AVEVA PI World
AMSTERDAM

MAY 18, 2022

Bring on the Power ! Welcome to the Power Generation Session

Shaping a Sustainable Future in Power Generation

Power Generation Industry

- An exciting and dynamic time in Power
- Active decarbonization efforts and the path to digital transformation is happening now! (Solar, Wind, Storage, Gas, Hydrogen, O&M…)
- The requirement for reliable, available, and affordable electricity is highlighted for consumers and for commercial economic recovery
- AVEVA's PI System and Predictive Analytics utilized for remote monitoring & diagnostics and enabling the remote workforce
- Market optimization requires an orchestrated interplay of the growing complexity of generation technologies
- Thanks to all supporting Power Generation and the reliable delivery of Electricity !

A True EMEA PI “World” Power Session

Japan, Germany, &
USA !
Mitsubishi Power

Italy !
ENEL and A2A

France !
EDF

Spain !
EDP Renewables

Czech Republic !
CEZ

Morocco !
TAQA

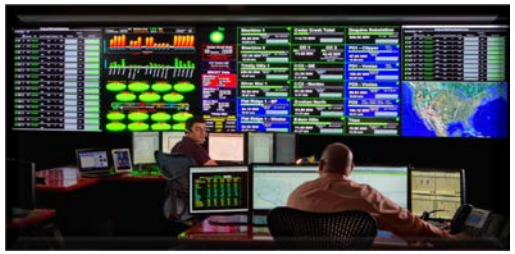
Sweden !
Vattenfall

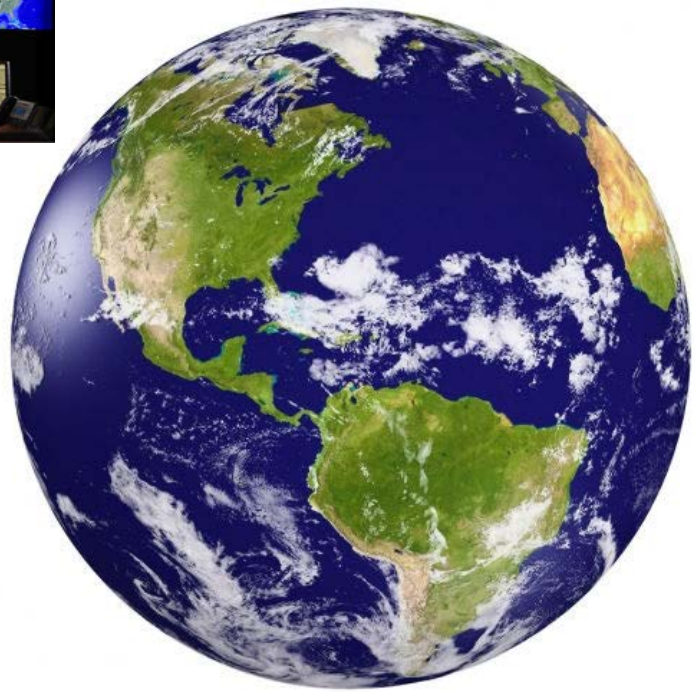
Turkey !
Enerjisa
Üretim

AVEVA

Multiple Power Generation Technologies

Fleetwide Monitoring



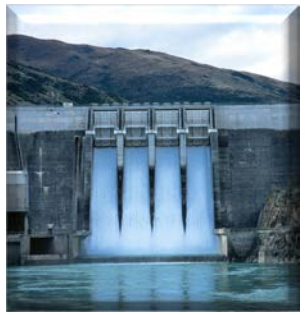


Wind Energy

CCGT

Nuclear Power

Hydro Electric



Energy Storage

Solar Energy

AVEVA

Power & Utilities Industry Team

P&U Industry Principals

David Thomason
Power Generation

Kevin Walsh
T&D and Smart Grid

Ann Moore
DER and T&D

William E. McEvoy
Power & Utilities

Douglas Nunez
Power Industry Marketing

Scott Gronwold-USA

Brian Deslatte-USA

Rafael Maldonado-EMEA

Anderson Amaral-LATAM

AVEVA

6

Thank you to our sponsors!

PLATINUM SPONSOR

cognizant

TQS Integration

STRATEGIC SPONSOR

Schneider Electric

GOLD SPONSORS

aws

SeeQ

WATERFALL
Stronger Than Firewalls

Thank you to our sponsors!

SILVER SPONSORS

BRONZE SPONSORS

Thank you to our exhibitors!

Visit the “Operational Excellence in Power” Demo Booth

- AVEVA PI System – Power Generation
- Solar ,Wind, and Traditional
- AVEVA Predictive Analytics

AVEVA

Windtopia

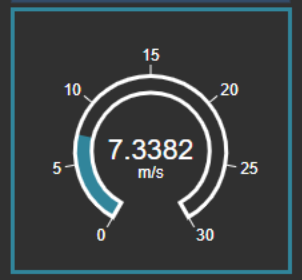
Farm Performance: Big Buffalo Wind Farm

Power Home
Wind Home
Farm Performance
Farm Forecast
Turbine Operations
Turbine Schematic

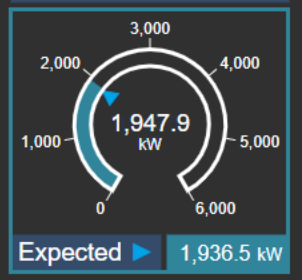
Change Context: Big Buffalo Wind Farm | Black Mesa Wind Farm | Black Wolf Wind Farm

Turbine Summary	
Normal Operation	4
Low Wind	0
High Wind	0
Auto Stop	0
Manual Stop	0
Curtailment	0
Turbines Installed	4

Wind Speed



Active Power

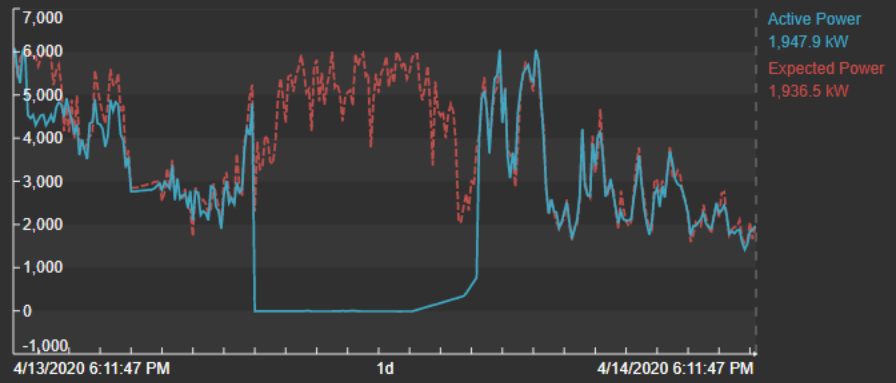


Asset	Wind Speed	Active Pow...
GE01	7.5294	460.05
GE02	8.6375	606.74
GE03	5.5237	263.3
GE04	7.5921	411.91

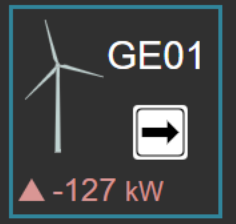
Capacity Factor 32.5 %

Equivalent Availability (MTD) 91.5

Actual and Expected Power



Under Performing Turbines



Windtopia

Turbine Operations: Turbine GE03

Power Home
Wind Home
Farm Performance
Farm Forecast
Turbine Operations
Turbine Schematic

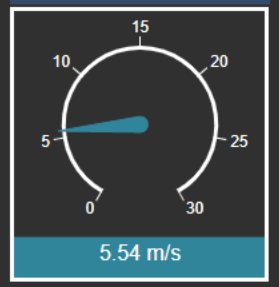
Change Context: GE01 GE02 GE03 GE04 GE05 GE06 GE07 GE08 GE09 GE10

Daily Generation	Capacity	State	Operating Efficiency	Overheat Alarm
6.5 MWh	30.8 %	Load Operation	100.0 %	

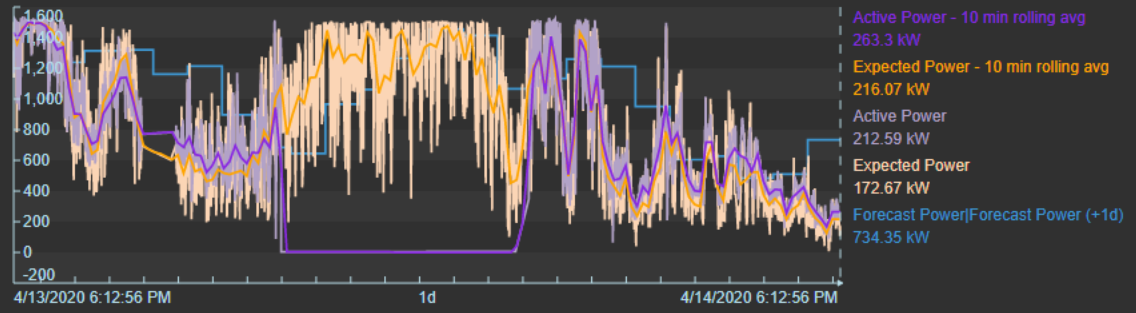
Turbine Details

Manufacturer	ACME
Model	1.5 csCWE
Power Rated	1,500 kW

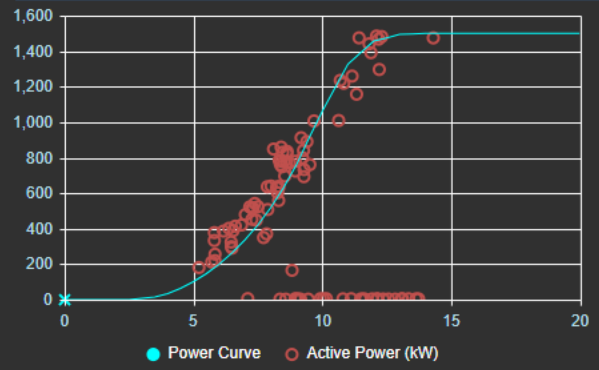
Wind Speed



Power Trends



Power Curve



High Temperature Events

Event Name	Asset	Start Time	End Time	Acknowledgment
HighTurbineTemp_GE03_2019-06-11 17:45:23.041	GE03	6/11/2019 6:45:23 PM	In Progress	Acknowledge
HighTurbineTemp_GE03_2020-03-07 15:40:50.149	GE03	3/7/2020 4:40:50 PM	In Progress	Acknowledge
HighTurbineTemp_GE03_2020-03-13 22:25:51.537	GE03	3/13/2020 11:25:51 PM	In Progress	Acknowledge
HighTurbineTemp_GE03_2020-03-14 00:16:07.448	GE03	3/14/2020 1:16:07 AM	In Progress	Acknowledge
HighTurbineTemp_GE03_2020-04-03 23:21:51.876	GE03	4/4/2020 12:21:51 PM	In Progress	Acknowledge

Temperature Sensors	Gearbox	Generator 1	Generator 2	Bearing A	Bearing B	Nacelle	Tower Base

PI Vision - Power Generation - W

localhost/PIVision/#/Displays/47/Power-Generation---Wind---Turbine-Image

OSIsoft PI Vision

New Display | AVEVA-DEMO\AVEVA-User

Power Generation - Wind - Turbine Im... (read-only) Asset: Windtopia+

Windtopia

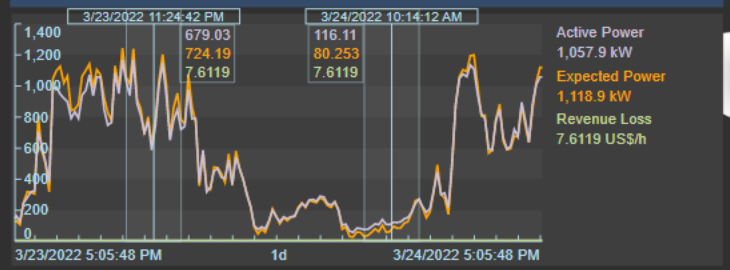
Turbine Operations: Turbine GE01

- Power Home
- Wind Home
- Farm Performance
- Farm Forecast
- Turbine Operations
- Turbine Schematic

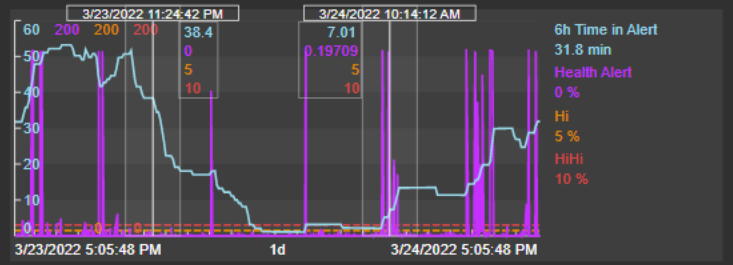
Change Context: GE01 GE02 GE03 GE04 GE05 GE06 GE07 GE08 GE09 GE10

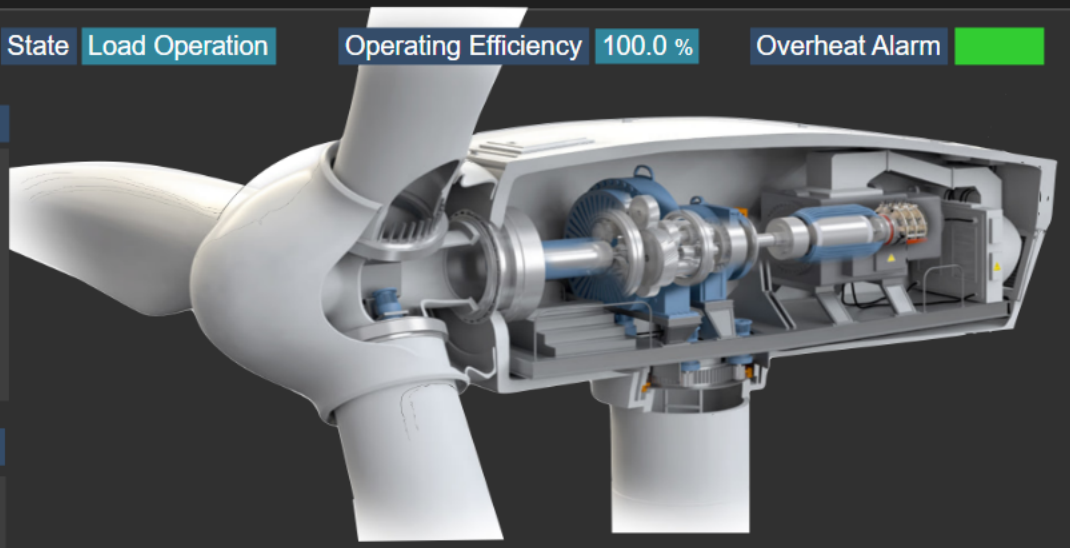
Daily Generation	7.2 MWh	Capacity	28.7 %	State	Load Operation	Operating Efficiency	100.0 %	Overheat Alarm	

Power Trends



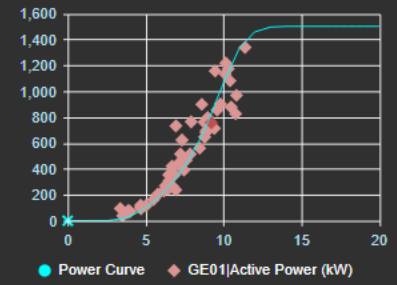
Predictive Health Score





Revenue Loss	Production Loss
7.61 US$/h	-255.79 kW

Power Curve



Predictive Health Events

Event Name	Start Time	End Time
Predictive Health Alert: GE01 2022-03-23 17:47	3/23/2022 5:47:08 PM	3/23/2022 5:53:08 PM
Predictive Health Alert: GE01 2022-03-23 20:16	3/23/2022 8:16:08 PM	3/23/2022 8:21:03 PM

Turbine Details

Manufacturer	Truvale
Model	T95-2MW
Power Rated	1,500 kW

View Alerts in Predictive Analytics

3/23/2022 5:05:48 PM | 1d | Now | 3/24/2022 5:05:48 PM

5:06 PM
3/24/2022

Trends: GE01 Turbine Performanc

localhost/PredictiveAnalyticsWeb/app/trends?projectids=2072

AVEVA™ Predictive Analytics

Trends | Faults | Forecast

03/22/2022 16:42 to **03/24/2022 16:42** at **35 Seconds**

Time Span | Auto (Last: 16:42)

2 | Days

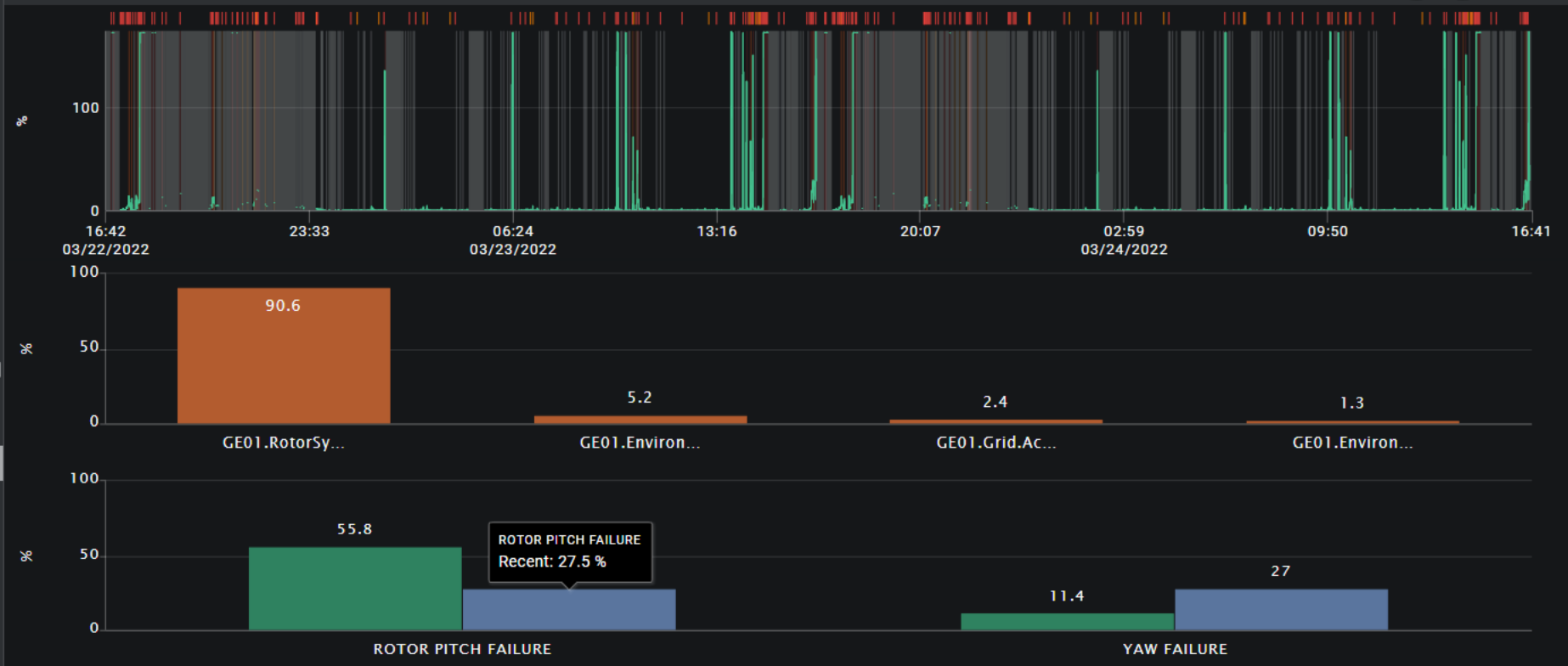
- GE01 Turbine Performance
  - Non-Modeled
    - GE01.Environment.Ambient Te...
    - GE01.RotorSystem.Rotor Rpm
    - GE01.Grid.Possible Power
  - GE01 Turbine Performance
    - (Overall Model Residual)
    - GE01.Environment.Wind Direct...
    - GE01.Environment.Wind Speed

Filters: Mark, Hide

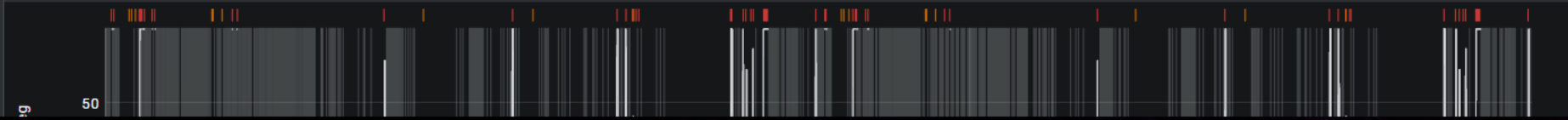
Alerts: Mark

Quality: Mark, Hide

(Overall Model Residual)



GE01.RotorSystem.Pitch Angle



5:05 PM
3/24/2022

Trends: GE01 Turbine Performanc

localhost/PredictiveAnalyticsWeb/app/trends?projectids=2072

AVEVA™ Predictive Analytics

Trends | Faults | Forecast

03/22/2022 16:42 to **03/24/2022 16:42** at **5 Seconds**

Time Span | Auto (Last: 16:42)

2 | Days

GE01 Turbine Performance

ROTOR PITCH FAILURE	55.8%
YAW FAILURE	11.4%

Fault Diagnostics: Threshold, Mark

Filters: Hide

Alerts

Quality: Hide

ROTOR PITCH FAILURE

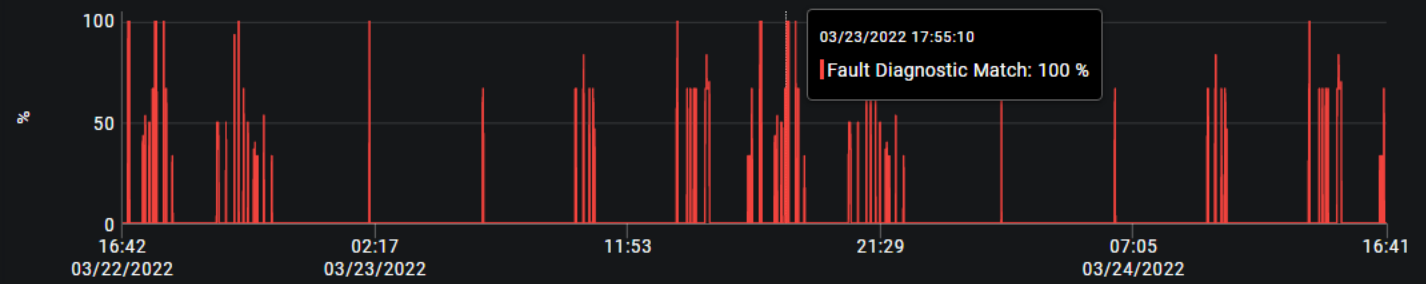
DESCRIPTION

Rotor pitch angle has deviated from expected pitch angle for the current wind speed. Reasons could be:
1) Control system action to protect turbine
2) Control system malfunction

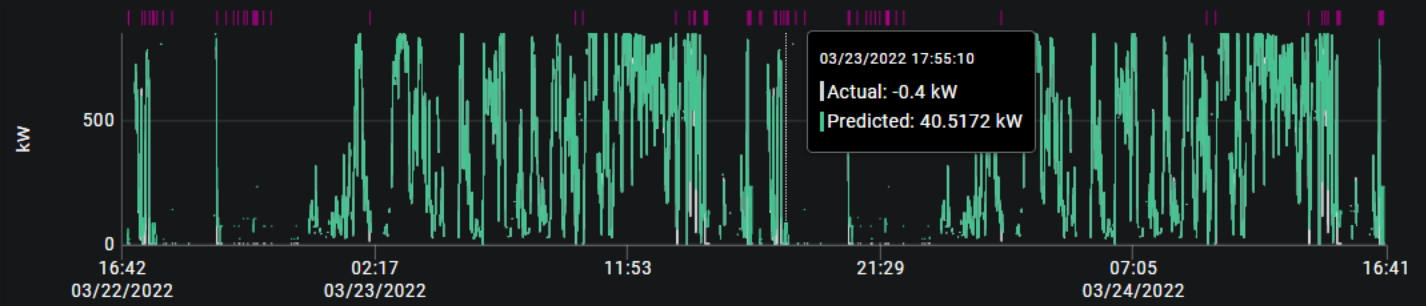
NEXT STEPS

1) Operational - Verify turbine within safe operating limits for wind speed & turbulence. Stop turbine if safety limits exceed.
2) Operational - Verify turbine within overall self protection limits. Stop turbine if safety limits exceed.

USER DEFINED PROPERTIES



Fault signature - ACTUAL ACTIVE POWER



Fault signature - ROTOR PITCH ANGLE

5:05 PM
3/24/2022

AVEVA PI World Online Power Generation Track

Across The Ocean: Working Together for a More Effective Plant Analytics Platform
Speakers – Beatriz Blanco, Tobias Rueschhoff, and Matthias Wienand

Analyzing Wind Power data in the AVEVA Data Hub
Speaker - Sergio Valencia Galán

TAQA – Centralized real-time monitoring project at TAQA EMC
Speaker – Mohammed Idrissi and Marco Lanteri (Pimsoft)

Advance Monitoring and Analytics on Combined Cycle Gas Plant
Speakers - Marco Panzeri, Emanuele Andrico

A lunch break and There's more…

AVEVA PI World Online Power Generation Track

Enerjisa Üretim SENKRON – Digitization and Pursuit of Excellence
Speaker – Emin Sahin and Kuzey Bener

Using Fledge to Enable IoT Condition Based Monitoring in PI
Speaker - Simon Jonsson Lahdenpera, David Agren and Daniel Deden

Monitoring and Diagnostics for Power Generation assets
Speaker – Daniela Bory, Aurelien Schwartz (Metroscope)

Leveraging AVEVA's Edge and Cloud Solutions to Satisfy New data needs
Speakers - Alessandro Civiero, Alvise Rossi, and Daniel Linares

Equipment condition evaluation based on online monitoring of vibrations and temperatures
Speakers - Jan Molnar

Join us tonight at Zuidpool

Offsite event behind the RAI

18:30 – 22:30

Have a great day of sharing ideas, driving innovation and learning!

Thanks for attending