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# Pollution Prevention & Netzero Carbon

Vale's Digital Journey to achieve sustainable goals

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Mining is the **basis of a chain** that contributes to the **development** of society. It is present in products that are essential to **people's well-being**.

- We exist to improve life and transform the future Together.
- A **global** mining company.
- A company with **strategic** assets.
- One of the **world's largest producers of iron ore, pellets and nickel**.

Take children to school



Bring energy to your home



Exercise your body and mind



Help develop medical devices



Relieve the summer heat



Keep us connected and entertained



# Our presence in operations



+20 Open-cast mines



+15 Underground mines



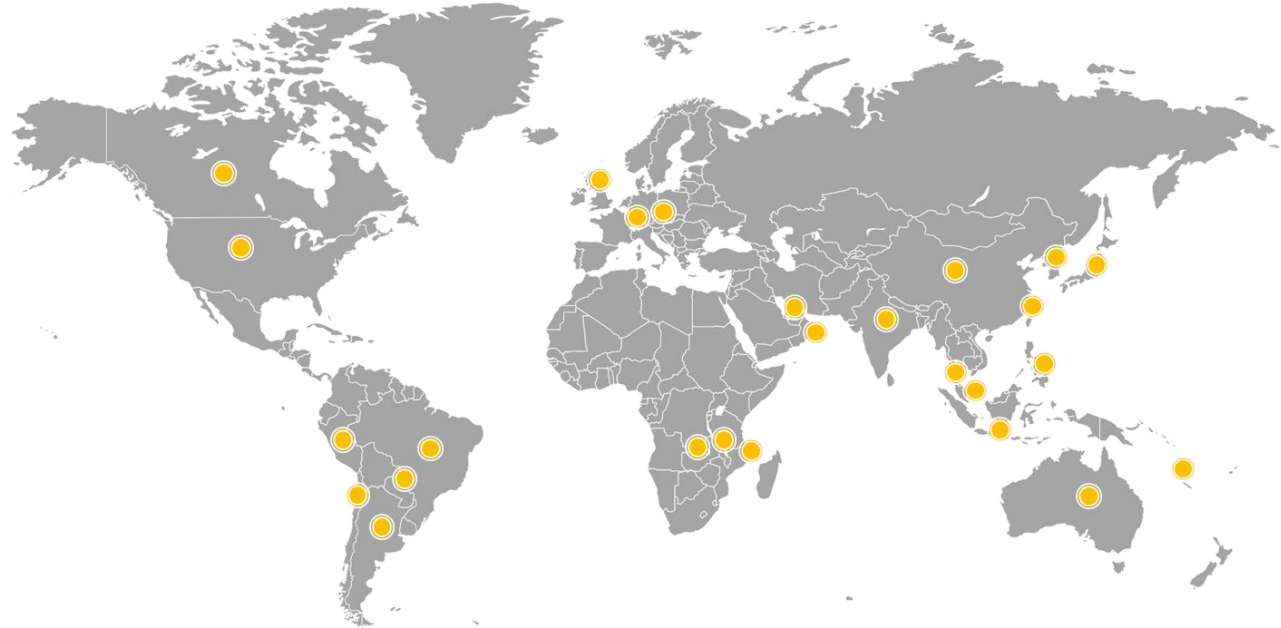
13 Pelletizing plants



2 Railroads



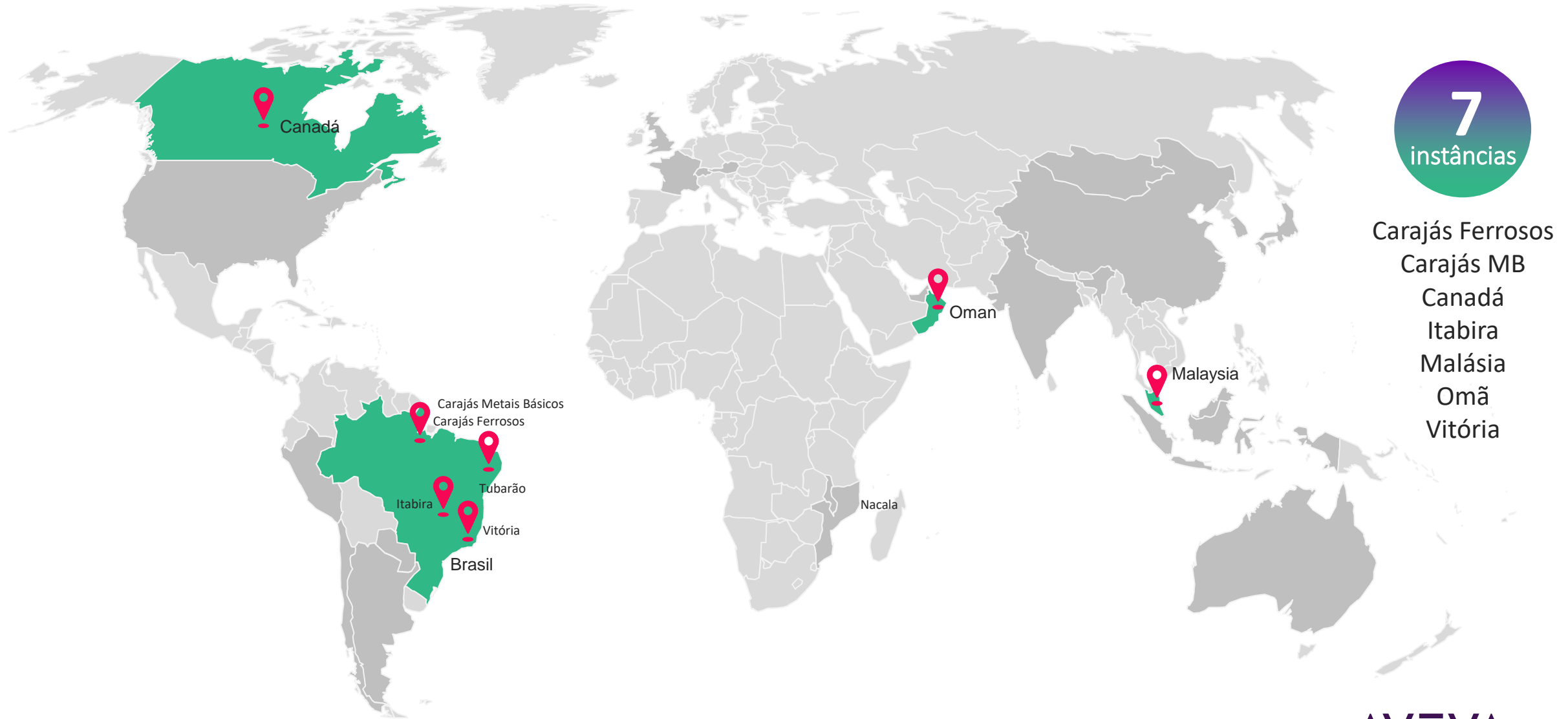
6 Ports of operation



- Iron
- Nickel
- Manganese
- Copper
- Coal



# AVEVA PI SYSTEM SCENARIO IN VALE



7  
instâncias

Carajás Ferrosos  
Carajás MB  
Canadá  
Itabira  
Malásia  
Omã  
Vitória

+80 OPERATIONAL UNITS

AVEVA

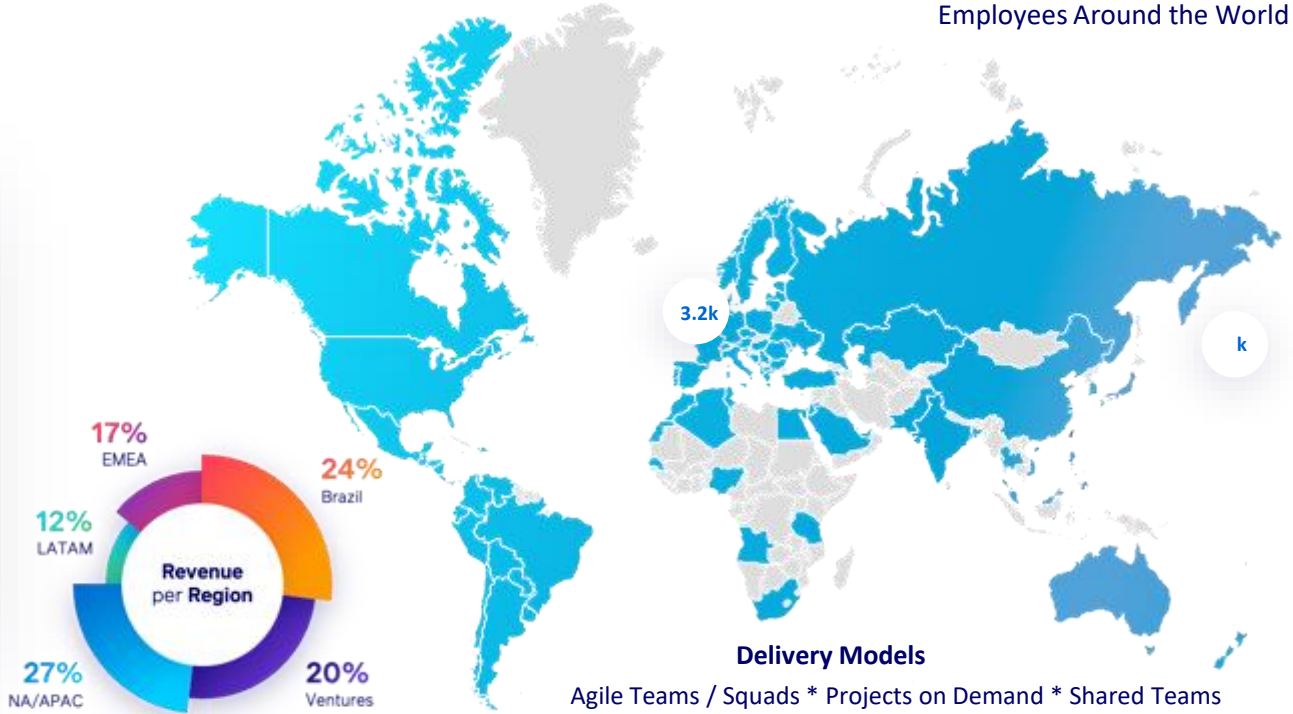
# Stefanini at a Glance

### Industries

- Banking, Financial Services, and Insurance
- Payments
- Energy and Utilities
- Life Sciences and Health Care
- Communication
- Media and Technology
- Consumer Goods
- Manufacturing and Automotive
- Retail

### Area of Expertise

- Digital Transformation
- Next Gen Applications
- Artificial Intelligence
- Automation Everywhere
- Analytics
- Cloud Enablement
- Digital Workplace and Infrastructure
- Digital Marketing
- Cyber Security
- Hybrid Infrastructure
- Smart Enterprise



### Delivery Models

Agile Teams / Squads \* Projects on Demand \* Shared Teams  
 Dedicated Teams \* Onshore, Offshores, and Nearshore



- 104** Countries Delivering Solutions
- 41** Present in Countries
- 32k** Employees
- 44** Languages
- 2.7k** Cities

Profitable and growing YoY since our inception in 1987

### KEY STATS

U\$ 1.5 Bi Revenue 2023	HQs: Michigan – US, Brussels – Belgium, São Paulo – Brazil and Mexico City – MX.
1,260 Active Clients 50% Global / Regional Clients	Global NPS : 65 97% Client Satisfaction 12.1 years Client Relationship avg.
Client Profile: 70% Multinational 66% Revenue above U\$ 1 Bi	Recognized in 95 reports by: FORRESTER Gartner ISG Everest Group



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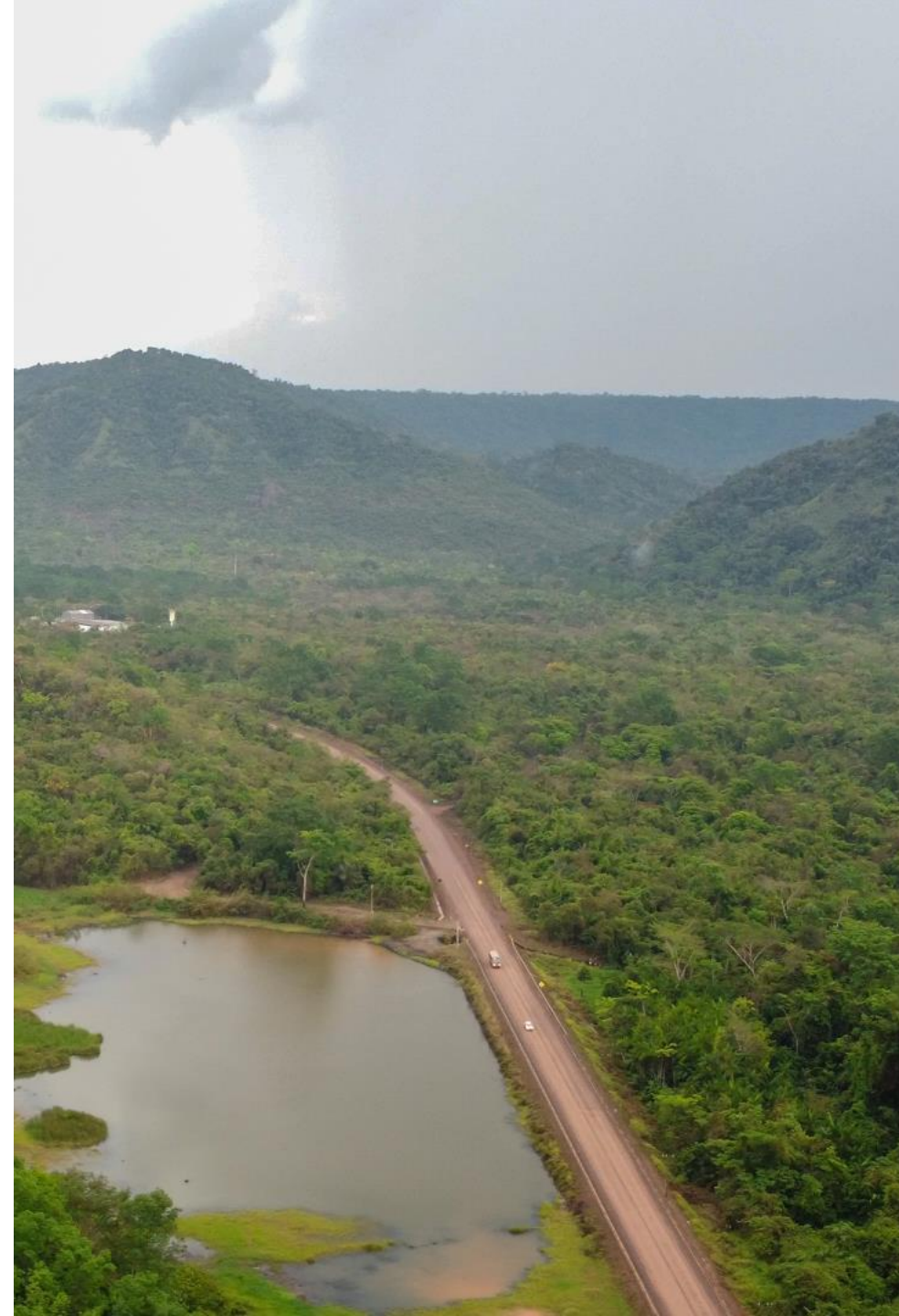
# Business Challenge and Impact

Challenge, Solution and Benefit

AVEVA



To comply with **agreements** signed with the **community** and **regulatory agencies**, Vale SA invests in accelerating the **digital transformation** of the **S11D Environmental Control Center** with the aim of increasing **pollution prevention**, **Netzero Carbon** and **employee safety and health**.





# Pollution Prevention & NetZero

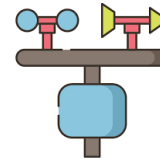
## Pollution Prevention

With the aim of preserving the Environment and meeting legal conditions, the Environmental Control Center monitors the following themes:



### Air Quality (4 Stations)

- Measurement of suspended particles arising from ore transportation.



### Weather (13 stations)

- Used to complement Air and Water condition analysis.



### Water Quality (15 Stations)

- To measure the water condition of rivers, streams and natural lakes.



### Forest Fire Detection (3 Stations)

- Preventing the destruction of fauna and flora;
- Reduction of carbon emissions into the atmosphere from forest fires;
- Preservation of the carbon capture element.



### Hydrology (12 Stations)

- Hydro Balance to identify potential water savings.

# Pollution Prevention & NetZero

## NetZero

**Energy Efficiency** is a key factor in **optimizing costs** and at the same time ensuring **reductions in greenhouse gas emissions**



### Vehicle Fuel

- Fossil Fuel and ethanol consumed by Vale's operational vehicles



### Electricity

- Electrical energy consumed by process plant



### Emulsion

- Product used in mine blast

Vale has committed to voluntarily **protecting** and **recovering** another 500,000 hectares of forest in Brazil by 2030. Of this total, 100,000 hectares will be recovered and another 400,000 will focus on protection.





# Vale's Digital Journey to achieve Pollution Prevention & Netzero Carbon

## Challenge

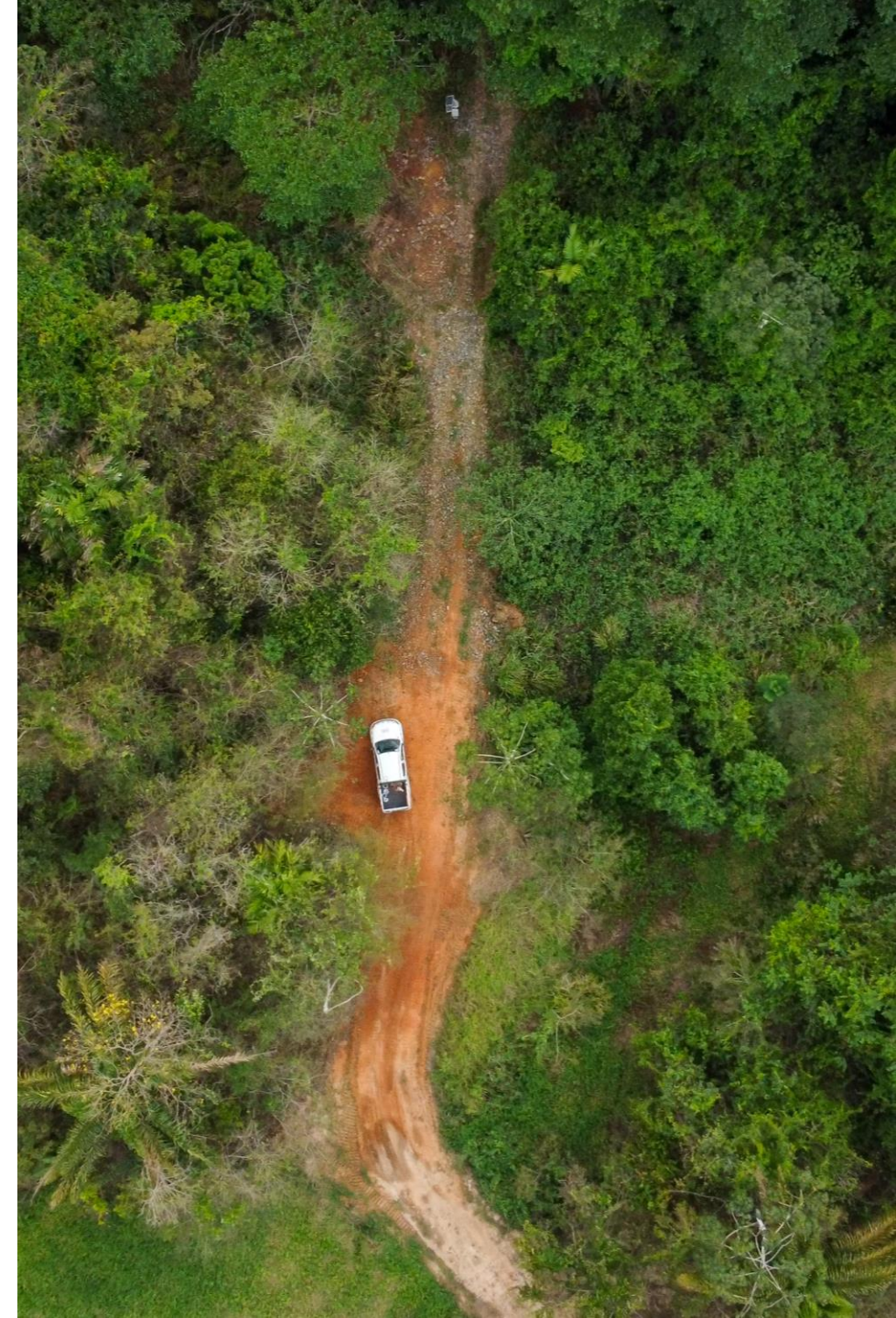
- Decrease or eliminate environmental negative impacts
- Decrease or eliminate environmental fines and operational stoppages
- Reduce employee risk exposure

## Solution

- Centralize all 35 environmental monitoring stations' data in real-time into PI System, designed simple and readable dashboard at PI Vision, reports using PI Datalink, PI Analyses to calculate alarms and alerts to prevent negative impact.

## Results

- **Mitigated risk of fine**
- **operator field trips decreased to 27% per month**
  - reducing the exposure of operators to field risks
  - reducing vehicle carbon emission
  - increasing effective operator work time
- **Automated report and Alarms**
  - reducing failure response time
  - Improving data traceability
  - enhancing information consistency
- **Created a data-driven and innovation culture**



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# Solution

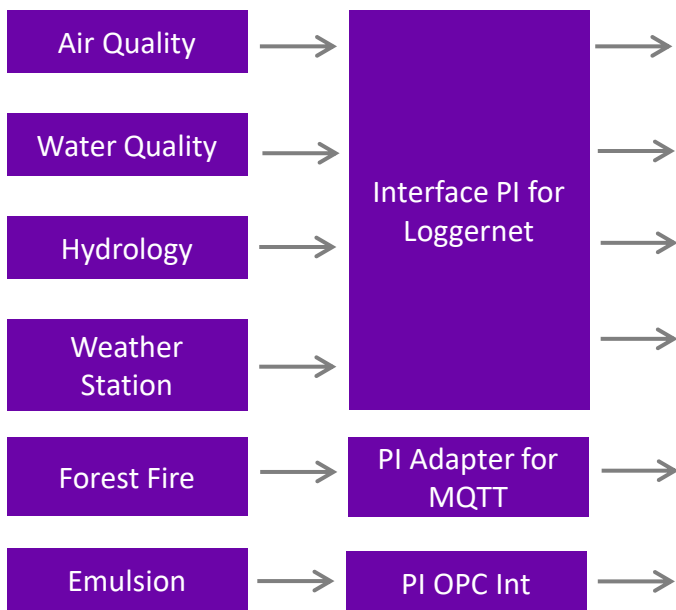
Development of instrumentation and use of AVEVA PI System



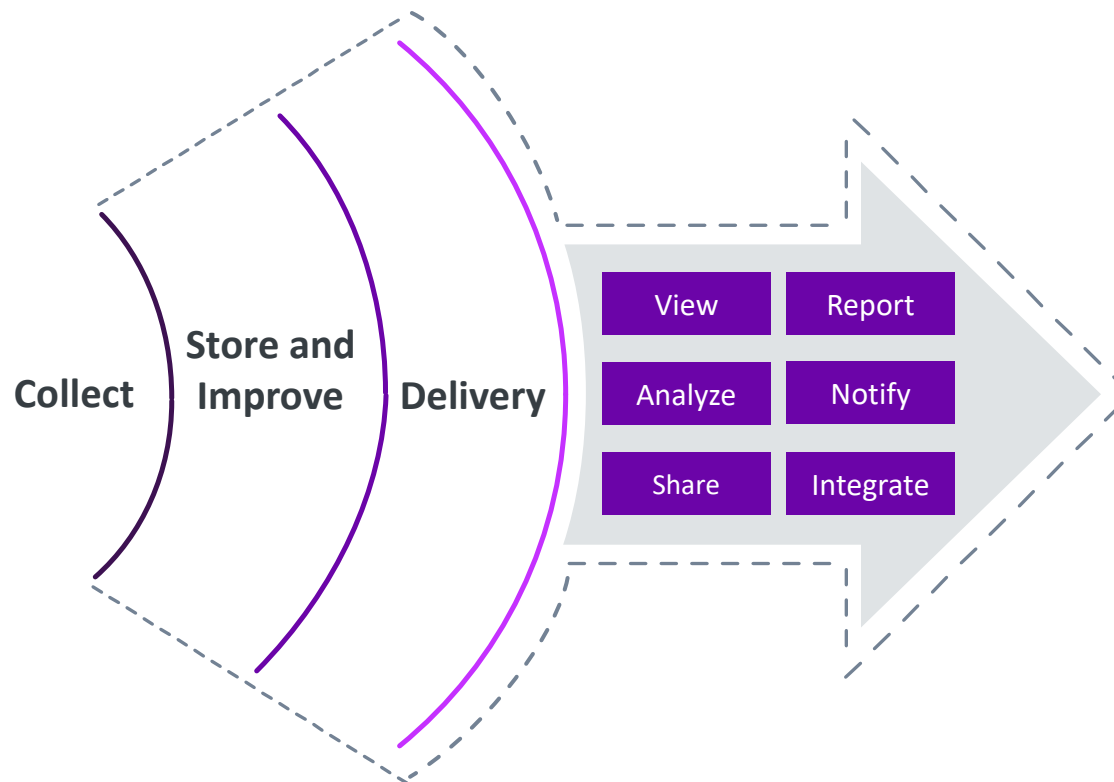


# Infrastructure

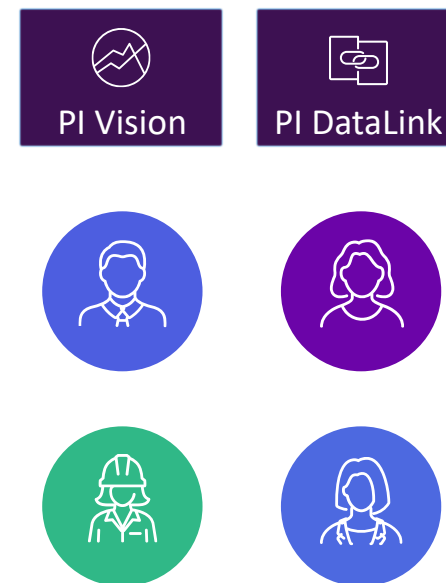
## Data Source: Monitoring Stations



## AVEVA PI System



## Clients



# AVEVA PI AF and Analyses

## Structure and enhance the data

- AVEVA PI AF:
  - **Environmental Operational Efficiency:** Using the hierarchical structuring of data in PI AF, operations staff have instant access to all information in PI Vision enabling operational readiness and reducing failure response time.
- AVEVA PI Analyses:
  - **Reduction of Environmental Impacts:** Applying calculation in PI Analyses made it possible to make quick decisions, based on current and historical data to control environmental conditions.

The screenshot displays the AVEVA PI AF software interface. On the left, a tree view under 'Elementos' lists various monitoring stations, including 'Estações de Monitoramento' and 'Dique 01 Mina-EAQAGSSD09'. The right pane shows the configuration for 'Dique 01 Mina-EAQAGSSD09' with tabs for 'General', 'Child Elements', 'Attributes', 'Ports', 'Analyses', 'Notification Rules', and 'Version'. The 'Attributes' tab is active, showing a table of data points categorized into 'Alarme', 'Informações', 'Monitoramento', and 'Saúde'.

Category: Alarme		
Name	Value	
Alarme	OK	
Alarme Dados Congelados	OK	
Alarme pH	OK	
Alarme Temp. da Água	OK	
Alarme Temp. Datalogger	OK	
Alarme Tensão da Bateria	OK	
Alarme Turbidez	OK	

Category: Informações		
Name	Value	
Código SAP	EAQAGSSD09	
Local	Dique 1 Mina	
Nome	Dique 01 Mina-EAQAGSSD09	
Nome da Estação	Estação de Qualidade da Água Di...	
Responsável	Melquezedequ C.	
Tipo da Estação	Qualidade da Água	

Category: Monitoramento		
Name	Value	
Cor	74,38926	
pH	6,5772	
Temp. da Água	34,005 °C	
Turbidez	19,795 NTU	

Category: Saúde		
Name	Value	
Temp. Datalogger	34,005 °C	
Tensão da Bateria	12,539 V	

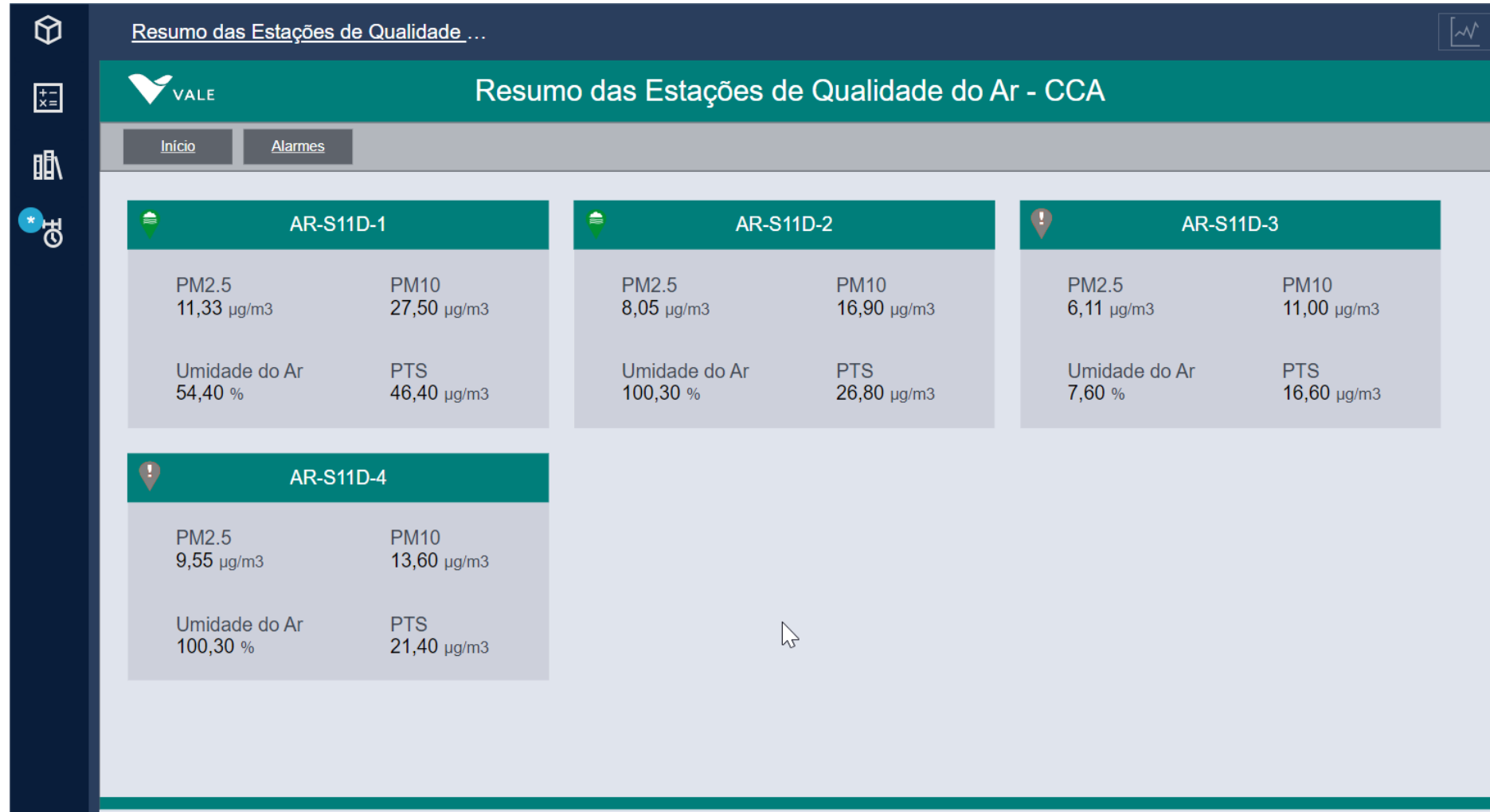
# AVEVA PI Vision

- **Interoperability**
- **Easy access**
- **Easy visualization**
- **Position, Theme, Alerts**
- **Quick decision making**
- **27 Screens**
- **20 users**
- **600 tags**



# AVEVA PI Vision

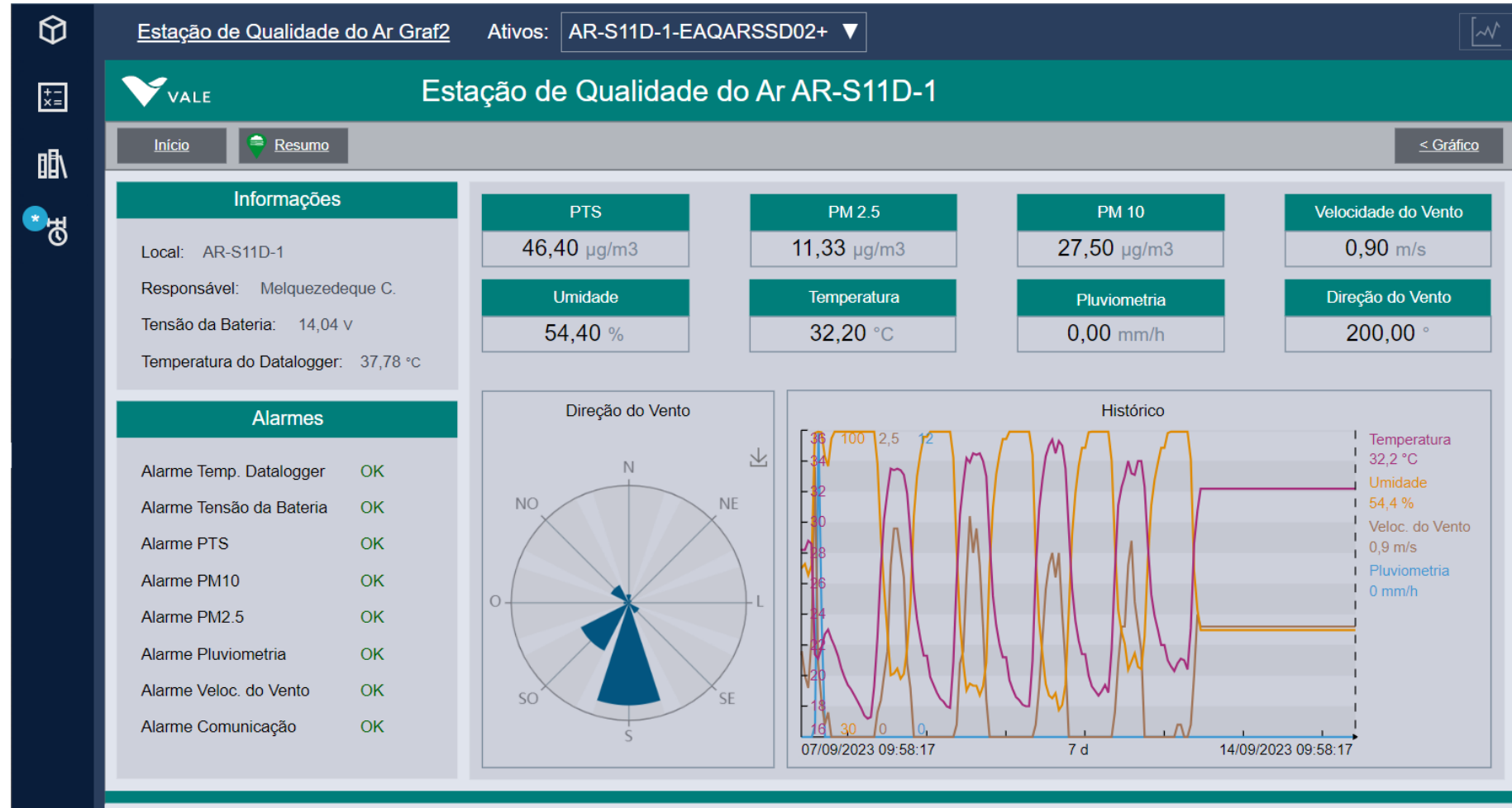
- Quick view of stations with the same theme
- Shows the main information
- Shows alerts





# AVEVA PI Vision

- All measurements
- General information
- Alarm detail
- Custom graphics
- Trend



# AVEVA PI Vision



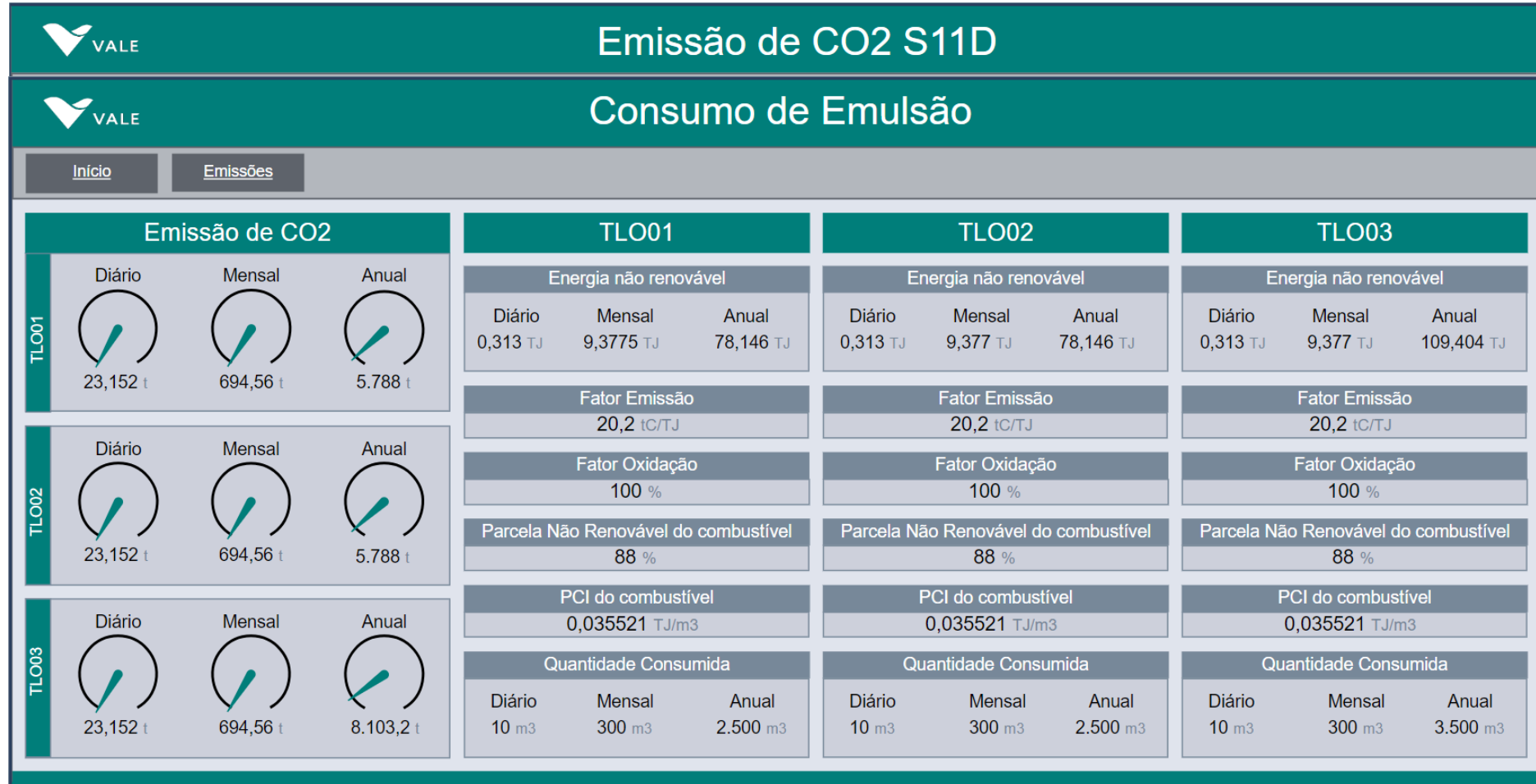
# AVEVA PI Vision

- Easily compare information
- Analyze data from different stations in seconds
- Show real and historical data
- Identify trends



# AVEVA PI Vision


- Calculate and Store data on Carbon Emissions
- Monitoring of Carbon Emissions
- Shows all variables involved in the calculation






# AVEVA PI Datalink

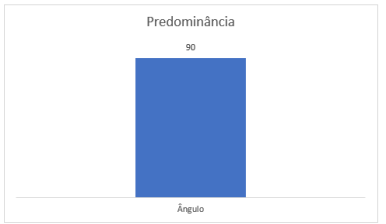
- Governmental Regulations
- Standardization
- Consistency
- Quick and simple
- 6 reports

 VALE
CCA - Centro de Controle Ambiental

Data de Início: 20/03/2023 00:00:00
Data de Fim: 28/03/2023 00:00:00
Tipo da Estação: Qualidade do Ar
Busca Estação: 
Estação: Alojamento 1B-EAQRSSD02

Data	Alarme	Alarme da Bateria	Alarme MP_2_5	Alarme MP_10	Alarme Pluviomet	Alarme PTS	Alarme Temp. Ar	Alarme Temp. Datalogger	Alarme Umidade Ar	Alarme Veloc. Vento	Direção do Vento	MP_2_5	MP_10	Nome da Estação
20-mar-23 00:00:00	Alto	OK	OK	Alto	OK	Alto	OK	OK	Alto	OK	219,15	5,25	68,67	Estação de Qualidade do Ar Alojamento 1B-EAQRSSD02
20-mar-23 01:00:00	Alto	OK	OK	Alto	OK	Alto	OK	OK	Alto	OK	218,78	5,24	68,42	Estação de Qualidade do Ar Alojamento 1B-EAQRSSD02
20-mar-23 02:00:00	Alto	OK	OK	Alto	OK	Alto	OK	OK	Alto	OK	218,42	5,24	68,16	Estação de Qualidade do Ar Alojamento 1B-EAQRSSD02
20-mar-23 03:00:00	Alto	OK	OK	Alto	OK	Alto	OK	OK	Alto	OK	218,05	5,24	67,90	Estação de Qualidade do Ar Alojamento 1B-EAQRSSD02
20-mar-23 04:00:00	Alto	OK	OK	Alto	OK	Alto	OK	OK	Alto	OK	217,69	5,23	67,64	Estação de Qualidade do Ar Alojamento 1B-EAQRSSD02
20-mar-23 05:00:00	Alto	OK	OK	Alto	OK	Alto	OK	OK	Alto	OK	217,32	5,23	67,38	Estação de Qualidade do Ar Alojamento 1B-EAQRSSD02
20-mar-23 06:00:00	Alto	OK	OK	Alto	OK	Alto	OK	OK	Alto	OK	216,96	5,23	67,12	Estação de Qualidade do Ar Alojamento 1B-EAQRSSD02
20-mar-23 07:00:00	Alto													
20-mar-23 08:00:00	Alto													
20-mar-23 09:00:00	Alto													
20-mar-23 10:00:00	Alto													
20-mar-23 11:00:00	Alto													
20-mar-23 12:00:00	Alto													
20-mar-23 13:00:00	Alto													
20-mar-23 14:00:00	Alto													
20-mar-23 15:00:00	Alto													
20-mar-23 16:00:00	Alto													
20-mar-23 17:00:00	Alto													
20-mar-23 18:00:00	Alto													
20-mar-23 19:00:00	Alto													
20-mar-23 20:00:00	Alto													
20-mar-23 21:00:00	Alto													
20-mar-23 22:00:00	Alto													
20-mar-23 23:00:00	Alto													
21-mar-23 00:00:00	Alto													
21-mar-23 01:00:00	Alto													
21-mar-23 02:00:00	Alto													
21-mar-23 03:00:00	Alto													
21-mar-23 04:00:00	Alto													
21-mar-23 05:00:00	Alto													
21-mar-23 06:00:00	Alto													

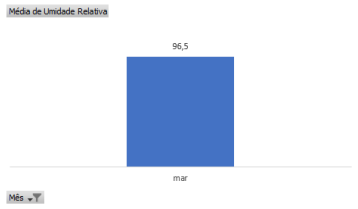
Direção do Vento



Predominância  
90

Ângulo

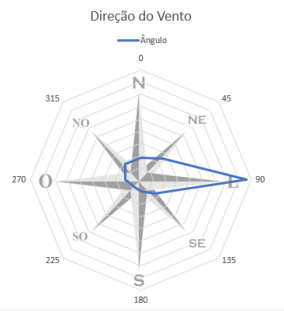
Umidade



Média de Umidade Relativa  
96,5

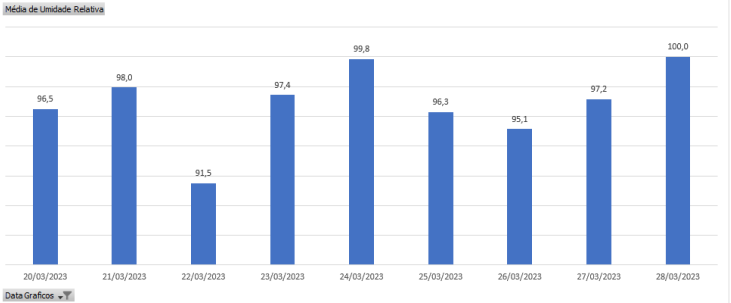
Mês - Y  
mar

Direção do Vento



Direção do Vento  
— Ângulo

Média de Umidade Relativa



Média de Umidade Relativa

Data Gráficos - Y

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# Impact and Results



# Impact and Results

- **Prevent government fines due to unmonitored environmental impacts.**

## Before the Project

- **600km:** Average distance traveled monthly for manual collections.
- **5h20m:** Average time spent collecting and reporting Air Quality data (4 stations).
- **5 Screens:** Number of systems that should be consulted to acquire data.
- **7 days:** Average time required to update all data through manual collection.
- **1 month:** Average time to implement communication infrastructure and integrate station into monitoring platform.

## After the Project

- **200km:** Average distance traveled monthly for preventive maintenance.
- **2 min:** Average time taken to generate Air Quality reports (4 stations).
- **1 Screen:** All data is concentrated on a single synoptic global monitoring screen.
- **5 min:** Stations transmit data every 5 min (battery and data savings).
- **3 day:** Simple and Easy to rollout the solution into other Vale's sites

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# Conclusion



# Conclusion

## Vale Purpose

- We believe mining is essential to the world's development and we only serve society when we generate prosperity for all and **take care of the planet.**



## AVEVA PI System

- With deeper operational insight, faster analysis of critical data, and expanded visibility of remote assets and IIoT sensors, AVEVA PI System **helps you operate more efficiently and sustainably.**



## Ihm Stefanini

- To be a strategic partner providing innovative solutions in search of a **more efficient and sustainable industry.**



Working together, it was possible to obtain real-time and historical environmental data analysis to ensure sustainability and efficiency gains in the environmental operation routines.



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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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Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

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