18/MAY/2022

Enerjisa Uretim - Digital Transformation with Senkron

Emin Onur Şahin & Kuzey Bener

About Our Company

Enerjisa Uretim

ENERJİSA ÜRETİM

Vision

- To be an energy company that continuously develops its knowledge, sets standards and directs the future of the sector.

5 Different Technology

21 Power Plants ;
3 Wind, 12 Hydro, 2 Solar , 3 Natural Gas
1 Lignite

3607 Capacity

850 People

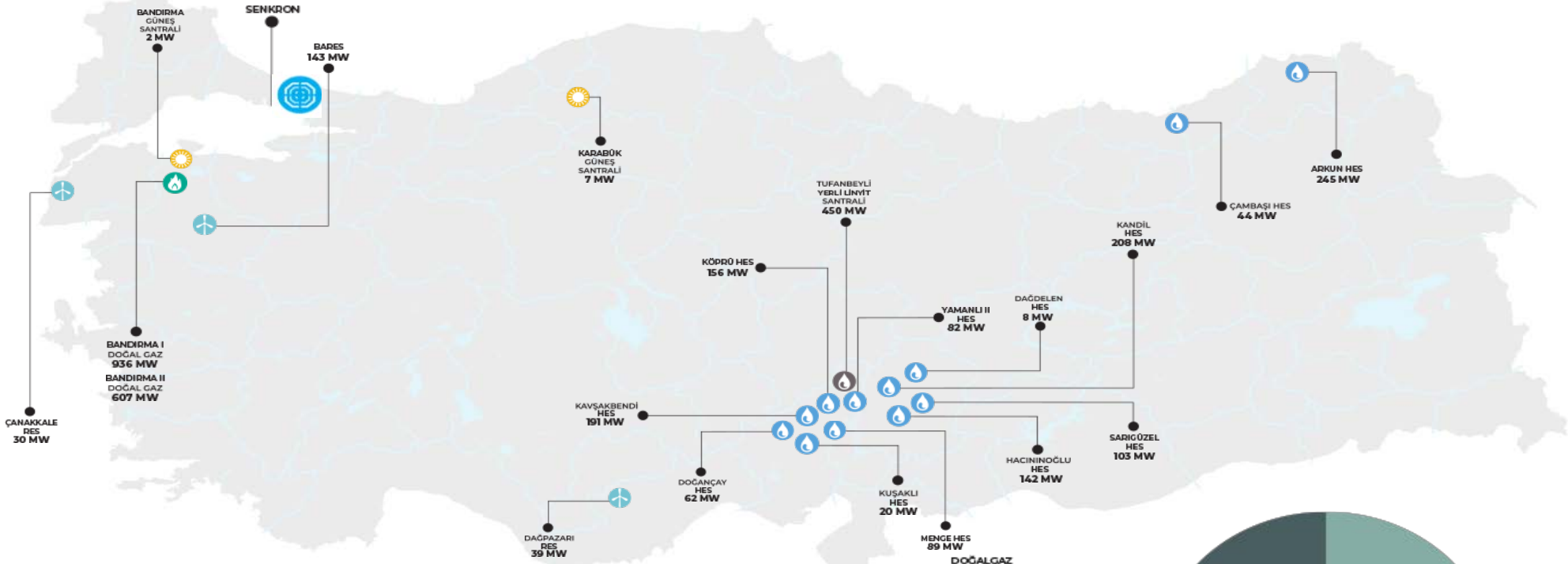
About Our Company

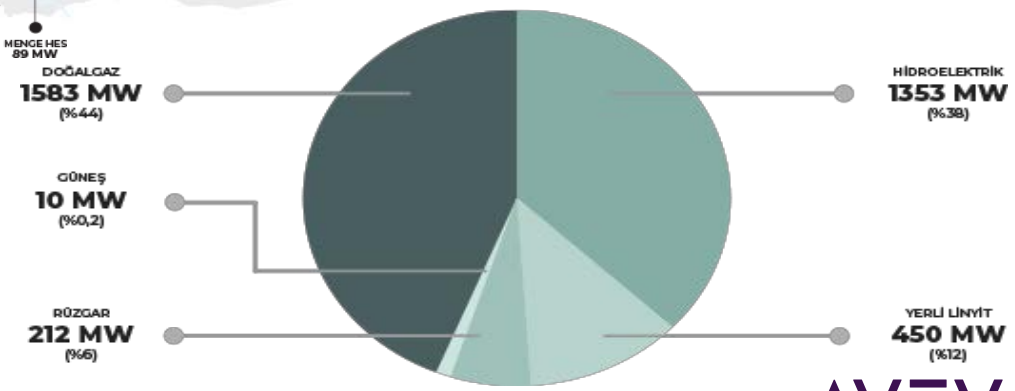
Our Portfolio

21

%56

3.607





DOĞALGAZ YERLİ LİNYİT HİDROELEKTRİK

RÜZGAR GÜNEŞ SENKRON

ENERJİSA ÜRETİM

AVEVA

About Our Company

Senkron Central Control Room

Senkron Central Control Room established in Istanbul.

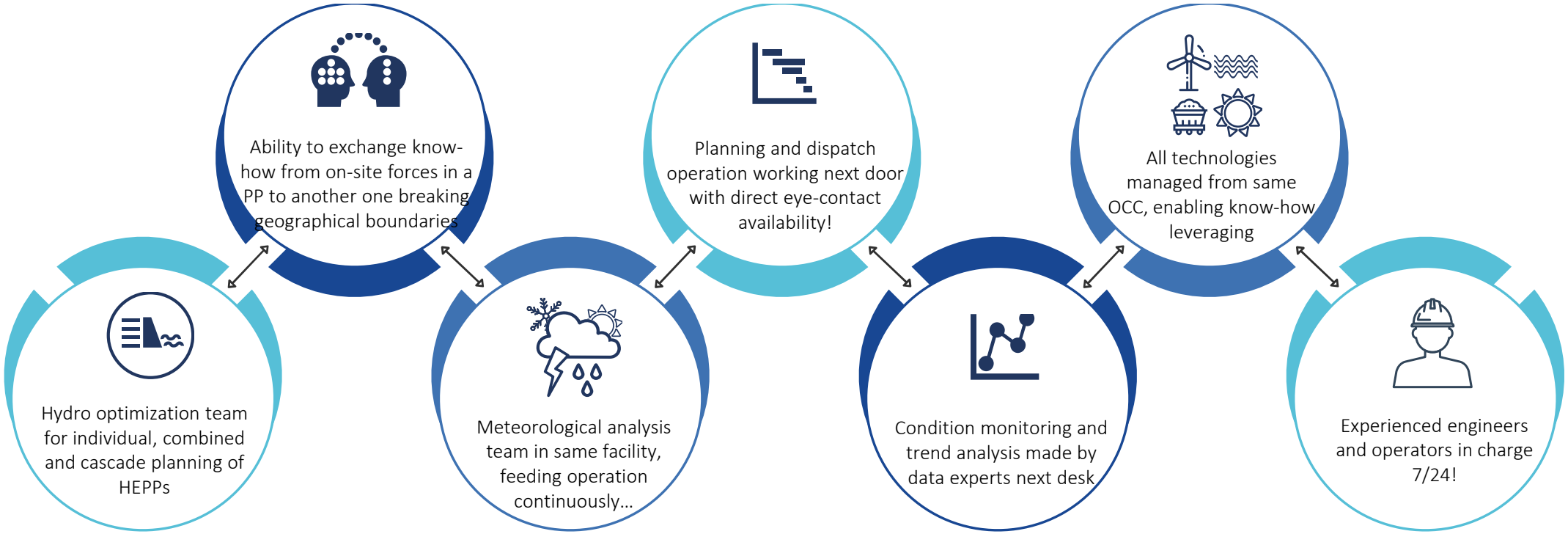
It has started the process of remote operation of 12 hydroelectric power plants. The wind and solar fleet was followed.

In addition to the remote operation of hydroelectric power plants, It includes control systems belonging to Thermal, wind and Solar power plants and performs process monitoring.

Senkron is one of the best examples of Enerjisa Uretim's goal of digitalization and the pursuit of excellence that has come to life.

What is SENKRON?

Project: SENKRON (An Operation Control Center)



Business Challenge

- [x] To be able to access all the data of 21 different power plants quickly and regularly, to be able to follow up instantly.
- [x] To interpret, visualize and draw conclusions from the data we have obtained
- [x] To be able to prevent failures & trips
- [x] Time consuming reporting

Digital Transformation projects with AVEVA PI

- Hydro Common Alarm Page using PI System Explorer
- Automatic reporting by using PI Integrator
- Advance Condition Monitoring using PI Asset Framework (AVEVA & TrendMiner)
- Condition Monitoring of whole asset instantly by using PI Vision
- Power Plant Management (PPM), (Target Load, Ancillary services)

Hydro Common Alarm Page using PI System Explorer

One Screen to Monitor 12 Hydro Plants

Event Name	Start Time	End Time	Severity	Acknowledgment
SRG Bara Gerilim Sinir Disinda Alarmi 2022-04-21 07:58:17.501	4/21/2022 7:58:17 AM	4/21/2022 7:59:30 AM	Warning	Acknowledged
KND Bara Gerilim Sinir Disinda Alarmi 2022-04-21 07:57:44.789	4/21/2022 7:57:44 AM	4/21/2022 7:59:36 AM	Warning	Acknowledged
MNG U1 GENERATOR PIT NEM ORANI>=65 2022-04-21 07:05:48.743	4/21/2022 7:05:48 AM	In Progress	Critical	Acknowledged
MNG U2 GENERATOR PIT NEM ORANI>=65 2022-04-21 07:04:18.710	4/21/2022 7:04:18 AM	In Progress	Critical	Acknowledged
CMB U1 GENERATOR KILAVUZ YATAK VIBRASYON DEGERI>=2 2022-04-21 06:40:59.552	4/21/2022 6:40:59 AM	4/21/2022 6:43:12 AM	Critical	Acknowledged
CMB Gol Seviyesi Yuksek 2022-04-21 06:39:02.629	4/21/2022 6:39:02 AM	In Progress	Information	Acknowledged
HCO GOL SEVIYE Dusuk 2022-04-21 05:54:54.277	4/21/2022 5:54:54 AM	4/21/2022 7:04:50 AM	Information	Acknowledged
HCO U2 REAKTIF SINIRI DIŞINDA 2022-04-21 05.02.12.441	4/21/2022 5.02.12 AM	4/21/2022 5.03.34 AM	Critical	Acknowledged
CMB YUKLEME HAVUZU (TUNEL) SEVIYESI DUSUK ALARMI 2022-04-21 04:19:34.802	4/21/2022 4:19:34 AM	4/21/2022 6:35:26 AM	Information	Acknowledged
CMB Gol Seviyesi Dusuk 2022-04-21 04:09:14.858	4/21/2022 4:09:14 AM	4/21/2022 6:34:52 AM	Information	Acknowledged
CMB U1 GENERATOR KILAVUZ YATAK VIBRASYON DEGERI>=2 2022-04-21 03:57:09.585	4/21/2022 3:57:09 AM	4/21/2022 4:00:12 AM	Critical	Acknowledged
CMB YUKLEME HAVUZU (TUNEL) SEVIYESI DUSUK ALARMI 2022-04-21 02:41:23.040	4/21/2022 2:41:23 AM	4/21/2022 3:46:17 AM	Information	Acknowledged
CMB YUKLEME HAVUZU (TUNEL) SEVIYESI DUSUK ALARMI 2022-04-21 02:39:52.258	4/21/2022 2:39:52 AM	4/21/2022 2:40:23 AM	Information	Acknowledged
CMB YUKLEME HAVUZU (TUNEL) SEVIYESI DUSUK ALARMI 2022-04-21 02:32:30.378	4/21/2022 2:32:30 AM	4/21/2022 2:34:04 AM	Information	Acknowledged
KPR U1 REAKTİF SINIRLARI DIŞINDA 2022-04-21 02:18:53.000	4/21/2022 2:18:53 AM	4/21/2022 2:25:47 AM	Critical	Acknowledged
KPR U1 REAKTIF SINIRI DISINA CIKTI ALARMI 2022-04-21 02:18:53.000	4/21/2022 2.18.53 AM	4/21/2022 2.25.47 AM	Warning	Acknowledged
KPR U1 REAKTIF SINIRI DISINA CIKTI ALARMI 2022-04-21 01:49:26.000	4/21/2022 1:49:26 AM	4/21/2022 1:54:29 AM	Warning	Acknowledged

What we done

- + 1000 **Event Frames** Created
- 9000 Events Occurred and Analyzed in 2021
- **Prioritisation** of the alarms

Added Values

To be able to monitor all hydro power plants from a single page.

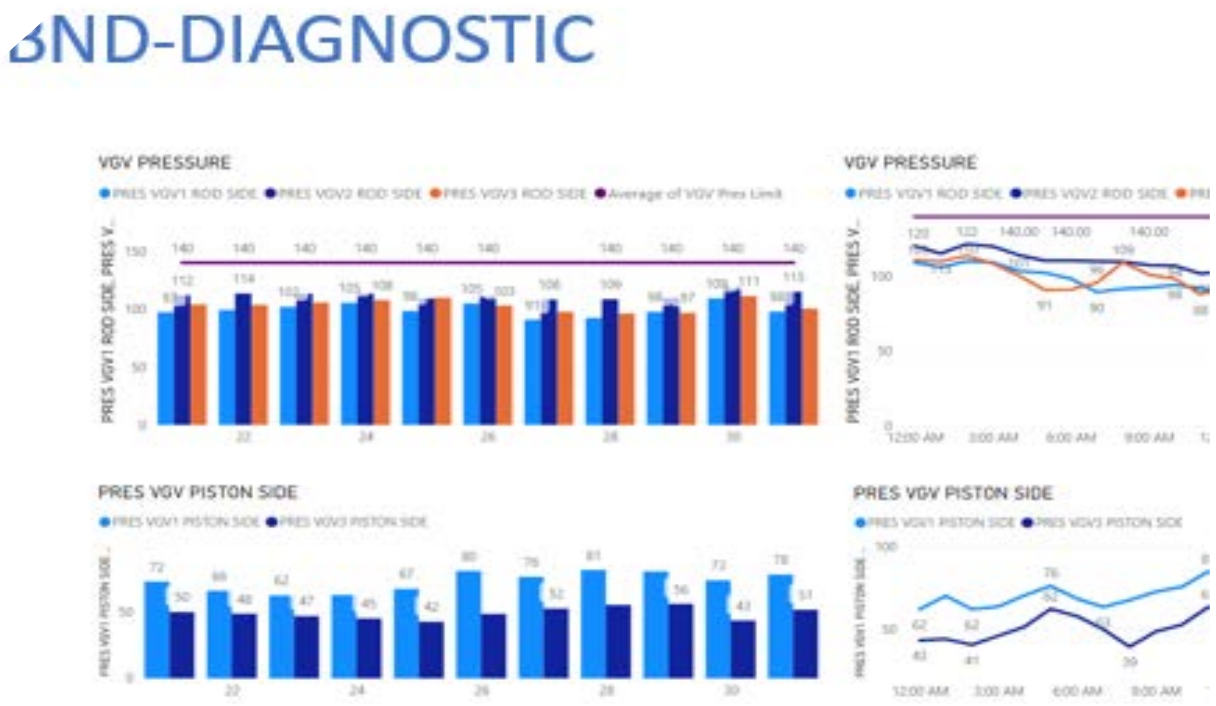
Minimizing the operation failures.

Communications with Plants operation team and performance team

Taking early actions for; SFC,PFC, Water Level, Temperature, Vibrations…

AVEVA

Automatic reporting by using PI Integrator



What we done

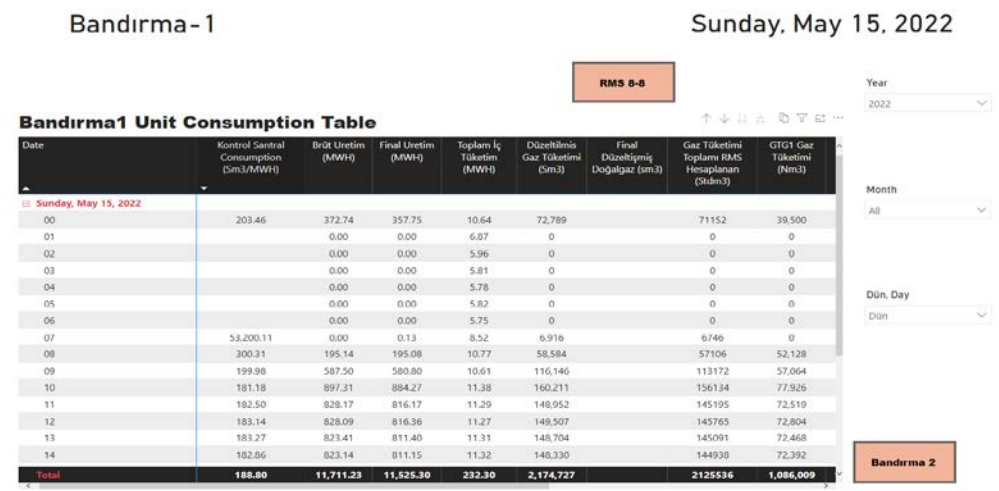
- Power Plant Diagnostic reports are created
- Daily Review reports are created

Added Values

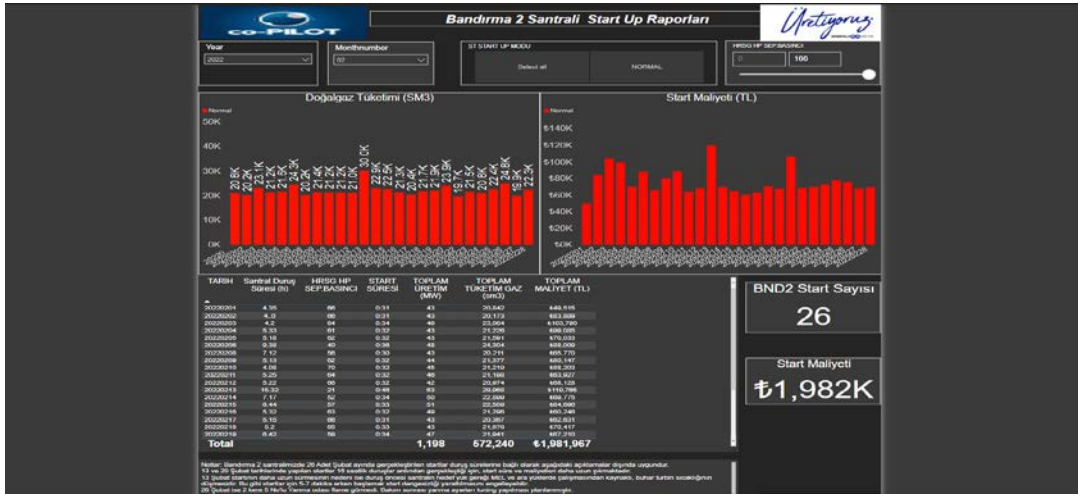
- To be able to monitor all fleet
- Reports are accessible to plant staff.
- Time Saving to Engineers
- On Time Reporting

AVEVA

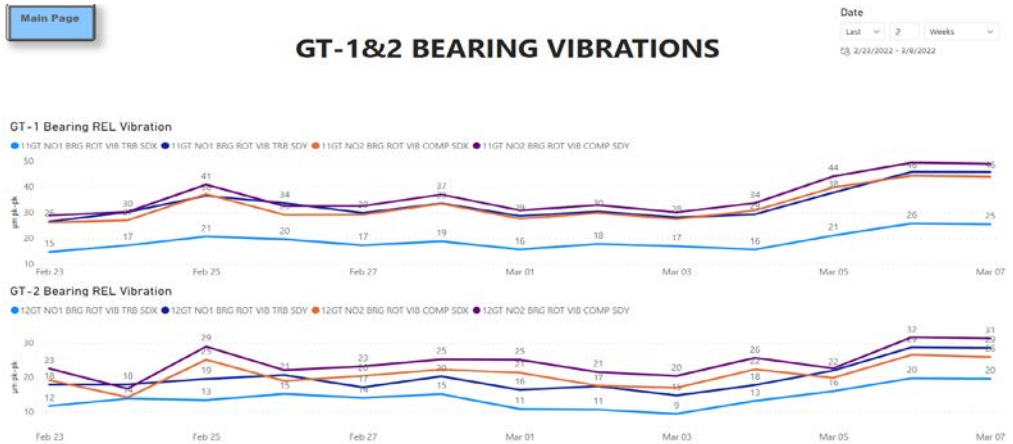
Automatic reporting



Natural Gas CCPP Production and Consumption Report

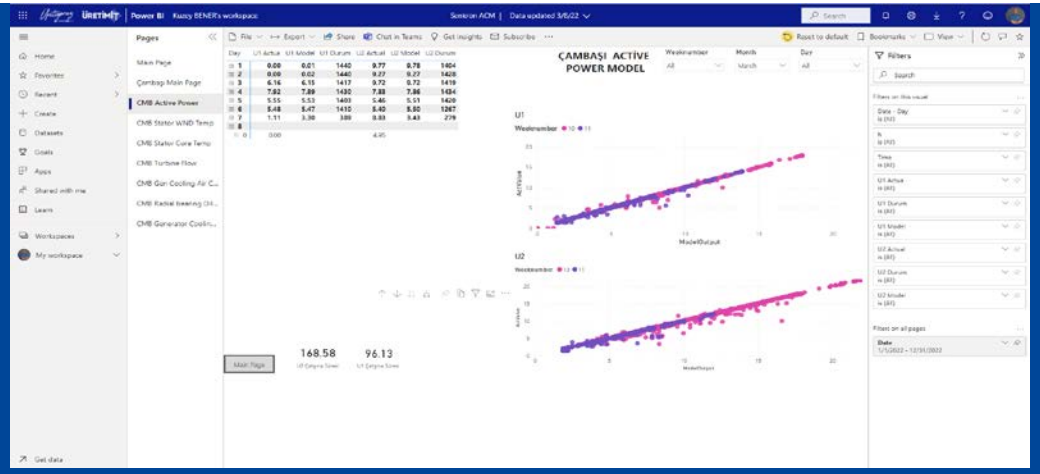


Natural Gas PP Start-up Reports



Diagnostic Reports

Advance Condition Monitoring using PI Asset Framework



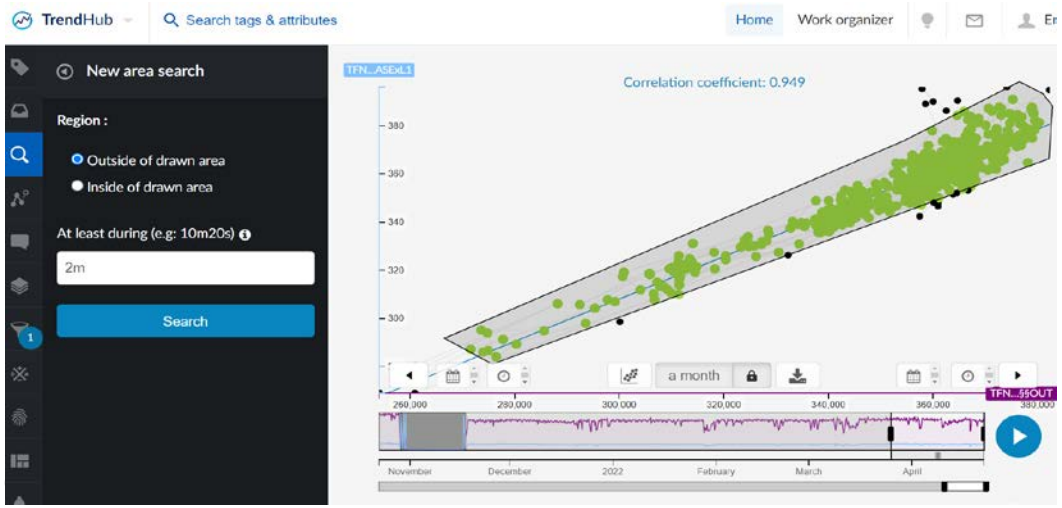
Hydro Power Plant Active Power ML Comparison

Hydro Power Plant Active Power ML Comparison

Advance Condition Monitoring using PI Asset Framework

PI Asset Framework & TrendMiner

- **Trend-Miner Operating Area Analizleri**
- **PA FAN**
- **SA FAN**
- **CID FAN**



DATABASE 5

Using PI Archive to feed the data.

METER

Determine the operating conditions and controls abnormal behaviors

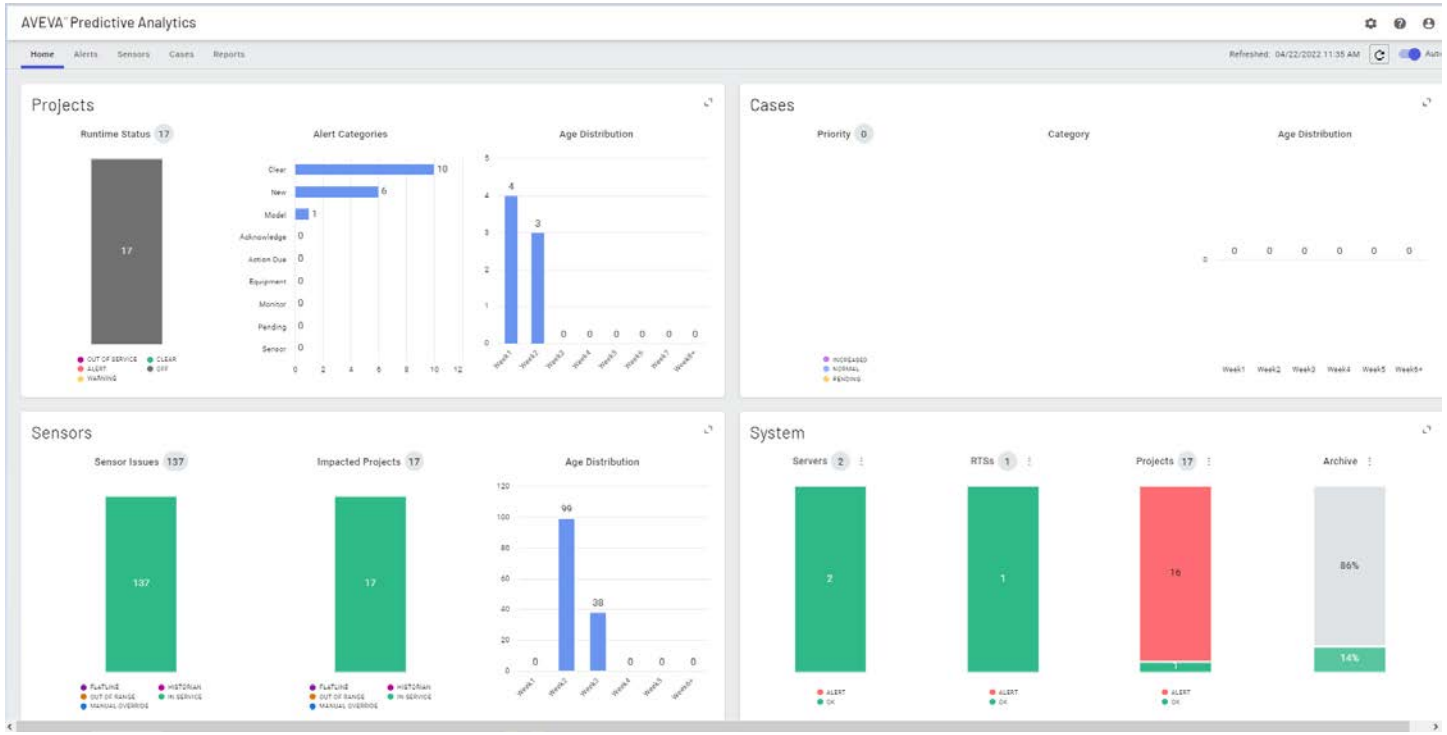
Define Root causes and fingerprint the easy indicators

MAINTENANCE

Creating alerts for predictive maintenance

Advance Condition Monitoring using PI Asset Framework

PI Asset Framework & AVEVA PRISM



DATABASE 5

Using PI Archive to feed the data.

METER

Determine the operating conditions and controls abnormal behaviors

MAINTENANCE

Creating alerts for predictive maintenance

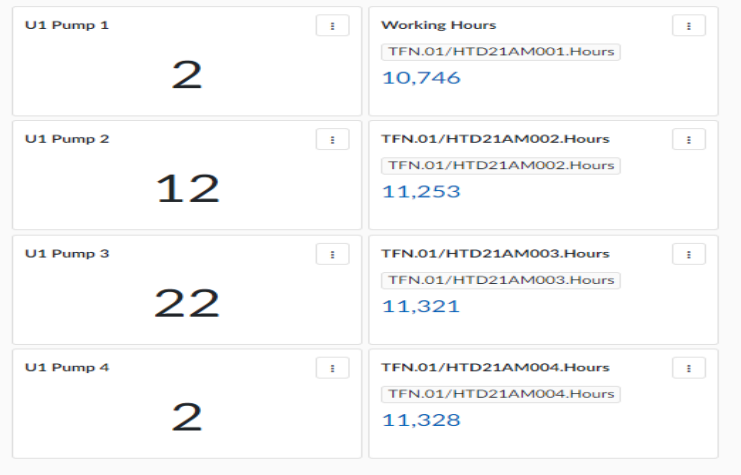
Advance Condition Monitoring using PI Asset Framework

Findings

- Case 1

Identify running Absorber Rec. Pumps

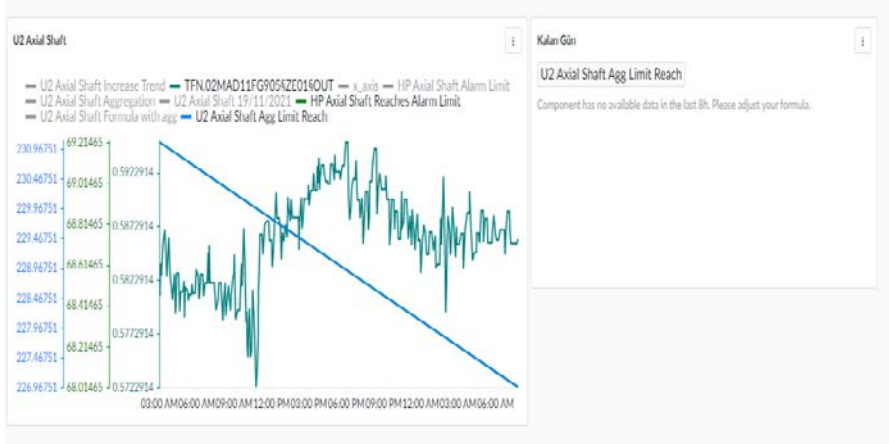
Number of running pumps depend on flue gas condition which leads decrease of internal consumption



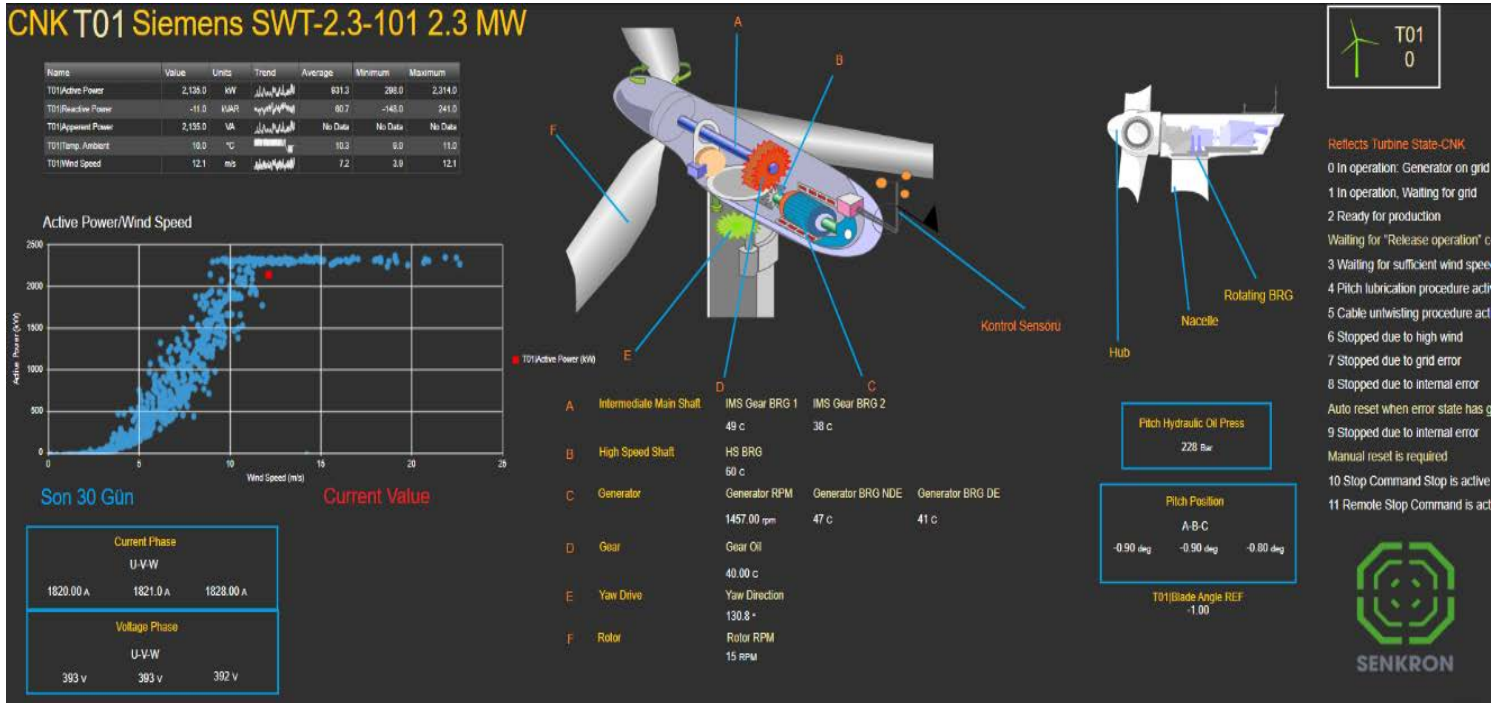
- Case 2

Axial shaft position change with time series analysis

Determine when the axial shaft position of the turbine reaches the alarm for maintenance



Condition Monitoring of whole asset instantly by using PI Vision



WINDMILL

- Creating dashboards for the assets
- Using multi-state functions for specific thresholds
- Fast refresh rate

Power Plant Management (PPM)

Load and Unbalance Control of 12 Hydro

	Fiyat Bilgileri			KVB								KPR								MNG							
SAAT	Yön	PTF	SMF	KGÜP	D. KGÜP	Net Gen	YAL YAT	EDM	PFK	SFK	Bara Set	KGÜP	D. KGÜP	Net Gen	YAL YAT	EDM	PFK	SFK	Bara Set	KGÜP	D. KGÜP	Net Gen	YAL YAT	EDM	PFK	SFK	Bara Set
H09	1293	2399	2500	98.5	94	91.99	-6.51		12	20	157	94	94	92.127	-1.873			36	157	62	62	55.822	-6.178			24	157
H10	1243	1999	0	98.5	94	87.967	-10.533		12	20	159	94	94	86.085	-7.915			36	158	62	62	52.637	-9.363			24	158
H11	1121	1988	0	4.5	0	4.841	0.341				159	0	0	0.156	0.156				158	0	0	44.062	43	1.062			158
H12	150	1724	0	4.5	0	4.38	-0.12				159	0	0	0	0				159	0	0	9.193	7.167	2.026			159
H13	-248	1890	0	4.5	0	4.115					159	0	0	0.088					159	0	0	-0.019					159
H14	0	1999	0	65.5	61	5.245					159	0	0						159	0	0	-0.024					159
H15	0	1999	0	65.5	61						159	0	0						159	0	0						159
H16	0	2199	0	4.5	0						159	0	0						159	62	62					24	159
H17	0	2500	0	4.5	0						159	0	0						159	62	62					24	159
H18	0	2500	0	4.5	0						159	0	0						159	62	62					24	159
H19	0	2500	0	4.5	0						159	0	0						159	62	62					24	159

	Ünite-1		Final Üretim - Ünite-1			
SAAT	Reaktif güç (Mvar)	Aktif güç (MW)	TEİAŞ Ü1 Üretim (MWh)	TEİAŞ Ü1 Tüketim (MWh)	Net Üretim (aktif güç) (MWh)	Final Üretim (MWh)
00:00-01:00	0	0	0	0	0	0
01:00-02:00	0	0	0	0	0	0
02:00-03:00	0	0	0	0	0	0
03:00-04:00	0	0	0	0	0	0
04:00-05:00	0	0	0	0	0	0
05:00-06:00	0	0	0	0	0	0
06:00-07:00	0	0	0	0	0	0
07:00-08:00	-31,399	19,890	0,989	0	0,838	0,989
08:00-09:00	0,839	43,477	44,121	0	44,128	44,121
09:00-10:00	0	0	0	0	0,154	0
10:00-11:00	0	0	0	0	0	0
11:00-12:00	0	0	0	0	0	0
12:00-13:00	0	0	0	0	0	0

Using the data we received from PI, we created our own product, Power Plant Management (PPM)

Automated Unit Start-Stops Reporting

Warning System for Ancillary Services

Automatic calculation of imbalance load

Automatic Reporting Using PowerBI

Mandatory reporting to local

SENKRON Digital Transformation

Challenge

- To monitor and operate 12 hydroelectric power plants with different Scada's under one roof.
- Track and monitor more than 60,000 signals instantly.
- Web visibility of fleet data for different users.
- Advanced data analysis.
- Data Management.

Solution

- Hydro common alarm management by using PI System Explorer Event Frame and Notifications.
- PI Vision templates for Process & Condition Monitoring for all fleet
- Using PI Integrator and PI AF system for data sourcing of external products
- Reporting with BI tools

Benefits

- Fewer operational errors
- Quick response time for trips and alarms from different locations
- Contribution to preventive maintenance (Data driven maintenance planning)
- Controlled and time saving internal and external reporting.

AVEVA

Emin Sahin

Speaker title

- Enerjisa Uretim
- emin.sahin@enerjisauretim.com

Kuzey Bener

Speaker title

- Enerjisa Uretim
- Kuzey.bener@enerjisauretim.com