



A2A Mobile Real-Time Asset Monitoring

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Agenda

- A2A Company
- Hydro and Thermo Plant in a single box
- PI Vision portal for all key users (OT/IT)
- Obtained Results and Business Impact
- Future plan and next step
- Summary and Conclusion

Background

A2A Company

A2A is the largest Italian multi-utility company, a leader in the energy, environment, heat and networks sectors.

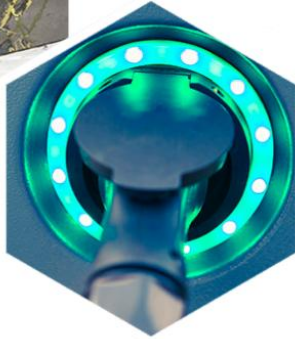
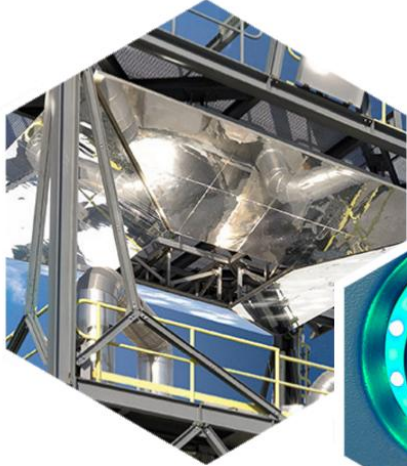
A2A is currently:

- **the Italian leader** in environmental services and district heating
- **the second-largest** domestic producer of energy, with a product mix geared to renewable sources
- **the second-largest** operator in electricity distribution networks
- **one of the largest** in gas and water cycle networks



A2A Mission

*High quality
Efficient Services
Sustainable Innovation*



*Open to the change
New business model
Green Economy and Smart City*

A2A Services and Numbers

Beyond Energy

 ELECTRICITY AND NATURAL GAS	 ENVIRONMENT	 SMART CITY
 DISTRIBUTION NETWORKS	 HEATING AND SERVICES	 WATER CYCLE
 ENERGY EFFICIENCY	 PUBLIC LIGHTING	 GENERATION



€ **5.1 BN**
Group revenues

 **13,494**
Group people

 **35.6%**
Proportion of electricity
produced from renewable
sources

 **1.45 MLN**
The tonnes of urban waste
collected and managed

A2A Plants

- *Hydroelectric*
- *Thermoelectric*
- Solar energy system
- Cogeneration and Thermal
- Waste to energy
- Integrated waste cycle
- Integrated water cycle
- Networks



Hydro and Thermo Plant

Hydro

- Mese - 391 MW
- Valtellina - 800MW
- Friuli - 235 MW
- Calabria - 484 MW

Thermo

- Chivasso – 1.179 MW
- Piacenza – 855 MW
- Cassano – 760 MW
- Mincio – 381 MW
- Sermide – 1.154 MW
- Monfalcone – 336 MW
- Gissi – 840 MW
- Brindisi – 640 MW
- S. Filippo del Mela – 960 MW

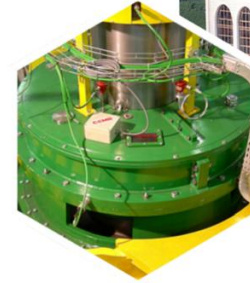


Challenge

Business challenge

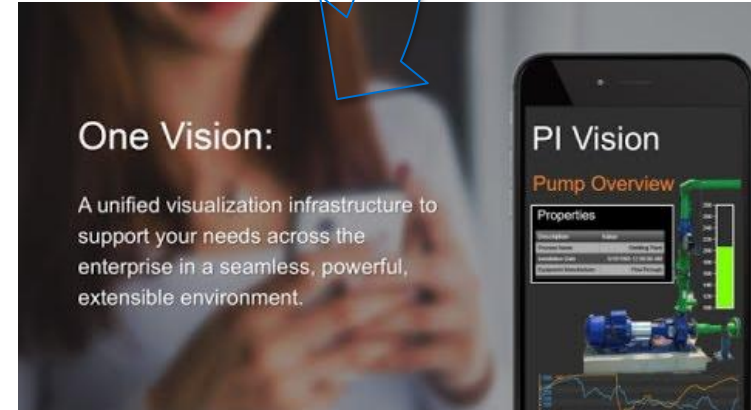
Plant Generation business challenges:

- Reliability and availability
- Increase life equipment
- Avoid plant failure
- Early failure detection
- Flexibility and ramping
- Provides notification
- Monitoring infrastructure
- ***Tablet and Mobile support***
- ***One platform for all key users***



PI Vision - All Plants data in a single box

- Provides all plant data to all key personnel
- Assuring a reliable infrastructure
- Notify alert and messages
- Monitoring infrastructure to guarantee a continuous services
- Web interface for all users with right profile and security
- Share data and info in a collaborative way

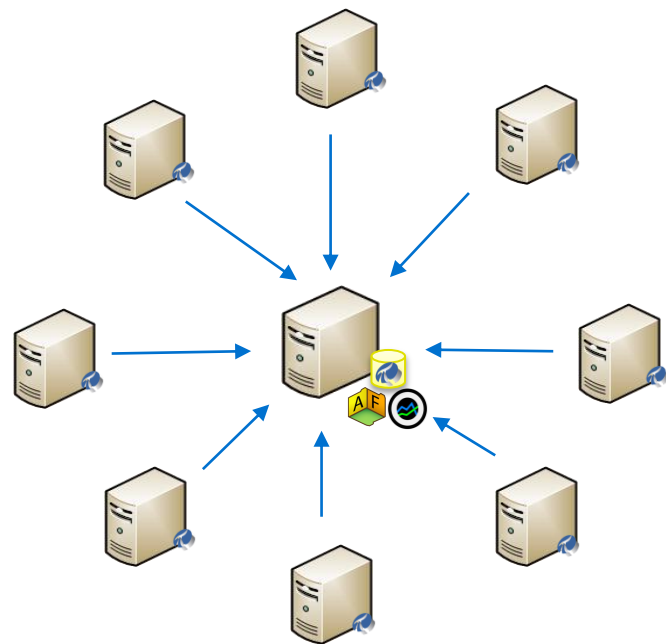


Solutions

PI System Infrastructure

PI System has become over time one of the core application for data aggregation and sharing in A2A infrastructure.

- **8 Plant PI Systems**
 - From 2k to 5k tags configured
 - PI-OPC Interfaces
- **Headquarter PI System**
 - 12k tags configured
 - PltoPI Interfaces from plants
 - Other data integrations
 - AF Models
 - PI Vision Portal



PI System components

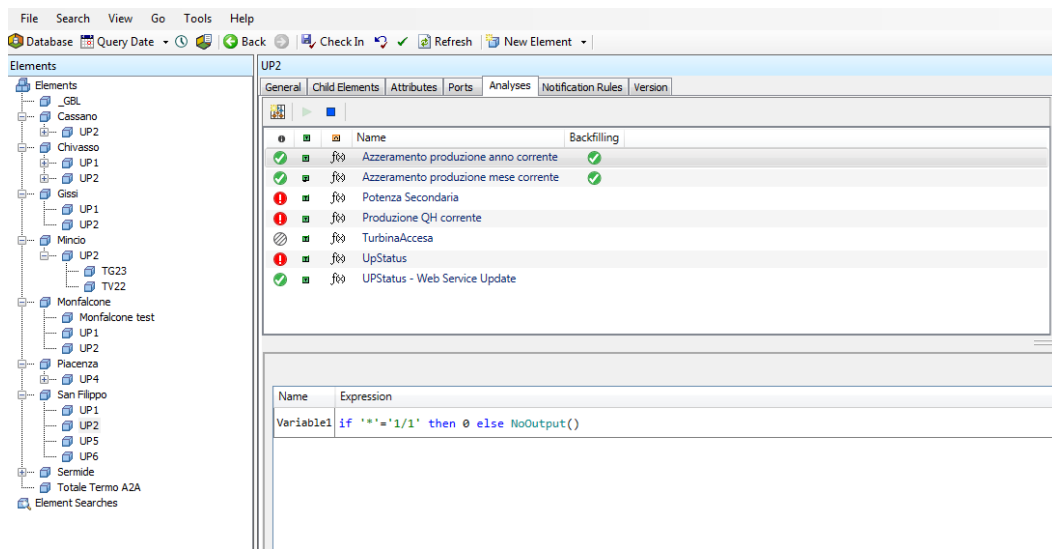
PI System infrastructure exchanges information with several external systems using different technologies:

- PI OPC Interfaces
- RDBMSPI Interfaces
- IT Monitoring Interfaces (PI PerfMon\PI Ping\PI TCP Response)
- PI Connector for IEC 60870-5-104 protocol
- Custom interface to write tag values in RTU system using IEC 60870-5-104 protocol
- Custom AF data references for web services (weather forecasting)
- Custom Web Services to integrate external business data (maintenance, planning, status, ..)

PI System components

All OSIsoft components are used to create a complex system in order to integrate all plant data in a single view:

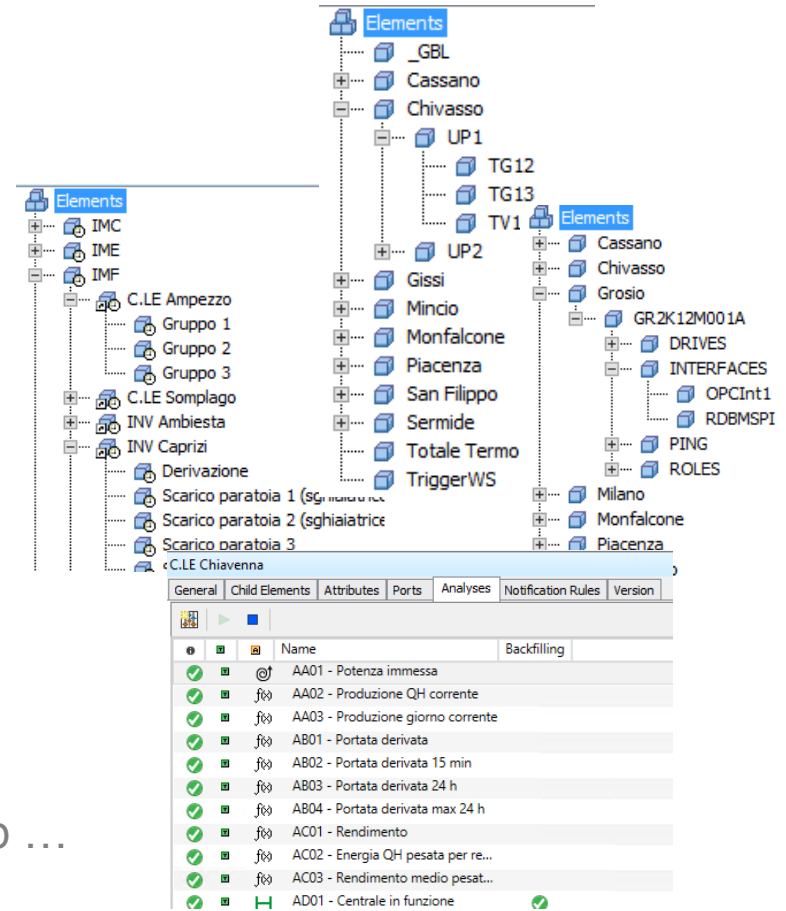
- PI Tags
- PI AF Models
- PI Event Frames
- PI Analytics
- PI Notifications
- PI-SDK
- PI Web API
- PI Vision extensibility



PI AF Models

Into **PI Asset framework**, raw data is organized and enriched

- **Asset organization**
 - 10 databases
 - 2500 elements
- **Advanced calculations**
 - nearly 5000 analyses
 - System notifications
 - Hydraulic and electric calculations
 - Totalizers and aggregations
 - Data Validation
 - Business rules calculations
- **AF Event Frames**
 - Relevant events like floods, unit startup ...
 - Current and planned unit status



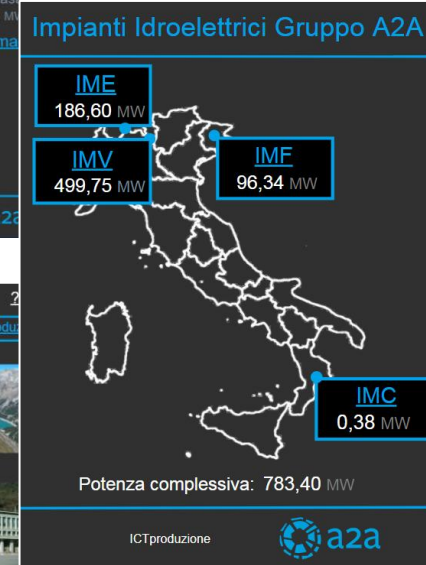
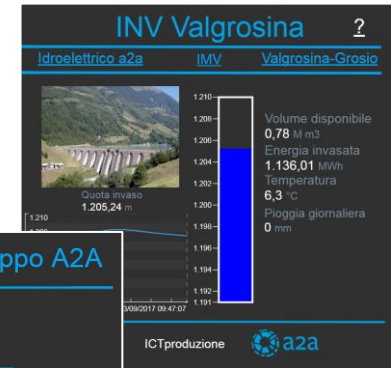
PI Vision Portal

- PI Vision is the natural solution for exposing PI System data to business users.
- About 200 displays organized in three main areas:
 - *PI Thermo Portal*
 - *PI Hydro Portal*
 - *PI Monitoring Portal*
- More than 200 end-users
- Each user can view only display of his relevant area accordingly to business role.
- Reverse proxy exposes PI Vision Portal to internet so information is always available even using mobile devices.
- Custom PI Vision widget for improved functionalities.
- AF hierarchies help users to build up their own displays with validated information.

PI Vision Portal

PI Hydro Portal exposes hydroelectric plant data

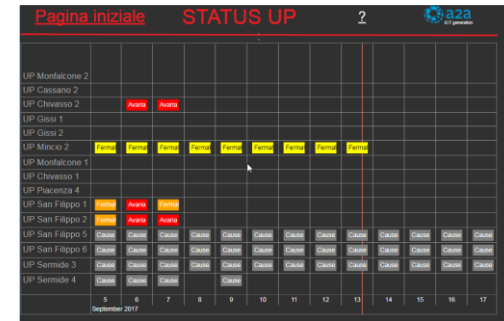
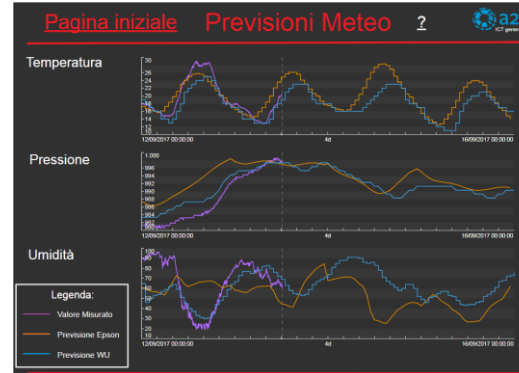
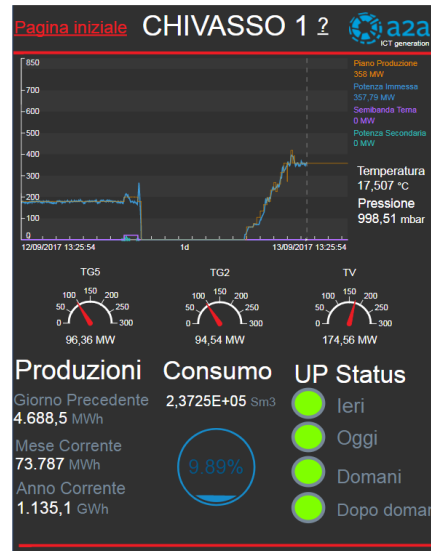
- Displays shape optimized for vertical mobile screen
- Few displays with all relevant information:
 - Current productions, from single turbine up to overall aggregation
 - Compare planned vs actual
 - Monitor dam levels
 - Weather information
 - Current and planned unit status
- Easy to explore and navigate historical data



PI Vision Portal

PI Thermo Portal is designed to expose data from thermoelectric plants

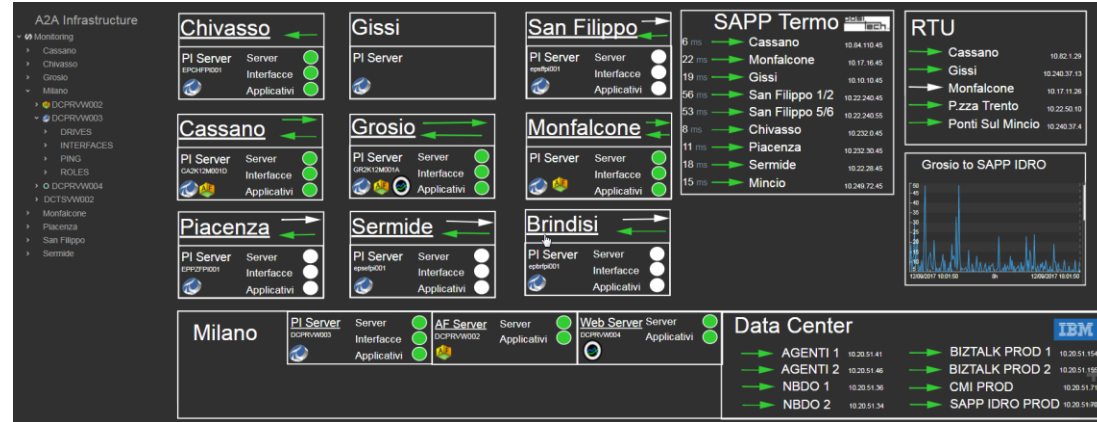
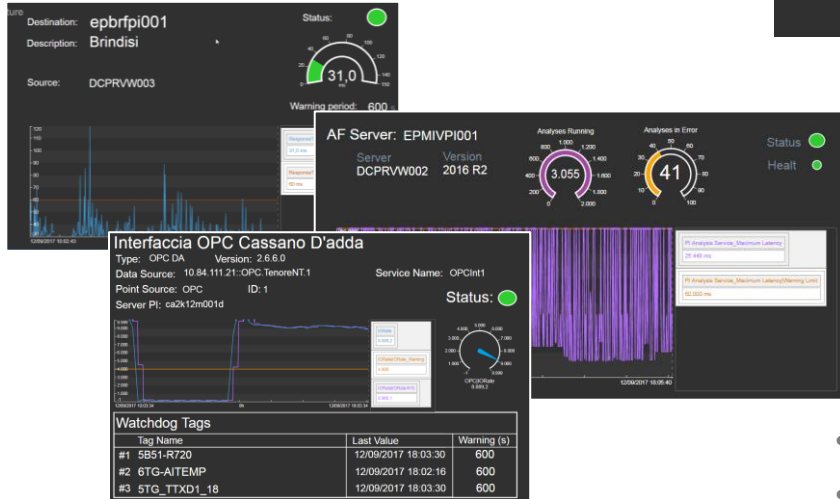
- Displays size optimized for vertical mobile screen
- Few displays with all relevant information:
 - Current productions and consumptions
 - Totalizers daily, MTD, YTD
 - Current and planned unit status like maintenance or failures
 - Weather forecast



PI Vision Portal

PI Monitoring portal helps to keep PI infrastructure under control reducing data losses and downtimes

- Overall display with summary view
 - KPIs highlighted with colors
 - Tree view allows navigation



Detail displays with status of each component like:

- Interfaces
- Network availability
- Server CPU\Ram\disk space

Current values and warning levels shown

Master data allows a faster response

- Usage of template reduces the total number of displays
- Direct link included in PI Notification emails

PI Vision custom widgets

PI Vision Extensibility feature allowed to enrich PI Vision with new functionalities

A2A Infrastructure

- Monitoring
 - Cassano
 - Chivasso
 - Grosio
 - Milano
 - DCPRVW002
 - DCPRVW003
 - DRIVES
 - INTERFACES
 - PING
 - ROLES
 - DCPRVW004
 - DCTSVW002
 - Monfalcone

TREE VIEW

Explore AF hierarchy

GANTT CHART

Shows event frames in custom timeline



Start Time	2017-04	End Time	2017-09	Interval	Sh	Applica	Scarica
Timestamp	C.LE Grosio[Piano di produzione [MW]		C.LE Grosio[Potenza immessa [MW]				
02-04/2017 18:19:52	90		89.94				
03-04/2017 02:19:52	0		0				
03-04/2017 10:19:52	23.5		24.18				
03-04/2017 18:19:52	92.6		92.55				
04-04/2017 02:19:52	0		0				
04-04/2017 10:19:52	144		144.26				

DATA TABLE

Shows timed data and save to excel

PI Vision custom widgets

Usage of PI Web API enables user action to data

EVENT FRAME GENERATOR

Allows manual entry on Event Frames

Elenco Pieni: INV Villa di Chiavenna

Data Inizio	Data Fine	Commento	Utente	Trend	Tabella
06/06/2017 00:00:00			Panzetti Marco		
06/09/2017 18:00:00		Piena	Panzetti Marco		

Gestione Pieni

Commento:

Data Inizio:

Data Fine:

Inizio Fine Pulisci

Calcolo Scarichi: Scarico di fondo

Attributi Input	Valore
Apertura paratoia monte	<input type="text" value="1"/>
Apertura paratoia valle	<input type="text" value="1"/>
Quota invaso	<input type="text" value="1204"/>

CALCOLA

Attributi Output	Valore
Portata scaricata	<input type="text" value="19,71"/>

CALCULATOR

Executes business formula using AF data reference

Results

Obtained Results and Business Impact

- High scalability and flexibility of PI System permits to **integrate all PI System data and KPI** in the PI Vision Portal.
- PI Asset Framework allows to **centralize all business rules**, events and notification based on PI System Data and distributed to all key personnel.
- **Single point of access** for all asset monitoring data according the **right policy**.
- **Mobile access** (tablet, smartphone) to the plant information.



Obtained Results and Business Impact

- PI Vision technology useful to **share** data and view between users.
- PI Vision allows to easily implement custom widget to **enhance the system** and implements simple GUI for the specific business rules.
- IT monitoring based on OSIsoft components to provide a **reliable infrastructure**: detect issue and notify alarm and alert.



Next step

Future Plan and Next Step

- Extend Thermo and Hydro portal with new pages, indicator, analysis, notifications and KPI.
- **Extend AF models** with new business rules of the plants.
- Implement Hydro and thermo balance calculation based on AF analytics platform.
- Extend model **data forecasting**.
- Implement automatic report.



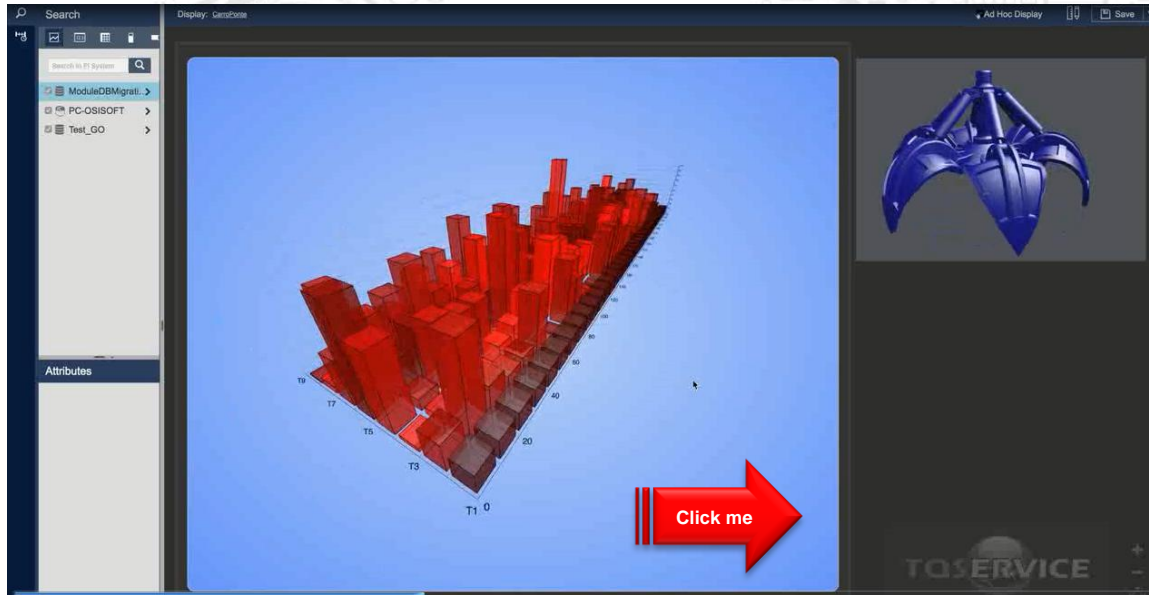
Future Plan and Next Step

- Implement Hydro **balance model** for predictive condition and monitoring.
- Implement new PI Vision custom widget to provides new functionalities for the end-users.
- Extend the IT monitoring for **all real-time critical core** infrastructure.
- Start a new project to directly **write data from PI System to RTU** with IEC-60870-5-104 protocol using the implemented custom interface.



3D Graphical in PI Vision

- 3D Widget for PI Vision to navigate data with 3D graphical view (histogram) or represent 3D asset model.



Summary

COMPANY and GOAL

A2A Company is the largest Italian Multi utility; leader in the production energy, environmental services, district heating.

OSIsoft PI System infrastructure is a fundamental core for main aims of the Company likes asset monitoring, innovation, quality, efficiency and knowledge sharing.



CHALLENGE

Business requires real-time key information always available for faster decisions

- Information is dispersed and difficult to reach
- Lack of specific infrastructural alerts causes data losses
- Increase data sharing causes new opportunities

SOLUTION

Adopting PI Vision as the only web end-user interface

- Business system data integration
- PI Vision displays
- Custom Widget for PI Vision
- Data Access with right AF profile security (inside and outside the company)

RESULTS

All end-users could access to plant data in a easy way independently of the site

- Single point of access
- Business model centralization
- Mobile access
- Collaboration analysis with PI Vision
- Increase reliability of infrastructure

Contact Information

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Questions

Please wait for the **microphone** before asking your questions

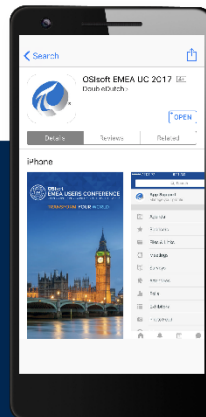


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감사합니다

Danke

谢谢

Merci

Gracias

Thank You

ありがとう

Спасибо

Obrigado