ISO 50001 Energy Management System
Case Study

2021 CHILE

Puerto Ventanas S.A

First Green Port of Chile to certify the EcoPort standard.

Organization Profile & Business Case

Located in the Bahía de Quintero, in the Puchuncaví commune, Puerto Ventanas S.A (PVSA) is the most important bulk port in the central area of the country and, also, one of the main maritime terminals in Chile. The port has first-line facilities, which allow its clients and the community to guarantee the development of activities and operations with the highest standard of safety and commitment to the environment. In addition, it constitutes an important contribution to the development of the country, the region and, especially, of the commune. Through its environmental, social, and economic commitment, Puerto Ventanas S.A. generates innovative and sustainable solutions for its clients, based on experience, responsibility and the interest in generating value for all the publics with whom we are committed. In a year marked by the global Covid 19 pandemic, the company has been able to maintain its operational excellence, providing services and complete assistance in integral docking, loading, and unloading of liquid and solid bulks.

"We have addressed the challenge of efficiency in the use of energy, both from a technological perspective, as well as in the generation of cultural changes and ways of operating"

—Luis Fuentes M, Sustainability Manager

Case Study Snapshot	
Industry	Ports
Product/Service	Management Services in Loading, Discharging, Portage, Storage and Dispatch of Bulk, Liquid and Breakbulk Cargo
Location	Bahía de Quintero, región de Valparaíso
Energy management system	ISO 50001:2018
Energy performance improvement period, in years	2
Energy Performance Improvement (%) over improvement period	4%
Total energy cost savings over improvement period	US $44,299
Cost to implement EnMS	US $21,000
Total Energy Savings over improvement period	1,099.83 (GJ)
Total CO_2-e emission reduction over improvement period	117 Metric Tons

The Energy Management Program (EMP) established at the Port through ISO standard 50.001:2018 has made it possible to identify guidelines with respect to the energy practices and policies that must be complied with and reinforced yearly, in order to comply with the objectives and targets proposed therein. This includes, maintaining an energy efficiency management system that enables the continuous detection of savings opportunities. Quantifying the energy performance through energy meters installed in the in different port areas. Ensuring that the acquisition of energy efficient technologies is preferred in projects of implementation, modification, or renewal of equipment

Energy management has played a very important role in the company's sustainability practices. For example, in 2021, Puerto Ventanas S.A signed a new contract with its energy supplier AES Andes, which certifies that 100% of the energy consumed by PVSA is from renewable energy sources (NCRE).

Business Benefits

The implementation of energy efficiency initiatives generates multiple benefits in areas such as: Reduction of the expense of energy and the operating or production costs, decreases the environmental impact, reduces the emissions of greenhouse effect gases, and improves the security of the supply of energy. In the period 2019-2020, Puerto Ventanas mobilized a total of 13.99 million bulk tons using electric power. The energy performance to date has allowed to generate energy savings of 305,508 kWh and the consequent energy cost savings US $44,299. The improvement period presented is 2 years and the commitment and efforts of the staff have made it possible to achieve the objectives of the EnMs.

The energy performance improvement of 4% compared to the base year (2019), results in the reduction of greenhouse gases (GHG), representing an accumulated reduction of 117 Tons of equivalent CO2, associated with electrical consumption in port operations. The incorporation of new infrastructure, more efficient equipment, and improvement in the execution of

Figure 1: Electric vehicle acquired by Puerto Ventanas in 2019

operational controls have made it possible to optimize energy use.

In 2019 Puerto Ventanas incorporated its first electric vehicle for administrative use. This has made it possible to improve energy consumption per kilometer traveled by 84% and has also avoided emitting 1.5 Ton CO2e per year.

The guidelines of sustainability have made it possible to demonstrate Puerto Ventanas' commitment to the environment, increase the company's competitiveness and anticipate national requirements or demands. In 2016 Puerto Ventanas S.A was the first chilean port to obtain the European EcoPort certification, the main environmental initiative of the European port sector. The main objective of EcoPort is to create awareness about the protection of the environment through cooperation and the exchange of knowledge between ports to improve environmental management. The EcoPort certification was renewed in 2018 and later in 2020.

In 2018, the Inter-American Committee on Ports, which belongs to the Organization of American States (OAS), presented the Maritime Award of the Americas in the "Green Ports" category, with Puerto Ventanas being the first Chilean port operator to receive this recognition, while in 2019 it was recognized in the category "Approach to the community and Port-City relationship" by the same Organization.

In the same way, the EnMS has allowed to generate strategic alliances. The Energy Efficiency Gold Award issued by the Chilean Ministry of Energy via the Energy Sustainability Agency (ASE) obtained in September 2014 and November 2017 was renewed in May 2021.

Plan

The development of an Energy Management System in 2015 was strengthened with the general management's directive to continue demonstrating that sustainability and the use of resources is a priority for the business and the relationship with the neighboring community. An energy management team was formed with the objective of leading the implementation of the ISO 50.001 standard within the company's processes.

Re-certification

In June 2021, the re-certification of the EnMS was carried out under the ISO 50: 001 standard in its 2018 version.

The renewal of the standard in its 2018 version implied an update in the methodology and analysis of the expected results of the EnMS. The recertification process considered a Gap Analysis that allowed identifying the gaps in relation to the 2011 version of the standard. For this, external consultancies and different trainings were carried out, for example, to process leaders, managers, and the energy management team.

For the transition to the ISO 50.001: 2018 standard, it was considered for the planning of the EnMS, the understanding of the needs and expectations of the interested parties, the risks and opportunities associated with the improvement of energy performance. Additionally, the new regulatory requirements and the need for participatory leadership on the part of process leaders were reinforced with practical workshops, involving them in decision-making for continuous improvement.

Energy review and planning: The Energy Management Program involve the entire organization, and focus on the following topics:

Leadership and management commitment, legal framework and voluntarily acquired commitments, training courses, procedures and inspections, operational control, monitoring and measurement. The purpose of this Program is to comply with the commitments established in the Integrated Policy, through the implementation of specific actions that contribute to improving energy performance. In addition, quantify the significant uses of energy through meters installed in operating systems, ensure, and privilege the acquisition of high energy efficiency technologies in new projects and maintain operational controls applicable to saving electricity consumption.

The energy review and the characterization of the processes that are energetically significant allow the establishment of objectives to optimize the use of energy.

The criteria to define a SEU are: Increase of the indicator with respect to the base year (> 10%). If it has a savings potential of less than 5 years. Percentage of total consumption associated with the same energy source (> 20%).

89% of the energy consumed in Puerto Ventanas is electrical energy from the network and only 11% corresponds to thermal energy.

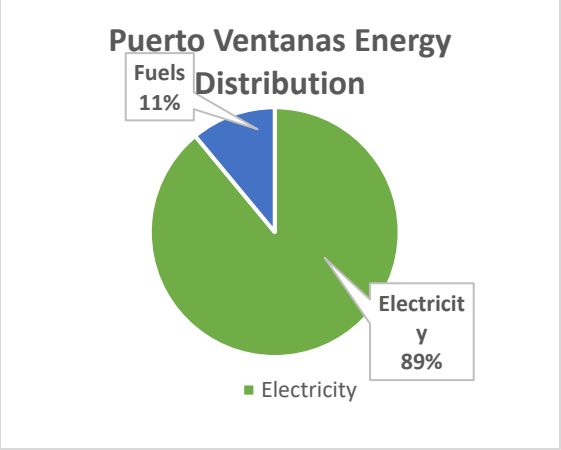


Figure 2: Puerto Ventanas Energy Distribution

Among the processes considered energy significant, are the bulk unloading processes with 42%, the bulk

boarding process with 28% and the bulk reception process with 25% of the total. These systems are mainly made up of cranes and conveyor belts.

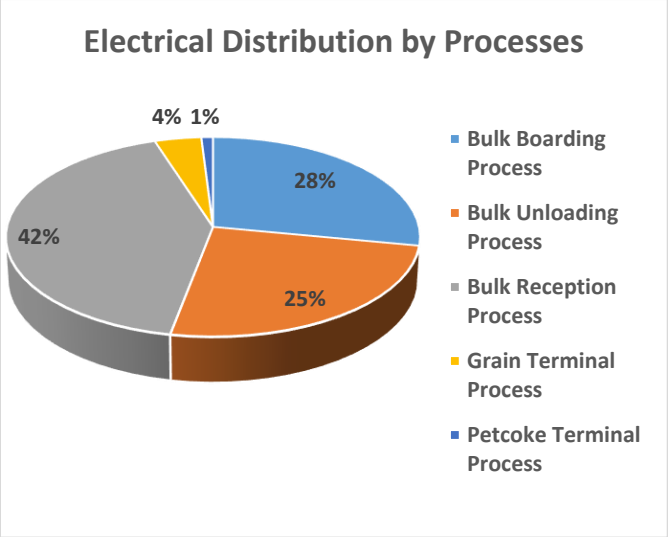


Figure 3: Electrical Distribution by Processes

"Our flexibility allows us to quickly adapt to the challenges posed by our environment, always putting safety first and constantly seeking to improve to provide a reliable and high-standard service for our clients"

— General Manager

Do, Check, Act

The Integrated Management System of PVSA has been structured based on the requirements contained in the ISO 14.001, ISO 9.001, ISO 50.001, and ISO 45.001. Since 2015, Puerto Ventanas S.A. has an energy management certification under standard ISO 50.001, which is verified and certified by Lloyd's Register Quality Assurance (LRQA), while, in June of 2021 the EnMS certification was carried out under standard ISO 50:001:2018. Sustainability area is responsible for the Port's environmental and energy management, for which it has a team of university-educated professionals with extensive experience to provide support to the different areas.

Energy Performance and Savings Verification

The monitoring of energy performance is carried out through the monthly analysis of energy consumption, using linear regression metrics. The variables used to generate the linear regression are energy (dependent variable) and tons of cargo moved (independent variable). The base period is considered to generate the linear regression in each process and thus the estimated energy is compared with the real energy. The year 2019 is considered as the base year. The indicators are:

- Total electricity consumption per month (kWh / ton moved)
- Total electricity consumption per month and by type of system and process (kWh / ton moved).

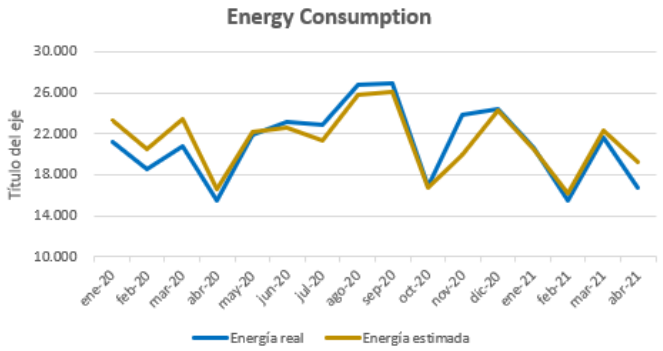
To obtain these indicators, the electrical energy information collected in the Power Monitoring Expert (PME) and Factory Talk Historian (FTH) servers will be used. Production data and monthly tons moved will be obtained from the official PVSA cargo movement record.

On the other hand, the management indicators will be measured according to the progress of the objectives of the EnMS and the Integrated Management System:

- Training; Communication; Energy performance review; Energy data collection; Internal Audits; Management Review; Compliance with legal requirements and other requirements.

Top management promotes support for energy management through activities such as Management Reviews where each process leader presents their indicators and initiatives to improve energy performance. In addition, as we will see later, senior management is open to being part of participatory agreements with institutions that promote the development of NCRE energy and good practices in the energy transition.

Among the activities to improve the energy performance of the SEUs is the operational control of the conveyor systems to prevent them from operating without bulk cargo, optimize the use of energy using variable frequency drives in motors, optimize the use of dust collectors only when needed, the incorporation of perimeter lighting and LED area projectors.



	Energy Performance Indicator - Andina Reception Process	Unit
2020	0,38	kWh/Ton
2021	0,36	kWh/Ton

Figure 4: Analysis of energy consumption and performance by processes

Quality of Information

The information related to energy controls is processed through a system of supervision, control, and data acquisition (SCADA). Puerto Ventanas developed a Distributed Control System (DCS) that allows to centralize the information of the different processes that compose it. Includes energy management and measurement software. In addition to a virtual data storage for evaluation of temporary tendencies.

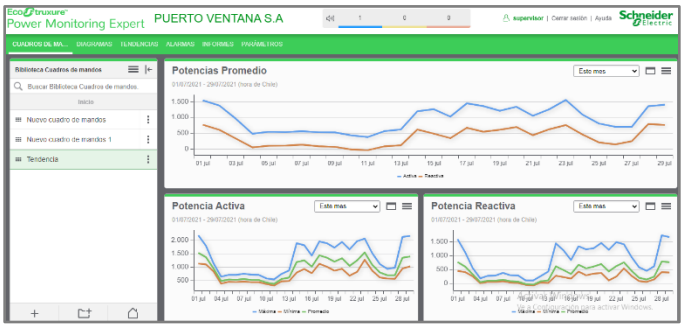


Figure 5: Screen of Power Monitoring Expert for energy data analysis

Additionally, the review of services and hardware belonging to the Control System belonging to the Puerto Ventanas facilities is implemented and systematized, in order to control and verify the availability of software and hardware associated with the control system.

Operational Control

Operational control is carried out on obtaining the data that feed the energy review matrix, planning maintenance actions related to the significant use of energy in accordance with what is described in the PVSA maintenance manual. Likewise, trained personnel will be considered for the handling and operation of those equipment taking data with instruments that are calibrated or verified in accordance with the provisions of the manual. The heads of areas and maintenance personnel are responsible for creating awareness and defining operational procedures for reducing energy consumption in conjunction with the energy management team.

Professional expertise and training

Energy Management Engineer leads the implementation of projects to improve the efficiency of the consumption of energy at Puerto Ventanas, such as: studies of the uses and consumption of energy at the port and participation in contractual reviews of electrical supply; management of technical information (plant equipment and systems, automatic control and power system), monitoring and following-up on energy efficiency indicators, providing feedback to the different areas regarding the results of the consumption of energy and options for minimizing and using energy efficiently.

Also, the Energy Management Team participates in training courses and certifications for example: Industrial Energy Manager given by the Energy Sustainability Agency (ASE) and ISO 50001:2018 Lead Auditor Certificate granted by the International Register of Certificated Auditors (IRCA). Additionally, management capacities in energy efficiency aspects are strengthened for process leaders and operational personnel whose responsibilities can directly impact the energy performance of the systems.

Tools and Other resources

Energy management has promoted the development of collaborative agreements with institutions and strategic actors in the generation, use and consumption of energy.

In line with one of the Company's strategic focuses, in January 2021, Puerto Ventanas signed a participation agreement with the company Alü Energy SpA for the development of the project called "Wave Power Generation in a Competitive Market". This project seeks to inject into the Puerto electrical network, energy generated from the waves of the sea.


PortalPortuario

INICIO INDUSTRIA PORTUARIA NAVEGACIÓN CRUCEROS COMERCIO EXTERIOR PUERTO SUSTENTABLE LOGÍSTICA ENTREVISTAS OPINIÓN

Puerto Ventanas desarrollará proyecto para generación de energía a partir del movimiento de las olas

28 Enero, 2021

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En el día mundial por la Reducción de las Emisiones de CO2, **Puerto Ventanas, filial del Grupo Sigdo Koppers**, firmó un importante convenio con la empresa Alu Energy que permitirá desarrollar un proyecto para la generación de energía proveniente de fuentes renovables.

Con la firma de este convenio, el puerto está apoyando una innovadora iniciativa que consiste en la generación de energía undimotriz que se obtiene a partir del movimiento de las olas del mar, generando energía sostenible, limpia y renovable.

El proyecto denominado "Generación de energía undimotriz en un mercado competitivo", cuenta con el cofinanciamiento de Corfo y el aporte de Puerto

Figure 6: Media communication about wave energy project

Additionally, the year 2021 Puerto Ventanas has been selected in two programs promoted by the Energy Sustainability Agency. One of them is the Electromobility Accelerator Program, the objective of which is to accelerate the transition stage of incorporation of technologies or electrification strategies of public and private sector mobility systems. The expected results of this program are: Develop a pilot project that considers the detection of opportunities for a possible implementation. Also generate a technological Roadmap that guides the electromobility transition in the long term. On the other hand, Puerto Ventanas will participate in the Green Hydrogen Accelerator program, an initiative focused on supporting the transition of green hydrogen, to institutions and companies that want to implement, in the short term, applications that use hydrogen and contribute to promoting their knowledge and use.

Transparency

Puerto Ventanas S.A. ensures transparency in making informed, responsible, and timely decisions, encouraging ethical action and the application of good practices in all processes and actions within the organization. In the same way, it seeks to safeguard permanent compliance with the company's values and ensure respect for current regulations and correct performance in the market. For this, the company guides its actions through instruments that contain these policies and practices: Code of Corporate Governance, Code of Ethics, Code of Ethics and Conduct for Suppliers, Crime Prevention Model, Environmental and Energy Policy. This can be verified in the Annual Reports section at https://puertoventanas.cl/en/. Additionally, other communication channels are carried out through mailings, corporate WhatsApp group and dissemination meetings to all collaborators.

What We Would Have Done Differently

- Enhance energy data acquisition and measurement systems for more detailed analysis.
- Further strengthening of the training programs for employees in energy management aspects.
- Better implementation and performance feedback for driven operational controls to manage energy in production processes.