Smart Wind Farm Reduces Downtime, Optimizes Operation

Expects $10 Million ROI from Single Wind Farm

A Decisyon App Composer Asset Optimization Use Case

A clean fuel source such as wind power can be a huge boon to energy companies — benefiting the environment and resulting in a million-dollar return-on-investment if managed right.

Windmill farms must be optimized for the greatest power output and return on investment. They must also take into account maintenance needs, warranties and a range of performance issues. A managed service provider (MSP) faced this challenge in optimizing the "Smart Wind Farm" solution it provided to its key customer — one of the largest energy suppliers in the U.S. The MSP wanted to provide an asset optimization solution for monitoring windmill farms from a central location so predictive maintenance, performance optimization and failure prediction would be simplified. The solution also had to help the energy supplier reduce overall downtime and optimize wind farm operations.

The MSP selected Decisyon App Composer (DAC) — the flagship product of Decisyon, providers of the industry's only visual app-building environment with rich built-in services to accelerate the design, development, sale and deployment of IoT solutions, without requiring coding.

Since 2014, the MSP has used DAC as its technology environment to deliver Industrial Asset Optimization (IAO) Services to its customers. The recent Smart Wind Farm solution encompasses all aspects of monitoring and maintenance, from data aggregation to the field team workflows. The solution provides a flexible, easy-to-use platform that manages large volumes of real-time data in different formats and structures — often coming in from multiple locations and disparate systems.

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Predicting Wind Turbine Life Cycle, Forecasting Power Output and Maintenance

Before the DAC solution was implemented, the MSP's energy customer faced tough challenges. For instance, to remain competitive in the marketplace, the energy customer had to predict the remaining useful life of several hundred wind turbines and components, as well as precisely forecast power output, maintenance planning, work effort and related revenue of its renewable energy operations.

Before engaging the MSP and DAC as a solution, the energy supplier grappled with these issues:

- Several hundred wind turbines coming out of warranty during the next several years

- Limited visibility of the maintenance needs for turbines that were out of warranty

- Difficulty accurately forecasting the maintenance expectations now and in the future

- Inability to proactively increase energy revenue due to maintenance and performance gaps

- Inefficient process management caused by its non-scalable, error prone and manually intensive spreadsheets, with data gathered and refreshed only on a monthly basis

The Decisyon Smart Wind Farm solution helped the MSP's customer move from reactive to predictive processes — maximizing the power of its assets by utilizing the power of Internet of Things (IoT).

A Smart Wind Farm Managed by DAC

Using the DAC Development Environment, the MSP delivered a Smart Wind Farm solution to its customer, providing all required functionality in a unified environment. DAC was deployed to manage a fleet of wind farms, the turbines within the farms, the parts and components of the turbines, and the maintenance teams assigned to repair them. The employees in different departments, such as engineering and maintenance, share the Smart Wind Farm solution. By using DAC's pre-defined connectors, they have the ability to see a holistic view of the data in one place without having to extract, translate and load data from multiple sources. The Smart Wind Farm easily merged the structured and non-structured data from numerous sources including an Historian system, an enterprise asset management system, asset detail repository, Google maps, weather widgets and various manuals.

The Smart Wind Farm solution consists of four distinct but integrated functional areas:

1. Asset Detail
2. Engineering Data
3. Performance Analytics
4. Maintenance & Scheduling

Asset Detail Drives Performance Engineering and Modeling

As part of the DAC solution, the asset detail app pages provide a graphical representation of turbines and their 70 components, including graphical CAD diagrams, and a comprehensive view of the remaining useful life (RUL) data on all inventory parts and components. The asset detail drives performance engineering and modeling using all the available data about the assets. It provides the user with a dynamic view of assets and components for engineering modeling, as well as an overall view of turbines, with instant access to current and historical performance by wind farm, turbine and/or component.

For maintenance management, the asset pages provide a single point to view the entire enterprise and a tactical gateway to execute changes. For instance, users can create tasks for the maintenance team and request approval to apply changes to the work order process. This level of visibility into asset details helps the energy supplier optimize asset economics.

Benefits delivered by the asset detail app pages include:

- Single point of control for wind turbine asset configuration
- Greater understanding of failure prediction via integration of advanced analytics
- Detailed prediction of savings and ROI calculations across the fleet and components using analytical models to determine the RUL of components and turbines
- Ability to accelerate the operations and increase uptime (revenue) or asset optimization (savings)
- Overall supply chain optimization achieving revenue and cost savings goals

ENGINEERING PAGES

Dive Deep Into Turbine Data, Proactively Solve Problems

Engineering pages allow engineers to focus on the turbine data and help identify potential outages. Thanks to the DAC environment, the engineer can click on a turbine in a map to view the detailed data in a chart or a graph, generate reports and collaborate around specific data points related to turbines. To identify the source of a problem, an engineer can drill down into the individual part and component levels. Tasks can be assigned and individuals can collaborate and make decisions based on the context of a relevant data point, which prevents wasting valuable time on emails, spreadsheets and phone calls.

Benefits delivered by the engineering pages include:
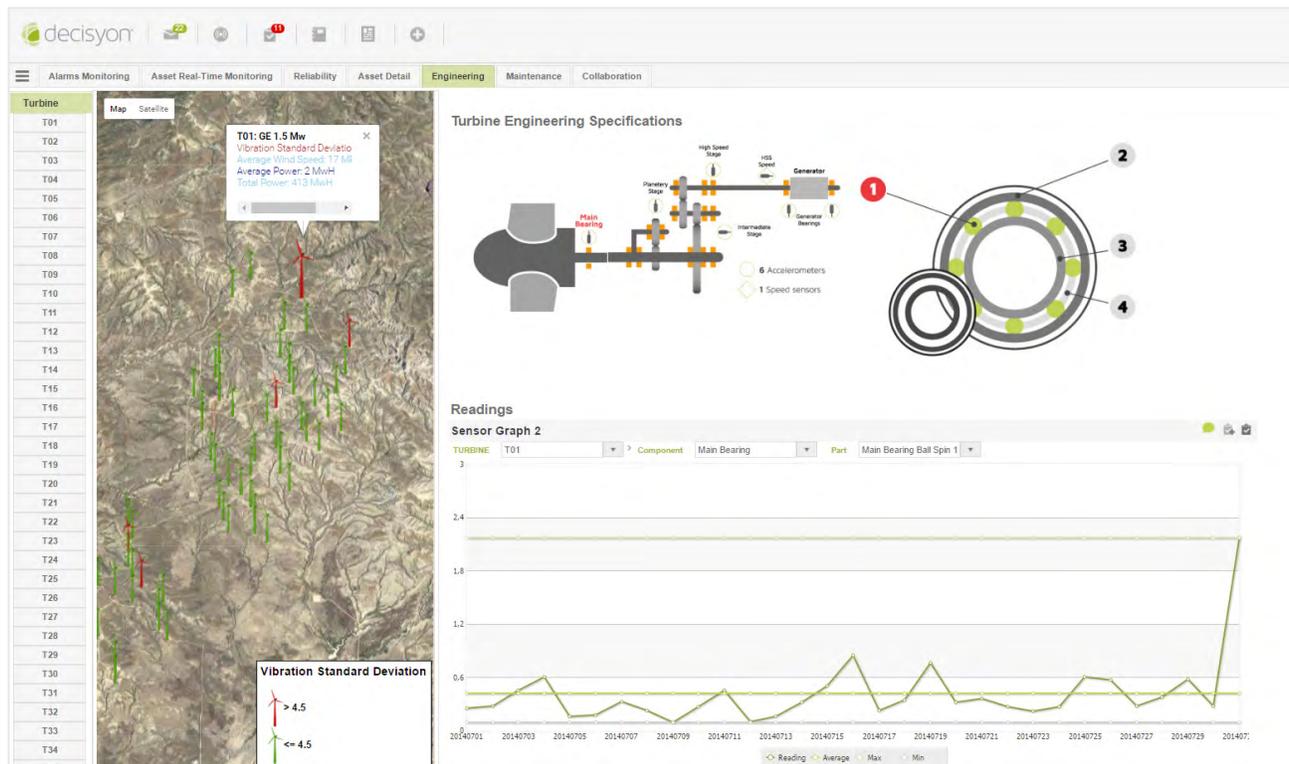
- Dynamic view of the asset and its components; each object in the asset detail will have a dynamic (real-time) component in the engineering detail
- Single point operational reporting on everything from vibration to oil inspection
- Asset health monitoring at the component level that allows users to design, implement and report KPIs
- Ability to drive maintenance operations — this enhances collaboration with the maintenance team, helps determine/forecast maintenance needs

Performance Analytics Optimizes Assets, Increases ROI Across Enterprise

Performance analytics pages enhance performance engineering by providing an overall view of all available data about the assets and a mechanism to optimize them. With DAC, these pages provide additional visibility into engineering solutions, ROI, cost, revenue and downtime. Within engineering, users can perform best-in-class comparisons, emulating best-performing turbines across the wind farm; run ROI simulation models to understand forward-looking impact on performance and maintenance benefits; monitor ROI after implementation of optimization plans; and perform dynamic correlation of best performers to determine suspected factors (pitch, gearbox, etc.). The user can also create dynamic, preventive maintenance processes to reduce corrective maintenance inefficiencies, decrease turbine downtime, as well as create models to reduce logistics and materials costs. By viewing the engineering pages, the user can manage and monitor the inventory, handle scheduling, maintenance and logistics across the enterprise.
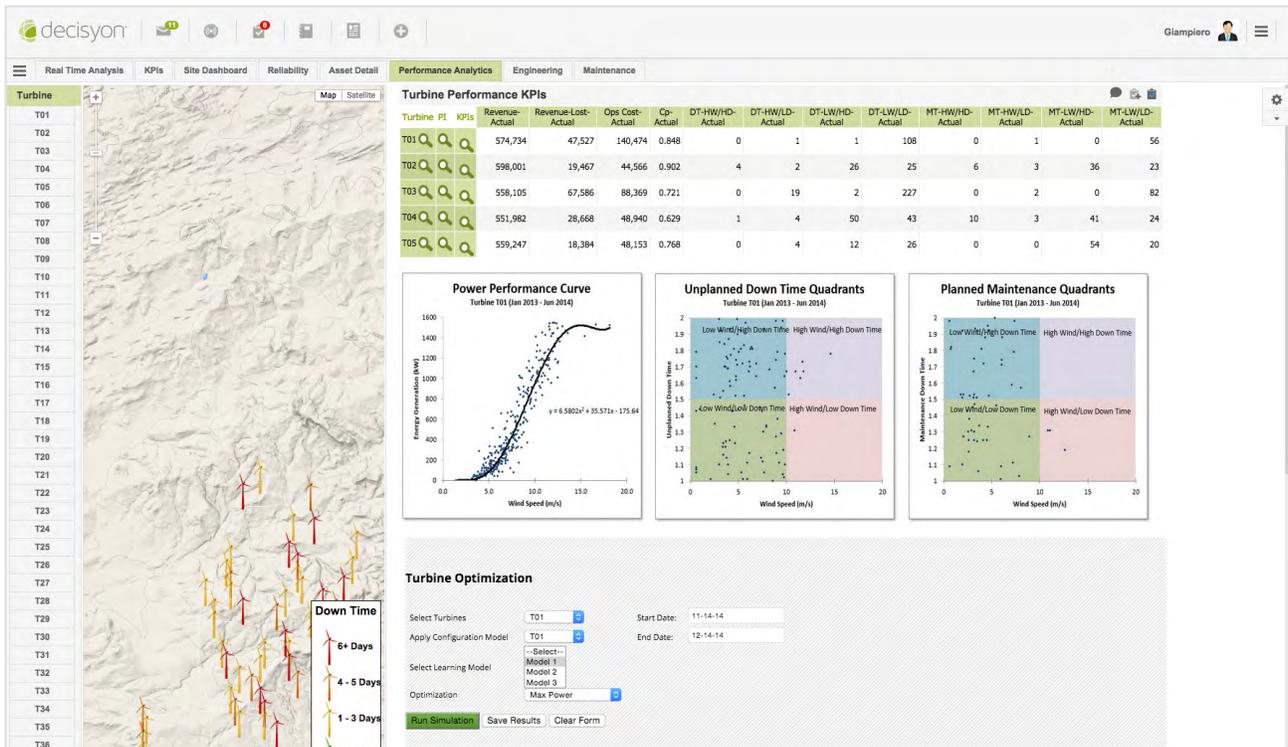
Benefits delivered by performance analytics include:

- Optimized performance across all levels — enterprise, fleet, site, asset and components
- Increased ROI on underperforming assets — leveraging the MSP's "learning model" based on best- performing assets
- Decreased turbine downtime from reduced corrective maintenance inefficiencies resulting from dynamic, preventative maintenance processes
- Reduction in logistics and materials costs through model creation

Centralized Maintenance Delivers Real-Time Resource Optimization

Maintenance pages provide a single point of maintenance management across the enterprise, encompassing engineering operations, business operations (HR, logistics, supply chain and finance), a master data view and coherent data governance. Multiple data sources are required for the maintenance team, and DAC unifies the user experience around all of them, allowing users to seamlessly move back and forth through the data, and efficiently take appropriate corrective action. These systems include traditional business databases, HR systems, SAP and the IoT data from the turbines. By providing a consolidated view of all data through DAC, this significantly reduces the time needed to handle maintenance requirements.
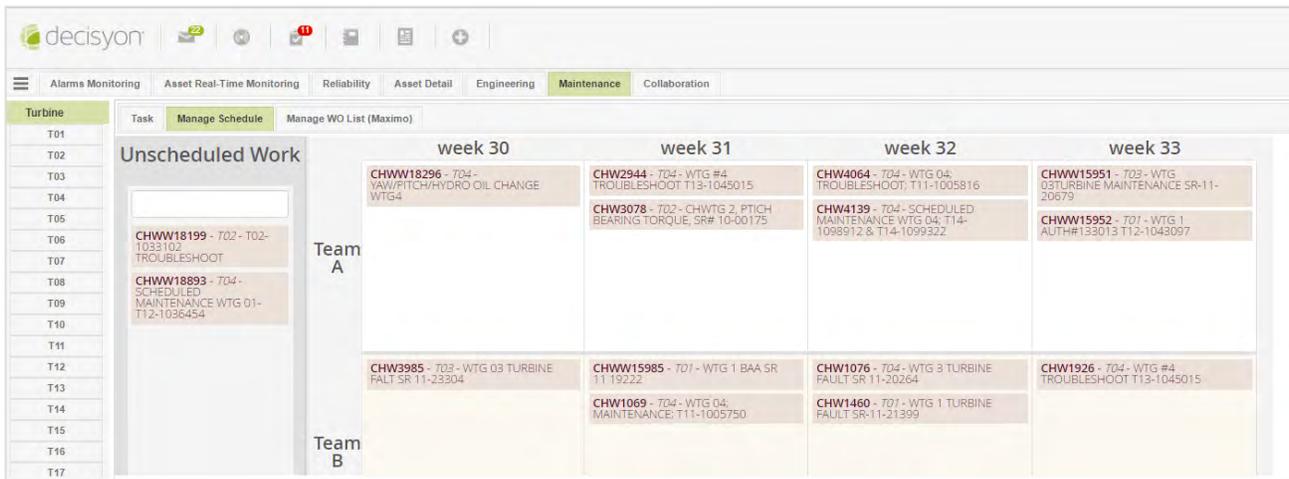
Benefits delivered by maintenance and scheduling pages include:

- Optimized enterprise-level maintenance through improved schedules, inventory, logistics and other processes

- Optimized inventory that allows user to discover obsolete inventory, use advanced analytics to predict excess inventory and use rolling average standard deviation to predict future stocking levels required

- Streamlined workflows that open and close work orders and link fault codes to specific work orders

- Real-time monitoring and reconciling of work activity

- Mobile access by field maintenance personnel with built-in, automated data validation from field to corporate systems

Tenfold Financial ROI Expected

Through the combined deployment of the solution provider's managed services and the Decisyon App Composer platform, the energy supplier expects to achieve a $10 million ROI from a single wind farm over the span of five years. During the planned rollout to all 17 wind farms in the next few years, the financial benefits are expected to grow at least tenfold by reducing downtime and saving money and resources through optimized operations.

Details on the anticipated ROI:

- **Reduced Downtime:** The MSP and DAC Smart Wind Farm Application will increase the energy supplier's revenue significantly over five years by preventing lost revenue caused by the wind farm downtime — saving roughly $1.25 million in gross margin per wind farm. In addition, a five percent improvement in revenue per windfarm is projected from optimized turbine performance by increasing preventive maintenance and decreasing corrective maintenance.

- **Optimized Operations:** The MSP and DAC Smart Wind Farm Application will realize significant savings over five years — a 20 percent cost reduction per wind farm resulting from lower inventory and labor costs and increased maintenance efficiency. The customer predicts a 10 percent improvement per wind farm through warehousing and logistics optimization.

About Decisyon

Decisyon enables business users to rapidly build solutions using a code-free visual software development environment. Our products accelerate your data journey from aggregation to visualization, insight, analysis and decision thru action. Decisyon offers the leading code-free visual software development environment for mission critical enterprise operations requiring real-time awareness and adaptability to their business operations and processes. We have developed and deployed many vertical solutions for the manufacturing, renewable energy, aviation, pharmaceutical, financial services, transportation and automotive industries. With built-in microservices such as data management, BI, mashboarding, rules engine, collaboration and execution, Decisyon offers a dramatic increase in speed to outcome for building and modifying vertical solutions. Decisyon's products and software solutions, ideally suited for IIoT applications running on any PaaS, are used in over 200 companies globally. Decisyon is headquartered in San Francisco, California.

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