EP Produzione
PI utilization in Italian Fleet

Franco Rossetti – Giorgio Annunziata

EP PRODUZIONE

OSIsoft. PI World BARCELONA SEPT. 24-27, 2018

PI OsiSoft User Conference

Barcelona 24 ÷ 27 Sep 2018

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Agenda

1. Company structure: EPH Group and EP Produzione
2. PI's development in EON and EP Produzione
3. PPs' HW connection scheme and PI Vision architecture
4. PI use in Power Plants
5. PI use in Asset Management and other divisions

EPH Company profile

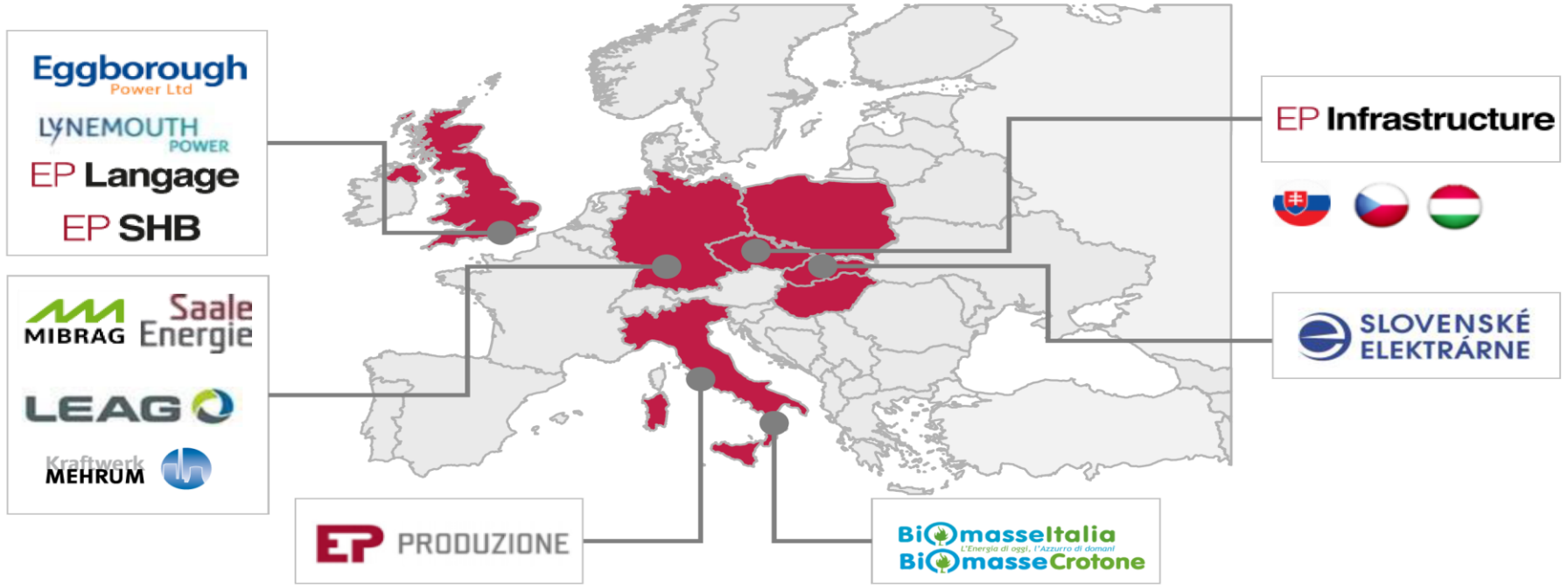
#1 Largest gas transmission route in Europe

#1 Gas distributor in Slovakia

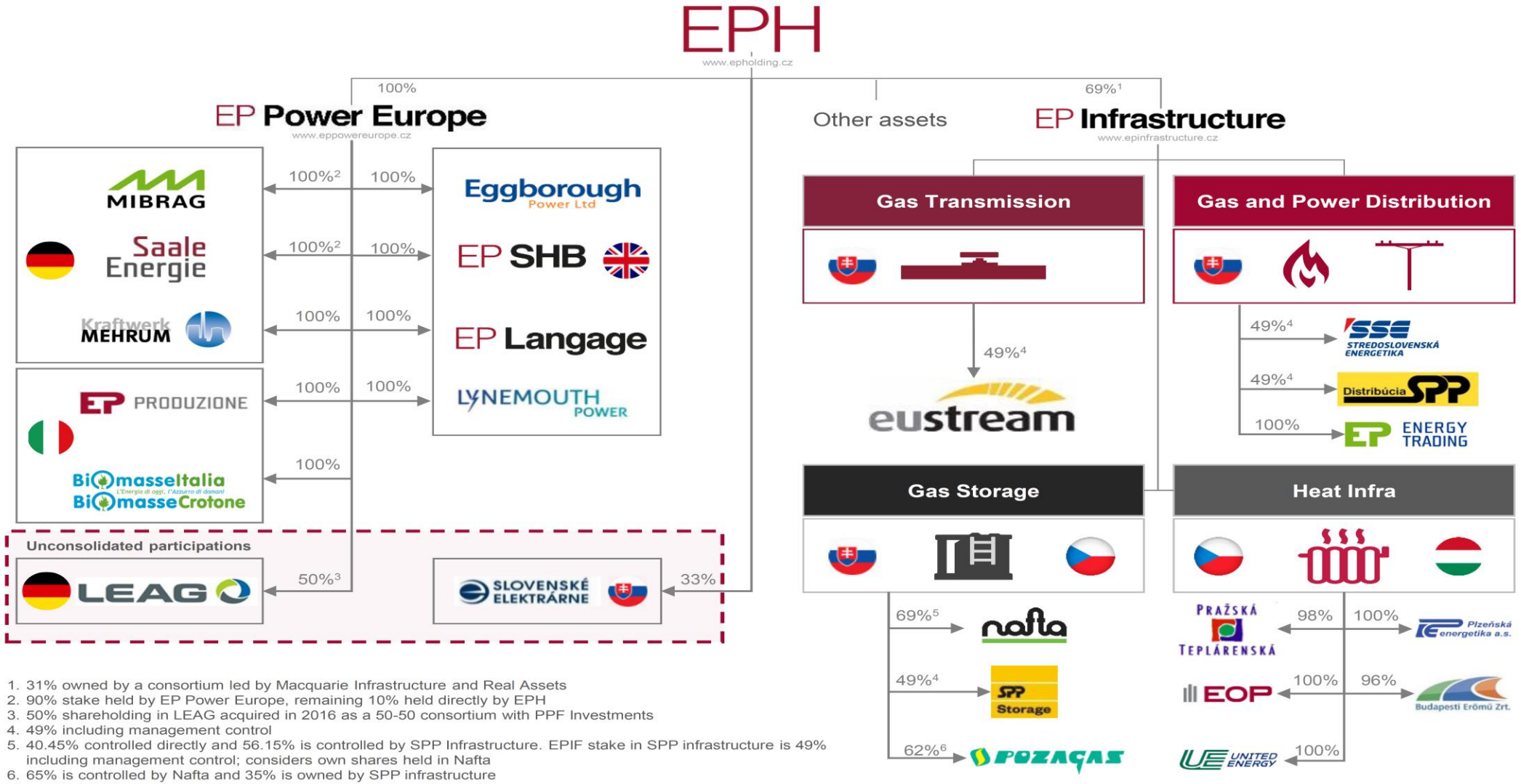
#1 Czech district heating infrastructure

#1 Gas storage player in region of Slovakia, the Czech Republic and Austria

Geographic presence of EPH



EPH group structure



1. 31% owned by a consortium led by Macquarie Infrastructure and Real Assets
2. 90% stake held by EP Power Europe, remaining 10% held directly by EPH
3. 50% shareholding in LEAG acquired in 2016 as a 50-50 consortium with PPF Investments
4. 49% including management control
5. 40.45% controlled directly and 56.15% is controlled by SPP Infrastructure. EPIF stake in SPP infrastructure is 49% including management control; considers own shares held in Nafta
6. 65% is controlled by Nafta and 35% is owned by SPP infrastructure

EPH fleet in Italy

Transaction perimeter

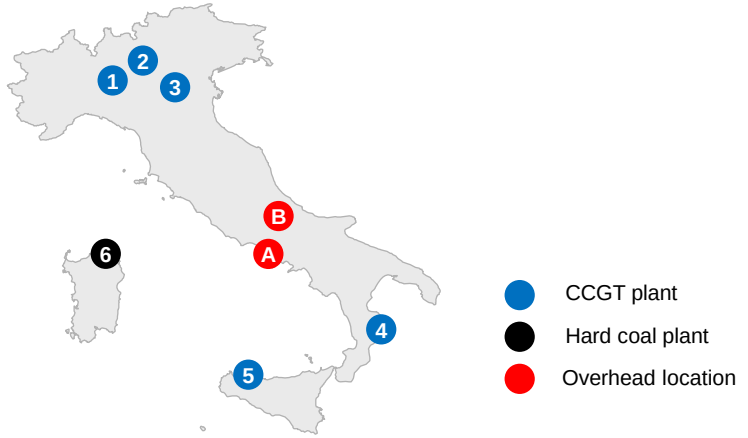
- E.ON has decided to exit Italy and to sell its Italian operations
- EPH took over in mid 2015:
  - Coal generation business of 598 MW net capacity in Sardinia
  - Gas generation business comprising of 5 operating power plants located mainly in the North of Italy
- These assets represent over 10%[1] of total thermal installed capacity in the Northern Zone and 7%[1] of total thermal installed capacity in Italy
- Coal-fired power plant Fiume Santo with 22% of thermal installed capacity in Sardinia, is a key local generation source
- The market is split into 6 zones with own prices

Livorno Ferraris power plant

Fiume Santo power plant

1.Calculated based on 100% ownership of capacity; Terna statistical data 2015
2. Two non-operating power plants CE Ferrara and CE Teverola (under decommissioning) are included among acquired power plants (both 58% ownership)

Assets overview



	Plant	Fuel	Net capacity (MW)	Built	Owner ship
1	Livorno Ferraris[3]	CCGT	805	2008	75%
2	Tavazzano Montanaso	CCGT	1.140	2005	100%
3	Ostiglia	CCGT	1.137	2005	100%
4	Scandale[4]	CCGT	814	2010	50%
5	Trapani	OCGT	213	2013	100%
6	Fiume Santo	Hard coal	599	2003	100%
	Total / Total EPH Share		**4.708/ 4.301** [3,4]		

A **Rome HQ**
B **Terni overhead location**

3. EP Produzione owns a 75%, BKW Italia S.p.A. owns a 25% (100% controlled by EP Produzione).
4. EP Produzione owns a 50%, A2A gencogas owns a 50% (50% controlled by EP Produzione).

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PI develompment in E.ON and EPP

EON

EPP

2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019

First installation

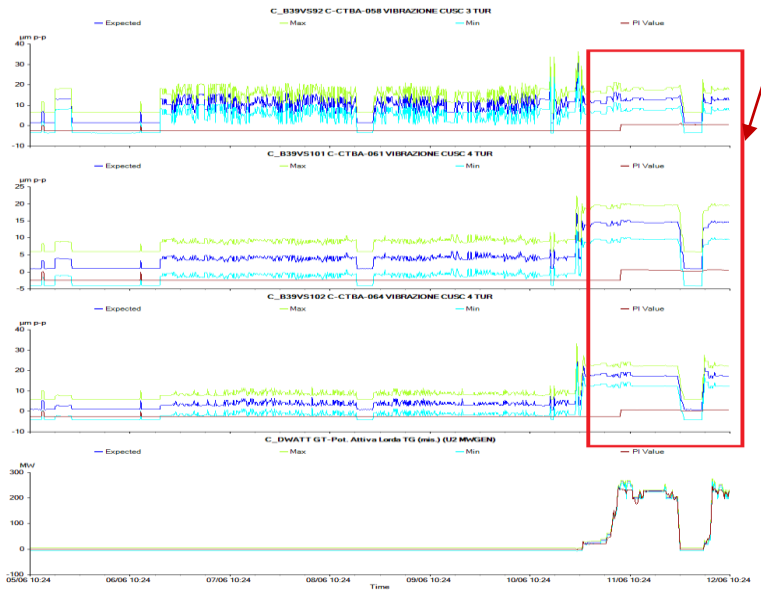
Installation completed

ACM development

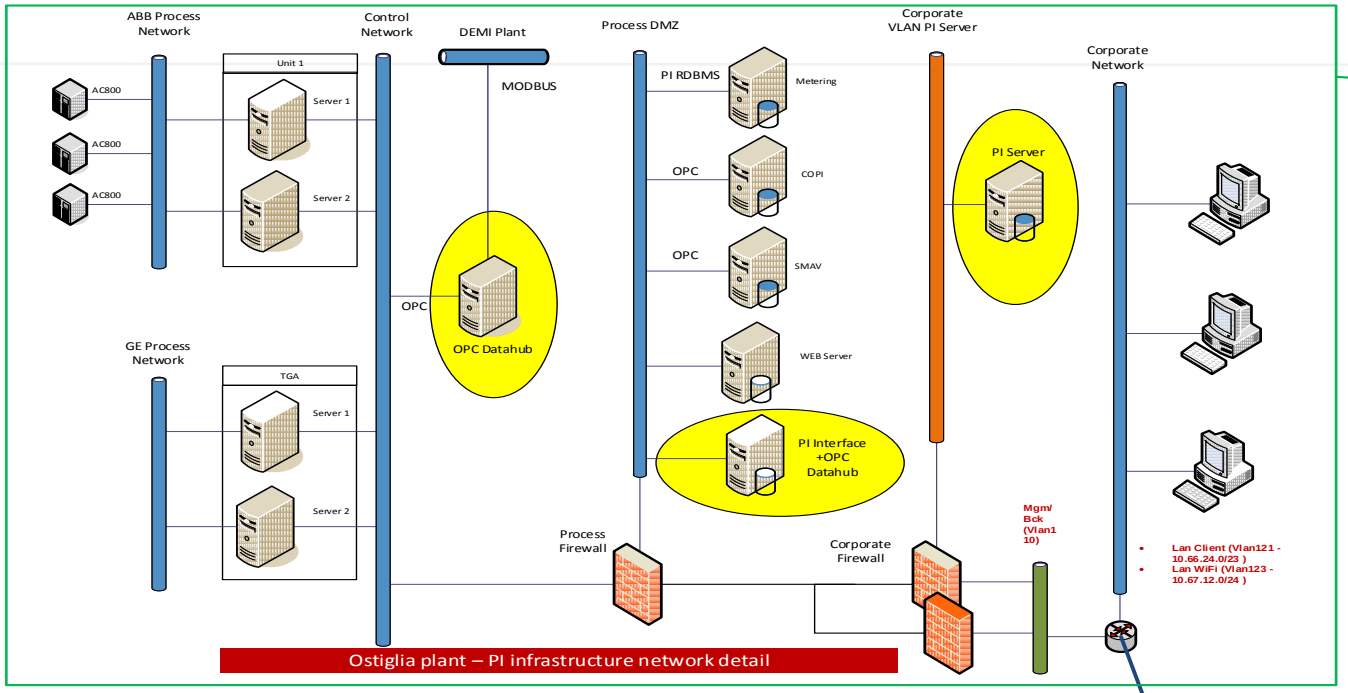
Updating HW and SW

Join To Company Domain

Asset Framework and PI Vision Development

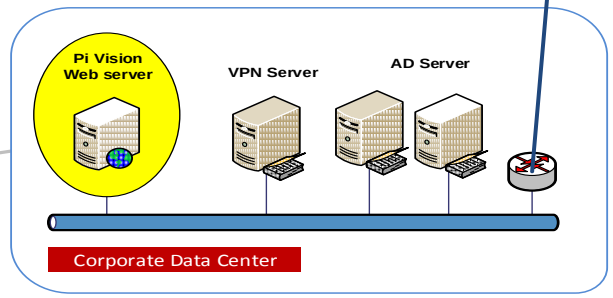


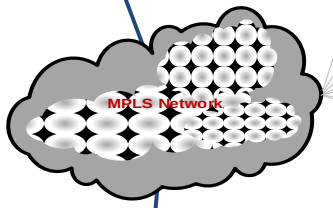
Power Plant HW connection scheme and PI Vision architecture

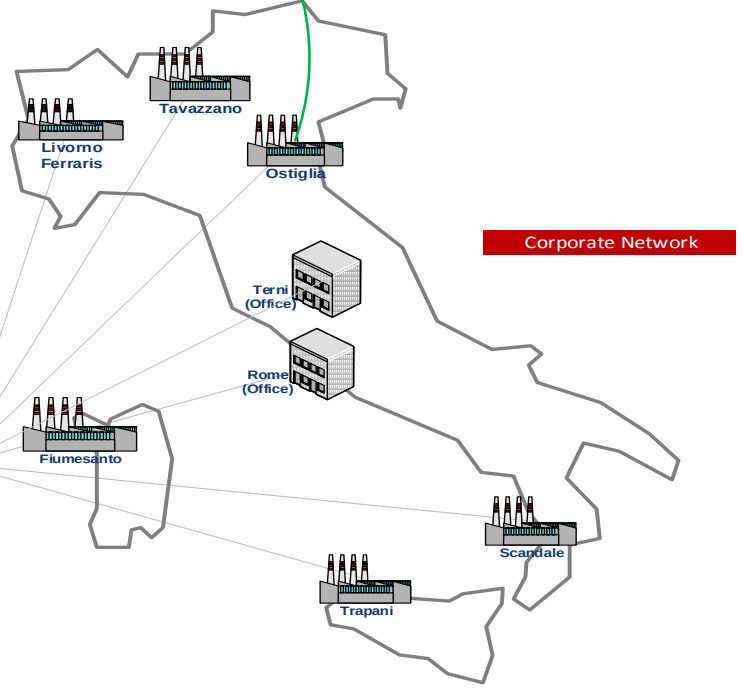


Nota N°1: Traffic between Corporate Network and Control network in not allowed

Nota N°2: Traffic between Corporate Network and Process network is not allowed







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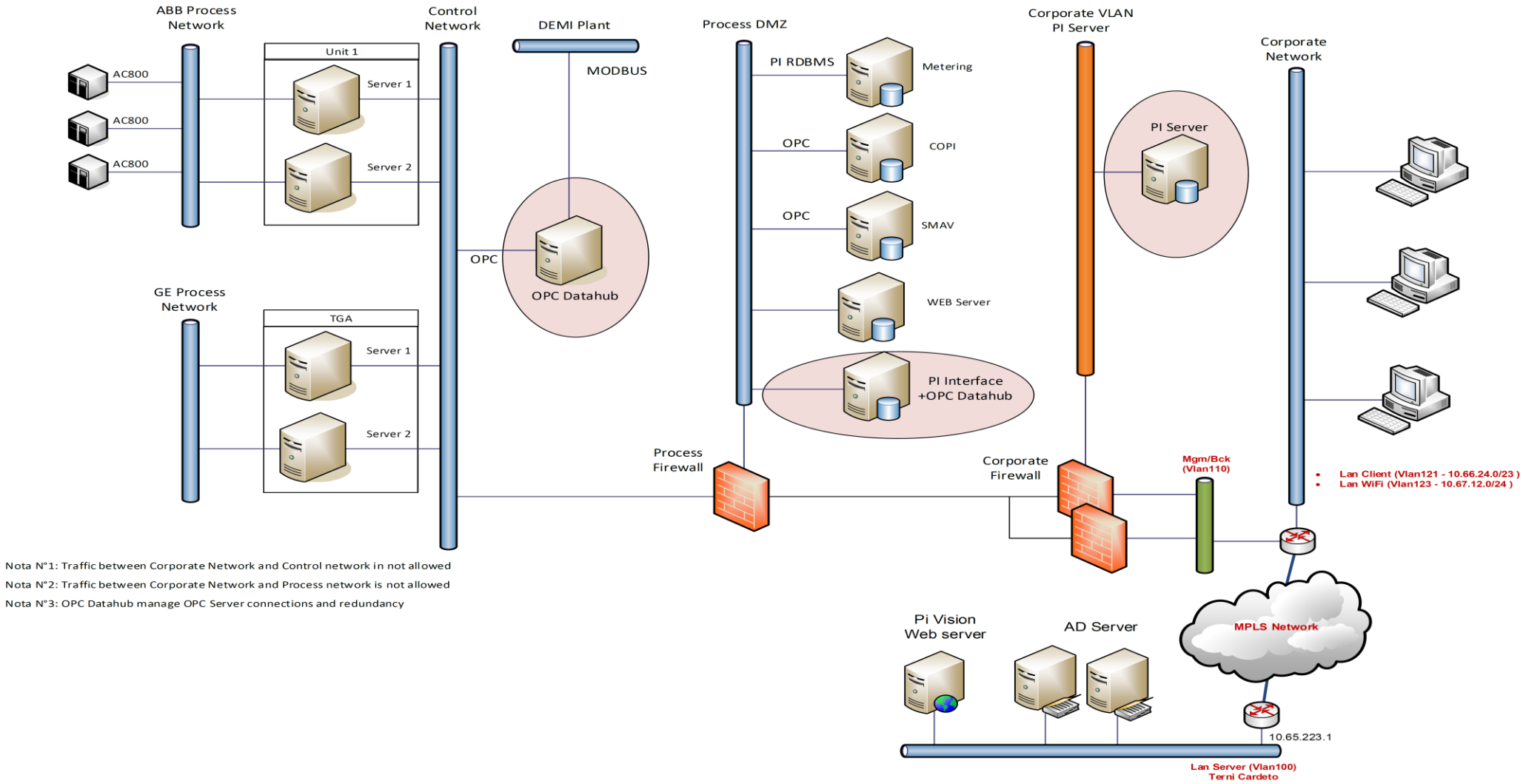
Power plant connection scheme



Nota N°1: Traffic between Corporate Network and Control network in not allowed

Nota N°2: Traffic between Corporate Network and Process network is not allowed

Nota N°3: OPC Datahub manage OPC Server connections and redundancy

PI use in power plant via Data link

Operational data for reporting and analysis purposes

- Start up consumption
- Energy production
- KPIs monitoring
- Equipment operating data Hours / Starts

Events analysis
Plant monitoring

Operating time

Energy Production

GT/ST FS-FFH-EOH

Fuel consumption

Startup/shutdown consumption and energy production

PI use in power plant via Data Link

Operational data for reporting and analysis purposes

Start up consumption - Energy production - KPIs monitoring - Equipment oerating data (op. hours / starts / trips …)

Daily Summary **29/08/2018**

Daily Net Power Generated

EU	OS1	OS2	OS12	OS3	Plant
MWh	0,00	6,69	6,69	0,00	6,69

Daily Gas Consumed

EU	OS1	OS2	OS12	OS3	Plant
KSmc (0-24)	0,00	3,59	3,59	0,00	3,59
KSmc (6-6)					2,41

Daily Efficency

EU	OS1	OS2	OS12	OS3	Plant
%	0,00	19,21	19,21	0,00	19,21

Daily Running Time (GT)

EU	OS1	OS2	OS12	OS3	Plant
hh:mm	00:00	00:06	00:06	00:00	00:06

Daily Running Time (CCGT)

EU	OS1	OS2	OS12	OS3	Plant
hh:mm	00:00	00:01	00:01	00:00	00:01

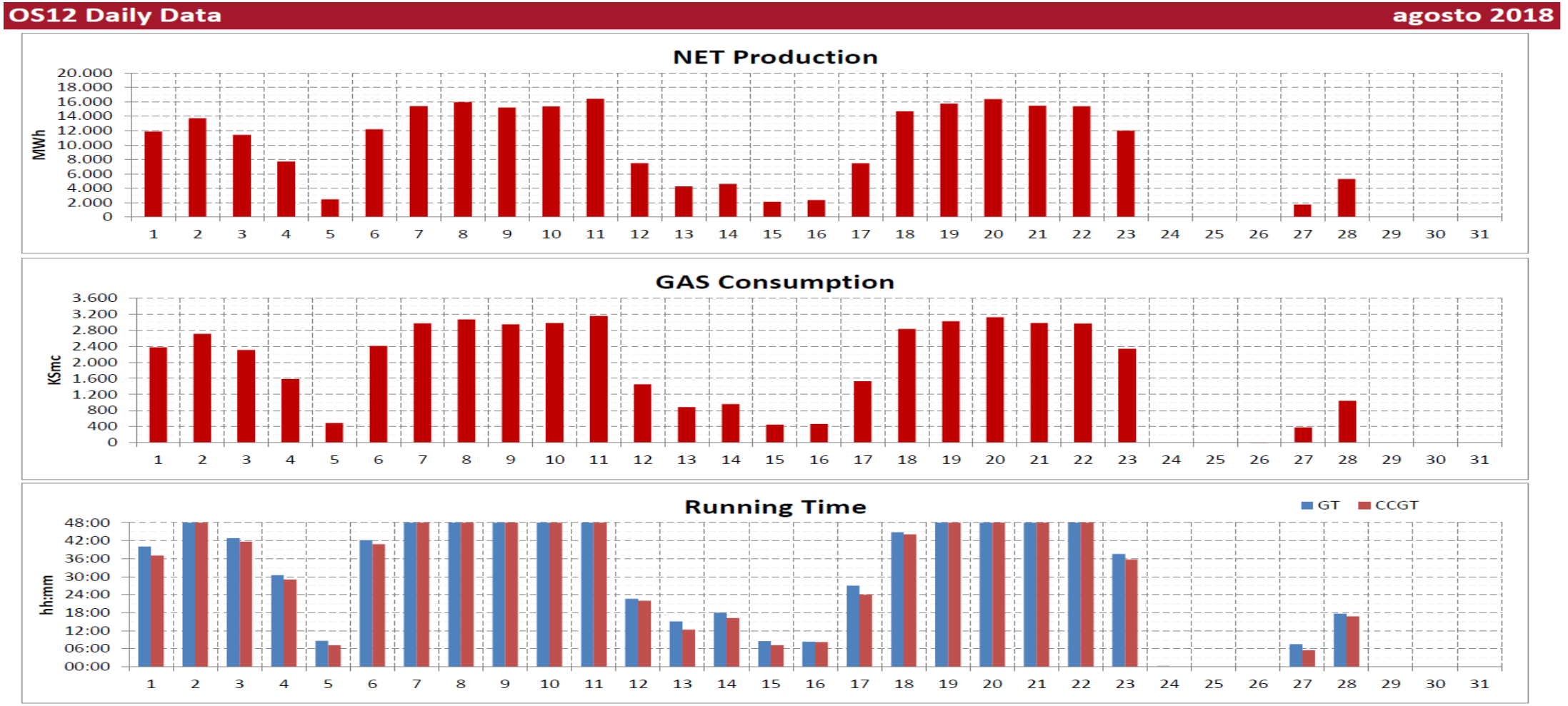
Imbalance

		OS1		OS2		OS12		OS3		Plant	
	EU	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Daily	MWh	0,0	0,0	0,0	0,0	6,7	0,0	0,0	0,0	6,7	0,0
	%	0,0%	0,0%	0,0%	0,0%	100,7%	0,0%	0,0%	0,0%	100,7%	0,0%
Monthly	MWh	0,0	0,0	0,0	0,0	1.948,9	-558,9	37,9	-16,3	1.986,8	-575,2
	%	0,0%	0,0%	0,0%	0,0%	0,7%	-0,2%	0,5%	-0,2%	0,7%	-0,2%
Yearly	MWh	0,0	0,0	0,0	0,0	10.101,2	-4.690,6	1.697,8	-533,1	11.799,0	-5.223,8
	%	0,0%	0,0%	0,0%	0,0%	0,8%	-0,4%	0,9%	-0,3%	0,8%	-0,4%

PI use in power plant via Data Link

Operational data for reporting and analysis purposes

Start up consumption - Energy production - KPIs monitoring - Equipment oerating data (op. hours / starts / trips …)



PI use in power plants via Data link

Operational live data for status check: production data – NG consumption – Heat Rate

1_PDP_PT_MIN_PCM	13/09/2018 18:18:00	**347**	MW
A_FQG_ISO5167	13/09/2018 18:18:51	**64.700**	Sm3/h
GC_PCI_ua_F	13/09/2018 18:14:30	34,957	MJ/Sm3
GC_PCS_ua_F	13/09/2018 18:14:30	38,778	MJ/Sm3
2_PDP_PT_MIN_PCM	13/09/2018 18:18:00	***347***	MW
C_FQG_ISO5167	13/09/2018 18:18:50	**66.593**	Sm3/h
A_DWATT	13/09/2018 18:18:43	***227***	MW
172A0KJE003_M	13/09/2018 18:18:49	***121***	MW
Net Power		***342,2***	MW
C_DWATT	13/09/2018 18:18:46	***232***	MW
272A0KJE003_M	13/09/2018 18:18:51	***120***	MW
Net Power		***346,1***	MW
	Totale PDP	**688**	**MW**
	Totale GAS	**131.293**	**Sm3/h**

HR (LHV)
6.699

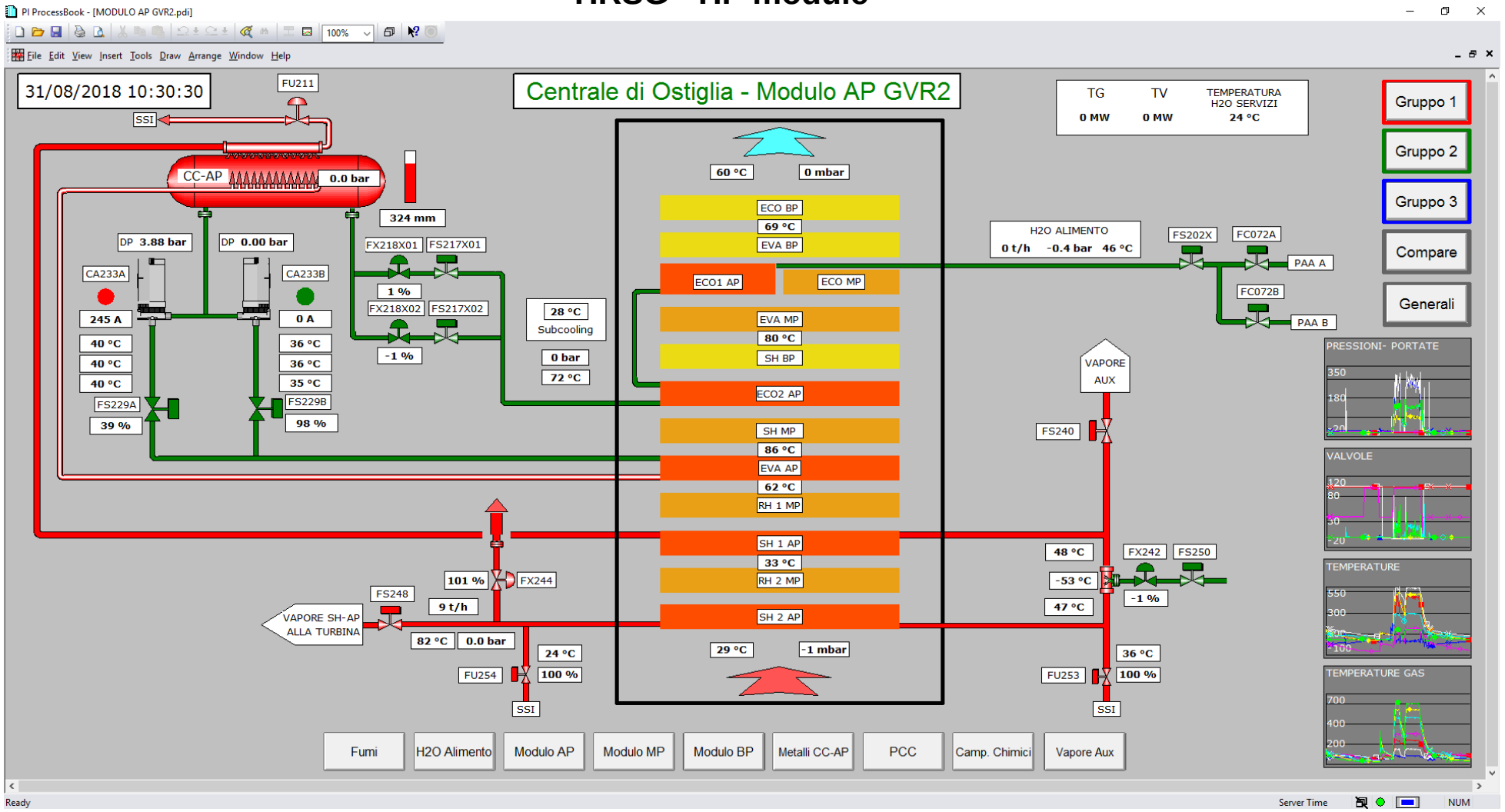
HR (LHV)
6.612

HR (LHV)
6.668

PI use in power plant via Process Book

Equipment analysis via office network, data available for PI clients whitin the power station and asset managment

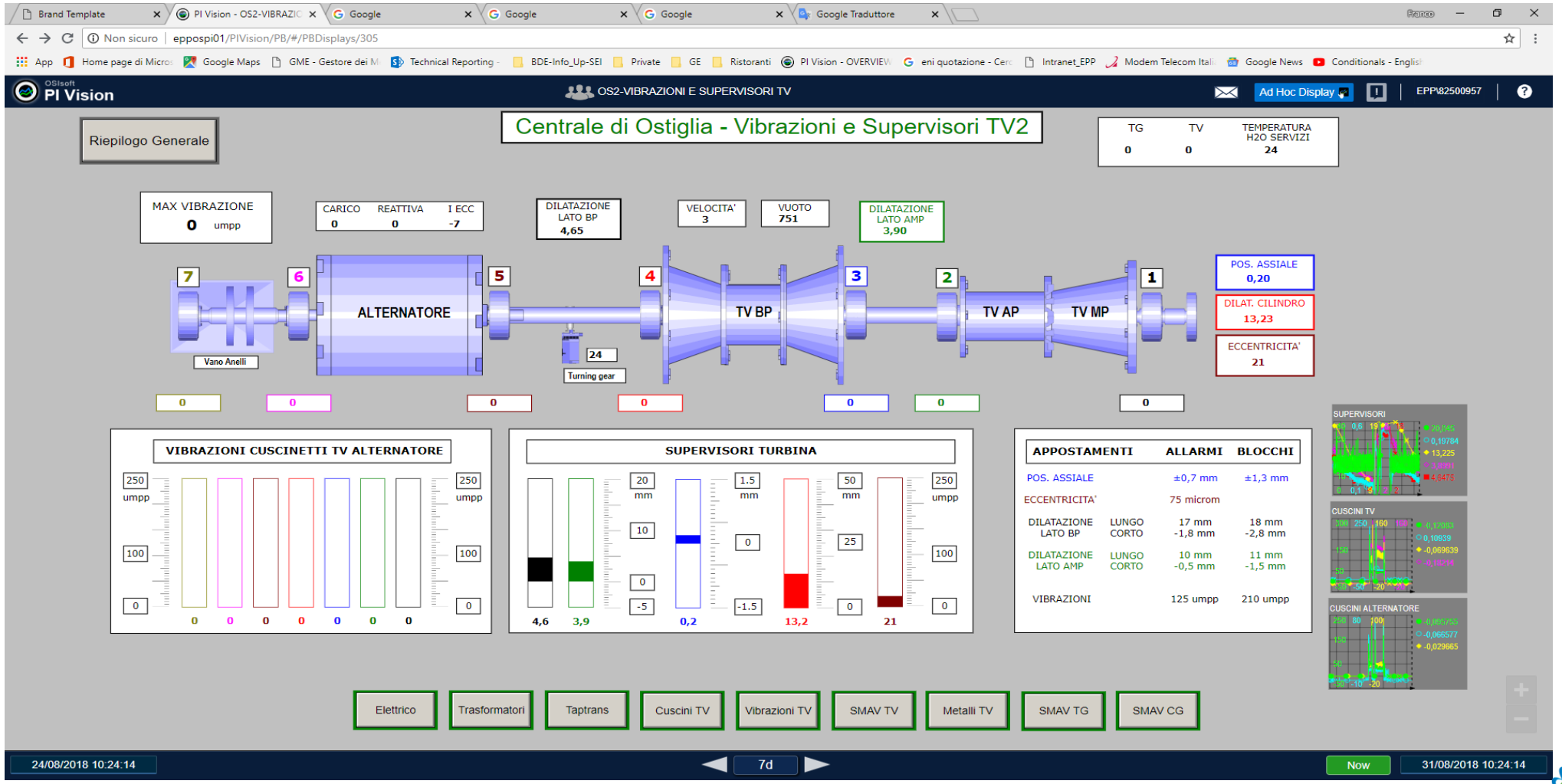
HRSG - HP module



PI use in power plant via Process Book

Equipment analysis via office network, data available for PI clients whitin the power station and asset managment

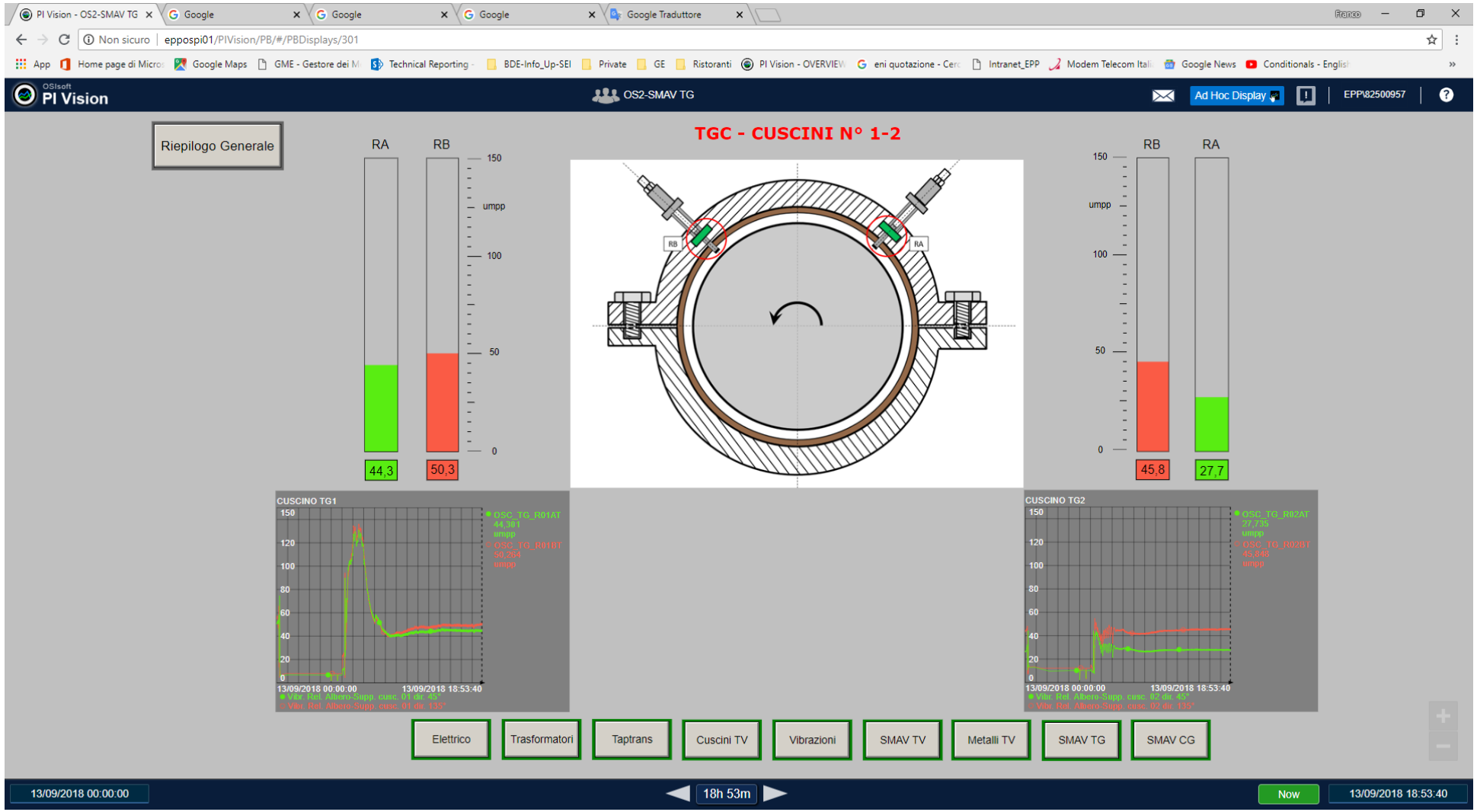
ST Bearings Vibration



PI use in power plant via Process Book

Equipment analysis via office network, data available for PI clients whitin the power station and asset managment

Live Bearing Vibration Details



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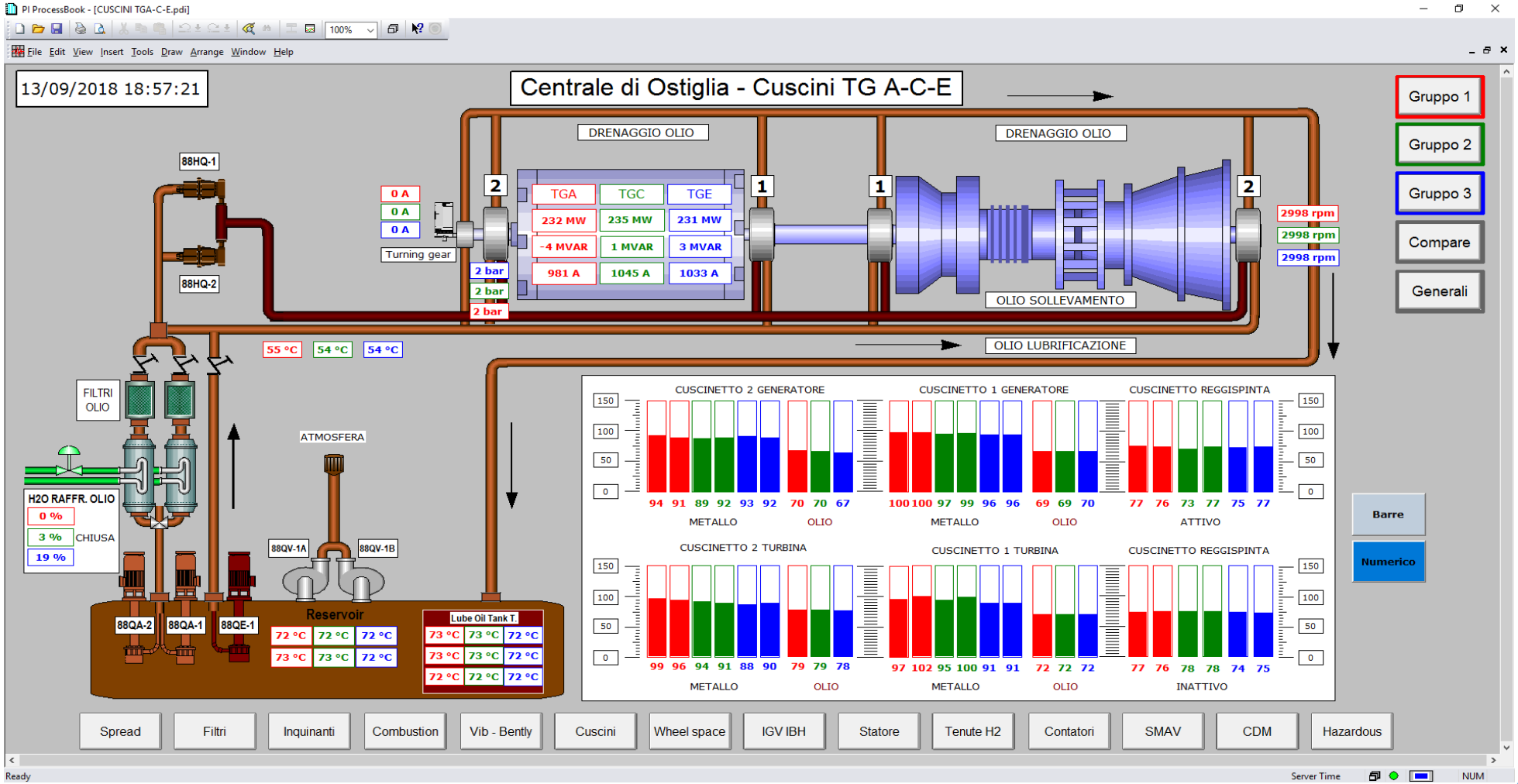
PI use in power plant via Process Book

Equipment analysis via office network, data available for PI clients whitin the power station and asset managment

Live data comparison – quick detection of deviation between identical units/equipment

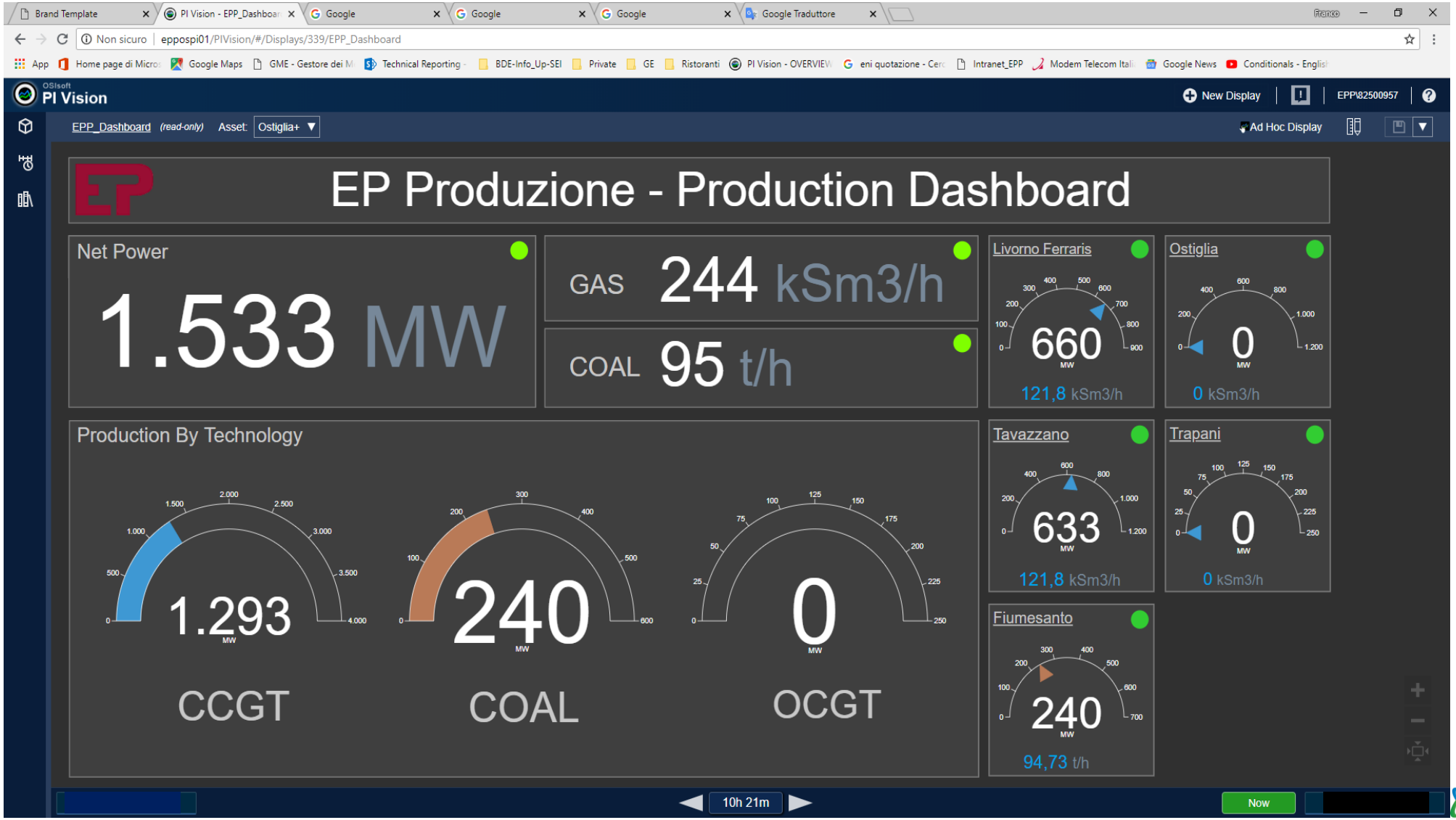


PI Vision on web

http://eppospi01/PIVision/PB/#/PBDisplays/5
http://eppospi01/PIVision/PB/#/PBDisplays/2
http://eppospi01/PIVision/#/
http://eppospi01/PIVision/#/Displays/339/EPP_Dashboard

PI Vision on web

Company dashboard, live data available via web on PCs and mobile devices



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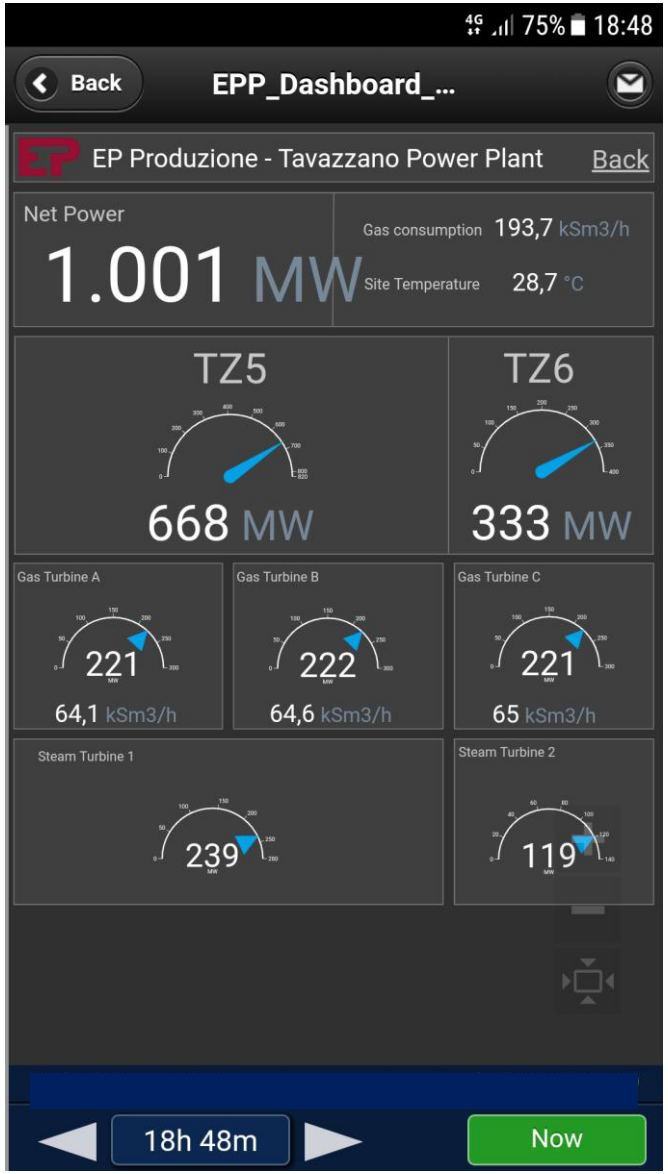
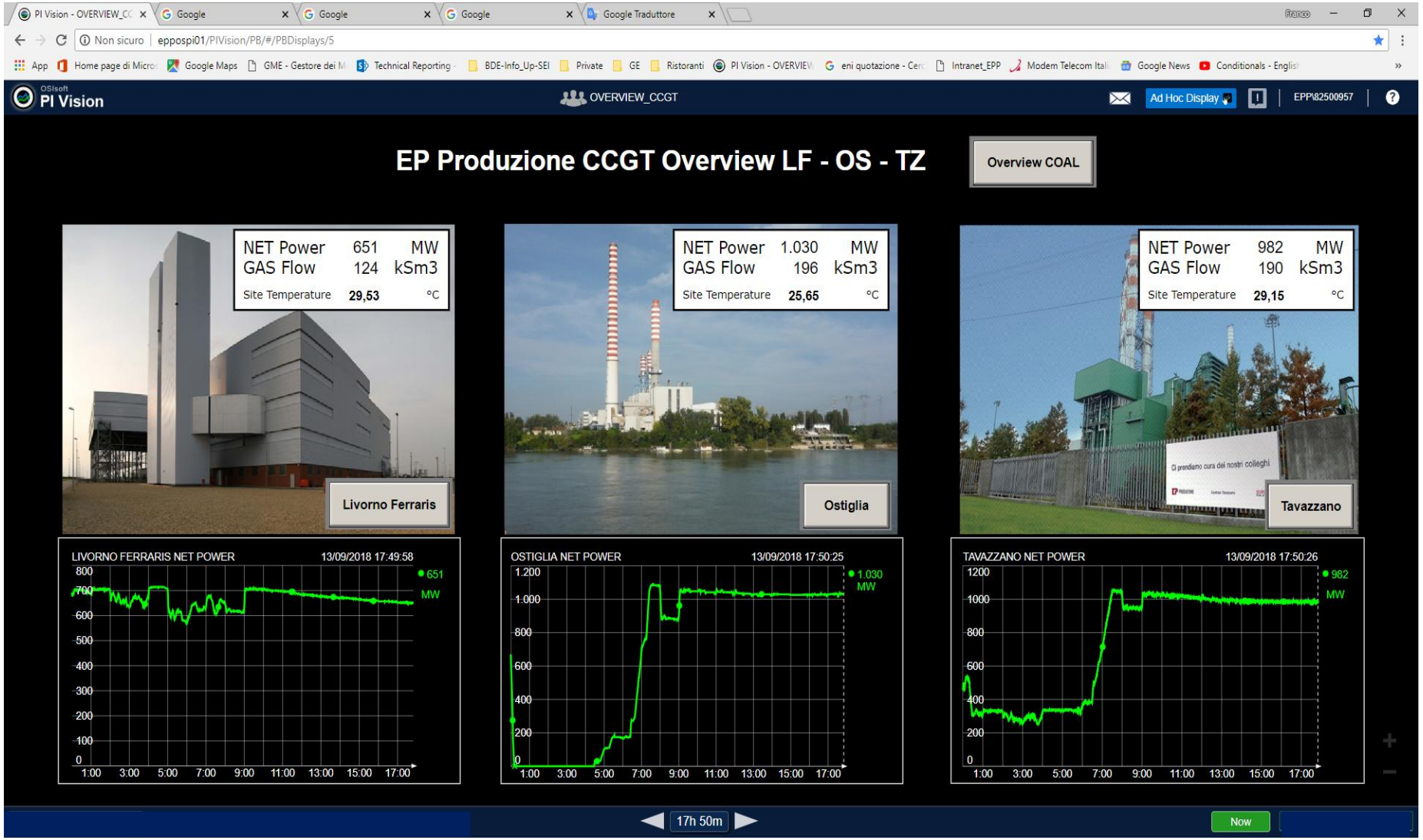
PI Vision on web

Company dashboard, live data available via web on PCs and mobile devices



Power Plant data from PI Vision on Web

Company's overview live data



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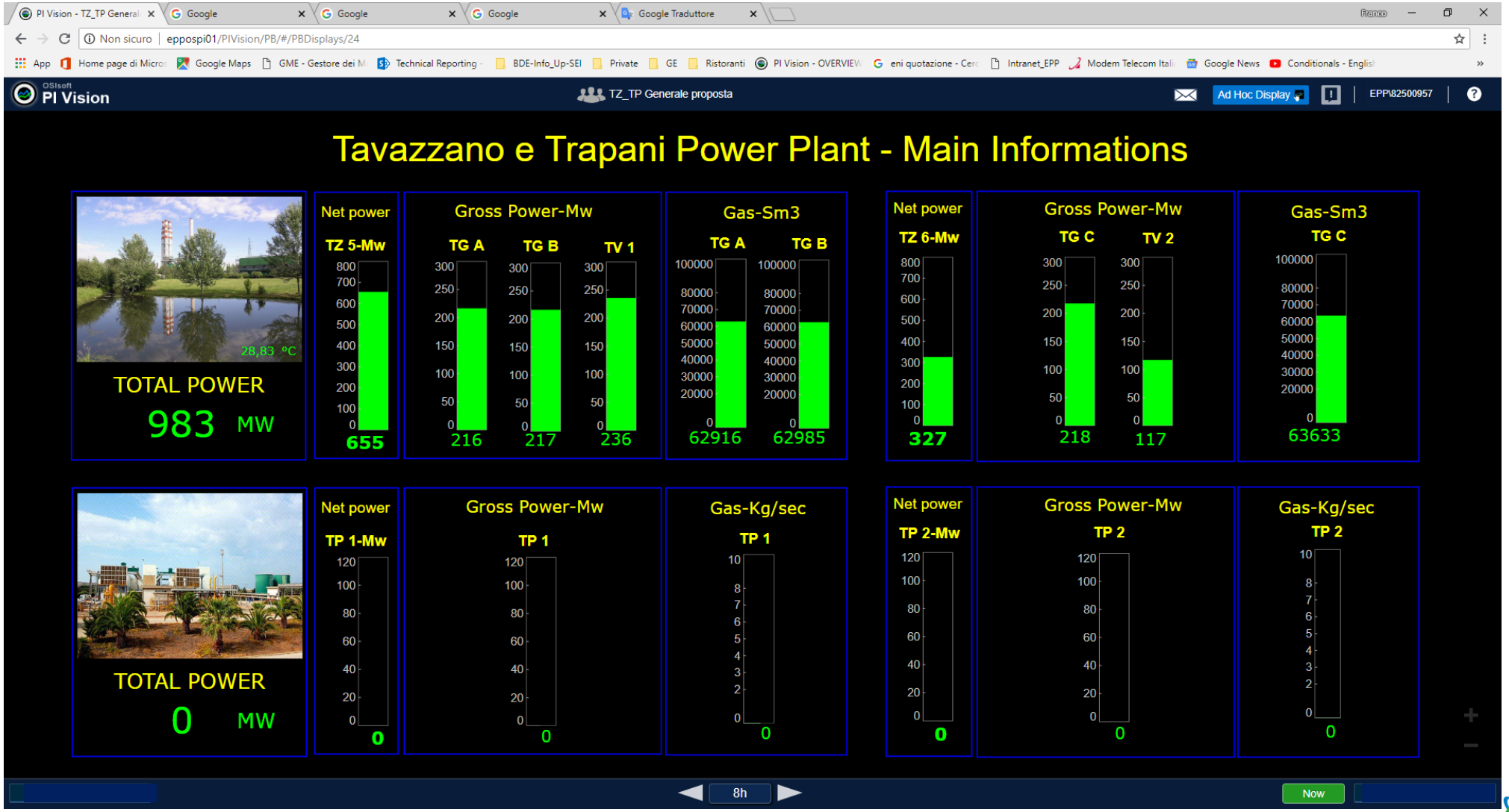
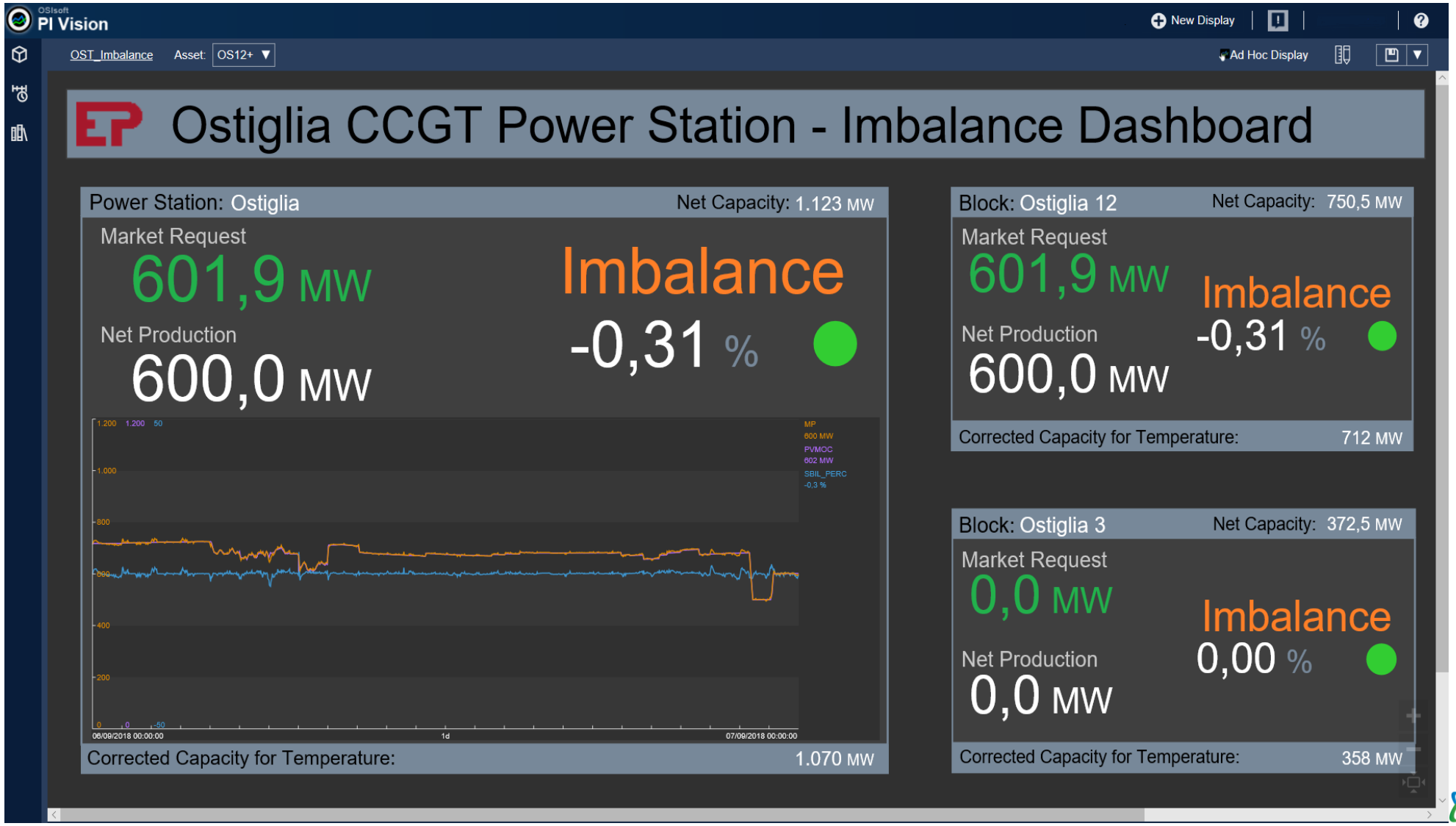
Power Plant data from PI Vision on Web

Plant's overview live data



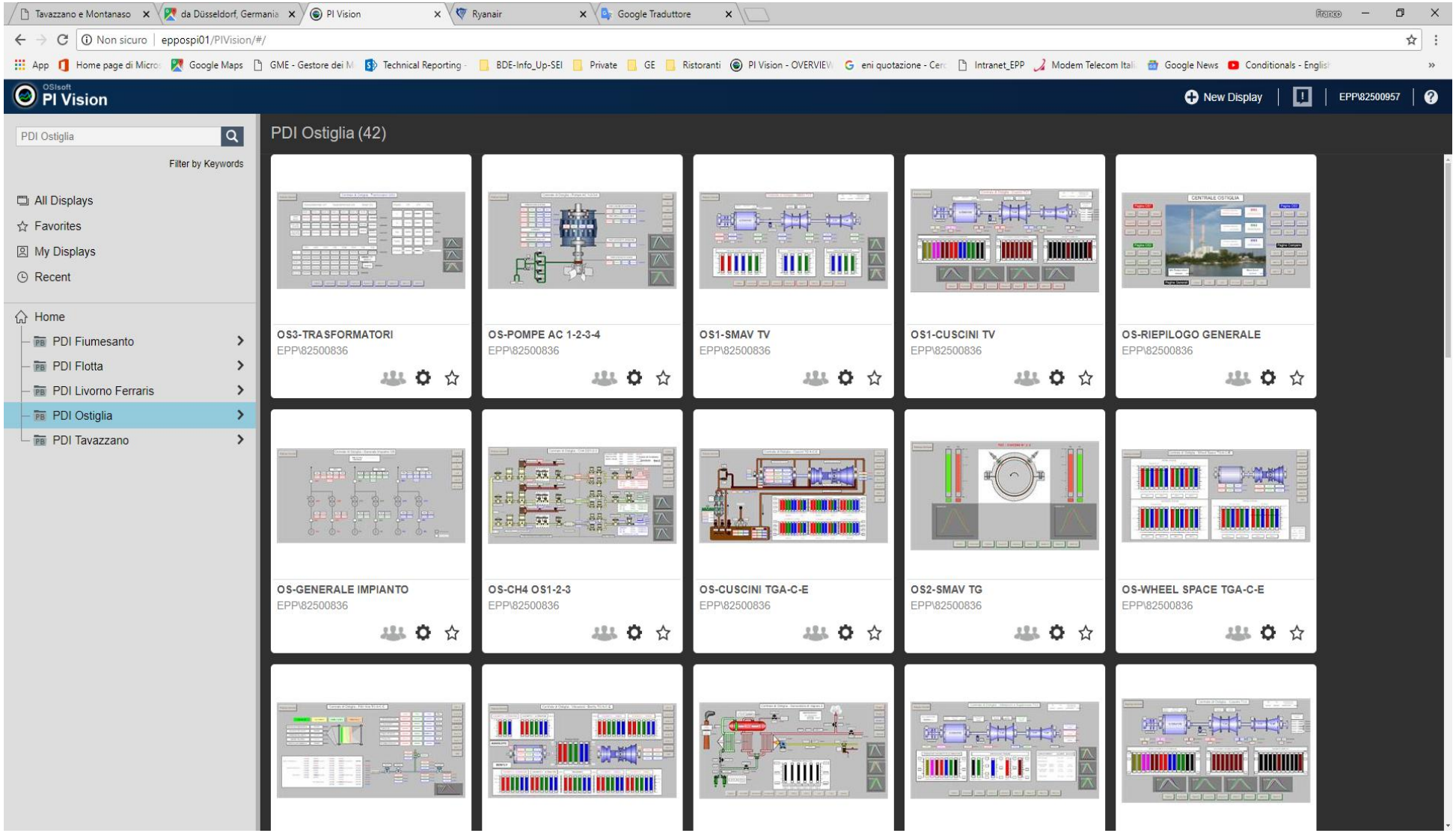
Power Plant data from PI Vision on Web

Specific detail overview live data (Market imbalance vs Load profile)



Power Plant data from PI Vision on Web

Fleet folders (live data)



Power Plant data from PI Vision on Web

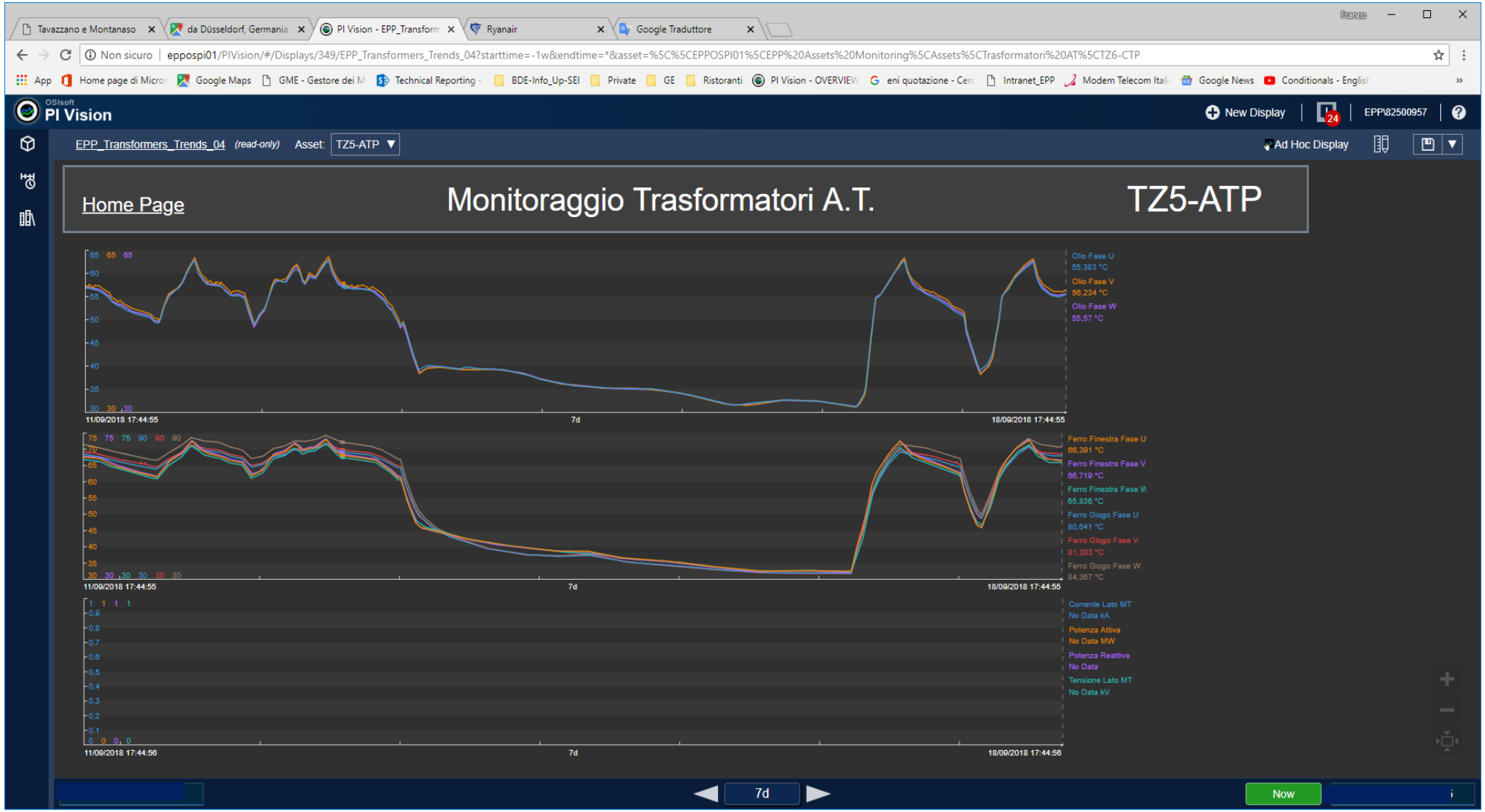
Fleet details Trafo Gas Analysis

Gas	Analisi Corrente		Crescita ultime due analisi		Crescita ultime dieci analisi	
Acetilene - C2H2	0,50697	18/09/2018 16:07:53	0,000	10/09/2018 18:54:14	0,002	31/08/2018 18:54:13
Etilene - C2H4	3	18/09/2018 16:07:53	0	10/09/2018 18:54:14	0	10/09/2018 18:54:14
Etano - C2H6	68	18/09/2018 16:07:53	0,004	10/09/2018 18:54:14	0,240	10/09/2018 18:54:14
Metano - CH4	22	18/09/2018 16:07:53	0	08/09/2018 18:54:16	0,080	10/09/2018 18:54:14
Monossido Carbonio - CO	66	18/09/2018 16:07:53	0	08/09/2018 18:54:16	0,080	10/09/2018 18:54:14
BiossidoCarbonio - CO2	2.307	18/09/2018 16:07:53	0	10/09/2018 18:54:14	12,400	10/09/2018 18:54:14
Idrogeno - H2	15	18/09/2018 16:07:53	0	10/09/2018 18:54:14	0,040	10/09/2018 18:54:14
Acqua - H2O	11	18/09/2018 16:06:21	0	10/09/2018 18:54:14	Calc Failed	10/09/2018 18:54:14
Ossigeno - O2	514	18/09/2018 16:07:53	0,002	10/09/2018 18:54:14	0,417	02/09/2018 18:54:12

Rapporto tra i GAS	
Acetilene/Etilene	0,144
Acetilene/Idrogeno	0,029
Etilene/Etano	0,043
Metano/Idrogeno	1,400
CO2/CO	35,925

Power Plant data from PI Vision on Web

Fleet details Trafo Gas Analysis



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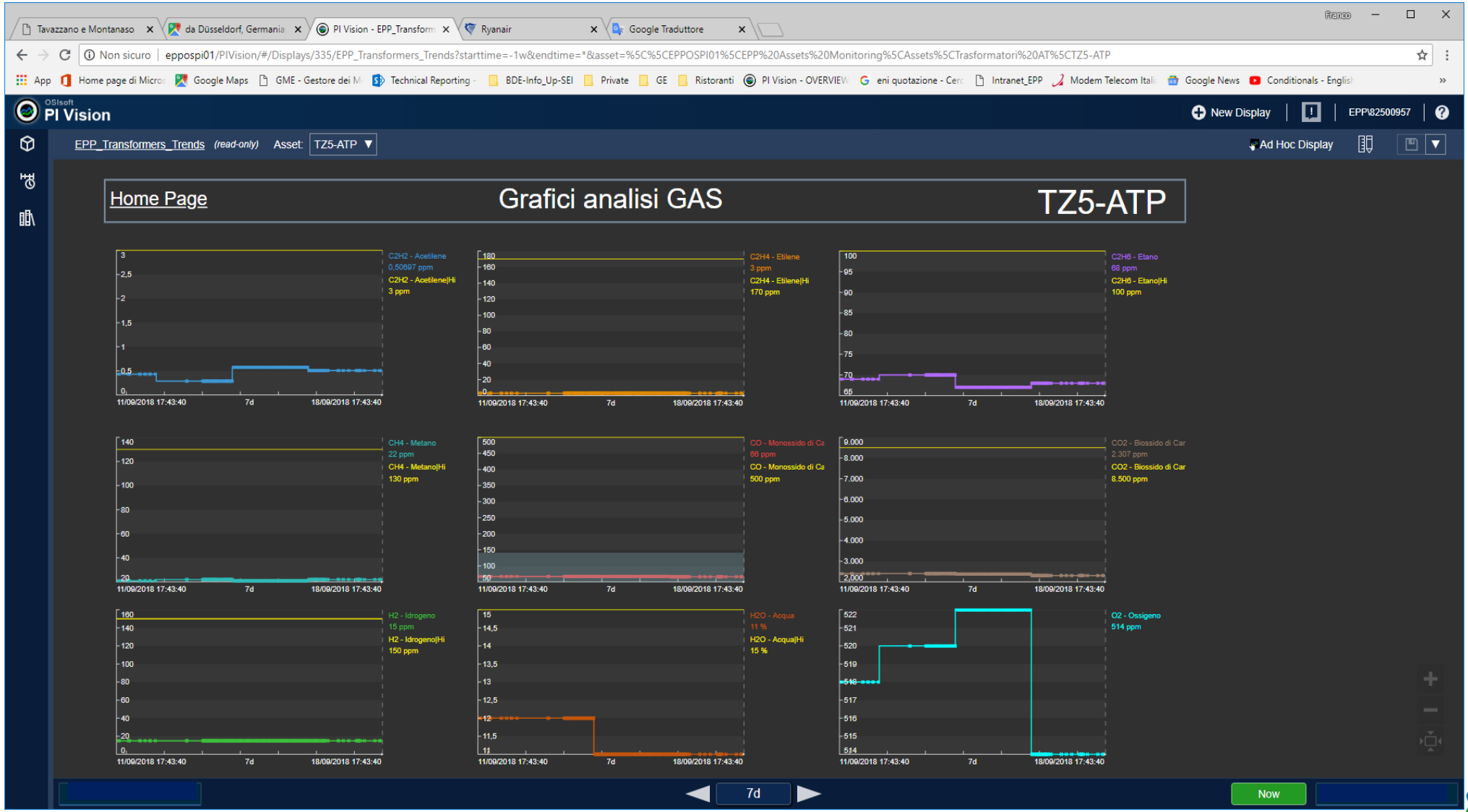
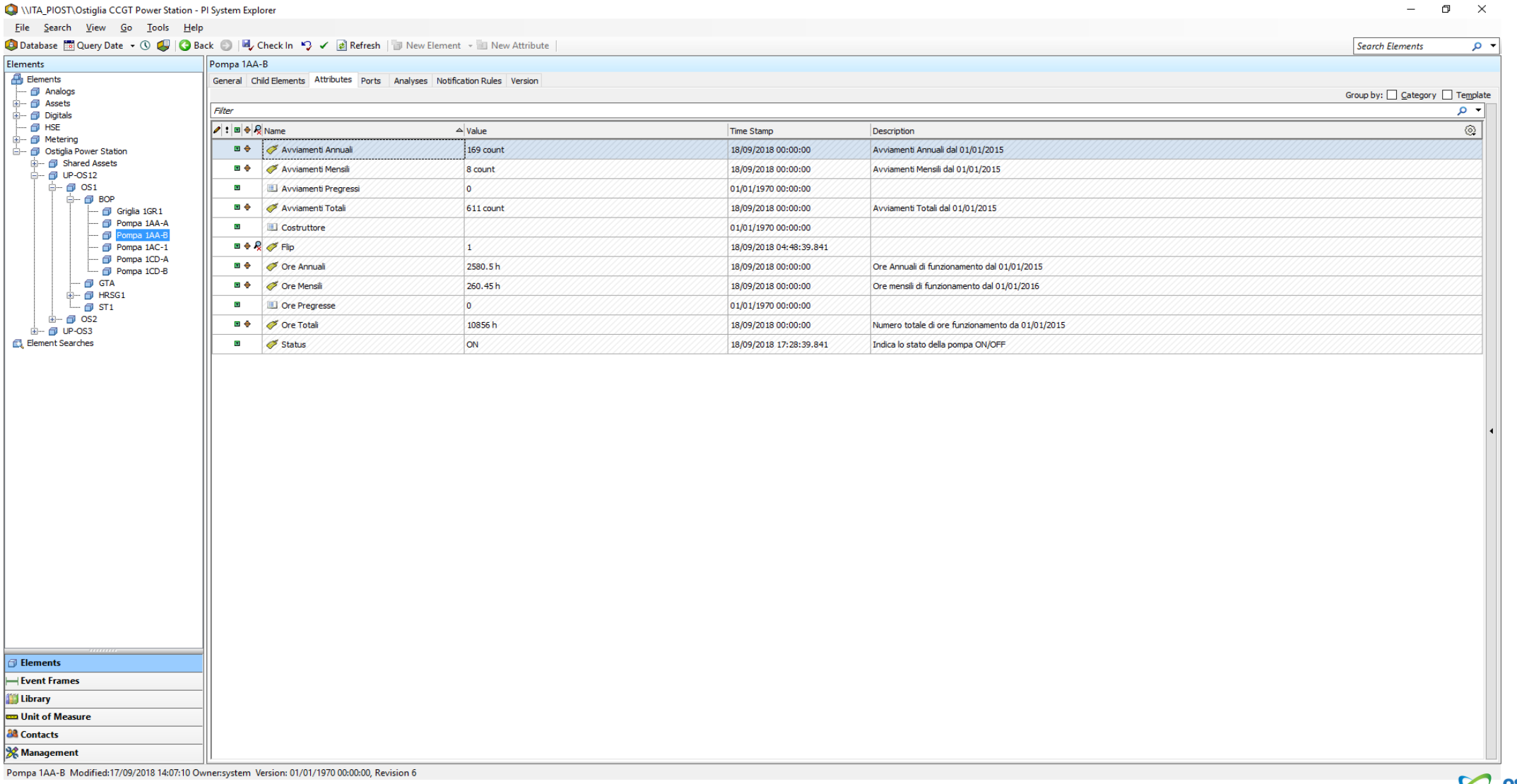
Power Plant data from PI Vision on Web

Fleet details Trafo Gas Analysis



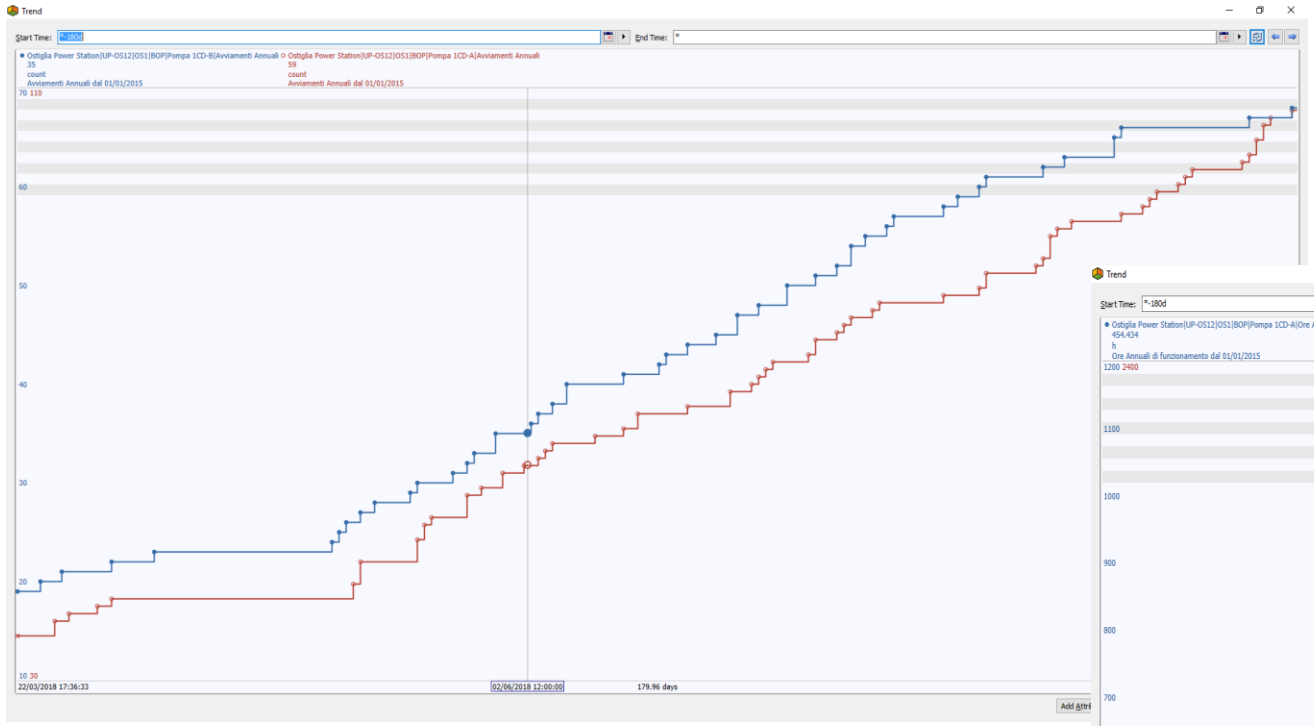
Power Plant data AF management and models

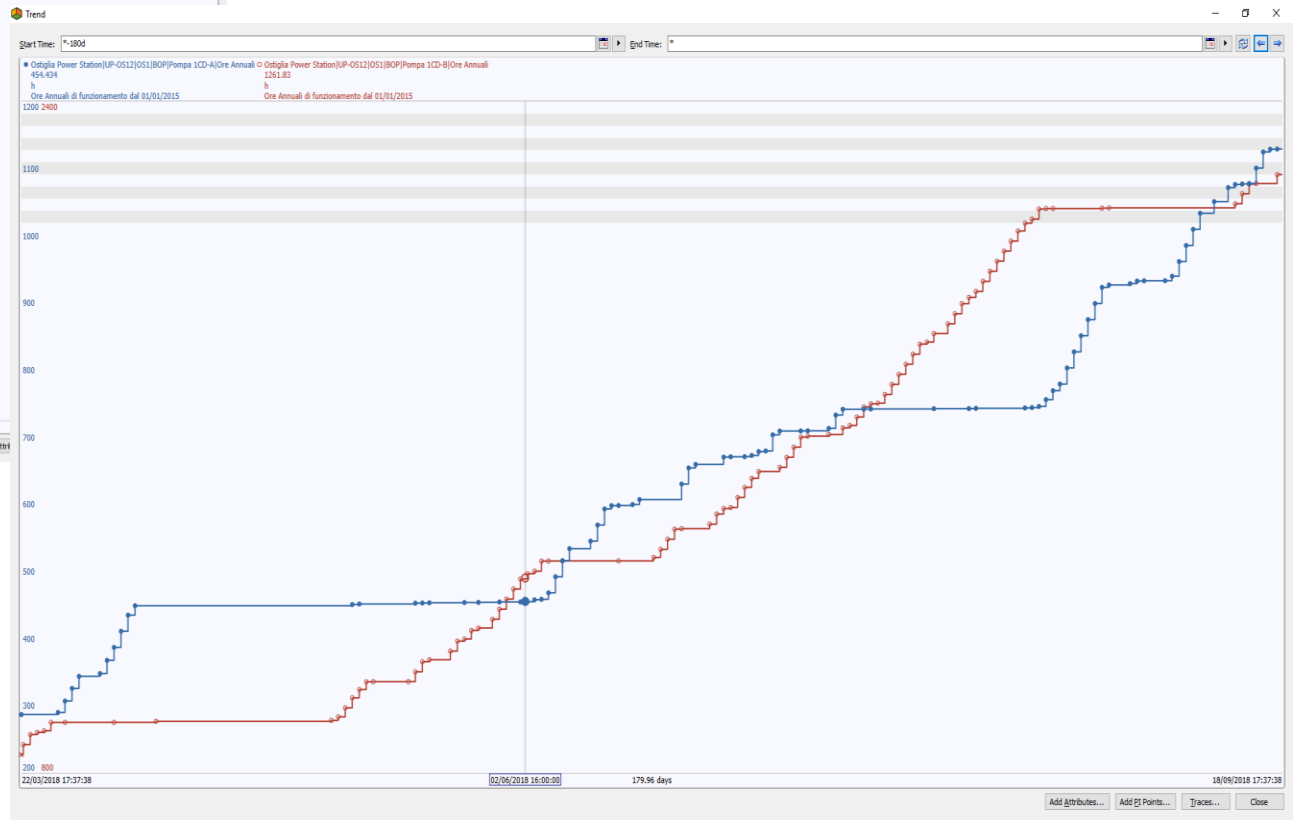
Asset Framework specific equipment models



Power Plant data AF management and models

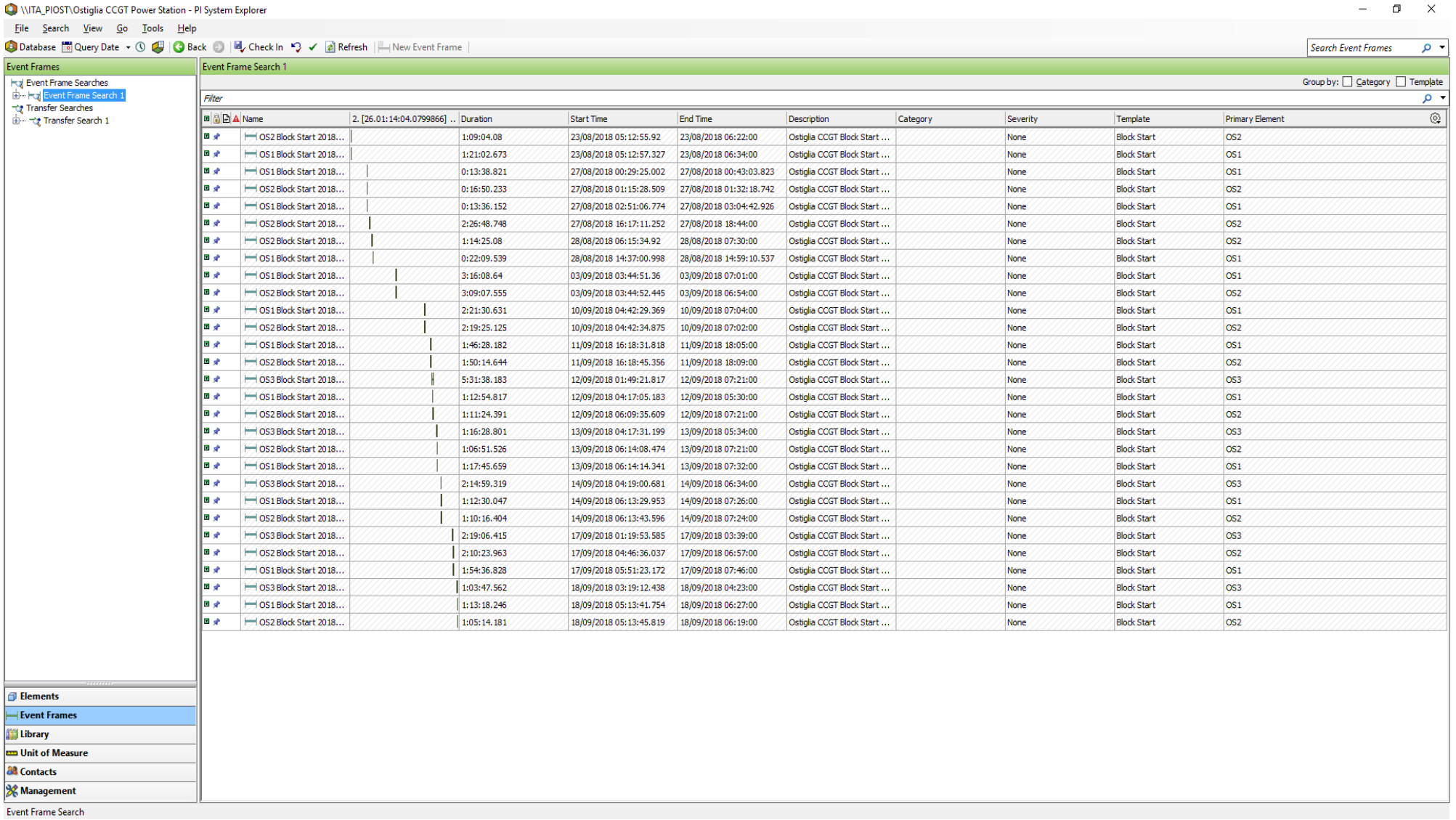
Asset Framework equipment operation (Starts – Hours)





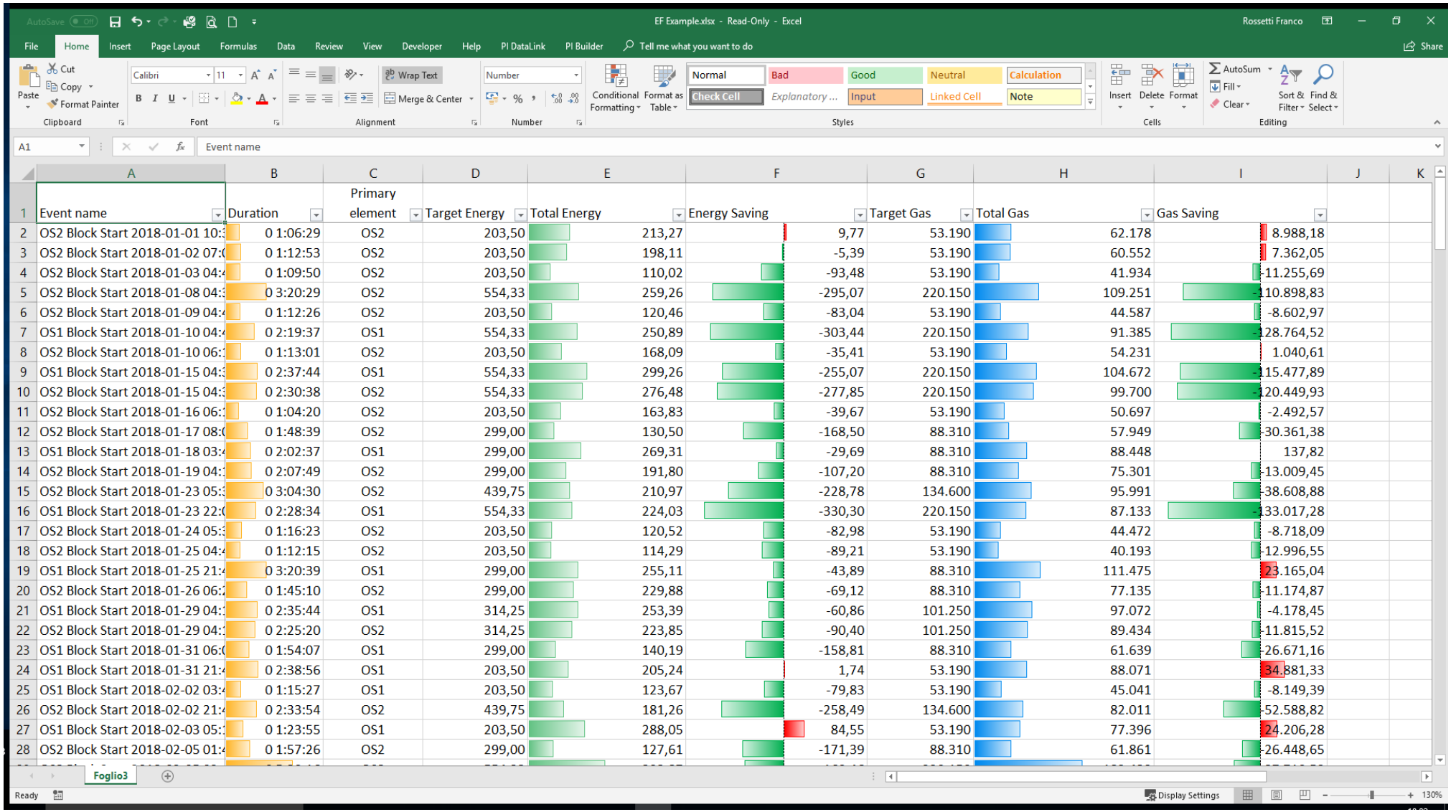
Power Plant data analysis with Asset Framework

Event Frame for starts-up analysis and comparison



Power Plant data analysis with Asset Framework

Event Frame for starts-up analysis and comparison



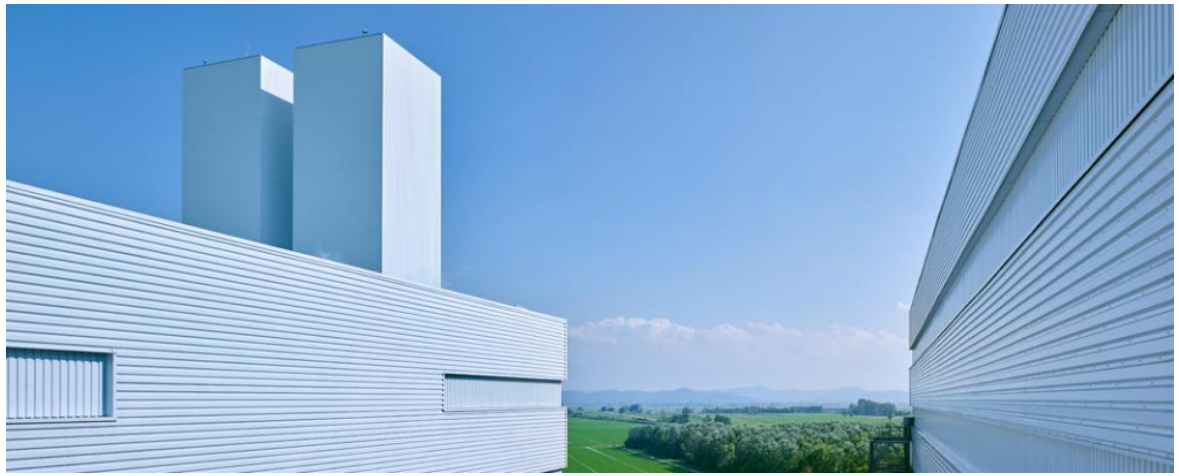
	Event name	Duration	Primary element	Target Energy	Total Energy	Energy Saving	Target Gas	Total Gas	Gas Saving
2	OS2 Block Start 2018-01-01 10:	0 1:06:29	OS2	203,50	213,27	9,77	53.190	62.178	8.988,18
3	OS2 Block Start 2018-01-02 07:(	0 1:12:53	OS2	203,50	198,11	-5,39	53.190	60.552	7.362,05
4	OS2 Block Start 2018-01-03 04:4	0 1:09:50	OS2	203,50	110,02	-93,48	53.190	41.934	-11.255,69
5	OS2 Block Start 2018-01-08 04:3	0 3:20:29	OS2	554,33	259,26	-295,07	220.150	109.251	-110.898,83
6	OS2 Block Start 2018-01-09 04:4	0 1:12:26	OS2	203,50	120,46	-83,04	53.190	44.587	-8.602,97
7	OS1 Block Start 2018-01-10 04:4	0 2:19:37	OS1	554,33	250,89	-303,44	220.150	91.385	-128.764,52
8	OS2 Block Start 2018-01-10 06:1	0 1:13:01	OS2	203,50	168,09	-35,41	53.190	54.231	1.040,61
9	OS1 Block Start 2018-01-15 04:3	0 2:37:44	OS1	554,33	299,26	-255,07	220.150	104.672	-115.477,89
10	OS2 Block Start 2018-01-15 04:3	0 2:30:38	OS2	554,33	276,48	-277,85	220.150	99.700	-120.449,93
11	OS2 Block Start 2018-01-16 06:1	0 1:04:20	OS2	203,50	163,83	-39,67	53.190	50.697	-2.492,57
12	OS2 Block Start 2018-01-17 08:(	0 1:48:39	OS2	299,00	130,50	-168,50	88.310	57.949	-30.361,38
13	OS1 Block Start 2018-01-18 03:4	0 2:02:37	OS1	299,00	269,31	-29,69	88.310	88.448	137,82
14	OS2 Block Start 2018-01-19 04:1	0 2:07:49	OS2	299,00	191,80	-107,20	88.310	75.301	-13.009,45
15	OS2 Block Start 2018-01-23 05:3	0 3:04:30	OS2	439,75	210,97	-228,78	134.600	95.991	-38.608,88
16	OS1 Block Start 2018-01-23 22:(	0 2:28:34	OS1	554,33	224,03	-330,30	220.150	87.133	-133.017,28
17	OS2 Block Start 2018-01-24 05:3	0 1:16:23	OS2	203,50	120,52	-82,98	53.190	44.472	-8.718,09
18	OS2 Block Start 2018-01-25 04:4	0 1:12:15	OS2	203,50	114,29	-89,21	53.190	40.193	-12.996,55
19	OS1 Block Start 2018-01-25 21:4	0 3:20:39	OS1	299,00	255,11	-43,89	88.310	111.475	23.165,04
20	OS2 Block Start 2018-01-26 06:2	0 1:45:10	OS2	299,00	229,88	-69,12	88.310	77.135	-11.174,87
21	OS1 Block Start 2018-01-29 04:1	0 2:35:44	OS1	314,25	253,39	-60,86	101.250	97.072	-4.178,45
22	OS2 Block Start 2018-01-29 04:1	0 2:25:20	OS2	314,25	223,85	-90,40	101.250	89.434	-11.815,52
23	OS1 Block Start 2018-01-31 06:(	0 1:54:07	OS1	299,00	140,19	-158,81	88.310	61.639	-26.671,16
24	OS1 Block Start 2018-01-31 21:4	0 2:38:56	OS1	203,50	205,24	1,74	53.190	88.071	34.881,33
25	OS1 Block Start 2018-02-02 03:4	0 1:15:27	OS1	203,50	123,67	-79,83	53.190	45.041	-8.149,39
26	OS2 Block Start 2018-02-02 21:4	0 2:33:54	OS2	439,75	181,26	-258,49	134.600	82.011	-52.588,82
27	OS1 Block Start 2018-02-03 05:1	0 1:23:55	OS1	203,50	288,05	84,55	53.190	77.396	24.206,28
28	OS2 Block Start 2018-02-05 01:4	0 1:57:26	OS2	299,00	127,61	-171,39	88.310	61.861	-26.448,65

PRODUZIONE

OSIsoft. PI World BARCELONA SEPT. 24-27, 2018

EP PRODUZIONE

PI utilization in Italian Fleet



CHALLENGE

- *Collect and manage, in a unique HW, big data coming from different sources like DCS – SCADA – Data Hub – Web Servers.*
- *Archive in safer way historical data.*
- *Reduce time consumption in data collection.*
- *Web visibility of fleet data for different users.*
- *Advanced data analysis.*
- *Support and advice in maintenance strategy.*
- *Automatic reporting.*

SOLUTIONS

- *PI server installation in all the fleet .*
- *Full visibility in corporate network via common IT architecture.*
- *Operator training on PI system.*
- *Creation of High Level team across the fleet.*
- *Internal development of PI Vison.*
- *Internal development of AF and EF.*
- *Internal development of data reporting.*
- *Cooperation with OSiSoft partners.*

RESULTS

- *Speed up data collection.*
- *Speed up data analysis.*
- *Reduced up to 50% FTE time and costs in data management.*
- *High level of data reliability.*
- *Web visibility on mobile devices for different users.*
- *Early detection of failure.*
- *Cost savings in maintenance strategy.*
- *High possibility of future development.*

Development plan

- Implementation of Condition Based Maintenace using PI data
- Implementation of Asset Condition Monitoring using PI data
- Connection between PI and Power BI Micrososft
- Automatic data collection for company’s data base (for authorities)
- Automatic data collection for company’s reporting (for board members)
- Manual data input via tablet with WiFi connection on PI server

THANKS FOR THE ATTENTION