the Certification under the ISO 50001:2011 by the end of 2018.

The priority tasks for the implementation were: training, creation of Manual and procedures of the Energy Management System (SGEn), sensibilization and diffusion campaigns.

Within the planning process of the Energy System, it is understood from the analysis and definition of the scope and limit of the system, understanding the

context of the organization in an appropriate manner..

On the other hand, the plan was carried out with energy planning, the elaboration of the procedure for energy planning where the identification of energy sources begins, to the projection of future energy uses. Realizing that we could look for the 3% annual decrease in energy uses that will be used in the Institutes.

Instituto	Tipo
Tecnológico de Estudios Superiores de Ixtapaluca	Descentralizado
Instituto Tecnológico de Tehuacán	Federal
Instituto Tecnológico José Mario Molina Pasquel y Henriquez, Campus Arandas	Descentralizado
Instituto Tecnológico José Mario Molina Pasquel y Henriquez, Campus Lagos de Moreno	Descentralizado
Instituto Tecnológico de Ciudad Guzmán	Federal
Instituto Tecnológico de Matamoros	Federal
Instituto Tecnológico Superior de Huichapan	Descentralizado
Instituto Tecnológico de Chihuahua II	Federal
Instituto Tecnológico Superior de Santiago Papasquiaro (Durango)	Descentralizado
Instituto Tecnológico de Matamoros (Tamaulipas)	Federal
Instituto Tecnológico de Nuevo Laredo (Tamaulipas)	Descentralizado
Instituto Tecnológico de Pabellón de Arteaga (Coahuila)	Federal
Instituto Tecnológico José Mario Molina Pasquel y Henriquez, Campus Arandas (Jalisco)	Descentralizado
Instituto Tecnológico José Mario Molina Pasquel y Henriquez, Campus Lagos de Moreno (Jalisco)	Federal
Instituto Tecnológico de Ciudad Guzmán (Jalisco)	Descentralizado

Image No. 3: List of institutes of Multi-site group

Another important issue during the planning process was to identify the strengths of the sites, so we could execute our action plans in the most effective way, keeping in mind the importance of an effective communication to all the organization.

The strengths of each institute that are part of the group helped to get completed the implementation plan. All of them already had at least one Management System previously consolidated, such as : Quality Management system ISO 9001 and Environmental Management System ISO 14001.



Image No. 4: Geographic location of sites

“The implementation of the Energy Management System ISO 50001:2018 in 2019 resulted in energy saving 19,800 GigaJoules and an estimated energy cost savings of \$500,000 mexican pesos”

—Hugo Saúl Sánchez Flores, Coordinator of energy Management System

Do, Check, Act

There are plenty of areas involved during the implementation process. These groups of people an technical experts are called Energy Management team, and were assigned by top management to support the system with their expertise and acknowledgement, as part of their commitment to get the certification. Each institute and the central area created their own team.

It was needed a technical skilled group of people as part of the Energy Management team, whom would determine the type of energy and power supply used in each site, as same as the uses and consumptions of energy. They identified the significant uses of energy and defined the energy baseline so each site could establish their ows goals

and objectives. In order to perform this activity, these teams were trained, according with the guidelines established under the collaboration agreement CONUEE-TecNM. Each of the 16 sites conducted their energetic diagnosis, showing a result of a total annual electric energy consumption of 37,169,273 MJ and 14,221,269 MJ for thermal energy.



Image No. 5: Total Energy Consumptions

Likewise, the diagnosis developed carried out that the largest energy consumer was the **Instituto Tecnológico de Ciudad Guzman**, with an annual consumption of 2,557,919 MJ, which is equivalent to 17.9% of the total energy consumption in the multi-sites group, the second place correspond to the **Instituto Tecnológico de Matamoros**, with 1,557,526 MJ, which represents the 10.9% of the total thermal energy; the third site, with 1,471,690 MJ, corresponding to 7.8% of the total, occupying by the **Instituto Tecnológico José Mario Molina Pasquel y Henríquez campus Arandas**. With respect to the electric energy, the major consumer is the **Instituto Tecnológico de Nuevo Laredo**, with 7,862,828 MJ, which is equivalent to 21.15% of the total electric energy consumption in the multi-sites group, the second place correspond to the **Instituto Tecnológico de Matamoros**, with 5,764,658 MJ, which correspond to 15.5% of total; and the third

major consumer is the **Instituto Tecnológico de Conkal**, with 5,314,712 MJ, corresponding to 14.29% of total.

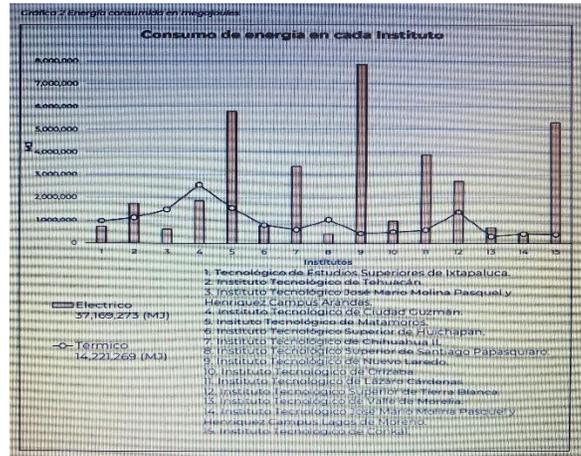


Imagen 6: Consumos por Instituto Tecnológico

In order to keep an effective tracking and verification of the implementation plan for the Energy Management System, there were conducted several training sessions, keeping in mind the importance of the sensibilization campaigns and the implementation of effective operational controls, by having previously established the pertinent objectives and goals. A systematic program of internal audits was implemented, closing with an evaluation of the degree of the system consolidation after one year of being implemented.

The **Comision Nacional para el Uso de la Energía** (CONUEE), has been a very strong support for the implementation of this Energy Management System, which has made possible to meet one of the TecNM goals to be a leader institution of the educational process to demonstrate its commitment with the environment, improving its energy performance and reducing the CO2 emmissions due to the educational process, which produces the 40% of the engineers of Mexico.

At the end of 2018 the Certification audit was conducted by **Instituto Mexicano de Normalización y Certificación IMNC**, with a zero non conformities and six improvement opportunities, granting the certification to the multi- site group of 16 Technological Institutes of the TECNOLÓGICO NACIONAL DE MEXICO, becoming the first multi-site group nationwide certified under the ISO 50001:2011.



Image No. 7: Certificate ISO 50001:2011

<https://youtu.be/evE60KqMtzs>

<https://youtu.be/ukrejPzDvUs>

Lessons Learned

- Top management commitment to the culture of the rational use of energy of all the multisites group of technological institutes.
- The creation of a culture of caring the environment and the impact as a result of every single activity performed by all the students, teachers, workers, parents and the society that are part of the educational process.
- There is no need of major investment to improve the energy efficiency in our teaching- learning activities at the TecNM.
- The TecNM is the only organization in MEXICO of public education fully committed with an Energy Management System.

Transparency

The TecNM communicates the implementation of the Energy Management System (SGEn) through different means, such as: institutional web page, social networks, e mails, press, radio and or TV, magazines, leaflets, brochures, posters, printed canvas, among others.

Links de videos de la implementación del Sistema de Gestión de la Energía del TecNM:

Through the Energy Management Working Group (EMWG), government officials worldwide share best practices and leverage their collective knowledge and experience to create high-impact national programs that accelerate the use of energy management systems in industry and commercial buildings. The EMWG was launched in 2010 by the Clean Energy Ministerial (CEM) and International Partnership for Energy Efficiency Cooperation (IPEEC).

For more information, please visit www.cleanenergyministerial.org/energymanagement.

