CASE STUDY

Successful Implementation of vNode at Taiba N'Diaye Wind Power Station by Infinity Power

Overcoming Connectivity barriers: vNode rescues Infinity Power's real-time Data flow for enhanced analysis and precision monitoring.

CLIENT: INFINITY POWER
A MASDAR INFINITY COMPANY

SOLUTION PROVIDER: EIFFAGE Vestas

vNode

CASE STUDY

Introduction

This case study highlights the successful implementation of the vNode solution at the Taiba N'Diaye Wind Power Station, a flagship project by Infinity Power. This project not only demonstrates the effectiveness of vNode in connectivity and data transmission security but also marks the beginning of a larger data centralization project across all wind and solar parks operated by Infinity Power.

Context

Infinity Power, in collaboration with Vestas and Eiffage, undertook the construction of the Taiba N'Diaye Wind Power Station in Senegal. The wind farm comprises 46 Vestas V126 turbines, with a total capacity of 158.7 MW. The generated energy is integrated into the national electrical grid through Senegal's National Electricity Company (Senelec).

Previous Challenges

Before the implementation of vNode, Infinity Power faced challenges in connectivity and real time data access from the substation of the wind farm to its Control Center in the United Kingdom allowing the implementation of new analysis technologies to find deviations and malfunctioning in real-time.

Solution

vNode is an Industrial IoT Gateway designed to effortlessly process automation system data and facilitate integration with SCADA systems, IoT solutions, Internet of Things Platforms, and, more broadly, any software solutions employed in industrial automation. With its robust data integration capabilities, in this project vNode has enabled the adoption of innovative and efficient solutions in renewable energy project management.

Implementation of vNode

As the main contractor, Vestas collaborated with Eiffage for comprehensive construction, and the engineering company subcontracted Schneider Electric and Vester Business for the implementation of control and communication systems. Vester Business played a crucial role in implementing vNode for data centralization.

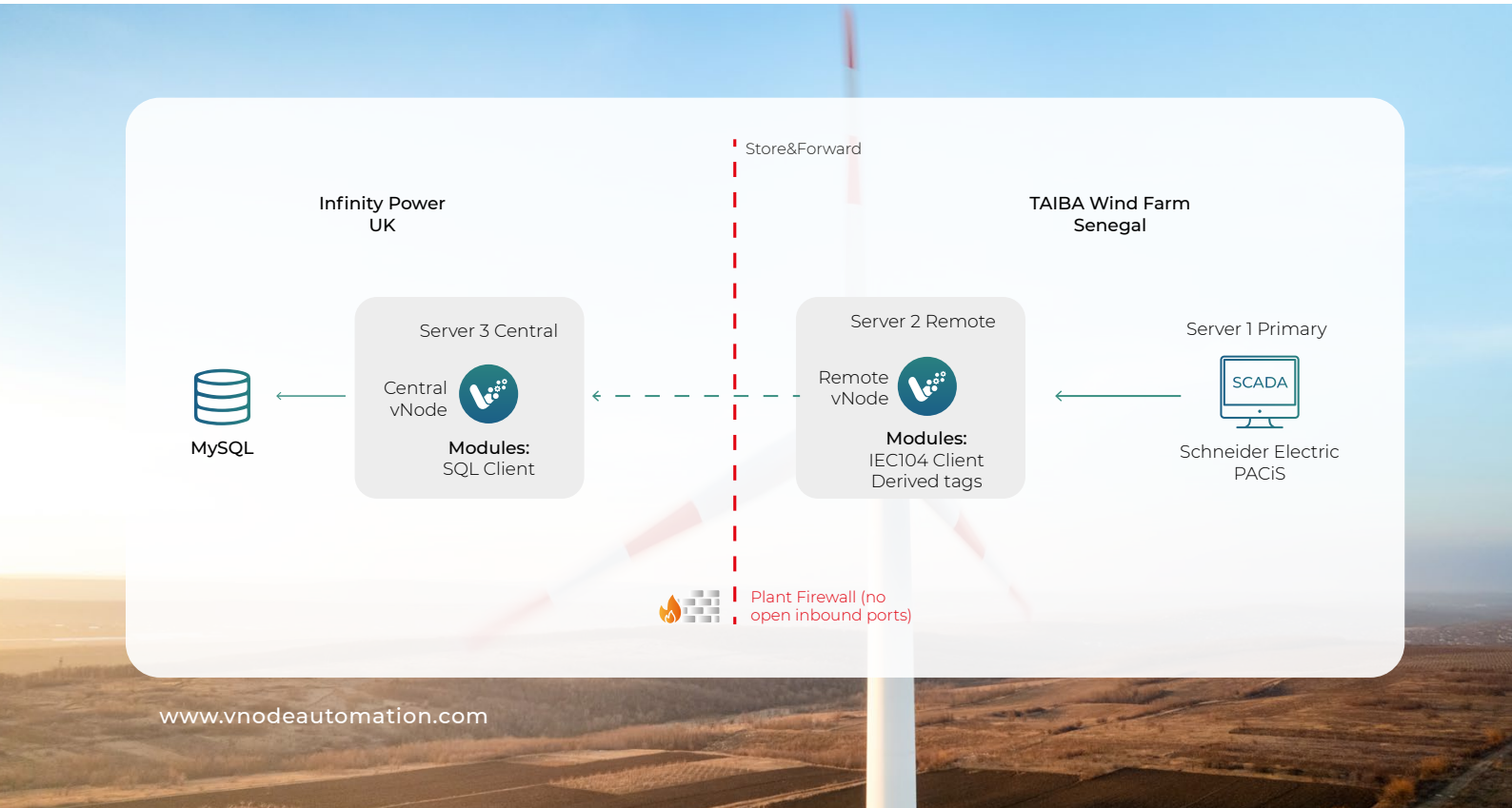
vNode incorporates diverse drivers for data collection from various sources, presenting a multitude of connection options, including the Modbus protocol, OPC DA connection, DLMS, and IEC 60870-5-104 protocol. Following several weeks of rigorous testing, the IEC 60870-5-104 protocol emerged as the chosen option. This decision was based on meticulous evaluation and analysis, considering factors such as:

a) PACiS was already sending data to other applications using IEC 104.

b) IEC 104 allows both pulling (General Interrogation) and spontaneous messages, allowing the communication to be lighter and faster.

c) The use of OPC DA wasn't convenient since a complex DCOM configuration was needed through Windows users from both computers.

Project Architecure



Operation of vNode

The remote vNode in the substation processes data from the PACIS system, normalizing and adding context before transmitting it to the Central vNode at Infinity Power's offices. The connection between vNode and PACIS is realized by the implementation of the protocol IEC 60870-5-104 where vNode acts as the Master and PACIS acts as the Slave.

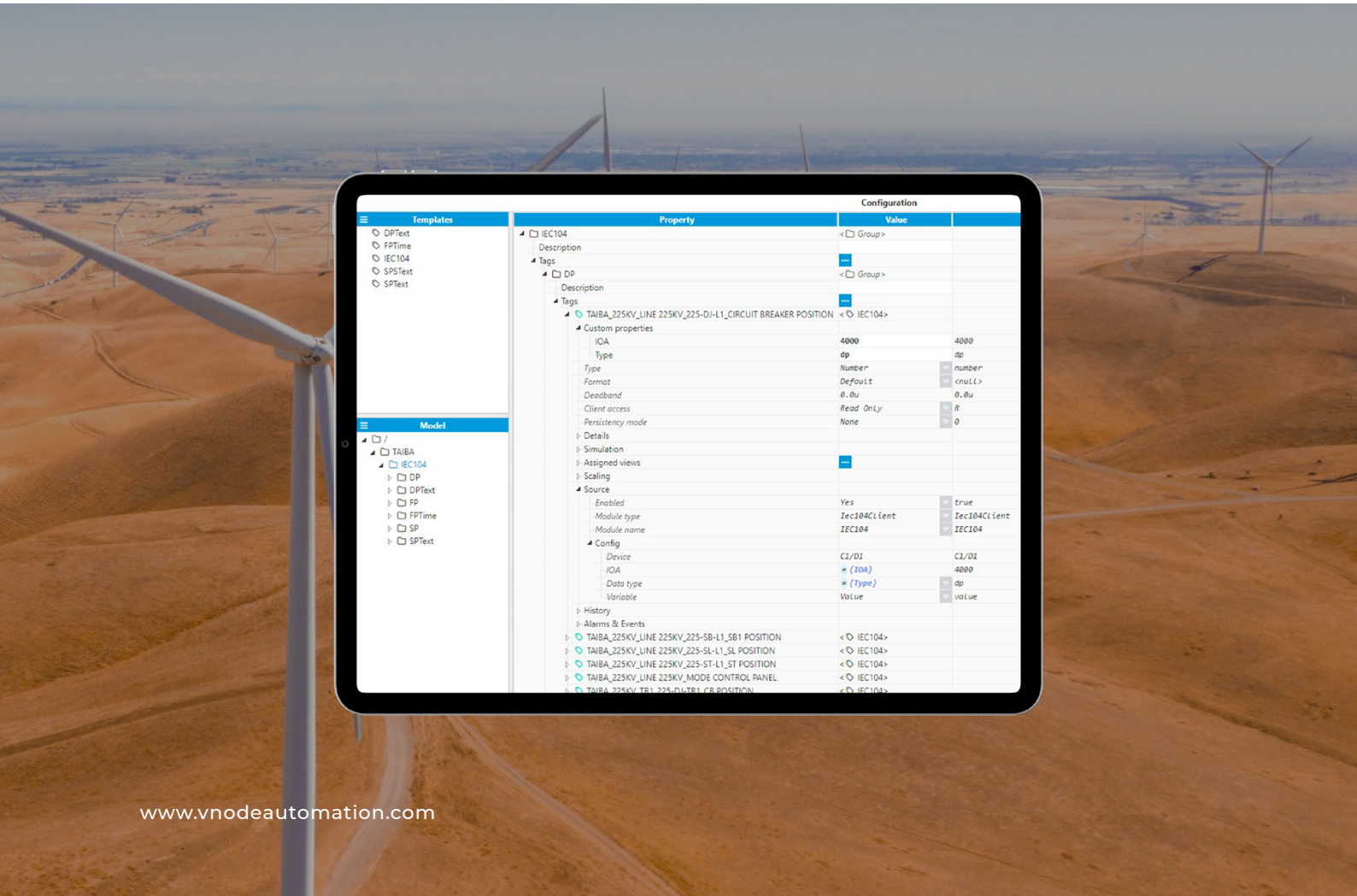
3 different data types are being collected from PACis: double points, single points and floating points.

A total amount of 1600 tags are being sent to the Central vNode (on change). This means an average of 185 events per second under normal operation.

This distributed architecture between vNodes ensures secure and efficient communication, using TLS 1.3 for encryption, data compression and enabling bidirectional communication without opening inbound ports on the site firewall.

Data Centralization

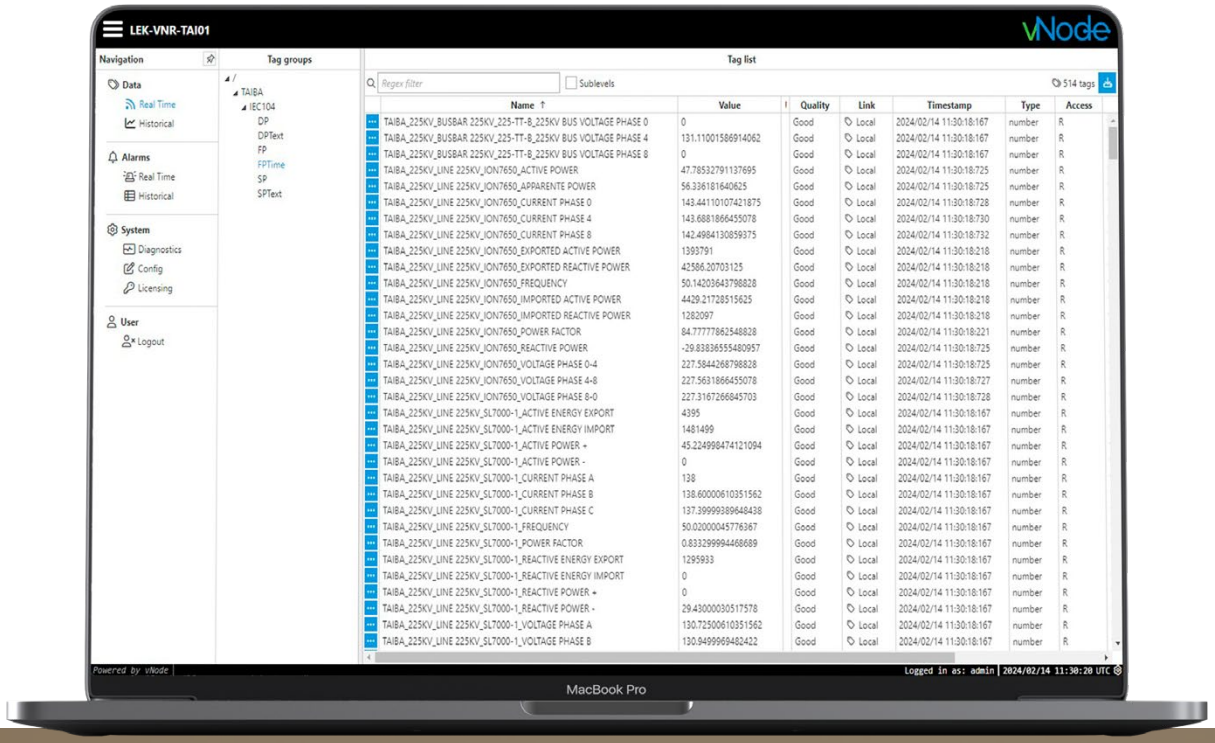
A Central vNode at Infinity Power's offices collects data from all distributed vNode nodes and inserts it into a central MySQL database. This central database serves as the primary repository for information generated by the wind farms, preparing it for subsequent analysis through Nispera's asset performance management software, which offers valuable insights that have a significant impact on multiple crucial departments. The data integration and the AI-powered analytics enable comprehensive reporting and analysis, encompassing asset performance data from all sites in a single view.



Results and Achievements

The successful implementation of vNode at the Taiba N'Diaye Wind Power Station represents a significant milestone for Infinity Power.

This project has not only improved real-time data transmission connectivity and security but also serves as the first step in a larger data centralization project across all its wind and solar parks.



"For our first time, we found the vNode solution very interesting in substation data's transmission. With this solution we can save data for more than two years and no data is lost even if the network is offline. It's flexible and quick to implement. With its functionalities, the data management and energy business become more reliable and more affordable.".

-Mr. Ibrahima Diallo, Site Manager at Eiffage Senegal.

“By utilizing vNode, the Taiba N'Diaye Wind Power Station has been able to maximize its energy production, improve grid stability, and reduce operational costs. This successful implementation showcases the potential of innovative solutions in the renewable energy sector and sets a positive example for future wind power projects.”

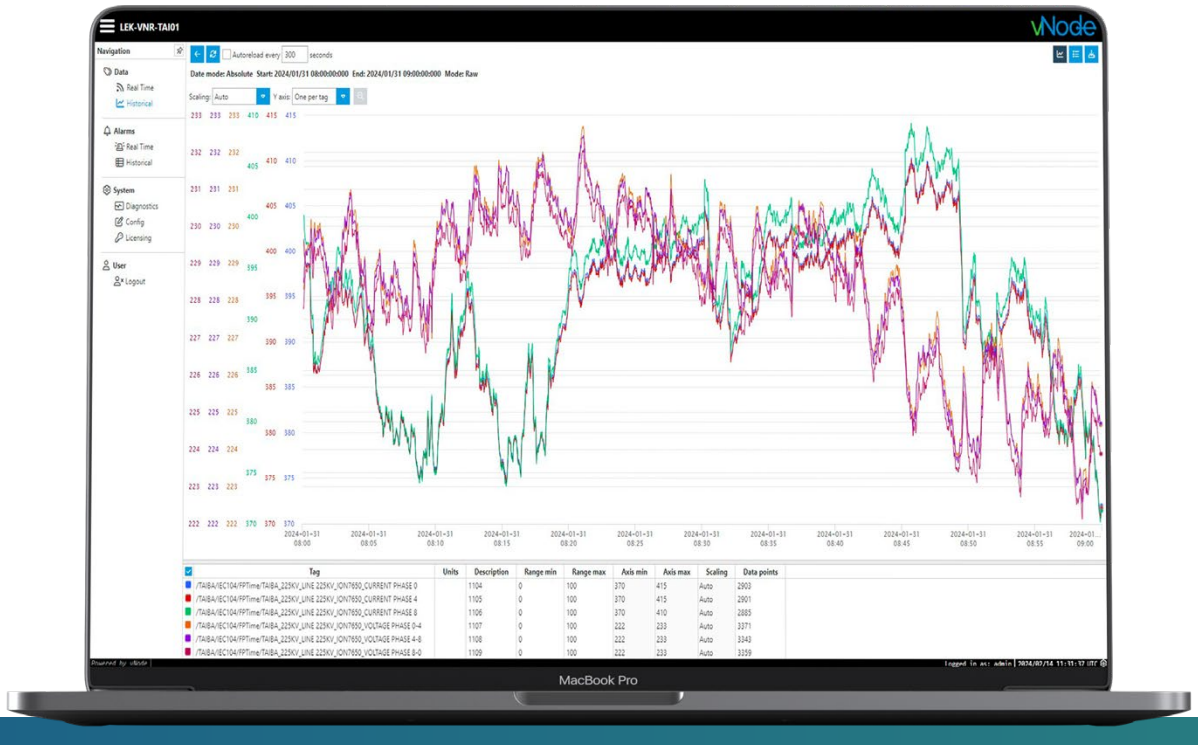
-Mr. Hany William, IT Sites Manager at Infinity Power.

Future Benefits

Data centralization with vNode will enable Infinity Power to have a comprehensive, real-time view of the operation of all its projects in Africa. This not only enhances operational efficiency but also lays the foundation for informed decision-making and sustainable development through clean energy generation.

Conclusion

The successful implementation of vNode at the Taiba N'Diaye Wind Power Station highlights Infinity Power's ability to adopt innovative and efficient solutions in renewable energy project management. This case study serves as a testament to Infinity Power's ongoing commitment to excellence in clean energy generation in Africa, using cutting-edge technologies to ensure a sustainable future.



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