MatrikonOPC

Case Study:

Ready for Energy Change
Energy Company uses OPC for operating its wind farms in Spain

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Wind power is increasingly becoming a more established source of energy. High oil prices, global warming concerns and the nuclear disaster in Fukushima have all contributed to more people looking at renewable energy sources such as wind power. Germany, for example, has decided to gradually phase-out nuclear power by 2022. Wind power will be the backbone of this energy transition – by the year 2050 it should cover about half of German electricity.
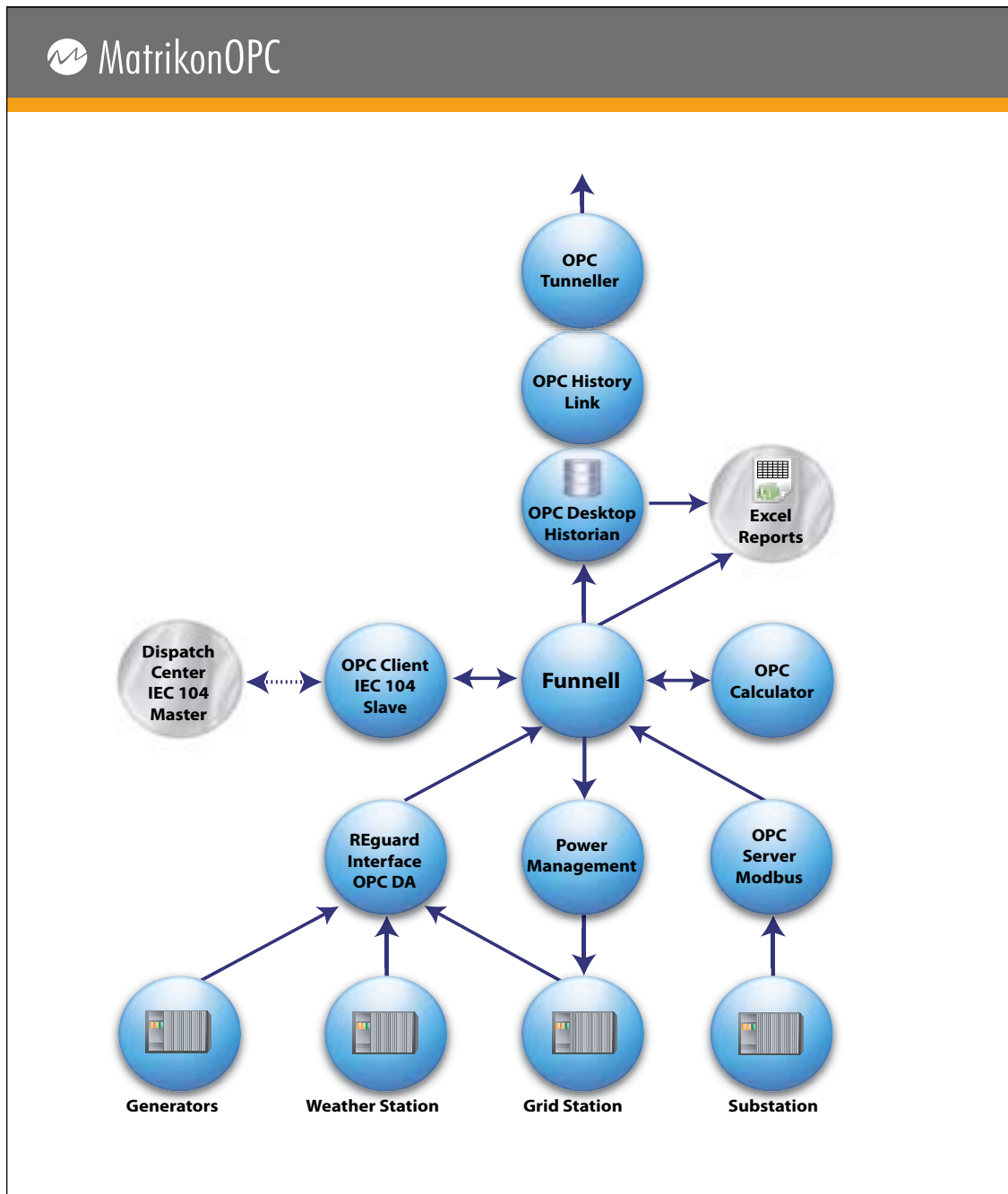
The energy transition in Germany shows that the successful integration of renewable energy into utility portfolios is increasing. Still, owners and operators of wind farms face many business challenges: optimizing operations, effective maintenance and increasing the accuracy and timeliness of decisions all affect the bottom line. Other critical issues include utility integration, accurate data analysis as well as forecasting and scheduling energy output. All these business aspects require reliable real time data for making effective decisions.

How challenges like these can be overcome by using OPC is well demonstrated in the example of a wind farm in Spain which is operated by a major energy company.

Guaranteed data delivery required

The energy company, which has 650,000 power distribution/retail customers, faced the challenge of providing centralized data access to three remote wind farms in Spain. The wind farms contain turbines and control systems from different vendors with varying, low bandwidth communication mediums. In order to have access to real-time information for equipment monitoring as well as making production decisions, the energy company needed guaranteed data delivery for its wind farms.

To do this, the company needed to establish bidirectional communications between three wind parks with approximately 26 megawatts per park and a control and a dispatch center (both located in Madrid). In addition, the company required: real time and historical data collection for periodical reports to its headquarters in Germany, technical diagnostic and real time supervision, centralized information for every project manager, manufacturer warranty, and outsourcing maintenance supervision.

Open connectivity with OPC

The energy company decided to use OPC, which is a series of open standard specifications for control automation data connectivity. OPC is the world's most popular standards-based data-connectivity method. It is used to answer one of the automation industry's biggest challenges: how to communicate between devices, controllers, and/or applications without getting caught up in the usual custom driver-based connectivity problems.

The most widely used variations of the classic OPC standard are: OPC Data Access (OPC DA) to move real-time data between control devices to HMIs, historians, and other display clients; OPC Historical Data Access (OPC HDA) to provide a standard way to share historical data; and OPC Alarms & Events (OPC A&E) for the transmission of alarms and events. These OPC specifications rely on Microsoft Windows' binary communication services implemented in the Component Object Model (COM) and Distributed Component Object Model (DCOM) which enable Windows applications to share data locally or remotely respectively. Thanks to this, all control systems, machine interfaces, automation applications etc., that run on a Windows platform, can easily take advantage of the data sharing offered by OPC Classic.

The key to OPC's success in creating truly vendor-independent communications is that OPC abstracts the Data Source, e.g. PLC, and Data Sink, e.g., HMI, implementation details from each side so data can be exchanged between the data source and the data consumer without requiring them to know anything about each other's native communications protocol and internal data organization. This is in sharp contrast to the custom driver approach of writing applications that, by definition, must natively communicate between each other. The OPC standard delivers both the flexibility to choose any SCADA, Historian or analysis tool on the market and the possibility to increase the robustness of existing architectures by easily adding new features and components without worrying about how the new and existing components will interconnect – a key consideration as wind parks grow and technology evolves. These benefits stood out above the rest when the energy company chose OPC solutions from MatrikonOPC for their wind farms. MatrikonOPC not only had the right solutions, but also a great deal of OPC experience in similar projects.

Implementation: challenges and solutions

While implementing the needed OPC solutions, various technical challenges had to be addressed, both in the wind farms and the control center.

One main challenge for almost every wind park operator is the connectivity with different control systems; in this case three different controllers from two different providers were involved. By utilizing OPC, seamless communications could be established to all of them and all necessary data collected.

The data coming from the turbines in the Spanish wind farms, however, were quite basic, such as generated electricity or the pitch angle of the wind turbine blades. To give the energy company more insightful information, MatrikonOPC implemented its MatrikonOPC Data Calculator in combination with MatrikonOPC Funnel. MatrikonOPC Funnel, like the name implies, provides a funnel that collects all process data from the wind farms into a single gateway. This way, the OPC Data Calculator only had to make one simple connection (to Funnel) to access data from all the data sources.
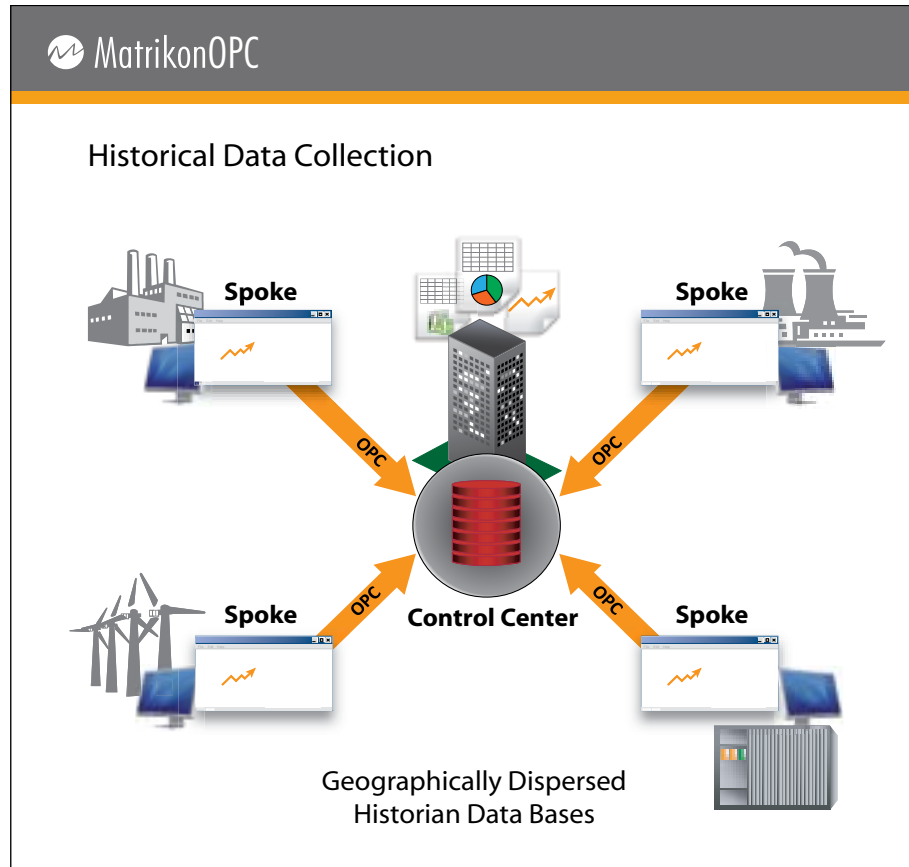
The MatrikonOPC Data Calculator is an OPC tool designed to combine any number of real time OPC inputs, condition them, and generate create real time OPC outputs. This way the tool turns raw data into information: for example, by combining generated energy with the mechanical stress a turbine is exposed to provide data that shows how efficiently the wind turbine is working.

Data transmission from wind farm to Historian

In order to be able to analyze the collected real-time data for the long term, it was important for the energy company to store the information in a data archiving tool. For that, instead of relying on only a centralized data historian, OPC Desktop Historians were used at each wind farm. The OPC Desktop Historian is a lightweight Historian solution that provides efficient high speed data archiving while being easy to install, configure, and administer.. When field activities such as maintenance are necessary, having the OPC Desktop Historians located at each wind farm allows engineers access all information they need locally.

In addition to storing all data on site locally, another standard OPC component called MatrikonOPC HistoryLink was used to automatically transmit archived data at each wind farm to the centralized data historian in the control center. HistoryLink uses OPC HDA to perform the transfer from data source to destination while ensuring that no data is lost. While wind farms sometimes generate and capture large amounts of local data they often operate in low bandwidth network environments which make it difficult to move the data to a centralized location. HistoryLink allowed the Energy company, where required, to select the most critical data for transfer to the central data historian.

In addition, to send selected data between systems yet avoid security and DCOM issues, a reliable data delivery mechanism was crucial. The MatrikonOPC Tunneller provided the secure transmission path for the delivered from the wind parks.

Results

Data consolidation from its different wind farms had been challenging for the energy company as it was confronted by problems such as multiple locations, proprietary components from multiple vendors, and the necessity for reliable communication channels over unreliable network environments.

Partnering with the experts from MatrikonOPC and its solutions was a key element for success. By using OPC as a corporate standard for communication, the energy company achieved an ease of implementation as well as support and maintenance, a scalable and robust architecture based on an open standard which enables the creation of a vendor neutral hardware and software architecture. As a result, the connectivity between the remote wind farms and the control center allowed for reliable data transition and reduced project costs.

Here are the solutions discussed in the case study:

OPC Funnel

OPC Funnel provides a single gateway that enables OPC clients to easily connect to multiple OPC Servers. This is ideal in situations where a client, such as a process historian, can only make a single connection to a data source due to licensing restrictions, or perhaps where a poorly programmed OPC client is only able to make one connection to a single OPC server.

⬇ Download OPC Funnel

OPC Data Calculator

MatrikonOPC Data Calculator is a powerful calculation engine requiring no programming experience to use. The intuitive graphical user interface allows full configuration of the calculation engine and for the creation of user defined templates. The calculation engine is sophisticated enough to handle even the most complex process data calculations for both real-time and historical data. Effortlessly perform complex process calculations using OPC tags with unlimited numerical precision. MatrikonOPC Data Calculator handles all of the "behind the scenes" mathematics enabling users to concentrate on calculation logic. Users can read and write data to multiple OPC servers by simply adding the tag values through the user interface.

⬇ Download OPC Data Calculator

OPC Desktop Historian

For manufacturers who need to analyze process data, OPC Desktop Historian is an affordable, easy to install, configure and administer data archiving tool. Unlike enterprise process historians that are designed to manage the needs of the entire corporation, OPC Desktop Historian focuses on data collection, not data presentation or processing. OPC Desktop Historian is a lightweight solution for time-based data storage that can stand alone or become part of a total enterprise data historian solution. Also it is a powerful historian for the price of an OPC HDA driver!

⬇ Download OPC Desktop Historian

OPC History Link

MatrikonOPC History Link is the only historical data transfer tool you will ever need. No longer will isolated islands of data plague your operation. A truly flexible and agile tool, MatrikonOPC History Link is for anyone who is currently collecting or storing historical data. This OPC compliant software is a quick and easy way to transfer historical data.

⬇ Download OPC History Link

OPC Tunneller

OPC Tunneller from MatrikonOPC (now with encryption and data compression) provides an easy, reliable and secure way to communicate between networked computers. It does away with the headaches typically associated with DCOM configuration. No longer are different protocols, security settings or locations a factor when sharing data between computers. This is achieved by simply installing OPC Tunneller on the OPC client and OPC server nodes and then telling the Tunneller client where the Tunneller server exists.

⬇ Download OPC Tunneller

About MatrikonOPC (a division of Matrikon Inc.)

MatrikonOPC provides software to access device data using the OPC standard. Our promise is to help clients unlock the potential of their data and provide them with vendor-neutral training and superior client care. MatrikonOPC builds close relationships with our customers to gain a true understanding of their business and then attain operational efficiency from both a technical and business perspective. With offices in Canada, the United States, Europe, Asia-Pacific and the Middle East, MatrikonOPC provides local presence on a worldwide scale.

For more information about MatrikonOPC Universal PLC Server and other products and services, visit us online at www.MatrikonOPC.com.

Toll Free: 1-877-628-7456
Ph: +1 (780) 945-4099

E-Mail: Info@MatrikonOPC.com
Web: www.MatrikonOPC.com

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