
AVEVAWORLD
PARIS

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ENERGÍA & CELULOSA

Sustainability priorities accelerated by industrial platform resulting in environmental and economic improvements

AVEVA World Paris - October 2024

Global ESG score: 93/100

Ence Group

ENCE has three independent yet complementary areas of business

Forestry management

- 65.000 hectares of forest area managed in the Peninsula
- Provides raw material for the other two lines of business
- ENCE boasts more than 60 years' experience in wood supply management

Pulp producers

- We are Europe´s leading eucalyptus pulp producer, with our 2 factories offering a combined maximum installed capacity of 1,2Mn
- Our focus is on growing segments of differentiated and special pulp products

Renewable Energy operators

- We are Spain's largest biomass operator, with a current renewable energy installed capacity of 266MW
- The renewable energy line provides the stability of regulated business to compensate the cyclical nature of the cellulose market

3

Ence: industry leader in sustainability

- Pioneers in publishing all our environmental data in our website
- We have received “Zero-waste” AENOR certificate in 100% of our plants
- 1st place in https://www.sustainalytics.com Paper & Forestry segment in 2023, obtaining a score of 93 out of 100
- Nordic Swan & Ecolabel
- More than 98% of the wood and biomass comes from suppliers approved according to European standard
- First company to receive SURE certification in Europe. Currently, 100% of our plants are certified for biomass sustainability
- Develop of new products to substitute plastic items

Global ESG score: 93/100

How AVEVA improved our operations

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Challenge	Solution	Lines of work

To achieve our goals in terms of:

- Minimizing variability of the processes
- Reducing operation downtime due to lack of water and water footprint
- Anticipate environmental deviations
- Increase energy efficiency

Deployment of the latest AVEVA™ PI System™ including:

- PI Asset Framework
- Event Frames
- Notifications
- PI Vision

CONNECT Data Services

Advanced Process Control

In 4 of our main projects:

1. Control loop monitoring and diagnostic tool
2. Reduction of water consumption
3. ML applied to environment management
4. Biomass power plant optimization

Along the process

- Huge amounts of data requiring registration and subsequent organization
- After recognizing the potential that AVEVA offered, we created a dedicated internal team focused on developing and leveraging each of AVEVA's tools
- Over the last two years, we have deepened our use of AVEVA tools, optimizing workflows and scaling each development in close collaboration with end users
- As we grew in competence and confidence with the platform, we saw an opportunity to make a significant leap towards a more advanced solution: CONNECT Data Services
- This step was the result of a natural process where maximizing our data management capabilities became the priority

Pulp and Renewable Energy

AVEVA projects for both businesses

PULP MILL

Fiber line:

- Cooking, washing, screening and bleaching
- Cutting and packaging

Energy and recovery:

- Evaporation and recovery boiler
- Causticization
- Biomass boiler

AVEVA Projects:

1. Control loop monitoring and diagnostic
2. Reduction of water consumption
3. Machine learning applied to environmental management

BIOMASS POWER PLANT

- Biomass boiler for steam production
- Steam turbine for electricity production

AVEVA Project:

4. Biomass power plant optimization

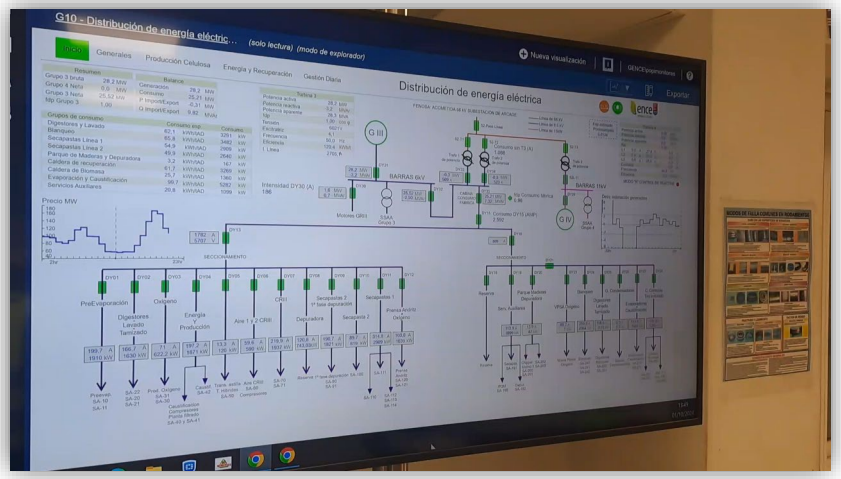
1. Control loop monitoring and diagnostic tool

Using existing instrumentation and PI System tools:

- Operational excellence is a priority for Ence
- A precise control of the instrumentation ensures that critical process variables remain within optimal ranges, improving overall process efficiency
- Control loop monitoring tool is fully developed with PI System (AF, Event frames, PI Vision…) taking in advantage its flexibility
- It also helps detect issues early, allowing for preventive maintenance and reducing unplanned downtime
- Facilitates analysis in case any deviation is detected, providing the probable cause and possible solution

1. Control loop monitoring and diagnostic tool

- General view
- Analysis details
- Deviation diagnosis



AVEVA™ PI Vision™

Resumen salida lazos 4

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Inicio

Lazo Control	Área	Descripción	% TIEMPO SALIDA ÚLTIMOS 15 DÍAS Mayor a 95%	Entre 10 y 1%	Menor a 1%	Deshabilitado
CAUSTIFI.862FC8325	CAUSTIFI	L1 licor verde a CLV3	97,0 %	0,0 %	0,1 %	2,9 %
CAUSTIFI.862FC8326	CAUSTIFI	L2 licor verde a CLV3	97,0 %	0,0 %	0,1 %	2,9 %
CAUSTIFI.862TD8300	CAUSTIFI	Td Apagador (%)	0,0 %	0,0 %	98,7 %	1,3 %
CAUSTIFI.864PC8340	CAUSTIFI	Presión aire escape FDLB2 (%)	0,0 %	24,9 %	71,8 %	1,4 %
CAUSTIFI.866PC0288	CAUSTIFI	pd entre alimentacion y salida filtro lb	0,0 %	0,1 %	92,3 %	7,5 %
HHCC.310PC0807	HHCC	vapor del eyector 1 de gases al horno	0,0 %	0,0 %	100,0 %	0,0 %

NAVIA

LISTA DE LAZOS DE CONTROL SALIDA DESVIADA

Condición	Consecuencia	Causa Probable	Solución Posible Ejemplo
Valor medio de trabajo entre 1 y 10%	Control inestable	Controlador sobredimensionado	1. Añadir restricción fija en proceso para aumentar la capacidad de control. Ejemplo: Tubería o válvula demasiado grande para el caudal aportado.
Valor medio de trabajo entre 1 y 10%	Control inestable	Controlador sobredimensionado	1. Añadir restricción fija en proceso para aumentar la capacidad de control. Ejemplo: Añadir placa de restricción previa o válvula manual de posición fija para reducir el caudal disponible y permitir que el controlador pueda trabajar entre el 15 y el 85% de su rango.
Valor medio de trabajo entre 1 y 10%	Control inestable	Controlador sobredimensionado	2. Limitar condiciones actuales de proceso para trabajar en un rango que permita que sea regulable Ejemplo: Intercambiador de calor con una capacidad de enfriamiento muy superior a la necesaria.
Valor medio de trabajo entre 1 y 10%	Control inestable	Controlador sobredimensionado	2. Limitar condiciones actuales de proceso para trabajar en un rango que permita que sea regulable Ejemplo: Reducir aporte de fluido frío para que la temperatura del fluido caliente sea regulable.
Valor medio de trabajo entre 95 y 100%	Control insuficiente	Anomalía puntual	1. Controlador obstruido, dañado o desgastado Ejemplo: Obstrucción de una tubería o válvula, rodete de una bomba gastado.
Valor medio de trabajo entre 95 y 100%	Control insuficiente	Controlador infradimensionado	2. Sustituir controlador por uno de mayor capacidad/ tamaño Ejemplo: Tubería, válvula o bomba demasiado pequeña para la capacidad necesaria.
Valor medio de trabajo entre 95 y 100%	Control insuficiente	Instalación sobredimensionada	3. Limitar condiciones actuales de proceso para trabajar en un rango que permita que sea regulable Ejemplo: Intercambiador de calor con una capacidad de calentamiento muy superior a la necesaria.
Valor medio de trabajo entre 95 y 100%	Control insuficiente	Instalación sobredimensionada	3. Limitar condiciones actuales de proceso para trabajar en un rango que permita que sea regulable Ejemplo: Reducir el aporte de fluido caliente para que la temperatura del fluido frío sea regulable.
Valor medio de trabajo <= 1%	Controlador fuera de servicio	Instalación obsoleta	1. Solicitar a Operación, Mantenimiento e Informática la confirmación para baja de los controles correspondientes. Ejemplo: Instalación obsoleta

Overall, the tool provides a clear understanding of the state of the instrumentation and take proactive actions to optimize maintenance and improve the stability and efficiency of the control loops in the pulp manufacturing process

Up to 15% environmental emissions reduction and 1500 MWh savings in each one of our pulp mills

2. Reduction of water consumption

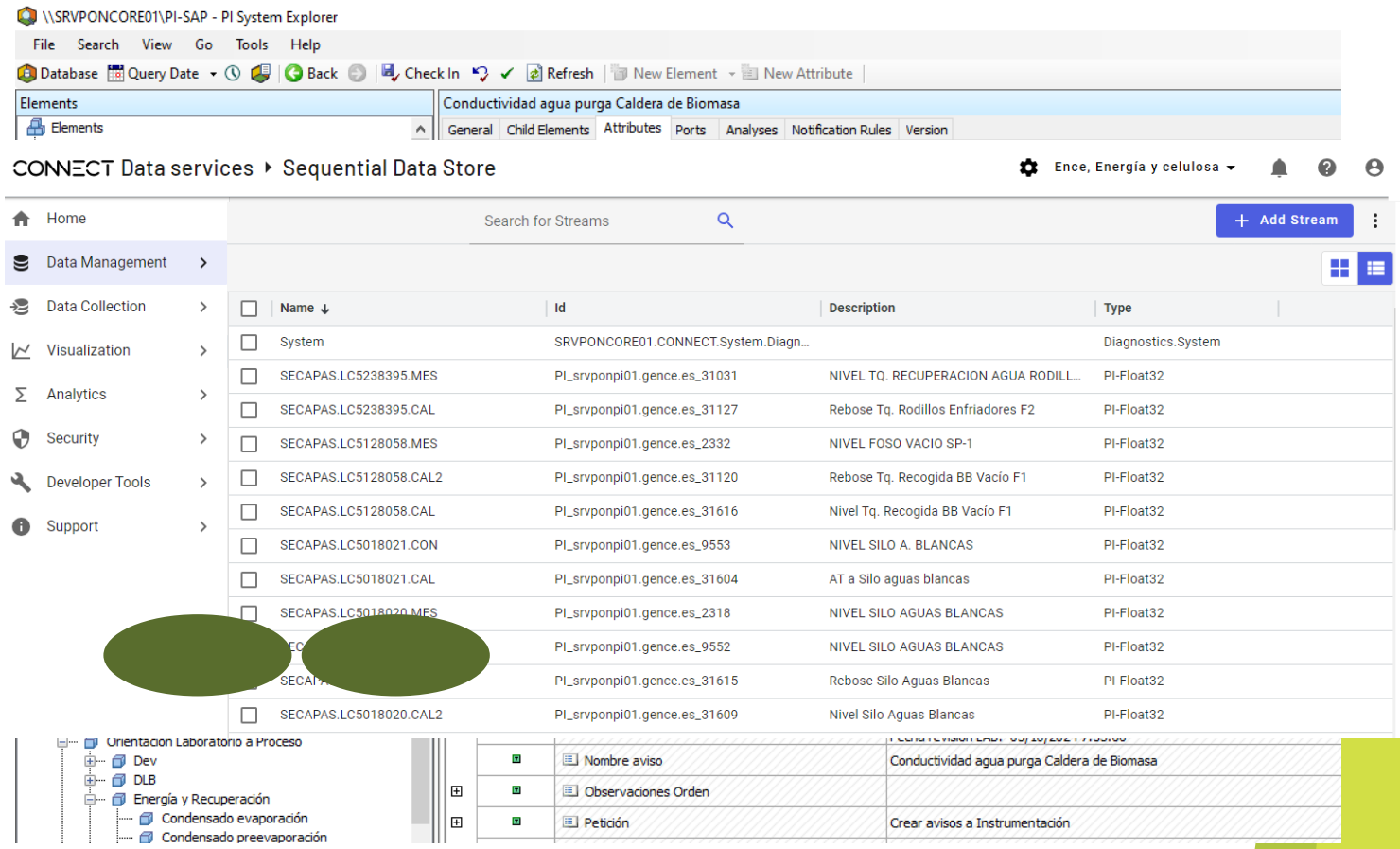
Looking for business resilience:

- Climate change is a reality. In the past, water resources were abundant in the north of the Iberian Peninsula. However, droughts are becoming increasingly common during the summer season
- At Ence we are fully committed to reducing our water footprint while becoming a more sustainable, resilient and efficient company
- Accurate control of our water consumption in each part of our pulp mill becomes essential to achieving our goals
- The overall dashboard allows us to take immediate action in case of deviations

2. Reduction of water consumption

- AF data contextualization
- CONNECT Data services
- Power BI Integration

By starting with all the data collected in PI System from all the different parts of the factory, contextualizing it thanks to AF and then publishing it through CONNECT Data Services, we are able to integrate the whole dataset with Power BI so that in a single report we can identify deviations and take actions quickly to resolve them

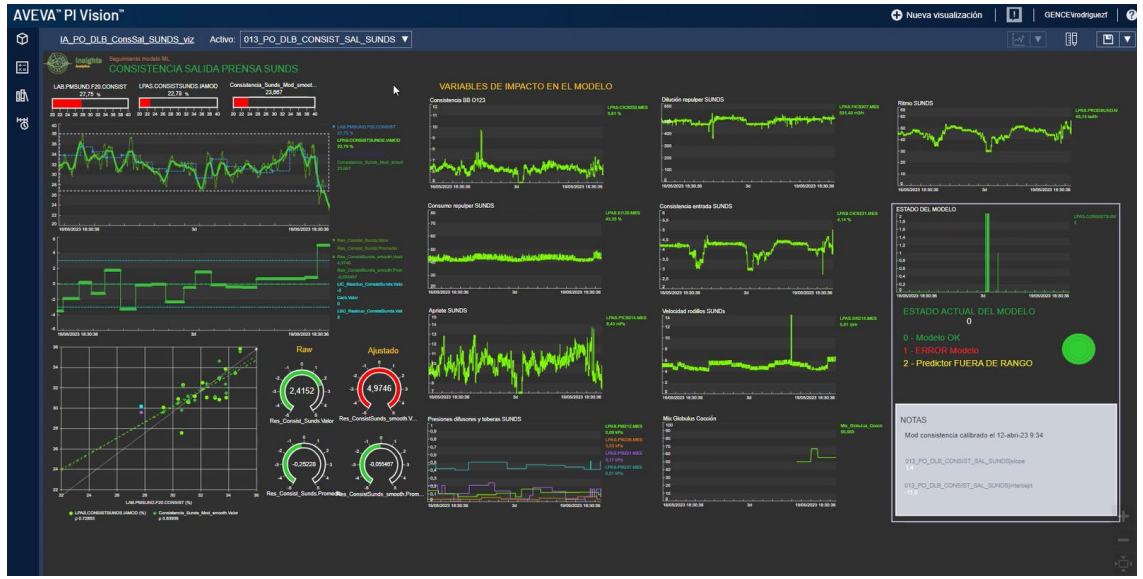


From 15 days of shutdown in 2023 to 0 days of shutdown in 2024 due to water limitations during summer season

3. Machine Learning applied to environment management

Old issues, new approaches:

- We have started to develop machine learning algorithms to improve environmental management
- These models were built with internal resources using open-source code and collecting all the information from the PI database
- The output/recommendations of the algorithms are integrated in PI Vision, as it is a familiar interface for us and within reach of operators and environmental technicians
- We worked along two lines: Predicting variables for better planning and management of water consumption and generation of virtual instruments to improve the control of our process



3. Machine Learning applied to environment management

- AF data contextualization
- Python ML models
- Predictions integrated in PI Vision

- This solution provides a future prediction of the flow of the river that feeds one of our plants, allowing us to anticipate and better manage this resource. The algorithm integrates online instrumentation (e.g. flow meters), historical rainfall data, and also integrates online data from official weather stations
- It is also used to predict flue gas environmental variables to adjust process parameters in real time

More anticipation against environmental deviations and proactive management before the issue begins

4. Biomass power plant optimization

New circumstances in the Spanish electricity market, new challenges:

- Our biomass power plants were designed to operate at full load for as long as possible
- However, due to the high penetration of wind and photovoltaic power, the electricity market has become unstable. To control this instability, we make our facilities available to the grid operator to adjust offer and demand in real time
- This means continuous load changes that impact on the efficiency and stability of the process
- With traditional process control approaches we were not able to regain the efficiency we were losing. Finally, we turned to **Advanced Process Control** tool to eliminate that gap

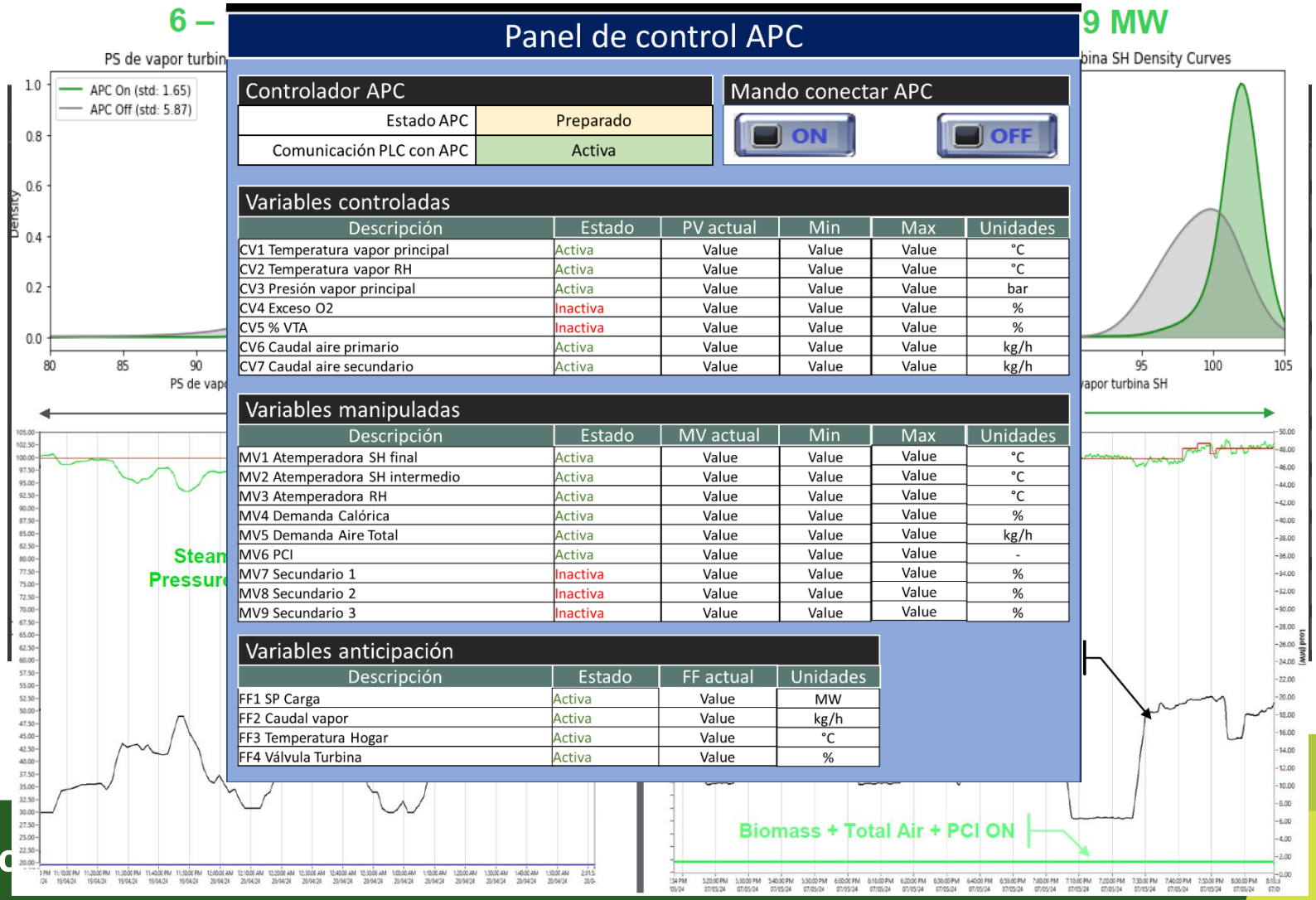
4. Biomass power plant optimization

- Multivariable models
- Standard deviation reduction
- Integrated into DCS/SCADA

Unlike control loops that correlate an input and output variable, this tool makes multivariable models capable of predicting combustion behavior so that they can anticipate and adjust setpoints to maintain process stability before process destabilization occurs, ensuring maximum process performance

The APC allows to automate the control loops avoiding more than 900 manual interventions per day

150k€ savings each year in biomass c



PULP, PAPER AND FOREST | Spain

Ence improves operations and drives sustainability with AVEVA

Challenge

- Minimizing process variability to meet operational goals
- Reducing our water footprint and preventing downtime caused by water shortages.
- Shifting from reactive to predictive management of environmental deviations.
- Optimizing power generation efficiency at our biomass plants

Solution

- Deployed AVEVA™ PI System™ to streamline data management and extended its value with CONNECT data services.
- Deployed Advanced Process Control to optimize energy production

Results

- **Reduced emissions by up to 15% and saved 1,500 MWh in each pulp mill**
- **Achieved 0 days of shutdown in 2024 summer season vs. 15 days in 2023**
- **Gained more anticipation against environmental deviations**
- **Saved 150k€/year in biomass consumption and reduced up to 10% environmental emissions**

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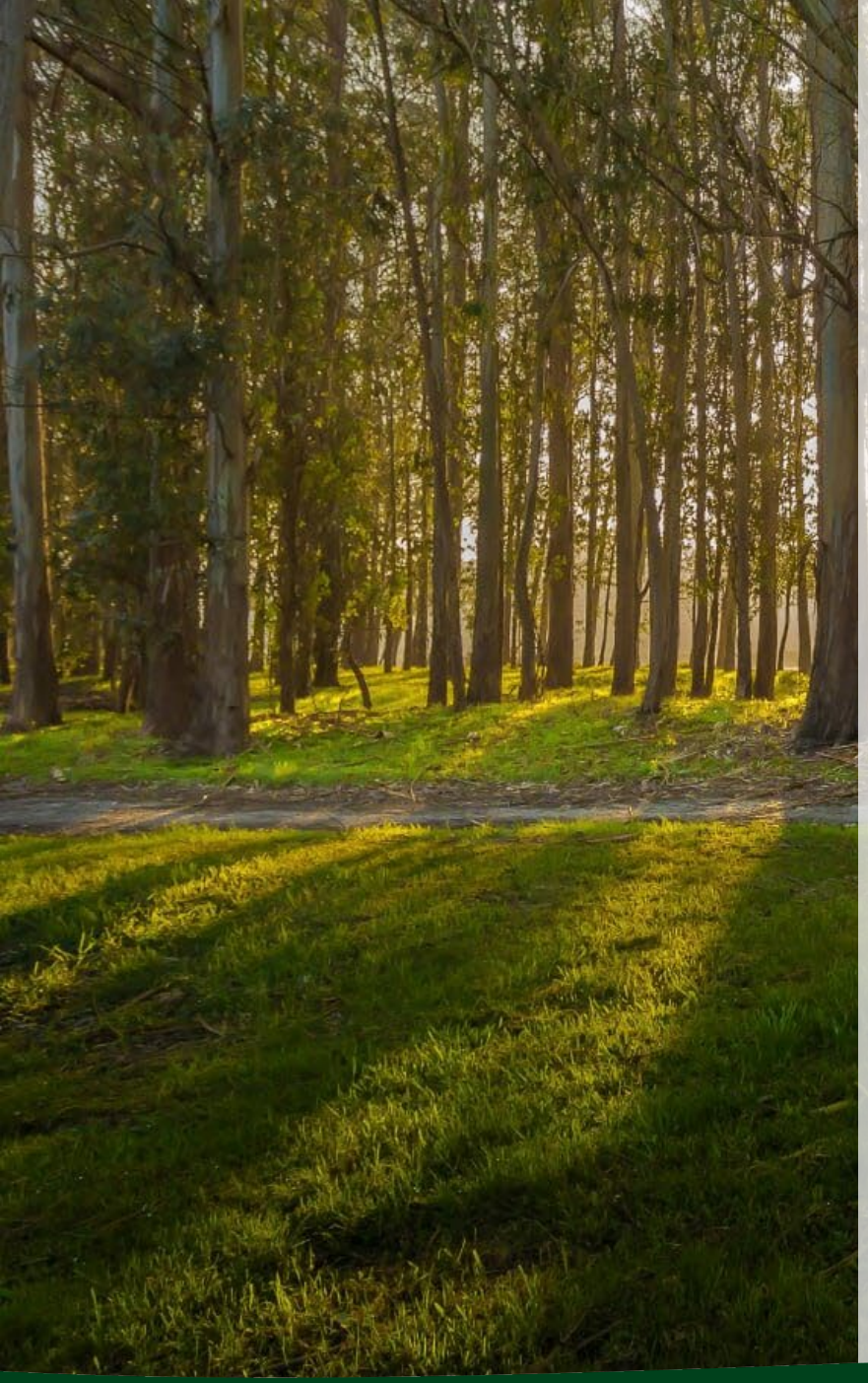

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“A sustainable future begins with responsible choices”

Ence's team

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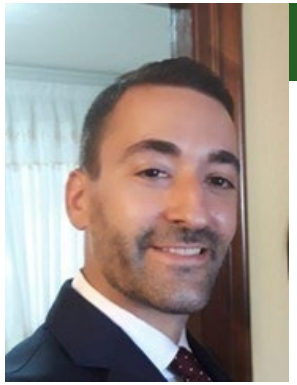

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Sustainalytics Global ESG score: 93/100

MSCI ESG RATINGS A

FTSE4Good

謝謝
DZIĘKUJĘ CI
TAPADH LEIBH
KEA LEBOHA
NGIYABONGA
БАЯРЛАЛАА
MISAOTRA ANAO
TEŞEKKÜR EDERIM
WHAKAWHETAI KOE
DANKIE
TERIMA KASIH
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TANK
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ХВАЛА ВАМ
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Questions?

Please wait for the microphone.

State your name and company.

Please remember to…

Navigate to this session in the mobile app to complete the survey.

Thank you!

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