CUSTOMER CASE STUDY

Valdespartera becomes Spain's First Sustainable "Smart City" with a little Help from AVEVA

Ecocity Valdespartera Zaragoza
Industry - Infrastructure

Goals

- To successfully implement an integrated remote control monitoring system for the city's urban services including drinking water supply network, sewage and rainwater treatment, landscape watering systems, electricity and gas supplies, street lighting, and pneumatic waste collection.

Challenges

- A need existed to integrate and consolidate data from a multitude of instrumentation devices that are responsible for operating the infrastructure.
- As the first type of city of its kind, Valdespartera required constant monitoring and evaluation of municipal services to ensure they met the sustainability goals of the overall urban design plan.
- Defining a common data capture infrastructure to measure and transmit information to a unified control center that would supervise compliance with the environmental criteria.

Solution

- System Platform
- InTouch® HMI
- Historian

Results

- The automation system manages 196 control points from nine service networks which comprise the city's technical infrastructure, ensuring compliance with environmental initiatives.
- The system's 78 servers/cabinets gather and store information received from 21,483 communication signals relayed from 9,000 digital meters installed throughout the city.
- Collected data is automatically distributed to technical management personnel, as well as a database where it is stored as "public interest" knowledge for future analysis on urban energy efficiency.

ZARAGOZA, Spain – As host of Expo 2008, an international exposition that focused on the timely themes of water and sustainable development, Zaragoza is now known for being the first urban development project built from the ground up with environmental sustainability as its core objective.

It also is a prime example of today's growing "Smart City" municipal planning initiatives to incorporate its digital infrastructure and data to enhance livability, workability and sustainability. To achieve this, Valdespartera required a centralized monitoring and control system that would enable operations personnel to access critical, real-time data to make better, faster and more efficient decisions for its community.

AVEVA industrial software solutions were selected to provide the integrated technology to manage the city's infrastructure processes, and deliver sustainable performance with the flexibility and agility to address the city's future evolving requirements.

Ecocity Valdespartera Zaragoza began to take shape in 1999 when the City of Zaragoza began negotiations with the Spanish Ministry of Defense to purchase land where Spanish Army barracks stood. By converting the property into a sustainable city, Valdespartera would be one of the world's first governed by bioclimatic criteria as outlined in the Kyoto Protocol.

In May 2003, after approval of the final Urban Development Project plan, work began on the project's infrastructure systems. The first building permits were issued in 2004 for this innovative urban development, and in 2007 Valdespartera began welcoming residents.

> "By powering the city's remote monitoring and management system, AVEVA software addresses two key issues for the Valdespartera team: effective and efficient control and management of all municipal networks, as well as accessibility and analyzing of environmental impact of operations in an integrated manner."
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> **Noelia Olona,**
> Technical Area Manager, Ecocity Valdespartera Zaragoza

Integrated Management Systems Key to Successful Facility Operations

The ambitious nature of Valdespartera's "Smart City" design required city planners to incorporate an integrated software infrastructure to manage its wide range of facilities. These operations include water and sewage treatment, electricity production from its solar panels and on-site substation, gas supply, street lighting, waste collection, mass transit operations, as well as residential housing, social event locations, and sporting facilities.

Valdespartera's city management team chose AVEVA software based on its successful implementations in other "Smart City" projects worldwide, as well as its open architecture design. This enables it to easily connect with various systems currently in place, and easily scale to meet future needs of Valdespartera. By providing Valdespartera's a digital infrastructure and actionable data, AVEVA software solutions enhance livability, workability and sustainability of the community.

"Incorporating operations with integrated management software that would assist the city to adhere to its strategy for energy efficiency and sustainability was part of the city plan from the beginning of the project, not an afterthought. As a result, the city's technology infrastructure encompasses a wide range of general services which is managed by a sophisticated control and monitoring technology system provided by AVEVA software solutions."

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Noelia Olona,

Technical Area Manager Ecocity Valdespartera Zaragoza

Embarking On a Revolutionary Ecocity Project

Unique in its kind, Valdespartera is, in reality, is a full-scale sustainability laboratory. Its bioclimatic use model is comprised of three concepts: (1) design of optimized general municipal services such as pneumatic waste collection and efficient water treatment; (2) specific construction and architecture parameters to include placement of screens to reduce the impact of regional winds, and buildings designed with flat roofs for placement of solar panels; and (3) use of building materials that provide a high level of insulation for energy conservation, as well as use locally sourced materials to avoid the high energy costs to import exotic varieties.

Complying with Sustainable Requirements within a Smart City

To successfully comply with the plan's bioclimatic requirements, nine management networks were created to control and supervise the city's wide range of processes used to operate Valdespartera's facilities. The main objective was to enable city managers to observe the behavior of all operations within the urban service networks, defining a common data capture infrastructure to measure results, and transmit information to a unified control center to monitor compliance with environmental criteria.

System Platform serves as the system's "Industrial Operating System" by providing configuration, deployment, communication, security, data connectivity and other services via a single, integrated software development environment. These services allowed Valdespartera's team to build a single, unified "Plant Model" that logically represents processes, physical equipment, ndustrial systems, and even legacy systems, making design and maintenance of more efficient and flexible.

By interfacing with the community's hundreds of field devices and plant systems System Platform provides essential context to data, greatly assisting with diagnostics and troubleshooting while providing valuable system documentation throughout the system lifecycle.

System Platform delivers a standardized set of industrial applications that ensures the city achieves best practices in overall energy efficiency. The network collects levels of energy consumption in homes and various other locations, which is analyzed by a team at the University of Zaragoza to verify that energy saving targets are being achieved by Valdespartera.

"The successes of an intricate urban planning model such as Ecocity Valdespartera Zaragoza was dependent on the implementation of an integrated control and analysis system. AVEVA's open architecture design provides the ideal integration model since it can easily connect to various network hardware devices without having to implement new technology. Today, we have a common technology infrastructure that provides a comprehensive view of all the municipal services and housing operations."

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Noelia Olona,

Technical Area Manager Ecocity Valdespartera Zaragoza

Remote Monitoring and Equipment Control with InTouch

With a multitude of networks to manage, all operations data converges at the Sustainable Urban Centre (SUC) for monitoring, data acquisition and management review. To successfully observe these processes, the team required a powerful tool for visualization as well as remote management of equipment when necessary, such as opening and closing valves, and identifying segments of the facility requiring maintenance.

InTouch provides an open and extensible Supervisory HMI and SCADA solution that allows Valdespartera's operations team to quickly create standardized, reusable visualization applications, and then deploy them across the entire enterprise. By improving real-time visibility into processes, InTouch HMI greatly improves operator effectiveness, increasing control of all processes to simplify and enforce standardization and change management.

It also provides considerable cost savings in terms of managing tasks that were previously done manually by an operator on-site. These activities can now be done remotely from the control center using InTouch HMI.

InTouch HMI delivers a breakthrough in advanced engineering tools, providing faster time to value, more effective HMI design, better trouble shooting, and ease of application maintenance. It enables technicians to quickly identify and address abnormal situations before they impact overall operations. With myriad of data sources, InTouch connects to hundreds of available I/O and OPC servers to gather the most comprehensive collection of data for later evaluation of overall processes.

In addition to the desktops operators at the SUC use to remotely supervise operations, a video wall has been set up to easily view the city's various industrial systems. InTouch HMI monitoring screens are projected on the video wall where values related to control are shown, along with video images.

"The integration of Historian enables the management team to gather real-time data for later analysis and dissemination. With Historian, we are able to maintain an integrated view of all processes functioning within the various urban service networks, as well as define a common data capture infrastructure to measure and then transmit information to the unified control center that monitors compliance with the environmental criteria."

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Noelia Olona,

Technical Area Manager Ecocity Valdespartera Zaragoza

Gaining Better Visibility into Valdespartera's Industrial Processes

Valdespartera's integrated network also collects important information on various levels of energy consumption in homes and other buildings which is monitored and analyzed by the team at the University of Zaragoza. The management group continually reviews and evaluates this information to ensure energy saving targets defined in the overall plan are being reached by municipal services as well as residents.

Historian simplifies this process and ensures that the data collected can be quickly accessed for evaluation. It assists the team to identify trends to determine the most efficient use of mass transit services, electricity generation and consumption, as well as the effective operation of its water/wastewater treatment and pneumatic waste collection facilities.

As a high-performance process historian, Historian is capable of storing huge volumes of data generated from Valdespartera's industrial facilities and homes. Historian easily retrieves and securely delivers this information to the appropriate teams, enabling them to analyze processes anywhere at any time.

Historian offers high performance, flexibility, scalability, and high reliability, combining advanced data storage and compression techniques with an industry-standard query interface. It also provides operators easy access to stored time-series information. Combined with InTouch, Historian offers a number of configurations to meet the needs of any of Valdespartera's industrial applications.

Data stored in the Historian can be easily accessed with a range of reporting and data analysis clients that deliver Historian data to any desktop, smart phone or tablet. Its advanced data retrieval modes can facilitate the most demanding data reporting and analysis requirements, simplifying report generation and saving valuable IT resources.

"In addition to monitoring data to verify the efficient operation of the facilities, Historian makes it possible to cross-check the information gathered to determine how a particular action impacts others. The remote control system helps solve two key issues for an intelligent city such as Valdespartera: it guarantees the remote control and management of municipal networks and it helps assess and analyze the environmental impact of their operations in an integrated manner."

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Noelia Olona,

Technical Area Manager Ecocity Valdespartera Zaragoza

Managing the Ecocities of Tomorrow with AVEVA Today

With the project completed, a study is currently underway to add new functionality to the system, such as video monitoring of all the technical facilities in Valdespartera (i.e. tanks, filter station, etc.), and receive direct information on household energy consumption for billing purposes.

The project's unique nature and the effectiveness of the remote control system built with AVEVA has led management at Ecocity Valdespartera Zaragoza to apply for a patent to protect both the methodology used to develop the project and its technical structure.

The data currently collected is already being analyzed to identify the real energy and cost savings of a proposed urban development of this scale. The goal is to demonstrate that energy efficient urban design is possible. It just requires cities that are able to measure, monitor, cross-check and compare the data of their activities. With AVEVA, that is a reality today.