AVEVAWORLD

ACCELERATE INDUSTRIAL INTELLIGENCE

ENEL:
Powering the 2026 Winter Games with AVEVA PI System

Enel | Plant & Grids Sensoring

Presenters: *Luca Franceschini* | *Enel Global Services*
Pelella Federica | *Enel Global Services*
Giuseppe Di Bartolo | *Ematica*

Who we are

We enable industrial data collection, monitoring and support through PI System-based platforms

ENEL Organization

COMPANY: ***Enel Global Services S.r.l.***

FUNCTIONAL ACTIVITY: **Global ICT**

ORGANIZATION UNIT: **Plant & Grids Sensoring**

EMATICA Organization

AVEVA Partner Ecosystem | System Integrator | ENDORSED

Sustainability Impact Partner

25+ years of **experience** in real-time data management
200+ successful projects delivered
120+ worldwide **clients**
100M+ real-time **tags** managed daily
3B€+ in annual client **savings**
90%+ reduction in client **downtime**

Speakers

LUCA FRANCESCHINI
Head of Plant and Grids Sensoring
Global ICT | Global

FEDERICA PELELLA
Plant and Grids Sensoring
Global ICT | Global

Speaker

GIUSEPPE DI BARTOLO
CRO
Ematica

ematica
Intelligence At Work

Agenda

01

Enel in the world

02

PI System ecosystem at scale (numbers)

03

Operating model:

HSM + AMS + ticketing

04

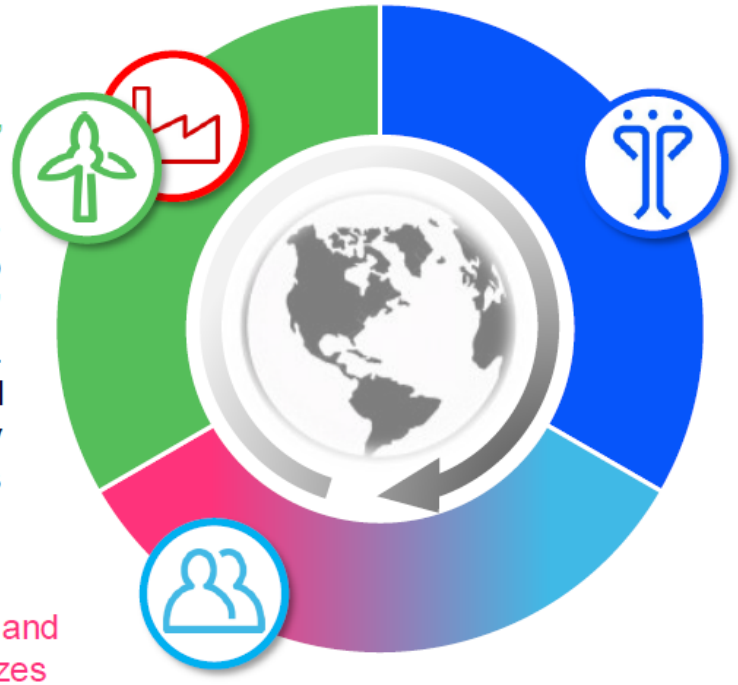
Spotlight: Olympic and Paralympic Winter Games 2026 (architecture, operations, reporting)

Enel in the world

Enel's Global Business Lines

Enel Green Power & Thermal Generation

Leads the energy transition through renewables' expansion, overseeing the development, construction, and operation of assets. Leverages Storage and pumped hydro as key solutions to balance renewables' variability, enhance grids' flexibility, and ensure reliable power supply. In addition, oversees the management of thermal assets globally, maximizing operational efficiency across regions



Enel Grids and Innovation

Develops, operates and renovates electricity networks. Ensures high standards of service quality, safety, resilience and sustainability. Maximizes operational efficiency and enables energy transition through renewables integration, electrification and fast and scalable technological innovation.

Enel Commercial

Develops customized integrated energy solutions and services driving the commercial strategies, optimizes customer value and operational efficiency, while innovating lifecycle solutions, exploring new technologies and business models, and overseeing the e-Mobility portfolio across countries to maximize growth and profitability.

Global Energy and Commodity Management

Leads the **optimization of generation** and customer supply positions in spot energy markets, drives the **valorization of asset flexibility** in ancillary services markets, **oversees gas sourcing optimization** for thermal generation and customer portfolios, and **maximizes integrated margins** through structured hedging and trading strategies.

Enel's leadership

World Presence

27 Countries

World's largest player in renewables

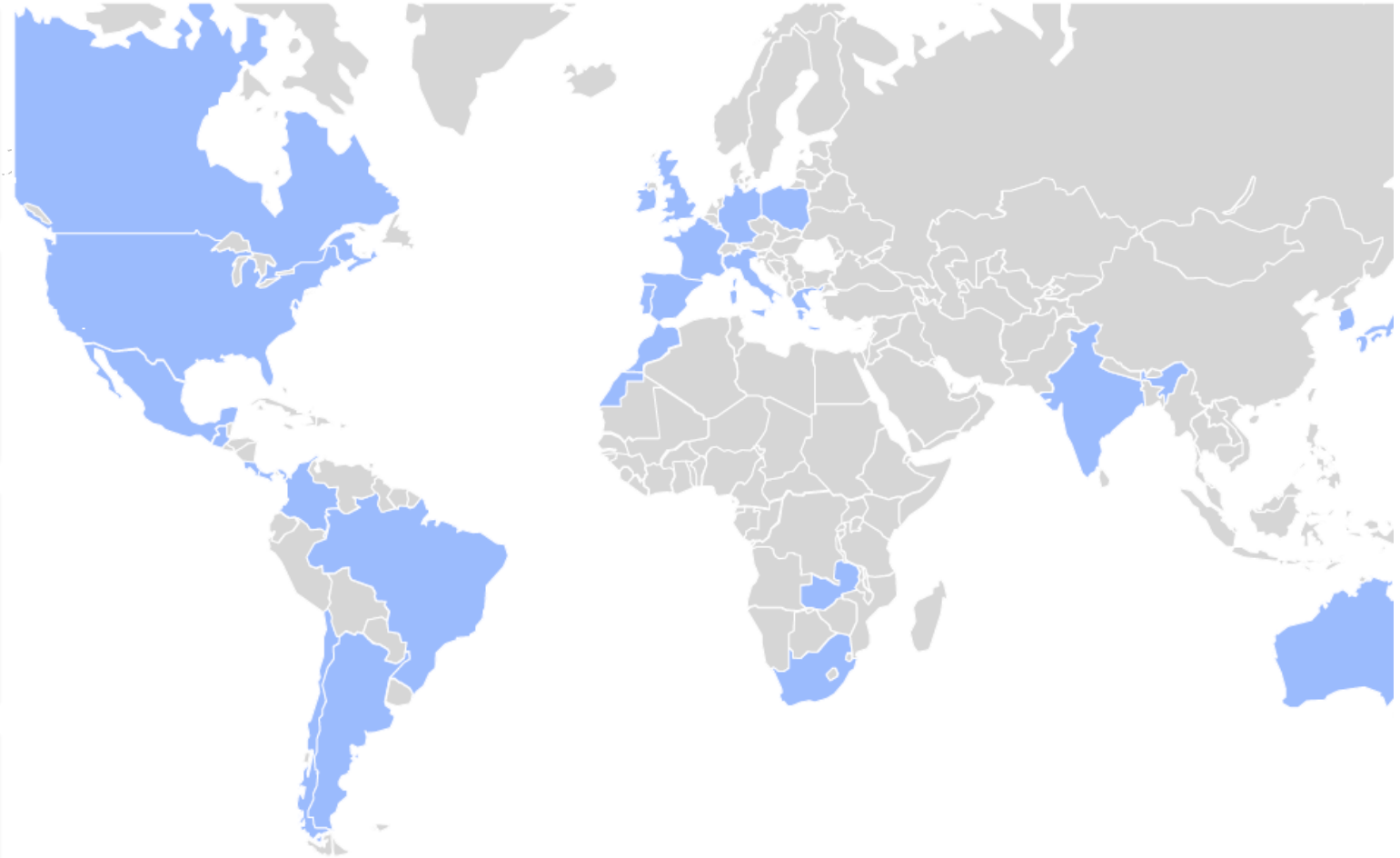
~ 68 GW
installed capacity[1]

1st network operator

~69 mn end users

Largest retail customer base worldwide

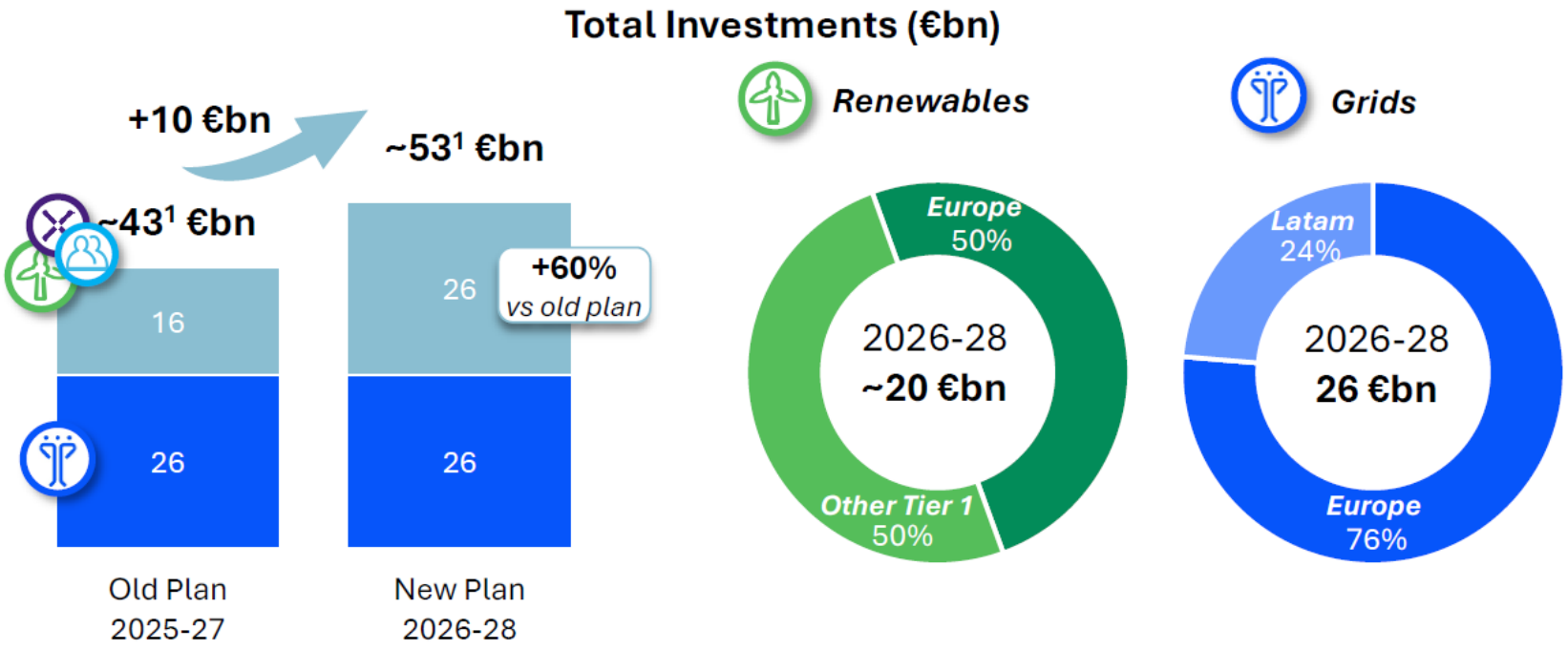
54 mn customers[2]



FY data; Benchmark update: data as of 31.12.2025; Enel's leadership in the different categories is defined at a Global level among listed companies, excluding companies with predominant state control.1. It includes managed capacity and BESS; 2. It includes power customers (liberalized and regulated markets) and gas customers

Energy context: Strategic pillars

Acceleration for a new strategic positioning



Business KPIs

	Grids	Renewables	Customers
	RAB Growth (€bn)	RES capacity (GW)[2]	Clients (mn)[3]
	47	68	23
	2025E	*2025*	*2025*
	58	**>80**	**~26**
	2028	*2028*	*2028*

Further **investments** in **grids** to **increase resilience** and **lead** the **transition**

Focus on **Tier 1 countries** to **reduce risk** and **enhance value**

1. Total Investments, split does not include other 2. It includes consolidated and deconsolidated capacity and BESS 3. Liberalized market: power, gas and fiber

PI System ecosystem at scale (numbers)

Plant Data Gathering

What does it mean?

AVEVA PI System represents main Enel worldwide Platform for data collection process directly from the plant, providing a structured BD to guarantee a high level of availability and quality of the data gathered

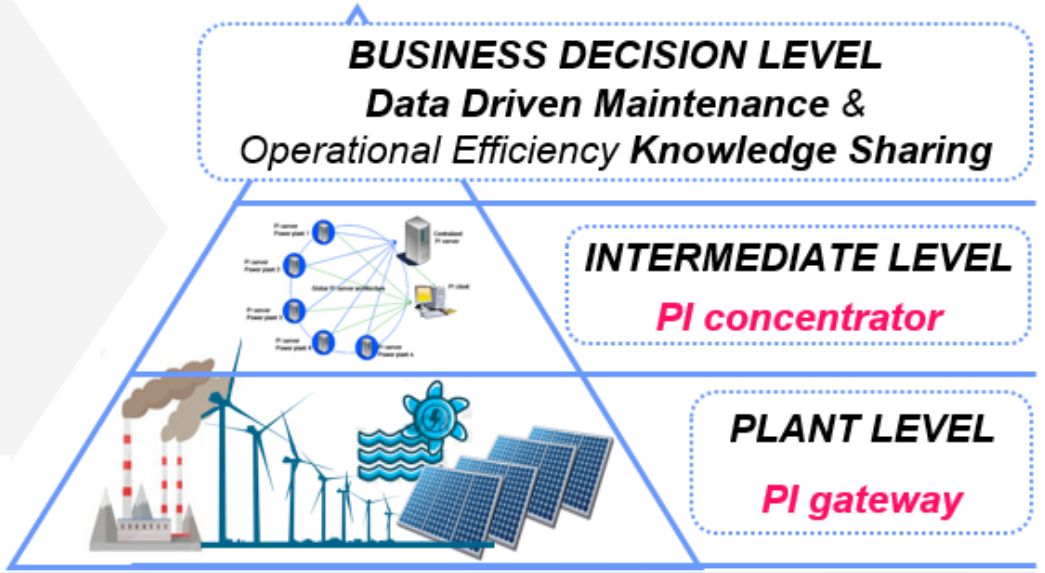
SUPPORTED PERIMETER

- ***Global Applications***
- ***Local Applications***

MAIN ACTIVITIES

- Predictive Analysis
- Performance Reporting
- Big Data Analysis
- Plant Monitoring System
- Monitoring rooms
- Plant Operations System

Data as key driver for advanced Analysis & Monitoring…



…at each level

PI System Global Footprint

Enel PI System machines & components

682
Machines
(+620 actively monitored)

Core PI Components

73	PI Data Archives
66	PI Asset Framework
16	PI Vision
8	PI Web API
28	PI SQL Database
491	PI Gateways

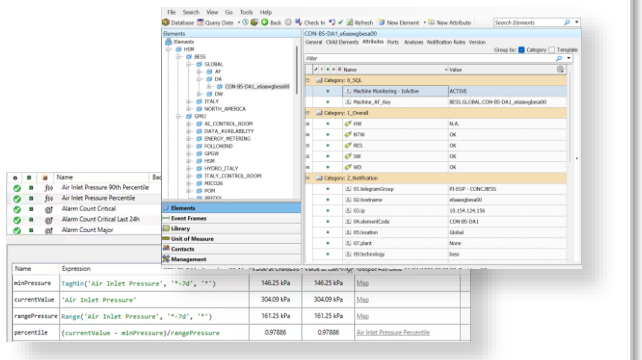
1.637 Data Acquisition Components
(Interfaces, Connectors, Adapters)

2.113 Total Data Sources

PI AF, Analysis & PI Vision numbers

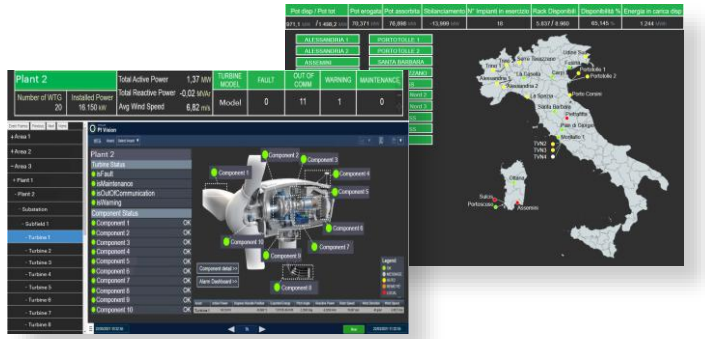
PI AF & Analysis *Numbers* [1,2]

- AF databases **>300**
- Analysis **>2.500.000**
- Signals **>27.000.000**
- Daily Executions **>500.000.000**



PI Vision *Numbers* [3]

- Num Displays **21.710**
- Display Owners **1.851**
- Num Users **5.924**
- Daily Users **1.056**

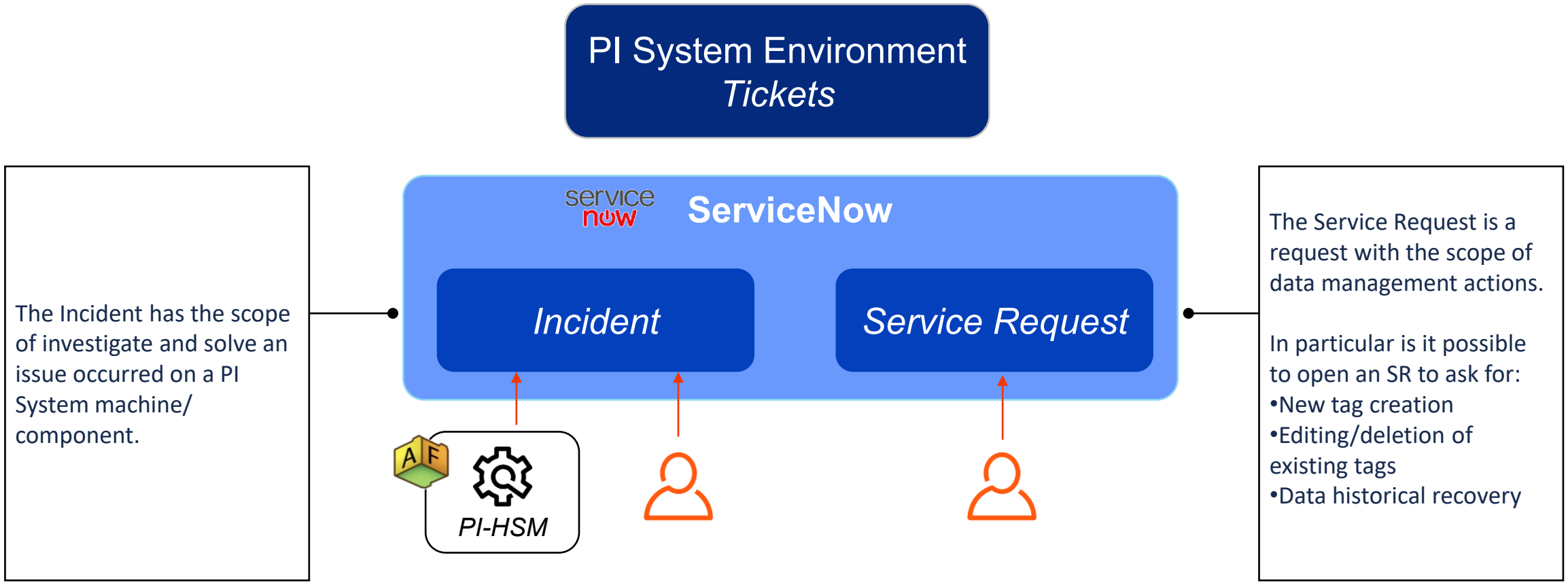


1. Considering the main monitored AF servers 2.Quality environment, Grid area and some segregated servers are excluded 3. Numbers referring to 2025

Operating model:
HSM + AMS + ticketing

PI System Ticket Opening

Incident and Service Request



Monitoring: HSM coverage & capabilities

The whole PI platform is monitored in real time to guarantee the maximum data reliability and availability **acting promptly** to solve the problem

ERROR RAISED

An error occurs on the PI System Infrastructure

HSM ERROR DETECTION

Hardware Software Monitoring tool catch the error

A ticket on Service Now is created automatically

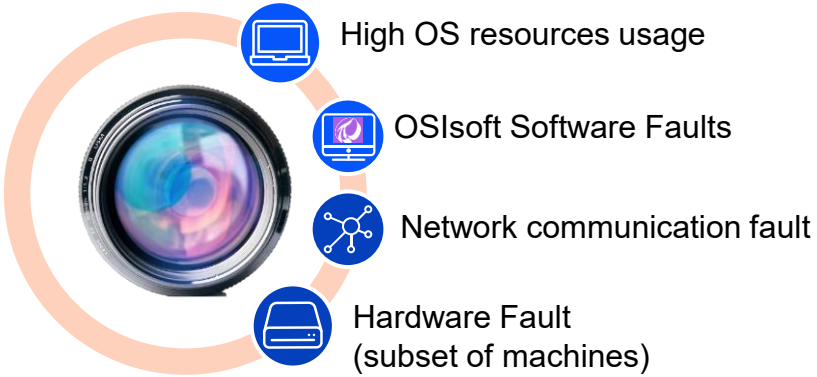
SERVICE NOW TICKET

TELEGRAM MESSAGE

Users receive a notification on Telegram with the error details

ISSUE TYPES

Issues collected in the HSM tool



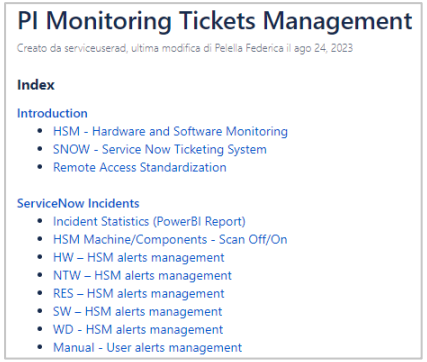
- High OS resources usage
- OSIsoft Software Faults
- Network communication fault
- Hardware Fault (subset of machines)

DASHBOARDS

Dashboard with the real-time situation on the entire PI System landscape

DOCUMENTATION

PI incident management guidelines to help users in the resolution of issues



PI Monitoring Tickets Management

Creato da serviceuserad, ultima modifica di Pelella Federica il ago 24, 2023

Index

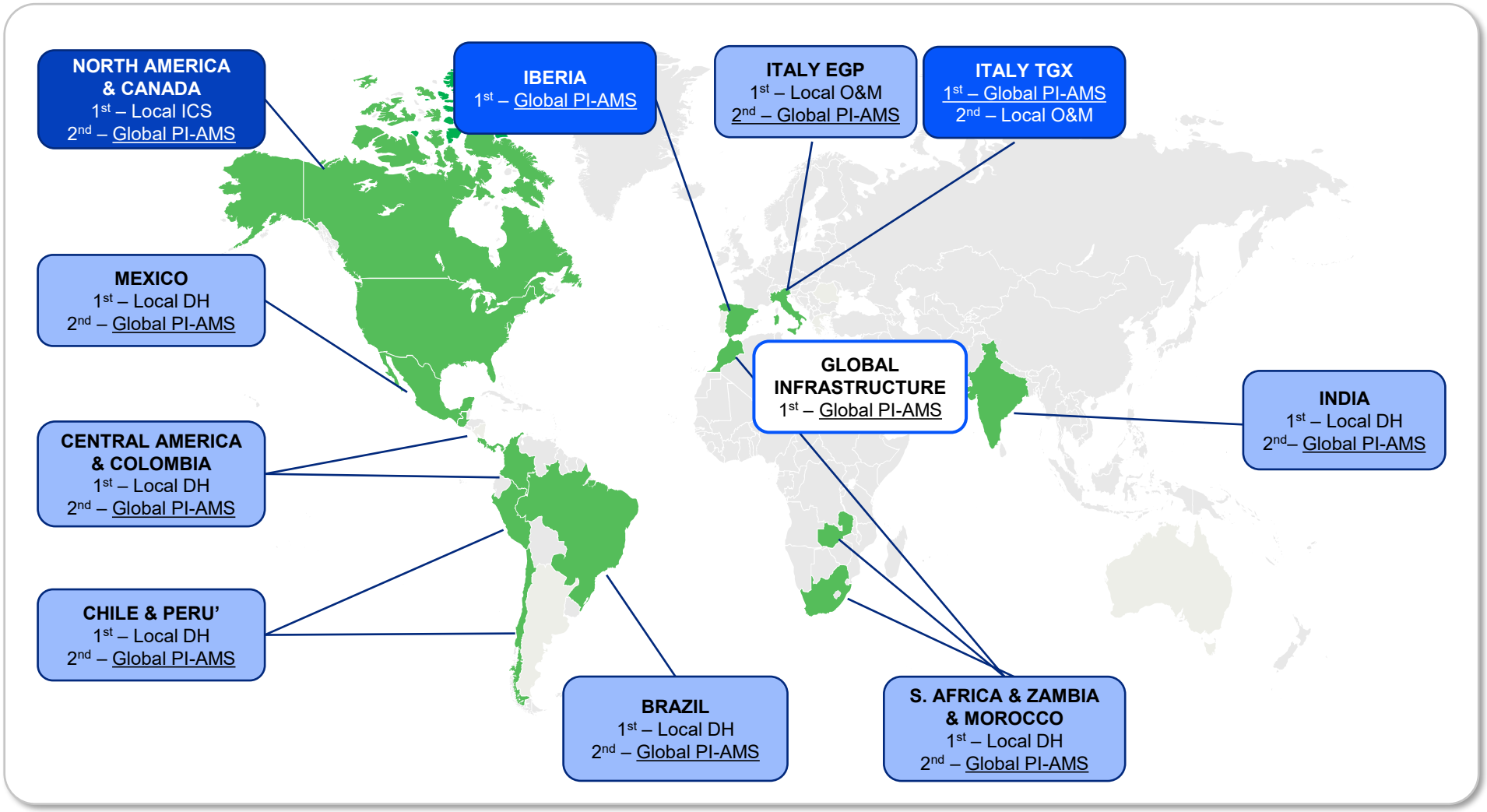
Operating model: AMS & ticketing

Global, multi-tier support structure

I Level of Support

II Level of Support

III Level of Support
GLOBAL DH



Map colours indicate HSM configuration status, callout colours indicate support levels status.

Spotlight:
Olympic and Paralympic Winter Games 2026 (architecture, operations, reporting)

Milano Cortina 2026 - Project

Introduction

Challenge

- **Ensure reliable power delivery** by managing multiple power sources (public supply and local GE/UPS)
- Build a **complex monitoring system** in a short time slot
- **Monitor the metrics and the consumption data** for each of the operative distributed Venues

Solution

- **Identify needs in terms of parameters to be monitored** in compliance with the required criteria
- **Develop a monitoring system**
- **Prepare an energy accounting system** with the aim of determining the actual characteristic consumption of each venue

Benefits

- **Real-time supervision** of the parameters of interest for each venue
- **The ability to intervene immediately** in case of a malfunction
- **Data availability** for reporting, analysis and statistics

Scope of the project

Venues details

Milano Cortina 2026 Winter Olympic & Paralympic Games

Feb. 6, 2026 – Mar. 15, 2026

DSO: e-distribuzione DSO: other

15	Competitive Venue	Region
	8	Lombardy
	4	Veneto
	3	Trentino Alto Adige

3	Non-competitive venues	Region
	2	Lombardy
	1	Veneto

***e-distribuzione* acts as the DSO in 8 of the 18 venues:**

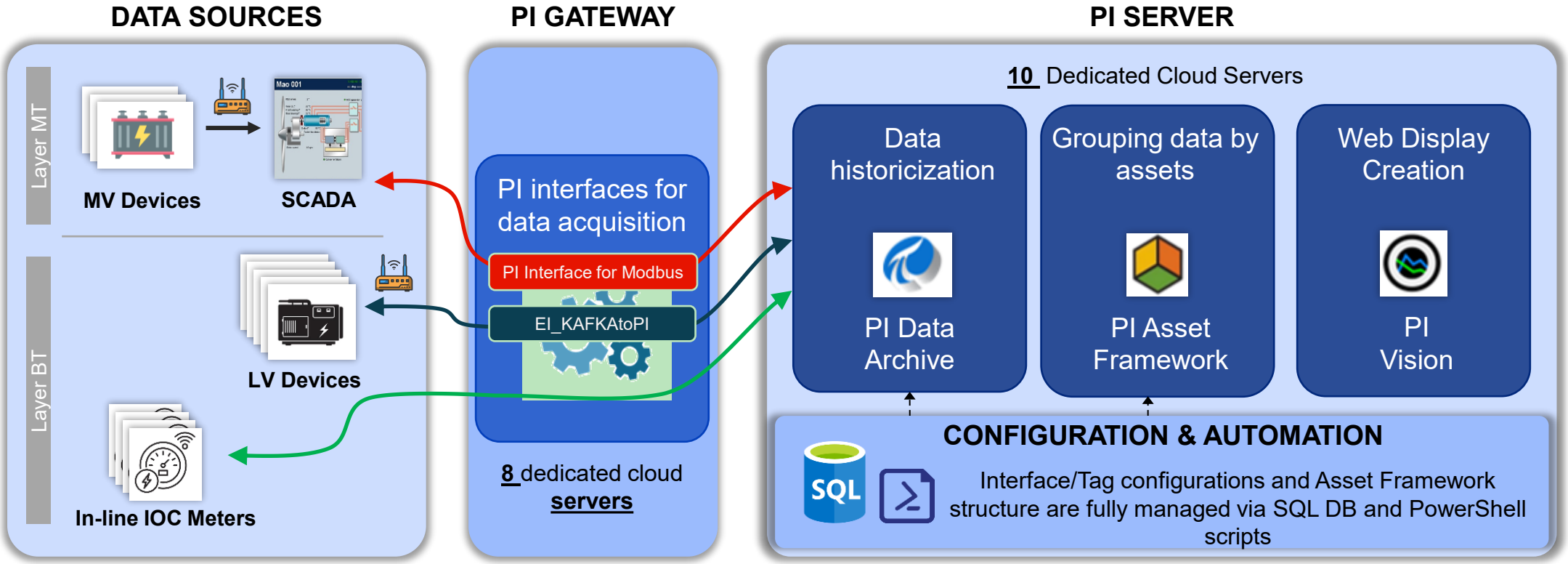
- ***5 venues** in **Veneto**, located in Cortina, Tofane, and Fiames*
- ***3 venues** in **Livigno and Bormio**, in Lombardy*

***In the remaining 10 venues**, the role of DSO is performed by the following operators:*

- ***UNARETI**, in the 7 venues in Milan, Lombardy*
- ***EDYNA**, in the venue in Anterselva, Trentino-Alto Adige*
- ***SET**, in the venue inTesero and Predazzo, Trentino-Alto Adige*

Monitoring System: PI System Architecture

Details on how the PI (Plant Information) monitoring system is implemented



Cloud **redundancy** is guaranteed for each feature (PI Gateway and PI Server)

18 Venues with **75 MV/LV cabins** — Data collected via the STM SCADA system provided by Enel

More than **750 BT devices** — Data collected directly from devices installed in the field by the Fondazione MiCo

Approximately **200 IOC devices** — Data collected from dedicated devices installed by the CIO's partners

Service Access Point

Technology

AVEVA **PI Data Archive** to store all the data/information

AVEVA **PI Asset Framework** to organize and contextualize data

AVEVA **PI Vision** for MV/LV Monitoring

AVEVA **PI Builder** for PI Point creation/modification and AF structure building

AVEVA **PI DataLink** for reporting

AVEVA **PI Interface** for **Modbus** for LV data acquisition

Ematica **interface** development for **KAFKA** measures and events integration

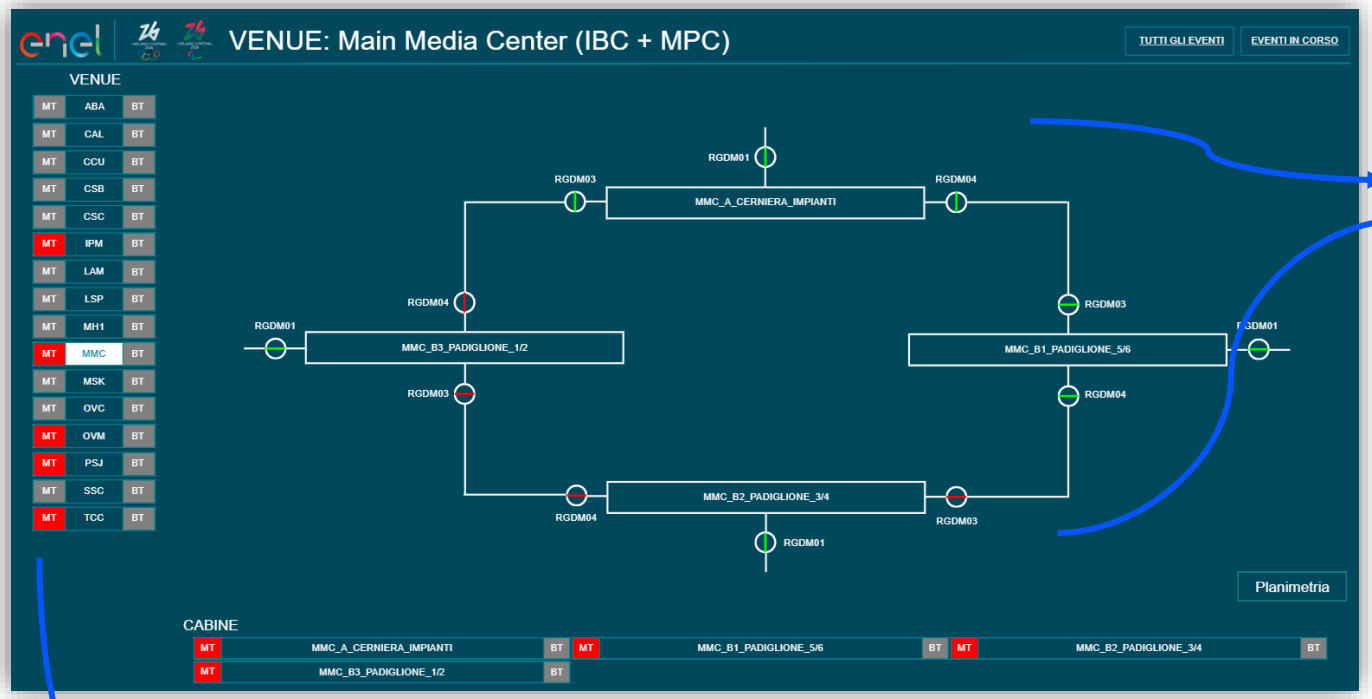
SQL Database as SSOT + **Powershell** Scripting for automation

Ematica *Image Viewer* **PI Vision Widget**

Monitoring System: The Application

Navigability and usability (1/2)

The monitoring system is a **graphical application** that provides control room **operators with detailed information**.
Operators can easily and intuitively navigate through the various views to **quickly identify anomalies in all MV and LV devices**.



Overview of all Venues with a preliminary indication of their general status, with anomalies highlighted in red

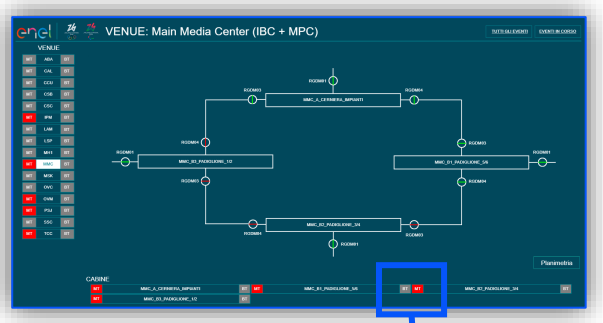
By selecting a venue, you can **check the status of all MV/LV cabins** and the **associated LV devices**, such as the corresponding **circuit breakers**, along with an indication of their **status**:

- green = proper operation under normal conditions
- red = anomaly

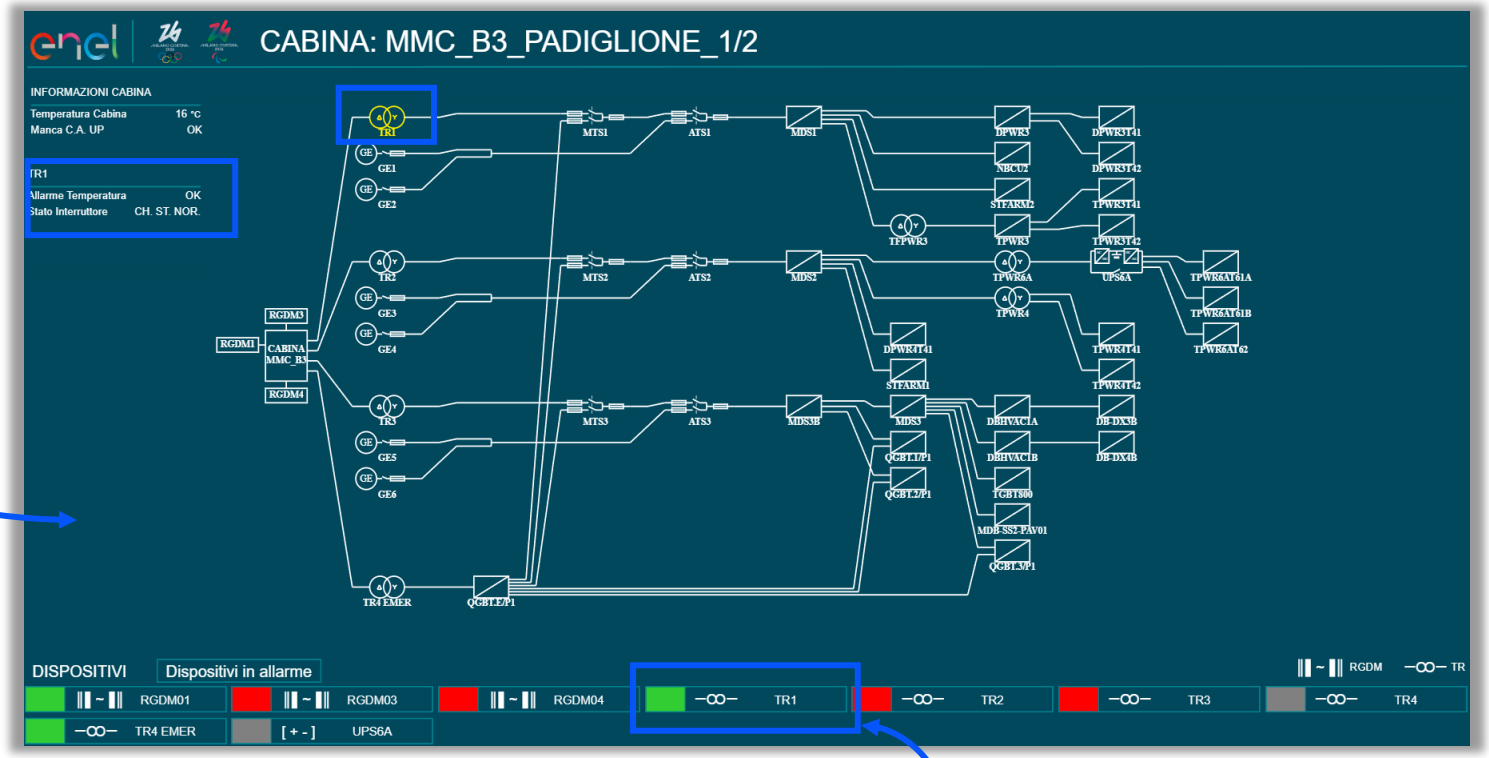
Mobile device compatibility to facilitate field operators' work.

Monitoring System: The Application

Navigability and usability (2/2): detailed monitoring



From the Venue details screen, **selecting an MV/LV cabin** allows operators to **view its single-line diagram**, with a list of connected devices.



When users select one of the cabin devices listed it is highlighted in **yellow** on the single-line diagram, **allowing to locate it immediately**; at the same time, the measures **associated with the selected device are displayed** in the left section of the screen.

Monitoring system: Supporting tools

Analysis of Anomaly and Failure Conditions

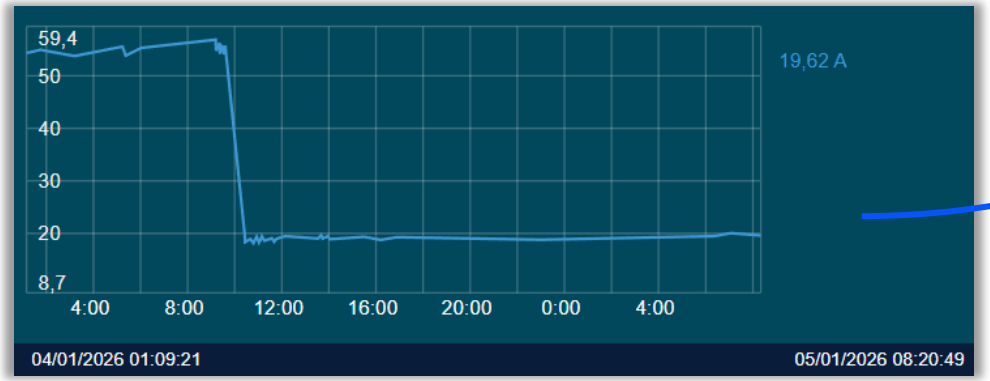
List of **fault events** and **error states**, including the **start and end times of each event,** calculated through **HSM**.

Main Media Center (IBC + MPC)

EVENTI IN CORSO

EVENTI

Event Name	Start Time	End Time ▲	Duration
MMC_B3_PADIGLIONE_1/2^RGDM03 - Interruttore Fuori Stato Normale - 2026-01-04 10:26:00	04/01/2026 10:26:00	In Progress	3d
MMC_B3_PADIGLIONE_1/2^RGDM04 - Interruttore Fuori Stato Normale - 2025-12-19 10:25:00	19/12/2025 10:25:00	In Progress	19d
MMC_B2_PADIGLIONE_3/4^RGDM04 - Interruttore Fuori Stato Normale - 2025-11-22 14:05:00	22/11/2025 14:05:00	In Progress	45d
MMC_B2_PADIGLIONE_3/4^RGDM03 - Interruttore Fuori Stato Normale - 2025-11-20 11:04:00	20/11/2025 11:04:00	In Progress	47d
MMC_B3_PADIGLIONE_1/2 - Mancanza C.A. su UP - 2025-12-17 02:16:00	17/12/2025 02:16:00	17/12/2025 02:19:00	3m
MMC_B3_PADIGLIONE_1/2^RGDM01 - Interruttore Fuori Stato Normale - 2025-11-20 10:53:00	20/11/2025 10:53:00	19/12/2025 10:28:00	28d 23h
MMC_B3_PADIGLIONE_1/2^RGDM01 - Interruttore Fuori Stato Normale - 2025-12-27 07:45:00	27/12/2025 07:45:00	29/12/2025 15:17:00	2d 7h
MMC_B3_PADIGLIONE_1/2^RGDM03 - Interruttore Fuori Stato Normale - 2025-12-29 15:16:00	29/12/2025 15:16:00	03/01/2026 15:46:00	5d
MMC_B2_PADIGLIONE_3/4^RGDM01 - Interruttore Fuori Stato Normale - 2026-01-03 15:45:00	03/01/2026 15:45:00	04/01/2026 10:27:00	18h 42m



For each measured parameter, users can **view its historical trend and failure rate** in order to analyze its evolution.

Milano Cortina 2026 - Reporting System

The metrics acquired by the MV/LV Monitoring System were highly granular and available for energy Accounting Reporting Systems.

By using them **we were able to create an insight report of energy consumption** (i.e. daily) **for each individual Venue**:

PI DataLink

SECTIONS

VENUE RESUME

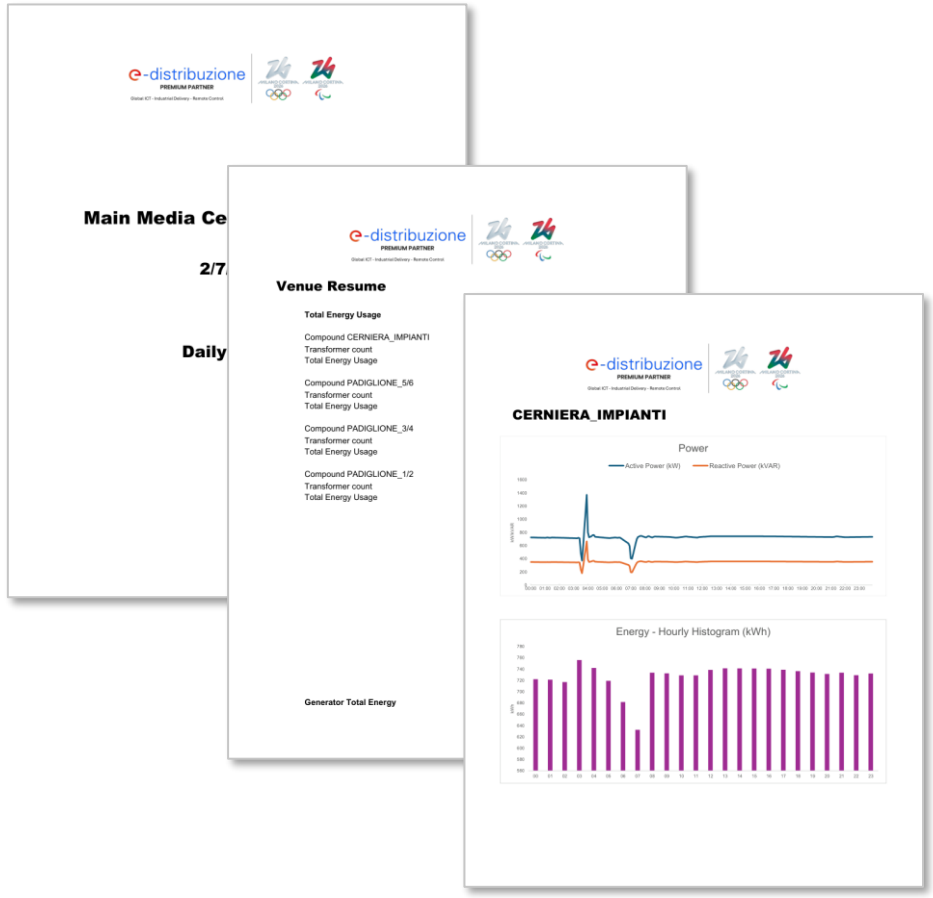
- Total energy used overall
- Energy used per service (*limited to power center tier*)
- Total energy produced by the GE

VENUE DETAIL

- Venue load curve (quart-hour data) overall
- Load curve per service (limited to power center tier)
- Load curve per GE

VENUE EVENTS

- Event log (*e.g.: circuit breaker trip, ATS source change, generator start/stop etc.*)



Milano Cortina 2026 - Key Results

Conclusive Numbers

18

Monitored Olympic and Paralympic Venues

11.387	65	~100	92
Tags acquired	*Source Device Models for BT*	*Tech App Users*	*PI Vision Displays*

Real-time granular monitoring *with PI System,* ***energy accounting by venue****, and* ***multi-level operational support***

ematica Intelligence At Work

Thank you