Combining Real-time and Spatial Decision Making with the PI Integrator for Esri ArcGIS

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Agenda

• Introduction
• Offshore wind power & DONG Energy
• PI System & PI Integrator at DONG Energy
• Condition Monitoring with PI System and Esri ArcGIS
• Utilizing PI Integrator for performance reporting and monitoring
• From architectural vision to business applications
• Business impact
Combining Real-time and Spatial Decision Making with the PI Integrator for Esri ArcGIS

“Working offshore can be a challenging environment and 15 times more expensive than working onshore,”

“Asset integrity improvements through remote monitoring will safeguard high health and safety standards and reduce OPEX costs.”

Business Challenge

• Accessing an offshore wind turbine can be a challenging environment
• Working in an offshore wind turbine can potentially be 15 times more expensive compared to an onshore turbine

Solution

• Better insights & logistical planning through access to production, control and spatial data on a map
• Frontloading Line of Business with best available information at hand

Results and Benefits

• Asset integrity improvements will potentially reduce unscheduled visits to 1.500 offshore wind turbines and reduce OPEX cost with up to ~20 EURm / year (NPV)
DONG Energy is one of the leading energy groups in Northern Europe

Our business is based on procuring, producing, distributing and trading in energy and related products in Northern Europe.

DONG Energy has 6,500 employees and is headquartered in Denmark.
DONG Energy has a Strategic Focus on Offshore Wind

DONG Energy will have 6.5 GW installed capacity corresponding to approx. 1,500 offshore wind turbines in 2020.

**Offshore Wind**

*Market leadership; growth and value creation*

**Priorities**
- Mature and construct project pipeline
- Reduce cost of energy
- Further develop industrial and financial partnerships
- Standardise and increase operational efficiency

**Targets**
- Installed gross capacity of 6.5 GW in 2020
- Offshore cost-of-energy below €100/MWh in 2020
- ROCE of 6-8% by 2016; 12-14% by 2020

**Strategic focus**

- Fastest growing renewable
- Market leader
- High share of regulated income
- Solid returns
HSE and OPEX cost are top of mind in DONG Energy
Transfer from crew vessels to wind turbine boat landings is one of the most challenging operations in offshore wind

Working offshore can be 15 times more expensive compared to similar work onshore

- Working offshore is one of the most challenging workplaces in the world and any offshore organization must have a strong focus on HSE
- Offshore activities are up to 15 times more costly than similar onshore activities and should be avoided if possible
- Lost production can be avoided by better logistical planning through access to production and spatial data on a map

From 3.6 to below 1.5 accident frequency (LTIF) by 2020

Offshore wind cost-of-energy below €100/MWh\(^1\) by 2020
Generic Workflow in Offshore Wind Power Operations

Reduced lead time and improved quality in decision making in index 1500 repair planning through frontloading

Key benefits
- Improved quality in reporting
- Fast decision making in Technical Support
- Improved data quality for Diagnostics
Supporting Line of Business in leveraging knowledge
Reduced lead time and improved quality in decision making in index 1500 repair planning through frontloading

Line of Business – Value creation through improved Business Processes

- INDEX 1500 OFFSHORE
- SAFETY
- LEADING EDGE

Business Process Support through data access

Key benefits

- Collaboration across platforms and data sources
- Transparent data flow
- Improved data accessibility for LoB

Data - Real time & Historic

- Spatial Data Esri
- Production & sensor Data OSI
- Master data & Financial Data SAP
OSIsoft solution at DONG Energy
Scope & Architectural Vision

Key benefits

- PI System as reliable and scalable data collection platform
- Standardized data (IEC, RDSPP) and improved data quality
- Leverage data through PI Coresight, PI ProcessBook, and PI Datalink for Excel
- Integration of PI System data with spatial data from Esri ArcGIS platform
- SAP Integration to support work dispatching

OSIsoft solution at DONG Energy
Scope & Architectural Vision

Wind Turbine Lab

Events

Wind turbines

AF Server

Event Frame Services

PI Server

SAP PM

Web Map with Widgets

ArcGIS Server

ArcGIS Geodatabase

Analytics Applications

Time Series

Events

Incidents

Incidents

Key benefits

- PI System as reliable and scalable data collection platform
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- Integration of PI System data with spatial data from Esri ArcGIS platform
- SAP Integration to support work dispatching
Leverage PI Web API & PI Integrator

PI SYSTEM
- Analyses
- Event Frames
- Template # open EF
- Geo
- PI Coresight
- Web API
- Ad Hoc Displays

ESRI ArcGIS
- Map
- Data
- App

ESRI Web App Builder
- Widget: Incident List

PI Integrator for Geo Event Extension
How to integrate Esri & OSIsoft platforms
Mapping and setting up the click by click service

- PI Geo
  - Setup
- PI Geo
  - Transport & Monitor
- GeoEvent Processor
  - Service
- ArcGIS Server
  - Mapping & configuration
- ArcGIS Online
  - Mapping & configuration

Dashboards & Applications

- Asset data & templates
- Adding Status & Time
- Adding Geographical Location
Portfolio Overview through OSIsoft and Esri platforms can reduce HSE risk and OPEX cost through improved asset integrity

- OSIsoft PI System integration with Esri GeoEvent Extension
- Display production and spatial asset location on maps
Case: Condition monitoring of pressure in converter cooling system

Abnormal behavior of the pressure leads to turbine stops resulting in lost production and costly unscheduled visit to the turbine.

The condition monitoring approach:
Save money and safeguard HSE performance by detecting abnormal behavior of the pressure in time to perform scheduled repair work before the turbine stops, thereby minimizing lost production and reducing cost of the visit dramatically.
Creating awareness with the PI System and ESRI ArcGIS

Key benefits
• Supporting on-site technicians in connection with repair work
• Supporting back office specialists in improving asset integrity
• Supporting site managers in optimizing offshore logistics

Overall awareness and responsiveness reduces the time spent offshore!
OSIsoft is used for monitoring park status and accessing critical park information on park and portfolio level.

**Site Management**

- Park status overview
- PI System data integration to map

**Portfolio Management**

- KPI measuring
- Portfolio overview

**Challenges**
- Standardization
- Stability
- Scalability

**Solution**
- OSIsoft PI System and Esri ArcGIS integration

**Key benefits**
- Visualization of performance
- Awareness and Responsiveness
- System stability
- One point for entry (Simplicity)
From architectural vision to business applications

In development...

- Events through WebAPI
- Deep links to PI Coresight
- PI Integrator for PI data in Esri maps
- Weather info
- Vessel locations
- Near real time production KPI’s

In production...

From architectural vision to business applications
Improved planning through spatial overview

4 unscheduled visits lowered to 2 per turbine / year will safeguard HSE performance in offshore activities and can potentially reduce OPEX cost with up to ~20 EURm / year (NPV)

- Asset integrity improvements will reduce the total number of unscheduled visits to the 1,500 offshore wind turbines in 2020

- Avoiding offshore maintenance visits due to better asset integrity and operational transparency will reduce HSE risk
Please wait for the microphone before asking your questions

State your name & company
THANK YOU