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UNIVERSIDAD AUTÓNOMA DE SAN LUIS POTOSÍ

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Abstract

Current climate change is happening in a very short space of time, this is mainly linked to the increase in the concentration of Greenhouse Gases (GHG) such as carbon dioxide (CO_2). According to the Worldwide Fund for Nature, in 2020 68% of global GHG emissions came from only ten countries, including Mexico (contributing with 1.68%). The main sources of GHG emissions in Mexico are transportation, electricity generation, and industry.

Climate change puts health, food, and energy security at risk, as well as the access to water of millions of Mexicans. An important aspect today is that energy consumption has increased dramatically in "buildings". Buildings' energy use currently represents more than 40% of total primary energy consumption in the U.S.A. and the E.U. To be successful in limiting global warming, the world urgently needs to use energy efficiently, as well as switch to clean energy sources for transporting, heating, or cooling.

For this, this work establishes the necessary guidelines for the creation of the University Energy Program (UEP) of the UASLP, this program seeks to: promote good practices in the use of energy, energy efficiency, sustainable urban mobility. To comply with the above, the following objectives were proposed: 1) To Identify the Energy Context of the UASLP and identify opportunities to improve its energy performance. 2) To develop an Energy Review of the UASLP to carry out Energy Planning following Significant Energy Uses. 3) To determine the requirements established in the ISO 50001: 2018 standard necessary to design the UEP. 4) To structure and establish a step-by-step action plan, where the resources to be used for the establishment of the UEP according to the ISO 50001: 2018 standard are defined. 5) To propose the perspectives for the potential implementation of the UEP within the UASLP.

As result, a pilot study was carried out on the current energy situation of the UASLP, the main Significant Uses of Energy were identified, an Energy Baseline was defined, as well as some Energy Performance Indicators that serve as the basis for the recommendation of a plan of step-by-step action for the creation of the UEP under the continuous improvement cycle of the international standard ISO 50001: 2018. This step-by-step action plan consists of action guidelines, the identification of possible stakeholders in the Energy Management System, as well as their action tools (procedures, processes, formats, lists, etc.); this content will serve as a guide for the subsequent creation and implementation of the UEP.

Keywords

Energy Management System, Significant Energy Uses, Energy Review, Energy Efficiency, University Energy Program

Resumen

El cambio climático actual está sucediendo en un espacio de tiempo muy corto, esto se vincula principalmente al aumento en la concentración de los Gases de Efecto Invernadero (GEI) como el dióxido de carbono (CO_2). Según el Fondo Mundial para la Naturaleza, en 2020 el 68% de las emisiones globales de GEI vienen de sólo diez países entre ellos México, contribuyendo con el 1.68%. Las principales fuentes de emisiones de los GEI en México son el transporte, la generación de electricidad y la industria.

El cambio climático pone en riesgo la salud, la seguridad alimentaria y energética, así como el acceso al agua de millones de mexicanos. Un aspecto importante en la actualidad es que el consumo de energía ha aumentado drásticamente en los "edificaciones". El uso de energía de los edificios representa actualmente más del 40% del consumo total de energía primaria en los E.U.A. y la U.E. Para tener éxito en limitar el calentamiento global, el mundo necesita con urgencia utilizar la energía de manera eficiente, así como cambiar a fuentes de energía limpias para transportar, calentar o enfriar.

Para ello el presente trabajo establece los lineamientos necesarios para la creación del Programa Universitario de Energía (PUEn) de la UASLP, este programa busca: promover las buenas prácticas en el uso de energía, la eficiencia energética, la movilidad urbana sostenible. Para cumplir con lo anterior se propusieron los siguientes objetivos: 1) Identificar el Contexto Energético de la UASLP e identificar oportunidades para mejorar su desempeño energético. 2) Realizar una Revisión Energética de la UASLP para llevar a cabo la Planificación Energética de acuerdo con Usos Significativos de Energía. 3) Determinar los requisitos establecidos en la norma ISO 50001:2018 necesarios para diseñar el PUEn. 4) Estructurar y establecer un plan de acción paso a paso, donde se definan los recursos a utilizar para el establecimiento de la PUEn según la norma ISO 50001: 2018. 5) Proponer las perspectivas para la potencial implementación de la PUEn dentro de la UASLP.

Como resultado se realizó un estudio piloto sobre la situación energética actual de la UASLP se identificaron los principales Usos Significativos de la Energía, se definió una Línea Base Energética, así como algunos Indicadores de Desempeño Energético que sirven de base para la recomendación de un plan de acción paso por paso para la creación del PUEn de acuerdo con el ciclo de mejora continua del estándar internacional ISO 50001:2018. Este plan de acción paso por paso consta de lineamientos de acción, la identificación de los posibles actores interesados en el Sistema de Manejo de energía, así como sus herramientas de acción (procedimientos, procesos, formatos, listas, etc.); mismo contenido servirá como guía para la posterior creación e implementación del PUEn.

Palabras Clave

Sistema de Manejo de Energía, Usos Significativos de Energía, Revisión Energética, Eficiencia Energética, Programa Universitario de Energía

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Abbreviations

CFE	Federal Commission of Energy
EMAS	Eco-Management and Audit Scheme
EnBL	Energy Baseline
EnMS	Energy Management System
EnPIs	Energy Performance Indicators
GDMTH	Large Demand Medium Hourly Voltage
HLS	High Level Structure
kWh	Kilowatt hour
NMX	Mexican Norm
NOM	Official Mexican Norm
PDCA	Plan-Do-Act-Check
PJ	Petajoules
SDGs	Sustainable Development Goals
SENER	Secretariat of Energy
SEnU	Significant Energy Uses
SLP	San Luis Potosí
tCO_2e	Tons of CO_2 equivalent
TFC	Total Final Consumption
TPES	Total Primary Energy Source
UASLP	Autonomous University of San Luis Potosí
UEP	University Energy Program

1 Introduction

1.1 Background and Problem/Research Gap

Currently, the production and use of energy for human activities (the building sector, production industry, food production, and transport), is the factor that mainly contributes to climate change and represents around 60% of all global gas emissions greenhouse effect, with CO_2 becoming more important (United Nations, 2015).

One aspect that has gained great relevance worldwide, is the effect that fossil fuels have on the environment and human health. This is because two sectors generate large emissions into the atmosphere: the first one is the generation of thermoelectric energy, which is highly dependent on coal, oil, and natural gas. The second sector with the most emissions to the atmosphere is transportation, most vehicles are dependent on fossil fuels and have emissions that are difficult to control (The Economist, 2003). CO_2 is the main greenhouse gas, and it is emitted in the fossil energy use and production processes (IILSEN, 2004). Between 1970 and 2000, global CO_2 emissions grew by 1.7% annually, while between 2000 and 2025 the annual growth rate is estimated to be 1.8%.

Global efforts so far to mitigate climate change culminated in the Paris Agreement in 2015. Through the agreement, 195 countries adopted the first-ever universal and legally binding, global climate deal. The target of the agreement (limiting the global average temperature rise to well below 2 °C, while aiming to limit the increase to 1.5 °C) is ambitious and cannot be achieved without a major overhaul of global energy production and consumption.

The moment of transition in which we are immersed requires thinking and acting on energy matters from the local level, not only to transform the energy matrix based on fossil fuels, into a more environmentally and socially reasonable one, based on renewable energies, if not, as we have previously advanced, towards an alternative energy movement based on the citizen participation (Cotarelo Álvarez, 2015).

In addition to its great potential to mitigate climate change, renewable energy can bring other benefits. If used properly, renewable energy can contribute to social and economic development, promote access to energy and secure energy supply, and reduce its negative effects on the environment and health. In most situations, it will be necessary to adopt policies aimed at promoting modifications to the energy system that increase the share of renewable energy in the energy mix. The adoption of renewable energy technologies has increased rapidly in recent years, and projections indicate that their percentage of use will increase substantially under the most ambitious mitigation scenarios (Edenhofer, Pichs-Madruga and Sokona, 2011).

According to (Henner and REN21, 2017), despite the growing development of renewable energies around the world, the contribution of renewable energies in the final total of energy consumption has seen only a moderate increase, only 11%, and of that 11% only 2.1% a fraction corresponds to the generation of solar energy.

It is currently recognized that the energy supply must undergo a transition from dependence on hydrocarbons to alternative energy sources, which implies the use of available renewable energy sources, such as solar energy, harnessed through the use of photovoltaic systems, which is clean, abundant energy and is available in most of the earth's surface.

For the purposes of this work, one important aspect is that energy consumption has dramatically increased in “buildings” over the past decade due to population growth, more time spent indoors, increased demand for building functions and indoor environmental quality, and global climate change. Building energy use currently accounts for over 40% of total primary energy consumption in the U.S. and E.U. Nevertheless, significant energy savings can be achieved in buildings if they are properly designed, constructed, and operated (Cao, Dai and Liu, 2016). For this reason, building energy efficiency can provide key solutions to energy shortages, carbon emissions, and their serious threat to our living environment. According to (USDOE, 2015), the major areas of energy consumption in buildings for developed countries are heating, ventilation, and air conditioning (35% of total building energy; lighting 11%); major appliances (water heating, refrigerators, and freezers, dryers) 18% with the remaining 36% in miscellaneous areas including electronics. In each case, there are opportunities both for improving the performance of system components (e.g., improving the efficiency of lighting devices) and improving the way they are controlled as a part of integrated building systems (e.g., sensors that adjust light levels to occupancy and daylight).

Opportunities for improved efficiency are enormous. By 2030, building energy use could be cut more than 20% using technologies known to be cost-effective today and by more than 35% if research goals are met. Much higher savings are technically possible.

1.2 General Objective

To establish the guidelines for the creation of the University Energy Program (UEP), which will seek to promote the good practices of energy uses, energy efficiency, sustainable urban mobility, and the prospects for a further implementation within the UASLP.

1.3 Specific Objectives

1. To identify the UASLP Energy Context and its opportunities for improvement.
2. To conduct an Energy Review for further Energy Planning following Significant Energy Uses
3. To determine the necessary requirements established in the ISO 50001:2018 standard to design the UEP.
4. To structure and establish a Step-by-step action plan, where the resources, procedures, and tools to be used for the establishment of the UEP according to ISO 50001:2018 standard, are defined.
5. To propose the perspectives for the potential implementation of the UEP within the UASLP.

1.4 Scope and Structure

The Sustainable Development Goals (SDGs) are a universal call to action to end poverty, protect the planet and improve the lives and prospects of people around the world. In 2015, all the Member States of the United Nations approved 17 Goals as part of the 2030 Agenda for Sustainable Development, which establishes a plan to achieve the Goals in 15 years.

The UASLP is an active member of sustainable development and is taking part in implementing actions to achieve the fixed Goals by 2030. The main objective of this document is to reach the SGD "7: Ensure access to affordable, reliable, sustainable and modern energy for all" within the University Energy Program of the UASLP. The development experienced by the UASLP is in the last years has caused a significant increase in energy consumption of the facilities of university buildings, whether they are lighting, appliances, or air conditioning.

In this situation, only a policy to promote energy-saving and energy management or supply of useful energy to the end-user perfectly planned on a local scale can keep the energy consumed from the Campuses in a controlled environment. In this way, it responds to the social demands of higher quality services, being respectful with the environment, thus complying with the idea of a sustainable campus.

The UASLP is the one that can best stimulate savings energy among their Campuses, setting an example through the actions undertaken in this sense in the centers of consumption that depend on it. Given this perspective, the present work is looking forward to making a pilot study driven by a strategic assessment of the energy context and actual status within the UASLP, and with this establish the guidelines to further implementation of the UNIVERSITY ENERGY PROGRAM in all the University Campuses, Faculties, Institutes and Academic Entities of the UASLP, based on the following basic pillars:

- Increase energy efficiency and reduce electricity costs
- Reduce CO_2 emissions related to energy consumption
- Contribute to the UASLP to achieve the SDGs
- Establish the guidelines that the university needs in order to implement an Energy Management System -EnMS- (in this work will be known as University Energy Program -UEP-) within all the campuses, faculties, and academic entities of the Autonomous University of San Luis Potosi, according to ISO 50001:2018 standard
- Recommendations for energy performance monitoring and continuous improvement of good energy practices within the UASLP.

2 Theoretical and conceptual framework

2.1 Energy

According to (EIA, 2020), energy is the ability to do work.

Modern civilization is possible because people have learned to convert energy from one form to another and then use it to do work.

Energy exists in different forms of energy: heat, light, motion, electrical, chemical, gravitational, etc.

These forms of energy can be divided into two general types of energy for doing work:

- Potential or stored energy
- Kinetic or work energy

Energy can be converted from one form to another. For example, the food a person eats contains chemical energy, and a person's body stores this energy until it uses it as kinetic energy in work or play. The stored chemical energy in coal or natural gas and the kinetic energy of water flowing in rivers can be converted into electrical energy, which in turn can be converted into light and heat.

There are many different sources of energy that can be divided into two basic categories:

- Renewable energy sources, which can be easily replenished.
- Non-renewable energy sources that cannot be easily replenished

Renewable and non-renewable energy sources can be used as primary energy sources to produce useful energy such as heat, or they can be used to produce secondary energy sources such as electricity and hydrogen.

In many countries, most energy sources for doing work are nonrenewable energy sources (EIA, 2020):

- Petroleum
- Hydrocarbon gas liquids
- Natural gas
- Coal
- Nuclear energy

These energy sources are called nonrenewable because their supplies are limited to the amounts that we can mine or extract from the earth. On the other hand, renewable energy sources are naturally replenished. Day after day, the sun shines, plants grow, the wind blows, and rivers flow.

The major types of **sources of renewable energy** are (EIA, 2020):

- Solar energy from the sun
- Geothermal energy from the heat inside the earth
- Wind energy

- Biomass from plants
- Hydropower from flowing water

According to data from the "World Energy Balances" (IEA, 2020b), world primary energy production in 2018 increased 3.20% compared to the previous year, reaching 14,421,153 million tons of oil equivalent (MMtoe) (Figure *1*).

The collective effort of the nations has been to reduce emissions and promote the sustainability of the energy sector, which caused the production of renewable energy to increase by 2.1% (SENER, 2020). On the other hand, the growth rates of natural gas and coal production decreased +3.1% and +2.2% respectively, compared to +5.0% and +3.3% in the previous year.

On the other hand, crude oil production stood out with 31.58% participation; 0.33% less than the previous year; Furthermore, natural gas exceeded 3,000 MMtoe, and represented 22.84% of world production. The nuclear energy component contributed 4.90% of production with 706.81 MMtoe, increasing 2.81% compared to 2017.

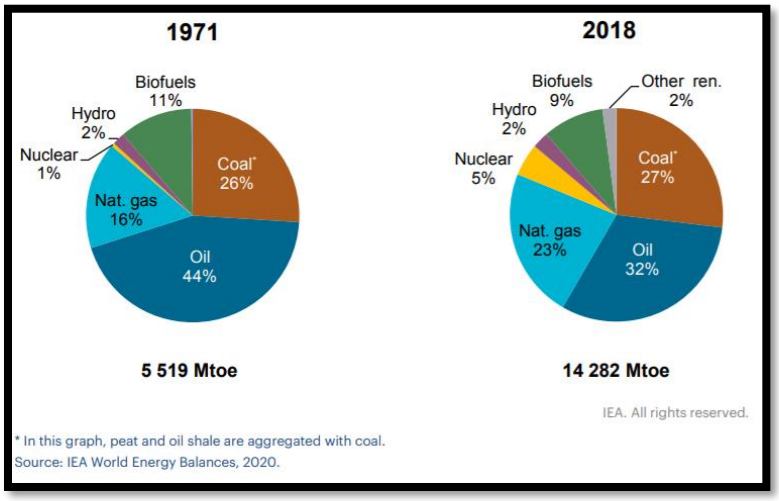


Figure 1. Total Energy Supply by Fuel (IEA, 2020b).

The global dependence on fossil fuels in the generation of electricity contributes to the increase in greenhouse gas (GHG) emissions and, consequently, to the increase in the impacts of climate change (Ibarra Sarlat, 2018). Therefore, the implementation of measures towards a global energy transition that does not depend on fossil fuels and that can meet the energy needs demanded by current economic and demographic growth is imperative for its implementation.

2.2 Renewable / Sustainable Energy Systems

2.2.1 Use of Energy in buildings

Having data on energy consumption in buildings is key to understanding consumption habits and potential sources of savings. Specifically, having information on the average value of

annual energy consumption per unit area in buildings in a country or region allows one to compare the energy performance of a given building.

The annual energy consumption per user in buildings worldwide in 2012 is estimated at 4,700 kWh/user. The country with the highest energy consumption per user is Canada with 20,000 kWh/user, while the country with the lowest consumption is India with 2,000 kWh/user. Russia has an annual energy consumption per user of 12,500 kWh/user, Mexico has a slightly higher value than India, of 2,500 kWh/user (Calixto-Aguirre and Huelsz-Lesbros, 2018).

Two factors that can explain the different energy consumption per user are the climate and the level of economic development of each country. Canada and Russia are countries that have a very cold climate during a long winter that requires a large consumption of energy for heating and southern Canada and parts of Russia have hot summers that also require energy for cooling. An indicator of the economic development of a country is the Gross Domestic Product (GDP) per capita, also called Purchasing Power Parity (PPP), expressed in international dollars. That is, both due to its climate and its level of economic development, it is explained that Canada presents the highest value of energy consumption per user.

According to data from the "World Energy Balances", (IEA, 2020b) between 1971 and 2018, total final consumption (TFC) was multiplied by a factor of 2.3, reaching 9 238 Mtoe in 2018 (see Figure *2*). The share of energy consumption of most sectors has remained stable such as commerce and services or industry. However, energy consumption in transport has increased significantly, from 23% of TFC in 1971 to 29% since 2015. Notwithstanding the growth of the transport sector, the industry remained the largest consuming sector globally in 2018, with the same share as in 1971 (38%). The residential sector was third in 2018 (21%).

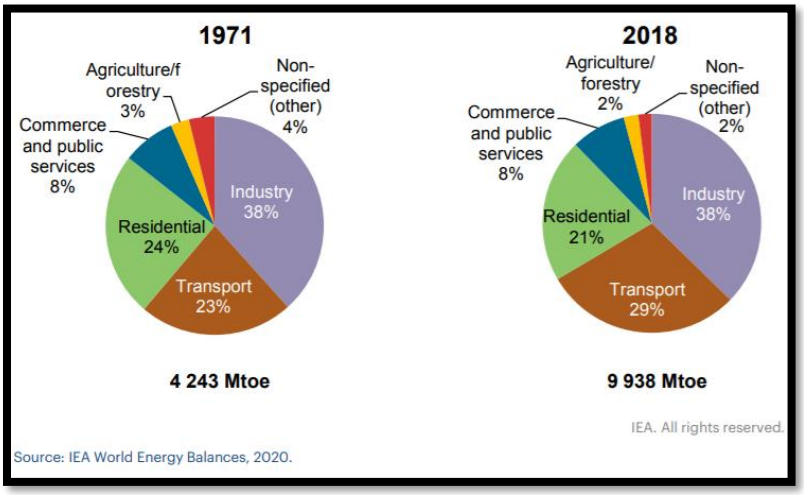


Figure 2. World total final energy consumption by sector (IEA, 2020b).

With data of the (IEA, 2020a), it had been found that energy-related CO_2 emissions from buildings have risen in recent years. Direct and indirect emissions from electricity and

commercial heat used in buildings rose to 10 $GtCO_2$ in 2019, the highest level ever recorded. Several factors have contributed to this rise, including growing energy demand for heating and cooling with rising air-conditioner ownership and extreme weather events.

As it is shown in the "2019 Global status Report for buildings and constructions", the space cooling demand rose more than 33% during 2010-18 and by 5% in 2017-18, while energy demand for appliances in 2018 increased by 18% since 2010 and for water heating by 11% (Figure *3*).

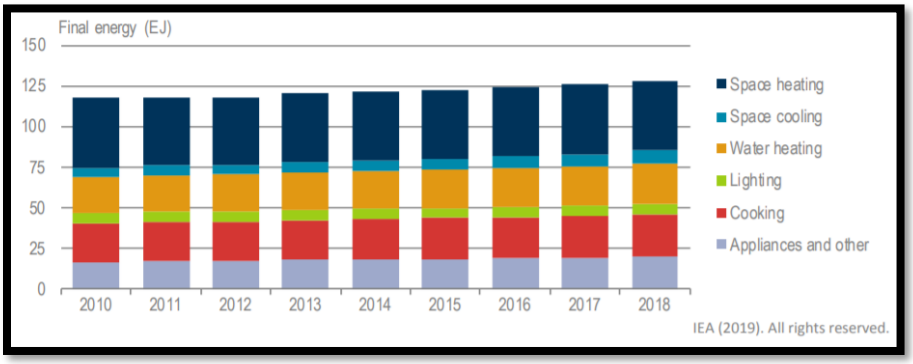


Figure 3. Global buildings sector final energy consumption by end-use, 2010-18 (United Nations Environment Programme, 2019).

Considering (SENER, 2020), in Mexico the sectors in which total final consumption is disaggregated are: transport, which is the most energy-intensive sector, representing 42.58%; the industrial one, which consumed 33.38%; the residential, commercial, and public with 20.01%; and agriculture, with 4.03%.

2.2.2 Mobility (Transport)

According to (Kreuzer and Wilmsmeier, 2014), the transport sector is a large consumer of energy, representing 19% of the world's final energy consumption in 2013; and the same sector will account for 97% of the increase in world oil consumption between 2013 and 2030. The consequent implications -in terms of energy security and greenhouse gas emissions- of a transport sector dominated by oil, suggest that the reduction of fuel used in this sector is (and should be) one of the highest priorities for all countries.

On the other hand, the International Energy Agency estimates that there is a potential for cost-effective technical improvement in fuel economy in new vehicles and that this improvement may reach 50% by 2030. This would lead to a reduction of about 500,000 equivalent tons of oil in the use of fuel and almost 1 Giga Ton of annual reduction of CO_2 ($GtCO_2e$) emissions.

Currently, the mobility of people and goods represents 20% of the total primary energy consumed worldwide and is for a quarter of CO_2 emissions related to energy consumption. Oil is the main fuel used in the transport sector, its constant predominance in transport is based on the following reasons:

a. it's high energy density,
b. its competitiveness in price compared to other alternatives, and
c. the technological lock-in

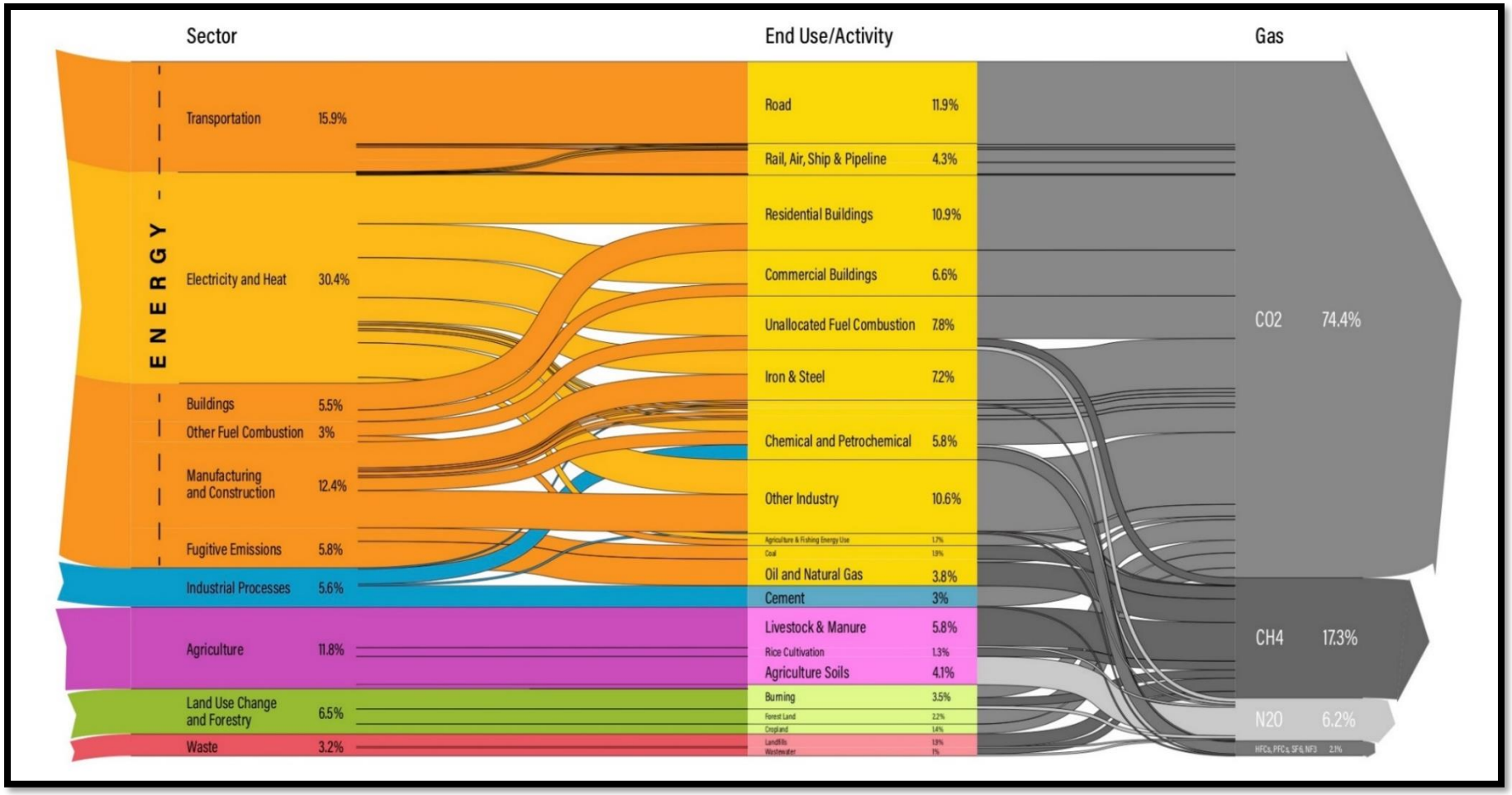
This last reason c), refers to the dependence on inherited transport technologies and infrastructure and the difficulties of their replacement on a large scale (IEA, 2012). Given the importance of mobility as one of the main activities that consume fossil fuels, and consequently, also as a source of emissions and other externalities, the region must review in detail its energy consumption patterns and achieve energy efficiency gains in mobility.

In addition to the last paragraph, CEPAL in its roadmap towards energy efficiency (Kreuzer and Wilmsmeier, 2014) suggested that technological advances are important to improve the energy efficiency of mobility, but they are only part of the equation. It is very important to work on promoting changes towards more efficient modes of transport, aiming for a more holistic approach to increase efficiency in mobility throughout the system. On the other hand, demand management to avoid the need for mobility must be an intrinsic part of the design of public policies. As the mobility of people and goods extends from a local level to an international level and solutions become more costly, international cooperation and coordination of efforts are unavoidable and of mutual benefit to all the actors.

Data of the (World Resources Institute, 2020), shows that energy consumption is by far the biggest source of human-caused greenhouse gas emissions, responsible for a whopping 73% worldwide (see Figure *4*). The energy sector includes transportation, electricity and heat, buildings, manufacturing and construction, fugitive emissions, and other fuel combustion. The other top sectors that produce emissions are agriculture, such as livestock and crop cultivation (12%); land use, land-use change, and forestry, such as deforestation (6.5%); industrial processes of chemicals, cement, and more (5.6%); and waste, including landfills and wastewater (3.2%).

Whereas, within the energy sector according to (World Resources Institute, 2020), the generation of heat and electricity is responsible for most emissions (15 $GtCO_2e$ in 2016, or 30% of total greenhouse gas emissions), followed by transportation (7.9 $GtCO_2e$ in 2016, or 15% of total emissions) and manufacturing and construction (6.1 $GtCO_2e$, or 12% of total emissions).

Figure 4. World Greenhouse Gas Emissions in 2014



Total of 49.4 $GtCO_2e$ taken from (World Resources Institute, 2020)

From the perspective of climate change, transport represents a sector with particular relevance. In addition to being responsible for an important part of global emissions, the dynamics of its emissions shows it as the sector with the highest growth and the most accelerated. Between 1970 and 2006, global emissions from the sector grew by 130% (Barbero and Tornquist, 2012). As reported by (REN21, 2021), the transport sector, accounted for an estimated 32% of total final energy consumption and had the lowest share of renewables (3.3%).

These are the reasons why this thesis work includes mobility -Transport- as an important topic because it represents a significant threat to long-term sustainable development and is one of the fastest-growing consumers of final energy and sources of greenhouse gas emissions. Moreover, transport is heavily reliant on petroleum, a limited resource that is also associated with geopolitical risks to the security of supply (Turton, 2005). Together, threats to the global environment and limited resource availability warrant a closer examination of possible pathways to a sustainable transport system.

The present COVID-19 pandemic has had significant impacts on the transport sector and its use of renewable energy. The (REN21, 2021) report, showed that the transport activity and energy demand fell sharply in the early months of 2020 but rebounded by year's end, also this activity remains the sector with the lowest share of renewables, as oil and petroleum products (and 0.8% nonrenewable electricity) continue to meet nearly all global transport energy needs (95.8%). Biofuels and renewable electricity met small shares of those needs (3.1% and 0.3%, respectively). Following a decade of steady growth, biofuel production decreased in 2020 due to the overall decline in transport energy demand, while electric car sales increased 41% during the year. Overall, the transport sector is not on track to meet global climate targets. Many countries still lack a holistic strategy for decarbonizing transport. Such a strategy could greatly decrease energy demand in the sector and thus allow for the renewable share in transport to increase (REN21, 2021).

2.2.3 Equipment and Energetic systems

Having data on energy consumption in buildings is key to understanding consumption habits and potential sources of savings. Specifically, having information, as (Calixto-Aguirre and Huelsz-Lesbros, 2018) showed, on the average value of annual energy consumption per unit area in buildings in a country or region allows one to compare the energy performance of a given building.

The building sector is known as one of the biggest drivers of energy demand and greenhouse gas emissions in the world, due to the high dependence on electricity in this sector. In Mexico, as mentioned in (Lorentzen, Mcneil and CONUEE, 2019) the energy requirements for space heating and water heating are moderate; in contrast to the electricity

used for lighting, refrigeration, air conditioning, and other electrical accessories and equipment that are particularly important. Fortunately, there is a wide spectrum of opportunities to mitigate the negative effects of electricity use in buildings, through the energy efficiency of equipment and the building envelope, as well as smart controls and occupant behavior.

Along with the beforementioned, The DGEE (Dirección General de Eficiencia Energética, 2020) suggested that there are inappropriate uses of energy as a result of bad habits that cause unnecessary waste, such as:

- lack of maintenance (poor inspection, bad settings in switches and sockets, little cleaning of protection elements)
- inefficient technology (incandescent bulbs, old refrigerators, resistance hot springs with deteriorated insulation).

These two factors (bad habits and old technology) contribute significantly to increasing the electricity consumption of each of the buildings. Given this, there are also good practices that can mean opportunities for improvement and optimization without investment or low investment; managing to reduce energy consumption and greater benefit for the building.

So far, residential buildings have been relatively well studied and energy efficiency programs for major household equipment have a long and successful history, including in Mexico (Sánchez Ramos *et al.*, 2007) (McNeil and Carreno, 2015). Electricity consumption in the non-residential building sector, which includes commercial and public buildings, is less well understood.

2.2.4 Energy efficiency

Energy efficiency is the most cost-effective way to reduce energy consumption. (Arróliga Galeano and Betanco, 2021) affirmed that Energy efficiency can be defined as the reduction of energy consumption, maintaining the same energy levels, without reducing comfort and quality of life, taking care of the environment, guaranteeing supply, and promoting sustainability in their use.

In this sense, in this search for energy saving that contributes to economic and environmental sustainability, this work considers that universities play a relevant role as centers of great consumption of electrical energy, both in occupation, lighting, air conditioning, and equipment; They have the responsibility to make efficient use of its consumption. On the other hand, the implementation of energy-saving, and efficiency measures favor increased awareness and commitment of the university community in the energy management process.

Energy efficiency considers aspects related to energy consumption, such as occupation, lighting, use of equipment, insulation, heating, air conditioning, domestic hot water, and the use of renewable energy sources for the energy supply of buildings. For (Carretero Peña, 2012), energy efficiency is the proportion or other quantitative relationship between the result in terms of performance, services, goods or energy, and the energy input.

The implementation of energy-saving and efficiency measures is a necessity both for existing buildings and for those to be built in the following years, within a sustainable economy scenario (Arróliga Galeano and Betanco, 2021).

According to (Lapido Rodríguez, Gómez Sarduy and Monteagudo Yánez, 2014), achieving higher levels of energy efficiency can be followed in two ways:

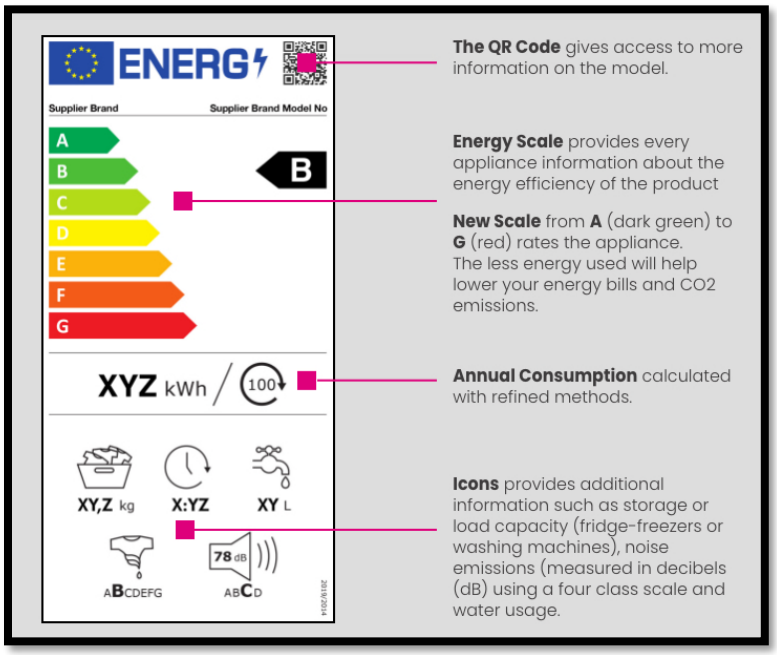
1. one based on better energy management with few investments, implementing an adequate energy management system, and
2. the other based on improvements. technological, investing in more efficient equipment and systems.

In addition, to achieve energy efficiency in a company or organization it is not enough that there is an energy-saving plan derived from a study or diagnosis. Energy Efficiency Consultancies reviewed mentioned that a management system must be in place to guarantee continuous improvement. Considering the above mentioned, a relevant factor in the promotion and subsequent success of measures to promote energy efficiency is the adequate consideration of the contexts of energy consumption, which presupposes surveys of energy uses, technologies, Energy Efficiency Label (EEL), and habits, through a consistent approach, before the implementation of the programs.

Furthermore, the EEL is an informative tool (Figure *5*) that allows knowing the energy consumption and the energy efficiency range of energy equipment, which must be contained in a label, the same that must be placed on the container, packaging, advertising, or body of the energy equipment in a visible place for -in this case- UASLP users. It may be printed on or attached to the appliance and should not be removed from the product until after it has been purchased by the UASLP (Dirección General de Eficiencia Energética, 2020). The UASLP will be one of the most benefited actors when purchasing equipment or appliance that has the energy efficiency labeling, their purchase will be guaranteed by the efficiency registered on the labeling and they will have the option of choosing the most efficient appliances.

Labeling is based on a scale of classification by letters and colors, ranging from A and green, for the most efficient teams, to G and red, for less efficient teams. Although the most efficient appliances are the most expensive at the time of purchase, their costs are generally amortized before the end of their useful life, so the savings are much greater (Dirección General de Eficiencia Energética, 2020).

Figure 5. European Energy Efficiency Label



The label above used here is a typical example of a Washing Machine. Adapted from (Very, 2021)

Subsequently, there must be continuous procedures for evaluating and monitoring results, by management indicators and the establishment of goals.

2.2.5 Renewable energy production *in situ*

Renewable energy set a record in new power capacity in 2020 (despite the present COVID-19 pandemic) and was the only source of electricity generation to register a net increase in total capacity. Investment in renewable power capacity rose for the third consecutive year, thus renewables remained the fastest-growing source of energy in buildings, increasing 4.1% annually on average between 2009 and 2019. Nowadays, policies to stimulate renewable energy uptake in buildings remain relatively scarce, although many options exist to improve efficiency in new and existing buildings, expand access to electricity and encourage the use of renewables (REN21, 2021).

Companies worldwide, like UASLP in this case, are contributing in various ways, including through manufacturing and production, research and development, installation, project financing, and energy infrastructure, as well as by procuring their energy from renewable sources. Despite the impacts of the COVID-19 pandemic and related recession, corporate sourcing of renewable electricity through power purchase agreements (PPAs) rose 18% in 2020 (BloombergNEF, 2021). Businesses also increased their use of renewables for heat and transport, although to a far lesser extent. A combination of factors is contributing to the growing business demand for renewables across all sectors. These include environmental

and ethical considerations, cost savings, competitiveness, risk mitigation, and business coalitions and collaboration (REN21, 2021). For some companies, the drive to increase the use of renewable energy is part of larger environmental goals and, often, a fundamental element of a broader sustainability strategy (Kopnina and Blewitt, 2018). Stakeholders such as academics, workers, students, residents, suppliers, and shareholders increasingly expect Universities to play their part in climate action and to become more accountable as well as more publicly transparent about their sustainability practices (Coppola, Krick and Blohmke, 2019).

Cost savings and competitiveness are other key drivers of business demand for renewables. Renewable electricity in particular has become increasingly attractive commercially compared to new and existing fossil fuels and has been cost-competitive compared to nuclear power for some time (IRENA, 2021). In some cases, it can be less expensive for companies to source their own renewable electricity directly from suppliers or to produce it themselves than to buy it from the grid (Solar Power Europe, 2019). In electricity generation, renewables now offer more attractive cost options for at least two-thirds of the global population (Moore and Bullard, 2020).

Risk mitigation objectives also drive companies to adopt renewables, as these energy sources can help reduce energy supply risks, price risks and reputational risks as environmental values take deeper root in a global society (RE-Source, 2020).
Finally, according to (REN21, 2021) business demand for renewable energy is most common in the electricity sector, the four main categories of renewable electricity are:

Self-generation and consumption
Companies develop their own renewable energy projects and use the electricity generated. These installations may be – in situ- on site (for example, rooftop solar) or off-site (such as a wind power project built relatively near the firm's facilities) (REN21, 2021). For practical reasons, this is the modality that best fits the UASLP. Therefore, the one here proposed by this UEP, to guide the university towards the goal of meeting the SDGs.

Power purchase agreements (PPAs)
Companies sign long-term contracts (typically 10 years) with an independent power producer or utility that commits them to procure a specific amount of renewable energy at a fixed price for a specified duration. Virtual PPAs are more popular in larger markets due to their flexibility, as buyers and sellers do not need to be connected to the same grid provider.
One advantage that corporate PPAs offer is "aggregation", where smaller purchasing companies form a consortium and aggregate their demand to secure more competitively priced deals and reduce financial risk (World Business Council for Sustainable Development (WBCSD), 2021).

Utility green procurement
Companies buy renewable electricity through green premium products (green label certified and priced) or bespoke contract arrangements, such as green tariffs (special rates). Energy utilities offer both options, allowing their business customers to buy renewable energy directly through billing and without requiring a long-term contractual commitment. However, the trade-off is a less

competitive price than that offered by PPAs (US Environmental Protection Agency (EPA), 2021b).

Environmental attribute certificates (EACs)

Companies purchase EACs from energy suppliers or brokers, effectively buying ownership rights to a specified amount of renewable electricity. The certificates are primarily "unbundled", meaning that they are bought and sold separately from the associated electricity generated (US Environmental Protection Agency (EPA), 2021a).

2.3 UN Sustainable Development Goals

A sustainable future means a balance of the needs of environmental, social, and economic systems, where organizations play a relevant role to achieve the objectives and goals of each one. The SDGs are integrated, as they recognize that interventions in one area will affect the results of others, meaning that the success of one affects the others.

The Sustainable Development Goals (SDGs) are an opportunity and a call for countries and their societies to embark on a new path that improves the lives of all, leaving no one behind. The 17 SDGs are found in the 2030 Agenda on Sustainable Development, which seeks to be the way to achieve a sustainable future (Figure *6*).

Figure 6. UN Sustainable Development Goals 2015.

The energy sector is one of the most essential sectors for national development (UN, 2015). Access to affordable, clean, and modern energy sources is important to enable many other basic amenities and services: to power hospitals to operate medical equipment and store vaccines at the required temperatures; to light houses, to enable children to study to achieve quality education; and to facilitate the development of digital infrastructure and communication technologies, to name a few.

For practical purposes, this research will focus on SDG 7 “Affordable and clean energy”. SDG 7 sets out three key targets and two additional targets for resource mobilization and policy to be achieved by 2030. The five key targets are:

- 7.1. Ensure universal access to affordable, reliable, and modern energy services.
- 7.2. Increase substantially the share of renewable energy in the global energy mix.
- 7.3. Double the global rate of improvement in energy efficiency.

The resource mobilization and policy-related targets are to:

- 7.a. Enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency, and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.
- 7.b. Expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries under their respective programs of support.

Therefore, the integration of an Energy Management System, in this case, the "University Energy Program" to the normal practice of operations within the UASLP represents an opportunity and an action to achieve the goals of the aforementioned SDG.

2.4 Energy Management Systems (EnMS)

The emergence of the EnMS is part of the process that took place in the international arena from the seventies, which was characterized by an energy crisis, in such a way that the EnMS emerged as an essential tool that has promoted energy performance worldwide (Cortez, Hernández and Martell, 2018).

(Walter Kahlenborn et al., 2015) mentioned that an EnMS systematically records energy flux and serves primarily as a basis for investments to improve energy efficiency. A functioning EnMS helps a company to meet the commitments made in its energy policy and to continuously and systematically improve its energy-related performance.

An EnMS comprises all the elements of an organization that is necessary for the creation of an energy policy and the definition and achievement of strategic goals. It thus encompasses the organizational and information structures, including resources, necessary for the implementation of energy management. It formulates and implements the energy policy (including strategic and operational objectives and action plan), planning, implementation,

and operation, monitoring and measurement, control and correction, internal audits, and periodic management review (see Figure *7*).

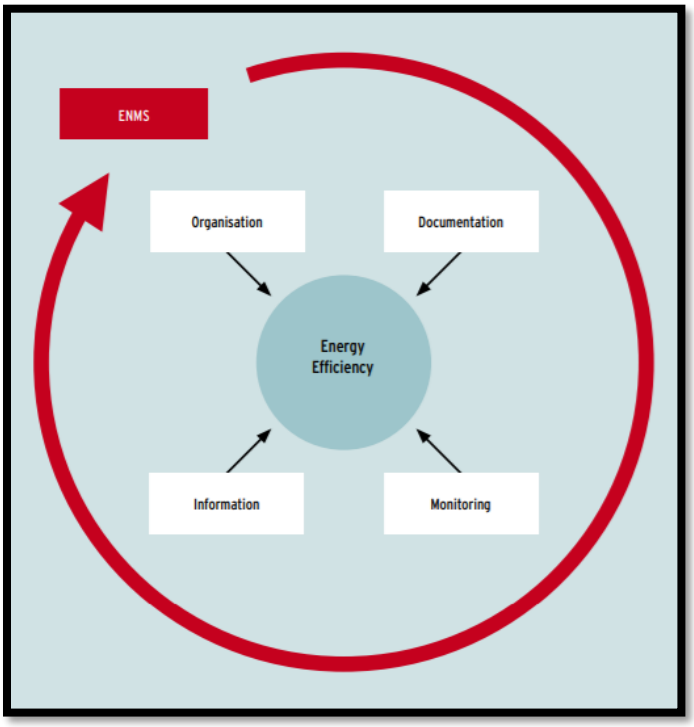


Figure 7. The most important aspects of an EnMS (Walter Kahlenborn et al., 2015)

For the above mentioned, implementation of an energy management system with the creation of the UEP, the UASLP will have the following advantages:

1. Cost reduction
2. Environmental protection
3. Sustainable management
4. Improvement of public image
5. Use of financial incentives
6. Projection of climate policies
7. Reduction of CO_2 footprint

Finally, an EnMS can be defined as a methodology to achieve a culture of sustained and continuous improvement of energy performance in organizations cost-effectively (Flores Díaz and Jáuregui Nares, 2020). The improvement requires the interaction and contribution of each of the requirements expressed within the international standard ISO 50001: 2018 and its national counterpart in Mexico, the Mexican Norm “NMX-J-SAA-50001-ANCE-IMNC-2019”.

On the other hand, management comprises a series of activities that allow generating organizational changes, both in structure and in some processes and procedures. Its incorporation also implies changes in the way of thinking and acting of those people who

are directly related to the management of energy-consuming processes (World Energy Council, 2004).

The parameters obtained from energy management allow the application of the international standard ISO 50001, which has to do with energy management systems, since this standard is intended to reduce greenhouse gas emissions, of the costs and consumption of energy and other related environmental impacts, in this sense the implementation of the indicators implies a continuous improvement in these aspects established in the standard. (Pinzón C et al., 2014)

2.4.1 ISO 50001:2018 standard

The standard was developed by the ISO TC 301 Technical Committee. Energy management and saving, with the participation of specialists from 67 countries, derived from a UNIDO initiative in 2007, to advance global change mitigation strategies climate by standardizing energy efficiency and energy management standards existing in different parts of the world.

ISO in its technical committee published the first version in 2011, that now is replaced by the 2018 version, this version shares structure, terms, and definitions (high-level structure, HLS) with other management system standards, which facilitates its integration and concentration of particular efforts in energy performance for the case of 50001, where the HLS functions as a unifying element. This is useful for organizations that operate with a single management system or known as an Integrated Management System (see Figure *8*).

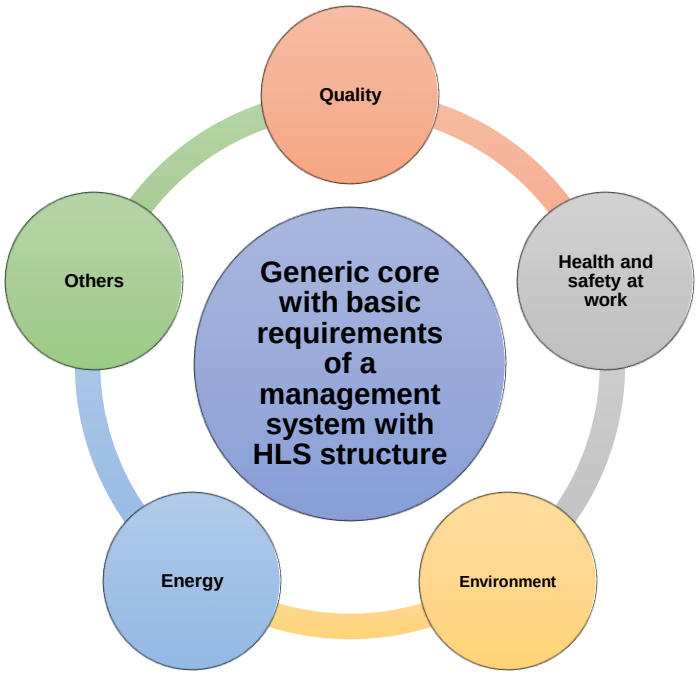


Figure 8. HLS Structure and Management System Standards, adapted from (Flores Díaz and Jáuregui Nares, 2020).

ISO 50001 can be used by companies in all sectors and sizes. An EnMS that is based on ISO 50001 can be implemented irrespective of existing management systems or can be integrated into the ones already in place. ISO 50001 was designed in such a way that it can be combined with other management systems, primarily those concerning quality and environmental management (Walter Kahlenborn et al., 2015).

As with ISO 9001 or ISO 14001 and EMAS, it is based on the Plan-Do-Check-Act cycle (PDCA). Accordingly, the various management systems can be easily consolidated, or the company has the option of conforming to the existing management system to develop a management system in accordance with ISO 50001.

The ISO 9001 standard series is mainly a standard for Quality Management Systems (QMS). It is likewise possible to integrate an Environmental Management System (EMS) or security management system into a QMS. The ISO 14001 standard primarily concentrates on developing and upgrading a functioning EMS within an organization. It is thus assumed that an active EMS improves the environmentally friendly character of a company. In various areas, EMAS goes much further than ISO 14001. In EMAS, the environmental management system functions to ensure, by means of organizational measures, that the environmental performance is always fully optimized.

The standards for management systems should not be observed in isolation: The structure of the environmental management standard ISO 14000 complies with the structure of the quality management standard ISO 9000. ISO 14001 served as the basis for EMAS and is a part of it. The structure of the ISO 50001:2011 international energy management standard is heavily based on the ISO 14001:2009 standard (Walter Kahlenborn et al., 2015).

To better picture where does the Management System Standards apply, below are shown the Standards that make up the Integrated Management System with HLS structure:

ISO 9001:2015	Quality management systems
ISO 14001:2015	Environmental management systems
ISO 20121:2012	Event sustainability management systems
ISO 21001:2018	Educational organizations
ISO 22000:2018	Food safety management systems
ISO 30301:2019	Information and documentation
ISO 41001:2018	Facility management
ISO 45001:2018	Occupational health and safety management systems
ISO 50001:2018	**Energy management systems**

These standards work under the HLS structure, and it comprises:

1. Reach
2. Normative references
3. Terms and definitions
4. Context of the organization
5. Leadership
6. Planning
7. Support
8. Operation
9. Performance evaluation
10. Improvement

Clauses 1 to 3 provide a background to the standard, and it is not until clause 4 that the requirements of that standard are established. While clauses 4 to 10 are common to all management system standards, ISO 50001 specifically relates to energy issues. Therefore, some processes need to be established, implemented, and maintained, such as an energy policy and conducting an exclusive energy review of ISO 50001 (Fletcher, 2018).

The EnMS based on ISO 50001: 2018 is based on the continuous improvement framework (Table *1*) "plan-do-check-act" (PDCA); the elements or requirements of the management system are organized around functional activities and incorporate energy management into existing organizational practices (Figure *9*).

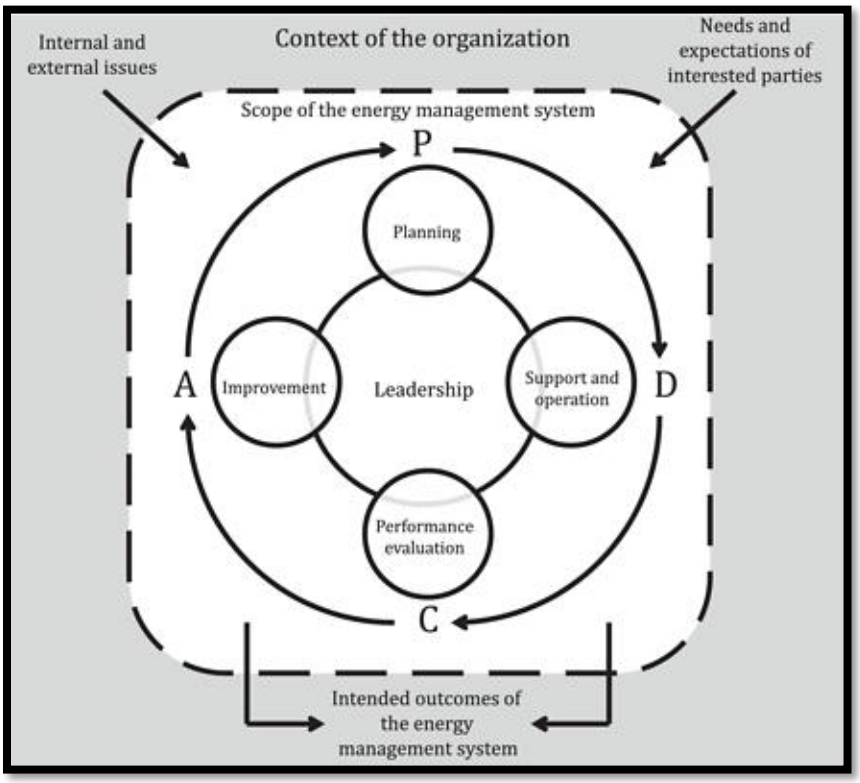


Figure 9. Continuous Improvement Cycle ISO 50001:2018

Table 1. The continuous improvement cycle and the requirements of ISO 50001: 2018

Plan	Understand the context of the organization, establish the energy policy and energy management team, consider actions to address risks and opportunities, conduct an energy review, identify Significant Energy Uses (SEnU) and establish Energy Performance Indicators (EnPIs), Energy Base Lines (EnBLs), Energy goals and objectives, and the action plans necessary to deliver the results that will improve energy performance, under the energy policy of the organization.	4. Context of the organization 5. Leadership 6. Planning	4.1. Understanding of the organization and its context 4.2. Understanding the needs and expectations of stakeholders 4.3. Determination of the scope of the energy management system 4.4. Energy management system 5.1. Leadership and commitment 5.2. Energetic politics 5.3. Roles, responsibilities, and authorities in the organization 6.1. Actions to address risks and opportunities 6.2. Objectives, energy goals, and planning to achieve them 6.3. Energy review 6.4. Energy performance indicators 6.5. Energy baseline 6.6. Planning for energy data collection
Do	Implement action plans, operational and maintenance controls, communication, ensure competition, and consider energy performance in design and procurement.	7. Support 8. Operation	7.1. Resources 7.2. Competence 7.3. Awareness 7.4. Communication 7.5. Documented information 8.1. Planning and operational control 8.2. Design 8.3. Acquisition
Verify	Monitor, measure, analyze, evaluate, audit, and direct reviews by energy performance management and the EnMS.	9. Performance evaluation	9.1. Monitoring, measurement, analysis, and evaluation of energy performance and the EnMS 9.2. Internal audit 9.3. Management review
Act	Take action to address nonconformities, and continually improve energy performance and EnMS.	10. Improvement	10.1. Non-conformity and corrective action 10.2. Continuous improvement

2.4.2 Campus EnMS Success cases

2.4.2.1 UNSW, Sydney

UNSW Sydney is an education and research-intensive university, delivering outstanding teaching alongside cutting-edge research. Environmental sustainability is a key element of its 2025 Strategy. Through this and its sustainability plan (UNSW, 2019), its mission is to become the first university in Australia to commit to having 100% of its electricity supplied by photovoltaic solar power. The students and staff are actively engaged in environmental and social issues. UNSW recognizes that they are uniquely positioned to contribute to solving global environmental challenges through teaching, research, thought leadership, and demonstrating leading practices on our campuses. UNSW is committed to continuously improving environmental performance across university operations – from the way they plan, construct, operate and power its buildings, reduce and manage waste, make purchasing decisions, and travel to and around their campuses. Through our learning and teaching programs, UNSW educates students about environmental issues and equips them to understand and solve global challenges.

Within the ENVIRONMENTAL SUSTAINABILITY PLAN 2019-21 (UNSW, 2019), Initial analysis shows that more than 50% of the emissions are indirect emissions associated with purchased goods and services, travel, and other activities. The UNSW will develop a complete inventory of direct and indirect emissions and develop a long-term pathway to zero emissions – aligned with the Paris Agreement's commitment of limiting global warming to 1.5°C.

The activities in each focus area of the Plan contribute to reducing greenhouse gas emissions.

Sustainability in Action Commitments

- Transition to renewable energy and reduce net GHG emissions to zero.
- Ensure our campuses and operations are resilient to future climate risks.
- Reduce net emissions from building energy use to zero by 2020.
- Expand onsite solar energy generation to 1.2MWp by 2022.

Activities

- Develop an emissions inventory and strategy to achieve net-zero emissions.
- Evaluate carbon pricing mechanisms.
- Purchase 100% renewable electricity by 2020.
- Develop a Climate Adaptation and Resilience Plan.

Furthermore, UNSW signed a 15-year solar energy Power Purchase Agreement in 2018 that will provide the University with 100% renewable electricity by 2020. By 2018, it expanded onsite solar PV generation capacity to almost 800kW – enough to power 160 homes (UNSW, 2019).

2.4.2.2 Stanford University

In addition to teaching, research, and public service in the field of sustainability Stanford University is committed to practicing sustainability in its operations and is making significant transformations of the campus toward that goal. The Stanford Energy System Innovations program is but one example and will provide the university an efficient, economic, and sustainable energy system for the 21st century (Standford University, 2014).

According to (Standford University, 2014) Stanford has completed the conceptual design of a 5.8MW of on-campus photovoltaic (PV) power generation system with solar panels on over a dozen major buildings and the largest parking garage on campus. A system this size is capable of supplying about 3% of the university's total electricity and would meet about 20% of campus load at times of peak daily demand. Stanford is also exploring much larger scale off-campus renewable electricity generation as part of its grid electricity sourcing effort as described in its report (Standford University, 2014). Both the on- and off-campus renewable power generation opportunities will be considered as Stanford finalizes the composition of its power portfolio to begin April 1, 2015, when the cogeneration plant is decommissioned.

Stanford has begun electrification of the Marguerite bus fleet and campus small vehicle fleets and the number of commuters using PEVs is also growing steadily. To support the adaption of electric vehicles Stanford is in the process of designing a campus-wide plug-in electric vehicle charging system for use by both commuters and university vehicles. The total estimated electricity use from a fully electrified campus fleet plus 5% to 10% of commuter vehicles is about equal to the electricity that will be generated from the new photovoltaic power generating system to be installed on the campus. Installation of the PEV charging system is expected to begin in the spring of 2015.

2.4.2.3 University of Calabria

The campus of the University of Calabria holds the distinction of being one of the greenest and most sustainable universities in all of Italy, thanks to energy-saving interventions carried out.

"*The replacement of approximately 33,000 lighting bodies with LED system has rendered this Calabrian university more virtuous from an energy-saving point of view*" (Racconti di Calabria, 2014).

Regarding this aspect, the University has carried out a whole renovation of its indoor artificial lighting system to pursue the dual objective of reducing the University's energy consumption, with the consequent reduction of CO_2 emissions into the atmosphere, and of upgrading the lighting system of the internal areas, which was very often obsolete and, in some cases, not capable of meeting minimum lighting requirements established by current regulations. This intervention provided for the replacement of the lighting bodies located inside the premises of the University of Calabria, such as classrooms, studies, laboratories, Aula Magna, Libraries, Administration, Secretariat, multipurpose rooms, toilets, and transit areas. Approximately 33,000 LED lighting fixtures allow a considerable energy consumption reduction. The improvement features related to the adoption of LED lamps affect all aspects inherent to using light sources, such as savings of about 93% compared to incandescent lamps; 90% savings compared to halogen lamps, 70% reduction compared to metal halide lamps, and 66% compared to fluorescent lamps. In addition to the considerable drop in the University's energy consumption and the consequent reduction in CO_2 emissions, the energy budget has decreased by about 40% (Racconti di Calabria, 2014). Furthermore, thanks to a software platform, created within the project, the new lighting system can be linked to brightness dimmers and control systems to program switching on the lighting bodies at any given time of the day and to regulate the luminous flux vis à vis the presence of external light. A solution that makes the new system even more virtuous in terms of efficiency and sustainability, shown by an average of 60% energy savings produced. The system allows monitoring all lighting while considering natural light: the intervention involved, in fact, not only the replacement of the old lighting bodies but also the installation of highly innovative sensors, which allow the new LED lamps to turn on and to switch off automatically if no presence is detected (Racconti di Calabria, 2014).

3 Methodology

The methodology used for the creation of the UEP is based on the requirements for the implementation of EnMS from ISO 50001: 2018. Therefore, a methodology integrated by 4 stages (Table *2*) is proposed, to carry out the design and implementation of an EnMS in the context of the continuous improvement cycle Plan-Do-Check-Act (PDCA).

For practical purposes, the scope of this methodology is limited only until the planning and the energy review at the UASLP (highlighted in bold letters in the Plan section of Table *2*). Since this is a pilot study, which is based on knowing the past and current energy situation of the UASLP, there are still no internal regulations that regulate the monitoring, operation, and evaluation of current energy consumption within the university. If more data on consumption, current regulations, and technical support were available at the time of this work, the present analysis would cover (depending on the time for its completion), all the aspects mentioned in Table 2 below.

The remaining part of the continuous cycle of Do-Check-Act steps, due to the information limitations, this work will only make the pilot guidelines as a recommendation in perspective for when the UEP is implemented in the UASLP.

Table 2. Steps for the design and implementation of an EnMS (ISO 50001:2018)

Plan	**UASLP Context** Leadership **Planning: Energy Review**
Do	Support Operation
Check	Perform Evaluation
Act	Improvement

As stated in the manual of (Flores Díaz, Escobar Pineda and Espinosa Flores, 2016) to better understand the abovementioned stages.

- PLAN: Refers to the activities associated with conducting the energy performance diagnosis and establishing the baseline, energy performance indicators (EnPI), objectives, goals, and action plans necessary to achieve the results that seek to improve energy performance under the UASLP energy policy (still yet non-existent, for this reason, the creation of this UEP is proposed).
- DO: Consider activities related to the implementation of UEP action plans.
- CHECK: It consists of monitoring and measuring the processes and key characteristics of the operations that determine energy performance concerning energy policies and objectives, reporting the results achieved.
- ACT: It involves taking actions to continuously improve energy performance and the EnMS.

3.1 Data needs

3.1.1 Identify the current Scenario (UASLP Context)

To determine the strategic issues that may affect the UASLP's ability to improve its energy performance and achieve the UEP's intended results, information is needed on the organization's strategic goals and challenges. This information may already have been identified as part of the organization's long-term or strategic planning process. It is desirable to have the participation of the Rectory in determining the relevant issues, not only to speed up the process but also to show the Rectory that the UEP considers the strategic problems facing the organization. However, it is unusual for the Rectory to participate in this process and will be usual for the Agenda Ambiental through the Energy Commission to develop this information on its own. In this case, the information must be presented to the high direction of UASLP for review and input. This approach assumes that the Energy Commission will have access to relevant information about the strategic direction, objectives, and challenges of the UASLP (USDOE, 2021).

Therefore, in this case, the "Literature Research" method is used to identify the current UASLP scenario and is best described in the next subtopic 3.2.1. This information will be collected in Chapter 4.3 of this document as the identification of the current scenario of the study case.

For the ISO 50001, identifying the stakeholders relevant to UEP's energy performance complements the high-level strategic understanding of the UASLP context. Identifying stakeholders and their requirements are best done by taking advantage of the multiple organizational perspectives represented by Agenda Ambiental through the Energy Commission. The Energy Commission will help ensure that a comprehensive approach has been taken and that the identified stakeholders are truly relevant to UASLP's energy performance and UEP. Since the Energy Commission has not yet been established properly within the UASLP, an individual can complete this task (my person in this case), and the results can be reviewed when the Energy Commission is formed or during the next annual UEP review. This "Stakeholders Analysis" methodology will be better explained in the next subtopic 3.2.2.

3.1.2 Planning process (Energy Review)

The Planning process provides an overview of the energy consumption and efficiency levels of the UASLP, essentials to create a UEP under the international standard ISO 50001. It is necessary to understand how, where, when, and why the UASLP consumes energy, and for this, it is necessary to analyze at a strategic and tactical level the behavior of the flow of the types of energy that the UASLP uses for its daily activities.

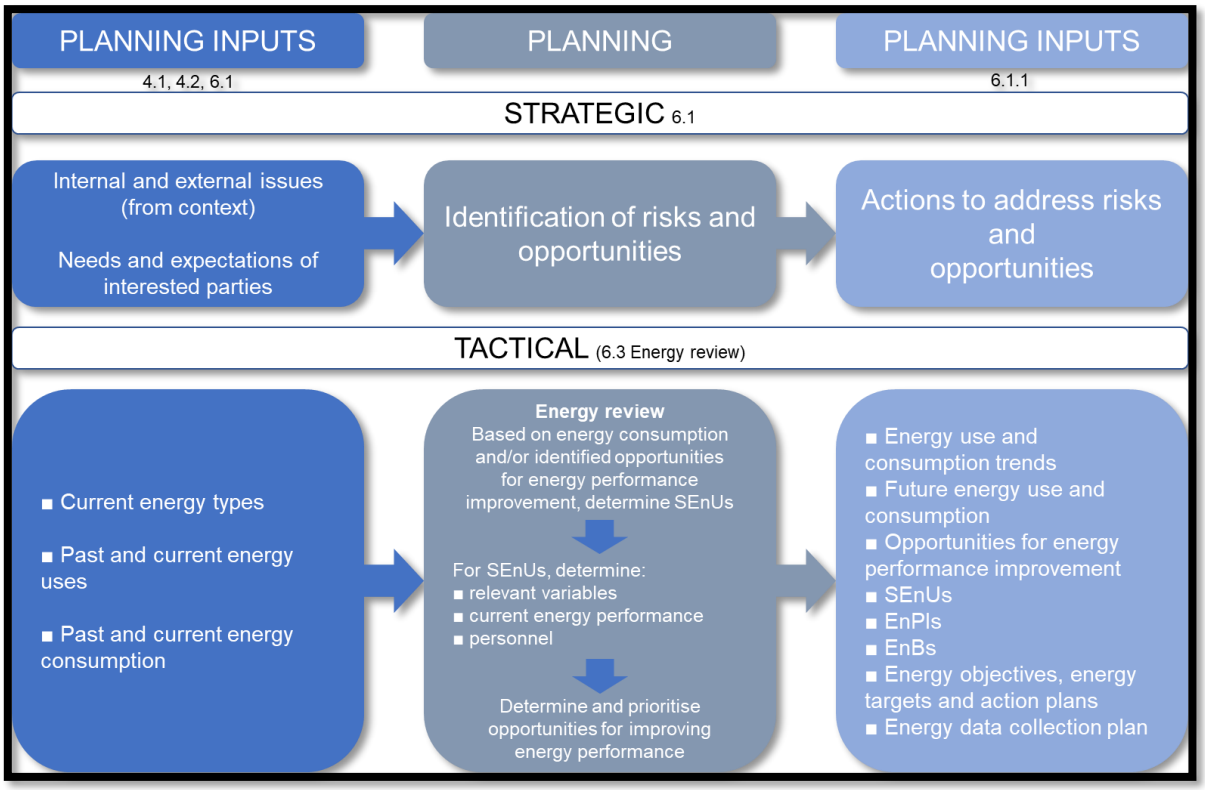
At the strategic level, understanding behavior is intertwined with internal and external stakeholder issues, who have needs and expectations regarding EnMS and energy

performance. Thus, risks and opportunities can be identified to establish actions to eliminate, mitigate or respond to various situations (Flores Díaz and Jáuregui Nares, 2020).

At a tactical level, the main topic is the methodology and criteria for conducting the energy review, which requires reliable energy data to formulate consumption prospects, identify opportunities for improvement, and establish energy goals and objectives. For this, it will be necessary to establish and monitor energy performance indicators and energy baselines, which should be directly related to significant energy uses, as well as to the energy data collection plan.

The planning process is illustrated in Figure 10 with the strategic and tactical levels:

Figure 10. Energy review within the planning process (CONUEE, 2020)

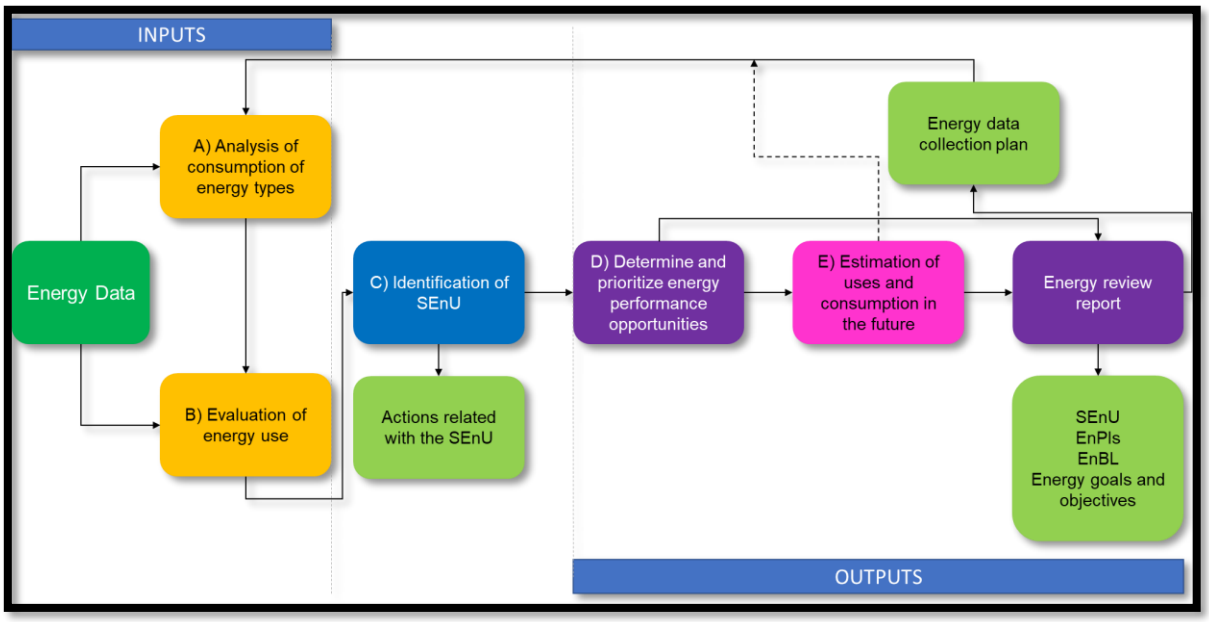


The energy review for the UEP focuses on the concept of energy performance, which considers energy consumption levels (the amounts of different energy used), energy efficiency (the relation of use of the types of energy), and the uses that are given to energy (the use of energy in production processes or provision of services).

Carrying out the energy performance study requires reliable and clear information on how, when, and where energy is used. The collection and monitoring of this information are necessary to correctly establish energy performance indicators and energy baselines since through these the continuous improvement of energy performance is demonstrated, as illustrated in Figure *11*.

The energy performance study can be carried out as part of the UASLP's procedures. In this case of limited resources, the information is obtained from energy receipts, surveys, and inventories of equipment (better explained in the next subtopic 3.2) that consumes energy within the scope and limits of the EnMS.

Figure 11. Energy review within the planning process



To better understand the concepts stated in the previous Figure 11 and according to the ISO 50001 terms, the Significant Energy Uses (SEnU) are determined and selected by this work and constitute a key aspect within the UEP as they are the priority within the energy management, for the purposes of this work the two SEnU are Electricity consumption within the UASLP and transportation-related with the UASLP activities.

The Energy performance indicators (EnPIs) are quantifiable values of the entire UASLP or some parts of it; They are selected to understand, monitor, measure, and analyze their energy performance before, during, and after the implementation of the UEP and other actions related to energy management. Due to the limited information, the EnPIs selected for this work were selected as questions within the survey that will be carried out with the UASLP community, these indicators are Artificial Lightning, Electrical Appliances, and Transportation (Table *3*). These ENPIs will be described and quantified in the Results and Discussion section.

Table 3. Energy Performance Indicators (EnPIs)

Energy Uses	EnPI	Units
Electrical Devices	Connected appliances	*Number/work area*
	Type of appliances	*Number per type/work area*
	Appliances' hours of use	*Hours of usage/day*
	Appliances' days of use	*Days of usage/week*
	Energy Efficient Appliances	*Usage percentage % (respect of the total of appliances)*
Artificial Lighting	How many bulbs or lamps	*Number/work area*
	Type of bulbs or lamps	*Number per type/work area*
	Bulbs or lamps' hours of use	*Hours of usage/day*
	Bulbs or lamps' days of use	*Days of usage/week*
Transportation	Time used in transportation	*Hours/day*
	Days of transportation	*Days/week*
	Means of transportation	*Name of resource*
	Travels per year	*Number/Distance (km)/year*
	Travel means per year	*Name/ Distance (km)/year*
	Estimate of travel hours	*Hours/year*
	Transport services	*Number of Vehicles per Entity*
		Number of Passengers per service
		Number of roundtrips per day
	Cars at the UASLP daily	*Number of cars entering per day*
	Motorcycles at the UASLP daily	*Number of Motorcycles entering per day*
	Zero-Emission Vehicles (ZEV)	*Average number on campus per day*
Consumption	Annual UASLP consumption	*kWh/year*
	Annual Energy Expenses	*$ MXN*
	CO_2 Annual Emissions	*tCO_2e*

The quantitative reference with which the level of consumption and efficiency of energy uses of an organization is compared is called the energy baseline (EnBL). The data to establish the first EnBL are taken from the energy review and in the case of this work, it will be calculated with the consumption data (Table *3*) of a previous period and an average of several periods for the years 2019 and 2020.

Summarizing, the Data Collection Plan will be obtained from CFE electricity receipts, “Energy Habits” survey, and inventories of equipment use, these data will be used as a framework to establish the selection criteria of the SEnU, EnPIs, and EnBL.

3.2 Data acquisition

3.2.1 Literature research

The bibliographic review is applied to this research topic to determine its relevance and importance and to ensure the originality of the research. In addition, it allows other researchers to consult the bibliographic sources cited, being able to understand and continue with the work carried out (Gómez-Luna *et al.*, 2014). First, the definition of the problem must be sufficiently clear to be able to carry out a bibliographic search that responds to the needs of the researcher, and that also contributes to the state of the art, so that it leads to a broad scenario and allows feedback on the research.

The proposed methodology is made up of three phases:

1) Information search: For the bibliographic research process, informational material such as books, popular science magazines or scientific research, Web sites and other information necessary to start the search must be available.
2) Organization of information: This phase is of great importance in any research project, it consists of systematically organizing the documentation found. It can be done both in a basic or detailed way. Initially, the information can be arranged in folders or spreadsheets developed by the researcher himself manually, however, the process is slow and poor; Another way to do it is by using special programs (Rivera and García Rojo, 2003).

   For the case of this research, *Mendeley Desktop* will be used, Mendeley Desktop is a document manager of scientific information. The advantages are in its intuitive use, document management, ease of import and export, and document sharing in private and public groups, supporting research work in the scientific social network.

3) Analysis of the information: The third phase is to analyze the information already organized, inquiring about which are the most useful documents for the subject under study. Information analysis is the task that takes the most time in bibliographic research, since with it the hopes to identify the contribution to be made. In this phase, you must have critical thinking and should be done in parallel with the first, since it is a constant process. It is a cycle where the ideas are raised in the formulation of the problem and if the problem is well known, the solution will be within reach (Gómez-Luna *et al.*, 2014).

3.2.2 Stakeholder Analysis

For (USDOE, 2021), a stakeholder is "a person or organization that can affect, be affected by, or perceive itself as affected by a decision or activity." In this case, we are interested in decisions or activities related to energy performance and the EnMS of your organization. A stakeholder who "perceives" himself as affected by such decisions or activities should report this to his organization.

In public policy making the actors and their behaviors represent the core of any possible theoretical model. The actors are those individuals or organizations that make the actions able to influence the decisional outcomes and that do it because they pursue goals regarding the problem and its possible solution, or their relations with other actors (Dente, 2014). In particular, any actor having a vested interest in the decision process, either directly affecting or being affected by its resolution, including experts and the public, is named stakeholder. Stakeholders have access to and can mobilize different types of resources (i.e. political, economic, legal, and cognitive resources), they can be grouped into different categories (i.e. political actors, bureaucratic actors, special interests, general interests, and experts) and they can have different roles (i.e. promoter, director opposer, ally, mediator, gatekeeper, and filter) (Dente, 2014).

These analytical categories are needed to simplify the analysis, as they supply useful guidelines to interpret (and forecast) stakeholders' behaviors. The final aim of the analysis is to develop a strategic view of the human and institutional landscape, the relationships between the different stakeholders, and the issues they care about most (Ferretti, 2016).

To this end, various stakeholders mapping techniques exist, nevertheless the one used in this work is a *Stakeholder Mapping "Net-Map"* that is a participatory tool to render social network graphs and at the same time foster discussions among participants about their situation. The visual bits help understand the complex nature of relationships between actors, their interests, and the influences of diverse stakeholders, that determine the outcome (The World Bank Group, 2016). To prepare the Stakeholder Mapping "Net-Map" the free online platform *"Kumu"* will be used. This is a platform to create digital maps by hand or it also has the possibility of importing existing data; For this work, the option of creating maps by hand from the Stakeholders matrix will be used.

By grouping stakeholders, this work, and Agenda Ambiental can thus produce a better picture of how communication and relationships between stakeholders can affect the UEP and its implementation. Identifying and studying the stakeholders involved in a decision problem is particularly important in the domain of decision making since key representatives can then be invited to participate in brainstorming sessions where cognitive mapping techniques can be used to identify and discuss the objectives to be pursued with a more systemic and interdisciplinary approach (Ferretti, 2016). Collaborative decision processes can thus help to tackle this challenge. The existence of a plurality of points of view allows us to imagine different possible approaches to the problem, different intervention methods, and different decisional procedures (Ferretti, 2016).

3.2.3 UASLP community survey

Within the production of statistics, surveys play a very important role. These surveys are measurements at a specific time, so it cannot be established that their results are accurate indicators of what will happen months later (Lastra, 2000).

This thesis work will use the *probabilistic survey*, which aims to study the methods to select and observe a part that is considered representative of the population, called a sample, to make inferences about the total. Specifically, *stratified sampling* will be used where a population is divided into several subpopulations called strata (Lastra, 2000), for this case the total population will be the entire UASLP community, and the strata into which it will be divided will be: *Students, Academic staff or teachers, and Administrative Staff*. The stratification criterion is to form homogeneous groups within each one and heterogeneous among them. The survey will be distributed to all the campuses and academic units along with the State of San Luis Potosí, via e-mail, through UASLP distribution lists with the help of the communication department of the Agenda Ambiental.

The intention of the survey is not to describe in a particular way the individuals who were part of the sample, but to obtain a statistical profile of the population (Lastra, 2000). For this, it relies on a set of probabilistic assumptions about the behavior of the population variables (UASLP Community).

The information is collected in a standardized way utilizing a survey (identical instructions for all subjects, identical formulation of the questions, etc.), which enables intragroup comparisons to be made. In the survey, you can find different types of questions depending on the answer, nature, content, and function. The questions can be classified into (Casas Anguita, Repullo Labrador Donado Campos and Casas Anguita, 2003):

1. Closed. Closed questions (also called pre-coded or fixed response) are those in which the respondent, to reflect his opinion or personal situation, must choose between two options: "yes-no", "true-false", "agree-in disagree", and so on. Their advantage is their easy response and coding; however, the information they offer is limited.

2. Multiple choice. These types of questions can be of three types:
   - Range of responses, when the respondent is offered a series of response options, which must be exhaustive and mutually exclusive.
   - Range of responses with an open item. This type of question is appropriate when it is not certain that it is exhaustive, and the possibility is left to the respondent to add options not contemplated in the answer alternatives offered.
   - Estimation questions. In this case, responses graded in intensity on the desired information point are offered as alternatives.

3. Open. Open questions are considered when the respondent is given the freedom to answer in their own words. This type of question is indicated in exploratory studies and

when the level of information that respondents have is unknown. They have the advantage of providing a lot of information and a maximum of freedom to the respondent; However, the coding of the answers can pose certain difficulties and requires a greater effort from the respondent to answer them.

For the determination of SEnU, a survey was chosen out to gather opinions from the members of the UASLP, responsible for the process and maintenance on specific anecdotes, lessons learned, good practices in the main energy-consuming systems, air conditioning, lighting, or refrigeration, among others.

The questionnaire survey is the most common and useful method to analyze occupancy and occupant behavior in residential buildings. The repartition in sections can be dictated by the aim of collecting information about physical, and behavioral variables (De Simone and Fajilla, 2019). Physical parameters allow defining the energy consumption context, the workspace typology, the heating/cooling systems, and equipment. To integrate the UASLP community behavior in energy calculation, there is a need to have hourly presence schedules for each group of rooms with similar activity types and systems usage schedules (De Simone and Fajilla, 2019). In particular, UASLP community profiles can be defined by considering how people occupy the building, use the systems, and how they interact with devices (windows, blinds, lighting, and appliances).

Building's energy consumption will be also investigated regarding occupancy categories and correlations. Hourly profiling will be detailed at room level and by splitting the analysis into weekdays and weekends.

3.2.4 UASLP Energy Consumptions and Inventory of energy equipment

For the ISO 50001, evaluating energy performance requires reliable information and clarity on how, when, and where energy is being used. The collection and monitoring of this information are necessary for the establishment of the EnBLs and energy management. The level of depth with which energy data collection can be carried out is directly related to the technological capacity to measure or estimate the energy consumption of energy uses. If there is no direct measurement of the energy consumption of equipment or facilities, it is possible to estimate it based on design and operation information.

The data must be appropriate as it will be used to establish energy objectives and targets.

According to (Flores Díaz, Escobar Pineda and Espinosa Flores, 2016), it is advisable to consider the steps described below:

- a) Determine the appropriate level of detail: Due to the practical terms of this research and due to the lack of energy data in this regard, it will have opted for the specific collection (equipment) with direct measurements and an analysis of energy service bills. The measurement can be as detailed as the UASLP requires, but it is

important to establish criteria to ensure that the resources are correctly invested and that an excess of information is not generated that will not be analyzed, or that was not strictly necessary.

It is also important to take care that if those estimations are made, they correspond to energy consumption and analyze if such. Sometimes it is necessary to have specific measurements.

- b) Identify documents of energy use and consumption: For the energy sources identified above, energy utility bills, meter readings, and other usage and consumption data can be collected. It is recommended to use the most recent data available.
- c) Account for all energy sources (energy matrix): An inventory of all energy consumers purchased, received, and generated on-site (electricity, gas, residual fuels, by-products) with their respective energy units (kWh, kJ, MMBTU) and homologation of units.

The energy data collection can be done in a simple format, where the different energy consumers are identified with their corresponding units in each period of time.

3.3 Data analysis

3.3.1 Descriptive analysis process

Through this type of descriptive research, which uses the analysis method, it will be possible to characterize the current energy situation of the UASLP, in addition to pointing out its characteristics and properties. Combined with certain classification criteria based on EnMS ISO50001: 2018, it serves to order, group, or systematize the actions involved in the investigative work.

Regarding the research that this document has described above, it can serve as the basis for other further research that requires a greater level of depth. The objective of this research is to describe the structure of the phenomena and their dynamics, to identify relevant aspects of the energy reality of the UASLP. For this, both quantitative techniques (inventories, receipts, surveys) and qualitative techniques (bibliographic review and the study of the habits of the UASLP community through the survey) will be used.

In accordance with (Behar Rivero, 2008); Descriptive analysis studies serve to analyze what a phenomenon and its components are like and how it manifests itself. They allow detailing the phenomenon studied basically through the measurement of one or more of its attributes.

The knowledge will be of greater depth than the exploratory one, the purpose of this is the delimitation of the facts that make up the research problem, such as:

1. Establish the demographic characteristics of the UASLP and its campuses (population number, distribution by activity performed, level of awareness, etc.).

2. Identify forms of behavior, attitudes of people who are in the universe of the UASLP (social behaviors, preferences, etc.)
3. Establish specific behaviors.
4. Discover and verify the possible association of the research variables contained in the EnMS ISO 50001: 2018.

In addition, this analysis will identify key characteristics of the UASLP and its relationship with energy, it will indicate forms of behavior and attitudes of the UASLP, it will establish specific behaviors, it will discover and verify the association between the research variables.

In accordance with the objectives set, this work indicates the type of description that it is proposed to make. Use specific techniques in information gatherings, such as observation, information gathering, and questionnaires. To collect information, it is subjected to a coding, tabulation, and statistical analysis process that will be presented in the results section.

“This study describes the frequency and the most important characteristics of the energy situation of the UASLP. To carry out descriptive studies, two fundamental elements must be taken into account: Sample and Instrument: EnMS ISO 50001”.

3.3.2 Index-based analysis process

An indicator is a measure (the distance that exists to achieve an objective or goal), on which the performance of an administration can be evaluated (Medina-Ross, Mata-Sandoval and López-Pérez, 2005). or university regulations through the UEP.

The EnPIs are statistics that seek to achieve a more in-depth understanding of the main problems of the UASLP energy sector. In addition, they are tools to inform university regulators and the general public, energy issues (Table 3) related to sustainable development and promote institutional dialogue (Meléndez M, 2014). The objective of the EnPIs is to provide information, in a format that simplifies decision-making at the institutional level, to help the university, evaluate whether its energy regulations are effective in achieving being a sustainable university in compliance with the UN SDGs. Thanks to the indicators, it should be easier to see what actions are needed for sustainable development and thus determine what statistics must be collected in the field of energy (Meléndez M, 2014). The EnPIs must be interpreted in the context of the UASLP's economy and its resources.

For this analysis, it is necessary to consider the factors that impact the level of energy consumption and efficiency (relevant variables) of the selected activities or levels that will have an EnPIs (Flores Díaz and Jáuregui Nares, 2020).

Some relevant variables that can affect energy performance are:

- Climate, ambient temperature, humidity, degrees/day.
- Occupancy levels in buildings.
- Availability of natural light and the necessary light levels.

- Hours of operation.
- Levels of activity (occupation).
- Distances traveled for transportation to the UASLP.
- Use of vehicles for transportation.

EnPIs values are required to be reviewed and compared over time, with the EnBLs to monitor and be able to report on positive results or significant deviations and respond to them.
The evolution of the EnPIs, over time and of the EnMS itself, indicates whether the implemented action plans produce the expected improvements; on the contrary, it will be necessary to review it and, if necessary, update it (Flores Díaz and Jáuregui Nares, 2020).

The Index-based analysis incorporates a series of indicators (Table 3) that allows this work to monitor both the amount of energy consumption and how energy is consumed. In addition, it is complemented with a proposal of graphic statistical techniques that facilitates the analysis of the measurement results. On the other hand, the proposal of indicators has bibliographic support and construct validity by ISO 50001 (Torres Navarro, Salete Waltrick and Flores Canales, 2017). Although this research offers a methodology for the treatment of data that originates through the identification of measurement needs in the UASLP, its coverage only covers types of indicators:

- Electrical Appliances
- Artificial lighting
- Transportation
- Consumption.

The resulting energy indicators consider the contributions of the specialized energy literature such as ISO 50001. On the other hand, both the methodological and design proposal of energy indicators may be replicated in others in all the faculties and academic units of the UASLP, both as in organizations of a similar nature and at the same time responding to the requirements regarding the availability of monitoring, measurement and analysis mechanisms usually required in various regulatory management systems (Torres Navarro, Salete Waltrick and Flores Canales, 2017).

3.4 Limits and biases

Due to the limitation for data collection, the implementation of this analysis in the future will require the UASLP to carry out checks on the status of the equipment to verify its status and functionality, in addition to establishing a systematic process for collecting and recording data to help the data analysis process is effective and representative of the operation of the entire UASLP.

An important limitation will be the period for which the energy consumption (in the form of electricity bills) of the entire UASLP is had since only the present work managed to obtain the invoices for the periods January-December 2019 and 2020, which is why which research will focus on this period and hence the limitation of analyzing earlier and more recent behavior to date.

Biases can be presented during the collection of responses in the online survey for the entire UASLP community. This is since the institutional communication lists will be used (all emails that are registered with the UASLP domain), the survey will reach all staff and the student community, from the highest position in the university government, to even the newest student. Therefore, previously mentioned, the survey will present an information bias because only the people interested in the subject of the survey (Energy) will be the people who will answer the survey; This bias does not mean that the interested parties are experts on the subject or have knowledge of it.

Another limitation for obtaining data should be highlighted, which will be the bias that will be had to obtain inventories of electrical equipment, their nominal powers, hours of operation, and energy consumption. An invitation will be made to the university community to share publicly and openly the inventories of their work centers. Reason for which again a bias will occur and only interested people or those who have this information will share it in this thesis work.

The only academic entity committed for obvious reasons to share its equipment inventory is Agenda Ambiental. However, there are still many information gaps due to the absence of an energy management program currently implemented at the university.

4 Study Case: UASLP, San Luis Potosi, Mexico

4.1 Mexican Energy Sector

According to (INEGI, 2020), by 2018, Mexico had a population of 125 million people. From UN statistics, the population by 2019 was 126.577,69 million people. The GDP in 2019 was 1,268,870.53 'current US$' (World Bank, 2021). Table *4* shows the leading economic indicators having the most recent information for 2019.

Table 4. National Energy Balance: Economic and energy indicators (SENER, 2019)

Description	Unit	2017	2018	2019
National energy consumption (petajoules)	PJ	9,249.746	9,236.858	8,811.055
National GDP (billions of pesos of 2013)	$	18,147.787	18,551.600	18,509.940
National population (millions of inhabitants)	pna	123.518	124.738	125.929
Energy intensity (KJ / $ produced)	Num	509.690	497.901	476.017
Per capita energy consumption (GJ / inhab.)	GJ	74.886	74.050	69.968
Electricity consumption (GWh)	GWh	259,881.837	277,928.224	284,214.999
Electricity consumption per capita (kWh / inhab.)	Num	2,103.995	2,228.100	2,256.938
Production (petajoules)	PJ	7,027.223	6,484.842	6,332.812
Gross domestic supply (petajoules)	PJ	9,249.746	9,236.858	8,811.055
Production ratio between gross domestic supply	Num	0.760	0.702	0.719

Primary energy considered in Mexico's energy balance includes those energy products that are extracted or captured directly from natural resources. The main products are mineral coal, oil, condensates, natural gas, nuclear energy, hydropower, geo-energy, wind energy, solar energy, sugarcane bagasse, firewood, and biogas. This type of life is used as an input to obtain secondary products or consumed directly. Secondary energy sources are derived from primary sources obtained in transformation centers, with specific characteristics for final consumption, such as coal coke, petroleum coke, liquefied petroleum gas (LP gas), gasoline, naphtha, kerosene, diesel, fuel oil, gas oil, dry gas, ethane, electricity, industrial gases derived from coal and non-energy products. Recently, asphalt, paraffin, lubricants, propane-propylene, and butane-butylene (SENER, 2020) are also used as raw materials.

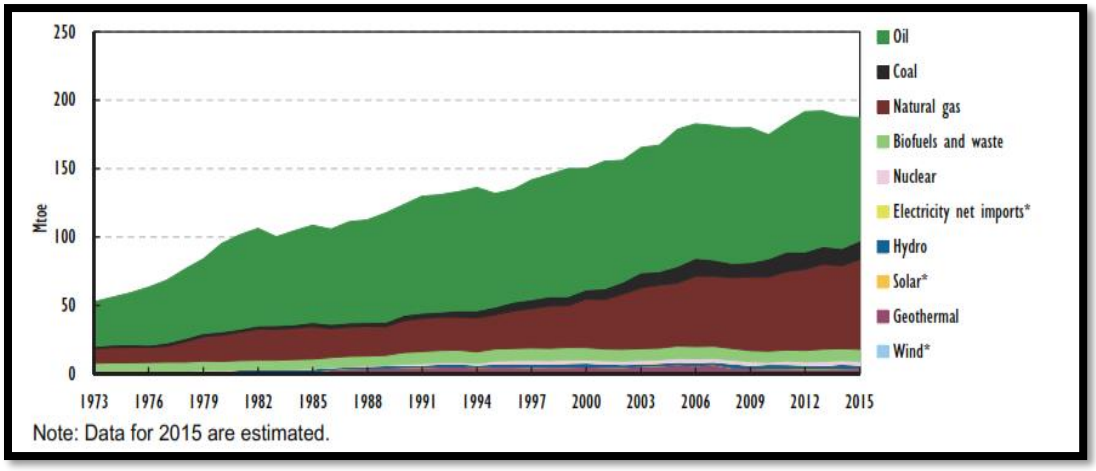
Table 5. Production of primary energy [Petajoules] (SENER,2019).

Description	2017	2018	2019
Total	7,027.223	6,484.842	6,332.812
Coal	308.240	279.578	230.461
Hydrocarbons	5,940.602	5,374.178	5,315.164
Raw oil	4,354.890	4,045.947	3,788.641
Condensates	67.283	48.901	60.487

Natural gas	1,518.428	1,279.330	1,466.036
Nucleoenergy	113.219	156.003	124.817
Renewable	665.162	675.084	662.370
Hydropower	114.652	116.948	84.989
Geoenergy	127.426	113.184	112.883
Solar energy	15.156	23.979	40.315
Wind power	38.231	47.119	60.216
Biogas	2.520	2.844	2.799
Biomass	367.177	371.010	361.168
Cane bagasse	116.869	121.926	113.249
Firewood	250.308	249.084	247.919

Mexico's Total Primary Energy Supply (TPES) has remained constant for decades, based on oil as the central primary energy resource (IEA, 2017). Although there was a moderate downturn between 2006 and 2010, the TPES has remained growing, standing the TPES at 187.3 million tons of oil equivalent (Mtoe) in 2015, being the fossil fuels accounted for 90.4%, mostly consisting of oil (48.1%), natural gas (35.1%), and coal (7.3%) (IEA, 2017). According to (INEGI, 2018), 99% of the country's inhabited homes have electricity, of which only 0.25% use solar energy as an alternative source, either exclusively or in a bidirectional or hybrid system ‘solar and public network.

Figure 12. Mexico’s total primary energy supply, 1973-2015 (IEA, 2017).



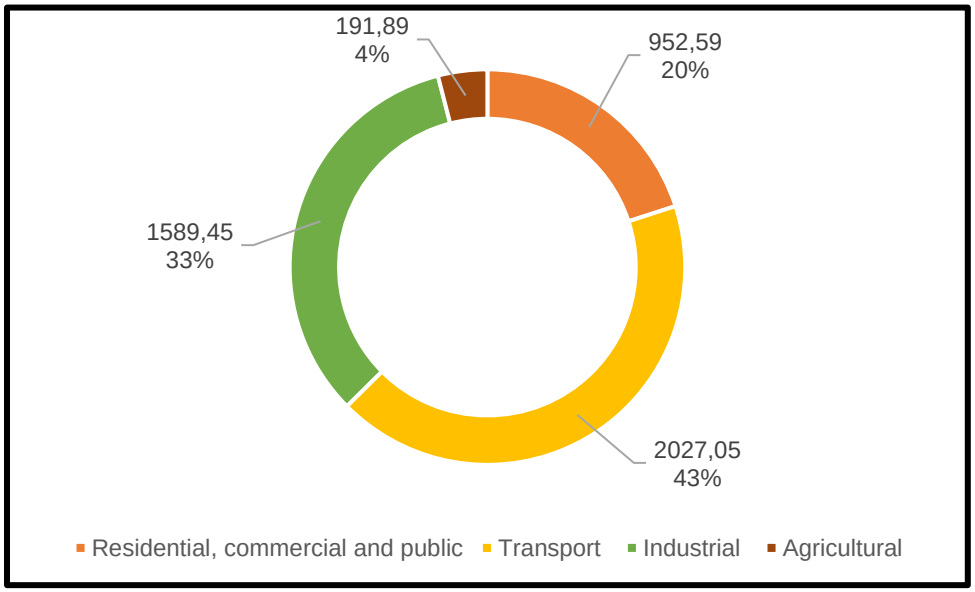
4.1.1 Energy demand by sectors

According to (SENER, 2020), in Mexico, gasoline and naphtha were the fuels with the highest energy consumption during 2019, with 29.14%. These showed a decrease of 13.73% compared to the previous year, which is reflected in the drop in consumption in the transportation sector.

Electricity was the second energy source with the highest consumption with 20.53%. Diesel covered 12.98% of the requirements for final energy, followed by dry gas with 11.32%.

The sectors in which total final consumption is broken down are transportation, which is the most intensive sector in energy use, representing 42.58%; the industrial, which consumed 33.38%; the residential, commercial, and public with 20.01%; and agriculture, with 4.03% (Figure *13*).

Figure 13. Final energy consumption (PJ) by sector 2019. Adapted from SENER, 2020



Energy consumption in the residential sector during 2019 decreased 1.53% compared to 2018, totaling 748.94 PJ (Table *6*). Likewise, during this year a decrease of 0.47% was observed in the consumption of firewood in homes.

As mentioned in (Lorentzen, Mcneil and CONUEE, 2019), the use of electricity for non-residential buildings (commercial sector in the national energy balance) reported in SENER's energy statistics, these are users of low voltage electricity corresponding to small companies. However, it is known that many hotels, hospitals, restaurants, shopping centers, supermarkets, schools, and hospitals are in medium voltage rates, which are considered as the industry. This has led to a systematic undercounting of the consumption of electricity

from non-residential buildings, and its corresponding over-counting of electricity consumption in industry, particularly in the "other industrial branches" sector (Lorentzen, Mcneil and CONUEE, 2019).

Energy consumption in the commercial sector decreased 1.95% compared to 2018. Electricity was the main source of energy with a 54.29% share in this sector.

The consumption of the public sector, which considers the electricity used in public lighting, pumping of drinking water and sewage, as the only energy resource, increased 6.52% compared to the previous year.

Table 6. Energy consumption in the residential, commercial, and public sectors (PJ). Adapted from (SENER,2020)

	2018	2019	2019%
Total	**958,97**	**952,59**	**100**
Residential	760,6	748,94	**78,62**
Electricity	*227,8*	*232,15*	*24,37*
Commercial	167,44	170,7	**17,92**
Electricity	*87,17*	*92,67*	*9,73*
Public	30,93	32,95	**3,46**
Electricity	*30,93*	*39,95*	*3,46*

For the transport sector, (SENER, 2020) reported that the fuel consumption totaled 2,027.05 PJ in 2019, 17.42% lower than in 2018. Auto-transportation was the most representative component with 89.15% participation, decreasing 16.61% compared to the previous year. The other types of transport also presented decreases in their consumption, except for electricity, which increased 3.08% (Table *7*).

Table 7. Energy consumption in the transport sector (PJ). Adapted from (SENER, 2020).

	2018	2019	2019%
Total	**2454,7**	**2027,05**	**100**
Auto-transportation	2205,07	1807,07	89,15
Aerial	190,74	175,87	8,68
Maritime	27,46	20,94	1,03
Railway	27,76	19,41	0,96
Electrical	3,67	3,78	0,19

4.1.2 Mexican Legislation of energy and energy efficiency

The Mexican political hierarchy works in an immense framework of a federal democratic republic headed by the President. The congressional system is the basis of the Government, and its order is broadly divided into five categories: the Executive, the Legislative, the Judicial, the State, and the Local Government. The President is elected for a non-renewable six-year term and appoints the cabinet. In the regional governments, state governors are elected for six-year terms; each State has a local legislature and has the right to levy state-wide taxes; municipal presidents are elected for three-year terms. Mexico's political system is highly centralized. State governments highly depend on Mexico City for the state revenues.

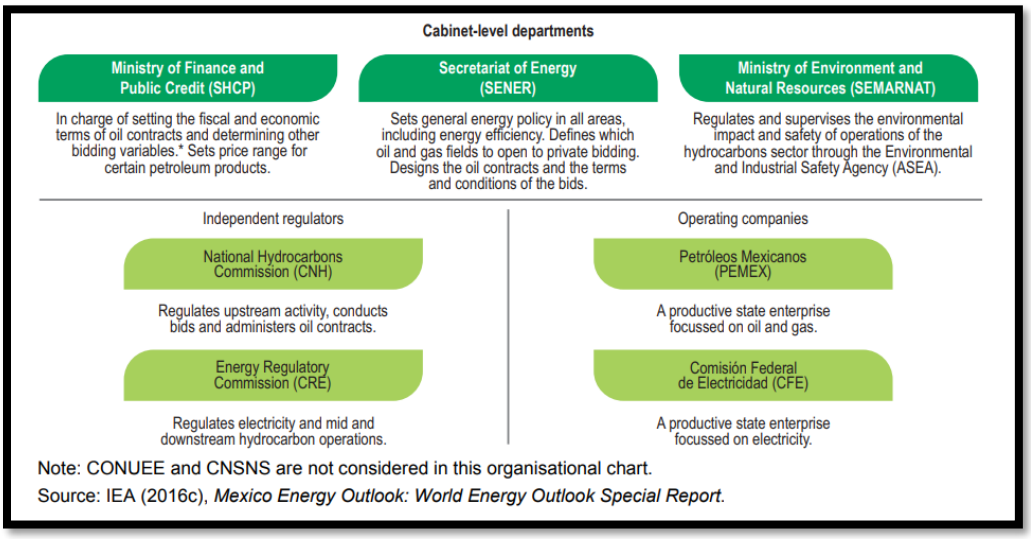
The most recent institutional framework of Mexico is shown in Figure *14*. The three central governmental bodies in charge of energy policy are:

- *The Ministry of Finance and Public Credit (SHCP)* has powers to overrule CRE's retail tariffs for the primary service suppliers. The unbundling of CFE and the introduction of regulated network tariffs are expected to increase transparency about the costs of the CFE. Responsibility for subsidies to electricity end-users will also be transferred from CFE to the Ministry of Finance and Public Credit, and they will be paid out from the government budget.

- *The Federal Ministry of Energy (SENER)* acts as the main body responsible for coordinating the electricity sector. There is no split of responsibility with states. The ministry oversees the electricity market reform, including preparing laws and decrees and implementing them. SENER issues every year a planning document for the electricity sector called The National Electricity System Development Program (PRODESEN). It includes an indicative program for the installation or closure of power plants. It also consists of the expansion and modernization programs of the national transmission grid and public distribution networks. The program is based on all public and private projects to increase generating capacity and includes projects for transmission and distribution on a time horizon of 15 years.

- *The Ministry of Environment and Natural Resources (SEMARNART)* acts as a regulator of environmental issues. In specific related to energy topics, SEMANART regulates and supervises the safety of operations and the management of ecological impacts from the hydrocarbons sector.

Figure 14. New Mexican energy institutional set-up (IEA, 2017).



On the other hand, there are other relevant actors like independent regulators and operating companies. Into the first ones, the *National Hydrocarbons Commission (CNH)* is one the most important based on its responsibility for regulating and supervising exploration and extraction of hydrocarbons, including collection from production points to their integration into the transport and storage systems, execution of bidding rounds and the signing of contracts for exploration and extraction of hydrocarbons. Another one is the *Energy Regulatory Commission (CRE)*, in charge of tasks like calculate network tariffs (transmission and distribution), operation of the primary service suppliers, including the electricity system from the operator of the *National Center for Energy Control (CENACE)*, as well as the final basic supply tariffs. CRE enjoys technical, operational, and managerial autonomy and can dispose of its revenues from a tax, not from the state budget. CRE has a clearly defined but limited set of additional responsibilities (dispute resolution, inspection and control rights, and an advisory role) and a very detailed governance structure, including limiting the term of CRE's President Commissioner to 14 years. Both CNH and CRE elect their board directors by the Senate.

As a relevant point, before the 2013 energy reform, supplying electricity was a government responsibility. The vertically integrated regulated utility, the *Federal Electricity Commission (CFE)*, was an integral part of the Government, owning most generating capacity and procuring, through Power Purchase Agreements, additional electricity from independent power producers. As part of the reform, CFE has been transformed into a productive state enterprise that SENER will continue to control. In that sense, the CENACE is the electricity system operator, known as the future system organization's cornerstone. CENACE is an autonomous body, formerly part of CFE. It was created in 2014 and is responsible for operating the national electricity and wholesale electricity markets. CENACE does not own transmission assets that remain the property of CFE. Still, CENACE works the wholesale electricity market to ensure the least-cost dispatch of all power plants in adherence to

economic considerations such as free competition, transparency, and market efficiency. Like independent system operators (ISOs) and regional transmission operators (RTOs) in the United States, it also plays a crucial role in planning the power system. They include investments in transmission, defining capacity requirements, operating capacity markets, and running long-term auctions (IEA, 2017).

Another essential operating company is *Mexican Petroleum (PEMEX)*, the state-owned oil company of the oil industry in Mexico, one of the ten largest oil companies globally that play a significant role in Mexico's economy and government revenues. It was founded in 1938 and had a monopoly in Mexico until 2014 in fuel production (petrol and diesel) and the granting of concessions at petrol stations. In 2014, the monopoly was ended, and the company was also opened to private capital. Since November 2017, petrol station owners also have set fuel prices entirely on their own. It is currently suffering from low productivity, among other things, following corruption scandals and a lack of investment in recent decades.

Other actors involved:

- The *National Gas Control Center (CENAGAS)* is responsible for the management, administration, and operation of the *National Gas Transportation System and Integrated Natural Gas Storage (SISTRANGAS)* to ensure continuity and security in the provision of natural gas services. The center elaborates the Five-Year Plan for the SISTRANGAS Expansion, submitted for approval to SENER, along with CRE's technical opinion.
- The *National Agency for Industrial Safety and Environmental Protection of the Hydrocarbons Sector (ASEA)* is an administrative body with technical and managerial autonomy which reports to the Ministry of Environment and Natural Resources (SEMARNAT). Its task is to regulate and supervise industrial, operational safety, and environmental protection in the hydrocarbons sector. It also oversees the dismantlement and abandonment of facilities, as well as GHG emissions control.
- The *National Energy Efficiency Commission (CONUEE)* is an administrative body with technical and operational autonomy embedded within SENER's structure. CONUEE aims to promote sustainable energy and energy efficiency measures throughout the energy supply chain from production to consumption.
- The *National Commission for Nuclear Safety and Safeguards (CNSNS)* has the mandate to ensure that all activities involving nuclear and radioactive materials and radiation sources are carried out exclusively for peaceful purposes and in a safe manner. This includes monitoring the implementation of nuclear, radiologic, physical security standards and safeguards for the operation of nuclear and radioactive facilities.

A Critical energy reform was implemented in Mexico in 2013. As a context, before 2012, Mexico had a traditional industry model where a vertically integrated state agency, the CFE, was responsible for developing all power industrial chain activities, from energy generation to delivery to end-users. The model allowed the participation of private generators under the category of non-public service or external energy producer. It operated under specific conditions over the energy produced like destination, referring to its consumption or intended for exports or direct sale to CFE; and authorization based on the fact that a CRE permit is mandatory.

In 2012, Enrique Peña Nieto announced the “Pacto por Mexico” agreement with major political parties across the political spectrum, including elaborating an energy reform. The Mexican Constitution's key amendments were related to Articles 25, 27, and 28, which reserved large parts of the State's energy sector activities. The reform decree also included 21 transitory articles, which outlined the main aspects of secondary legislation. The fundamental principles of the reform were:

- reaffirming the constitutional principle of state ownership over subsoil resources
- free competition among economic actors in the sector
- strengthening of regulatory agencies focus on transparency and accountability in the new contracts
- environmental protection and fostering clean energy.

Based on these principles and taking into account the status quo of a mostly closed and monopolized energy market, the energy reform allowed a liberalization of the market. In that sense, CFE became a competitor in the marketplace to operate under a competitive environment. It represented an option to satisfy their electricity needs from an array of options available for the largest energy consumers, marking a threshold for CFE’s historic monopoly in the value chain's consumer sector.

Legislation is derived from energy reform. Following the constitutional reform of December 2013 by December 2015, the Mexican Senate approved ten new laws and 12 modified ones. Critical new components of the package are:

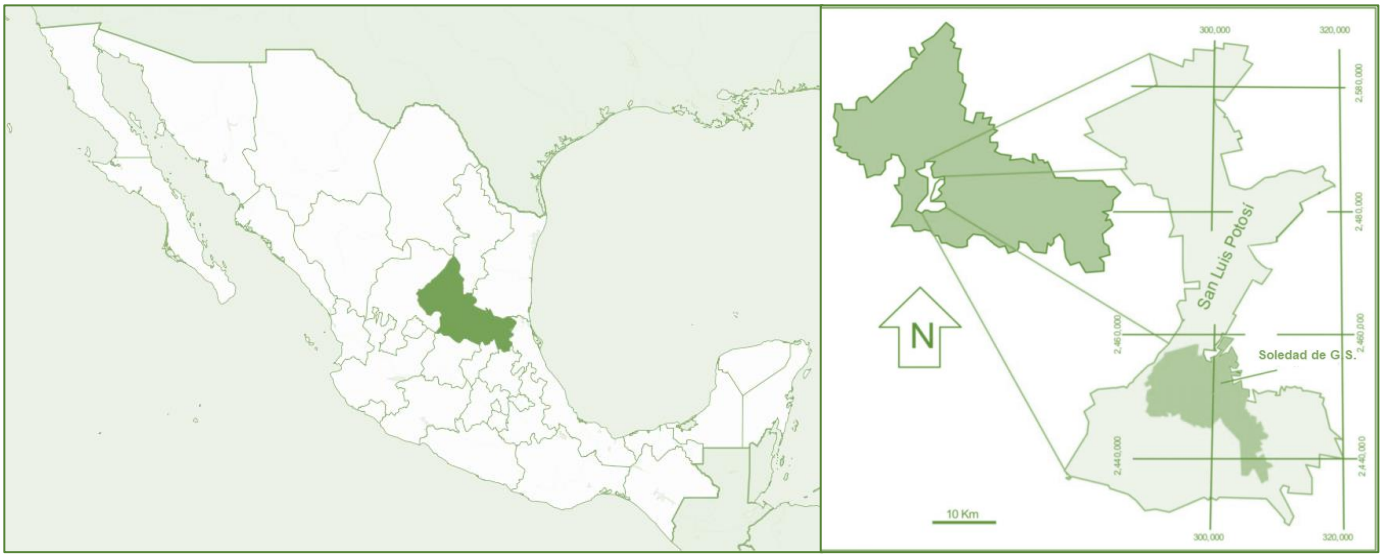
- The *Law replacing the former PEMEX and the new Federal Electricity Commission (CFE)* redefines both companies as ’state productive enterprises’ subject to ordinary corporate tax. It will pay a dividend to the State.
- The *Coordinated Energy Regulatory Agencies Law* establishes the organization and remit of the energy regulator CRE and the hydrocarbons regulator CNH.
- The *Hydrocarbons Law*, which authorizes and regulates private actors' participation in the sector via service and profit-sharing contracts and “licenses” and permits. It also creates an independent system operator for the gas pipeline network, CENAGAS.

- A new *Law on Environmental and Industrial Safety for the hydrocarbons sector*, including a newly created specialized regulatory agency (ASEA).
- The *Electric Industry Law* redefines the roles of the energy regulatory agency CRE in the power sector and separates the transmission grid operator (CENACE) from the state utility CFE.
- A new fiscal framework for the hydrocarbons sector, including a dedicated *Hydrocarbons Revenue Law*, defines state revenue's various instruments.
- A separate law deals with the newly created oil fund for stabilization and development (the *Mexican Petroleum Fund*), which will receive all non-tax income from the hydrocarbons sector. The Central Bank administers it under the direction of a board comprising the Finance (chair) and Energy Ministers, the Central Bank Governor, and four independent members nominated by the President and ratified by two-thirds of the senators in session.
- The *Energy Transition Law* reiterates 35% clean energy in the electric generation mix by 2024 (including nuclear energy) through a series of benchmarks, a 25% target by 2018 and a 30% target in 2021. The Law includes a flexibility mechanism that allows the targets to be lowered during the first four years in either significant scarcity or price inflation. The Ministry of Energy (SENER)is responsible for the monitoring of the target fulfillment.

4.2 City of SLP and local environment

The study site of this investigation is located within the city of San Luis Potosí in Mexico, which represents the capital of the same-named federal state. The core area of the metropolitan zone is composed of the municipalities of San Luis Potosí and Soledad de Graciano Sánchez (Figure *15*). Together they account for 1,133,571 inhabitants (41.7% of state pop.) with a population density of 633.9 inhabitants/km² (INEGI, 2015).

Figure 15. Location of the City of San Luis Potosí, MX. Adapted from (UASLP, 2018).

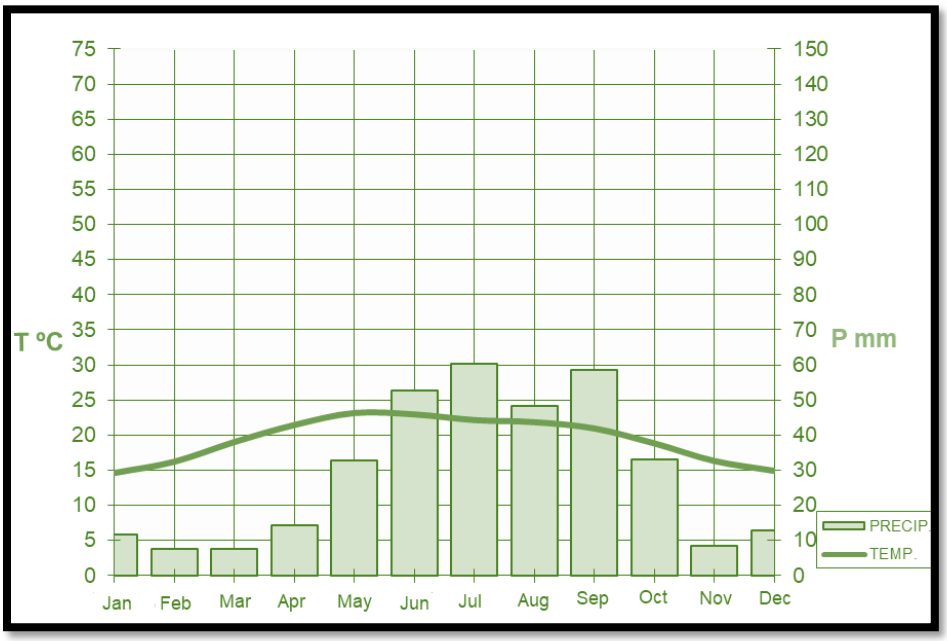


Within the capital is most of the food, chemical, furniture, machinery, industrial, and domestic equipment industries (INEGI, 2015). Activities that likewise represent a significant energy demand.

The City of San Luis Potosí is located in the central region of the state, and its climate is dry-temperate occurs in a greater proportion within the state, its geographical location is between the parallels 22° 40' and 21° 57' north latitude, the meridians 100° 44' and 101° 11' of west longitude and an altitude of 1900 meters approx. The city is characterized by a dry-temperate climate with rains in summer, in this type of climate the average temperatures can go from 12 to 18°C and the temperatures of the coldest month can be between -3 to 18°C and of the hottest month above 18°C, the total annual precipitation in these climates varies between 300 to 40mm.

The average annual precipitation recorded by the Villa de Reyes Climatological Station (the closest to the city of San Luis Potosí), is 347.7mm, the minimum average precipitation occurs in February and March with 7.6mm and the maximum in July with 60.3mm. The months with the highest rainfall are from June to September, and the months with the least rainfall are November through March. The average number of days with rain is 31.2, being July with the highest average number of days with rain, with 5.0. In *Figure 16*, an ombrothermal diagram is shown where normal precipitation and mean temperature were plotted. In addition, it is observed that the drought period in the region that includes the city of San Luis Potosí covers eight months and occurs between the months of October to May. For its elaboration, the monthly averages registered in the climatological station for the period 1951-2010 were used.

Figure 16. Ombrothermal diagram with data from station 24101, Villa de Reyes. Own creation



The central region where the capital is located has an average altitude of two thousand meters above sea level, being a dry area with low cloudiness (<30 days a year). According to (Chávez Almazán and Nahmad Molinari, 2015), its latitude, high elevation, low cloud cover, and climate mean that it has a solar availability of five kilowatt-hours for each square meter, every day (5 kWh / m2day). What makes the city of San Luis Potosí, an attractive city for the installation of photovoltaic systems of renewable solar energy.

4.3 UASLP and Campuses

4.3.1 History, Size, and Organizational Structure

4.3.1.1 History

As mentioned on the official website of the UASLP, the birth of the Autonomous University of San Luis Potosí (UASLP) was the result of the ideological struggles of men and women who sought freedom through education. Today we have news of the various movements that teachers and students carried out from the last twenty years of the 19th century in favor of a change in the educational structure of the higher level.

In March 1885, a group of students from the Scientific and Literary Institute, supported by various figures of culture and science in San Luis Potosí, openly expressed their desire for change within the same Institute, and founded an entity, although for a brief period, which they themselves called the "Free University". They were the first attempts to obtain academic freedom and thought for the institution.

The Autonomy of the UASLP is a process that was closely linked to the concept of university, since the profound change that took place on January 9, 1923, implied, not only the freedom it acquired as an institution to make its own decisions, but also the essence and spirit that entails the creation of an institution, based on the principle of universality of knowledge and the freedom of the human spirit.

The university spirit has always been fueled by academic freedom, the diffusion of culture, and the development of research. Its community, made up of students, workers, and officials, has constantly fought for this, always keeping the reason for its autonomy in force.

The current university is the product of all those generations of students and teachers, managers, and workers, who understood that the university system was the way to generate the changes that are needed. The vestiges of a past full of hard work, and a struggle for educational and scientific continuity, bear witness to a heritage that the Autonomous University of San Luis Potosí assumes with recognition, and at the same time aware of the responsibility and commitment that this implies.

4.3.1.2 Size

According to the (UASLP, 2020) report, the UASLP in the state of San Luis Potosí, has 8 University Campuses, the description of the sites where these campuses are located will be made in the following subtopic 4.3.2.

In addition, within these campuses are distributed 15 Faculties, 2 Academic Units, 7 Research Institutes, 4 National Research Centers, 1 Preparatory School, and 2 Arts Teaching Centers.

Table 8. Dependencies, Academic Units, and Entities of the UASLP

Academic entities	Research Institutes
- Facultad de Agronomía y Veterinaria - Facultad de Ciencias - Facultad de Ciencias de la Comunicación - Facultad de Ciencias de la Información - Facultad de Ciencias Químicas - Facultad de Ciencias Sociales y Humanidades - Facultad de Contaduría y Administración - Facultad de Derecho “Abogado Ponciano Arriaga Leija” - Facultad de Economía - Facultad de Enfermería y Nutrición - Facultad de Estomatología - Facultad del Hábitat Facultad de Ingeniería - Facultad de Medicina - Facultad de Psicología - Escuela Preparatoria de Matehuala	- Agenda Ambiental - Centro de Biociencias - Centro de Investigación en Ciencias de la Salud y Biomedicina - Centro de Investigación y Extensión Zona Media - Coordinación para la Innovación y Aplicación de la Ciencia y la Tecnología - Instituto de Ciencias Educativas - Instituto de Física - Instituto de Geología - Instituto de Investigación en Comunicación Óptica - Instituto de Investigaciones Humanísticas - Instituto de Metalurgia - Instituto de Investigación de Zonas Desérticas

- Unidad Académica Multidisciplinaria Zona Huasteca - Unidad Académica Multidisciplinaria Zona Media - Zona Media Coordinación Académica Región Altiplano - Coordinación Académica Región Altiplano Oeste - Coordinación Académica Región Huasteca Sur - Coordinación Académica de Arte - Departamento Físico Matemáticas - Departamento Universitario de Inglés	
Administrative Dependencies	
Extension	**Management**
- División de Difusión Cultural - División de Vinculación Universitaria - Centro Universitario de Apoyo Tecnológico y Empresarial - Centro de Idiomas Universitario - Centro de Bienestar Familiar - Centro de Documentación Histórica Licenciado Rafael Montejano y Aguiñaga	- Rectoría - Defensoría de los Derechos Universitarios - Departamento de Comunicación Social - Dirección de Edificación y Diseño de Obras - Dirección Institucional de Gestión de Calidad - Dirección de Imagen y Promoción Institucional - Dirección de Fortalecimiento Humano - Dirección de Fomento Editorial y Publicaciones - Dirección de Radio y Televisión Universitaria - Secretaría Particular - Secretaría General - Secretaría Académica - Secretaría de Finanzas - Dirección de Gestión del Conocimiento y la Innovación - Secretaría de Investigación y Posgrado - Secretaría Administrativa - Secretaría de Planeación - Sistema de Bibliotecas - División de Desarrollo Humano - División de Informática - División de Servicios Escolares - División de Servicios Estudiantiles - Abogado General - Contraloría General

As part of the strategies embodied in the 2016-2020 Steering Work Plan and the 2013-2023 Institutional Development Plan, related to the improvement program and assurance of the relevance and quality of educational programs and the good governance program, the UASLP through the Academic Secretariat, continues to promote the updating of the System of Academic Indicators, as an observation instrument that allows knowing the changes produced in the institution over time in terms of academic capacity and competitiveness. In addition, constant efforts are made to ensure that the system has conceptual consistency, technical stability, comparability, and official cut-off dates. The cut-off date of these indicators, presented in (UASLP, 2020) corresponds to March 2020.

The university's community indicators are divided into students, academic staff (where 98% of this personnel have postgraduate studies), and administrative staff (Table *9*).

Table 9. Total population of the UASLP. Adapted from (UASLP, 2020)

Students	32,775
Administrative staff	3,189
Academic staff	3,293
Total UASLP community	**39,257**

As the UASLP publishes it on its official website, its MISSION is: To generate and strengthen university regulations to assist the Rectory in making administrative, academic, and government decisions, with a human capital committed to guaranteeing correct access to the information, and optimization of resources, in addition to promoting actions in the field of security and civil protection to achieve institutional purposes.

While its VISION is: To assist with the Rector to maintain a high degree of governance through the participation of the university community, with avant-garde institutional regulations, supported by a culture of prevention, safety, quality, transparency, and social responsibility.

4.3.2 Location in City/campuses

Based on data from the official website, the UASLP has *8 University Campuses* distributed throughout the state of San Luis Potosí. Due to the lack of information in some sections of the UASLP website, it was not possible to find specific information on the total population of each campus, as well as the personnel that is part of them, therefore, for practical reasons of this investigation, a summary of the local and climate conditions of the place where each campus is located will be given.

- Campus Huasteca (Cd. Valles)

The municipality of Ciudad Valles in 2020 had a population of 179,371 inhabitants. It is located in the eastern part of the state, in the Huasteca area, the municipal seat has the following coordinates: 99º01 " of west longitude and 21º59" of north latitude, with a height of 70 meters above sea level. Its limits are to the north, Tamaulipas; to the east Tamuín; to the south, Aquismón, and Tanlajás; to the west, Tamasopo; to the northwest, El Naranjo.

Cd. Valles is located in the most mountainous formations of the territory, a large part of the Sierra Madre Oriental. The entire region to the south and center is made up of plain. Its type of climate is considered tropical. Its average annual temperature is 24.5ºC, with an absolute temperature of 45.5ºC and a minimum of 6ºC. Its annual rainfall is 1,400mm (INAFED, 2021a).

- Campus Zona Media (Cd. Fernández and Río Verde)

Due to their geographical location and proximity, the following campuses in the present work will describe with the same conditions. The municipalities of Cd. Fernández and Río Verde in 2020 had a population of 48,106 and 97,943 inhabitants respectively.

The municipality is located in the eastern part of the state, in the middle zone, the municipal head has the following coordinates: 100º00 "west longitude and 21º56" north latitude, with a height of 980 meters above sea level. Its approximate distance to the state capital is 131 kilometers. There are the mountainous areas of Xichú and La Garganta de Plazuela to the south; the Sierra Gorda to the west, covering part of the states of Querétaro and Guanajuato and to the west the Cordón de la Mesa Larga, with altitudes that vary from 1,000 to 2,000 meters above sea level. Its types of climates are: In the northern part it is semi-dry, semi-warm, in the center it is dry-semi-warm and in much of the southwest it is temperate sub-humid, with rains in summer; it has an annual average temperature of 21ºC and rainfall of 479.5mm (INAFED, 2021c).

- Campus Matehuala

The municipality of Matehuala in 2020 had a population of 102,199 inhabitants. The municipality is located in the northern part of the state, in the highlands, the municipal seat has the following coordinates: 100º39 "west longitude and 23º39" north latitude, with a height of 1,570 meters above sea level. Its limits are: to the north Cedral, to the east the state of Nuevo León, to the south Villa de Guadalupe, to the west Villa de Guadalupe and Villa de la Paz. The semi-hot dry climate predominates. In the extreme northwestern part, it has a small strip of temperate dry climate. The average annual temperature is 19.3ºC and a rainfall of 450mm (INAFED, 2021b).

- Campus Altiplano Oeste (Salinas)

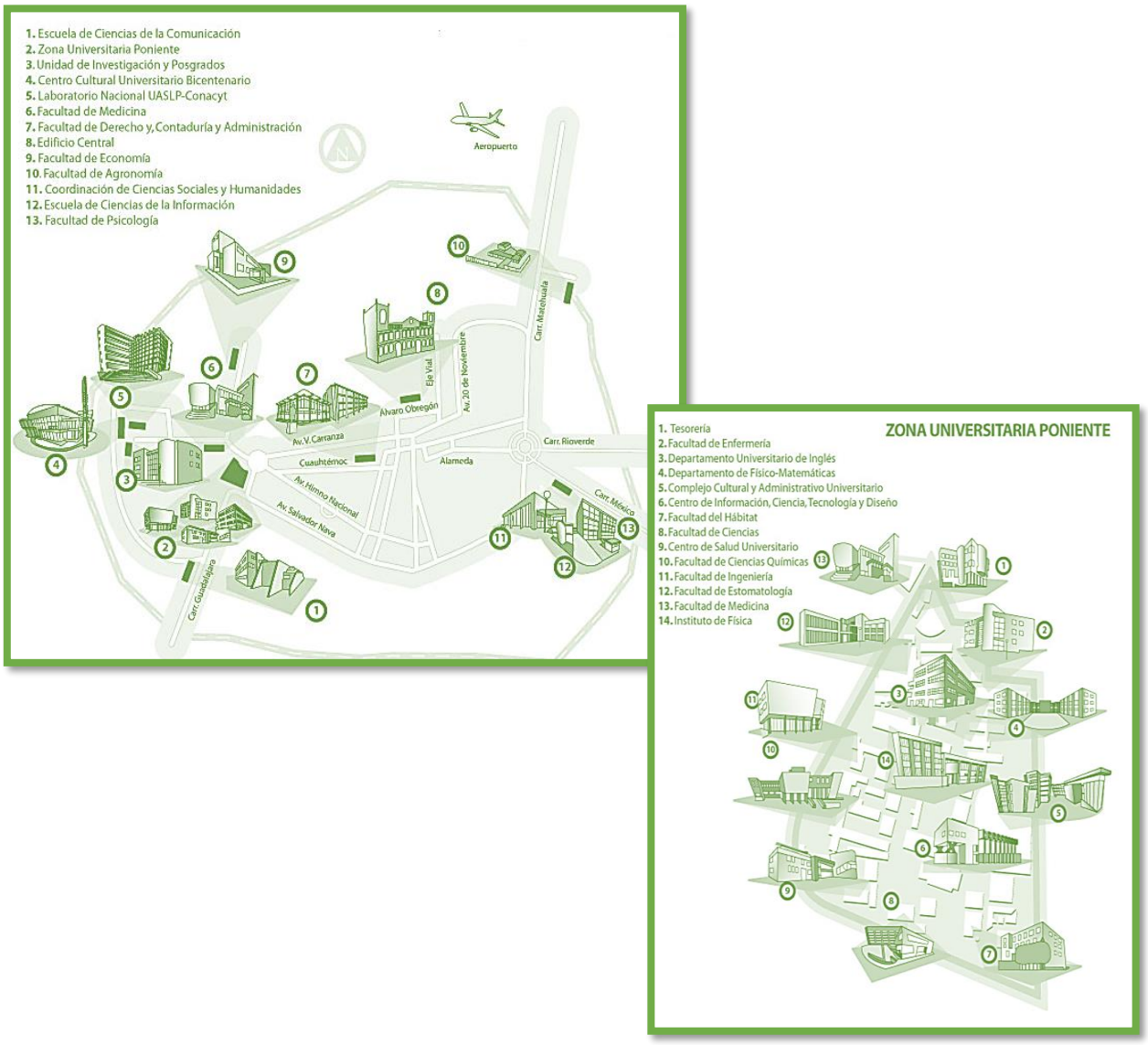
The municipality of Salinas in 2020 had a population of 31,107 inhabitants. The municipality is located in the northwestern part of the state, in the altiplano area, the municipal seat has the following coordinates: 101º43 "west longitude and 22º38" north latitude, with a height of 2,070 meters above sea level, its limits are: to the north Charcas; to the east Moctezuma, to the southeast, south, and southwest the state of Zacatecas; to the west Villa de Ramos; to the northwest Santo Domingo. Its approximate distance to the state capital is 95 kilometers. A small portion to the north of the municipality has a very dry temperate climate, the predominant climate in its central part from north to south is dry temperate; In all the eastern part bordering the municipalities of Charcas, Venado, and Moctezuma, is semi-dry temperate. Its average annual temperature is 18.7ºC and its rainfall is 391 mm (INAFED, 2021d).

- Campuses in San Luis Potosí and Soledad de Graciano Sánchez

The characteristics of the San Luis Potosí metropolitan area that encompasses these two municipalities were previously described in chapter 4.2.

Below in (Figure 17), there is a representation of the campuses, dependencies, faculties, and academic entities that are located within the metropolitan area of the city of SLP. To the left of (Figure 17), the “Zona Universitaria Poniente” (University West Campus) is shown since it is the largest entity of the UASLP and in energy, terms are the most important because it is the one that consumes the greatest energy resources of the entire university.

Figure 17. Location of the UASLP in the city of SLP.



- Campus Huasteca Sur (Tamazunchale)

The municipality of Tamazunchale in 2020 had a population of 95,037 inhabitants. The municipality is located in the southeastern part of the state, in the Huasteca area, the municipal seat has the following coordinates: 98º48 "west longitude and 21º16" north latitude, with a height of 140 meters above sea level. Its limits are: to the north, Matlapa, and Tampacán; to the east, San Martín Chalchicuautla; to the south and west, the state of Hidalgo. Its approximate distance to the state capital is 372 kilometers. In the north of the municipality, the semi-warm humid climate prevails with abundant rain in summer, in the south, the climate is semi-warm humid with rain all year round. The average annual

temperature is 25.50ºC with an absolute maximum of 44ºC and an absolute minimum of 11ºC. Annual rainfall is 2,168.3mm (INAFED, 2021e).

4.3.3 Building stock and equipment

To implement the PDAC Continuous Improvement Cycle, the "Planning" cycle section 6.3-6.6. The UASLP needs to have a well-defined and accurate Inventory of its equipment and total infrastructure, broken down by entities or departments. Due to the lack of general information, this document only presents the document that the UASLP currently has “Infrastructure Catalog 2020, (UASLP, 2021)”. In it are the equipment and infrastructure by area or academic entity. The limitation is that only the name of the equipment and the infrastructure is mentioned, it does not mention brands, work powers, and much fewer hours of use.

With the aforementioned, for the creation of the University Energy Program, it is necessary to obtain more information in this regard, and for this, all academic entities and administrative agencies must work together to be able to share the information in a standardized way.

4.3.4 UASLP Legislation

As mentioned in the 2013-2023 Institutional Development Plan (UASLP, 2013), the organizational structure has allowed the UASLP to develop its functions adequately so far, for its high degree of governance to support and facilitate institutional development and decision-making. Institutional regulations are constantly updated to support decision-making, regulate university life and strengthen institutional governance.

Based on its fully recognized right of autonomy and its statutory capacity to issue its own legal system, the Honorable University Board of Directors, from the beginning of its operations and with the power granted by article 32 of the Organic Statute of the UASLP, has promptly issued the internal regulations of academic entities and management entities, in the process of exercising this attribution and because of the need to give legal certainty to administrative processes, regulation in the coexistence of our community and its members, and equitable access to the spaces, resources, processes, and services of this institution, in favor of equality, balance, social peace, and orderly growth.

They are strengths of the institution; the existence of the constitutional normative foundation that gives it capacity and personality, full, broad, recognized, and in force, as well as in federal and local regulatory laws; the decrees of autonomy and creation, and its organic law by order of the Political Constitution of the State of San Luis Potosí; the existence and validity of the fundamental norm of the institution called the Organic Statute, where the foundations of its government and organization are laid; its regulatory laws, and its own uses and customs as an informal source of law. The entity in charge of keeping university regulations updated and disseminating them is called the Regulations Department.

The Autonomous University of San Luis Potosí has established a work plan to update its institutional regulations, considering the evolution of the institution and its requirements, as well as the UASLP 2023 Vision, and the programs, objectives, and strategies of the Institutional Plan of Development 2013-2023. For the practical purposes of this work, some of the most important university regulations are mentioned below. This regulation is divided into statutes, Regulations, and Manuals (UASLP, 2013).

- Organic Statute of the UASLP

Manuals

- General Counsel Organization Manual
- Manual of the Organization of the Finance Secretariat

Regulations

- Regulation of the Academic Staff of the UASLP
- Regulation of Transparency Access to Public Information and Protection of Personal Data of the UASLP
- Pension Regulations
- **Regulations for the Use of Vehicles**
- **Property Acquisition Regulation**
- **Financial Investments Regulation**
- **Regulations of the Construction Commission**
- Regulations of the University Federation
- **Regulation of Permits, Licenses, and Commissions**
- **Prevention, Security and Civil Protection Regulation**

The constant updating of the normative bodies of the institution represents an area of opportunity, which attends to the social dynamics, the historical evolution, and the new challenges facing human coexistence.

5 Results and Discussion

The results obtained by this thesis work are presented in a way that matches with the methodology proposed on Chapter 3. Since the present work is a pilot study that will serve to know the context and to make a very general review of the energy uses in the University. This is due to the fact that to the present date there is no precedent in the UASLP on a system specifically for energy management, currently there is only an Environmental Management System by the Agenda. The only thing that could be obtained were some scattered data on mobility and electricity consumption that the Agenda Ambiental had (these data will be shown later in this chapter).

The results generated by this work, which will be presented below, are part of a costume tailored approach made with the purpose of knowing the context and presenting a university energy review of the university. These results generated here serve to elaborate the first energy indicators of the UASLP, these will be the pioneers for further work and the elaboration of the UEP.

Finally, the last result generated by this work are found in the Annexes section (Chapter 9) and consists of a step-by-step plan (see Chapter 6) with all the procedures that must be fulfilled if the UEP is to be implemented within all UASLP campuses. The UEP can only be implemented at UASLP, once all the information and elements required to complete the documentation proposed in the Annexes section of this work are available.

The results here generated have the purpose of establishing the guidelines for the subsequent implementation of the University Energy Program (UEP). The reference used for said implementation of the UEP is the ISO 50001: 2018 standard, so its methodology will be followed for the presentation of results.

5.1 UASLP Context

For the understanding of the organization and its context, as a complement of this chapter the previous Chapter 4 was created.

5.1.1 Needs and Expectations of Stakeholders

According to the ISO 50001 standard, one of the essential parts to understand the context of an organization (the UASLP for the present work), it is necessary to analyze the present situation of the stakeholders and for this the mapping and stakeholder analysis was carried out. To understand the needs and expectations of Stakeholders, a Stakeholders analysis was carried out by identifying 3 main groups: The **University (decision-maker, resource owner)**, the **Beneficiaries,** and the **Potential Collaborators** (*Figure 18, Annex A-12b*).

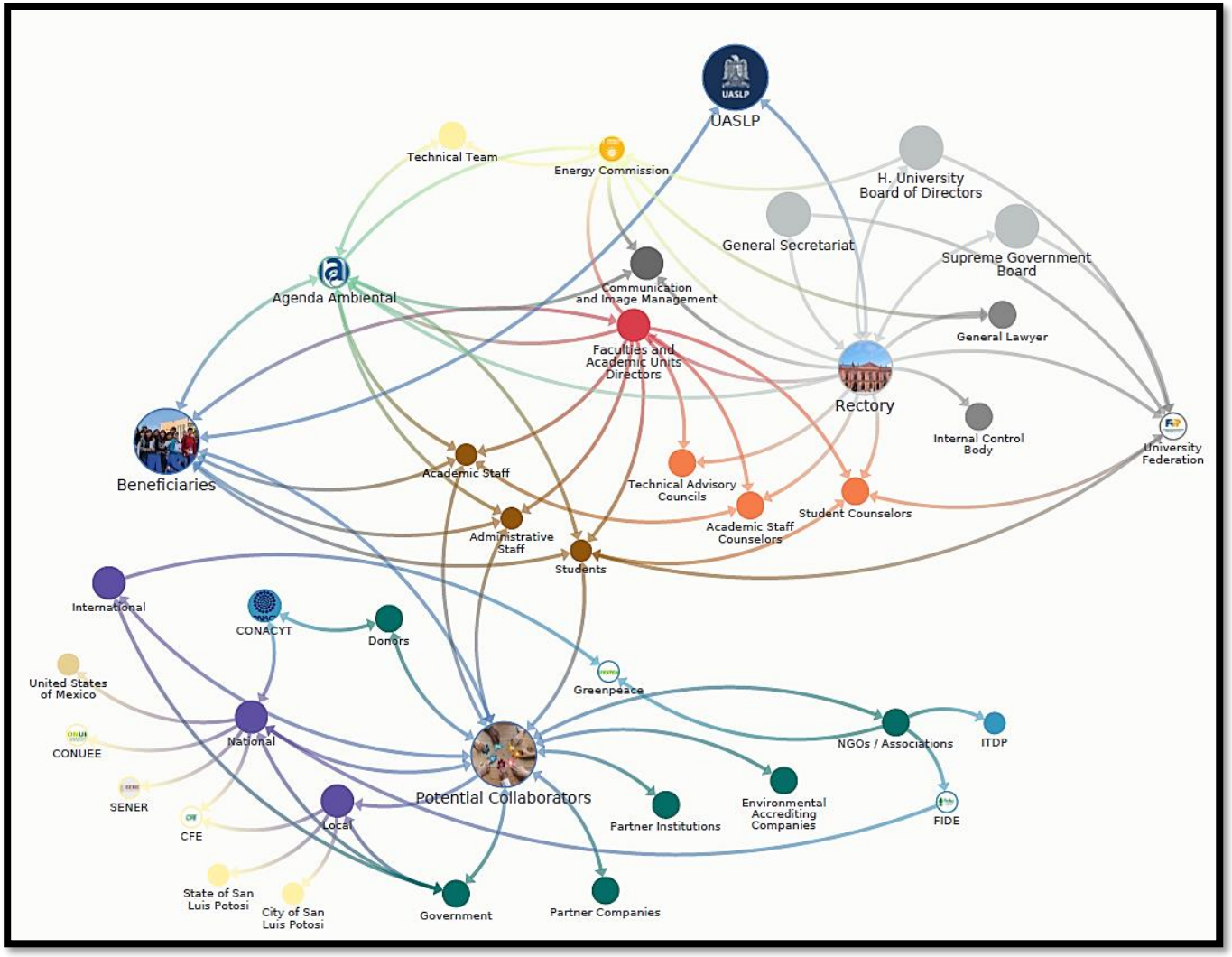
Within the UASLP, the structure with which it is governed internally is identified and where decisions are made jointly by the Boards and the Rectory (Spheres in gray).

Another important stakeholder for the UEP is the Agenda Ambiental, this is the university body in charge of articulating strategies to achieve sustainability within the UASLP, so it will also be in charge of implementing, verifying, monitoring, and improving the UEP. For this, according to the ISO 50001 standard, the Agenda Ambiental must implement an Energy Commission that is in charge of the operation of the program. In turn, this Energy Commission must form a Technical Team, which has experts in energy matters who help to develop strategies and who actively participate in the identification of energy performance. The dissemination of the UEP to the university community and the general public will be carried out by the Communication and Image Directorate of the UASLP.

At the core of the Stakeholders, Mapping is the academic and administrative staff and students. Because to achieve the energy efficiency goals proposed by the UEP, these Stakeholders are of the utmost importance to meet them, which is why they are among the operational Stakeholders and also the beneficiaries of the UEP. Potential collaborators were identified according to the importance they may have in the implementation of UEP, either with financial, academic, scientific, dissemination, innovation, cooperation, and legislation in the local, national and international energy field. As the UEP is implemented, all the Stakeholders mentioned in this analysis are subject to modification, as well as the possible addition of more interested parties is projected.

For a better understanding of the Relevance that these groups have with the implementation of the University Energy Program (UEP), a stakeholder analysis is detailed (Figure 18, *Annex A-12*). This Annex A-12 presents in depth the Stakeholders, their responsibilities within the UEP the role they play in decision-making and, finally, the potential to collaborate with the implementation of the UEP.

Figure 18. UEP Stakeholders Mapping (Annex A-12b)



To determine the Scope and Limits of the UEP and at the same time to gather information to measure the EnPIs proposed in Table 3 of Chapter 3.1.2, the methodology selected to describe the activities that are carried out within the UASLP by level was the UASLP Energy Habits Survey. In Annex A-10, the Questionnaire developed is shown.

The survey was conducted focusing on two main issues for the UEP, energy demand in buildings and mobility related to UASLP activities. The sample obtained from the UASLP population is 170 participants (number of respondents).

The results obtained for energy demand in buildings are presented below.

5.1.2 Energy Demand's Outlook of UASLP buildings

The results of the survey showed that 50% of the respondents were Professors/Researchers, 41% were administrative staff, and only 5% of the respondents were students. The other 4% were classified as "other".

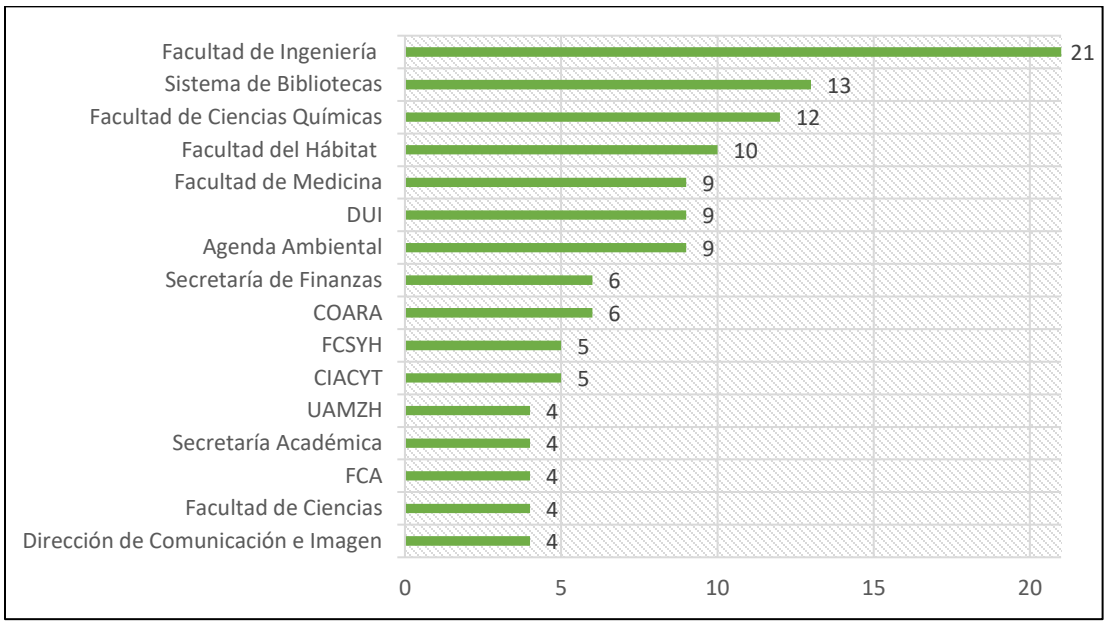
The following data shows that students are not willing to answer surveys on topics in their university, which can represent a problem when the UEP needs to be implemented because Students are the largest proportion of people within the university, since, of the total of 39257 people that make up the UASLP, 32775 are Students (83.5%), so attention should be paid to how to get the UEP to them.

It could also be observed that 81% of the people who responded to the survey have been in the institution for more than 5 years, which shows that the commitment to read and respond to topics of importance to the university (in this case, they are communicated to via email) is primarily from UASLP staff and not from its students.

Regarding the part of the academic entities surveyed. Various entities with a greater number of responses were identified. In this list is the Faculty of Engineering with 21 people surveyed, followed by the Library System with 13 and the Faculty of Chemical Sciences with 12. It should also be noted that despite the size (number of people per entity) of the Agenda Ambiental in comparison With the Faculties of Engineering or Chemical Sciences, a good response to the survey was also obtained with a number of 9 respondents (Figure 19). Entities that had 3 or fewer responses were omitted from the Figure.

With this result, it can be inferred which academic entities of the UASLP are the ones that will have the least impact since the UEP is implemented, as well as in which entities a greater effort will be needed to communicate and implement the program.

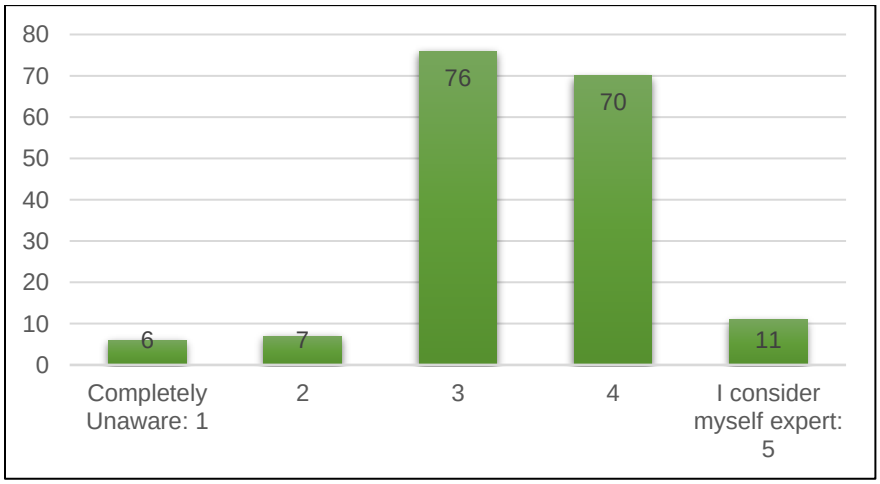
Figure 19. Number of Respondents of UASLP Academic Entities



Another important aspect to identify energy consumption behaviors by the UASLP community is the level of awareness that they consider having. Within the survey, the community was asked using a scale from 1 to 5, where 1 is "completely unaware" and 5 was "I consider myself an expert" (Figure 20). Most of the respondents consider themselves at level 3 with 76 responses and level 4 with 70 responses. What makes us see is that the majority of those surveyed have some kind of awareness (no matter how slight) about the use of energy.

This is probably also due to a bias in the survey, in which the only respondents were people to finish with these issues.

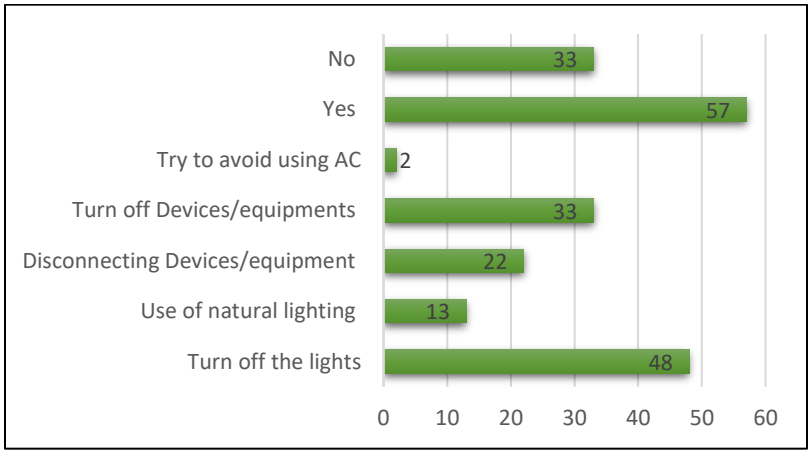
Figure 20. Level of Energy Consumption Awareness



In addition to that, it was asked if people had ever tried to reduce their energy consumption within the UASLP. Of these 57 people answered YES, 33 answered NO, and the others mentioned the actions they take to reduce their energy consumption. Among these actions, the one with the highest number of responses was "I turn off the lights when they are not used" with 48 responses, followed by "I turn off the equipment or devices" with 33 responses (Figure 21).

According to the sample of the surveyed population, it is shown that a good part of the UASLP staff contributes small actions to reduce energy consumption.

Figure 21. Actions to lower Energy Consumption



Electrical Devices within the UASLP

In order to have the panorama that the UEP needs the activities and the current types of energy consumption, within the survey an electrical appliances section was carried out, to have an idea of which are the most frequently found and the most used within the UASLP.

To classify electrical appliances or equipment, the following symbology was made where A) refers to air conditioners or heating and so on. This symbology only applies to this section of questions:

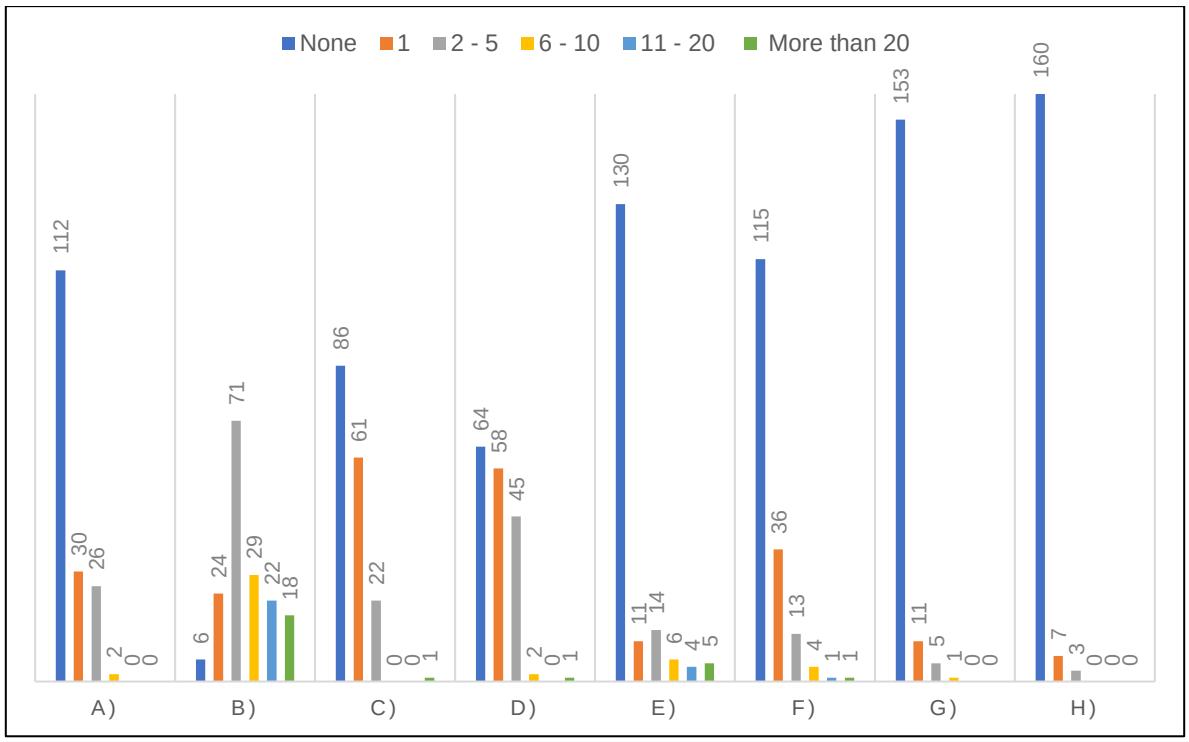
A)	B)	C)	D)	E)	F)	G)	H)
AC / Heating	Office appliances (PCs, Scanners, Printers, No-breaks, faxes, etc.)	Fridges / Coolers	Kitchen appliances (Coffee makers, microwave, stoves, electric grills, water heaters, etc.)	Lab appliances (Centrifuges, microscopes, analytical instruments, ovens, etc)	Teaching tools (TVs, projectors, digital blackboards, etc).	Freezers, super freezers	Other higher voltage appliances (e.g. metal welders, electric arc, foundry, etc.)

This section was first divided into the number of devices or equipment that is present within the work area of the person surveyed (this can be a laboratory, office, classroom, common spaces, etc.), (Figure 22).

The results obtained for this question most of the respondents have 2 to 5 office devices B) in their work area; 61 respondents have at least 1 refrigerator or cooler C); 58 respondents also have at least one kitchen appliance D).

In the case of appliances that have a higher consumption such as AC / heaters A), 30 people have at least one, and 26 have 2 to 5 in their work area. On the contrary, 160 people responded that there is no higher voltage device H) within their work area.

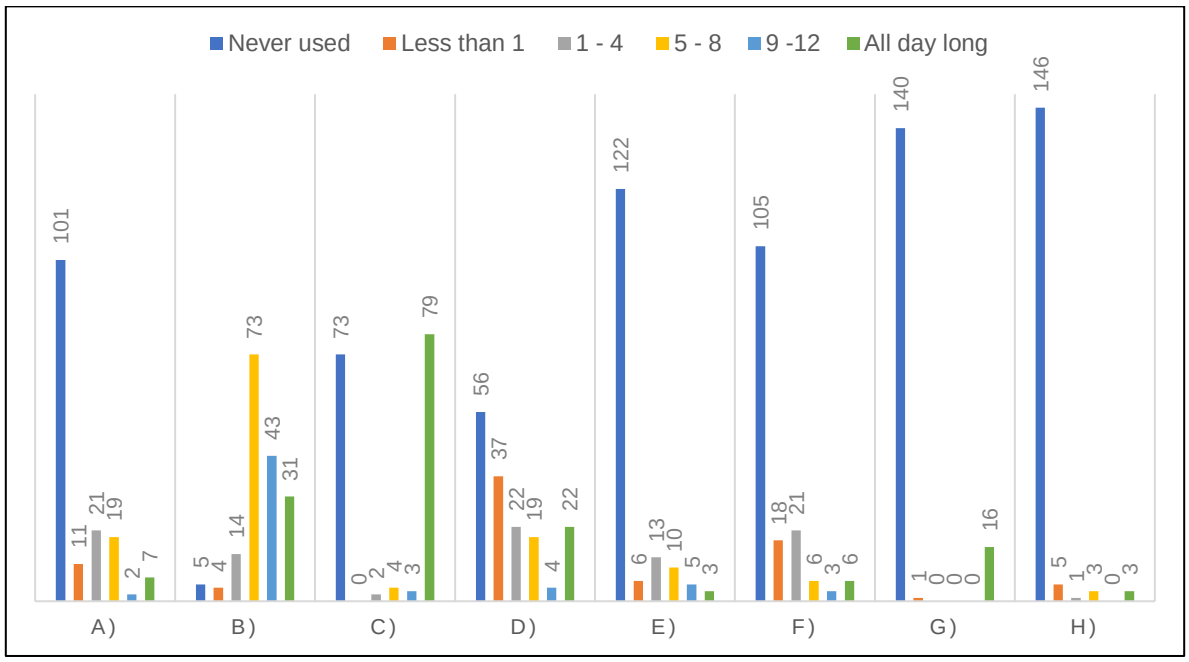
Figure 22. Electrical Devices/Equipment by Workspace



In the next question, the hours per day in which these electrical appliances are in use were asked (Figure 23). Here it was found that refrigerators or coolers C) 79 people responded that they are on all day without stopping. Office appliances B), 73 people responded that they are working from 5 to 8 hours and even 43 people mentioned that they are working up to 12 per day. The air conditioners, depending on the region of the state of San Luis Potosí where they are located, can be kept on for up to 8 hours a day A).

With this, we infer that those appliances that are connected and running all day could be key on the road to energy efficiency.

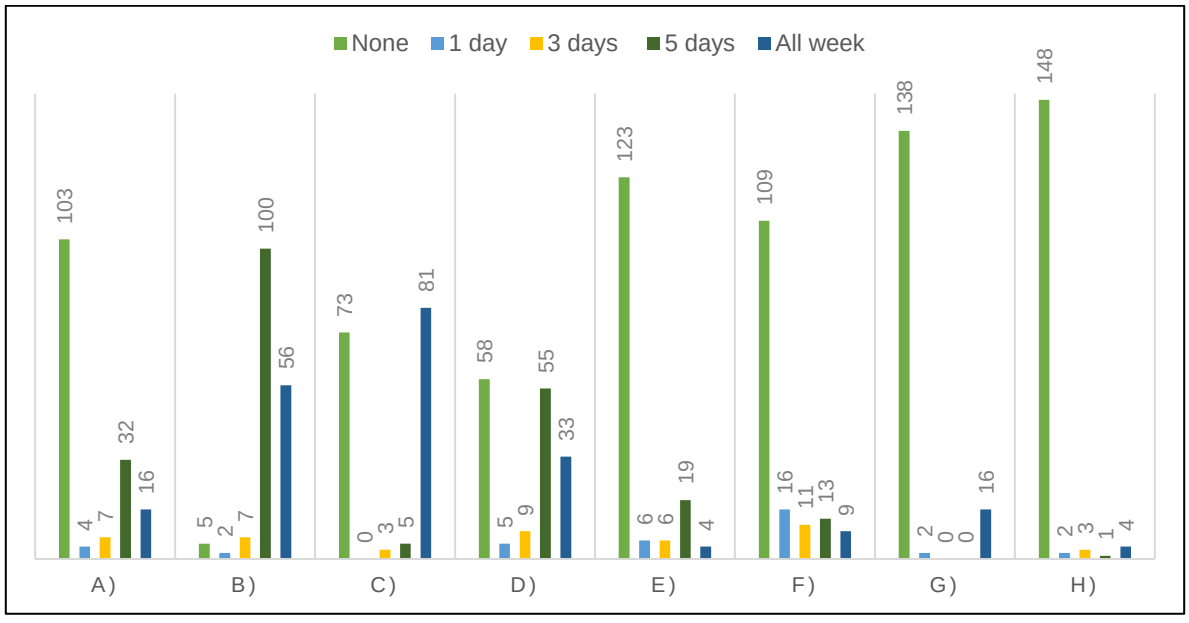
Figure 23. Usage hours of Electrical Devices/Equipment



For the usage days of this electrical equipment and devices (Figure 24), it was found that 81 people responded that in the same way the refrigerators or coolers C) are working all week, as well as some kitchen appliances D) with 33 responses.

The devices most used during the 5-day work shift are office devices B) with 100 responses and AC A) with 32.

Figure 24. Usage days of Electrical Devices/Equipment



Lighting within UASLP

To broaden the panorama of energy consumption (electrical), another section within the survey was created to evaluate the number of lighting accessories that exist in the UASLP. This is because there is currently no general inventory, much less with itemized consumption.

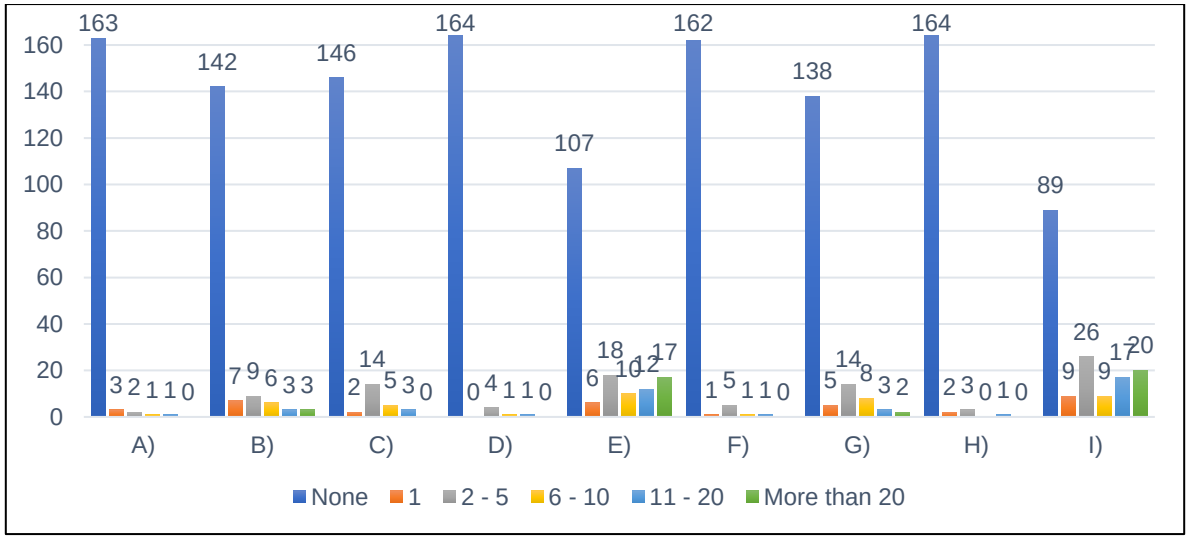
To classify lighting accessories within UASLP, the following symbology was made where A) refers to Incandescent bulbs and so on. This symbology only applies to this section of questions:

A)	B)	C)	D)	E)	F)	G)	H)	I)
Incandescent bulbs	Low consumption bulbs	LED bulbs	Halogen Bulbs	Fluorescent bulbs	Incandescent lamps	LED lamps	Halogen lamps	Fluorescent lamps

For this section, respondents were asked how many lights and lamps are within their work area. The following results were obtained, the most commonly used lighting systems are fluorescent bulbs E) with 17 people who answered that there are more than 20 of these in their work area; In addition, 20 people responded that more than 20 fluorescent lamps I) are within their work area.

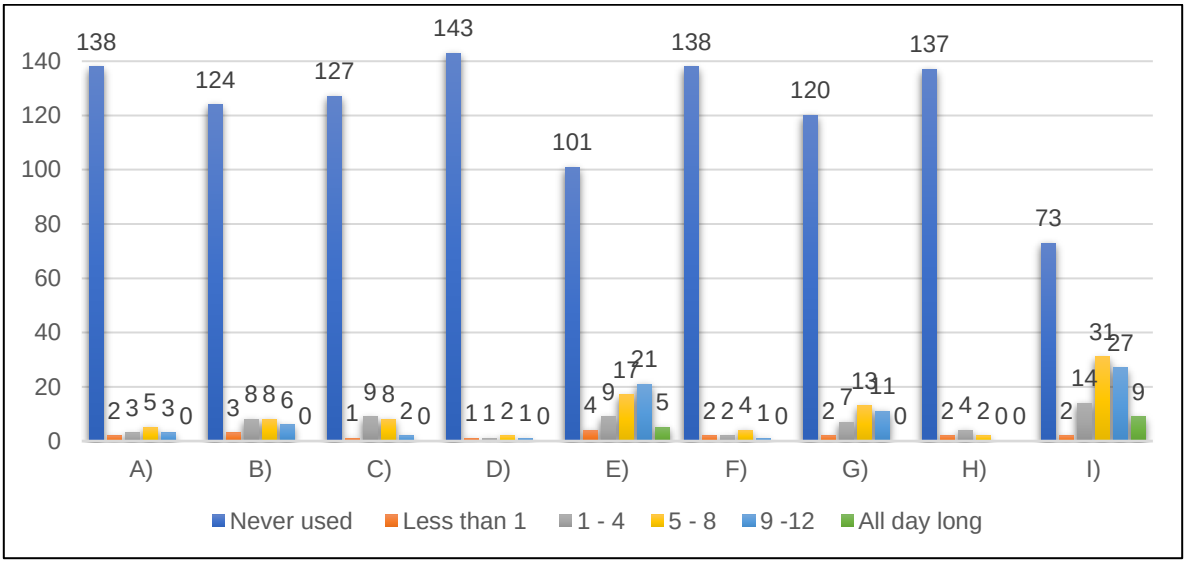
Fluorescent lighting according to Figure 25 is found as the most-used lighting type within the UASLP, followed by LED represented in C) and G).

Figure 25.Lightbulbs and Lamps by Workspace within UASLP



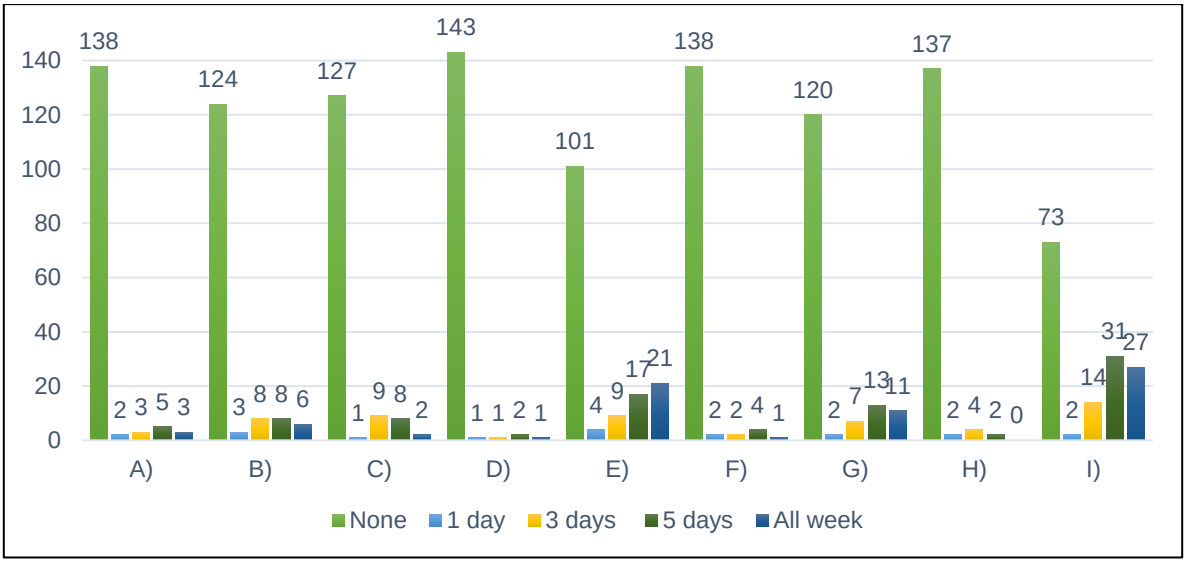
In the next question, the hours per day in which these Lighting devices are in use were asked (Figure 26). In Figure 26 it is shown that the lighting that is on most of the day is Fluorescent with a number of 21 people responded for the bulbs E) and 27 people responded that the lamps I), in both cases, they are on 9 to 12 hours a day. Which represents a good indicator to estimate energy consumption for the UEP.

Figure 26. Usage hours of Lightbulbs and Lamps within UASLP.



Finally, the respondents were asked the days a week in which these luminaires are turned on (Figure 27). Again, in the figure it is shown that the luminaires that are lit the most are the fluorescent ones E) and I), you agree with the respondents they are on from 5 to 7 days a week, which shows us the lighting trends at the UASLP.

Figure 27.Usage days of Lightbulbs and Lamps within UASLP

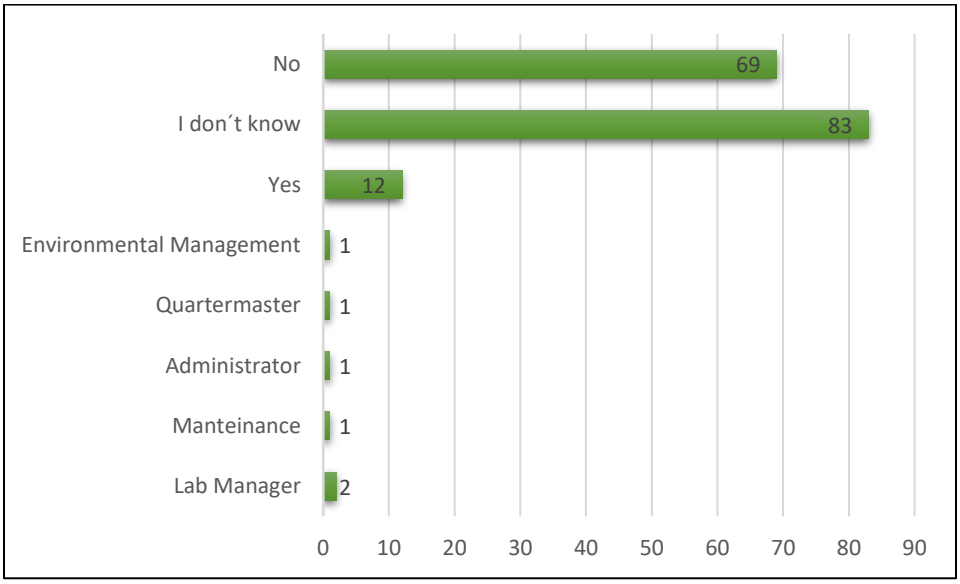


In addition to knowing the habits of the community according to the lighting in their work centers, the community was also asked about the status of the lights when the work areas are empty to which 92% answered that the lights they turn off when not in use, while the remaining 8% answered that they do not know what happens with lighting.

The following question refers to whether there is awareness about the use of renewable energy within their work centers to which only 2% of the respondents answered that they have photovoltaic panels within their work centers, these responses came from CIACYT Therefore, it is known that renewable generation systems were installed in that entity.

In the last question of this section, the community was asked if it is aware that in its work area there is someone in charge of verifying the correct practices on the use of energy (Figure 28), to which 69 people answered NO, 83 responded that they "don't know" and 18 answered that if there is someone, in each workspace someone different takes care of it.

Figure 28. Knowledge of Foreman for verifying the correct practices in the Use of Energy



This aspect is important for the UEP, the Energy Commission, hand in hand with the Agenda Ambiental, must approve those in charge of verification by the academic entity, area, or building to supervise that the goal of energy efficiency is reached.

To round off the information obtained by the survey, the indicator provided by the UASLP Agenda Ambiental is presented, which shows that currently within all the University facilities there are 15% energy-efficient electronic devices.

Energy-efficient appliances usage percentage% (concerning the total number of appliances)	15

5.1.3 Mobility Energy Demand of UASLP (Induced traffic)

The second part of the survey was made on the mobility that the UASLP community has to carry out its activities, mobility was chosen for its impact on the emission of greenhouse gases (GHG) and Climate Change.

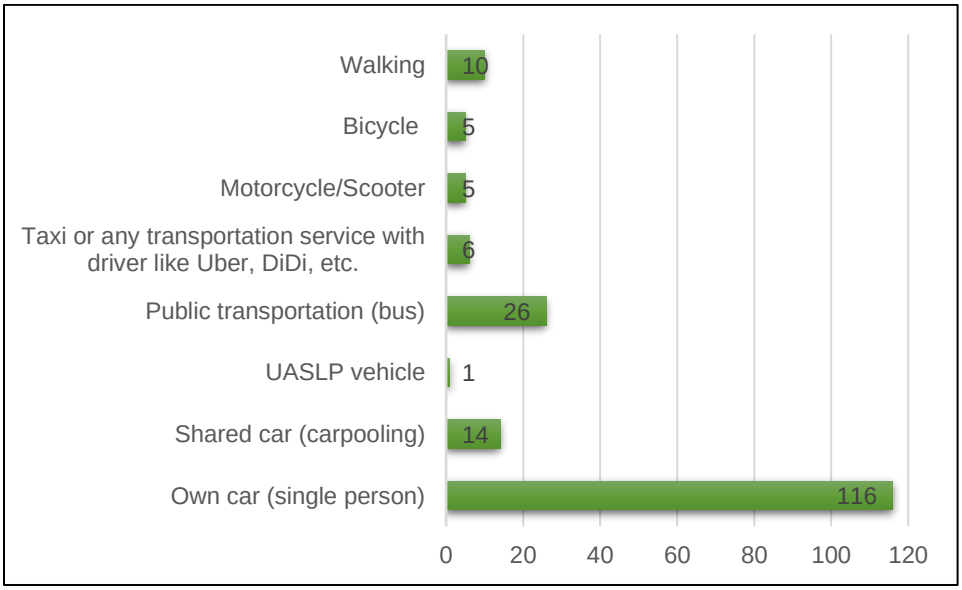
In this section, respondents were asked to answer about the mobility they had before the current COVID-19 pandemic in case their mobility was affected by it.

For which, they first asked if they currently must make trips to the UASLP or work from home, to this 73% of the 170 respondents answered that "Yes, several times a week", while 23% answered "Yes, but only in extraordinary cases "and only 5% (presumable students) answered" No ", it is known that they work directly from home.

Another question was the average time it takes them to travel from their home to the UASLP. In this question, most of the responses (86 people) answered that it takes 16-30 minutes to travel, while 56 people answered that it takes them less than 15 minutes; only 2 people responded that it takes them more than 2 hours to get to the university per trip.

Furthermore, to get an idea of how many days people must travel to the UASLP, the question was addressed within the survey. 145 people responded to this or 85% of them said that their work or study day is 5 days a week. Since they are the majority, this data is taken as a baseline. To broaden the panorama on the mobility of the UASLP community, a good indicator is the means of transport that they commonly use. The following Figure 29 shows the means preferred by people.

Figure 29. Means of Transportation used



In Figure 26 it is observed that the preferred means of transport for people is their own car since 116 people of the 170 surveyed use this mean of transportation. This represents an area of opportunity for the UEP, in conjunction with the *UNIBici* program and the Agenda Ambiental, campaigns should be promoted to reduce car use.

In addition to the trips to travel daily to the UASLP, there are trips to other cities, states, or countries for reasons related to the University, for this reason, respondents were asked the number of trips they make per year, the means of transport for these trips and the number of hours they travel per year (Figures 30, 31 and 32). Within these questions, he was given the option to decide whether they are short trips (- 200 km approx.), Medium trips (+ 200 km), and long trips outside the country.

Figure 30. Travels per year related to UASLP

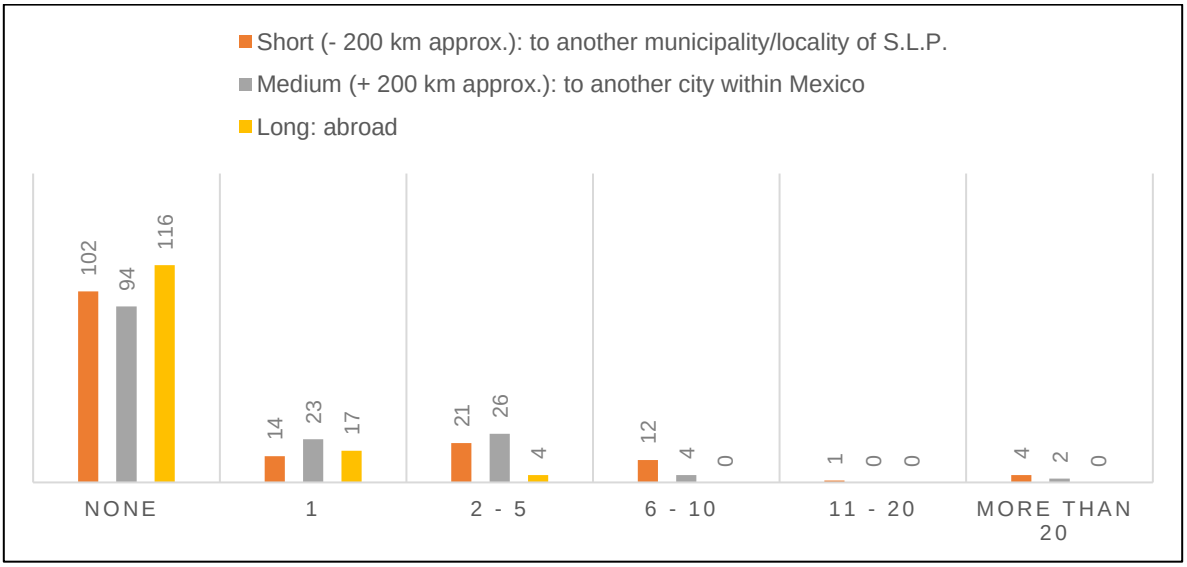
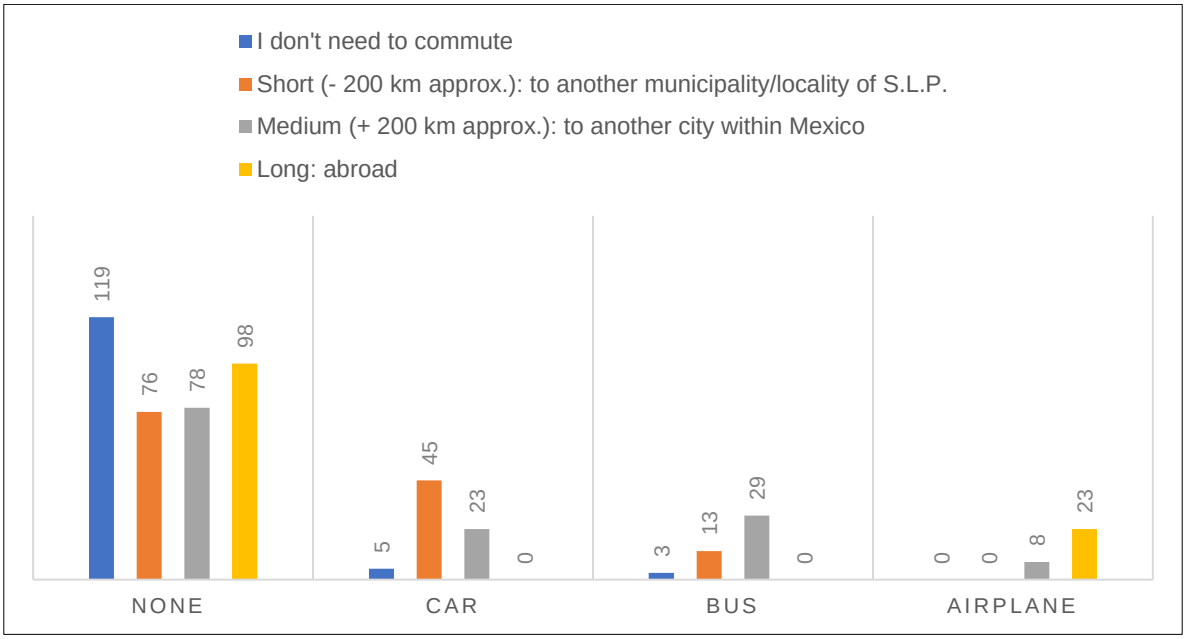


Figure 30 shows that most respondents do not make any trips for work or study. A smaller part of the respondents only make one trip a year and of these 23 people answered that they make this trip to another city within Mexico. Another part responded that they make 2 to 5 trips where the majority (26 people) responded that they also make them to another city within the country. Only 2 people responded that they make more than 20 trips outside the country per year.

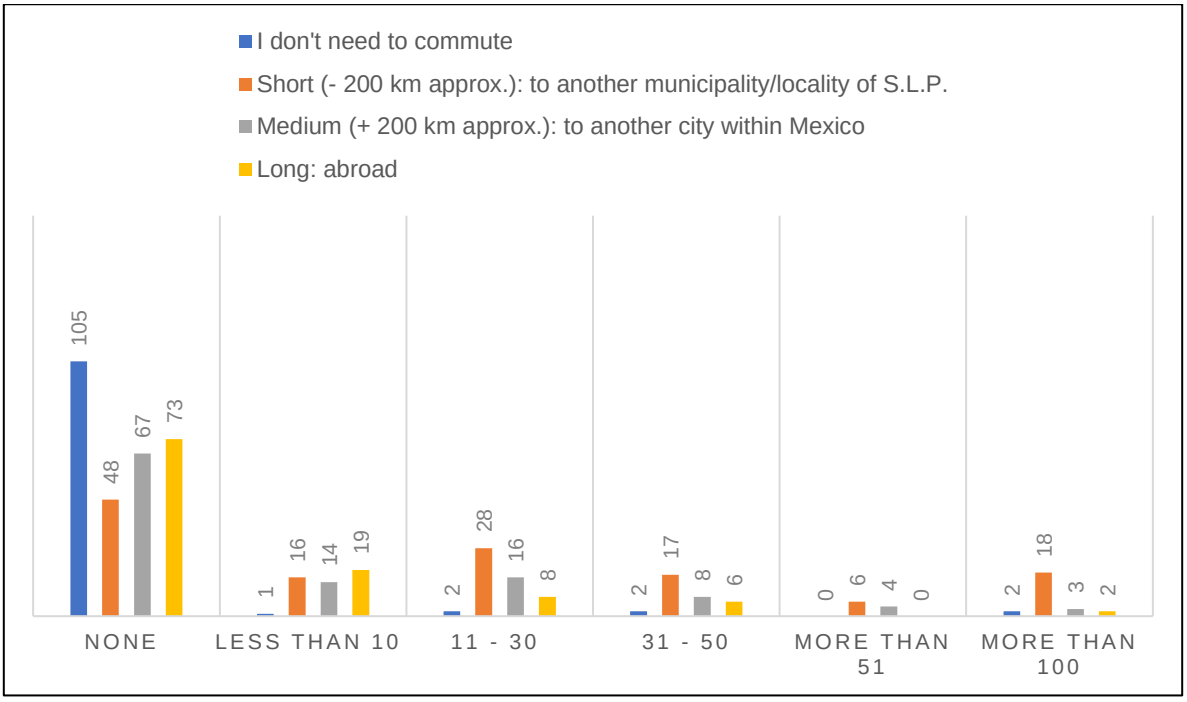
According to the means by which the trips mentioned in Figure 30 are made. Figure 31 shows that 45 people responded that for short trips they use a car, 29 people responded that for medium trips they use a bus and 23 people responded that for long trips outside the country they use airplanes.

Figure 31. Means of transport according to travel distance



Finally, to know an estimate of travel hours related to UASLP activities, most of these hours are used for short trips (Figure 32). 16 people responded that they spend less than 10 hours of travel per year, 28 responded from 11 to 30 hours, 6 more than 50 hours, and 18 more than 100 hours a year on short trips. Only two people responded that they travel more than 100 hours a year for long trips outside the country, an activity that generates the highest amount of GHG emissions from burning fuel in airplanes.

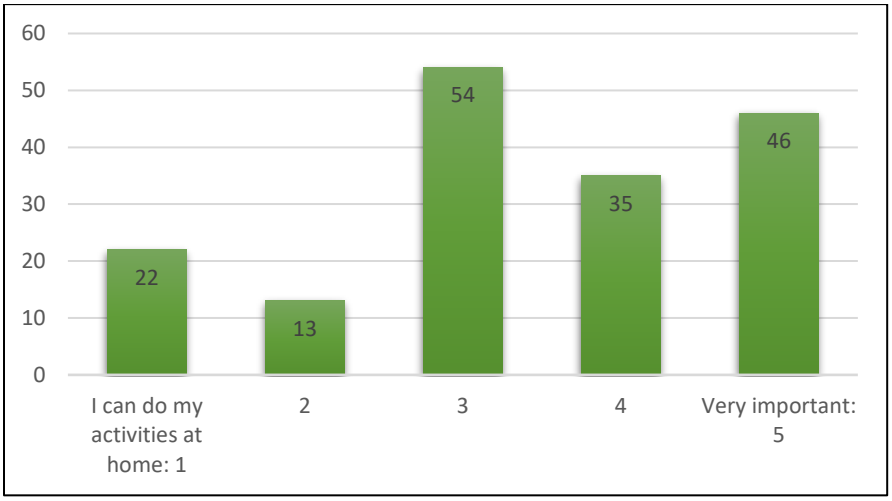
Figure 32. Travels Hours per Year related to UASLP



To close with the mobility survey, respondents were asked about their opinion about whether they believe that the current COVID-19 pandemic affected their mobility, to which 78% of people answered "YES", 11% answered that "NO" and 11% answered that they have the same mobility before and during the pandemic.

As a strategy to reduce fuel consumption thanks to urban mobility, the community was asked about the importance of returning to their normal activities within the UASLP (Figure 33). On a scale where 1 means "I can do my activities from home" and 5 "Very Important" to return to normal activities, 54 people responded neutrally while 46 people consider it very important to return to their face-to-face activities at university.

Figure 33. Importance of going back to normal activities within UASLP



Complementary data to the survey

The indicators are shown below expand the panorama of mobility obtained through the surveys. These indicators mentioned in Table 3 of Chapter 3.1.2, were obtained directly from data from the UASLP Agenda Ambiental and show that in addition to the mobility problem faced by the university due to cars that do not belong to the institution, the UASLP also has transportation private. In addition to private transport, the indicator of the number of vehicles, motorcycles, and zero-emission vehicles (ZEV) that enter the University per day is shown.

	Number of transport services of each entity	No. Passengers per service	No. of round trips per day
Coordinación Academica Region Altiplano	1 Bus	44	0,33
Coordinación Academica Region Altiplano Oeste	1 Bus	15	1
Facultad de Agronomía y Veterinaria	6 Busses	44	3
Facultad de Medicina	1 Bus	25	1
Instituto de Geología	1 Truck	10	1
Instituto de Metalurgia	1 Truck	2	1
Total	**9 Busses** **2 Trucks**	**140**	**7,33**
Number of cars entering the UASLP daily			**3129**
Number of motorcycles entering the UASLP daily			**606**
The average number of Zero-Emission Vehicles (ZEV) (electric cars etc.) on campus per day			**12,2**

It is presumed that the UASLP has more private transport (trucks, cars, and buses), even so, the exact data is not available at the moment. When implementing the UEP, an exact quantification of these indicators must be obtained.

5.2 UASLP Energy Review

Following the planning process proposed by Figure 10, in Chapter 3.1 and due to the existing data limitation. For the tactical part, the energy review was made by identifying the Significant Energy Uses (SEnU), they were determined and selected by the present work through the results obtained by the survey carried out, and they constitute a key aspect within the UEP being the priority within energy management. Due to the limitation to be able to carry out an analysis of energy consumption and uses as a framework to establish the selection criteria of the SEnU. In this sense, the definition establishes two criteria: the first refers to substantial energy consumption, while the second refers to the use that offers considerable potential for improving energy performance.

All the SEnU that were discussed in the survey has the potential to improve their energy performance because none is an essential process for the operation of the UASLP. The energy performance indicators (EnPI) obtained from the survey are quantifiable values from the UASLP; They were selected to understand, monitor, measure, and analyze their energy performance before, during, and after the implementation of the UEP.

When defining the EnPIs, due to the available data, they were thought of as global indicators (at the entire UASLP level) aimed mainly at top management. That is why there must be several factors that impact the level of energy consumption and efficiency (relevant variables) of the selected activities since the conditions of each Campus or academic entity are different, there are newer buildings than others, some campuses are They are in a warm tropical climate, another is a semi-desert, the number of staff also varies. For this reason, some examples of relevant variables that can affect energy performance are listed here:

- Climate, ambient temperature, humidity, degrees/day.
- Occupancy levels in buildings.
- Availability of natural light and the necessary light levels.
- Hours of operation.
- Loading and use of vehicles.

EnPIs values are required to be reviewed and compared over time; that is, the Energy Base Line (EnBL), to monitor and be able to report on positive results or significant deviations and respond to them.

The quantitative reference with which the level of consumption and efficiency of energy uses of the UASLP is compared is called the energy baseline (EnBL).

The first action to obtaining the EnBL was to establish an adequate period of time (2019-2020), which represents the operating cycles of the UASLP and also satisfies the requirements of having all the monthly consumption measurements reported by the CFE bills that affect energy performance.

The data to establish the EnBL were taken from the energy review and calculated with consumption data from previous periods. The EnBL is shown below in Tables 10 – 11 and

Figures 34 – 35, the total consumption of the UASLP was calculated and its economic expenditure in Mexican pesos $ MXN.

In addition, a model was made to be able to compare the consumption of the “Zona Universitaria Poniente” by itself and with this determination that it is the campus with the highest consumption, representing around one-third of total energy consumption within the UASLP.

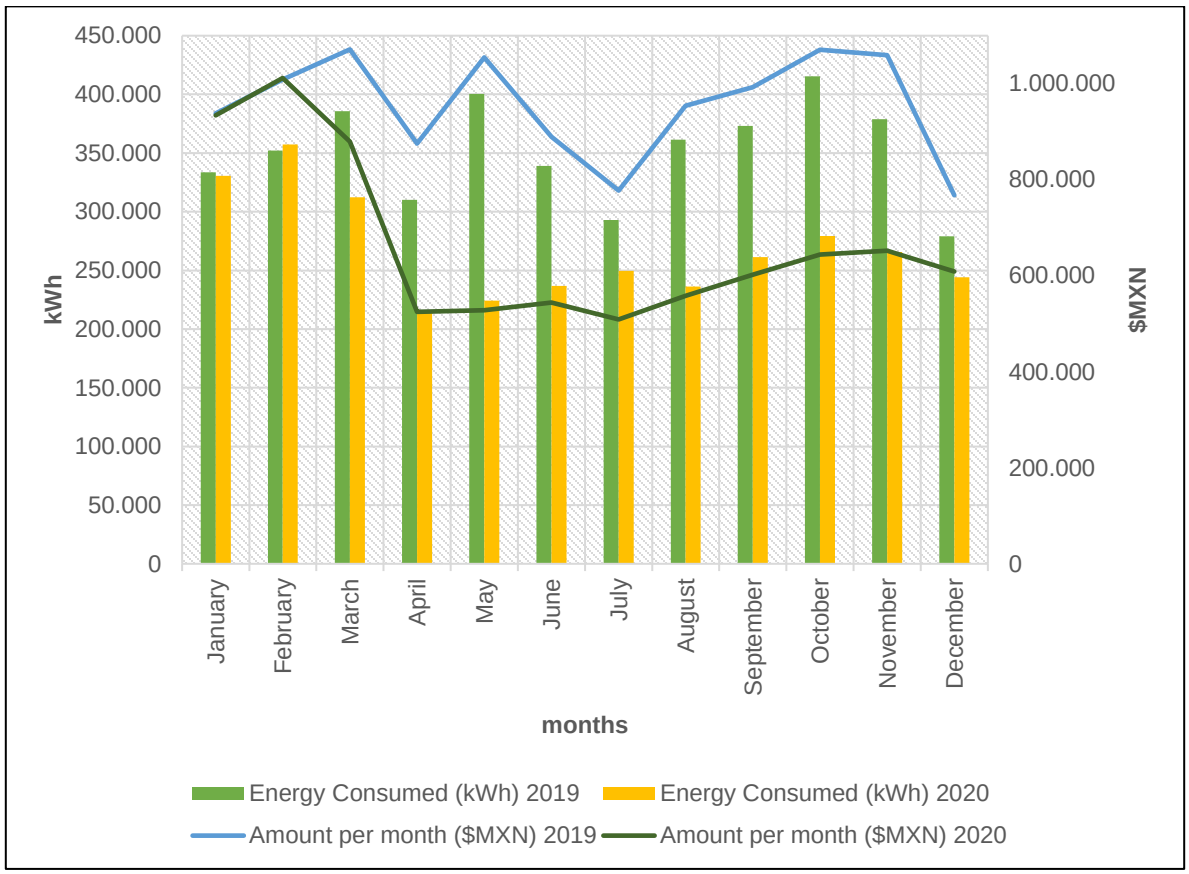
Table 10. Energy Consumption of the Zona Universitaria Poniente for the period (2019-2020)

Month	Energy Consumed (kWh) 2019	Amount per month ($MXN) 2019	Energy Consumed (kWh) 2020	Amount per month ($MXN) 2020
January	333631	$ 938.206,00	330538	$ 934.000,00
February	352057	$ 1.008.622,00	357433	$ 1.011.836,00
March	385788	$ 1.071.448,00	312284	$ 879.137,00
April	310109	$ 875.602,00	215264	$ 524.924,00
May	400373	$ 1.054.509,00	224119	$ 527.891,00
June	339073	$ 889.661,00	236693	$ 544.317,16
July	293066	$ 777.307,00	249624	$ 508.994,58
August	361436	$ 953.854,00	236287	$ 557.900,75
September	373091	$ 992.426,00	261365	$ 602.074,26
October	415454	$ 1.070.545,00	279350	$ 644.212,75
November	378755	$ 1.059.634,00	265656	$ 652.293,69
December	279036	$ 767.739,00	244075	$ 608.560,51
Total	**4221869**	**$ 11.459.553,00**	**3212688**	**$ 7.996.141,70**
tCO_2e	**2132,04**		**1587,06**	
		2019-2020	1009181	$ 3.463.411,30

During the period 2019-2020, in Figure 34 it is observed that the months with greater consumption are those corresponding to the periods of January and February. During the month of March - April 2020, there is a decrease in energy consumption of the "Poniente University Zone" this because in those months the UASLP decided to carry out its activities remotely due to the current pandemic of Covid-19, which that significantly affects energy consumption.

The difference between consumption for the Zona Universitaria Poniente of 2019-2020 was 1009191 kWh and economic savings of 3,463411.30 million pesos was had. This indicates that the ENP of the UEP can be an opportunity area of special attention thanks to the scanning of the processes.

Figure 34. Energy Consumption of the Zona Universitaria Poniente for the period (2019-2020)



Concerning the whole UASLP considering all its campuses and academic entities Table 11 and Figure 35. The behavior of energy consumption is similar to that of the Zona Universitaria Poniente consumption. During 2019 (normal year of activities) it is observed that during the months of holiday April, July, and December, energy consumption decreases, this behavior does not apply by the year 2020, because during this year, face-to-face activities were suspended in the UASLP by What the behavior of energy consumption decreases significantly compared to the year 2019. As Table 11 shows it in 2020, 3'566'116 kWh less than 2019 was consumed and economic savings of $ 9, 942308.32 Mexican pesos.

Table 11. Energy Consumption of the whole UASLP for the period (2019-2020)

Month	Energy Consumed (kWh) 2019	Amount per month ($MXN) 2019	Energy Consumed (kWh) 2020	Amount per month ($MXN) 2020
January	946344	$ 2.357.523,00	898857	$ 2.439.062,00
February	1040916	$ 2.732.385,00	1027176	$ 2.711.269,00
March	1144534	$ 2.951.048,00	991838	$ 2.588.295,00
April	960195	$ 2.470.605,00	679175	$ 1.624.544,93
May	1197402	$ 3.160.046,00	678839	$ 1.609.685,11
June	1120893	$ 2.774.342,46	640254	$ 1.461.662,97
July	892985	$ 2.369.919,79	719695	$ 1.658.281,73
August	1168923	$ 2.894.807,00	690486	$ 1.621.036,69
September	1230119	$ 3.020.540,00	735420	$ 1.701.846,11
October	1268118	$ 3.069.521,79	817277	$ 1.869.532,23
November	1098500	$ 2.843.862,00	750375	$ 1.835.546,50
December	837845	$ 2.137.044,00	711266	$ 1.718.573,45
Total	**12906774**	**$ 32.781.644,04**	**9340658**	**$ 22.839.335,72**
tCO_2e	**6517,92**		**4614,28**	
		2019-2020	3566116	$ 9.942.308,32

The formula used to calculate these emissions is shown below (Flores Díaz and Jáuregui Nares, 2020):

Emissions of GHG Electricity = (Electricity consumption) (FEE year)

Where:

Emissions of GHG Electricity = GHG emissions due to electricity consumption per year in tCO_2e;

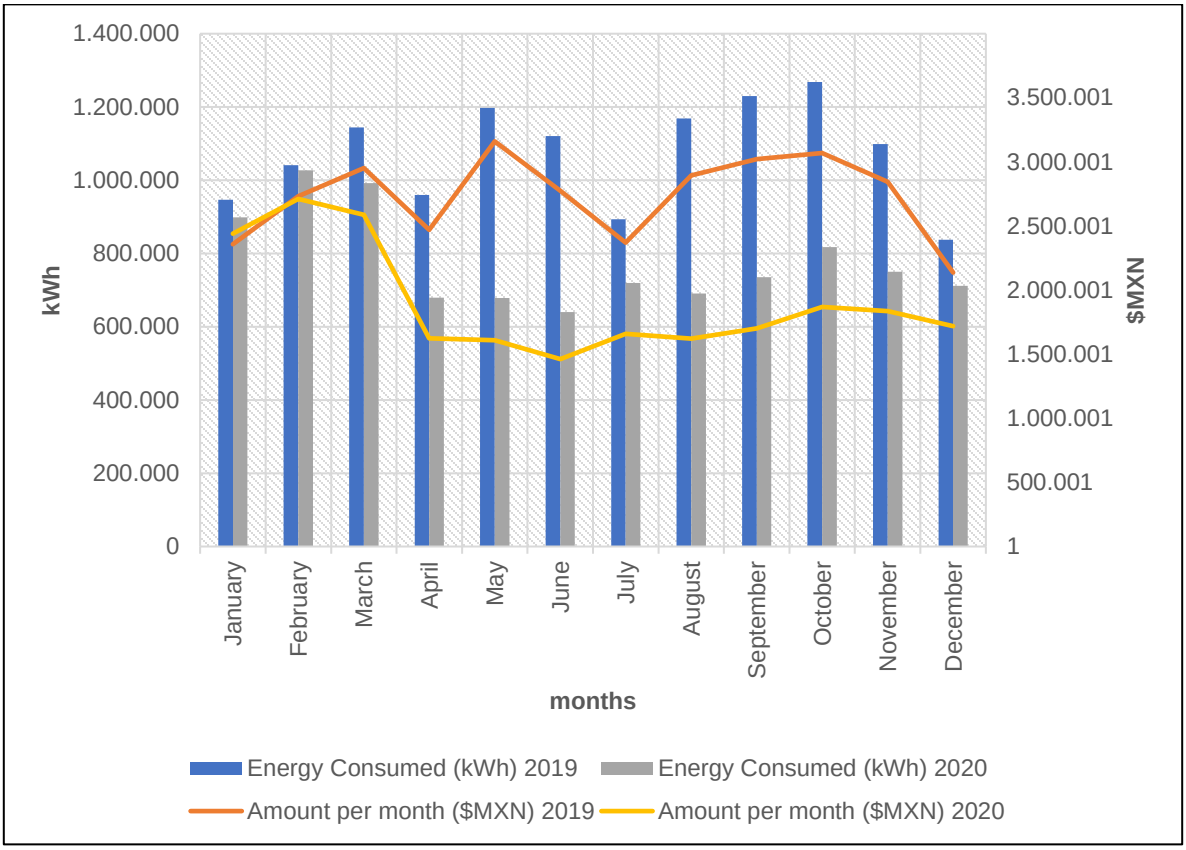
Electricity consumption = Electricity consumption per year in MWh;

FEE Year = CO_2e emission factor due to electricity consumption per year in (tCO_2e/MWh).

During the period of 2019, *6517 tCO_2e* was issued, while in 2020, *4614* were issued.

The tons of CO_2 equivalent was calculated through the annual publications of the national average factor of CO_2 emissions due to electricity consumption (tCO_2/MWh), which for the year 2019 this factor was 0.505 (CRE, 2020), and for the year 2020, the official factor was 0.494 (SEMARNAT, 2021).

Figure 35. Energy Consumption of the whole UASLP for the period (2019-2020)



The data were obtained from CFE consumer bills. Most of these readings within the UASLP are CFE "GDMTH" tariffs, they are supplied in medium voltage with a demand of 100 kW or more.

To improve energy savings in the UASLP, the UEP should focus on peak kW because they reduce the cost of demand, reduce consumption during peak hours (always consider the schedules that the CFE applies to the UASLP depending on on-campus location).

Once the EnBL was known, the present work obtained information through inventories of equipment and its consumptions, from the SEnUs of the UASLP.

Inventories were obtained from 3 different locations within the UASLP, the first and the most complete is the inventory provided by the Agenda Ambiental, which mostly has electrical office appliances, an air conditioner, and some electrical kitchen appliances.

Since within its facilities the Agenda Ambiental does not have any laboratory, its main SEnUs are the computer room that, being in use for approximately 2 hours, consumes approximately 16 kWh (Table 12); It also has an Air Conditioning that being for 2 hours consumes approximately 6.4 kWh.

Table 12. Inventory of the Agenda Ambiental to Identify SEnU

Agenda Ambiental Electrical Appliances					
Brand	**Electrical appliance**	**Qty**	**Power (W)**	**Hours/day**	**kWh**
KIOCERA	Printer KM-5050	1	20	8	0,16
HP	Printer LASERJET 5500dn	1	20	8	0,16
HP	Printer LASERJET P1005	1	20	8	0,16
KIOCERA	Printer KM-5035	1	18	1	0,018
TEFAL	Coffee Maker CM351	1	950	3	2,85
LG	Microwave MS-1144DP	1	1500	2	3
EVERSTAR	EM031MEL Microwave	1	1500	2	3
GE	Water Dispenser GXCF05D	1	5	24	0,12
EPSON	Powerlite X14 + video projector	1	250	3	0,75
BEN Q	Mini Projector, Model: Joybee GP2	1	150	2	0,3
SONY	Video projector, SERIES: 7009326, color: white	1	250	3	0,75
EPSON	Powerlite X24 +	1	250	3	0,75
EPSON	Powerlite S6 + Video Projector	1	250	3	0,75
SONY	Video projector, model: XGA-VPL-EX7, white	1	250	3	0,75
SONY	Video projector, model: VPL-CX61, gray with black	1	250	3	0,75
EPSON	Powerlite X24 +	1	250	3	0,75
BEN Q	Mini Projector, Model: Joybee GP3	1	150	2	0,3
EPSON	POWER LITE X36 + (3LCD 3600)	1	250	3	0,75
DELL	VOSTRO 3450 V14Cl3	1	200	8	1,6
DELL	Notebook INSPIRON 14R 114Si5s650SB	1	200	8	1,6
HP	Mini 110-3712LA	1	130	0	0
DELL	Vostro 1320	1	200	0	0
HP	ENVY X2 11-050la	1	200	8	1,6
TOSHIBA	OOSMIO X875-Q7390	1	200	0	0
DELL	Inspiron 15R (5537)	1	200	8	1,6
ACER	V5-171-6466 (LNX.M3AAL.022)	1	200	8	1,6
HP	Model 630 Notebook	1	200	0	0
DELL	Latitude E5500	2	200	0	0
DELL	Inspiron 3537 15R 15.6 HD Touch	1	200	8	1,6
DELL	Inspiron Mini 1210	1	130	8	1,04
DELL	Vostro 5470 V5470_i5450SW8Ps	2	200	8	3,2
ACER	Aspire V3-371-771 \	2	200	0	0
DELL	VOSTRO 3459 laptop	2	200	8	3,2
DELL	Inspire 15 5570	1	200	8	1,6
Lenovo	V330-1411 \ B	1	200	8	1,6
DELL	Vostro 3400 laptop	1	200	8	1,6

DELL	Precision T1500	1	400	0	0
DELL	Inspiron 620	1	400	8	3,2
DELL	Optiplex 740	1	400	8	3,2
DELL	Dimension 8200	2	400	8	6,4
DELL	Dimension 9200	1	400	8	3,2
DELL	Optiplex 9020	1	400	8	3,2
DELL	Vostro 460	1	400	0	0
DELL	Vostro 220s	3	400	8	9,6
DELL	Optiplex 9010	2	400	8	6,4
DELL	PowerEdge T420 5U Tower	1	400	8	3,2
DELL	XSP 8700 Computer Minitower	1	400	8	3,2
DELL	DELL Optiplex 760	20	400	2	16
Boxlight	Speakers Soundlite	1	30	1	0,03
CISCO	Access point	1	15	24	0,36
Phillips	Pedestal fan	1	200	1	0,2
LASKO	Tower fan	1	100	1	0,1
Man freal	20 "floor fan	1	200	1	0,2
Mirage	Air conditioning 1.5Tons	2	1600	2	6,4
IMPCO	Medium wash air	1	1200	1	1,2
Vapovent	Medium wash air	1	1200	1	1,2
				Total	**105,2**

The total kWh that the Agenda Ambiental consumes was calculated by estimating the hours that these electrical appliances are used because this data was not available, the powers (W) at which the appliances work were also standardized for other similar appliances due to because this information was not available either. Having said the above, it is presumed that approximately the Agenda Ambiental consumes a total of 105 kWh in an average workday, therefore it presents opportunities for improvement mentioned above.

Thanks to question 13 of the "UASLP Energy Habits" Survey (Annex 10), inventories from the CIACYT heat and chemical treatment laboratory, as well as from Carrel 18 from the same research institute, were obtained by email (Table 13).

In the laboratory, it is shown that the SEnU are the baths at a constant temperature since they are used in greater relation to the other laboratory devices. It was calculated that this laboratory consumes approximately 18.38 kWh per day without counting lighting since no data was obtained from this.

On the other hand, Carrel 18 of the CIACYT Second Floor can consume up to 43.5 kWh per day if it is charging the uninterruptible power supply.

Table 13. Inventories of the CIACYT Institute to Identify SEnU

CIACYT Heat and Chemical treatment laboratory					
Brand	**Electrical appliance**	**Qty**	**Power (W)**	**Hours/day**	**kWh**
SHIMADZU	Spectrophotometer	1	300	1,6	0,48
ANOVA	Constant temperature bath	1	1000	9,6	9,6
PolyScience	Constant temperature bath	1	400	7,2	2,88
ThermoScientific	Constant temperature bath	1	730	4,8	3,504
Binder	Oven	1	800	2,4	1,92
				Total	**18,38**
CIACYT Floor 2, Carrel 18					
-	Coffee maker	1	1350	2	2,7
-	Fan	1	100	4	0,4
-	Telephone	1	2	2	0,004
HP	Z220 Workstation	1	530	8	4,24
HP	Monitor	1	19	8	0,152
APC	Uninterruptible Power Supply	1	1500	24	36
				Total	**43,5**

Although the use of renewable energies does not represent an improvement in the current energy performance of the UASLP, the University has cogeneration systems within some of its faculties or academic entities (Table 14), however, this can be incorporated into the system of UEP energy management.

Through the Agenda Ambiental, generation data were obtained within the UASLP in its different campuses and entities throughout the state. Despite having these data, to implement the UEP, it is necessary for the UASLP to update its databases, because it is known that there are more photovoltaic systems within the University, but they have not yet been quantified. Therefore, if UASLP wants to have an EnMS within the UEP you need data that is as close to reality as possible.

The current estimate is that within all UASLP campuses and entities (Table 14), 190.87 kWh per day are produced. Which does not represent a significant contribution to energy performance.

Table 14. Renewable Energy Generation within UASLP

Campus	Entity	Municipality	No. of Panels	Energy per panel (W)	Energy Production kWh	Energy Production kWh/year (2019)
Zona Universitaria Poniente	Instituto de Física	SLP	14	250	14,455	5276,075
	Centro de Capacitación en Ingeniería de Materiales		210	250	10	3650
	Facultad de Ingeniería			250	20	7300
	Facultad del Hábitat		30	250	25	9125
Zona Universitaria Sur	IICO		40	510	42,126	15375,99
Zona Media	Unidad Académica Multidisciplinaria Zona Media	Río Verde	-	250	-	-
Zona Huasteca Sur	Campus Huasteca Sur	Tamazunchale	42	245	42,4977	15511,6605
Zona Universitaria Norte	Facultad de Agronomía y Veterinaria	Soledad de Graciano Sánchez	-	250	-	-
Zona Universitaria Noroeste	Unidad de Posgrados e Investigación	SLP	-	250	-	-
	CIACYT		40	250	36,8	13432
Total of Solar Energy production per year						69670,7255
Total of Solar Energy production by all campuses per day						190,8787

- No information was available.

6 Step-by-Step towards a University Energy Program

6.1 Overview of UEP and selected program elements and tools

The effectiveness of the UEP will depend, to a large extent, on the commitment and availability of all the actors involved in the UASLP to manage the use and cost of energy, in addition to making the changes that are necessary on a day-to-day basis to facilitate these improvements and reduce costs (Flores Díaz and Jáuregui Nares, 2020).

There are different ways to incorporate energy management into daily activities; that is, there is no right or wrong way to do it; however, there are some recommendations to achieve this.

Improvement in measurable results of:

- Energy efficiency
- Energy consumption related to energy use, compared to the energy baseline

Scope of other expected results such as:

- Reduced cost in energy
- Compliance with the general objectives of climate change
- Improved reliability
- Increase in the use of renewable energies

Continuous improvement of the UEP in terms of:

- Suitability
- Adequacy
- Efficacy
- Alignment with the strategic direction

This work focused on identifying the core requirements of the EnMS of ISO 50001: 2018 to facilitate the future implementation of the UEP under this scheme.

> *Core requirements are essential to observe and improve the energy performance of the UEP. The core requirements are all those focused on energy management itself. This means that, if the UASLP decides to work only on them, it will also be integrating energy performance into its operational control variables and it will be possible to see results in energy consumption and costs associated with it (ASE, 2018).*

These requirements apply to all analysis activities of energy use and consumption and its associated costs.

The core requirements proposed in this work are visualized in Figure 36 below. This figure represents the cycle of continuous improvement in energy management and is composed of two essential parts, the first part is the results found in this work, while the second part is the guidelines for future implementation of the UEP. These guidelines are composed of procedures, regulations, procedures, and lists that the UASLP together with the Agenda Ambiental must develop if they want to implement a university energy program that adheres to the international standard ISO 50001:2018.

In addition to the above, Figure 36 is composed of a continuous improvement cycle where the phases of the cycle are listed in pastel colors, as well as the tools that this work developed to comply with these phases. These tools are marked by a color traffic light where the tools in GREEN color were fully developed in the present work, the tools in YELLOW color were partially completed due to time conditions, present pandemic COVID-19 situation, and lack of information about them, while the tools in RED color need to be fully completed by the team in charge of implementing the UEP, because until the date of this work there is no data to fulfill them, due to the technical limitations, they should be fulfilled for an expert team and/or because the lack of existence of energy policies/strategies within the UASLP. These tools are the milestones to future works regarding the implementation of the present UEP.

If the information and time of this research had been sufficient, the goal was to have as many GREEN tools as possible, but because of the above mentioned, this research is focused on being a pilot study and gives a systematized guide of the steps that have to be followed to implement an EnMS (these tools are broken-down for its visualization in Chapter 9 - Annexes of this document), so this research does not seek to have all the information that is missing in the YELLOW and RED tools as an objective.

It should be noted that the elements in Figure 36 were standardized in a generic manner for the entire UASLP due to the information available and the fact that the results presented in Chapter 5 were obtained from the entire UASLP in general, making it difficult to classify by entities, campuses, or faculties.

The following work suggests that for correct implementation of the UEP, a study should be carried out according to the specific characteristics of each site: climatic factors in the area, infrastructure, number of people/users, age of the buildings, renewable energy generation potential and connection to the electrical grid. This is since as mentioned in chapter 4.3.2 the UASLP has campuses in different locations in the state of SLP, so the energy needs are different from site to site.

Figure 36. Overview of the elements required to implement an EnMS under the ISO 50001:2018 standard.

Results of this work: "Getting to know current energetic situation of the UASLP"				
Chapter	Subchapter	Status	Document	Name / Tool
UASLP Context	Energy Demand's Outlook		A-10	Energy Habits UASLP / Survey
	Mobility Energy Demand		A-10	
	Needs and Expectations of Stakeholders		A-01	Risk Management / Procedure
			A-01b	PESTEL / Questionnaire
			A-12	Stakeholders' Analysis
			A-12b	Stakeholders' Mapping
	Determination of the EnMS's (UEP) Scope		A-04	Scope and Limits of the UEP / Format
			A-10	Energy Habits UASLP / Survey
Energy Review -Planning-	Significant Energy Uses (SEnU)		A-09	Equipment and Lighting Inventory / Master list
			A-10	Energy Habits UASLP / Survey
			A-18	Energy Planning / Procedure
			Chapter 5	UASLP Inventories of Equipment / Results
			Chapter 5	UASLP Energy Consumptions / Results
	Energy Performance Indicator (EnPIs)		A-09	Equipment and Lighting Inventory / Master List
			A-10	Energy Habits UASLP / Survey
			A-18	Energy Planning / Procedure
			Chapter 5	UASLP Inventories of Equipment / Results
			Chapter 5	UASLP Energy Consumptions / Results
	Energy Baseline (EnBL)		A-18	Energy Planning / Procedure
			Chapter 5	UASLP Energy Consumptions / Results
	Planning for further Energy Data collection		A-18	Energy Planning / Procedure

Further recommendations: "Guidelines for future work on implementation of the UEP"				
Chapter	Subchapter		Document	Name / Tool
Leadership	Leadership and Commitment		A-04	Scope and Limits of the UEP / Format
			A-13	Energy Commission / Organizational chart
			A-18	Energy Planning / Procedure
			A-19	Communication of the UEP / Procedure
			A-19b	Communication of the UEP / Binnacle
	Energetic Policy		A-14	Energy Policy
	Roles and Responsibilities and Autorities for the UEP		A-12	Stakeholders' Analysis
			A-12b	Stakeholders' Mapping
			A-13	Energy Commission / Organizational chart
Support	Resources for the UEP		AOP	Annual Operational Program / Suggested
	Energy Competence and Awareness		A-20	Competence and Awareness / Procedure
	Communication		A-19	Communication of the UEP / Procedure
			A-19b	Communication of the UEP / Binnacle
	Documented Information		A-02	Control of Records / Procedure
			A-04	Scope and Limits of the UEP / Format
			A-14	Energy Policy
			A-15	Controlled Documents / Master List
			A-16	Controlled Records / Master List
Operation	Planning and operational control		A-05	Operational Controls / Matrix
			A-11	Work for Direct Purchases / Instructive
	Design		A-06	Desing, Modification and Renovation / Format
	Acquisition and new purchases		A-11	Work for Direct Purchases / Instructive
Performance Evaluation	Monitoring, measurement, analysis and evaluation of energy performance		A-07	Identifying Legal and other Requirements / Format
			A-18	Energy Planning / Procedure
	Internal Audit		A-03	Realization of Internal Audits / Procedure
	Top Management Review		A-08	Results of the Top Management Review / Format
Improvement	Non-conformity and corrective actions		A-17	Corrective Actions / Procedure
	Continuous improvement		All of the above	

Symbology

Cycle Phase		Status	
	Plan		Completed
	Do		Partially completed
	Check		Needs to be done
	Act		

The figure is composed of the elements needed to implement the UEP, it shows the work done by the present work, as well as the information and elements that need to be gathered by other works in the future to have a 100% compliance with the University Energy Program (UEP).

6.2 Roles and Responsibilities

To have a better understanding of the roles and responsibilities of each of the actors involved in the implementation of the UEP. As mentioned in the methodology chapter 3.2.2., An analysis of the interested parties was carried out (Annexes 12 and 12b).

The analysis presents the actors, their responsibilities, their current role in decision-making, and the potential to collaborate with the UEP. The stakeholder groups were classified into Beneficiaries, decision-makers, and potential collaborators.

As a complement to the information generated in the analysis, a mapping of the Stakeholders was also prepared (Annex 12b), where the relationships and connections between the different stakeholders are illustrated and which are essential for the implementation of the UEP within the UASLP.

6.3 The Defined Procedure for the Action Plan according to ISO 50001:2018

The following procedure is proposed by this work under the continuous improvement scheme "PLAN-DO-CHECK-ACT" described in chapter 2.4 of this work, and according to Figure 36. In Figure 36 the results and the recommendations for the implementation of an EnMS according to the international standard ISO 50001:2018 were presented.

The defined procedure is divided into chapters and sub-chapters (each chapter and sub-chapter are divided by number and color). Within each sub-chapter, the elements that must exist in some way to comply with it are presented, as well as the documents (in the form of Annexes) that will serve as a guide to collect these elements. In addition, inside the defined procedure, there are the stakeholders that must be involved in each sub-chapter at the time of implementing the UEP.

The last element of the defined procedure consists of the scope with which this thesis work was carried out. Within this Scope it is mentioned, what this thesis work done, which are the elements that this work did not do (due to lack of information and/or time), and which are the elements that are not within the scope to complete, for example, it is up to the Top Management only to carry them out.

For aesthetic reasons, the procedures will be presented on the next page (Pag 92).

6.3.1 PLAN				
	4. UASLP Context			
	4.1. Understanding of the organization and its context	**4.2. Understanding the needs and expectations of stakeholders**	**4.3. Determination of the scope of the energy management system (UEP)**	**4.4. Energy management system (UEP)**
Elements	The first step for the creation of the University Energy Program (UEP), is necessary to determine the internal and external factors that affect, positively or negatively, the expected or projected results concerning the UEP and its energy performance, which will serve to connect the two elements with strategic planning. External factors are those that are outside the physical limits of the UASLP interested in energy performance, such as: • Natural, climate, geographical circumstances. • Energy suppliers and suppliers. • Shareholders, economic and financial issues. • Communities, cultural, social, and political environment. • Government, voluntary or contractual regulations. • The technology is available in the market. • General public.	Under the nature of the UASLP and the 4.1 actions, it is necessary to determine: a) Stakeholders that are relevant to energy performance and the UEP, both Internal: UASLP and beneficiaries; and External: Potential collaborators, partners. b) The relevant needs and expectations (i.e., requirements) of these interested parties. c) Which of these needs and expectations become legal requirements and other requirements. d) It ensures that the applicable requirements are considered. e) Legal requirements and other requirements are reviewed at defined intervals. This Legislation was described in Chapter 4, subchapters 4.1.2 and 4.3.4.	To determine the scope and limits of the UEP, it is recommended to apply the following methodology: 1. Establish a level at which you want to manage energy, such as: • Campuses • Faculties • Offices • Branches • Buildings • Operation 2. Describe and write the activities that are carried out according to the selected level. 3. Describe and write the location of the activities described and/or the energy elements that make up each of the selected activities.	To establish and implement the UEP it is necessary to analyze the current activities of the UASLP and compare them with the reference requirements found in the ISO standard 50001: 2018. It is about planning the integration and interaction of the requirements of the standard ISO with the routine operations of the organization, so it will include personnel, time, and resources. The Agenda Ambiental aims to establish, implement, maintain, and continuously improve the UEP, including the necessary processes and their interactions, as well as the continuous improvement of its energy performance, under the requirements of the ISO 50001: 2018 standard, with the

	Internal factors refer to those that are within the physical limits of the UASLP and concentrate activities, such as: • The staff and their skills. • Organizational culture. • Strategic planning and organizational management. • Mission and vision of the UASLP. • The technology used and the level of productivity.			help of the following matrix of guidelines.
Annexes (A)	A-01 and A-01b	A-01, A-01b A-12, A-12b	A-04 A-10	This document will be the guideline to establish an EnMS called UEP.
Actors involved	All stakeholders	All stakeholders	Internal Stakeholders	All stakeholders
Scope	To understand the UASLP context both the Stakeholders analysis was performed, and chapter 4 UASLP study case was developed. The risk analysis is just marked as a guideline format for further studies due to the limits of this work.	To understand the UASLP context both the Stakeholders analysis was performed, and in Chapter 4, the UASLP study case was developed. The risk analysis is just marked as a guideline format for further studies due to the limits of this work.	To describe the energy activities and their locations (points 2 and 3 of this matrix) within the UASLP, the only available was to implement an online Survey based on the UASLP community "Energy habits" A-10. A-04 format is the guideline information for further implementation.	This document will help to establish the guidelines, procedures, and documents necessary to implement the UEP within the UASLP.

	5. Leadership		
	5.1. Leadership and commitment	**5.2. Energetic policy**	**5.3. Roles, responsibilities, and authorities in the organization**
Elements	The top management "Led by Rectory" in this case, demonstrates its leadership and its commitment	The Top Management establishes its commitment to improving energy	The Top Management with help of Agenda Ambiental ensures that the functions,

	regarding the continuous improvement of its energy performance and the effectiveness of its UEP. For this is needed: a) Ensure that the scope and limit of the UEP is established through the format to determine the scope and limit of the UEP A-04; b) Ensure that the energy policy A-14 is established and in requirement 5.2, the energy objectives and goals in the procedure for energy planning A-18, being compatible with the strategic direction of the UASLP. c) Ensure the integration of the UEP requirements in the UASLP educational processes; d) Ensure that action plans are approved and implemented through the procedure for energy planning A-18. e) Ensure that the necessary resources are available; f) Communicating the importance of effective energy management and compliance with UEP requirements, through the communication procedure A-19 and A-19b; g) Ensure that its intended results are achieved; h) Promoting continuous improvement of energy performance and UEP; i) Ensure the formation of an energy management team, this work will propose that team as "Energy Commission", the organization chart of the energy management team A-13; j) Direct and support people to contribute to the effectiveness of the UEP and the improvement of energy performance.	performance and defines the Energy Policy under the requirements of the ISO 50001: 2018 standard, ensuring that: This policy is communicated to the entire UASLP community and is available to the public through the official university website and official pages of each faculty or academic entity,	responsibilities, and authority of the UEP are defined, documented, and communicated within the UASLP, and thus facilitate effective energy management, according to the Stakeholder analysis A-12 and A-12b. The Top management must assign to the Energy Commission the responsibility and authority to: a) Ensuring that the UEP is established, implemented, maintained, and continually improved; b) Ensure that the UEP conforms to the requirements of ISO 50001: 2018; c) Implements action plans to continuously improve energy performance; d) Present reports on the performance of the UEP and the continuous improvement of energy performance to top management at defined intervals; e) Establish the criteria and methods necessary to ensure that the operation and control of the UEP are effective.

	k) Support other pertinent functions of the Rectory to demonstrate their leadership as applicable to their areas of responsibility. l) Ensure that the EnPIs adequately represent energy performance through the procedure for energy planning A-18; m) Ensure that processes are established and implemented to identify and deal with changes that affect the UASLP and energy performance within the scope and limits of the UEP.		
Annexes (A)	A-04, A-13, A-14, A-18, A-19 and A-19b	A-14	A-12, A-12b and A-13
Actors involved	Top Management of UASLP, Rectory, Agenda Ambiental, Energy Commission		
Scope	In this section, as administrative responsibilities of Top management and rectory, this work will only give the guidelines (in the form of documents) for its implementation.	This section contains the guideline that refers to the Energy Policy document.	In this section, as administrative responsibilities of Top management and rectory, this work will only give the guidelines for its further implementation.

	6. Planning					
	6.1. Actions to address risks and opportunities	**6.2. Objectives, energy goals, and planning to achieve them**	**6.3. Energy review**	**6.4. Energy performance indicators**	**6.5. Energy baseline**	**6.6. Planning for energy data collection**
Elements	The UASLP through the UEP and the procedure for risk management A-01 and A-01b before	The UASLP establishes energy goals, as well as its energy objective for the relevant functions and levels, through the procedure for energy planning A-18.	The UASLP develops, records, and maintains an energy performance diagnosis using the results of the UEP. It documents the methodology and criteria	The UEP determines that EnPIs are appropriate for measuring and monitoring its energy	The UEP establishes an energy baseline EnBL, through the information of the initial energy	In perspective, the UASLP must define and implement an energy data collection plan appropriate to its size, its complexity, its

	its implementation must: • Ensure that the UEP can achieve its intended results, including improved energy performance; • Prevent or reduce the effects concerned; • Achieve continuous improvement of UEP and energy performance. The UASLP must plan: a) Actions to deal with risks and opportunities b) The way to integrate and implement the actions in the UEP and the energy performance processes, as well	The energy objective and goals of the UASLP are consistent with its energy policy, being measurable, considering the applicable requirements, and considering its SEnU, as well as the opportunities for energy performance, UEP Manual being the object monitoring, communicating, and updating as appropriate. • The UASLP plans the way to achieve its energy objective and goals, establishing and maintaining action plans including: • The goals to achieve the objective. • The activities planned to achieve the goals. • The assignment of authority and responsibility. • The means considered in the Annual Operational Program (AOP); and the anticipated timetable for achieving those objectives and goals.	used to develop the energy review through the Procedure for energy planning A-18 with the following actions. This document: analyzes the use and consumption of energy based on the survey of energy habits, inventories, and total energy consumption of the UASLP, identifying the present types of energy, as well as evaluating the past and present use and consumption of energy. It is based on the use and consumption of energy, identifying the significant uses of energy, determining the relevant variables, current energy performance, and identifying the people who work under the control that influences or affects the SEnU. Determine, prioritize, and record opportunities to improve energy performance, as well as estimate energy use.	performance, allowing the UASLP to demonstrate the improvement of its energy performance in the future. The proposed methodology to determine and update the EnPIs must be documented and updated annually, through the procedure for energy planning A-18.	performance diagnosis and considering a period for data collection appropriate to the use and consumption of the energy of the UASLP. For this work, the periods 2019 – 2020 were chosen, because they are the ones with the full data to compare. In perspective, the baseline must be maintained and recorded using the procedure for energy planning A-18.	measurement, and monitoring equipment. The plan should specify the data needed to track key characteristics and establish the manner and frequency with which the data should be collected and kept using the A-18 Energy Planning Procedure. The data to be collected should include: a) The relevant variables for the SEnU; b) Energy consumption related to UASLP; c) Operational criteria related to SEnU;

	as to evaluate the effectiveness of these actions.	• The control and monitoring through review periods, responsible for carrying out	The UASLP must update the energy performance diagnosis annually, in response to major changes in facilities, equipment, systems, or processes.			
Documents and Annexes (A)	A-01 and A-01b	A-18 It is suggested to develop an Annual Operational Program (AOP).	A-09, A-10, A-18; Inventories, of equipment and UASLP Energy Consumption per Year.	A-09, A-10, A-18; Inventories, of equipment and UASLP Energy Consumption per Year.	A-18 and UASLP Energy Consumption per Year.	A-09, A-10, A-18; Inventories, of equipment and UASLP Energy Consumption per Year.
Actors involved	Top Management of UASLP, Rectory, Agenda Ambiental, Energy Commission	Top Management of UASLP, Rectory, Agenda Ambiental, Energy Commission	Top Management of UASLP, Rectory, Agenda Ambiental, Energy Commission	All Internal Stakeholders must collaborate	Top Management of UASLP, Rectory, Agenda Ambiental, Energy Commission	All Internal Stakeholders must collaborate hand by hand with CFE (External Stakeholder).
Scope	In this section, as administrative responsibilities of Top management and rectory, this work will only give the guidelines (in the form of documents) for its implementation.	Due to the scope of this work, for this point of the ISO 50001 reference standard, only the energy indicators of the UASLP are defined, through the collection of consumption data. These results are found in this document in the results section.	Due to the scope of this work, this work analyzes the use and consumption of energy identifying present types of energy, as well as evaluating past and present energy use and consumption. These results are found in this document in the results section.	Due to the scope of this work, for this point of the ISO 50001 reference standard, only the energy indicators of the UASLP are defined, through the collection of	The present work considers as EnBL, the total energy consumption of the UASLP for the years 2019-2020, as well as its expenses in $ MXN. See in	Due to data limitations in this study, it is ensured that the key characteristics of the UASLP that affect its energy performance were identified, measured, and analyzed at planned intervals, by conducting an energy

				consumption data. These results are found in this document in the results section.	the results section.	habits survey, compiling inventories. and total energy consumption.

	6.3.2 DO				
	7. Support				
	7.1. Resources	**7.2. Competence**	**7.3. Awareness**	**7.4. Communication**	**7.5. Documented information**
Elements	For this section, the UASLP must ensure that it determines and provides the necessary resources to establish, implement, maintain, and continuously improve the energy performance of its University Energy Program through the budget allocation in an Annual Operational Program (AOP).	The UASLP must determine the necessary competence of the people who study and work under its control that affect their energy performance and the UEP, as well as ensure that these people have the competence based on their education, training, skills, or appropriate experiences. When these proceeds, actions must be taken to acquire the necessary	The UASLP should ensure that people who carry out studies or work under the control of the organization are aware of the energy policy and their contributions to the effectiveness of the UEP. This must include the achievement of energy objectives and targets, and the benefits of improved energy performance,	The UASLP must establish, implement, and maintain the communication procedure A-19 and A-19b, to carry out the external and internal communication about energy aspects (scope and limits, Energy Policy, significant uses, objectives, energy performance, the behavior of indicators, etc.), through different means, such as Website, social networks, emails electronic, press, radio and/or TV, magazines, brochures, brochures, posters, printed canvas, among others.	The UEP of the UASLP must have the documented information required in the ISO 50001: 2018 standard, as well as the documented information that the UASLP determines as necessary for the effectiveness of the UEP to demonstrate the improvement of energy performance. Documented information from the UASLP UEP includes: a) Manual of the Energy Management System. b) The description of the scope of the UEP, described in requirement 4.3 of this manual

	Based on the needs of each of the Faculties, Academic Units, or dependencies, to determine, provide and maintain the necessary infrastructure according to the particular conditions and available resources.	competence, evaluating the effectiveness of the actions taken, through the competence and awareness procedure A-20 or the one that applies to each Faculty, Academic Unit, or Unit, retaining appropriate documented information as evidence of competence	as well as the impact of their activities or behavior concerning energy performance and the implications of non-compliance with the requirements of the UEP, through the procedure of competence and awareness A-20 or the one that applies to each Faculty, Academic Unit, or dependency.	The UASLP must ensure that the information communicated is consistent with the information generated within the UEP and that it is reliable. The UASLP must establish that any person who works and studies on behalf of the Institution, can make comments or suggestions for the improvement of the UEP through the suggestion box or the means that each entity designates, keeping documented information.	and in the format to determine the scope and limit of the UEP A-04. c) The documented declaration of the Energy Policy described in requirement 5.2 of this manual, as well as in the Energy Policy document A-14 and through the UASLP portal d) Documentation determined by the UASLP including the UEP's records. e) Master list of UEP documents A-15. f) The records required by the UASLP to ensure effective planning, operation, and processes related to the UEP, are found in the A-16 record control list. g) The UASLP will establish, implement, and maintain the A-02 record control procedure for the identification, storage, protection, recovery, disposition of the records, retention time, and disposition of the records.
Documents and Annexes (A)	It is suggested to develop an Annual Operational Program (AOP).	A-20	A-20	A-19 and A-19b	A-02, A-04, A-14, A-15 and A-16
Actors involved	Top Management	All internal Stakeholders	All internal Stakeholders	All Stakeholders	All internal Stakeholders

Scope	This section, as administrative responsibility of Top management, Rectory and Agenda Ambiental, this work will only give the guidelines for its implementation.		
	8. Operation		
	8.1. Planning and operational control	**8.2. Design**	**8.3. Acquisition**
Elements	The UASLP must plan, implement, and control the processes, related to UES, necessary to meet the requirements and to implement the determined actions: a) Establishing criteria for processes, including the effective operation and maintenance of facilities, equipment, systems, and processes that use energy, when their absence could lead to significant deviations from their anticipated energy performance; b) Communicating the criteria to the relevant people who use a job or study under the control of the UASLP; c) Implementing process control under the criteria, including the operation and maintenance of the facilities, equipment, systems, and processes that use energy, under the established criteria; d) Maintaining documented information to the extent necessary to ensure that the processes have been carried out as planned, through the A-05 operational control format. In addition, the UASLP must ensure that it controls purchases and acquisitions through work instructions for making direct purchases A-11. Contractors and suppliers are informed about the applicable procedures and requirements on SEnU.	The UASLP must consider the opportunities for improvement, the results of energy performance, and operational control in the design of new, modified, or renovated facilities, equipment, systems, or processes that can have a significant impact on its energy performance. The results of the energy performance evaluation will be incorporated, when appropriate, in the procurement activities of the relevant projects through the A-06 design format.	The UASLP must establish and implement criteria to evaluate energy use, consumption, and efficiency during the planned or expected useful life when acquiring energy services, products, equipment, and services that use energy and that have a significant impact on the energy performance herself. When acquiring products, equipment, and services that use energy and that have an impact on the SEnU, the UASLP must inform the suppliers that the purchases will be evaluated based on energy performance to make a decision, which is established in the work instructions for making direct purchases A-11 or to the one that applies to each Faculty, Academic Unit or dependency.
Annexes	A-05 and A-11	A-06	A-11

Actors involved	Top management, department of acquisitions, and all Internal Stakeholders
Scope	This section, as administrative responsibility of Top management and rectory, this work will only give the guidelines for its implementation.

6.3.3 CHECK

	9. Performance Evaluation		
	***9.1. Monitoring, measurement, analysis, and evaluation of energy performance and the UEP**	**9.2. Internal audit**	**9.3. Management review**
Elements	As a first step, the UASLP must implement and maintain the monitoring and measurement of the key characteristics of the operations that will allow determining the current energy performance, in addition, they are monitored and analyzed regularly through the implementation of the UEP in the procedure for energy planning A-18 where; 1) The effectiveness of action plans to achieve energy goals and objectives; 2) The EnPIs; 3) The operation of the SEnU; 4) Real consumption versus expected; The methods of monitoring, measurement, analysis, and evaluation, as appropriate, are carried	The UASLP, through the Energy Commission, will ensure that the internal audits of the UEP are carried out at planned intervals, to: a) Improvement in energy performance; b) It complies with: • The organization's requirements for the UEP; • Energy policy, energy objectives, and targets. • The requirements of the international standard ISO 50001: 2018 c) It is being implemented effectively and is being effectively maintained.	The Top Management-Rectory will review the performance of the UEP at least once a year, applying the management review format A-08, to ensure its convenience, adequacy, and continued effectiveness. The review by the UASLP Rectory of the UASLP will consider: a) The status of the actions of the previous reviews by the management; b) Changes in internal and external issues, associated risks, and opportunities relevant to the UEP; c) Information on the performance of the UEP, including trends in: 1. Non-conformities and corrective actions; 2. Results of monitoring and measurements; 3. Results of the audits; 4. Results of the evaluation of compliance with legal requirements and other requirements;

	out on a semi-annual basis, as well as the evaluation of the results of monitoring and measurement. The energy performance was evaluated in this work (results section) by comparing the values of the EnPIs with those corresponding to the EnBL. The prospective UASLP should investigate significant deviations in energy performance and respond to them, retaining documented information on the investigation results and the response. The UASLP every six months shall evaluate its compliance with the legal requirements and other requirements through the Format to identify legal requirements and other A-07 requirements, where it is determined how these requirements apply to the use of energy, to the energy consumption, energy efficiency, and UEP.	The UASLP will plan, establish, implement, and maintain audit programs, taking into account the efficient use of energy in the operations involved and the results of the previous audits, through the operation of the internal auditing procedure A-03. The selection of the auditors and the performance of the audits ensure the objectivity and impartiality of the audit process. The records of the results of the audits will be kept, informing Top management. The documented information will be kept as evidence of the execution of the audit program and its results, through the audit report.	d) Opportunities for continuous improvement, including those related to competition; e) Energy policy. The outputs of the Top Management-Rectory Review should include decisions related to continuous improvement opportunities and any changes to the UEP, including: a) Opportunities for improving energy performance; b) Energy policy; c) The EnPIs or the EnBL; d) The objectives, energy goals, action plans, or other elements of the UEP and the actions to be taken if they are not achieved; e) Opportunities to improve integration with business processes; f) The allocation of resources; g) Improving competition, taking consequences, and communication. The elements of energy performance inputs for the Rectory Review are established in the ISO 50001: 2018 standard.
Annexes (A)	A-18 for the Energy Planning A-07 for Legal Requirements	A-03 Internal Auditing Procedure	A-08
Actors involved	Top Management of UASLP, Rectory, Agenda Ambiental, Energy Commission	Top Management of UASLP, Rectory, Agenda Ambiental, Energy Commission	Top Management of UASLP, Rectory, Agenda Ambiental, Energy Commission
Scope	The results presented in this work focused on identifying the key characteristics to determine the current	This section, as administrative responsibility of Top management, Rectory and Agenda Ambiental, this	This section, as administrative responsibility of Top management, Rectory and Agenda Ambiental, this work will only give the guidelines for its implementation.

	energy performance situation of the UASLP. These were determined through energy inventories, the "UASLP energy habits" survey A-10 and total energy consumption for the years 2019-2020. Based on these, the UASLP will be able to investigate energy performance through the implementation of the UEP in the future.	work will only give the guidelines for its implementation.	

* Key step to begin implementation of the UEP. This must be done before all the other activities are proposed in this methodology, so this work focuses on leaving the milestones for later implementation.

	6.3.4 ACT	
	10. Improvement	
	10.1. Non-conformity and corrective actions	**10.2. Continuous improvement**
Elements	The UASLP shall identify the non-conformities of the UEP, determining their cause, and taking actions to mitigate their impacts through the Corrective Action Procedure for non-conformities A-17. Records of the results of such actions will be kept.	The UASLP shall continually improve the convenience, education, and effectiveness of the UEP. The UASLP shall demonstrate continuous improvement of energy performance.
Documents and Annexes (A)	A-17	With all the documents described in this procedure
Actors involved	Top Management of UASLP, Rectory, Agenda Ambiental, Energy Commission	All Internal Stakeholders
Comments	This section, as administrative responsibility of Top management, Rectory and Agenda Ambiental, this work will only give the guidelines for its implementation.	

6.4 Documents required for the implementation of UEP

Following the procedures mentioned in the previous chapter 6.3, below in Table 15 the documents, procedures, checklists, Survey, and Stakeholder's analysis that are contained in the Annexes, together with the procedures of Chapter 6.3, conform to the core documents that make the guidelines for the implementation of the University Energy Program (UEP), and they now are listed.

Table 15. Documents required to implement the UEP under ISO 50001 scheme

Code	Name
A-01	Risk Management Procedure
A-01b	Analysis of the context of the Organization "PESTEL"
A-02	Procedure for the Control of Records
A-03	Procedure for the realization of Internal Audits
A-04	Format to determine the Scope and Limits of the UEP
A-05	Operational Controls Matrix
A-06	Format for design, modification and renovation
A-07	Format to Identify Legal and other Requirements
A-08	Format for the Results of the Top Management Review
A-09	Master list of Equipment and Lighting Inventory of the UEP
A-10	Questionnaire of the Survey "Energy Habits UASLP"
A-11	Instructive of work for Direct Purchases
A-12	UASLP Stakeholders Analysis
A-12b	UASLP Stakeholders Mapping
A-13	Organizational chart for the Energy Commission
A-14	UASLP Energy Policy
A-15	Master list of controlled documents of the UEP
A-16	Master list of controlled records of the UEP
A-17	Procedure for Corrective Actions
A-18	Procedure for the Energy Planning
A-19	Communication Procedure of the UEP
A-19b	Communication Binnacle of the UEP
A-20	Competence and Awareness Procedure

6.4.1 The necessity for an Energy Database

Before the implementation of the UEP, the fundamental step to do so is to have the evaluation of the energy performance of the UEP, this must contain the data and information to evaluate the level of implementation and permeability that the management activities have had in the processes of the organization, to compare the activities and the results obtained according to what was planned and executed.

A continuous evaluation system allows timely identification of energy deviations and takes the necessary actions to ensure compliance with the energy objectives and goals established by the UASLP. A continuous evaluation system makes it possible to identify energy deviations promptly and carry out the necessary actions to ensure compliance with the energy objectives and goals established by the organization.

It is necessary that the organization, through the energy management team, with the authorization of top management, define:

a. The key characteristics and criteria for measuring, monitoring, and evaluating the effectiveness of action plans, EnPIs, SEnU operation, and actual versus expected consumption. These points should be considered within the energy data collection plan.
b. The measurement methods, evaluation of the energy data to ensure the traceability and repeatability of the results, also includes the issue of competence of the personnel involved in obtaining and analyzing them.
c. The periods in which the monitoring and measurement of energy data are necessary, which may be influenced by factors such as variations caused by different ways of operating the facilities, fluctuations in energy consumption due to variation in the equipment or production, signs of equipment failure, and occupancy levels.
d. The times in which the monitoring and measurement results are analyzed and evaluated, including the comparison of the actual energy performance against the previously normalized energy baseline.

6.5 Limitations of the UEP

The level of maturity of the UEP that corresponds to the degree of integration of the EnMS with the daily activities of the UASLP is at level 1, which is the establishment or intention of, but it is intended in the future to reach a level 4, where the system has been fully adopted in the organization.

An appropriate level to receive an initial audit for a certification process is at level 2, Integrated.

Level 1, Defined: Integrating an Energy Management System is contemplated. You can have elements of an EnMS already deployed. It has an unstructured or informal approach. Few participants in energy management with limited or no tools. The system framework is structured, and the first management commitments are generated.

In addition to the level of maturity of the EnMS, the present work presents the limitation that the energy indicators were established for the entire university in general, however, the university has campuses and academic entities with different conditions. It has the infrastructure and new buildings, as well as buildings that are several years old. In addition, the different campuses and academic entities are under different types of climate and

climatic conditions, which is why the energy performance is different. For the practical reasons of this work, the conditions were homogenized.

Within the UASLP there are still no measurement methods, evaluation of energy data. For the present work, the traceability and repeatability of the results cannot be ensured, in addition to the issue that at the moment there is no specialized team that has competencies and is involved in obtaining and analyzing them.

6.6 Suggestions and Recommendations – further work

According to ISO 50001: 2018 (Flores Díaz, Escobar Pineda and Espinosa Flores, 2016), the implementation of the UEP requires commitment and time of dedication to the project by the UASLP. It also requires allocating human resources and financial resources to it. It is about incorporating the topic of energy in daily conversations and the decision-making process.

It is easy to express interest, however, top management must demonstrate its commitment to supporting the UEP and its continuous improvement. In this sense, some of the basic responsibilities of Top Management are:

Support and participate in:

- The creation, implementation, and communication of an energy policy.
- Approval of an energy management team (Energy Commission).
- Decision-making for the improvement of the UEP and energy performance.
- Incorporating energy performance as long-term planning.
- Compliance with UEP requirements.

Ensure:

- The establishment of energy objectives and goals.
- The quality and relevance of the Energy Performance Indicators (EnPIs) for the UASLP.
- Measurement and communication of UEP results at specified intervals.

Appoint:

- An Energy Commission with the authority and powers for the implementation, maintenance, and improvement of the UEP and energy performance.

Supply:

- The resources required for each of the stages of the UEP are described below and for the improvement of energy performance.
- These include human, technological and financial resources in addition to specialized skills.

Carryout:

- Reviews by Top Management.
- The existence of a UEP without the necessary level of commitment is not enough to guarantee improvements.
- Top management, their interest, and commitment are the example for the rest of the organization to follow. It is key that the importance of the EnMS is adopted and integrated into the philosophy of the UASLP so that it permeates all levels.
- Top management must make sure of this and will do so only if they believe in the project, otherwise, the UEP will only remain at a documentary level, without being able to integrate it into daily work practices.

The time to establish and implement the UEP will depend entirely on the UASLP and its context, the degree of interest, and personnel involved, it can take from a few months (4 to 8) to years to reach an innovative level of maturity.

Since there is still no single methodology to implement an EnMS, it is proposed to start with training on the requirements of the ISO 50001 standard to the people who will oversee implementing this program, to carry out the tasks on continuous improvement of energy performance.

It must begin with commitment, and it begins at any level of the UASLP (From the Agenda Ambiental to Top Management); what is necessary is to create an implementation plan with times and responsibilities. The basic resources to implement it include the time of the staff to carry out the activities and material necessary to measure the current energy performance.

The cost of implementation depends on the UASLP and the need to use internal or external resources, which leads to a large variation; The basic costs that can be considered include elements such as the training of personnel, the elaboration of an energy diagnosis, and the hiring of a consultant (internal or external) to assume the leadership or just what accompaniment to the process.

To train students and staff, one of the requirements is competence, where it is necessary to identify training needs, so that only during the activity will the number of people that need to be trained and in what subjects be obtained as a result.

7 Conclusions and outlooks

With what is mentioned in this work, we can conclude based on the objectives set.

In accordance with the General Objective, this work established a workable map that will serve as a pioneering study for the creation of the University Energy Program. Within the workable-map, step-by-step guidelines were established to promote correct practices in the use of energy, achieve energy efficiency, have sustainable urban mobility, and finally reach the goal of being a Sustainable University under the ISO 50001:2018 standard and that in turn, complies with the SDGs proposed by the United Nations.

In addition, the specific objectives were met as follows:

- The energy context of the UASLP was identified. First, the possible stakeholders in the implementation of the UEP were identified, three main groups of potential stakeholders were identified (both internal and external), the University was identified as decision-maker and owner of the resources, the Collaborators were also identified, and finally to potential collaborators.

Second, electrical appliances and lighting were identified as the main challenge for the university if it wants to improve energy efficiency. Contrary to what was initially thought, office appliances and fluorescent lighting are the most efficient consumers of electricity for longer periods of time. Regarding mobility, it was identified that most of the people who move to the UASLP do so in their own car (a single person), so it is extremely important to give more importance to programs such as UNIBici, to shared use of automobiles (Carpooling) or that the University implements a system with transportation routes for staff and students since it has transportation vehicles. In addition, it was identified that the greatest amount of travel hours for university subjects is done in cars and are short work trips, it is proposed that this type of trips be made in a longer period of time to reduce mobility, that is, put two or three trips together in one.

- An energy review was carried out according to the Significant Energy Uses (SEnUs) identified with information from the energy context of the UASLP.

In this energy review, it was found that the most important SEnUs within the University are the consumption of electrical energy by electrical appliances and lighting and the energy consumption due to mobility. In addition to the SEnUs, some Energy Performance Indicators (EnPIs) were identified, these were classified into: Electrical appliances, Artificial lighting, Transportation, and Energy Consumption. Finally, the Energy Base Line (EnBL) of the UASLP for the 2019-2020 period was identified. The period was chosen based on the available data and the EnBL for the University showed-up that energy consumption for the 2020 period in comparison with 2019 decreased considerably (as expected), thanks to the pause in face-to-face activities due to the present COVID-19 pandemic, which caused saving of almost 10 million pesos and 2,000 tCO_2e to the University in that year.

- Once the energy context of the UASLP is known and the energy review has been carried out, the requirements that are needed for the design of the UEP were determined under the guidelines of the international standard ISO 50001: 2018.

Once the energy context of the UASLP is known and the energy review has been carried out, the requirements that need to be followed for the design of the UEP under the guidelines of the international standard ISO 50001: 2018 were determined.

According to the standard, it is necessary to have all the elements of the PDCA continuous improvement cycle to design an EnMS (UEP), so based on the pilot study carried out in the present work, it was found that the Planning phase also needs to define the leadership of the UASLP through roles and responsibilities, as well as an energy policy. For the Do phase, it is necessary to have the support of financial resources, communication, documented information, as well as competence and awareness about the use of energy. For the Check phase, it is necessary to carry out energy performance evaluations through monitoring, measurement, analysis, reviews, and internal auditing. This Check phase is extremely important because if this phase does not exist, the UEP can never be implemented and be functional.

Finally, the phase that completes the continuous improvement cycle is the Act phase, to comply with this it is necessary to carry out continuous improvement actions through corrective actions that the internal audits throw in the Check phase.

- Once the necessary requirements to design the UEP were determined, a Step-by-step action plan was proposed where the elements to be covered were defined, as well as resources to be used for the creation of the UEP.

For the success of this action plan, it is worth mentioning that both the plan and its tools must be adapted according to the conditions of each Campus. Since this work was done in a general way, standardizing the conditions for all campuses, faculties, institutes, and academic entities of the UASLP.

This is because the UASLP has 8 different campuses in the state of SLP, and these campuses have very different conditions, some are located in the Huasteca area of the state where the temperature and humidity most of the year are very high, in addition to almost no wind. Other campuses are in the middle zone where the humidity is very low, the solar incidence is high and the wind gusts too. In addition, some of its campuses are located in areas considered "rural" and are small in size and population, so their energy consumption can be much lower compared to the campuses that are in the state capital and that have a university community too large. In turn, some of its campuses, institutes, or entities are practically new in age (such as the pedregal campus) and others are very old (such as the Poniente University Zone).

Many of these tools (Chapter 9 - Annexes) were only designed as guidelines because the scope of this work is not to complete them all. The justification available is due to the fact that this work is a pilot study, so there are currently data limitations, technical limitations, and that there is also no expertise in energy management systems. As mentioned in Chapter

6.1 and thanks to the scope of this work, some tools were completely made, others were partially completed, and others need to be done from scratch to implement the UEP.

When the tools proposed in this work are adapted to the conditions of each place, an efficient and effective UEP can be implemented that will allow the UASLP to achieve its energy efficiency goal.

- As a perspective for the potential implementation of the UEP within the University, this paper proposes to follow the example of the success stories of other universities around the world and take them as a precedent in university energy planning.

For example, the case of the UNSW University in Sydney, which has an emissions inventory system, and 100% of the electricity it uses comes from renewable sources. The case of Stanford University in California, which has a 5.8 MW on-campus photovoltaic plant and has a fleet of electric transport vehicles (buses and cars) to transport its personnel. Finally, the example of the University of Calabria in Italy, which renewed its entire artificial lighting system with an automated LED system that is managed through intelligent software with sensors, which has significantly reduced its energy consumption by 60%, consequently its CO_2 emissions and your energy budget.

In the case of the UASLP, it is specifically proposed first to change all the old luminaires to LED luminaires, as well as the formation of an Energy Commission with its respective technical team that oversees monitoring the PDCA plan and subsequently implementing the UEP. in college. After the implementation and monitoring of the UEP, it is suggested to continue with the installation of photovoltaic systems generating renewable energy on-campus and add them as an energy performance indicator EnPI to the UEP, to follow the example of Stanford University in California or UNSW in Sidney.

It is important to mention that this work suggests making changes that do not require a lot of technology to achieve energy efficiency first, such as raising awareness of staff, moving an LED lighting system, using as much solar lighting as possible, sustainable construction in the case of new campuses and the use of emission-free means of transport.

Once the UEP is implemented, functioning adequately and these non-technological changes are fulfilled, now if in perspective, with the saved budget, technological solutions such as those seen in successful cases around the world can be implemented.

8 References

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9 Annexes

In this section you will find complete documents with the information, others partially completed, and others that need to be completed in the future if the UEP is to be implemented. The information on the status of the annexes is found in the traffic light in Figure 38 - Chapter 6.1.

Some of the annexes, present explanatory, and educational examples of how they should be filled in in the future, so it is only information as "mocking".

This does not mean that the information found in "blue letters" in the annexes: 5, 6, 7, 8, 15, 16, and 19b; is absolute information that should be indispensable when trying to create the University Energy Program (UEP), since all information is subject to change and must be weighted according to the criteria of the Energy Commission and the group of experts that direct this Management System.

9.1 Annex 1: Risk Management Procedure, A-01

	RISK MANAGEMENT PROCEDURE	Code: A-01 Revision:
UASLP Universidad Autónoma de San Luis Potosí	Reference Norm: ISO 31000:2009, ISO 9001:2015 ISO 14001:2015 ISO 50001:2018	Page 1 of 10

1. Purpose

Define the rules and procedures that govern risk management, associated with the objectives of the UEP within the Autonomous University of San Luis Potosí (UASLP); from its identification to the follow-up of the action plans defined for legal, regulatory, and local compliance.

2. Scope

To all the processes and activities developed in the UASLP, which involve a risk.

3. Operating Policies

3.1 The coordinator of the Energy Commission, the person in charge of the Risk Management System and Top Management, will be responsible for recording the risks and opportunities associated with the Integral Quality System (SICAL) in the **Risk Identification, Evaluation and Rating Card** and the ***Risk*** Management ***Matrix*** which will include ***the*** following:

- Indicator
- Risk
- Responsible
- Decision level
- Classification
- Risk Factors (causes)
- Effects (impact)
- Stakeholders
- Initial Risk Assessment
- Valuation after controls
- Risk Map
- Strategies and actions
- Evidence

3.2 Communication and consultation with stakeholders should take place at all stages of the Risk Management Process to:

EMISSION CONTROL		
Developed	**Revised**	**Authorized**

a) Identify and define both the objectives, goals, and indicators of the UASLP and those responsible directly involved in the risk management process, and

b) Define the bases and criteria to be considered for the identification of the causes and effects of the risks, as well as the actions that are adopted for their treatment.

The purpose of the foregoing should be to:
1. Establish an appropriate context.
2. Ensure that the objectives and goals of the UASLP are understood and considered by those responsible for implementing the risk management process.
3. Ensure that risks are correctly identified, and
4. Constitute a working group where all the substantive areas of the university are represented for the proper analysis of the risks.

3.3 To integrate Risk Management into Management Systems it is important to evaluate and understand the external and internal context of the organization, in accordance with the following:

3.3.3 The description of the external context (international, regional and/or local level) may include:

- Social
- Politic
- Legal
- Financial
- Technological
- Economic
- Ecological
- Competitiveness

The description of the internal context (intrinsic situations related to the UASLP) may include:

- Structure
- Powers
- Processes
- Objectives
- Goals or strategies
- Human resources
- Material Resources
- Financial Resources
- Technological Capacity

The information is analyzed in detail and by means of a SWOT analysis and/or Analysis questionnaire "PESTEL", the context of the organization can be determined with Annex A-19b.

The University annually follows up on the internal and external issues determined, through the Review Procedure by the Rectory.

3.3.1 Identify Stakeholders.

An interested party refers to an individual or group of people who may affect or be affected by the decision-making or actions derived for the execution of the UASLP's own activities and that, on certain occasions by the development of these, affect the interests of those who interact in the same medium reaching to impact them positively or negatively.

Annex A-12 and A-12b are available to determine the UASLP's Stakeholders, which allows to visualize globally the participation and the level of impact of the members involved in the provision of the educational service.

3.4 Once the context is defined, the risks are determined, starting with their identification, and classification according to the following:

Risk Decision Level:

- Strategic
- Managerial
- Operative.

Types of Risks:

- Administrative
- Safety
- Public works
- Health
- Budgetary
- Service
- Legal
- Financial

3.5 Risk analysis involves consideration of the causes (factors), consequences (impact) and likelihood that those consequences may occur.

Risks should be assessed on a value scale from low to very high, regardless of existing controls to manage risk, as shown in the following table:

		Consequence				
		Negligible 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
Likelihood	5 Almost certain	Moderate 5	High 10	Extreme 15	Extreme 20	Extreme 25
	4 Likely	Moderate 4	High 8	High 12	Extreme 16	Extreme 20
	3 Possible	Low 3	Moderate 6	High 9	High 12	Extreme 15
	2 Unlikely	Low 2	Moderate 4	Moderate 6	High 8	High 10
	1 Rare	Low 1	Low 2	Low 3	Moderate 4	Moderate 5

Consequences: It is evaluated according to the magnitude of the effects identified in case the risk materializes, ("Catastrophic" is the largest and "Negligible" to the least magnitude).
Probability of occurrence: The scale of value of the estimate that an event occurs, in a given period.

The assessment of the consequences and the probability of occurrence before the evaluation of controls will be determined without considering the existing controls to manage the risks, in order to visualize the maximum vulnerability to which the institution is exposed if they are not adequately addressed.

3.6 The Control Assessment shall be carried out in accordance with the following:

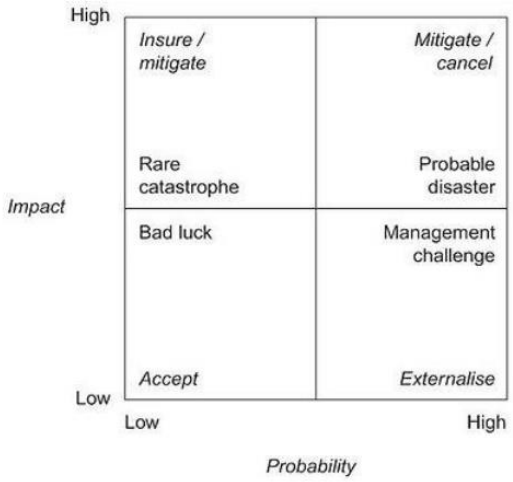
a) Check whether or not controls exist for risk factors and, where appropriate, for their effects;
b) Describe the controls in place to manage risk factors and, where appropriate, for their effects;
c) Determine the type of control: preventive and corrective;
d) Identify the following in the controls:

1. Deficiency: when it does not meet any of the following conditions: that it is documented, authorized, operating with evidence of compliance and is effective, and
2. Sufficiency: when documented, authorized, operating with evidence of compliance and is effective, and
e) Determine whether the risk is sufficiently controlled, when at least all its factors have sufficient controls.

For the assessment of the impact and probability of occurrence before and after the evaluation of controls, the holders of the institutions may use methodologies, models and /or theories based on mathematical calculations, such as weighted scores, preference calculations, analytical hierarchy process and probabilistic models, among others.

3.7 Final risk assessment with regard to controls shall be carried out in accordance with the following:

a) The final value will be given to the impact and probability of occurrence of the risk with the comparison of the results of the risk assessment and control stages.



For the above, the UASLP will consider that if the risk is sufficiently controlled the risk assessment passes to some lower scale, otherwise, the result of the initial risk assessment is maintained before the controls have been established.

The final risk assessment may never be higher than the Initial Assessment.
If some of the risk controls are deficient, or non-existent. **The final valuation will not be valid** when it does not consider the Initial Assessment, the existence of controls and the evaluation of controls.

3.8 Risk Map is the graphical representation of one or more risks that allows to link the probability of occurrence and its possible impact in a clear and objective way.

The risks will be located by quadrants in the Risk Management Matrix and will be plotted in the Risk Map, based on the final assessment of the impact on the horizontal axis and the probability of occurrence on the vertical axis.
The graphical representation of the Risk Map shall contain the following quadrants:

Quadrant I. Risks of Immediate Attention. - They are critical for their high probability of occurrence and degree of impact, they are located on the scale of value greater than 5 and up to 10 of both axes;

Quadrant II. Risks of Periodic Attention. - They have a high probability of occurrence located on the scale of value greater than 5 and up to 10 and low degree of impact of 0 and up to 5;

Quadrant III. Controlled Risks. - They are of low probability of occurrence and degree of impact, they are located on the scale of value of 0 and up to 5 of both axes, and

Quadrant IV. Follow-up Risks. - They have low probability of occurrence with value of 0 and up to 5 and high degree of impact greater than 5 and up to 10

3.9 Strategies and Actions

a) The strategies will constitute the options to manage the risks, based on their assessment with respect to controls, which will allow to determine the control actions to be implemented by factor or cause.

Some of the strategies that can be considered independently, interrelated or as a whole, are as follows:

1. **Avoid risk. -** It is applied before taking any risk. It is achieved when substantial changes are generated within the processes by improvement, redesign or elimination, the result of sufficient controls and actions undertaken.

2. **Reduce risk. -** Preferably applied before opting for other, more costly and difficult measures. It involves establishing actions aimed at reducing the probability of occurrence (prevention actions) and impact (contingency actions), such as the optimization of procedures and the implementation of controls.

3. **Take the risk. -** It applies when the risk is in quadrant III and can be accepted without the need to take other control measures than those possessed, or when you have no option to reduce it and can only establish contingency actions, and Transfer or share the **risk. -** It involves the management of the risk with a third party who has the necessary experience and expertise to assume it.

3.10 For the implementation and monitoring of the strategies and actions, the ***Matrix of management of risks and opportunities*** will be elaborated, duly signed by the Rectory of the UASLP and the person in charge of the Risk Management System or SICAL.

The follow-up to the fulfillment of the control actions must be carried out periodically by the person in charge of the system, to inform quarterly to the Rectory of the UASLP the result, in accordance with the following:

a) Quantitative summary of the control actions committed, indicating the total of those completed and the percentage of compliance they represent, the total of those that are in process and the percentage of progress of each of them, as well as the pending ones without progress.
b) Where appropriate, the description of the main problems that hinder compliance with the control actions.
c) General conclusion on the overall progress in the attention of the control actions committed and with respect to those concluded their contribution as added value to avoid materializing the risks, indicating their effects on the Management System and on the fulfillment of goals, objectives and indicators.

3.11 An Annual Report of the behavior of the risks will be made, in relation to those determined in the Matrix of Risks and opportunities of the immediately preceding year in the Review by the Management, and will contain at least the following:

a) Risks with changes in the final assessment of probability of occurrence and degree of impact, those modified in their conceptualization and the new risks;
b) Comparison of total risks per quadrant;
c) Change in total risks and by quadrant;
d) Conclusions on the results achieved in relation to those expected, both quantitative and qualitative of risk management.

The Annual Report of the behavior of the risks, must strengthen the process of risk management and the person in charge of the risk management system in the UASLP will inform the Coordination of the Energy Commission as required.

UASLP Universidad Autónoma de San Luis Potosí	RISK MANAGEMENT PROCEDURE	Code: A-01
		Revision:
	Reference Norm: ISO 31000:2009, ISO 9001:2015 ISO 14001:2015 ISO 50001:2018	Page 7 of 10

4. Description of the procedure

Sequence of Stages	Activity	Responsible
1. Analyze the possible risks in the defined context.	Those responsible for the process must have knowledge of the operation of this, to which the risk analysis will be carried out. Process analysis is a series of internal and external factors that can generate risk situations known as weaknesses (internal risk factor) and threats (external risk factor), which will later become the possible causes generating the risk.	Responsible for the process and Risk Assessment Committee (SICAL)
2. Identify the risks for each process	Those responsible for each process together with the participants in it carry out the identification of the real and most occurring risks that may affect the performance of the process, through brainstorming or the methodology that the work team decides. In this first stage, the causes or risk factors of the process, the effects or impact, stakeholders are identified and the risk it generates is defined, according to the following general drafting structure: For the registration of the above, the identification, evaluation and risk rating card (A-19b) is used.	Responsible for the process and Top Management
3. Analyze the identified risks	For each of the risks recorded: It identifies the process, objective, goal or strategy with which the person in charge is related and the level of decision for its follow-up. It is classified according to the type of risk. The probability of the event happening and the impact of the event are rated according to the table of weights for risk assessment (see 3.5).	Responsible for the process
4. Evaluate the controls	4.1 The evaluation of controls shall be carried out in accordance with the following: Check whether or not controls exist for risk factors and, where appropriate, for their effects; Describe the controls in place to manage risk factors and, where appropriate, for their effects; Determine the type of control: preventive and corrective; Identify the following in the controls:	Responsible for the process

UASLP Universidad Autónoma de San Luis Potosí	RISK MANAGEMENT PROCEDURE	Code: A-01
		Revision:
	Reference Norm: ISO 31000:2009, ISO 9001:2015 ISO 14001:2015 ISO 50001:2018	Page 8 of 10

Sequence of Stages	Activity	Responsible
	Deficiency: when it does not meet any of the following conditions: that it is documented, authorized, operating with evidence of compliance and is effective, and Sufficiency: when documented, authorized, operating with evidence of compliance and is effective, and determine whether the risk is sufficiently controlled, when at least all its factors are sufficiently controlled.	
5. Evaluate the Risks with respect to controls (Final Evaluation).	5.2 The final value will be given to the impact and probability of occurrence of the risk with the comparison of the results of the risk assessment and control stages. For the foregoing, the institutions shall consider that if the risk is sufficiently controlled the risk assessment is transferred to some lower scale, otherwise the result of the initial assessment is maintained of the risk before the controls have been established.	Responsible for the process
6. Prepare the Risk Map	6.1 The risks will be located by quadrants in the Identification Card, evaluation and risk rating and will be plotted in the Risk Map, depending on the final assessment of the impact on the horizontal axis and the probability of occurrence on the vertical axis.	Responsible for the process
7. Define strategies and control actions for risk management.	7.1 Those responsible for the process will implement strategies and actions for the control of the identified risks that must be previously coordinated and agreed with all participants.	Responsible for the process
8. Develop a Risk Management Matrix	8.1 For the implementation and monitoring of the strategies and actions, the Risk Management Matrix will be prepared, duly signed by the Rector and the person in charge of the System, and will include: a) Risks; b) Risk factors; c) Strategies for managing risks, and d) Stakeholders e) Stakeholder requirements f) The registered control actions 1. Numerical values of the impact and probability of occurrence and quadrant of risk location; 2. Responsible for its implementation; 3. The start and end dates, and 4. Means of verification.	Responsible for the Risk Management System (SICAL)
9. Verify the application and effectiveness of the	9.1 The application of control actions will be followed up with a frequency of no more than 3 months, to verify compliance and effectiveness.	Responsible for the System of Risk Management

control actions		(SICAL)
10. Apply improvement actions	10.1 If, as a result of the analysis, follow-up to the risks and results of the quarterly evaluation of the process, opportunities for improvement are identified, the process manager determines and implements the relevant improvement actions. If it detects compliance and effectiveness, it goes to point 11.	Process Manager Responsible for the Risk Management System (SICAL) and TOP Management

5. Reference Documents

Document
ISO 9001:2015 Quality Management System
ISO 14001:2015 Environmental Management System
ISO 31000 Risk Management Standard - Principles and Guidelines

6. Records

Registration	Time of retention	Responsible	Registration code
Identification, evaluation and risk rating.		Responsible for process	
Risk and Opportunity Management Matrix		Management Representative	

7. Annexes

A-19b Analysis Questionnaire (PESTEL)
A-12b UASLP Stakeholders

8. Changes to this release

Revision number	Update date	Description of the change

9.1.1 Annex 1b: Analysis of the context of the Organization "PESTEL", A-01b

UASLP Universidad Autónoma de San Luis Potosí	**Analysis of the context of the organization** Questionnaire analysis "PESTEL"	**Code: A-01b** **Revision:**
	Reference Standard: ISO 31000:2009, ISO 9001:2015 ISO 14001:2015 ISO 50001:2018	**page 1 of 3**

Description of the tool

PESTEL analysis should be performed by the UASLP as part of their planning to better understand the opportunities and risks the University faces.

The objective is to evaluate the external and internal environment of the University for the creation of energy management system planning and work hand by hand with UASLP's quality management system.

The PESTEL Analysis analyzes six types of information, which are listed below:

- **P**: Information on the political environment affecting the current or future situation
- **E**: The identification of economic factors that may affect the university
- **S**: Identification of social changes within the cities that the UASLP is located in, such as cultural and demographic changes
- **T**: Tracking technology changes so that their potential impact on the university can be evaluated.
- **E**: Identification of ecological factors that could affect, regulations and laws in matters of ecology.
- **L**: Legal, regulations, laws on employment, operation and product; on rights, protected or regulated sectors.

----------QUESTIONNAIRE----------

Please answer the following questions in the order that apply in the region in which you operate. These questions will help determine areas where more data collection and research may be needed.

1. What **political** factors in your state can generate additional **opportunities** for the implementation or improvement of your Energy Management System?
Example: Government has initiated an electricity support program.

- Harmony between Syndicate and the Administration.
- Relationship with state governments and municipal presidency.
- Transition
- Relays at all three levels of government
- Private industry ratio

2. What are the **political** factors in your state that may generate additional **risks** for the improvement or implementation of your Energy Management System?

Example: Tightening of fiscal policies to collect taxes or raising the electrical tariff.

- Confrontation between Trade Union, CFE and Administration.
- Bureaucratization of procedures for the exercise of federal resources.
- Lack of updating of regulations of the UASLP
- The federation-state cooperation agreements are not respected.

3. What **economic** factors in your state can generate additional **opportunities** for the improvement or implementation of your Energy Management System?
Example: Several organizations have come together to access government programs that will improve energy prices for industries and UASLP have been invited.

UASLP Universidad Autónoma de San Luis Potosí	Analysis of the context of the organization Questionnaire analysis "PESTEL"	Code: A-01b Revision:
	Reference Standard: ISO 31000:2009, ISO 9001:2015 ISO 14001:2015 ISO 50001:2018	page 2 of 3

- Increased the private industry investment in the state.
- Enabling more programs for co-generation.
- Increased tax incentives for investors, including EnMS.

4. What are the **economic** factors in your state that can generate **risks** that affect the improvement or implementation of your Energy Management System?

Example: Due to economic difficulties, fewer customers are able to pay for their products and services.

- Fluctuation of the exchange rate of the peso against the dollar with a direct impact on infrastructure.
- Budget adjustments in the UASLP and CONACYT.

5. What **social** factors in your State can generate additional **opportunities** for the improvement or implementation of your Energy Management System?

Example: A lot of people from other regions are moving into SLP and are looking for educational services or jobs.

- There is population migration through the generation of new jobs and this leads to greater demand for new entrants.
- The largest number of companies in the region favors the relationship with private industry.

6. What are the **social** factors in your state that can generate **risks** for the improvement or implementation of your Energy Management System?

Example: The city has been reached by a large number of residents who do not speak the local language, the organization does not have translation services.

- High levels of insecurity.
- The social problems due to the mobilization of the teaching profession affect the acceptance of graduates for professional residence and hiring.

7. What **technological** factors in your state can generate additional **opportunities** for the improvement or implementation of the Energy Management System?

Example: A new means for data collection enables UASLP to collect data from a more efficient way.

- New technologies and communication schemes have an impact on the diversification of educational offer and on the operation of the univesity.
- Creation of Centers of Innovation and technological development within the UASLP.
- The development of technological projects by the students of the UASLP, favors the incorporation of the same in the Private industry.
- The use of management system in the Teaching-Learning process improves indicators.

8. What are the **technological** factors in your state that can generate **risks** for the improvement or implementation of the Energy Management System?

Example: Research shows very little evidence that the labor impact is specified with the students and employers that use them.

- Lack of training and resistance to change in the use of management system.
- Variation in the availability of communication infrastructure throughout the country.
- Lack of quality in communication signals, in various areas.

UASLP Universidad Autónoma de San Luis Potosí	Analysis of the context of the organization Questionnaire analysis "PESTEL"	Code: A-01b Revision:
	Reference Standard: ISO 31000:2009, ISO 9001:2015 ISO 14001:2015 ISO 50001:2018	page 3 of 3

9. What **ecological** factors in your state can generate additional **opportunities** for the improvement or implementation of the Energy Management System?

Example: Distinguish UASLP processes with characteristics of high savings in energy consumption can differentiate the university in the market

- There is policy at the central level for the operation of the UEP
- There is greater ecological awareness.
- SEMARNAT is more widely publicized about environmental protection policy and programs.

10. What **ecological** factors in your state can generate **risks** for the improvement or implementation of the Energy Management System?

Example: A new law on environmental protection and GHG emissions with coercive actions (fines) and frequent operational inspections.

- Lack of knowledge and application of applicable regulations in force.
- High levels of pollution in the region.
- Presence of high-risk population in the vicinity of the Institution.

11. What **legal** factors in your state may generate additional **opportunities** for the improvement or implementation of the Energy Management System?

Example: A new law that protects auto rights for the development of energy monitoring systems

- The incorporation of Energy Management Systems and their interrelationship, favors the knowledge and application of current regulations.
- There is a teaching staff with high levels of training and knowledge in regulations and applicable legislation.
- The creation of the UEP with its own legal personality expands the operating margin of the system.

12. What **legal** factors in your state that may generate **risks** for the improvement or implementation of the Energy Management System?

Example: An increase over the requirements for revalidate operating licenses (COA) for your university

- Lack of knowledge and/or lack of awareness of the applicable regulations in force.
- Changes in the laws of the IMSS and the ISSSTE.

.....END OF THE QUESTIONNAIRE.....

9.2 Annex 2: Procedure for the Control of Records, A-02

UASLP Universidad Autónoma de San Luis Potosí	Procedure for the control of records	Code: A-02
		Revision:
	Reference Norm ISO 9001:2015 7.5.3.2 ISO 14001:2015 7.5.3 ISO 50001:2018 7.5.3	Page 1 of 5

1 Purpose

Establishing the necessary controls for the identification, storage, protection, recovery, retention time and the disposition of the Quality and Environmental records established in the management systems of the UASLP.

2 Scope

This procedure applies to all records generated in the UASLP's UEP management system.

3 Operating Policies

3.1 The control for the identification, storage, protection, recovery, retention time and disposition of the records is the responsibility of the user in accordance with the provisions of the list for the control of the records and what is described in section 7 of each of the procedures.

3.2 All formats of the procedures at the time of need are converted into records; which must be controlled by each of the users and in accordance with the previous policy.

3.3 The spaces in the forms for the records must be requested according to their instructions or canceled if they do not need to be filled out.

3.4 In cases, in which the records are controlled by folio, and there is the need to make some correction, the registration must be completely canceled by crossing it with the word "CANCELED", being archived and kept in the corresponding area of use in order to maintain a control, in accordance with current regulations.

3.5 The disposition of the registers shall be subject to the regulations in force and to the nature of the registers.

3.6 The Forms for the generation of records are located in the portal of the Agenda Ambiental and can be downloaded by the staff and academics for their use.

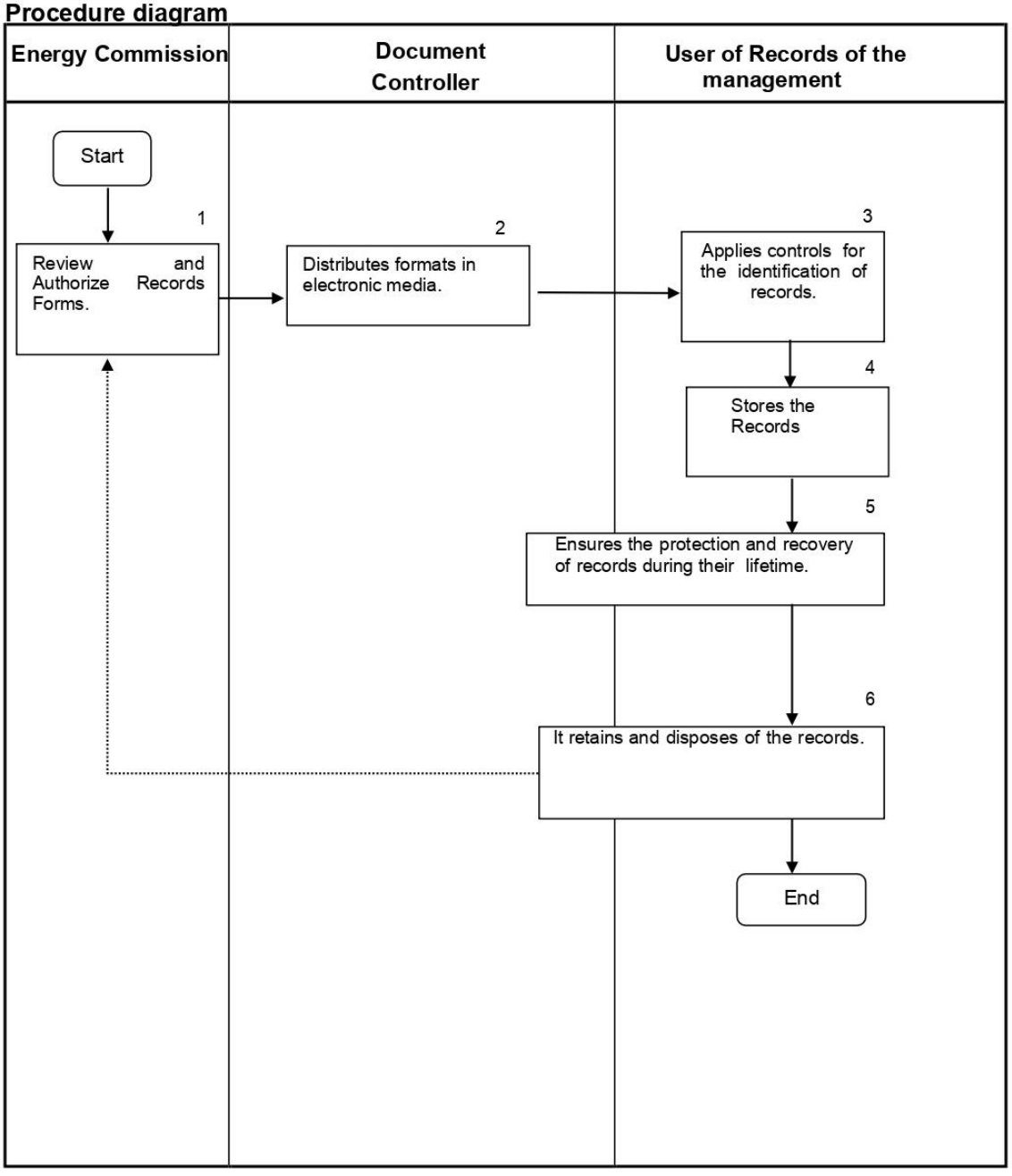
3.7 Users of the records are responsible for maintaining a printed or electronic backup in order for them to be recovered, if there is any continuity.

3.8 Records must be readable, identified with a code and/or name, archived in a defined place for access, retrieval, and traceable.

EMISSION CONTROL		
Developed	**Revised**	**Authorized**

	Procedure for the control of records	Code: A-02
UASLP Universidad Autónoma de San Luis Potosí		Revision:
	Reference Norm ISO 9001:2015 7.5.3.2 ISO 14001:2015 7.5.3 ISO 50001:2018 7.5.3	Page 2 of 5

4 Procedure diagram



	Procedure for the control of records	Code: A-02 Revision:
UASLP Universidad Autónoma de San Luis Potosí	Reference Norm ISO 9001:2015 7.5.3.2 ISO 14001:2015 7.5.3 ISO 50001:2018 7.5.3	Page 3 of 5

5 Description of the procedure

Sequence of stages	Activity	Responsible
1. Review and Authorize Forms for Records.	1.1 Receive proposals for formats for quality records with the justification to generate a new record or register it in the UEP 1.2 Check that the formats or documents for proposed registries are suitable to the UEP 1.3 Authorizes the formats or documents for records which expressly to incorporate them into the UEP	Energy Commission
2. Distribute formats in electronic media	2.1 Distributes the formats for records to users based on the provisions of the procedure for the control of documents. 2.2 It delivers the formats in digital and/or physical means eliminating both the numbers that refer to the filling instruction and the instruction itself, so that at the time of requesting and printing, it becomes a record. 2.3 Notifies the user of the records that you can consult the filling instructions on the portal in case you have any questions about the filling of the form. 2.4 It must inform the user of the formats for records about the control conditions that you must apply to your records generated during the operation of your procedure. 2.5 It informs users of the forms that they must fill in all the fields of these based on what is described in each of the instructions and cancel the unused fields, so that they cannot be altered. 2.6 It informs users that the records must not present erasures or amendments, so if the information that is recorded is incorrect, said registration must be canceled by crossing it with the word "CANCELED" in particular if it is handled by folio.	Agenda Ambiental

	Procedure for the control of records	Code: A-02 Revision:
UASLP Universidad Autónoma de San Luis Potosí	Reference Norm ISO 9001:2015 7.5.3.2 ISO 14001:2015 7.5.3 ISO 50001:2018 7.5.3	Page 4 of 5

3. Applies controls for the identification of records.	3.1 Applies the controls for the identification, storage, protection, retrieval, retention time and disposition of records as set out in the "Records" section of each Procedure.	User of Records
4. Store the Records.	4.1 Controls the way records are stored, determining whether it is physical or electronic based on what is established in the master records control list.	User of Records
5. Ensures the protection and recovery of registrations during their validity	5.1 The retrieval of recorded evidence is made through the identification, storage and protection of records. 5.2 The form of protection of the logs must ensure that they are not damaged, regardless of the means used to store them. 5.3 Generates a physical or electronic backup when it is convenient to guarantee recovery in case of loss or contingency that puts them at risk of loss. 5.4 Safeguards UEP legal compliance records	User of records and Energy Commission
6. Retains and keep the records	6.1 It retains the Records at the place of use for the time established in the Register Control List (section 7 of each record) or in the same format when it does not belong to a particular procedure. 6.2 Quality, environmental and/or energy records with a legal character must be kept in archives as established by university law. 6.3 It has the records once the period of use and storage established for each of them has ended, in order to be able to recover them in case you need to leave. 6.4 It shares the Register Control list with the Energy Commission to authorize its retaining and keeping of the records.	User of Records

	Procedure for the control of records	Code: A-02 Revision:
UASLP Universidad Autónoma de San Luis Potosí	Reference Norm ISO 9001:2015 7.5.3.2 ISO 14001:2015 7.5.3 ISO 50001:2018 7.5.3	Page 5 of 5

6 Reference Documents

documents
Standard for quality management system- Foundation and vocabulary. ISO 9000:2015 COPANT/ISO 9000-2015 NMX-CC-9000-IMNC-2015.
Standard for quality management system- Requirements. ISO 9001:2015 COPANT/ISO 9001-2015 NMX-CC-9001-IMNC-2015.
Environmental Management System Standard - Requirements with guidance for use ISO 14001:2015 COPANT/ISO 14001-2015 NMX-CC-14001-IMNC-2015
ISO 50001:2018 Energy Management System Standard

7 Changes to this version

Revision Number	Update Date	Description of the Change

9.3 Annex 3: Procedure for the realization of Internal Audits, A-03

	Procedure for the realization of Internal Audits	Code: A-03 Revision:
UASLP	Reference Norm: ISO 9001:2015 9.2 ISO 14001:2015 9.2 ISO 50001:2018 9.2	Page 1 of 7

1. Purpose

Establishing the guidelines to direct the planning and realization of the Internal Audits by the UASLP Energy Commission, which allow to verify the implementation, operation, maintenance, and compliance of ISO 50001:2018 for University Energy Program.

2. Scope

It applies to the processes, products, and services that students, staff and stakeholders carry out within the UASLP.

3. Operating policies

3.1. The Rectory, responsible for the system and Auditor Leader prepares the annual program of internal audits.

3.2. The UEP manager and Auditor Leader ensures the selection and competence of the audit team.

3.3. It is the responsibility of the Rectory and the UEP manager to ensure that the audit is performed according to the plan.

3.4. The feasibility of the audit should be determined taking into account the availability of information, the resources required, and the staff.

3.5. Where the audit is considered feasible, the audit team should be selected taking into account the necessary competence of the auditors.

3.6. Prior to ***in situ*** audit activities, the documentation of the Institute, Faculty, Campus, Centre should be reviewed to determine the conformity of the system, according to the documentation with the audit criteria.

3.7. The leader of the audit team is responsible for assigning to each team member the responsibilities to audit specific processes, functions, locations, areas, risk identification or activities.

3.8. It is the responsibility of the Rectory and the person responsible for the system to convene the Energy Commission after the delivery of the Audit Report to address the findings of the Audit and apply the Corrective Actions procedures, these actions are not considered as part of the Audit.

3.9. The Energy Commission will have to verify the implementation of the Corrective Actions and its effectiveness, this verification can be part of a subsequent audit.

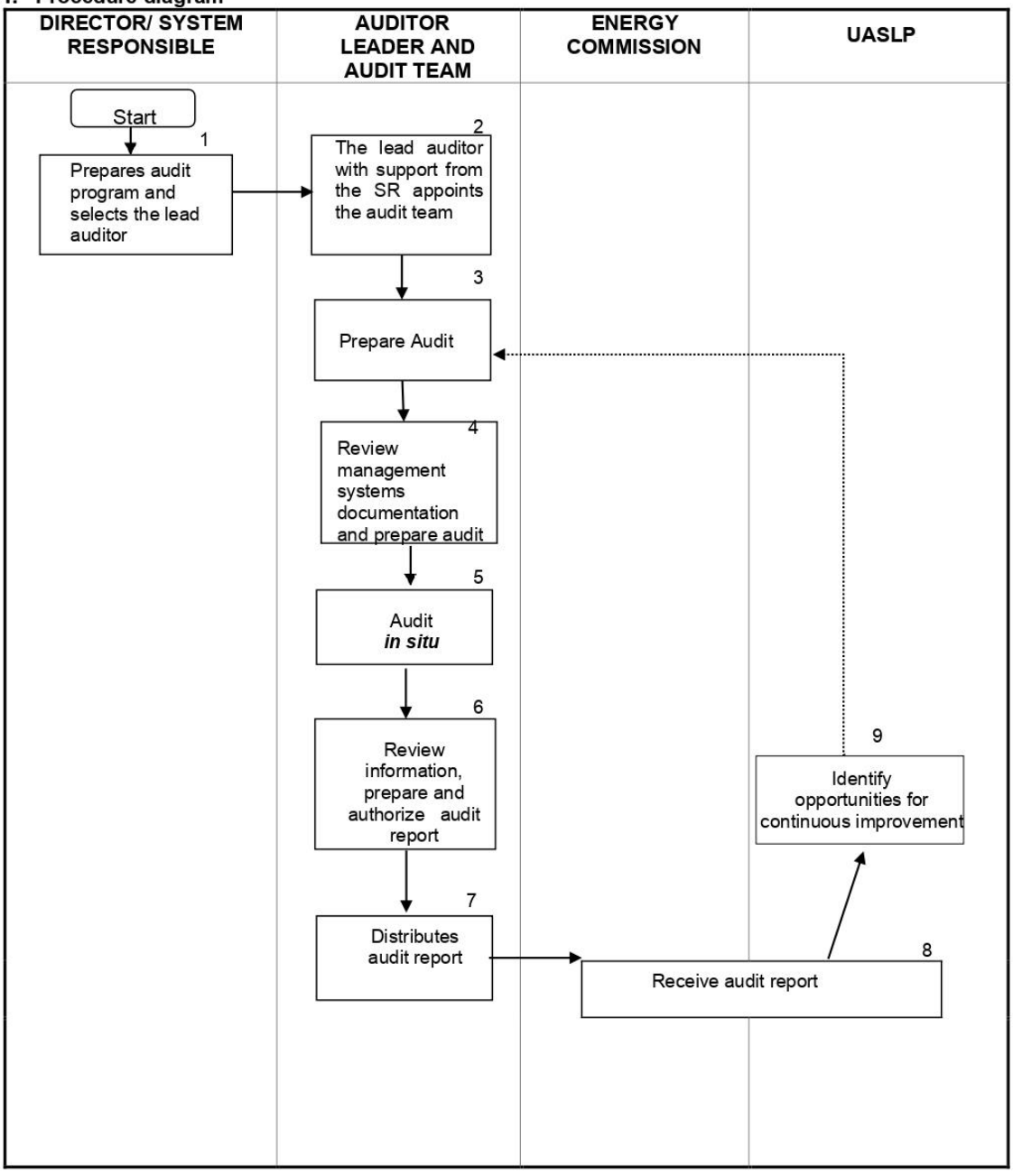
3.10. It is the responsibility of the UEP responsible to keep the auditors' files up to date.

3.11. It is the power of the auditor/him/her leader to inform the auditee when the documentation is inadequate and to decide whether to continue or suspend the audit until the documentation problems are resolved.

EMISSION CONTROL		
Developed	**Revised**	**Authorized**
signature:	signature:	signature:

	Procedure for the realization of Internal Audits	Code: A-03
UASLP		Revision:
	Reference Norm: ISO 9001:2015 9.2 ISO 14001:2015 9.2 ISO 50001:2018 9.2	Page 2 of 7

4. Procedure diagram



	Procedure for the realization of Internal Audits	Code: A-03 Revision:
UASLP	Reference Norm: ISO 9001:2015 9.2 ISO 14001:2015 9.2 ISO 50001:2018 9.2	Page 3 of 7

5. Description of the procedure

SEQUENCE	ACTIVITIES	RESPONSIBLE
1. Prepare annual audit program and select the lead auditor	1.1 Prepare annual Work Program of EnMS that includes the annual audit program and publish scheduled dates. 1.2 Prepare a program according to the resources and needs of the Campus, Faculty or Entity that will be audited. 1.3 The lead auditor qualifies for the case of Internal Auditing at the Technological Institute and the format for auditing qualification must be required based on the criteria for auditing and the results of the auditors' qualification and personal skills, the lead auditor is appointed.	System Manager
2.- The auditor leader with support from the SR appoints the audit team	2.1 The lead auditor with the support of the UEP management designates the audit team and will need a format for auditing, based on the criteria for qualification of auditors, and the results of qualification and personal skills of the auditors.	Auditor leader and responsible for the system (SR).
3. Prepare audit plan	3.1 Once the audit team has been formed and the Lead Auditor has been appointed, they must prepare the audit plan considering: The objectives, scope, criteria and estimated duration of the audit, providing for meetings with the audit management and meetings of the audit team, including the preparation, review and preparation of the final report. 3.2 Assign to each member the responsibility to audit specific processes, functions, places, areas or activities, considering the independence and competence of the auditors. 3.3 Auditors in training may be included in the team and audited under direction or supervision. ***3.4*** It presents the auditee with the audit plan before ***in-situ*** activities begin.	Auditor leader and audit team
4. Review documentation and prepare ***in-situ*** audit	4.1 Before starting ***in-situ*** activities, the documentation should be reviewed to determine the conformity of the system, taking into account: the size, nature and complexity of the campus, faculty or academic entity, as well as the scope and objectives of the audit, especially when the audit is for the first time or extended to the scope of the UEP. 4.2 If the documentation is inadequate, the team leader must inform the auditee and decide whether to continue or suspend the audit until the documentation issues are resolved. See point 3.1	Energy Committee

	Procedure for the realization of Internal Audits	Code: A-03 Revision:
UASLP	Reference Norm: ISO 9001:2015 9.2 ISO 14001:2015 9.2 ISO 50001:2018 9.2	Page 4 of 7

SEQUENCE	ACTIVITIES	RESPONSIBLE
	4.3 If the documentation is adequate, they prepare the working documents to carry out the ***in-situ*** audit.	
5 ***In-situ audit***	5.1 Hold the opening meeting with the management of the auditee, when considering appropriate with the environmental system management or with those responsible for the functions or processes to be audited. The purpose of the opening meeting is: "to confirm the audit plan, to provide a brief summary of how audit activities will be carried out, to confirm communication channels, and to provide the auditee with the opportunity to ask questions about the development of the audit".	Auditor Leader
	5.2 Inform the auditee to decide whether to reconfirm or modify the audit plan, or changes in the objectives of the audit or its scope, or its termination. When the available evidence of the audit indicates that the objectives of the audit are not achievable. 5.3 Assign networking activities and schedule for interviews, visit to specific areas of institutions, provide clarifications, or help to gather information from guides or observers as long as they have been designated by the auditee. 5.4 According to the audit plan, review the compliance of the management system evaluated according to the audit criteria and requirements of the standard (use format for audit notes) 5.5 It meet when necessary to review audit findings at appropriate stages during the audit.	Energy Committee

UASLP	Procedure for the realization of Internal Audits	Code: A-03 Revision:
	Reference Norm: ISO 9001:2015 9.2 ISO 14001:2015 9.2 ISO 50001:2018 9.2	Page 5 of 7

6.Review information, Prepare and authorize audit report	6.1 Meet before the closing meeting for; review audit findings, agree on audit findings, prepare recommendations, and comment on audit follow-up if that is considered in the objectives. (the conclusions may deal with matters relating to; degree of compliance with standard ISO 50001:2018) or audit criteria, the effective implementation, maintenance and improvement of management systems and the ability of the management review process to ensure the continuous suitability, adequacy, effectiveness and improvements of the management system. 6.2 Evaluate the audit evidence against the audit criteria to generate the findings, which may indicate both compliance and nonconformity. (When the audit objectives specify so, the audit findings can identify an opportunity for improvement.) 6.3 Prepare the audit report to be ready for the closing meeting. 6.4 Review the report prepared and provide record of the complete audit, approve and sign it for distribution.	Audit team Auditor Leader Auditor Committee Leader
7. Distribute audit report	7.1 Chair the closing meeting, present the findings and conclusions of the audit. 7.2 Deliver the audit report to the Director/Rectory, or to the recipients designated by the Audit Client. 7.3 Agree with the auditee in the time interval necessary for the auditee to present a plan of corrective or preventive actions. If appropriate, opportunities for improvement are presented emphasizing that the recommendations are not mandatory. **Note:** The audit report is the property of the audited. Members of the audit team and all recipients of the report must respect and maintain the proper confidentiality of the report.	Auditor Leader

	Procedure for the realization of Internal Audits	Code: A-03 Revision:
UASLP	Reference Norm: ISO 9001:2015 9.2 ISO 14001:2015 9.2 ISO 50001:2018 9.2	Page 6 of 7

8. Receive audit report	8.1 Receive the Audit Report and agree on the time interval to present your plan of corrective or preventive actions that will address the Non-conformities derived from the audit. **Note:** The audit ends when all the activities described in the audit plan have been carried out and the approved audit report has been distributed. **Audit follow-up activities:** 8.2 Set a date for convening a meeting with Top management for the analysis of the findings. 8.3 It should verify whether the corrective action was implemented and its effectiveness. This verification can be part of a subsequent audit.	Director Top Management
9. Identify opportunities for continuous improvement	9.1 During the meeting with Top Management and the analysis of findings, define an action plan to implement corrective actions and work in the non-conformities derived. 9.2 When all of this is set start preparing a subsequent audit to promote continuous improvement.	Top Management and Directors

6. Reference documents

Documents
Guidelines for the Audit of Quality, Environmental and/or Energy Management Systems ISO 19011:2018

7. Records

Records	Retention time	Responsible for Preserving it	Code
Qualification of auditors		Rs	
Audit Plan		Rs	
Opening meeting		Rs	
Audit report		Rs	
Closing meeting		Rs	

8. Glossary

Scope of the Audit: Extent and limits of an audit, (complete management system or specific process or activity).

Auditee -Faculty, Campus or academic entity to which the audit is practiced: For the purpose of the internal audit, the auditee is the area or department declared in the EnMS.

Auditor Leader = Leader of the audit team: Responsible for coordinating and following up on the audit process.

Auditor: Person with the competence to carry out an audit.

Audit: Systematic, independent and documented process to obtain evidence and evaluate it objective in order to determine the extent to which the established criteria are met to determine if the Quality and Environmental activities comply with the established provisions and if they are effectively implemented, and are appropriate to achieve objectives.

Internal Audit: Audit carried out with staff of the Technological Institute trained as auditors, without auditing their own work.

Audit Client: Technological Institute (organization or entity) that requests an audit.

Audit Findings: Results of an audit, provided by the Audit Team after considering the objectives of the audit and all its findings.

Audit Criteria: These are the references used against which compliance is determined and may include policies, procedures, rules, laws and regulations, contractual requirements or codes of conduct.

Auditor team: One or more internal auditors who carry out an audit. An auditor of the audit team is appointed as the leader of the audit team.

Audit Evidence: Records, statements of fact, or any other information relevant and verifiable to the audit criteria.

Audit Findings: Result of the evaluation of the evidence collected during the audit with respect to the audit criteria.

Non-Conformity: Non-compliance with a requirement of IS0 9001:2015, ISO 14001:2015 and/or ISO 50001:2018

Audit Plan: Description of the activities and details agreed for the audit.

Audit Program: Set of one or more audits planned in a given period of time and directed towards a specific purpose.

SR: responsible for the system

9. Changes to this release

REVIEW NUMBER	UPDATE DATE	CHANGE DESCRIPTION

9.4 Annex 4: Format to determine the Scope and Limits of the UEP, A-04

UASLP Universidad Autónoma de San Luis Potosí	Format to determine the Scope and Limits of the UEP	Code: A-04
		Revision:
	Reference to ISO 50001: 2018 4.3	page 1 of 4

Faculty, Academic Entity or Dependency: _____

Scope
Make a general diagram of specific UASLP process where they are pointed out. **Inputs-outputs of energy, vehicles, processes and equipment.** **Complete the diagram with the possible, current, and probable instruments and measurement points for the assigned process.** **Establish a level at which energy should be managed.** **Describe the activities, processes, areas to be included in the University Energy Program scheme.**
Limit Location Power Source
Describe the physical location (campus address), areas and/or types of energy used for activities, processes, areas of energy management. **The general diagram of the installations is based on selecting the UEP approach.** **Describes the location or energy elements that make up each of the selected activities.**

Date of preparation: _____

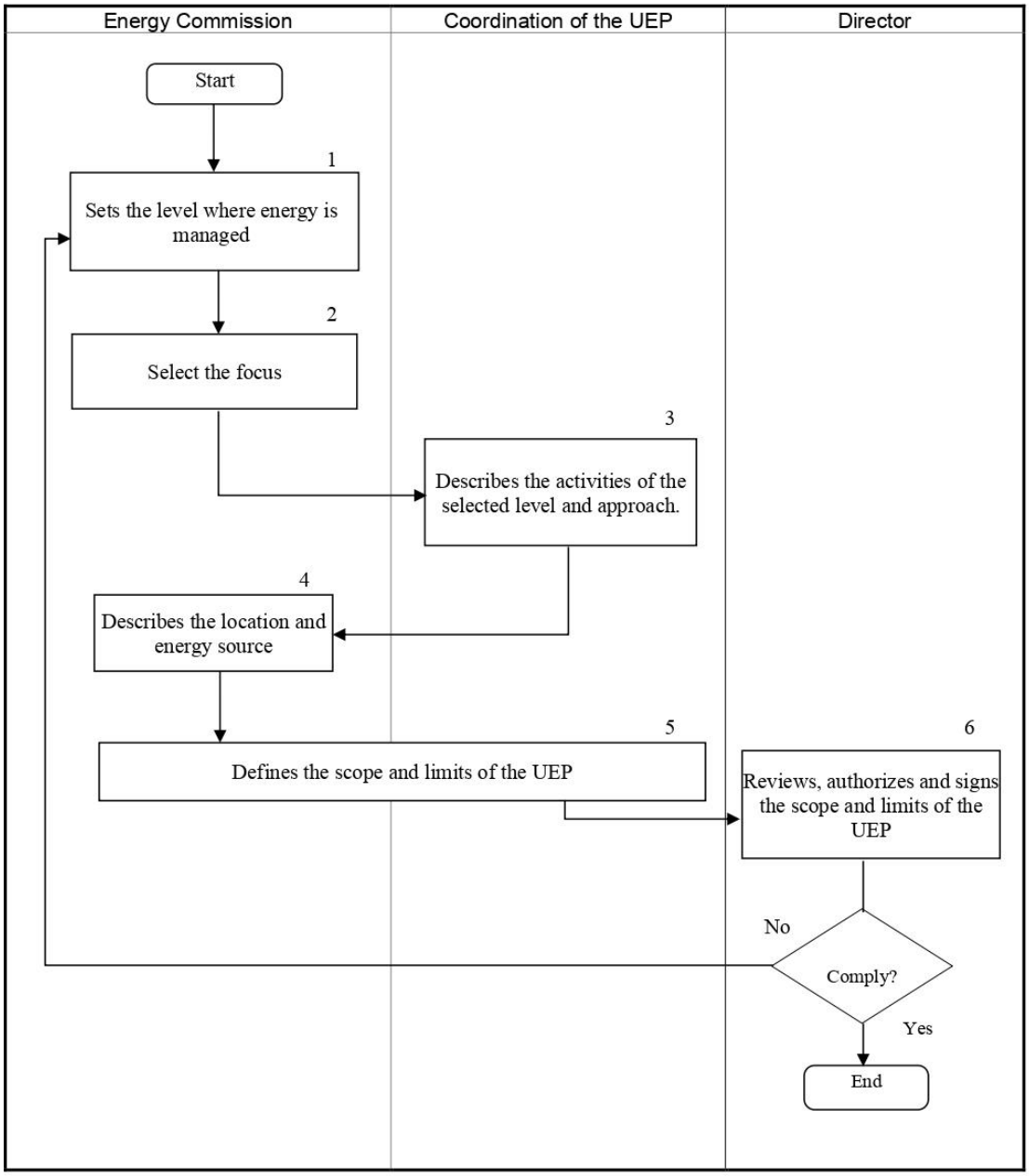
UASLP Universidad Autónoma de San Luis Potosí	Format to determine the Scope and Limits of the UEP	Code: A-04
		Revision:
	Reference to ISO 50001: 2018 4.3	page 2 of 4

Made by Leader of the Energy Commission	Signature of Authorization Director

*Individual management system, fill in both fields

*Multi-site management system, the scope is consensus between all the participants and the limit is all the addresses/locations where the campuses are located

Flowchart for defining scope and limit



Description of the procedure

Stages	Activity	Responsible
Sets the level where energy is managed	Make a general process diagram where inputs-outputs of energy, vehicles, processes, and equipment in which those are indicated. Complete the diagram with current instruments and measurement points. Sets the level by which you want to manage energy. E.g., Campus, Offices, buildings, facilities, etc.	Energy Commission
Select the focus	Select the approach to which you want to manage energy, according to the characteristics of the Campuses, Institutes and Centers of UASLP, either by process or by energy system.	Energy Commission
Describe the activities of the selected level and approach	Make the description of each of the activities that are developed in the university, considering the level and approach identified in the previous stages.	UEP coordination
Describe the location and energy source	Use the process map defined in stage 1 and make a brief description of the location of the activities or energy elements that make up each of the activities selected in the previous stage, as well as the energy source identified.	Energy Commission
Defines the scope and limits of UEP	Analyze the data collected, and define scope and limits of the UEP, which will be the basis for the system.	Energy Commission
Review, authorize and sign UEP limits	Review this document Does it comply with the provisions? YES: Authorizes and signs the format. End of process. No: Return to stage 1.	Director and Energy Commission

9.5 Annex 5: Operational Controls Matrix, A-05

UASLP	Operational Controls Matrix							Code: A-05													
	Reference Norm ISO 50001:2018 8.1							Revision:													
								Page 1 of 1													
								YEAR													
ENERGY TYPE	ACTUAL CONDITION	OPPORTUNITY FOR IMPROVEMENT	ACTIVITIES TO BE DEVELOPED/OPERATIONAL CONTROLS	AREAS INVOLVED	FINANCIAL RESOURCES NECESSARY	HUMAN RESOURCES NECESSARY	RESPONSIBLE	FREQUENCY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Electricity	High consumptions	Energy saving appliances and raising awareness between UASLP Community	Implementation of the University Energy Program (UEP)	Agenda Ambiental, Communication and Image Management, Top Management	to be calculated	to be calculated	Agenda Ambiental and Energy Commission	Monthly	x	x	x	x	x	x	x	x	x	x	x	x
Fuel	Indirectly high consumptions due to mobility of the UASLP Community	Support programs like UNIBici and Car pooling	Awareness campaings, audiovisual information	Agenda Ambiental, Communication and Image Management, Top Management	to be calculated	to be calculated	Agenda Ambiental and Energy Commission	Each two months	x		x		x		x		x		x	

ELABORATED	REVISED	AUTHORIZED
José Salvador Fernández Reyes	Dr. Marcos Algara Siller	
NAME	NAME	NAME
UEP Collaborator	Head of the UEP	Top Management
POSITION	POSITION	POSITION

9.6 Annex 6: Format for design, modification and renovation, A-06

	Format for design, modification and renovation	Code: A-06
UASLP		Revision:
	Reference Norm to ISO 50001: 2018 8.2	page 1 of 1

Faculty or Academic Entity: Agenda Ambiental
Date: 23.08.2021
Project: Change from fluorescent to LED luminaire for the Agenda Ambiental building

Description: The university has guidelines for Led lamps since 2016 in which it is specified under what conditions the electrical maintenance department will make the change from fluorescent luminaires to Led luminaires.

Location Area	Activities	Responsible		2021											
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			D												
			R												
Agenda Ambiental			M								X				X
			D												
			M												
			R												

Design ☐ **Modification** ☐ **Renovation** ☐

Energy Saving Goal: make the change from 16 fluorescent lamps to LED lamps 120cm and 17 fluorescent bulbs to LED bulbs, which would imply a total investment of $ MXN 1,581.51.

Results: Save half the energy consumed by fluorescent bulbs by switching to LED technology, when it is implemented.

Authorizes
Director

9.7 Annex 7: Format to Identify Legal and other Requirements, A-07

	FORMAT TO IDENTIFY LEGAL AND OTHER REQUIREMENTS					Code: A-07
	Reference Norm ISO 50001:2018 9.1.2					Revision: 1
Faculty or Academic Entity (1) : Agenda Ambiental				Date (2): 23.08.2021		
#	SIGNIFICANT USE OF ENERGY (3)	IDENTIFICATION OF LEGAL REQUIREMENT OR OTHER SUBSCRIBED REQUIREMENT (4)	Compliance Evaluation (5)			Responsable (7)
			YES Compliant	NO Compliant	Evidence or Observation (6)	
1	Electrical Appliances	UASLP Energy Policy (Non applicable yet)		NO	Inventories and UASLP Infraestructure	Energy Commission
2	Lighting	UASLP Energy Policy (Non applicable yet)		NO	Energy Habits UASLP, Survey	Energy Commission
3	Fuel Consumption (mobility)	UASLP Energy Policy (Non applicable yet)		NO	Energy Habits UASLP, Survey	Energy Commission and UASLP
4						
5						
6						
7						
8						
9						
10						

Number of Requirement with "YES" Compliance	
Number of Requirement Without "NO" Compliance	3
Requirements Compliance Index	3

FILLING INSTRUCTION	
N°	
1	Enter the name of the Faculty or academic entity
2	Write down the date the form was filled out.
3	Write down the significant use of energy to which the legal requirement corresponds
4	Write down the Article, fractions and paragraphs of the different laws that apply to the different significant uses of energy.
5	Write down (YES) if it is met or (NO) if it does not meet the legal requirement or other subscribed requirement
6	Record the evidence that supports compliance or observations of non-compliance with the legal requirement or other subscribed requirement
7	Write down the person responsible for applying the legal requirement or other subscribed requirement

9.8 Annex 8: Format for the Results of the Top Management Review, A-08

	FORMAT FOR THE RESULTS OF THE TOP MANAGEMENT REVIEW	Code: A-08
UASLP		Rev.
	Reference Norm ISO 50001:2018 9.3	Page 1 de 1

Follow-up actions on previous management reviews

FACULTY OR ACADEMIC ENTITY:	DATE
Agenda Ambiental	23.08.2021

NAME OF PARTICIPANTS:	AREAS:
Juan Perez, Mary Simmons, Joe Müller and Dinorah Palma	Agenda Ambiental Environmental Management System

TOPICS	DECISIONS AND/OR ACTIONS RESULT OF THE REVIEW	DEGREE OF COMPLIANCE	RISK IDENTIFICATION	RESPONSIBLE
1.- The energy policy review	To date, the University has not yet implemented an energy policy focused on energy saving	Low	Non-compliance with the SDGs and the goal of being a sustainable university	Top Management
2.- The review of energy performance and related EnPIs	This work is a pilot study to know the energy performance of the UASLP, the creation of an action plan is missing	Low	Economic expenditure and contribution to the emission of GHGs	Top Management and Energy Commission
3.- The results of the evaluation of compliance with legal requirements and changes in legal requirements and other requirements	None of the requirements are in full compliance	Low	Non-compliance with the SDGs and the goal of being a sustainable university	Top Management, Energy Commission and Agenda Ambiental
4.- The degree of fulfillment of the energy objectives and goals	First, it is necessary to set the objectives and energy goals that the university can achieve.	Low	Non-compliance with the SDGs and the goal of being a sustainable university	Top Management, Energy Commission and Agenda Ambiental
5.- The status of corrective actions and risks	Corrective actions are in their development phase and time is lacking for their implementation	Low	Economic expenditure and contribution to the emission of GHGs	Energy Comission, Technical team, Agenda Ambiental and Top Management

9.9 Annex 9: Master list of Equipment and Lighting Inventory of the UEP, A-09

UASLP	Master list of Equipments and Lighting Inventory of the UEP	Code: A-09
		Rev.
	Reference Norm ISO 50001:2018 6.6	Page 1 de 1

Academic Entity/Unit: Building: Level or Room: Date:

Clasification	Equipment	Brand	Model	Quantity	Nominal Voltage (V)	Nominal Current (A)	Nominal Power (W)	Usage Hours	Consumption	En. Efficiency Label	Observations	Photography
Lighting												
Air Conditioning												
Office appliances												
Lab appliances												
Other												

Responsible:	Signature:

9.10 Annex 10: Survey "Energy Habits UASLP", A-10

Hábitos energéticos / Energy habits UASLP

La siguiente encuesta está dirigida a la comunidad UASLP, en especial a la Zona Universitaria Poniente.

El motivo de la presente encuesta es conocer y evaluar los hábitos energéticos de la comunidad dentro de la UASLP - antes y después de la presente pandemia de COVID-19 -, en términos de: "consumo energético (eléctrico)" y "movilidad" destinada a actividades relacionadas a la UASLP.

La información aquí recabada servirá para la creación del "Programa Universitario de Energía" por parte de la Agenda Ambiental, UASLP. El presente programa se desarrolla como parte de la transición hacia una Universidad Sostenible, que tiene como ejes rectores los Objetivos del Desarrollo Sostenible (ODSs) de las Naciones Unidas - (UN).
Enlace a los ODSs: https://www.un.org/sustainabledevelopment/es/objetivos-de-desarrollo-sostenible/

Por este motivo, se le pide a la comunidad responder de la manera más sincera posible. Todas las respuestas son anónimas y servirán para ampliar el panorama con el cuenta actualmente la comunidad UASLP sobre sus consumo energéticos.

Cualquier aclaración y/o comentario al respecto, por favor contacte a:
A186546@alumnos.uaslp.mx

// English version //

The following survey is aimed to the UASLP community, especially for the Poniente University Zone.

The reason for this survey is to know and evaluate the energy habits of the community within the UASLP - before and after the current COVID-19 pandemic -, in terms of: "energy consumption (electricity)" and "mobility" for activities related to the UASLP.

The information collected here will be used for the creation of the "University Energy Program" by the Environmental Agenda, UASLP. This program is developed as part of the transition to a Sustainable University, whose guiding principles are the Sustainable Development Goals (SDGs) of the United Nations (UN).
Link to the SDGs: https://www.un.org/sustainabledevelopment/es/objetivos-de-desarrollo-sostenible/

For this reason, the community is asked to respond as honestly as possible. All responses are anonymous and will serve to broaden the panorama that the UASLP community currently has on its energy consumption.

Any clarification and / or comments in this regard, please contact:
A186546@alumnos.uaslp.mx

* Required

1. ¿En qué idioma le gustaría responder a esta encuesta? / In which language would you like to answer this survey? *

   Mark only one oval.

   - ◯ Español *Skip to question 2*
   - ◯ English *Skip to question 29*

Información general

En la siguiente sección se menciona el término "área de trabajo", por favor entiéndase "área de trabajo" como el espacio que usted comparte cada día con sus colegas. Este espacio no está limitado a una oficina o aula, ya que este puede ser también el área, piso, laboratorio o departamento al que usted pertenece.

2. Ocupación *

   Mark only one oval.

   - ◯ Estudiante
   - ◯ Administrativo
   - ◯ Profesor / Investigador
   - ◯ Other: _____

3. Entidad académica a la que pertenece *

Mark only one oval.

- ◯ Facultad de Ingeniería
- ◯ Facultad de Ciencias Químicas
- ◯ Facultad de Enfermería y Nutrición
- ◯ Facultad del Hábitat
- ◯ Facultad de Estomatología
- ◯ Facultad de Medicina
- ◯ Departamento de Físico Matemáticas
- ◯ Instituto de Física
- ◯ Instituto de Geología
- ◯ Agenda Ambiental
- ◯ Coordinación Académica en Arte (CAArte)
- ◯ Secretaría de Finanzas
- ◯ Secretaría Académica
- ◯ Secretearía de Planeación
- ◯ División de Servicios Estudiantiles
- ◯ División de Informática
- ◯ Departamento Universitario de Inglés (DUI)
- ◯ Sistema de Bibliotecas
- ◯ Other: _____

4. Por favor, especifique el nombre de su edificio, piso, entidad u oficina. *

_____

5. ¿Cuántas personas aproximadamente comparten su área de trabajo? *

_____

6. ¿Cuántos años lleva siendo parte de la UASLP? *

Mark only one oval.

- menos de un año
- 1 - 3 años
- 3 - 5 años
- más de 5 años

Consumo energético dentro de la UASLP

En está sección se realizarán preguntas sobre los hábitos energéticos de la comunidad, relacionados a actividades dentro de las instalaciones de la UASLP.

Nota: en la siguiente sección se menciona el término "área de trabajo", por favor entiéndase "área de trabajo" como el espacio que usted comparte cada día con sus colegas. Este espacio no está limitado a una oficina o aula, ya que este puede ser también el área, piso, laboratorio o departamento al que usted pertenece.

7. ¿En que nivel considera usted que se encuentra su concientización, relacionada con los siguientes términos? "consumo, ahorro energético y movilidad" *

Mark only one oval.

	1	2	3	4	5	
Desconozco completamente						Me considero experto en el tema

Antes de la presente pandemia de COVID-19.

Si actualmente se encuentra desarrollando sus actividades en casa y no tiene motivos para ir a la UASLP, por favor tome en cuenta las actividades cotidianas que realizaba en la UASLP antes de la pandemia.

8. ¿Alguna vez usted a tratado/disminuido su consumo de energía dentro de la UASLP? -Si su respuesta fue sí, mencione ¿cómo? *

Mark only one oval.

- ◯ Sí
- ◯ No
- ◯ Other: _____

9. ¿Cuántos aparatos conectados a la red eléctrica se encuentran en su área de trabajo? * 8 points

Mark only one oval per row.

	Ninguno	1	2 - 5	6 - 10	11 - 20	más de 20
Aire acondicionado / Calefacción	◯	◯	◯	◯	◯	◯
Aparatos de computo (PCs, Scanners, Impresoras, reguladores de corriente, faxes, etc.)	◯	◯	◯	◯	◯	◯
Refrigeradores	◯	◯	◯	◯	◯	◯
Aparatos de cocina (Cafeteras, microondas, estufas, parrillas, calentadores de agua, etc.)	◯	◯	◯	◯	◯	◯
Aparatos de laboratorio (centrífugas, microscopios, instrumentos analíticos, hornos, etc)	◯	◯	◯	◯	◯	◯
Instrumentos de docencia (televisiones, proyectores, pizarrones inteligentes, etc).	◯	◯	◯	◯	◯	◯
Congeladores, super congeladores	◯	◯	◯	◯	◯	◯
Otros aparatos de mayor voltaje (p.ej: soldadoras de metal, arco eléctrico, fundición, etc.)	◯	◯	◯	◯	◯	◯

10. ¿Cuántas horas al día se encuentran conectados estos aparatos en su área de trabajo? 8 points

Mark only one oval per row.

	Nunca se usan	menos de 1 hora	1 - 4 hrs	5 - 8 hrs	9 - 12 hrs	Todo el día
Aire acondicionado / Calefacción	◯	◯	◯	◯	◯	◯
Aparatos de computo (PCs, Scanners, Impresoras, reguladores de corriente, faxes, etc.)	◯	◯	◯	◯	◯	◯
Refrigeradores	◯	◯	◯	◯	◯	◯
Aparatos de cocina (Cafeteras, microondas, estufas, parrillas, calentadores de agua, etc.)	◯	◯	◯	◯	◯	◯
Aparatos de laboratorio (centrífugas, microscopios, instrumentos analíticos, hornos, etc)	◯	◯	◯	◯	◯	◯
Instrumentos de docencia (televisiones, proyectores, pizarrones inteligentes, etc).	◯	◯	◯	◯	◯	◯
Congeladores, super congeladores	◯	◯	◯	◯	◯	◯
Otros aparatos de mayor voltaje (p.ej: soldadoras de metal, arco eléctrico, fundición, etc.)	◯	◯	◯	◯	◯	◯

11. ¿Cuántos días a la semana se encuentran conectados estos aparatos en su área de trabajo? 8 points

Mark only one oval per row.

	Ninguno	1 día	3 días	5 días	Toda la semana
Aire acondicionado / Calefacción	◯	◯	◯	◯	◯
Aparatos de computo (PCs, Scanners, Impresoras, reguladores de corriente, faxes, etc.)	◯	◯	◯	◯	◯
Refrigeradores	◯	◯	◯	◯	◯
Aparatos de cocina (Cafeteras, microondas, estufas, parrillas, calentadores de agua, etc.)	◯	◯	◯	◯	◯
Aparatos de laboratorio (centrífugas, microscopios, instrumentos analíticos, hornos, etc)	◯	◯	◯	◯	◯
Instrumentos de docencia (televisiones, proyectores, pizarrones inteligentes, etc).	◯	◯	◯	◯	◯
Congeladores, super congeladores	◯	◯	◯	◯	◯
Otros aparatos de mayor voltaje (p.ej: soldadoras de metal, arco eléctrico, fundición, etc.)	◯	◯	◯	◯	◯

12. ¿Cuándo las áreas de trabajo están vacías (durante la noche, fines de semana, días festivos, COVID-19 Home office), estos aparatos?

Mark only one oval.

- ◯ Permanecen en función "Stand-by" ó "Energy saving"
- ◯ Se desconectan completamente
- ◯ Permanecen en uso
- ◯ Desconozco

13. Si conoce la potencia (W) a la que operan los aparatos eléctricos, o cuenta con un inventario de aparatos eléctricos en su área de trabajo y está dispuesto a compartir dicha información con nosotros, por favor escriba su correo para ponernos en contacto directo con usted.

14. ¿Cuántos focos/lámparas se encuentran en su área de trabajo? * 9 points

INCANDESCENTES

HALÓGENAS

BAJO CONSUMO

FLUORESCENTES

LEDS

Mark only one oval per row.

	Ninguno	1	2 - 5	6 - 10	11 - 20	más de 20
Focos Incandescentes	◯	◯	◯	◯	◯	◯
Focos de Bajo consumo	◯	◯	◯	◯	◯	◯
Focos LED	◯	◯	◯	◯	◯	◯
Focos de Halógeno	◯	◯	◯	◯	◯	◯
Focos Fluorescentes	◯	◯	◯	◯	◯	◯
Lámparas Incandescentes	◯	◯	◯	◯	◯	◯
Lámparas LED	◯	◯	◯	◯	◯	◯
Lámparas de Halógeno	◯	◯	◯	◯	◯	◯
Lámparas Fluorescentes	◯	◯	◯	◯	◯	◯

15. ¿Cuántas horas al día se encuentran encendidos estos focos/lámparas en su área de trabajo? 9 points

Mark only one oval per row.

	Nunca se usan	menos de una hora	1 - 4 hrs	5 - 8 hrs	9 - 12 hrs	todo el día
Focos Incandescentes	◯	◯	◯	◯	◯	◯
Focos de Bajo consumo	◯	◯	◯	◯	◯	◯
Focos LED	◯	◯	◯	◯	◯	◯
Focos de Halógeno	◯	◯	◯	◯	◯	◯
Focos Fluorescentes	◯	◯	◯	◯	◯	◯
Lámparas Incandescentes	◯	◯	◯	◯	◯	◯
Lámparas LED	◯	◯	◯	◯	◯	◯
Lámparas de Halógeno	◯	◯	◯	◯	◯	◯
Lámparas Fluorescentes	◯	◯	◯	◯	◯	◯

16. ¿Cuántos días a la semana se encuentran encendidos estos focos/lámparas en su área de trabajo? 9 points

Mark only one oval per row.

	Ningún día	1 día	3 días	5 días	toda la semana
Focos Incandescentes	◯	◯	◯	◯	◯
Focos de Bajo consumo	◯	◯	◯	◯	◯
Focos LED	◯	◯	◯	◯	◯
Focos de Halógeno	◯	◯	◯	◯	◯
Focos Fluorescentes	◯	◯	◯	◯	◯
Lámparas Incandescentes	◯	◯	◯	◯	◯
Lámparas LED	◯	◯	◯	◯	◯
Lámparas de Halógeno	◯	◯	◯	◯	◯
Lámparas Fluorescentes	◯	◯	◯	◯	◯

17. ¿Cuándo las áreas de trabajo están vacías (durante la noche, fines de semana, días festivos, COVID-19 Home office), estos focos?

Mark only one oval.

◯ Permanecen encendidos
◯ Se apagan cuando no se utilizan
◯ Desconozco

18. ¿Tiene el conocimiento de que existe en su área de trabajo, alguna fuente renovable generadora de energía conectada a la red? p.ej: paneles solares, calentadores solares, turbinas eólicas, etc. -Si su respuesta es SÍ, por favor mencione ¿cuál? * 1 point

Mark only one oval.

- ◯ Sí
- ◯ No
- ◯ Other: _____

19. ¿Existe alguna persona encargada de verificar las correctas prácticas de uso y consumo de energía en su área de trabajo? Por favor, nómbrelo. *

Mark only one oval.

- ◯ Sí
- ◯ No
- ◯ Desconozco
- ◯ Other: _____

Movilidad

En está sección se realizarán preguntas sobre la movilidad de la comunidad, principalmente consumo de combustible relacionados con actividades de la UASLP.

20. ¿Actualmente en tiempo de pandemia COVID-19, ha tenido que acudir a la universidad a desarrollar cualquier tipo de actividad? *

Mark only one oval.

- ◯ No
- ◯ Sí, varias veces por semana
- ◯ Sí, pero sólo en casos extraordinarios

Antes de la presente pandemia de COVID-19

Si actualmente se encuentra desarrollando sus actividades en casa y no tiene motivos para ir a la UASLP, por favor tome en cuenta la movilidad que tenía antes de la pandemia.

21. ¿Cuánto tiempo le toma por día desplazarse de donde se encuentre, hacía su área de trabajo en la UASLP? *

Check all that apply.

- [ ] menos de 15 min
- [ ] de 16 - 30 min
- [ ] menos de 1 hora
- [ ] 1 - 2 hrs
- [ ] más de 2 hrs
- Other: [ ] _____

22. ¿Cuántos días a la semana se desplaza de donde se encuentre, hacía su área de trabajo en la UASLP? *

Check all that apply.

- [ ] Ninguno
- [ ] 1 día
- [ ] 2 días
- [ ] 3 días
- [ ] 4 días
- [ ] 5 días
- [ ] 7 días

23. ¿Qué medio de transporte utiliza principalmente para desplazarse hacía la UASLP? *

Check all that apply.

- [ ] Automóvil propio (una sola persona)
- [ ] Automóvil compartido (Carpooling con más personas al mismo destino)
- [ ] Automóviles/camionetas de la UASLP
- [ ] Transporte público (Autobús)
- [ ] Taxi o cualquier servicio de transporte con conductor como Uber, DiDi, etc.
- [ ] Motocicleta / Motoneta
- [ ] Bicicleta
- [ ] Caminando

Other: [ ] _____

24. ¿Aproximadamente cuántos viajes realiza/realizaba al año por motivos de estudio relacionados con la UASLP?

Mark only one oval per row.

	Ninguno	1	2 - 5	6 - 10	11 - 20	más de 20
Cortos (- 200 km aprox.): a otro municipio/localidad de S.L.P.	◯	◯	◯	◯	◯	◯
Medios (+ 200 km aprox.): a otra cuidad en México	◯	◯	◯	◯	◯	◯
Largos: fuera del país	◯	◯	◯	◯	◯	◯

25. ¿Qué medio de transporte utiliza principalmente para realizar dichos viajes por motivos de estudio relacionados con la UASLP?

Mark only one oval per row.

	Ninguno	Automóvil	Autobús	Avión
No requiero desplazarme	◯	◯	◯	◯
Cortos (- 200 km aprox.): a otro municipio/localidad de S.L.P.	◯	◯	◯	◯
Medios (+ 200 km aprox.): a otra cuidad de México	◯	◯	◯	◯
Largos: fuera del país	◯	◯	◯	◯

26. Por favor, elija un estimado de las horas de viaje que realiza al año.

Mark only one oval per row.

	0 hrs	menos de 10 hrs	de 11 - 30 hrs	de 31 - 50 hrs	más de 51 hrs	más de 100 hrs
No requiero desplazarme	◯	◯	◯	◯	◯	◯
Automóvil	◯	◯	◯	◯	◯	◯
Autobús	◯	◯	◯	◯	◯	◯
Avión	◯	◯	◯	◯	◯	◯

27. ¿Usted cree que la presente pandemia de COVID-19 afectó en su movilidad, tanto dentro como fuera de la ciudad? *

Mark only one oval.

- ◯ Sí
- ◯ No
- ◯ Tengo la misma movilidad

28. Que tan importante considera usted que es regresar a las actividades cotidianas de manera presencial, dentro de la UASLP *

Mark only one oval.

	1	2	3	4	5	
Puedo realizar mis actividades desde casa	◯	◯	◯	◯	◯	Muy importante

Skip to section 8 (¡Muchas gracias por su tiempo! / Thank you so much for your time!)

General Information

In the next section the term "work area" is mentioned, please understand "work area" as the space that you share every day with your colleagues. This space is not limited to an office or classroom, since this can also be the area, floor, laboratory or department to which you belong.

29. Occupation *

Mark only one oval.

- ◯ Student
- ◯ Administrative
- ◯ Professor / Researcher
- ◯ Other: _____

30. Academic Entity to which you belong *

Mark only one oval.

- ◯ Facultad de Ingeniería
- ◯ Facultad de Ciencias Químicas
- ◯ Facultad de Enfermería y Nutrición
- ◯ Facultad del Hábitat
- ◯ Facultad de Estomatología
- ◯ Facultad de Medicina
- ◯ Departamento de Físico Matemáticas
- ◯ Instituto de Física
- ◯ Instituto de Geología
- ◯ Agenda Ambiental
- ◯ Coordinación Académica en Arte (CAArte)
- ◯ Secretaría de Finanzas
- ◯ Secretaría Académica
- ◯ Secretearía de Planeación
- ◯ División de Servicios Estudiantiles
- ◯ División de Informática
- ◯ Departamento Universitario de Inglés (DUI)
- ◯ Sistema de Bibliotecas
- ◯ Other: _____

31. Please specify the name of your building, floor, entity or office. *

_____

32. Approximately how many people share your workspace? *

_____

33. How many years have you been part of the UASLP? *

Mark only one oval.

- ◯ Less than a year
- ◯ 1 - 3 years
- ◯ 3 - 5 years
- ◯ more than 5 years

Energy consumption within the UASLP

In this section, questions will be asked about the energy habits of the community, related to activities within the UASLP facilities.

If you are currently carrying out your activities at home and you have no reason to go to the UASLP, please take into account the daily activities that you carried out at the UASLP before the pandemic.

Note: The term "work area" is mentioned in the following section, please understand "work area" as the space that you share every day with your colleagues. This space is not limited to an office or classroom, since this can also be the area, floor, laboratory or department to which you belong.

34. At what level do you consider your awareness, related to the following terms? "consumption, energy saving and mobility" *

Mark only one oval.

	1	2	3	4	5	
Completely unaware	◯	◯	◯	◯	◯	I consider myself expert on the topic

Before the present pandemic of COVID-19.

If you are currently carrying out your activities at home and you have no reason to go to the UASLP, please take into account the daily activities that you carried out at the UASLP before the pandemic.

35. Have you ever tried/decreased your energy consumption within the UASLP? -If your answer was yes, mention how? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Other: _____

36. How many connected appliances exist in your work area? * 8 points

Mark only one oval per row.

	None	1	2 - 5	6 - 10	11 - 20	more than 20
AC / Heating	◯	◯	◯	◯	◯	◯
Office appliances (PCs, Scanners, Printers, No-breaks, faxes, etc.)	◯	◯	◯	◯	◯	◯
Fridges / Coolers	◯	◯	◯	◯	◯	◯
Kitchen appliances (Coffee makers, microowave, stoves, electric grills, water heaters, etc.)	◯	◯	◯	◯	◯	◯
Lab appliances (Centrifuges, microscopes, analytical instruments, ovens , etc)	◯	◯	◯	◯	◯	◯
Teaching tools (TVs, projectors, digital blackboards, etc).	◯	◯	◯	◯	◯	◯
Freezer, super freezers	◯	◯	◯	◯	◯	◯
Other higher voltage appliances (e.g. metal welders, electric arc, foundry, etc.)	◯	◯	◯	◯	◯	◯

37. How many hours per day are these devices connected in your work area? 8 points

Mark only one oval per row.

	Never used	Less than one hour	1 - 4 hrs	5 - 8 hrs	9 - 12 hrs	All day long
AC / Heating	◯	◯	◯	◯	◯	◯
Office appliances (PCs, Scanners, Printers, No-breaks, faxes, etc.)	◯	◯	◯	◯	◯	◯
Fridges / Coolers	◯	◯	◯	◯	◯	◯
Kitchen appliances (Coffee makers, microowave, stoves, electric grills, water heaters, etc.)	◯	◯	◯	◯	◯	◯
Lab appliances (Centrifuges, microscopes, analytical instruments, ovens , etc)	◯	◯	◯	◯	◯	◯
Teaching tools (TVs, projectors, digital blackboards, etc).	◯	◯	◯	◯	◯	◯
Freezer, super freezers	◯	◯	◯	◯	◯	◯
Other higher voltage appliances (e.g. metal welders, electric arc, foundry, etc.)	◯	◯	◯	◯	◯	◯

38. How many days per week are these devices connected in your work area? 8 points

Mark only one oval per row.

	None	1 day	3 days	5 days	all week
AC / Heating	◯	◯	◯	◯	◯
Office appliances (PCs, Scanners, Printers, No-breaks, faxes, etc.)	◯	◯	◯	◯	◯
Fridges / Coolers	◯	◯	◯	◯	◯
Kitchen appliances (Coffee makers, microowave, stoves, electric grills, water heaters, etc.)	◯	◯	◯	◯	◯
Lab appliances (Centrifuges, microscopes, analytical instruments, ovens , etc)	◯	◯	◯	◯	◯
Teaching tools (TVs, projectors, digital blackboards, etc).	◯	◯	◯	◯	◯
Freezer, super freezers	◯	◯	◯	◯	◯
Other higher voltage appliances (e.g. metal welders, electric arc, foundry, etc.)	◯	◯	◯	◯	◯

39. When the work areas are empty (overnight, weekends, holidays, COVID-19 Home office), these appliances?

Mark only one oval.

- ◯ They remain in "Stand-by" or "Energy saving" function
- ◯ They are being disconnected completely
- ◯ They remain in use
- ◯ I don't know

40. If you know the power (W) at which your electrical appliances operate, or if you have an inventory of electrical appliances in your work area and you are willing to share such information with us, please write down your email in order to contact you directly.

41. How many bulbs/lamps exist in your work area? * 9 points

INCANDESCENT

HALOGEN

LOW CONSUMPTION

FLUORESCENT

LEDS

Mark only one oval per row.

	None	1	2 - 5	6 - 10	11 - 20	more than 20
Incandescent bulbs	◯	◯	◯	◯	◯	◯
Low consumption bulbs	◯	◯	◯	◯	◯	◯
LED bulbs	◯	◯	◯	◯	◯	◯
Halogen Bulbs	◯	◯	◯	◯	◯	◯
Fluorescent bulbs	◯	◯	◯	◯	◯	◯
Incandescent lamps	◯	◯	◯	◯	◯	◯
LED lamps	◯	◯	◯	◯	◯	◯
Halogen lamps	◯	◯	◯	◯	◯	◯
Fluorescent lamps	◯	◯	◯	◯	◯	◯

42. How many hours per day are these light bulbs/lamps on, in your work area? 9 points

Mark only one oval per row.

	Never used	Less than one hour	1 - 4 hrs	5 - 8 hrs	6 - 10	9 - 12 hrs	All day long
Incandescent bulbs	◯	◯	◯	◯	◯	◯	◯
Low consumption bulbs	◯	◯	◯	◯	◯	◯	◯
LED bulbs	◯	◯	◯	◯	◯	◯	◯
Halogen Bulbs	◯	◯	◯	◯	◯	◯	◯
Fluorescent bulbs	◯	◯	◯	◯	◯	◯	◯
Incandescent lamps	◯	◯	◯	◯	◯	◯	◯
LED lamps	◯	◯	◯	◯	◯	◯	◯
Halogen lamps	◯	◯	◯	◯	◯	◯	◯
Fluorescent lamps	◯	◯	◯	◯	◯	◯	◯

43. How many days per week are these light bulbs/lamps on, in your work area? 9 points

Mark only one oval per row.

	Not a single day	1 day	3 days	5 days	All week
Incandescent bulbs	◯	◯	◯	◯	◯
Low consumption bulbs	◯	◯	◯	◯	◯
LED bulbs	◯	◯	◯	◯	◯
Halogen Bulbs	◯	◯	◯	◯	◯
Fluorescent bulbs	◯	◯	◯	◯	◯
Incandescent lamps	◯	◯	◯	◯	◯
LED lamps	◯	◯	◯	◯	◯
Halogen lamps	◯	◯	◯	◯	◯
Fluorescent lamps	◯	◯	◯	◯	◯

44. When work areas are empty (overnight, weekends, holidays, COVID-19 Home office), these bulbs? *

Mark only one oval.

- ◯ They stay on
- ◯ They are turned off when not in use
- ◯ I don't know

45. Have you the knowledge that in your work area exist some source of renewable energy that is connected to the grid? e.g: solar panels, solar heaters, wind turbines, etc. -If your answer is YES, please mention which one? * 1 point

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Other: _____

46. Is there someone in charge of verifying the correct practices of energy use and consumption in your work area? Please name it. *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know
- ◯ Other: _____

Mobility

In this section, questions will be asked about community mobility, mainly fuel consumption related to UASLP activities.

47. Currently in times of the COVID-19 pandemic, have you had to go to university to develop any type of activity? *

Mark only one oval.

- ◯ No
- ◯ Yes, several times per week
- ◯ Yes, but only in extraordinary cases

Before the present pandemic of COVID-19

If you are currently carrying out your activities at home and you have no reason to go to the UASLP, please take into account the mobility you had before the pandemic.

48. How long does it take you per day to travel from where you are, to your work area at UASLP? *

Check all that apply.

- [ ] less than 15 min
- [ ] 16 - 30 min
- [ ] less than an hour
- [ ] 1 - 2 hrs
- [ ] more than 2 hrs
- [ ] Other: _____

49. How many days per week do you travel from where you are, to your work area at the UASLP? *

Check all that apply.

- [ ] None
- [ ] 1 day
- [ ] 2 days
- [ ] 3 days
- [ ] 4 days
- [ ] 5 days
- [ ] 7 days

50. What means of transport do you use mainly to get to the UASLP? *

Check all that apply.

- [ ] Own car (single person)
- [ ] Shared car (carpooling / more than one person going to the same destination)
- [ ] UASLP cars/trucks
- [ ] Public transportation (bus)
- [ ] Taxi or any transportation service with driver like Uber, DiDi, etc.
- [ ] Motorcycle/Scooter
- [ ] Bicycle
- [ ] Walking

Other: [ ] _____

51. Approximately how many trips do you take/did per year for study reasons related to the UASLP? *

Mark only one oval per row.

	None	1	2 - 5	6 - 10	11 - 20	more than 20
Short (- 200 km approx.): to another municipality/locality of S.L.P.	◯	◯	◯	◯	◯	◯
Medium (+ 200 km approx.): to another city within Mexico	◯	◯	◯	◯	◯	◯
Long: abroad	◯	◯	◯	◯	◯	◯

52. What means of transport do you mainly use to make these trips for study related to the UASLP?

Mark only one oval per row.

	None	Car/truck	Bus	Airplane
I do not need to move	◯	◯	◯	◯
Short (- 200 km approx.): to another municipality/locality of S.L.P.	◯	◯	◯	◯
Medium (+ 200 km approx.): to another city within Mexico	◯	◯	◯	◯
Long: abroad	◯	◯	◯	◯

53. Please choose an estimate of the travel hours you make per year.

Mark only one oval per row.

	0 hrs	less than 10 hrs	11 - 30 hrs	31 - 50 hrs	more than 51 hrs	more than 100 hrs
I do not need to move	◯	◯	◯	◯	◯	◯
Car/Truck	◯	◯	◯	◯	◯	◯
Bus	◯	◯	◯	◯	◯	◯
Airplane	◯	◯	◯	◯	◯	◯

54. Do you think that the current COVID-19 pandemic affected your mobility within and outside the city? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I have the same mobility as usual

55. How important do you consider it is to return to daily activities in person, within the UASLP. *

Mark only one oval.

	1	2	3	4	5	
I can do my activities at home	◯	◯	◯	◯	◯	Very important

¡Muchas gracias por su tiempo! / Thank you so much for your time!

Con esta encuesta estamos ayudando a que la UASLP se posicione como una Universidad Sustentable en el mundo. // With this survey we are helping the UASLP to position itself as a World's Sustainable University.

9.11 Annex 11: Instructive of work for Direct Purchases, A-11

UASLP Universidad Autónoma de San Luis Potosí	Instructive of work for Direct Purchases	Code: A-11
		Revision:
	Reference Norm ISO 9001:2015 6.1, 7.1.1, 7.1.5.2, 8.2 ISO 14001:2015 4.2, 6.1, 7.1, 7.3, 8.1 ISO 50001:2018 8.3	Page 1 of 2

WORK INSTRUCTIONS FOR MAKING DIRECT PURCHASES

1. The purchase of goods and services for the UASLP is carried out by the Administrative Secretariat verifying compliance with the Law of acquisitions, Leases and Services of the Public Sector art. 20, 21 and their regulations, and the ISO 14001:2015, ISO 9001:2015 and 50001:2018 Standards.

2. The Head of the Secretariat establish strategies for the responsible consumption of materials that involve: sustainable purchases, energy saving appliances and lighting, sources of renewable energy, sustainable use of materials, integral management of waste, energy performance and incentivize the student towards environmental and energy awareness.

3. The requesting areas fill out the Goods and Services Requisition Form, clearly specifying the purchase requirements, collect the corresponding signatures and deliver it to the Department's comptroller office.

4. The Internal comptroller Office requests quotes from suppliers registered in the Supplier Catalogue, previously evaluated, selected and/or reassessed by the procurement office of the Department of Material Resources and Services, through the supplier selection and supplier evaluation formats.

5. The Internal Comptroller assigns the purchase to the supplier of the good or service, based on the amount of the purchase, quality, price, compliance with environmental, energy and service regulations, and which has already obtained more than 70 points in its evaluation.

6. The Administrative Secretariat must ensure that all purchases are made in accordance with current regulations (Law on Acquisitions, Leases and Services of the Public Sector, and ISO 14001:2015, ISO 9001:2015 and 50001:2018).

7. The Procurement Office makes the purchase to the selected supplier of the Catalogue of Approved Suppliers, using the format for Purchase Order of Goods or Services.

8. In the contracting of a service, the service provider must respect the environmental and energy criteria (like Energy Efficiency Label) of the UASLP described in the established Operational Controls and in the supply of goods the supplier must provide the safety sheet of the materials or substances supplied.

9. The Internal Comptroller, Warehouse and Inventories, receives from the supplier the goods purchased and verifies compliance with the purchase requirements specified in the Requisition of Goods and Services, the Purchase Order of Goods or Services comparing it with the invoice and goods received, as well as receives the technical sheet (SDS) of the good purchased if applicable.

10. The Office of Warehouse and Inventories makes the simultaneous entry and exit of warehouse and delivers the goods to the requesting areas, who sign the document and store the goods according to security criteria if applicable.

	Instructive of work for Direct Purchases	Code: A-11
UASLP Universidad Autónoma de San Luis Potosí		Revision:
	Reference Norm ISO 9001:2015 6.1, 7.1.1, 7.1.5.2, 8.2 ISO 14001:2015 4.2, 6.1, 7.1, 7.3, 8.1 ISO 50001:2018 8.3	page 2 of 2

11. In the event that the property requires its safekeeping in the warehouse, this must be done in accordance with the security criteria that apply.

12. The Warehouse and Inventory Office integrates a file (entry and exit from warehouse, supplier's invoice as well as records) and sends it by memorandum to the Financial Resources Department to schedule or carry out the corresponding payment.

13. In the case of services, the Department of Material Resources and Services, is the one who receives from the supplier, so that with the Head of the requesting area determine if they comply with the specifications registered in the Order for the Purchase of Goods or Services. Only if it meets the specifications, the Department of Financial Resources is notified, so that it can make the payment of the invoice in accordance with current regulations.

EMISSION CONTROL		
Developed	**Revised**	**Authorized**
signature:	signature:	signature:

RECORDS	TIME OF RETENTION	RRESPONSIBLE FOR KEEPING IT	REGISTRATION CODE
Selection of Suppliers.		Procurement Office	
Supplier Evaluation.		Procurement Office	
Requisition of Goods and Services.		Procurement Office	
Catalog of Approved Suppliers.		Procurement Office	
Purchase Order of the Good or Service.		Procurement Office	

9.12 Annex 12: UASLP Stakeholders Analysis, A-12

UASLP Universidad Autónoma de San Luis Potosí	UASLP Stakeholders Analysis	Code: A-12
	Reference Norm ISO 50001:2018	Revision:

Part 1: Beneficiaries

Stakeholder	**Number** How many?	**Potential benefits** What do beneficiaries stand to benefit from the project?	**Potential to collaborate** How will the project work with beneficiaries?
• **Staff** • **Professors** • **All Students**	**3,293** **3,189** **32,775**	• Higher Ecological and Sustainable Quality of the University • Savings in terms of energy consumption and finally economic expenses • Reduce the CO_2 footprint of the UASLP. • Working under the UN SDGs scheme, as a Sustainable University • Higher sense of responsibility • Improvements in the use of available resources	• The UEP needs to interact hand by hand with the mentioned Stakeholders, as it will not work without them. —> Awareness at every level of organization is necessary
Total number of direct beneficiaries	**39,257 (UASLP, 2020)**		

	UASLP Stakeholders Analysis	Code: A-12
UASLP Universidad Autónoma de San Luis Potosí	Reference Norm ISO 50001:2018	Revision:

Part 2: Decision-makers / resource owners (ESTATUTO ORGÁNICO DE LA UNIVERSIDAD AUTÓNOMA DE SAN LUIS POTOSÍ, 2020)

Stakeholder / *Responsibility within UEP*	Person / Position	Current role in decision making	**Potential to collaborate** How will the project work with decision-makers / resource owners?
Supreme Government Board** ***To Analyze and Decide	The Supreme Board is made up of five people appointed by the Board of Directors. Members of the Supreme Governing Board: - Dr. Guadalupe Andrade Cepeda - Dr. Elisa Leyva Ramos - Dr. Juan Manuel Tejada Tayabas - Dr. Pedro Villaseñor González - Ing. José Arnoldo González Ortiz	The Supreme Board is the body of maximum authority, which is established outside the ordinary government, to dictate decisions in extraordinary cases and serious situations that arise at the University and will intervene in them only at the request of the Rectory or a qualified majority consisting of two-thirds of those who make up the Board of Directors. (ESTATUTO ORGÁNICO DE LA UNIVERSIDAD AUTÓNOMA DE SAN LUIS POTOSÍ, 2020)	The project needs to reach the ears and interests of the maximum authority within the UASLP, to have stronger support with the implementation of the UEP.
H. University Board of Directors** ***To Analyze and Decide	The Board of Directors is made up of: - The titular person of the Rectory, who is its President - The Directors of the faculties, schools, and multidisciplinary academic units - A representative of the academic staff for each Faculty, School, and Multidisciplinary Academic Unit, who will act as a teacher advisor or teacher advisor	The Board of Directors is the supreme body of autonomy and authority, which is established to exercise the ordinary government of the University. It dictates all the measures and the corresponding regulations to organize life within the University. It issues its regulations and approves those of the Faculties, Schools, Multidisciplinary Academic Units, Coordinations, Institutes, and all the rules and general provisions	The UASLP needs to have strong policies within the UASLP to support its actions and its sustainability culture.

* These Stakeholders belong to what the University Energy Program (UEP) mentions as Senior Management of the Autonomous University of San Luis Potosí.
** Stakeholders that are part of the Rector's office but are not considered Top Management because all decisions are made by Rectory, and they are only in charge of executing them.

UASLP Universidad Autónoma de San Luis Potosí	UASLP Stakeholders Analysis Reference Norm ISO 50001:2018	Code: A-12 Revision:

	- A representative of the students for each Faculty, School, and Multidisciplinary Academic Unit, who will act as student counselor or student counselor - The person holding the presidency of the University Federation - The titular person of the General Secretariat of the University, who will be the Secretary or the Secretary of the Council - The person holding the presidency of the Association of Parents, Mothers, and Guardians of the University.	aimed at the best organization and technical, academic, administrative, and extension operation of the University.	
Rectory** ***To Direct and Communicate	President: - Dr. Alejandro Javier Zermeño Guerra	The head of the Rectory is responsible for the University, and he will exercise the legal representation of the UASLP in all kinds of legal acts and before any authority, as well as in official acts; He will delegate the faculty of legal representation of the University to the General Counsel, by appointing him, if this is ratified by the Board of Directors.	The project needs to reach the ears and interests of rectory within the UASLP, to help with the regulations and the implementation of the UEP.
****General Secretariat** ***To Verify and Communicate***	- General Secretary: Marco Antonio Aranda Martínez. - Head of the Regulations Department: M.A.J. Juan Miguel Chávez Vázquez. - Head of the Projects Department: Gerardo Castañón Nieto. - Head of the Department of Security and Protection of Patrimonial Assets: Mtro. Antonio Garza Nieto. - Head of the Unit for Liaison, Transparency, and Access to	Coordinate the issuance and updating of the regulations of the University. Coordinate the issuance of the University Gazette. To keep control of the correspondence and give a daily account of all matters to the Rectory, to agree on the procedure that should be granted to them. To sign the legal acts, as well as the credit titles that are held or issued respectively by the University; what it will do jointly or indistinctly with the Rectory, who occupies	Marketing and communication of Agenda Ambiental programs to the UASLP community through articles/news in the University Gazette.

* These Stakeholders belong to what the University Energy Program (UEP) mentions as Senior Management of the Autonomous University of San Luis Potosí.
** Stakeholders that are part of the Rector's office but are not considered Top Management because all decisions are made by Rectory, and they are only in charge of executing them.

	UASLP Stakeholders Analysis	Code: A-12
	Reference Norm ISO 50001:2018	Revision:

	Information: Lic. Luis Enrique Vera Noyola.	the ownership of the Ministry of Finance, the Comptroller's Office, and the Attorney General. To Issue the circulars and communications ordered by the Rectory, which are necessary for the proper dispatch of University affairs.	
****Internal Control Body** ***To Finance and contribute***	- Comptroller General: M.A.I Anel Puente Loredo - Assistant Controller: C.P. Georgina Ojeda Perez - Sub-coordinator: M.A. Sandra Angelica del Valle Cuevas - Sub-coordinator: Lic. Yadira Flores Martínez - Administrator: C.P. Ma. Clara Jasso Aguilar	The internal control, the supervision of the budget and patrimony of the University as well as the exercise of the functions of the dependencies and support instances, will oversee the general comptroller's office.	It will oversee controlling the resources or any type of financial aid that the UEP has. Another scenario will be that the Internal Control Body will help get economic and purchases help to make possible the implementation of the program within the UASLP.
****General Lawyer** ***To Support and Suggest***	- Lic. Joel González de Anda	Legally represents the UASLP in contentious and judicial matters in which it is a party. Legally advises the university authorities when so requested, legally representing them before any administrative or judicial authority, federal, state, or municipal; Advises the representation of the University before the Mixed Commissions provided for in the Collective Work Contracts of Academic Staff and Administrative Staff, as well as participating in those in which it is given intervention; To attend to the queries and requests related to the right of petition that, in any matter, are formulated to the university authorities, whenever they request it. To dictate the corresponding	He will provide support to the program through meetings with the Energy Commission to provide legal advice on the goals set by the UEP and in perspective obtaining technological resources to achieve energy efficiency.

* These Stakeholders belong to what the University Energy Program (UEP) mentions as Senior Management of the Autonomous University of San Luis Potosí.
** Stakeholders that are part of the Rector's office but are not considered Top Management because all decisions are made by Rectory, and they are only in charge of executing them.

	UASLP Stakeholders Analysis	Code: A-12
	Reference Norm ISO 50001:2018	Revision:

		measures to unify the criteria and legal procedures of the various instances, Academic Entities and University Dependencies. Assists the regulatory bodies of the University in the performance of their functions, when so requested. To advise members of the university community, as well as managing and obtaining legal protection for all works, inventions, trademarks, patents, and the like, that the University or the members of the university community produce in terms of copyright and industrial property, defining the rights and obligations that in each case correspond to the University and the authors or inventors. Signs the contracts and agreements of a civil, commercial, and administrative nature with the agreement of the Rectory, which are necessary for the development and achievement of the purposes of the University.	
Academic Staff Counselors ***To Participate and Communicate***	A pair that is made up of a woman and a man regardless of the order, of each Faculty, School, or Multidisciplinary Academic Unit.	The counselor owner and counselor substitute representing the academic staff. The pair is elected in an assembly of teachers and professors, researchers and researchers, and academic technicians and techniques, which must be convened by the person holder of the respective address, with the agreement of the Rectory.	The UEP looks for the inclusion of energy sustainability in the academic staff councils, due to all the activities and involving work that these counselors perform within the university.
Student Counselors ***To Participate and Communicate***	A pair that is made up of a woman and a man regardless of the order, of each Faculty, School, or Multidisciplinary Academic Unit.	The counselor owner and substitute representing all the students. The pair is elected in an assembly of teachers and professors, researchers and researchers,	The UEP looks for the inclusion of energy sustainability in the student councils, due to all the activities and

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		and academic technicians and techniques, which must be convened by the person holder of the respective address, with the agreement of the Rectory.	involving work that these counselors perform within the university.
University Federation ***To Participate and Communicate***	President: Oscar Alán Patiño Sanjuanero	Work on the demands of the university students and on the activities that they have expressed for some time. One of its main objectives is the creation of agreements with the industrial private sector to achieve a job bank for students who are close to graduating and reduce the unemployment rate. Create a link between educational entities and the Office of the Ombudsman for University Rights.	The project needs a representation of the students' voice within the UASLP and shares with other partner universities.
University Directors** ***To Participate and Implement	The directors are the representatives of the Rectory and have the administrative and academic authority in the faculties, schools, and Multidisciplinary Academic Units of the University to which they belong. For the full list of Directors' names visit: http://www.uaslp.mx/Paginas/Universidad/Directorio.aspx	Be responsible for the fulfillment of the university regulations, the resolutions of the Board of Directors, and the agreements issued by the Rectory. To execute and evaluate the study, research, and work plans and programs corresponding to their Academic Entity. To order, monitor, and supervise the procedures, procedures, and, in general, the measures concerning the organization and administration of its academic entity. To submit an annual report of work to the Rectory.	The UEP needs a representation in each faculty/academic unit within the UASLP and to share ideas and information with other academic entities.
Technical Advisory Councils ***To Participate and Communicate***	The Faculties, Schools, Multidisciplinary Academic Units, and Research Institutes not attached to an Academic Entity, have a Technical Council. The Technical Councils are made up of the person holding the management, who occupies the general secretariat, and the representatives before the Board of	Study and rule on the initiatives, projects, or matters that are submitted for its consideration, having to pronounce its resolution in writing. Prepare and submit to the approval of the Board of Directors the draft of Internal Regulations, as well as the amendments or additions to it. Monitor academic coordination and the promotion	Work hand in hand with Agenda Ambiental and the Energy Commission to find new energy improvements and reach better results when the UEP has been implemented.

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	Directors. There is in its integration a maximum of four professors and professors, re-eligible. Whoever represents the student society or the organization that takes their place and each advisor will have a substitute.	of scientific research. In general, provide technical and scientific advice under its Internal Regulations.	
Academic Staff ***To implement and verify***	All academic staff in general, are hired by the University.	Within the functions corresponding to the category or level of academic staff, under the institutional plans and programs without prejudice to their employment status and considering the needs to develop university work within interdisciplinary plans. They carry out the tasks assigned to them corresponding to their category, level, assignment, and working day, under the activities, programs, and institutional plans. They carry out the school and support tasks entrusted to them according to the needs of the institution. Occur regularly and on time to professorships, laboratories, seminars or workshops of their assignment and other university activities(REGLAMENTO DEL PERSONAL ACADÉMICO DE LA UNIVERSIDAD AUTÓNOMA DE SAN LUIS POTOSÍ., 1984).	The Academics should add to their agenda and teach sustainability topics (especially energy) to make UASLP a pioneer in sustainability and environmental practices.
Students ***To implement and verify***	All students in general who are enrolled at the University.	Students are one of the most important actors for the University Energy Program since they are the largest community within the UASLP. Only in conjunction with them and their actions will it be possible to have sustainable management of energy within the university. The duties of the university students are only: Respect and honor the institution, comply with the study plans and	Due to the number of student communities that the UASLP has, students are one of the pillars to enforce the UEP. Because by raising the awareness of the students, they will be the first to collaborate with lower energy consumption and better practices related to the use of energy (both electricity and transportation).

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		programs and carry out the positions of representation for which they have been elected.	
Administrative Staff ***To implement and verify***	All administrative staff in general, who are hired by the University.	Being a great number of personnel within the UASLP, the administrative personnel play an important role in the implementation of the UEP for the following reasons: They observe good manners during service. They provide data and documents related to the employment relationship that is necessary for the integration of the respective files. They Participate in the training courses given by the University to improve their preparation and efficiency (in this case collaborate with the UEP from their workstations and throughout the University), this being mandatory according to the detection of needs and the training program of the Human Development Division	Concerning the student community, raising the awareness of the administrative staff will help to collaborate with lower energy consumption and better practices related to the use of energy (both electricity and transportation).
Agenda Ambiental ***To Supervise and Participate***	The instance of transversal coordination between academic and administrative entities. - Dr. Marcos Algara Siller, Director - LAE Zoraida Aguilar Pérez, Director's Assistant - LAE Araceli Carvajal Mendoza, Administration - BP Laura Daniela Hernández Rodríguez, Institutional Management - MCA Diana Elizabeth Navarro Flores Social, Communication	Agenda Ambiental promotes and supports the incorporation of the environmental and sustainability perspective in all the activities of the University so that it has a profound impact both inside and outside the institution. Incorporates the environmental perspective into undergraduate and graduate curricula; train and update teachers and researchers on environmental topics; strengthens research; diversifies laboratory and consulting services on environmental issues; improves the environmental performance of the university and develops communication	The Agenda Ambiental will articulate strategies to achieve energy sustainability for the university community and society, through the UEP and the multidisciplinary integration of education and research, institutional management, linkage, and communication.

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		strategies. It promotes the culture of sustainability, contributes to the generation of environmental knowledge, and helps to link the interior and exterior of the university. To achieve effective communication, the communication area is created, which seeks strategies both within the university and towards the rest of society. https://ambiental.uaslp.mx/	
Energy Commission ***To Analyze, Communicate, Audit Supervise and Lead***	The Energy Commission will be built with 3 representatives of the Union and 3 representatives of the UASLP unless the corresponding regulation indicates a specific form of integration; with their respective alternates, who may interchangeably replace any of the owners.	Diagnosis, creation of knowledge, and current sustainable energy applications by our university community through the Energy Commission. The energy commission will subject its operation to the provisions of its Contract and its respective regulations. Its agreements will be binding on the parties, who will comply with it within the terms stipulated in the regulations themselves. The secretary of the energy commission must present a semi-annual report of activities, in addition to making a delivery reception at the end of his position to the General Secretariat of the UAPA and the General Counsel of the UASLP,. (UAPA-UASLP, 2020). To Participate in the preparation, review, and authorization of the UEP operating procedures and documents. • Ensure that UEP processes are established, implemented, and maintained. • Coordinate Internal Audit. • Management review	The Energy commission within the UASLP is the entity responsible to measure, monitoring, enforce and empower energy efficiency in and out of the university.

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		• Certification, surveillance, and recertification audit process	
Technical Team ***To Participate, Support, and Review***	The technical team should be made up of experts in energy issues, as well as in the following disciplines: project management, procurement, production/provision of services, research and development, maintenance, facilities, training, communication, and marketing. The technical team will always work under the direction of the Energy Commission.	Effectively implement UEP activities. • Participate in the identification of energy performance indicators. • Design and propose strategies to optimize energy use. • Carry out energy review.	The Technical Team, hand by hand with the Energy Commission of the UASLP is in charge of review the procedures and operating documents of the UEP, when appropriate.
Communication and Image Management ***To Communicate and Support***	PRESS AND DISSEMINATION Responsible: LCC María Guadalupe Guevara Díaz UNIVERSITY DISCLOSURE Responsible: LC Patricia Briones Zermeño WEB COMMUNICATION Responsible: LCC José Manuel Juárez Ramírez AUDIOVISUAL PRODUCTION Responsible: Guillermo Flores Cruz	This Management is primarily divided into different sections. *Press and Diffusion*: Its function is to publish information in the local printed and electronic media, and to undertake actions that benefit the institution's policies and improve the image of its members. Likewise, it helps to maintain a cordial and respectful relationship with the representatives of the local and national press. *University Disclosure*: Promotes and projects the daily university work and the dissemination of science, through the means that the UASLP has created for this purpose. This office is in charge of the magazine Universitarios Potosinos, the Gaceta Sinergia, and the correction of texts generated by the university. *Web communication*: Designs and distributes content on the platforms of digital and interactive spaces, through images, videos,	To Communicate and disseminate internally and externally the UEP as well as energy performance. To Communicate and disseminate internally and externally energy policy, significant uses, energy objectives and goals.

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	animations, hyperlinks and emails in order to generate internal and external communication strategies that meet the needs of the UASLP and also respond to those of the information and knowledge society. In addition, it encourages interaction and collaboration between all those who make use of them and who are interconnected in the network. *Audiovisual Production*: Registers and promotes institutional, academic, and sporting events. It is a dynamic instrument that allows teachers, researchers, officials, and students to communicate the results obtained from their research, courses, workshops, activities, summaries and information synthesis. It produces the weekly newscast University Conscience and science and technology capsules that are broadcast on local channel 9 and in nine municipalities of the state.	

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Part 3: Potential collaborators / "competitors"

Stakeholder	Information	Current role What role does the actor play in the project area?	Potential to collaborate How will the project work with collaborators/competitors?
Federal Electricity Commission (CFE)	CFE San Luis Potosi: Entity in charge of supplying, distributing, regulating, and charging all entities of the UASLP for electricity.	The Federal Electricity Commission (CFE) has the mission of providing the public electricity service with criteria of sufficiency, competitiveness, and sustainability committed to customer satisfaction, the development of the country, and the preservation of the environment. The Federal Electricity Commission (CFE) offers various products for users who contract the electric power service in the national territory. CFE Products and Services: - Evaluation of Saving Technologies. - Energy Saving Program for the Electricity Sector. - Energy Saving Certificates.	Work hand in hand with the CFE to share ideas, technological improvements, and awareness campaigns in terms of energy, both inside and outside the university.
National Commission for the Efficient Use of Energy (CONUEE)	The National Commission for the Efficient Use of Energy (CONUEE) is a decentralized administrative body of the Ministry of Energy, which was created through the Law for the Sustainable Use of Energy published in the Official Gazette of the Federation on 28 November 2008, and its main objective is to promote energy efficiency and act as a technical body for the sustainable use of energy.	To promote the optimal use of energy, from its exploitation to its consumption, and propose to the Secretariat the Energy Efficiency Goals and the mechanisms for their fulfillment. To formulate and issue the methodologies and procedures to quantify energy by type and end-use and determine the dimensions and economic value of consumption and that of the exploitation, production, transformation, and distribution	With the help and guidance of CONUEE, the UASLP can include theoretical and practical training in different areas such as energy efficiency. These can be offered frequently in the facilities and led by a technical expert and a facilitator-motivator, as well as the live broadcast of several webinars by specialists.

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		infrastructure avoided arising from sustainable use actions of energy. To Issue and verify general administrative provisions regarding Energy Efficiency and activities that include the sustainable use of energy, by the applicable provisions.	
Escrow for the Saving of Electrical Energy (FIDE)	Private, non-profit trust, constituted at the initiative of the Federal Electricity Commission (CFE), in support of the Electricity Savings Program; to assist in saving actions and efficient use of electrical energy. Clients: CONCAMIN, CANACINTRA, CANAME, CMIC, CNEC and SUTERM Trustee: Nacional Financiera, S.N.C., who grants powers to a fiduciary delegate who acts as attorney-in-fact for the Trustee, who in turn delegates powers to the General Director of FIDE and the latter in turn to the Deputy Directors in their area of competence. Commissioners: CFE and electricity consumers who are beneficiaries of the services provided by the Trust.	Carry out actions that allow inducing and promoting the saving and efficient use of electrical energy in industries, businesses, and services, small and medium businesses, municipalities, the residential and agricultural sectors. FIDE provides technical assistance services to consumers, to improve productivity, contribute to economic and social development, and preserve the environment. It offers Technical and financial support through programs, savings, efficiency improvement, and support.	FIDE has financing, actions, dissemination programs, staff awareness workshops, training of promoters, and support for technical execution (elements for the development of an energy diagnosis), to promote among the population the culture of sustainable use of electricity.
The Institute for Transportation and Development Policy (ITDP)	Currently, they are not working in the city of San Luis Potosi.	The organization works with local and national authorities, the academic sector, and partner organizations to promote transport solutions that reduce greenhouse gas emissions, environmental pollution, poverty, travel times, serious injuries, and deaths from traffic events and thereby	ITDP has eight offices on five continents and has worked in more than 100 cities in 30 countries. They have expertise on several key issues in transport and urban development. ITDP has been working to promote environmentally sustainable and equitable transportation in cities

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		improve economic development and quality of life in cities.	worldwide, guided by Eight Principles for Better Streets and Better Cities.
Greenpeace Mexico	Greenpeace is an international non-profit organization and fully funded by its partners. They do not accept money from companies or governments to maintain the independence of their actions.	Greenpeace takes creative non-violent actions to denounce threats to the environment and pressure companies and governments to adopt solutions that are essential for a greener and more peaceful future.	The UASLP through the UEP could collaborate with Greenpeace doing together seminars, webinars, and awareness campaigns on the correct uses of energy and as an aid in mitigating climate change.
National Council of Science and Technology (CONACYT)	The budgetary programs of the CONACYT destined to the granting of support for the growth, strengthening, and linking of the science, technology, and innovation sector are classified as: - Sector Funds - Mixed Funds - Institutional Funds - Institutional Supports - Financial information - Funds - Innovation Stimulus Program - Fiscal Incentive for Research and Technology Development The establishment of these funds allows the Council to interact both with the State Secretariats, the State Governments, and the Federative Entities, as well as with the institutions of the academic and scientific field, the civil society organizations, and the private companies that make up the scientific system. the technology of Mexico.	The National Council of Science and Technology (CONACYT) is a decentralized public body of the State, not sectorized, with legal personality and its assets, which enjoys technical, operational, and administrative autonomy; Its purpose is to be the advisory entity of the Federal Executive and specialized to articulate the public policies of the federal government and promote the development of scientific research, technological development and innovation to promote the technological modernization of the country.	CONACYT is the largest entity from which the UASLP receives resources and financial support. The UASLP must continue to be at the forefront of science and technology hand in hand with CONACYT and thus continue to have resources to implement the UEP.
Partner Institutions	According to the institutional development program and the action plan of the Liaison Division, a strategy is established to sign agreements with the various sectors of society.	Local, regional, and all over the world: UASLP maintains contacts with numerous universities and other scientific institutions. The UASLP also offers various cooperation options for	Share knowledge, technology, and science with other universities around the world.

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	Below is a list of the agreements made by the UASLP: Internationalization Directorate Catalog http://www.uaslp.mx/Vinculacion/convenios	entrepreneurs: from arranging an intern to promoting talented students.	
Partner Companies	Expanding cooperation with companies and institutions is an important goal of UASLP. As the access to science, the university supports companies and institutions competently and reliably to find suitable scientists for research and development, advisory and service tasks, and to carry out innovative projects. UASLP is also a good address in the field of continuous training and the recruitment of qualified workers. Below is a list of the agreements made by the UASLP: Catalog of Agreements with the Productive, Social and Government sectors http://www.uaslp.mx/Vinculacion/convenios	UASLP offers companies and institutions a wide range of cooperation possibilities: research and development projects, conferences, internal workshops, scientific training, promotion of young academics.	Get in contact with other companies interested in working with the UASLP on energy efficiency and sustainability topics all around the world.
Environmental Accrediting Companies	Certifier Entities of ISOs	Currently, the UASLP has the Institutional Quality Management Directorate, in charge of managing the Comprehensive Quality System (Sical), which arose in 2002 as part of the Human Development Division with the aim of maintaining strategic processes of management, certified under international quality standards, and to contribute to the organization of the institution by promoting the updating of organization manuals and administrative procedures. The UASLP has maintained the ISO-9001 standard certification	Regulates and issues the certificates that will present the UASLP as an environmentally responsible and sustainable university.

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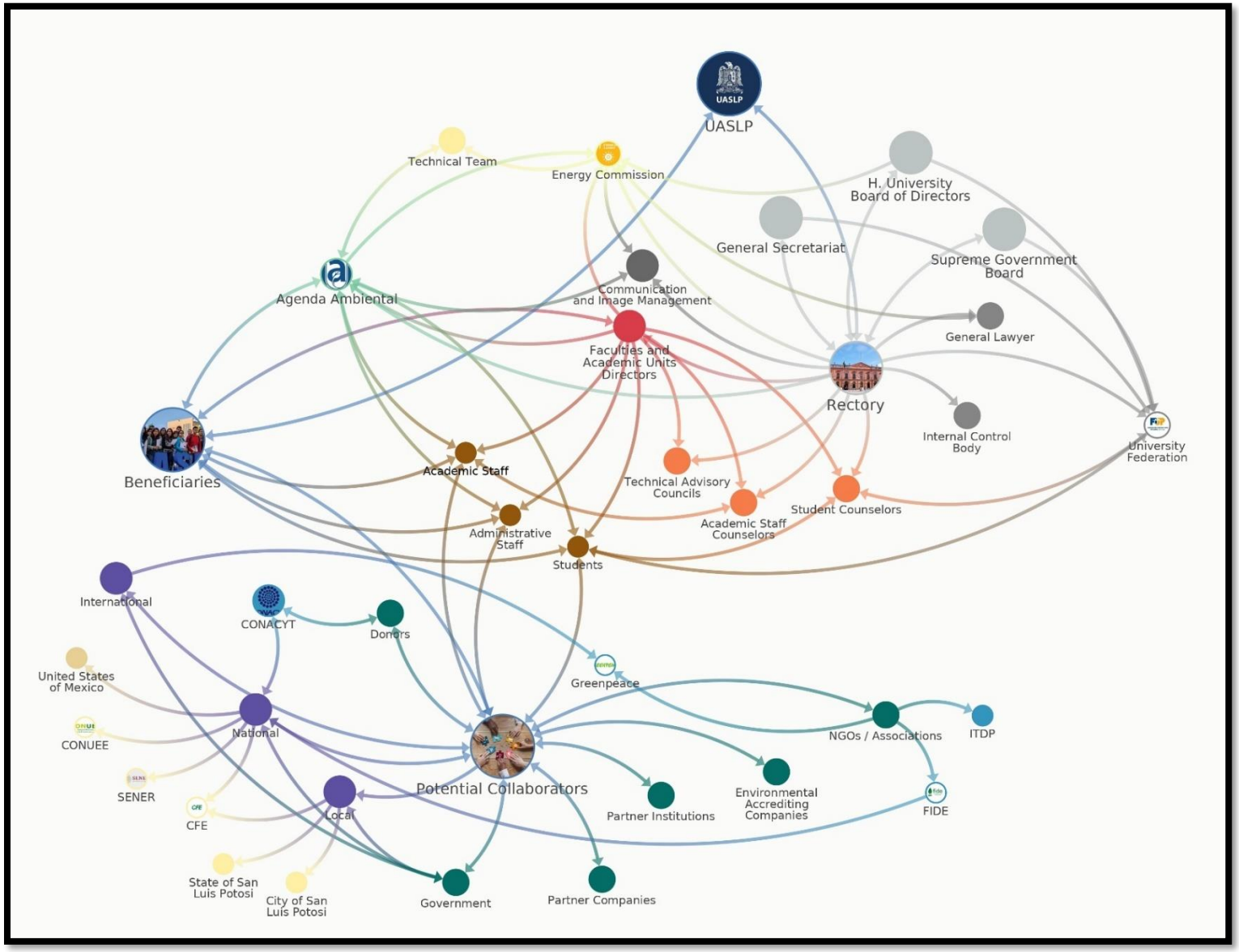
		uninterruptedly since 2003, which has contributed to its consolidation as a top-level institution.	
Government (Regional, Countrywide)	Knowledge Transfer. Concrete forms of transfer include cooperation with companies and other institutions, the exploitation of intellectual property rights, and the realization of start-ups.	To facilitate the step towards the foundation, some publicly funded pots are intended to allow those who wish to start a company to obtain their scientific knowledge from the university in the private sector. Many of these projects are carried out as research projects at the university. UASLP's commissioning service offers advice and assistance.	It is important to work with government entities to obtain financial support, as well as in the dissemination to the community of the work carried out by the UEP and the benefits that it will bring to the environment.

9.12.1 Annex 12b: UASLP Stakeholders Mapping, A-12b



9.13 Annex 13: Organizational chart for the Energy Commission, A-13

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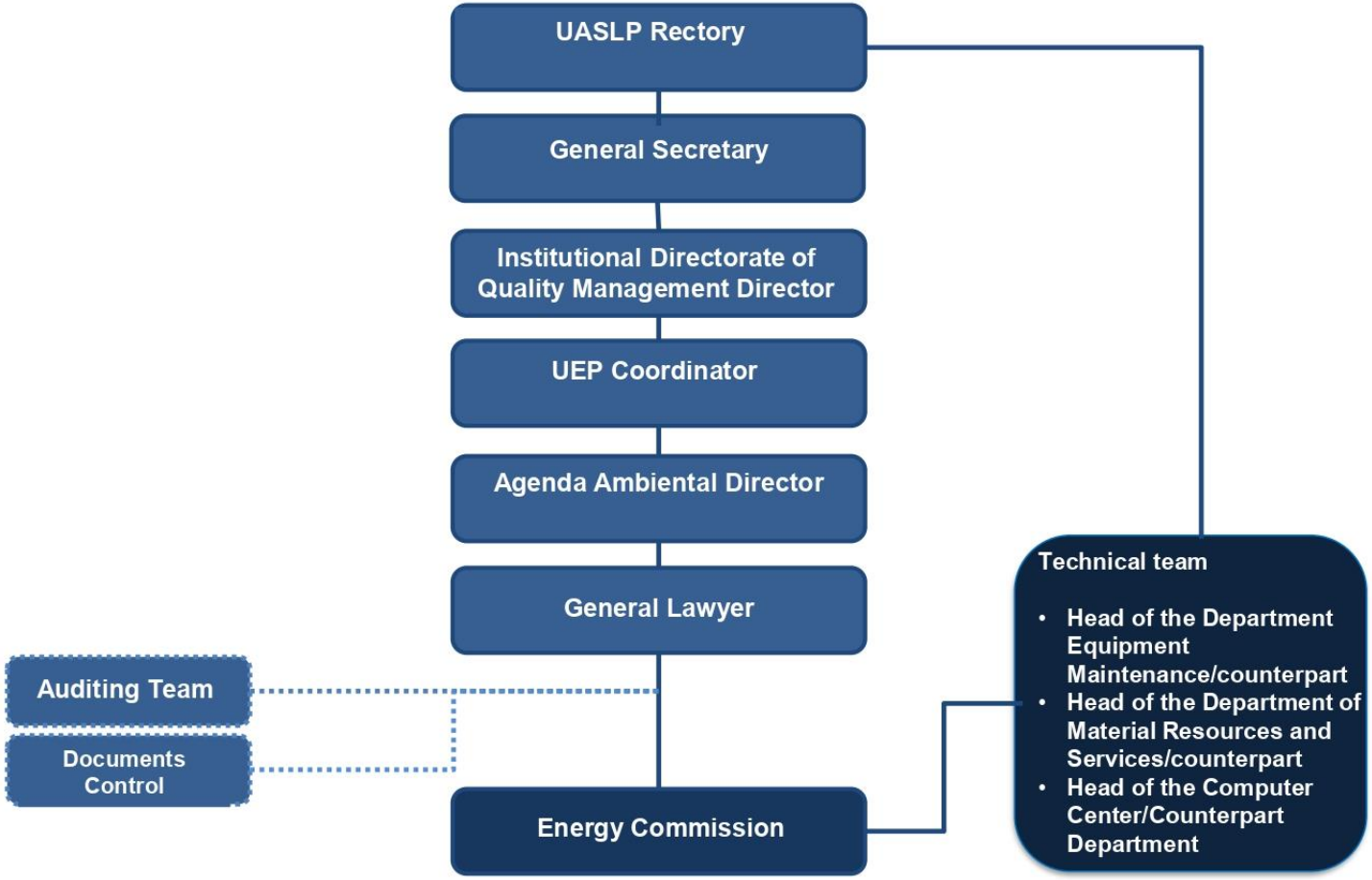

9.14 Annex 14: UASLP Energy Policy, A-14

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	Reference Norm ISO 50001:2018 5.2	Page 1 of 1

Energy Policy

"The Autonomous University of San Luis Potosí establishes the commitment to guide all the activities of the Educational Process, towards respect for the environment, through the implementation of its University Energy Program (UEP) based on the ISO 50001: 2018 standard, achieving the continuous improvement of its energy performance, using the efficient use of energy as a basis, ensuring the availability of information and resources to achieve the established objectives and goals, as well as complying with applicable energy legislation, helping to be one of the fundamental pillars of the sustained, sustainable and equitable development of the nation ".

9.15 Annex 15: Master list of controlled documents of the UEP, A-15

	Master list of controlled Documents of the UEP	Code: A-15
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	Reference Norm ISO Standard 50001:2018 7.5.3	page 1 of 1

No.	Controlled document name	Code	No. review	Date of authorization
1	Risk Management Procedure	A-01	1	23.08.2021
2	Analysis of the context of the Organization "PESTEL"	A-01b	1	23.08.2021
3	Procedure for the Control of Records	A-02	1	23.08.2021
4	Procedure for the realization of Internal Audits	A-03	1	23.08.2021
5	Format to determine the Scope and Limits of the UEP	A-04	1	23.08.2021
6	Operational Controls Matrix	A-05	1	23.08.2021
6	Format for design, modification and renovation	A-06	1	23.08.2021
7	Format to Identify Legal and other Requirements	A-07	1	23.08.2021
8	Format for the Results of the Top Management Review	A-08	1	23.08.2021
10	Master list of Equipment and Lighting Inventory of the UEP	A-09	1	23.08.2021
11	Questionnaire of the Survey "Energy Habits UASLP"	A-10	1	23.08.2021
12	Instructive of work for Direct Purchases	A-11	1	23.08.2021
13	UASLP Stakeholders Analysis and Mapping	A-12; 12b	1	23.08.2021
14	Organizational chart for the Energy Commission	A-13	1	23.08.2021
15	UASLP Energy Policy	A-14	1	23.08.2021
16	Master list of controlled documents of the UEP	A-15	1	23.08.2021
17	Master list of controlled records of the UEP	A-16	1	23.08.2021
18	Procedure for Corrective Actions	A-17	1	23.08.2021
19	Procedure for the Energy Planning	A-18	1	23.08.2021
20	Communication Procedure of the UEP	A-19	1	23.08.2021
21	Communication Binnacle of the UEP	A-19b	1	23.08.2021
22	Competence and Awareness Procedure	A-20	1	23.08.2021

Head of the UEP: Dr. Marcos Algara Siller DOCUMENT CONTROLLER OF THE UEP	23.08.2021 DOCUMENT ISSUE DATE

***The documents identified and previously declared must be kept on this list, likewise and requires adding the documents that apply for each of the sites belonging to the University Energy Program according to your particular needs for control.**

9.16 Annex 16: Master list of controlled records of the UEP, A-16

	Master list of controlled Records of the UEP	Code: A-16
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	Reference Norm ISO Standard 50001:2018 7.5.3	Page 1 of 1

No.	Controlled Record name	Code	No. review	Date of authorization
1	Assistance lists of energy training	AL-01	1	23.08.2021
2	Energy awareness campaign training	AC-01	1	23.08.2021
3	Minute Meeting of Energy Commission conformation	MM-01	1	23.08.2021
4	Minute meeting of Energy Technical team conformation	MM-02	1	23.08.2021
5	Top management instruments for UASLP energy policy	TM-01	1	23.08.2021
6	Agreements with CFE and awareness campaigns	AC-02	1	23.08.2021
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Head of the UEP: Dr. Marcos Algara Siller DOCUMENT CONTROLLER OF THE UEP	23.08.2021 DOCUMENT ISSUE DATE

***The documents identified and previously declared must be kept on this list, likewise and requires adding the documents that apply for each of the sites belonging to the University Energy Program according to your particular needs for control.**

9.17 Annex 17: Procedure for Corrective Actions, A-17

	Procedure for Corrective Actions	Code: A-17
UASLP		Revision:
	Reference Norm ISO 9001:2015 10.2.1 ISO 14001:2015 10.2 ISO 50001:2018 10.1	Page 1 of 6

1. Purpose

Establishing guidelines for taking actions that eliminate the causes of Non-Compliance from Management Systems to prevent recurrence.

2. Scope

It applies to all institutes, faculties, campuses, or academic entities of the UASLP.

3. Operating policies.

3.1 Corrective Actions can arise from the analysis of the causes that originate the non-conformities found that come from:

3.1.1 Internal Audits.
3.1.2 External Audits.
3.1.3 Data Analysis.
3.1.4 Analysis of the Effectiveness of the Processes.
3.1.5 Follow-up to the Review of the UEP by Top Management.
3.1.6 Analysis of Complaints and/or Suggestions of the UASLP Community.
3.1.7 Non-Compliant Identification.
3.1.8 Service Audits.
3.1.9 Work Environment Analysis.
3.1.10 Non-compliance with the declarations of the UEP.
3.1.11 Non-compliance with the requirements of the applicable standard.

3.2. The SR must be always informed about the Non-conformities detected and the Corrective Actions implemented in the organization to eliminate the Non-Conformity.

3.3 The analysis of the Root Cause of Non-conformities must be carried out by those responsible for the process to which it belongs, within the Quality Committee and/or Energy Commission as necessary and determine the corrective action or correction of the same.

3.4 It is the responsibility of the Rectory and Directors, owners of the process impacted by non-conformity, to verify the effectiveness of the Corrective Actions or corrections implemented.

3.5 Corrective actions are considered as concluded once they have been verified and evaluated by the responsible committees, as well as by eliminating the causes that gave rise to non-conformities.

3.6 The RS is responsible for informing to the Rectory and the Coordinator of the UEP, about the status of the Corrective Actions implemented in the UASLP.

EMISSION CONTROL		
Developed	**Revised**	**Authorized**

	Procedure for Corrective Actions	Code: A-17
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	Reference Norm ISO 9001:2015 10.2.1 ISO 14001:2015 10.2 ISO 50001:2018 10.1	Page 2 of 6

4. Description of the procedure

Sequence of stages	activity	responsible
1. Review Non-conformities.	1.1 Review nonconformities detected derived from the sources declared in operation policy 3.1 and informs the Energy Commission 1.2 Request the System Manager root cause analysis to identify the cause of the NC and schedule Energy Commission Meeting to conduct root cause analysis.	Responsible Area.
2. Evaluates the need to implement actions.	2.1 Analyze the non-compliance detected and determines the need to carry out a correction or corrective action. 2.2 If a correction is carried out, the person in charge of the system will be informed for control and release. 2.3 In case of carrying out a corrective action, the statistical technique (brainstorming or Ishikawa) will be selected to perform the analysis of the root cause.	Responsible area.
3. Perform cause analysis.	3.1 Identify the root cause that gave rise to the non-Conformity and asks the responsible area to evaluate the need to open a review of corrective actions, if necessary. 3.2 Prepare Corrective Action Requisition and defines the corrective actions to be implemented.	Energy Committee Responsible area

UASLP	Procedure for Corrective Actions	Code: A-17 Revision:
	Reference Norm ISO 9001:2015 10.2.1 ISO 14001:2015 10.2 ISO 50001:2018 10.1	Page 3 of 6

4. Implement corrective actions.	4.1 Implement actions in order to prevent Non-conformities from happening again. 4.2 Follow-up on the Actions implemented and monitor that the specific actions have been implemented. 4.3 It record the results of the actions taken in it, periodically informs the System Manager about the results of the actions taken to eliminate Non-Conformity or prevent its recurrence.	Responsible Area.

5. Evaluates the effectiveness of corrective actions.	5.1 Receive the report of results of the actions and requisition Electronic Format for the Status of Corrective Actions (screenshot) in order to keep track of the status of the implemented actions. 5.2 Calls on the members of the energy commission to review this effectiveness	Energy Committee
6. Review effectiveness of actions taken.	6.1 Review the effectiveness of the Corrective Actions implemented and informs the System Manager. If they are effective, inform the System Manager to record the progress and/or closure of the review of corrective actions. They are NOT effective back to stage 2.	Energy Committee
7. Register, close RAC and prepare a report.	**7.1** Record the progress of the actions implemented and when they have reached 100%, close review of corrective actions and note the closing date in format and Electronic Format for Corrective Actions Status (screenshot). **7.2** Informs the Rectory of the UASLP in the Review by the Direction, about the status of the Corrective Actions. NOTE: This information serves as input for the Management Review.	Head of UEP

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UASLP	Reference Norm ISO 9001:2015 10.2.1 ISO 14001:2015 10.2 ISO 50001:2018 10.1	Page 4 of 6

8. Receive information.	8.1 Receive the report on the status of corrective actions to propose and establish improvement actions to the system. 8.2 term.	Rectory

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	Reference Norm ISO 9001:2015 10.2.1 ISO 14001:2015 10.2 ISO 50001:2018 10.1	Page 5 of 6

5. Reference documents

Documents
Quality Manual.
Quality Plans.
Audit Reports.
Identification, Registration and Control of the Non-Conforming Product.
Report of Results of the Service Audits.
Results of the survey for the determination and management of the work environment.
UEP procedure for dealing with complaints and/or suggestions.

6. Records

Records	Time Retention	Responsible for preserving it	Registration code
Requisition of Corrective Actions and/or Corrections.		Responsible for the Area	
Electronic Format for Corrective Action Status.		System Manager	

7. Glossary

Corrective Action: Action taken to eliminate the cause of a **non-compliance** detected or other undesirable situation in the operation of the Management Systems.
Fix: Action taken to delete a Detected Non-conformities.

8. Changes in this release

Revision Number	Update date	Description of the change

9.18 Annex 18: Procedure for the Energy Planning, A-18

UASLP Universidad Autónoma de San Luis Potosí	Procedure for the Energy Planning	Code: A-18
		Revision:
	Reference Norm ISO 50001: 2018 6, 6.2, 6.3, 6.4, 6.5 y 6.6	page 1 of 6

1. Purpose

Establishing the guidelines and activities to carry out an adequate energy planning and improve the energy performance of the Faculties, academic entities and dependencies of the whole UASLP.

2. Scope

This procedure applies to all faculties, academic entities and dependencies of the UASLP that will implement the University Energy Program (UEP), working under the ISO 50001:2018 standard.

3. Operating Policies

31. . - The head of the UEP must disseminate activities related to energy planning.

32. . - The technical team and the Energy Commission shall establish the Energy Baseline (EnBL) that should match with the one proposed in this work.

33. . - The Energy Commission must identify new EnPIs that complement the ones proposed in this document for monitoring and measurement, as well as establish and implement action plans for the improvement of their energy performance.

34. . - The technical team and the Energy Commission will carry out the energy review which was started in this work and it should be updated on an annual basis.

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UASLP Universidad Autónoma de San Luis Potosí	Procedure for the Energy Planning	Code: A-18
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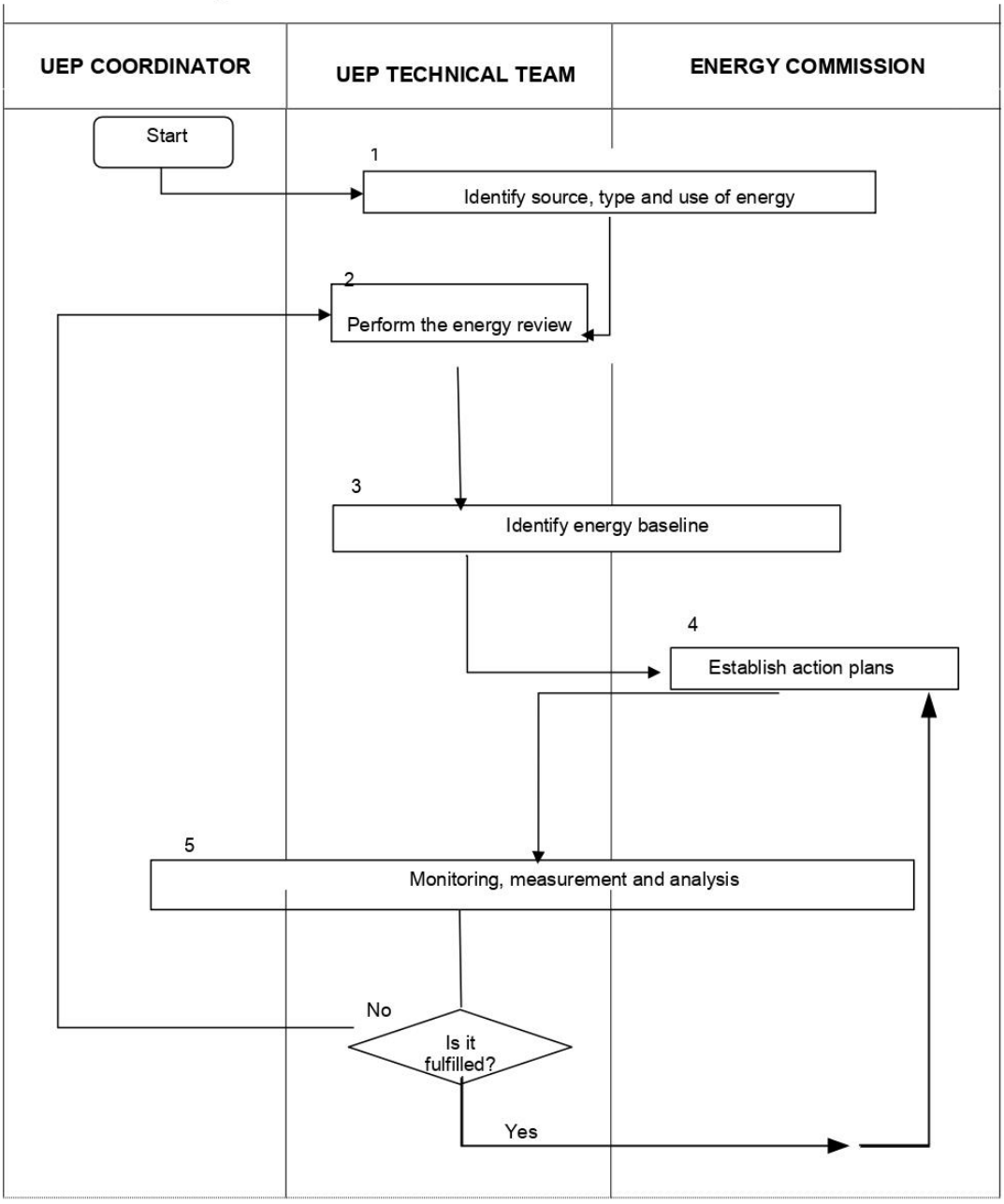
	Reference Norm ISO 50001: 2018 6, 6.2, 6.3, 6.4, 6.5 y 6.6	page 2 of 6

4. Procedure Diagram



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5. Description of the procedure

Stages	Activity	Responsible
1.- Identify source, type and use of energy	1.1. Collect energy information (sources, types and uses of UEP energy).	Energy Commission / Technical team
2.- Perform the energy review	2.1 Carry out a quantitative analysis of past and present energy consumption, based on what was collected in stage 1. 2.2 Identify significant energy uses (SEnUs) affecting the UASLP, as well as Identify opportunities for improvement of UEP. 2.3 Determine objective, goal and indicator of SEnUs identified. 2.4 Estimate future use and consumption of energy. *Note: At this point it is important to know and determine that not all campuses are in the same climatic conditions, which will directly affect energy performance and consumption. For this reason, the climatic factors in each area where a UASLP facility is located should be considered as EnPIs.*	Technical team
3.- Identify Baseline	3.1 Perform the analysis of the energy consumption of a previous year. 3.2 Establish the Energy baseline(s) -EnBLs-	Energy Commission and Technical team.

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4.- Establish action plans	4.1 Establish action plans to improve energy performance in the UASLP.	Energy Commission
5.- Monitoring, measurement and analysis	5.1 Verify compliance with stablished objectives, goals and action plans. 5.2 Identify the key features of the UEP by request them in the corresponding format. **5.3** Establish the monitoring and measurement of SEnUs. **5.4** Establish the monitoring and measurement of EnPIs. **5.5** Establish the monitoring and measurement compliance with the action plans and their effectiveness in achieving energy objectives and goals. **5.6** Establish the follow-ups of relevant variables that directly affect SEnUs. **5.7** Establish the monitoring and measurement of real, versus expected energy consumption. It does not comply, perform an analysis of the Energy review. If it complies, establish new action plans for the future.	UEP Coordination / Technical Team / Energy Commission

6. Reference document

Document
ISO 50001:2018

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		Revision:
	Reference Norm ISO 50001: 2018 6, 6.2, 6.3, 6.4, 6.5 y 6.6	page 5 of 6

7. Records

Records	Retention time	Responsible for preserving it	Code registration
Format for identifying energy sources, types and uses		System Manager	
Format to identify Energy Consumption		System Manager	
Format for identifying EnBL		System Manager	
Format to identify EnPIs and energy performance		System Manager	
Format for action plans		System Manager	
Key feature measurement and tracking plan format		Representative of the rectory	

8. Changes in this release

Revision number	Update date	Description of the change

9.19 Annex 19: Communication Procedure of the UEP, A-19

	Communication Procedure of the UEP	Code: A-19
UASLP Universidad Autónoma de San Luis Potosí		Revision:
	Reference Norm ISO 14001:2015 7.4 ISO 50001:2018 7.4	Page 1 of 5

1. Purpose.

To establish the guidelines and activities that allow an internal and external communication between the different levels and functions of the UASLP, as well as with the interested stakeholders in relation to the environmental aspects and/or significant uses of the energy of the UASLP.

2. Scope

This procedure applies to the dissemination of any internal and/or external communication that is related to the environmental aspects and/or significant uses of the UASLP's energy.

3. Operating policies

3.1 The Communication and Image Management is responsible for carrying out the internal and external dissemination of the UEP and the design of the presentation of the information considering the current graphic identity.

3.2 The main internal communication topics of the UEP will be based mainly on the Environmental and/or Energy Policy, environmental aspects and/or significant uses of energy, applicable legal requirements, objectives, and goals set.

3.3 The main external communication topics of the UEP will be based mainly on the Environmental and/or Energy Policy, environmental aspects and/or significant uses of energy, applicable legal requirements, objectives and established environmental goals.

3.4 Those responsible for the processes and/or procedures identify the needs of internal and/or external communication of the UEP and send it to the Responsible and/or Coordinator of the UEP, who validates the information and requests by document to the Communication and Image Management such needs, the information must include: validity, responsible for the issuance and responsible for the withdrawal of the same.

3.5 The media can be through the Website, social networks, emails, press, radio and/or TV, university magazine, triptychs, brochures, posters, printed tarpaulins, and those mentioned in the Communication Policy, your choice will depend on the material to be disseminated.

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	Communication Procedure of the UEP	Code: A-19
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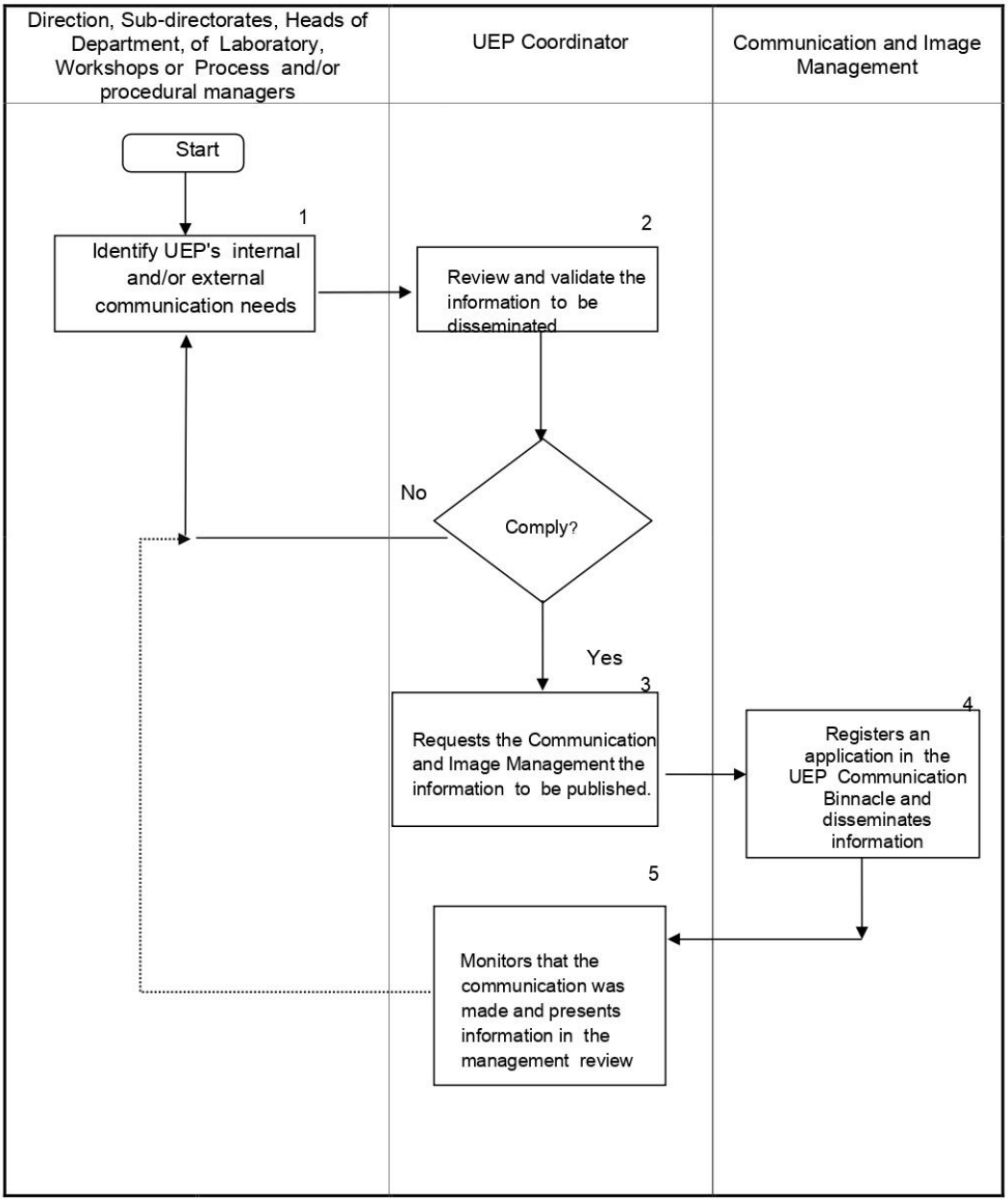
	Reference Norm ISO 14001:2015 7.4 ISO 50001:2018 7.4	Page 2 of 5

4. Procedure diagram



UASLP	Communication Procedure of the UEP	Code: A-19
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	Reference Norm ISO 14001:2015 7.4 ISO 50001:2018 7.4	Page 3 of 5

5. Description of the procedure

sequence	activity	responsible
1. Identify communication needs and/or internal and/or external information of the UEP.	1.1 The personnel who carry out activities related to significant environmental aspects, owners of processes and/or procedures determine the information that must be disclosed internally or externally and recommends the media to be used. 1.2 Delivers the Information to the UEP Coordination.	Management, Sub-Directorates, Heads of Department, laboratories, Workshops or Responsible for processes and / or procedures.
2. Review and validate the information to be disseminated.	2.1 Receives the dissemination needs of the different areas. 2.2 The UEP Coordinator reviews and validates that the information to be published is in accordance with the Environmental/Energy Policy of the UASLP, for inclusion in the communication program or its immediate publication. **If it does not** comply, inform the requesting area and return to point 1. **If it Comply**, it informs the requesting area and sends to Communication and Image Management for dissemination.	UEP coordination.
3. Request the information to be disseminated	3.1 The information is sent to the Communication and Image Management through a document (physical and/or electronic) indicating whether the communication is internal or external and the proposal of the communication method.	UEP coordination.
4. Register application in UEP Communication Blog	4.1 Receives from the UEP Coordinator by letter the information validated for dissemination and Communication and Image Management. 4.2 Register the communication request in the UEP Communication Binnacle (A-19b) 4.3 Disseminates and communicates information.	Department of Communication and Dissemination
5. Verifies that the requested communication was responded to.	5.1 It is registered in the Communication Binnacle (A-19b) of the UEP if the communication was carried out, for the taking of corresponding actions. This verification will be carried out 10 days after the dissemination has been made. 5.2 According to the information received, it analyzes it and incorporates for review by the UEP management the communication of external stakeholders.	UEP coordination.

UASLP	Communication Procedure of the UEP	Code: A-19
		Revision:
	Reference Norm ISO 14001:2015 7.4 ISO 50001:2018 7.4	page 3 of 5

5. Description of the procedure

sequence	activity	responsible
1. Identify communication needs and / or internal and / or external information of the UEP.	1.1 The personnel who carry out activities related to significant environmental aspects, owners of processes and/or procedures determine the information that must be disclosed internally or externally and recommends the media to be used. 1.2 Delivers the Information to the UEP Coordination.	Management, Sub-Directorates, Heads of Department, laboratories, Workshops or Responsible for processes and / or procedures.
2. Review and validate the information to be disseminated .	2.1 Receives the dissemination needs of the different areas. 2.2 The UEP Coordinator reviews and validates that the information to be published is in accordance with the Environmental/Energy Policy of the UASLP, for inclusion in the communication program or its immediate publication. **If it does not** comply, inform the requesting area and return to point 1. **If it Comply**, it informs the requesting area and sends to Department of Communication and Dissemination for dissemination.	UEP coordination.
3. Request the information to be disseminated	3.1 The information is sent to the Department of Communication and Dissemination through a document (physical and/or electronic) indicating whether the communication is internal or external and the proposal of the communication method.	UEP coordination.
4. Register application in UEP Communication Blog	4.1 Receives from the UEP Coordinator by letter the information validated for dissemination and communication. 4.2 Register the communication request in the UEP Communication Binnacle (A-19b) 4.3 Disseminates and communicates information.	Department of Communication and Dissemination
5. Verifies that the requested communication was responded to.	5.1 It is registered in the Communication Binnacle (A-19b) of the UEP if the communication was carried out, for the taking of corresponding actions. This verification will be carried out 10 days after the dissemination has been made. 5.2 According to the information received, it analyzes it and incorporates for review by the UEP management the communication of external stakeholders. .	UEP coordination.

6. Reference documents

Documents
ISO 14001:2015.
ISO 50001:2018.

7. Records

Records	Retention time	Responsible for Preserving it	Code
UEP Communication		Communication and Image Management	

8. Glossary

Internal Communication: These are all those publications that are exclusive to an area, department and/or the Technological Community that are only communicated within the UASLP Institutions.

External Communication: These are all those publications of an area, department and / or the Technological Community that communicates to the outside of the Institutions of the UASLP, in the different Communication Channels.

Technological Community: It is the whole of the Staff and students of UASLP.

Interested Stakeholders: Person or group that has an interest or is affected by the environmental performance of UASLP.

Communication Channels:

Group meetings
The meeting arises when two or more people are summoned to communicate, debate, make decisions and / or agreements on any environmental aspect of the Energy Management System (UEP) having as evidence of the same a minute of agreements and / or results.

Internal publications
It is all that information that is published and disseminated for information exclusive to the technological community. The bulletins are used as a channel of communication of the information, derived from the management, that interests to transmit. It's a one-way vehicle.

Internal circulars
The internal circular, understood as a letter or memorandum in which senior management communicates something to all the members or to a part of the institution, is unidirectional.

Display case or bulletin board
They are places to view and read information provided by senior management. They are strategically distributed located to place varied information, in which writings, tables, graphics, photographs, posters or the like a replaced.

Poster or blanket
They are graphic elements of information, about something concrete, more or less punctual, equipped with design to attract the attention of staff and users, to the message and information. Communication is one-sided and top-down.

Videos
They are audiovisual productions developed to transmit information taking advantage of the possibilities of these media. Information may be generated about the nature or activities of the UEP.

Surveys
It is a one-way, but upstream, communication element. It allows to obtain the opinion of the employees or users on some aspects of the management, of their activities or processes and also to receive suggestions about them.

Mailbox of observations, complaints and/or suggestions

It is a physical or virtual space, where the technology community and stakeholders can express their opinions regarding any UE concerns. If used to gather complaints, suggestions, and feedback from employees and users, it would be used for one-way upward communication.

E-mail
Form of virtual communication, where the information is done in a personal way, allowing a two-way communication, where the drawback is that it can be delayed. It can be used as forums for opinion and debate, suggestion box and the like, the e-mail allows a *two-way* communication, up and down between the controls and the rest of the users.

Website or internet
Global technology of virtual communication through interconnected networks; when used for internal communication, it gives the possibility to access informative content about the UEP, results, general reports, products or activities, etc.

Internet (social networks)
Internet technology to share within an organization part of its information systems through a private network; It is one more option of communication between the parties involved, and suggestions, requests or any communication in general, are made in a faster and more efficient way.

Mass media:
Radio, television, newspapers, magazines, spectacular advertisements and bulletins are used as a channel of mass communication of information, derived from management, that is interested in transmitting. They are one-way vehicles.

9. Changes to this version

Revision number	Update date	Description of the change

9.19.1 Annex 19b: Communication Binnacle of the UEP, A-19b

UASLP Universidad Autónoma de San Luis Potosí	COMMUNICATION BINNACLE OF THE UEP Reference Norm ISO 14001:2015 7.4 Reference Norm ISO 50001:2018 7.4							Code: A-19b Revision 1 Sheet: 1				
APPLICATION DATE (2)	WHAT TO COMMUNICATE? (3)	TYPE OF COMMUNICATION (4)		WHO TO COMMUNICATE? (5)	MEANS OF COMMUNICATION (6)	WHO PRODUCES THE MATERIAL TO BE COMMUNICATED? (7)	COMMUNICATION PERIOD (8)	THE COMMUNICATION WAS REALIZED (10)		THE COMUNICATION WAS EFFECTIVE (11)		
		INTERNAL	EXTERNAL					YES	NO	YES	NO	WHY?
Jun.2021	UEP creation awareness	X		Entire UASLP Community: Students, Academics and Staff	Web communitacion, Newsletters and releases, Radio UASLP, UASLP Magazines and audiovisual production.	Agenda Ambiental in colaboration with Communication and Image Management	Jan.2022 - Dec.2022		X		X	Because the communication is not yet created
Aug. 2021	Conformation of the Energy Commission	X	X	Entire UASLP Community, Local Government and Energy authorities	Web communitacion, Newsletters and releases, Radio UASLP, UASLP Magazines and Local TV.	Rectory, Agenda Ambiental in colaboration with Communication and Image Management	Jan.2022 - Dec.2022		X		X	Because the communication is not yet created

(9) LCC María Guadalupe Guevara Díaz (Press & Dissemination)

Approval

Head of the Department of Communication and Image Management

FILLING INSTRUCTIONS	
Number	Description
1	Consecutive sheet number
2	Application date
3	Concept or name of what is to be communicated
4	Indicate the type of publication, Internal or External
5	Note to whom the publication will be released
6	Communication medium to be used
7	Write down who produced the material
8	Publication period
9	Name and Signature of the Head of the Communication and Image Management
10	The RS and/or coordination of the UEP signs in accordance that the request for information dissemination was responded to.
11	The SR and/or coordination of the UEP rubric if what was communicated was effective or not and provides a brief description of the result.

9.20 Annex 20: Competence and Awareness Procedure, A-20

UASLP Universidad Autónoma de San Luis Potosí	Competence and Awareness Procedure	Code: A-20
		Revision:
	Reference Norm ISO 14001:2015 7.2 and 7.3 ISO 50001:2018 7.2 and 7.3	Page 1 of 6

1. Purpose

Establishing the guidelines for the education, training, and awareness of stakeholders in each of the significant uses of energy, in accordance with the University Energy Program (UEP).

2. Scope

It applies to stakeholders both internal and external to the UASLP, who perform activities or services that affect significant energy uses; as well as their ability to meet their legal and other requirements within the UASLP.

3. Operating Policies

3.1. The Heads of Departments of: Human Resources, Academic Development, Material Resources and Services, Responsible for the Activity, Coordinator of the UEP are responsible for establishing the programs for training and awareness.

3.2. The Department of Human Resources will carry out the programming of the courses for the training, updating and awareness of the staff, Academics, and support to education.

3.3. The Department of Academic Development is responsible for training, updating and raising awareness for faculty members and students.

3.4. The Heads of laboratories and workshops will be in charge of raising students' awareness, at the time of making use of the laboratories and workshops on what is relevant to the UEP.

3.5. The Administrative Secretary is responsible for conducting training and sensitization to suppliers.

3.6. The Agenda Ambiental will be in charge of raising awareness of interested parties in external events and visits when making use of the UASLP facilities.

3.7. The courses will be oriented after detection and prioritization of the needs of the UASLP.

3.8. It is the responsibility of the Department of Quality (DAC) of the UASLP and Director of each campus to ensure the realization of training and environmental awareness programs.

3.9. The feasibility of training courses should be determined taking into account the availability of the required resources, and the staff.

3.10. The formats used in this procedure are consistent with those declared in the Quality Management System.

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UASLP Universidad Autónoma de San Luis Potosí	Competence and Awareness Procedure	Code: A-20
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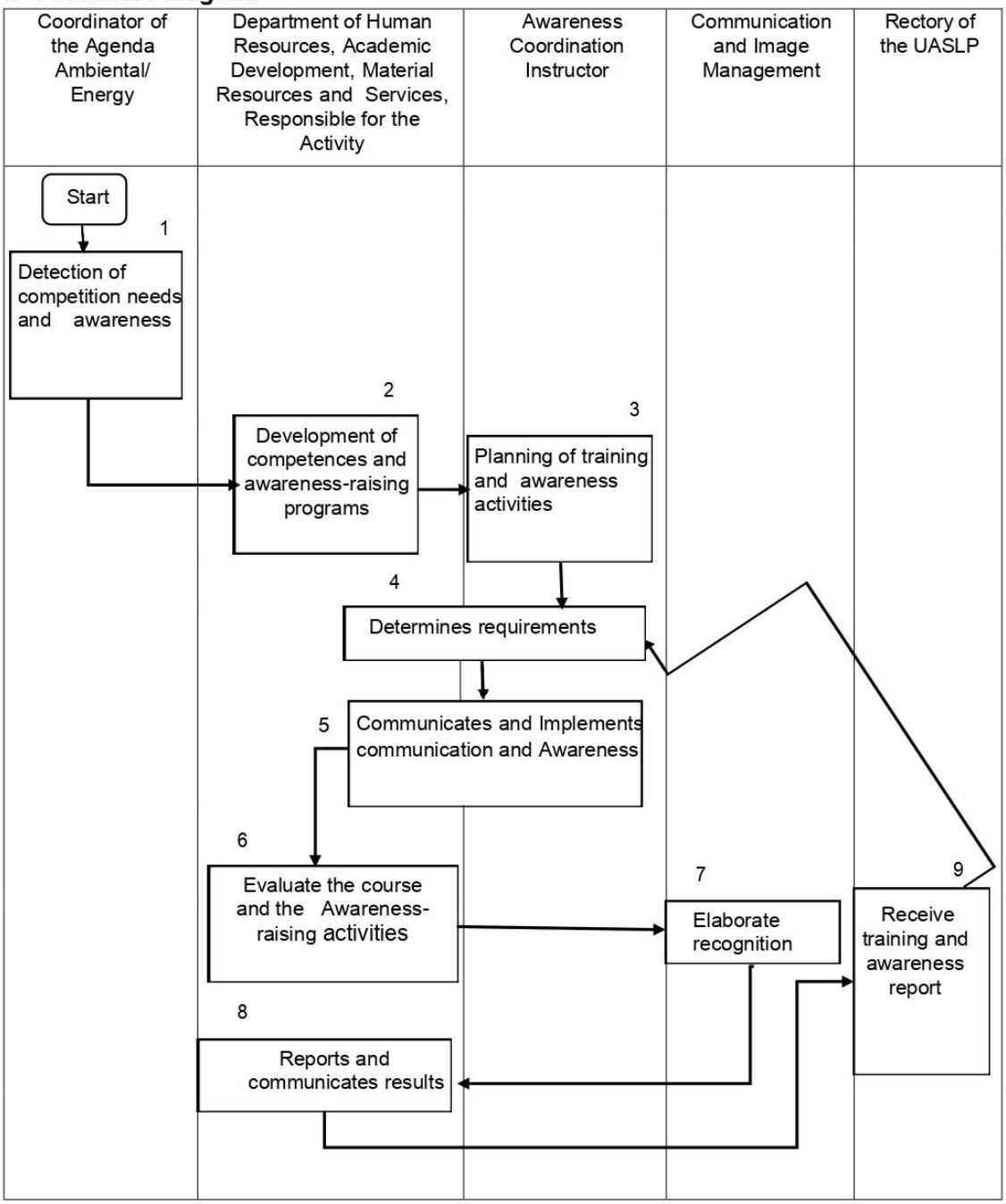
	Reference Norm ISO 14001:2015 7.2 and 7.3 ISO 50001:2018 7.2 and 7.3	Page 2 of 6

4. Procedure diagram



UASLP Universidad Autónoma de San Luis Potosí	Competence and Awareness Procedure	Code: A-20
		Revision:
	Reference Norm ISO 14001:2015 7.2 and 7.3 ISO 50001:2018 7.2 and 7.3	Page 3 of 6

5. Description of the procedure

Sequence	Activity	Responsible
1. Identification of competence, training and awareness-raising needs	1. 1 Training needs for environmental aspects and/or significant energy uses (SEnUs) are detected in accordance with the UEP, through the help of a Competence and Awareness matrix -that need to be created-. This diagnosis can be made before each school year, in such a way as to know the resources required. Although, it is important to mention that some need for training, education or training can be done at any stage, which is based on present or future needs. 1. 2 The Department of Human Resources and Academic Development sends to the corresponding areas the format for the diagnosis of needs (applicable code).	Coordinator of the Agenda Ambiental
2. Elaboration of programs competence training and taking of conscience	2.1 Determine the sequence of courses based on needs. 2.2 Select the instructor using the Criteria for Selecting Internal and External Instructors format (applicable code) 2.3 Develop the competition, training, and awareness program 2.4 Maintains a list of instructors (internal and external), with their corresponding evaluations.	Department of Human Resources, Academic Development, Activity Manager, and Awareness Coordination.
3. Planning of competition, training and awareness-raising activities	3. 1 Prepares competency, training and awareness plan and course or talk materials and sends it to the Agenda Ambiental. 3. 2 Establish a supplementary appropriation arising from participation in the activities of the UEP. 3.3 Establish a permanent mechanism for competition, training and awareness-raising involving stakeholders in the UEP.	Instructor, Academic Departments

UASLP Universidad Autónoma de San Luis Potosí	Competence and Awareness Procedure	Code: A-20
		Revision:
	Reference Norm ISO 14001:2015 7.2 and 7.3 ISO 50001:2018 7.2 and 7.3	Page 4 of 6

4. Determines requirements	4. 1 The corresponding department manages the requirements requested by the instructor.	Department of Human Resources, Academic Development and Material Resources and Service, Responsible for the Activity
5. **Communicates and implements competence, training and awareness**	5.1 Communicates and disseminates the UEP's Competence, Training and Awareness Programs once they have been accepted; with the intention that their participation and assistance, be known in good time. 5. 2 With respect to the training provided to service providers (primarily those whose services have identified environmental aspects and/or significant energy uses), the Head of Purchasing Office of the Administrative Secretary, from his list of suppliers, will identify them for talks on Environmental/Energy Awareness. 5.3 The Agenda Ambiental will be responsible for raising the awareness of interested parties in external events and visits when making use of the institute's facilities on what is relevant to the UEP.	Department of Human Resources, Academic Development and Material Resources and Services, Communication and Image Management
6. Evaluates competence, training and awareness	6.1 Delivery to the participants the evaluation format of the course for completion. 6. 2 Communicates the results to the person in charge of the control of the course and/or to the instructor.	Department of Human Resources and Academic Development
7. Prepare Recognitions	7. 1 Based on the results of competition, training and awareness, recognitions are prepared for the participants.	Communication and Image Management

8. Reports and communicates results.	8. 1 Performs analysis according to attendance lists and course evaluation format, updating competency program, training and awareness. 8. 2 Communicates the results of training to the Campus/ Faculty Management.	Department of Human Resources, Academic Development
9. Receive report of competence, training and awareness	9.1 Receives progress report on competence, training and awareness programs 9.2 Implements actions according to conclusions of the reports. 9.3 Determine new requirements for the future.	Rectory

6. Reference documents

documents
Institutional Program of Innovation and Development of the UASLP

7. Records

Registration	Time of retention	Responsible for preserving it	Code
Matrix of Competence, Training and UEP Awareness		Department of Human Resources, Academic Development, Material Resources and Services and Responsible for the Activity	
Matrix of Competence, Training and Awareness of UEP			
Attendance List			

8. Glossary

Term	Definition
Training	Process by which it is possible to achieve a degree of cognitive response to the topics covered.
Instructor	Person(s) designated to conduct the training process on the subject to be treated considering their professional training, education, experience and skills to commune.
Awareness	Process to develop environmental awareness in a personal and/or collective way based on the taking of positive attitudes of the care of the environment.
Competence	Attitude of staff based on their professional training, education, experience and the level of training achieved through their participation in the courses and activities on the topics covered.

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9. Changes to this release

Revision number.	Update date	Description of the change.