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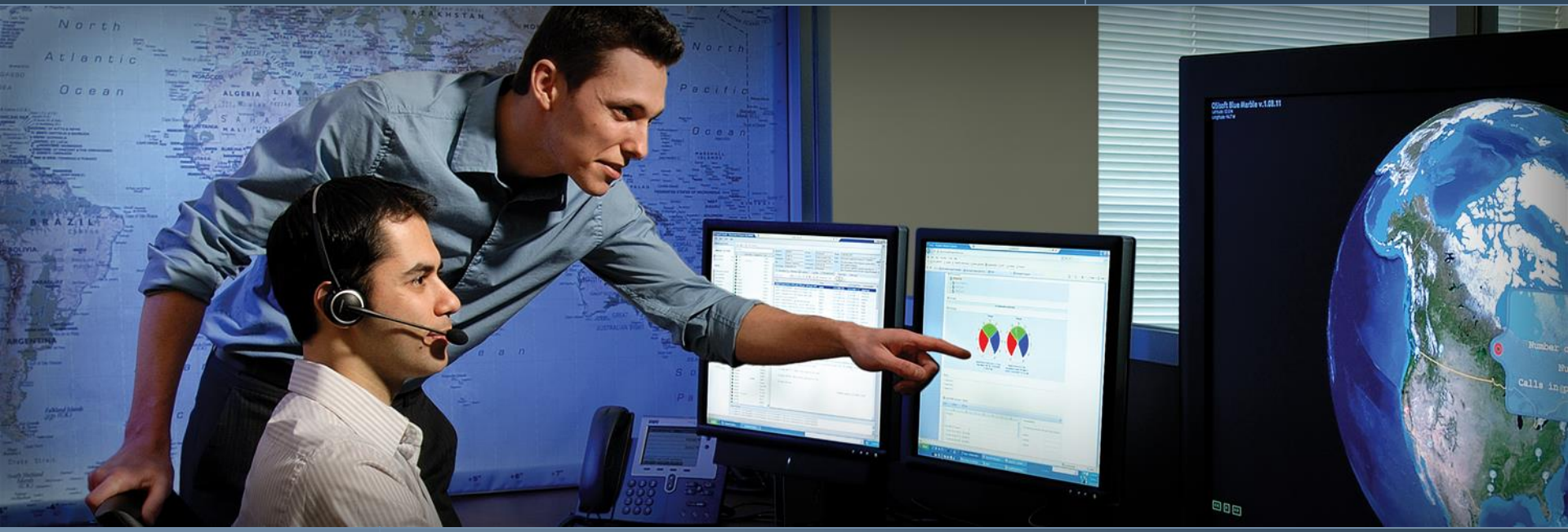
Regional Seminar Series



PI utilization and usage in Power and heat generation industry

Marcin Błasiak
Production Support Systems Specialist
Vattenfall Heat Poland S.A.

2009-10-01

Empowering Business in Real Time.

Agenda of presentation

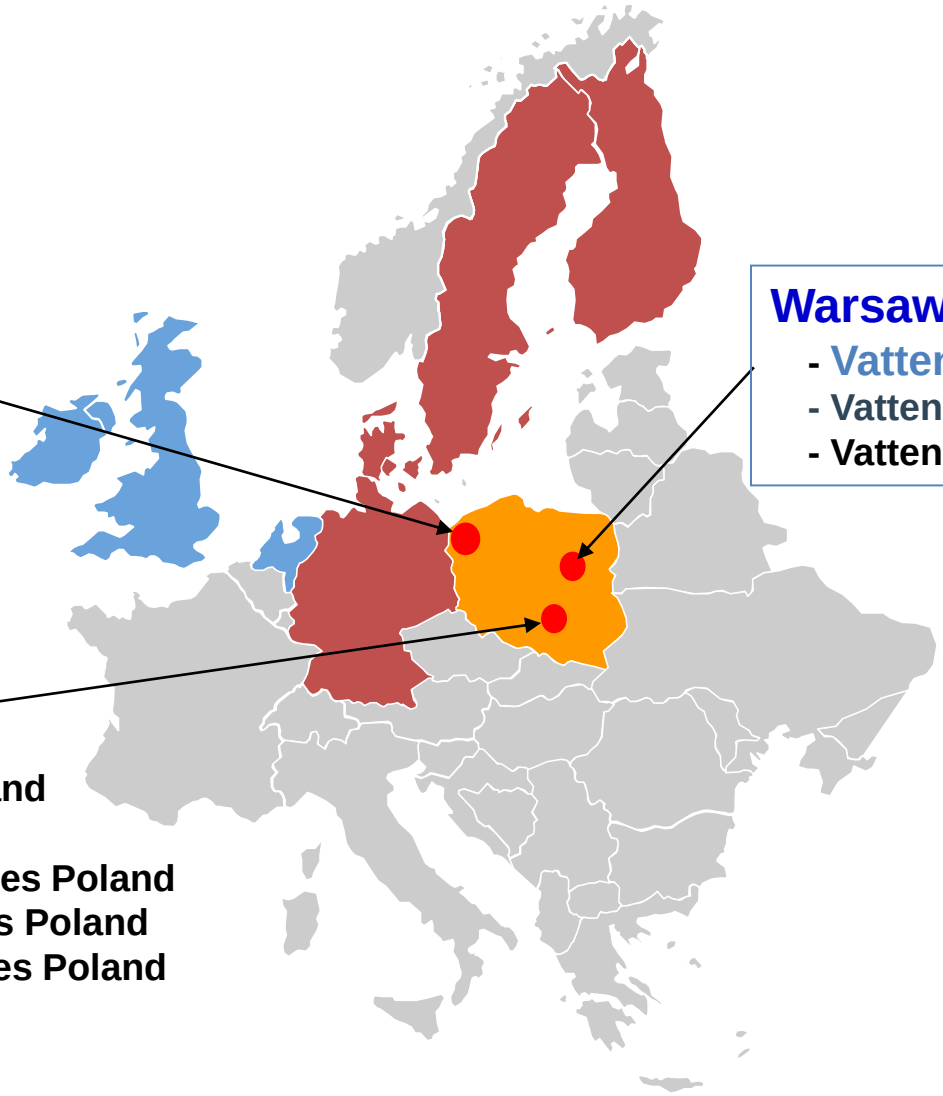
Vattenfall in Poland

PI System in Vattenfall Heat Poland (Business Case)

Examples of PI System utlization in Vattenfall Heat Poland

Vattenfall in Poland

Vattenfall in Poland



Szczecin
- Vattenfall Wolin-North

Warsaw
- Vattenfall Heat Poland
- Vattenfall Poland
- Vattenfall Trading Services

Gliwice
- Vattenfall Distribution Poland
- Vattenfall Sales Poland
- Vattenfall Customer Services Poland
- Vattenfall Network Services Poland
- Vattenfall Business Services Poland

Vattenfall in Warsaw

Total capacity:

4 684 MW of heat
929 MW of electricity

CHP Żerań

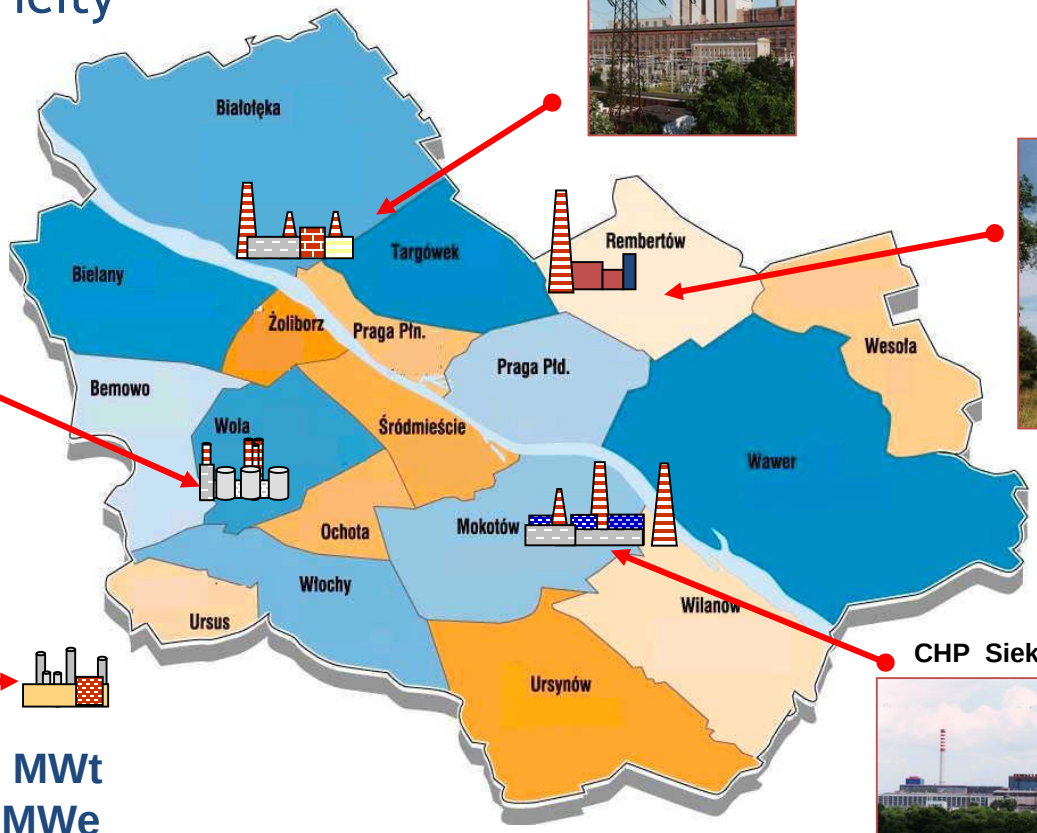
1554 MWt
298 MWe

H Wola

465 MWt

H Kawęczyn

465 MWt



CHP Pruszków

186 MWt
9 MWe

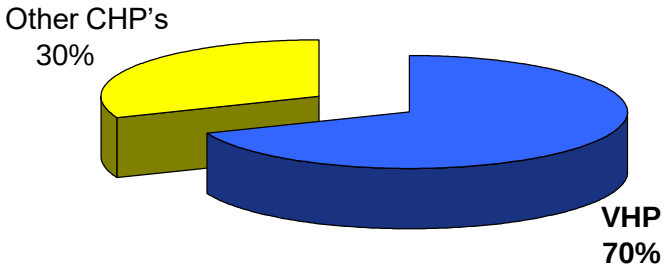
CHP Siekierki

2014 MWt
622 MWe

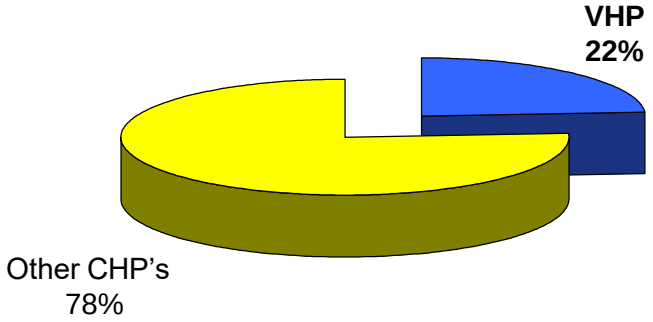
Vattenfall's market position

Heat market

Vattenfall's share in warsaw's heat market



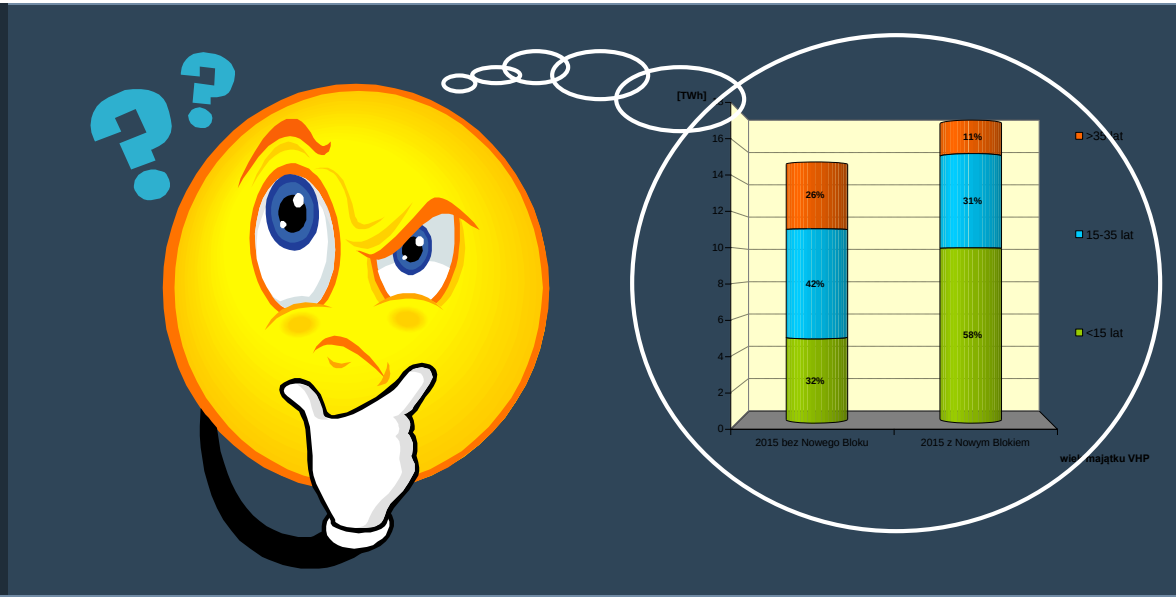
Vattenfall's share in polish heat market



Electricity market

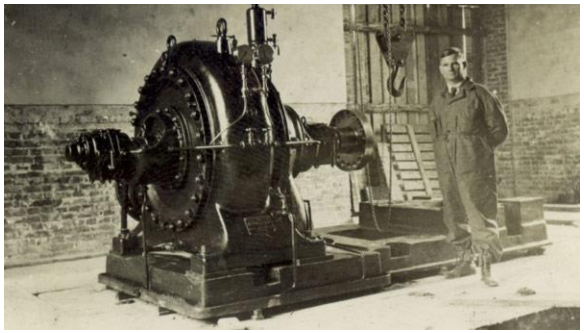
Vattenfall's share in total polish electricity market – **2,7 %**
… in the CHP sector – **22 %**

PI System in Vattenfall Heat Poland (Business Case)



PI System in VHP (Business Case)

The beginning …

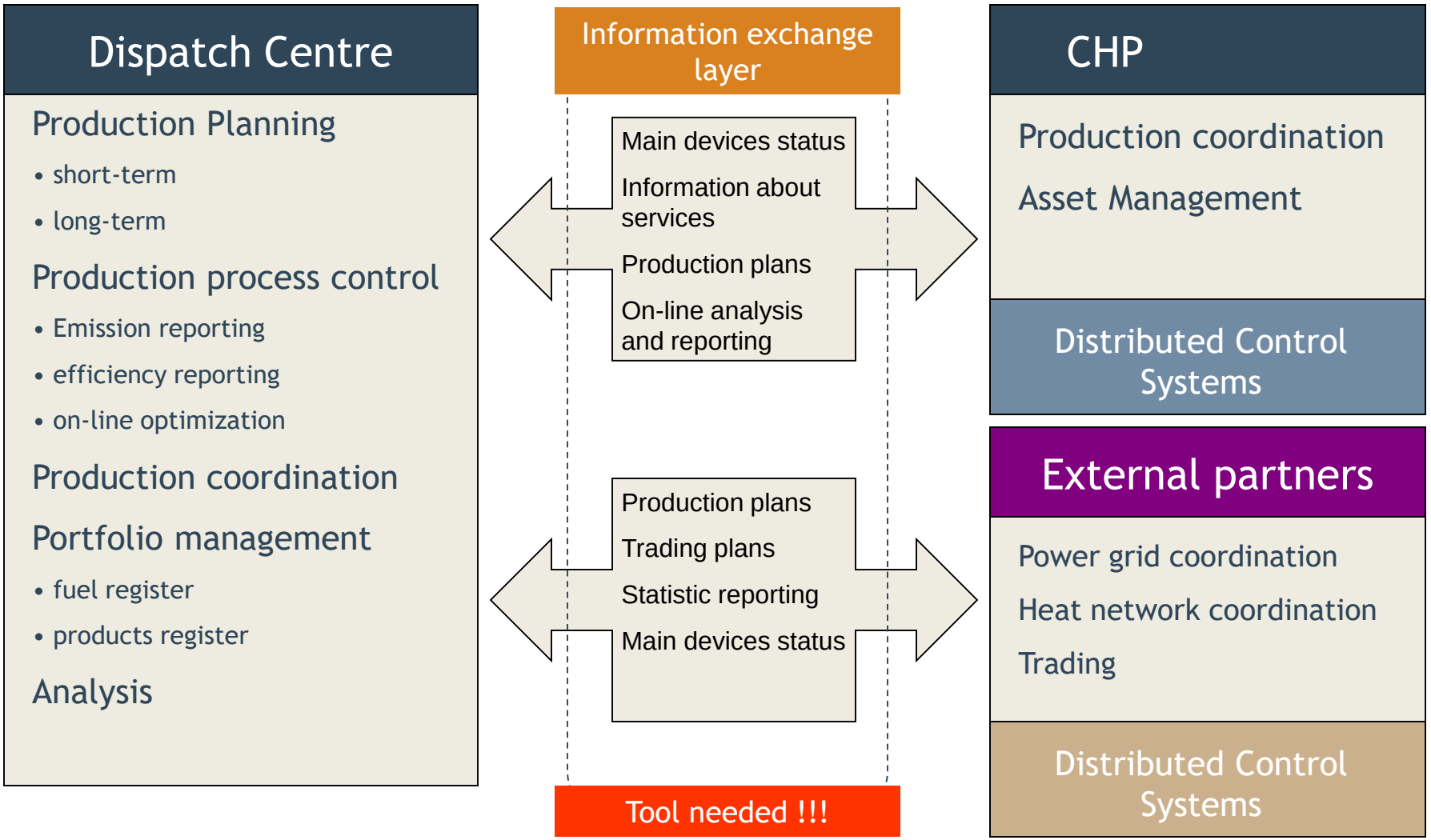


5 independent Power Plants
Lack of detailed central planning
lack of central monitoring of technological process
Not optimal production process

After 2000… efficiency improvement

The beginning of **Production Dispatch**
Need for detailed information exchange with partners
A lot of calculations & reporting… very quickly
Quick access to information about production process
Need for production process optimization

PI System in VHP (Business Case)



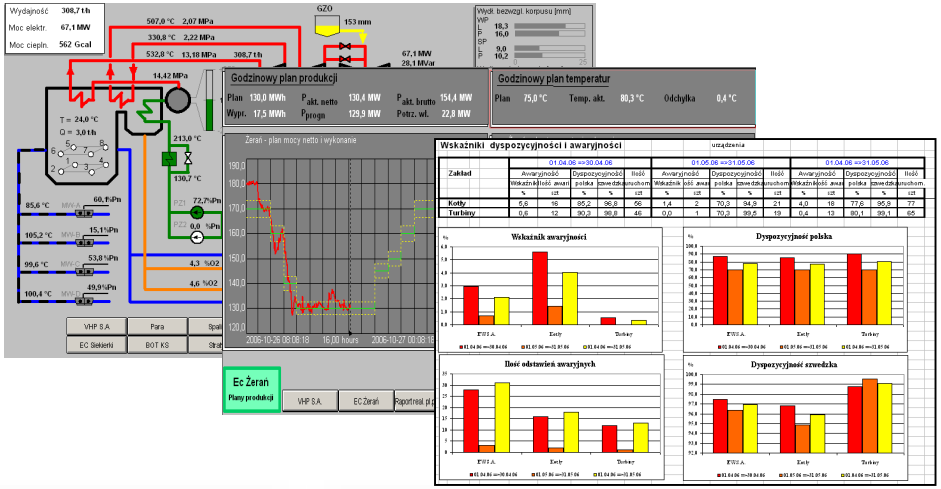
POWER & UTILITIES

VHP: Operational Data Protected

"We needed to gather the complex information about technological process and store it in one place. W needed a system that would make these information easily accessible for many person. We also needed system that would provide tools for analyses and reporting"

Dariusz Korniluk, VHP Portfolio Manager

VATTENFALL



Customer Business Challenge

- Providing the possibility of central production management
- Providing complex information about technological process and tools for analysis
- Making the system user-friendly and easily accessible for many users
- System should be flexible for upgrades and development

Solution

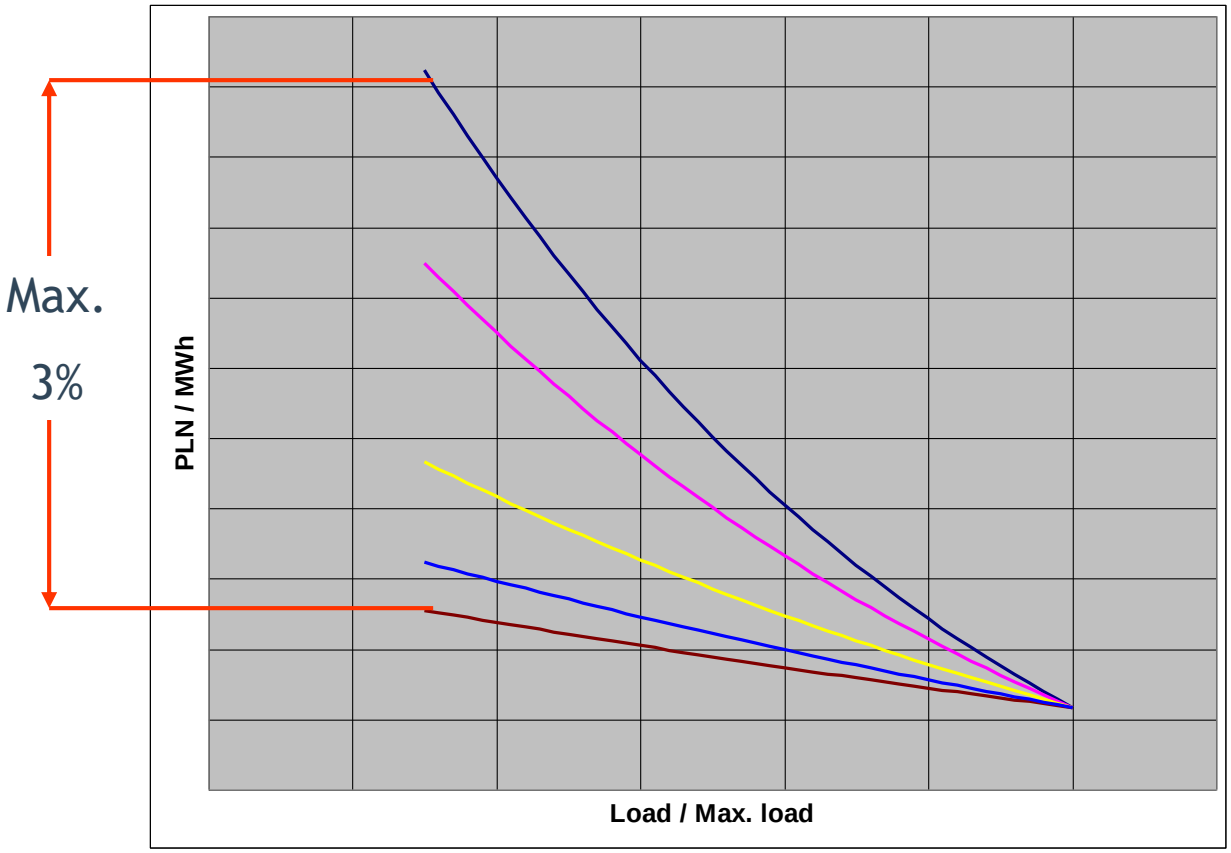
- Implemented PI system to provide data from production area to all production and business area
- Provided view to the data using ProcessBook (synoptic screens) and DataLink (analysis)
- Provided ACE for continuous advanced calculations
- Provided MCN Health monitoring to secure the system efficiency

Customer Results / Benefits

- Incrased number of analysis in the same amount of time
- Decreased variable costs caused by on-line cost calculations **(ca. 50 kEUR per year)**
- Increased efficiency in consequence of on-line efficiency calculations **(3-5 %)**
- Increased accesibilty to information about production process

Empowering Business in Real Time.

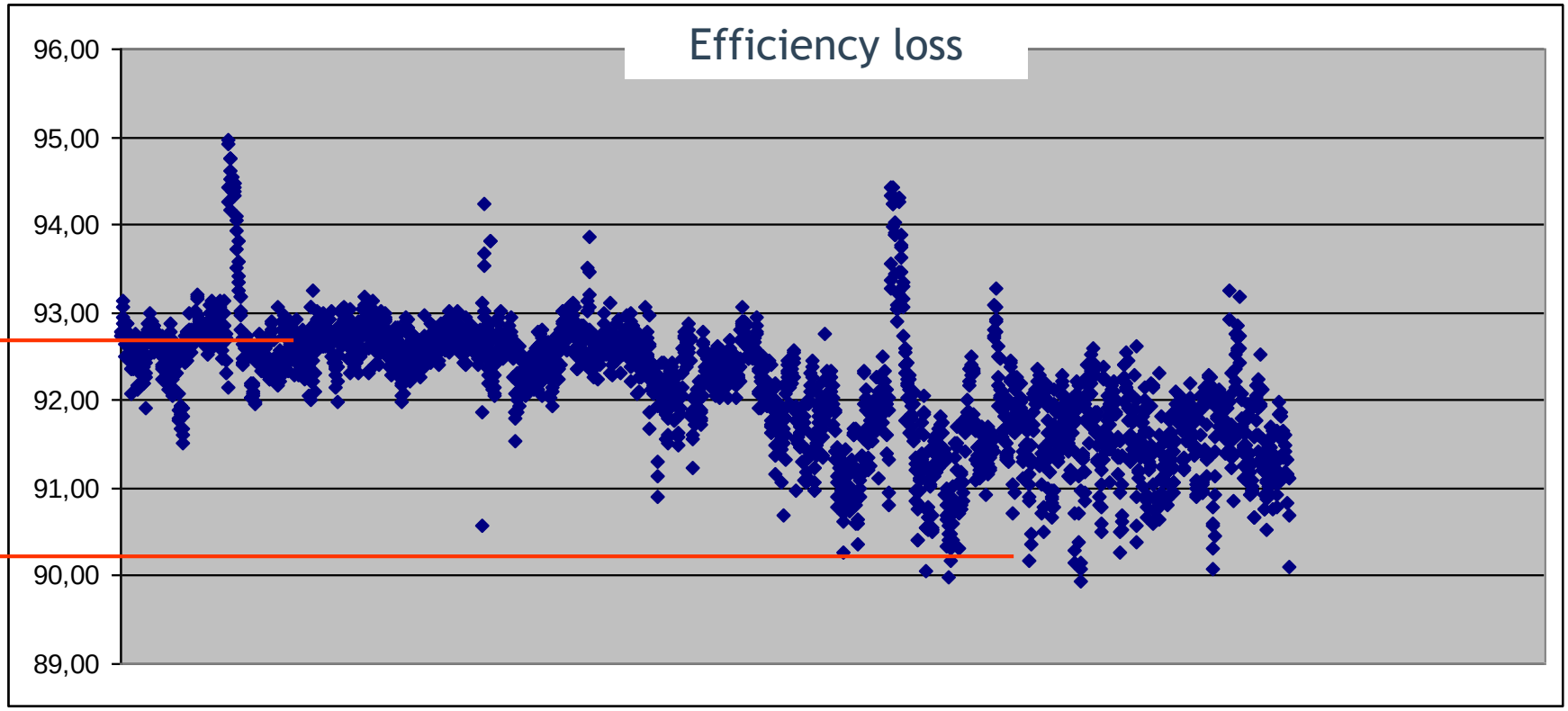
PI System in VHP (Business Case)



On-line variable cost calculation gives possibility to choose between optimal devices set to provide optimal configuration

Optimal configuration = ca. 50.000 EUR saving per year

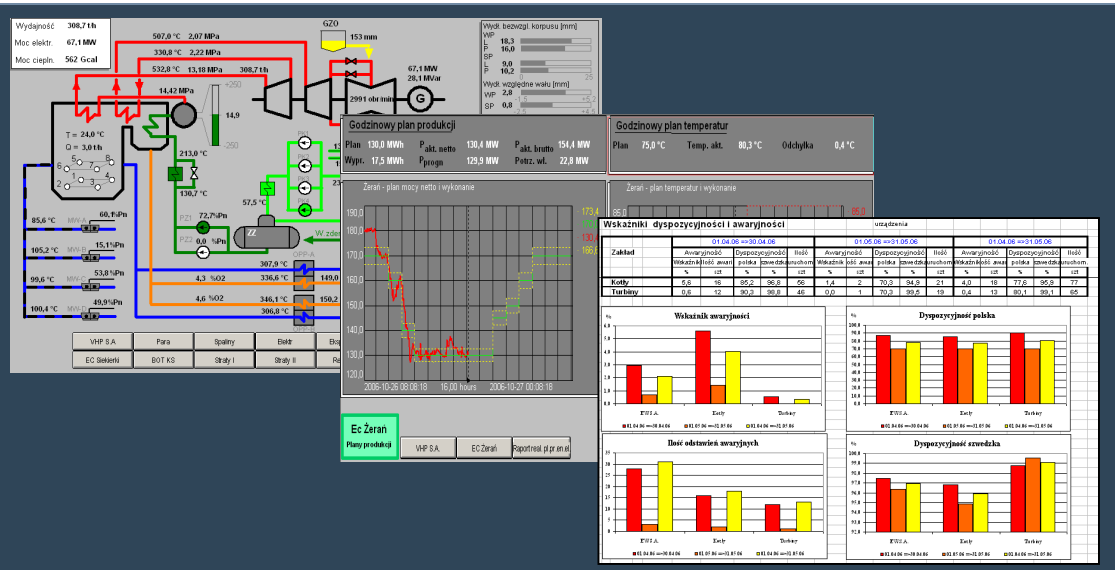
PI System in VHP (Business Case)



Instead of complex measurement procedure twice a year we provide online calculation (in connection with neural networks) to see how device (boiler behaves)

On-line calculation = another 50.000 EUR saving per year

Examples of PI System utlization in Vattenfall Heat Poland



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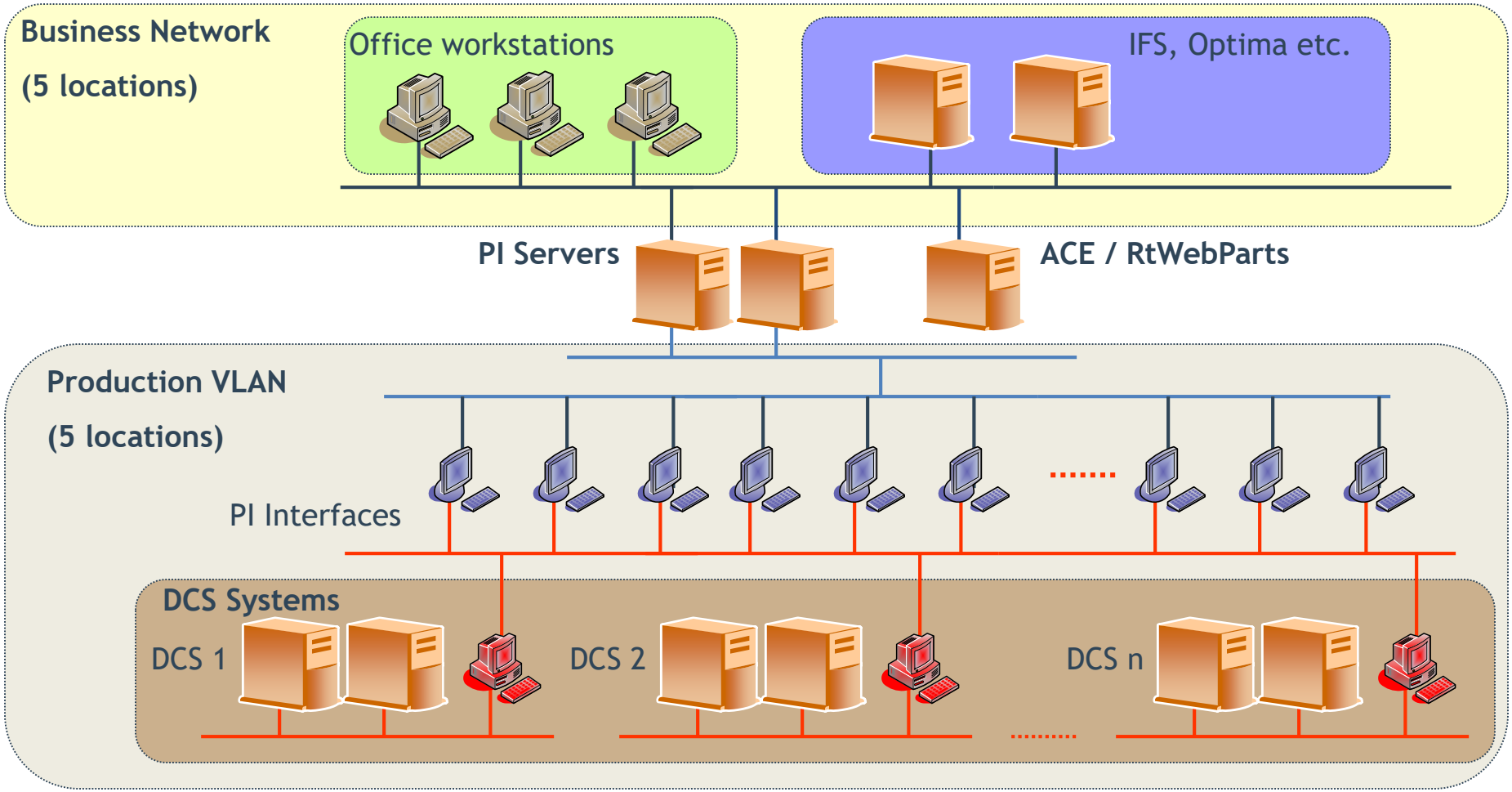
PI System in VHP (Business Case)

PI System Infrastructure in Vattenfall Heat Poland



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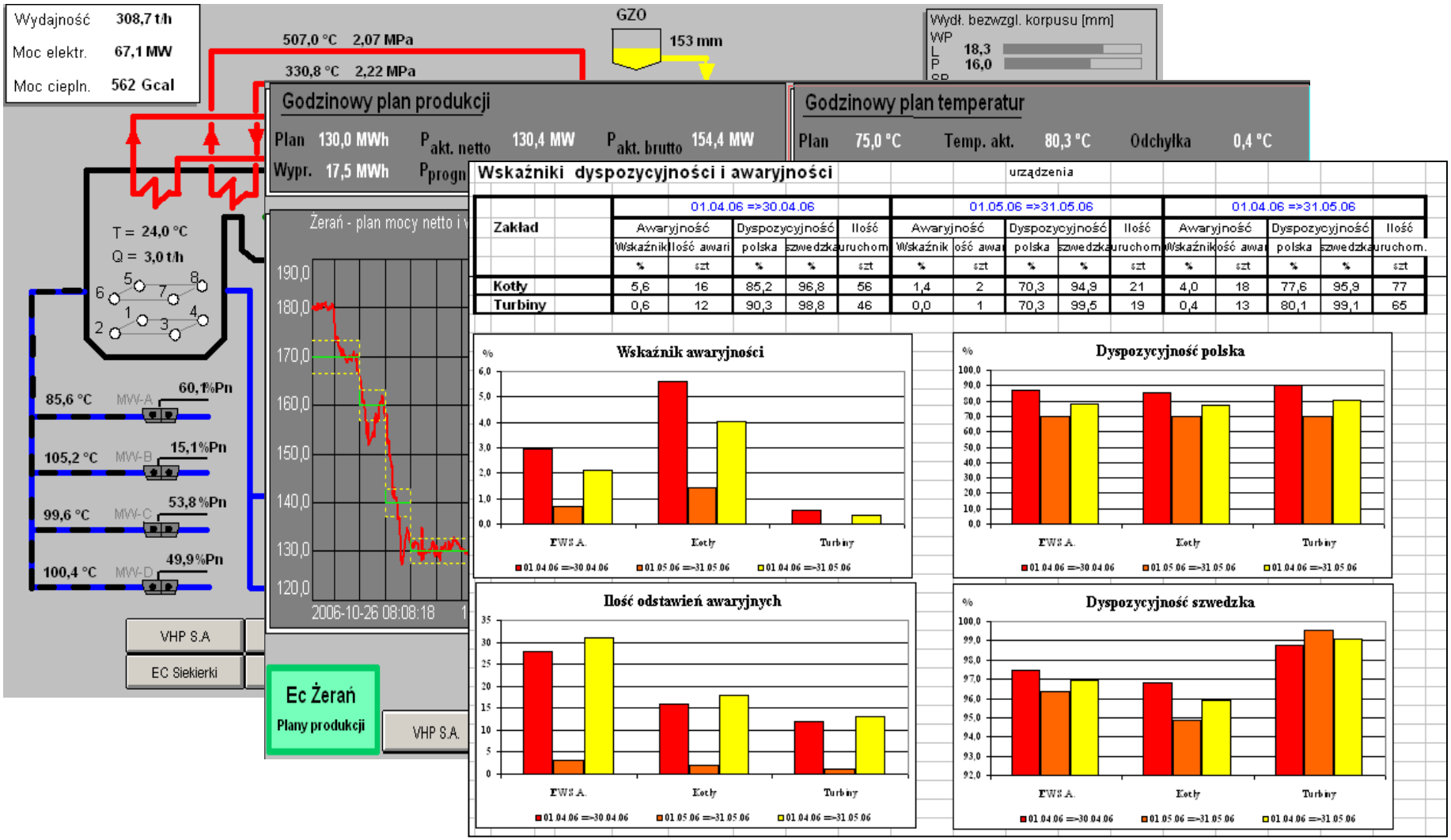
Examples of PI System utlization in Vattenfall Heat Poland



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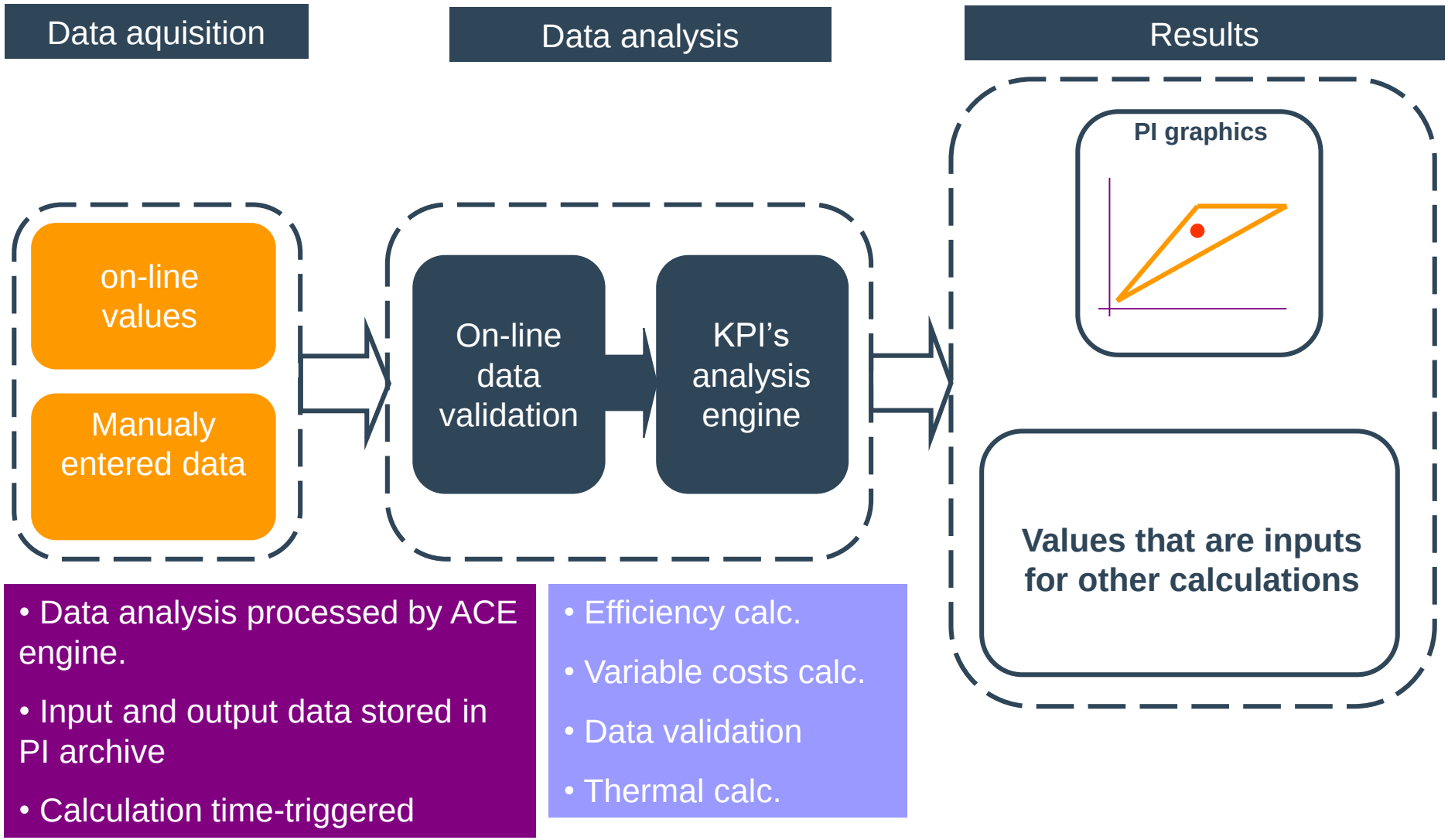
Examples of PI System utlization in Vattenfall Heat Poland

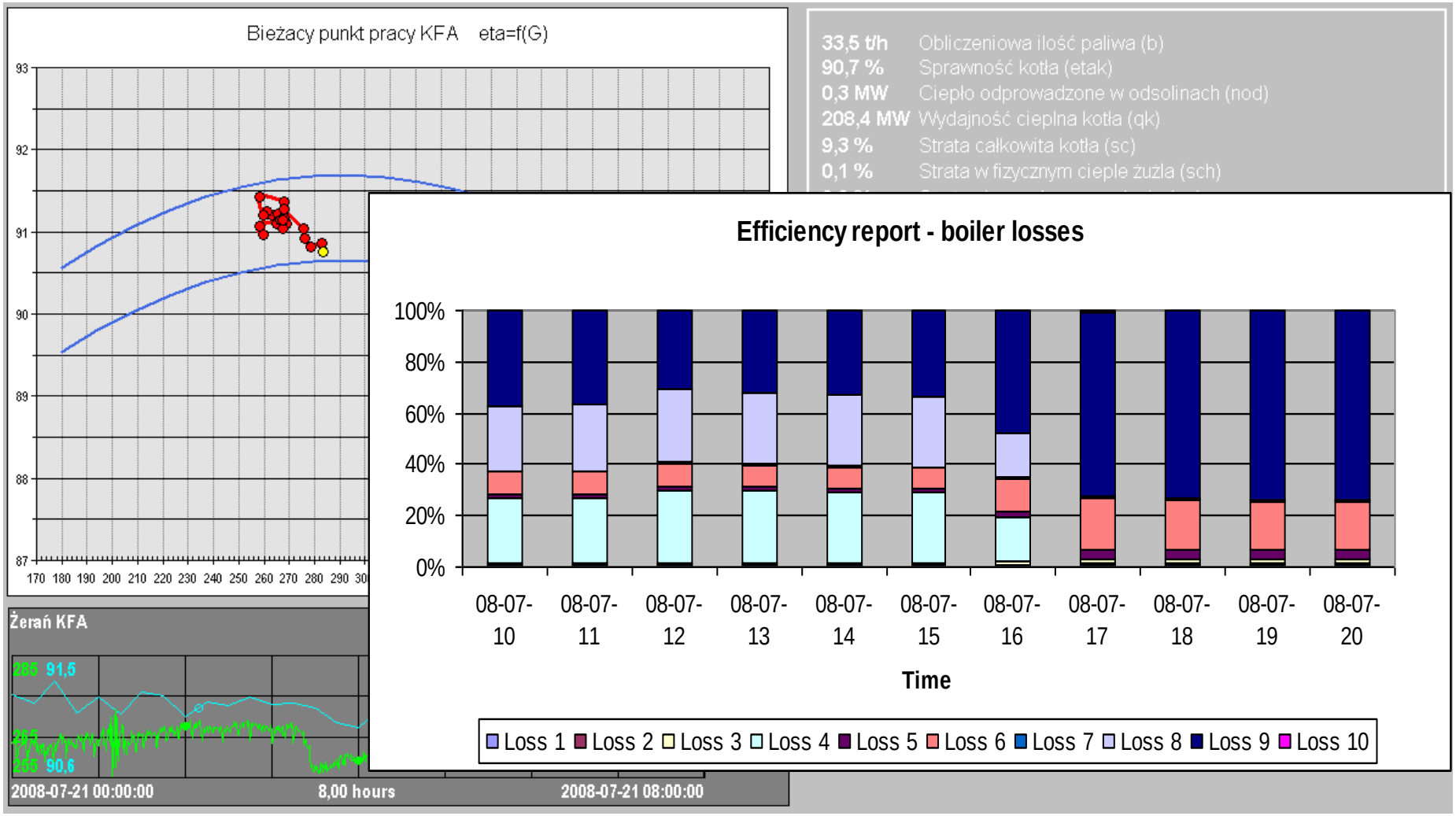


- Data analysis processed by ACE engine.
- Input and output data stored in PI archive
- Calculation time-triggered

- Efficiency calc.
- Variable costs calc.
- Data validation
- Thermal calc.

Empowering Business in Real Time.

Examples of PI System utlization in Vattenfall Heat Poland



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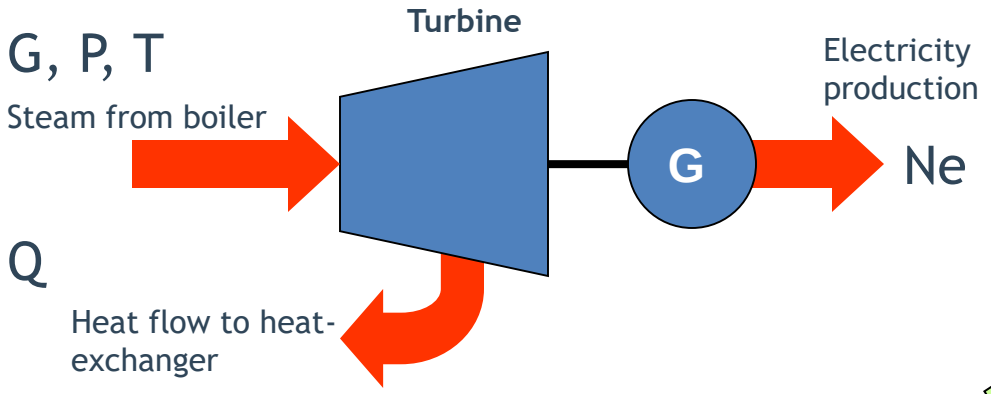
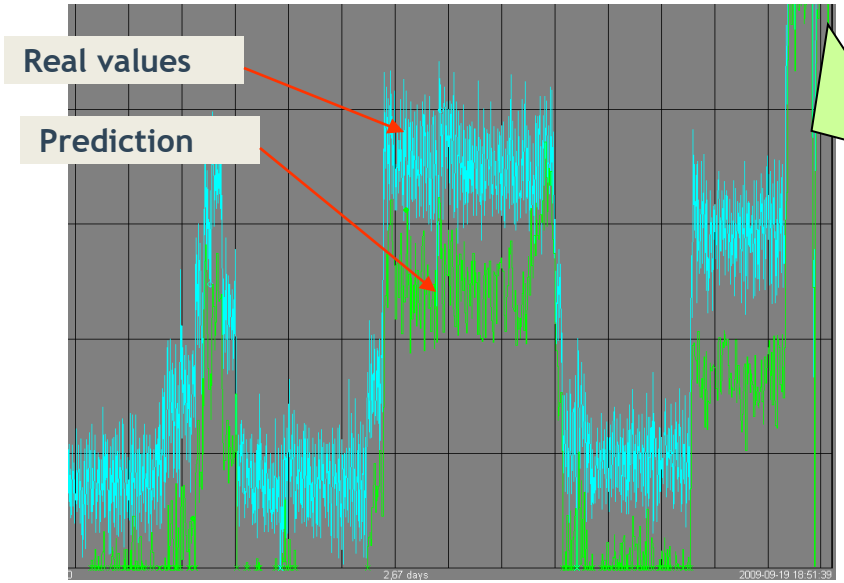
Examples of PI System utlization in Vattenfall Heat Poland

Neural networks (production parameters prediction)





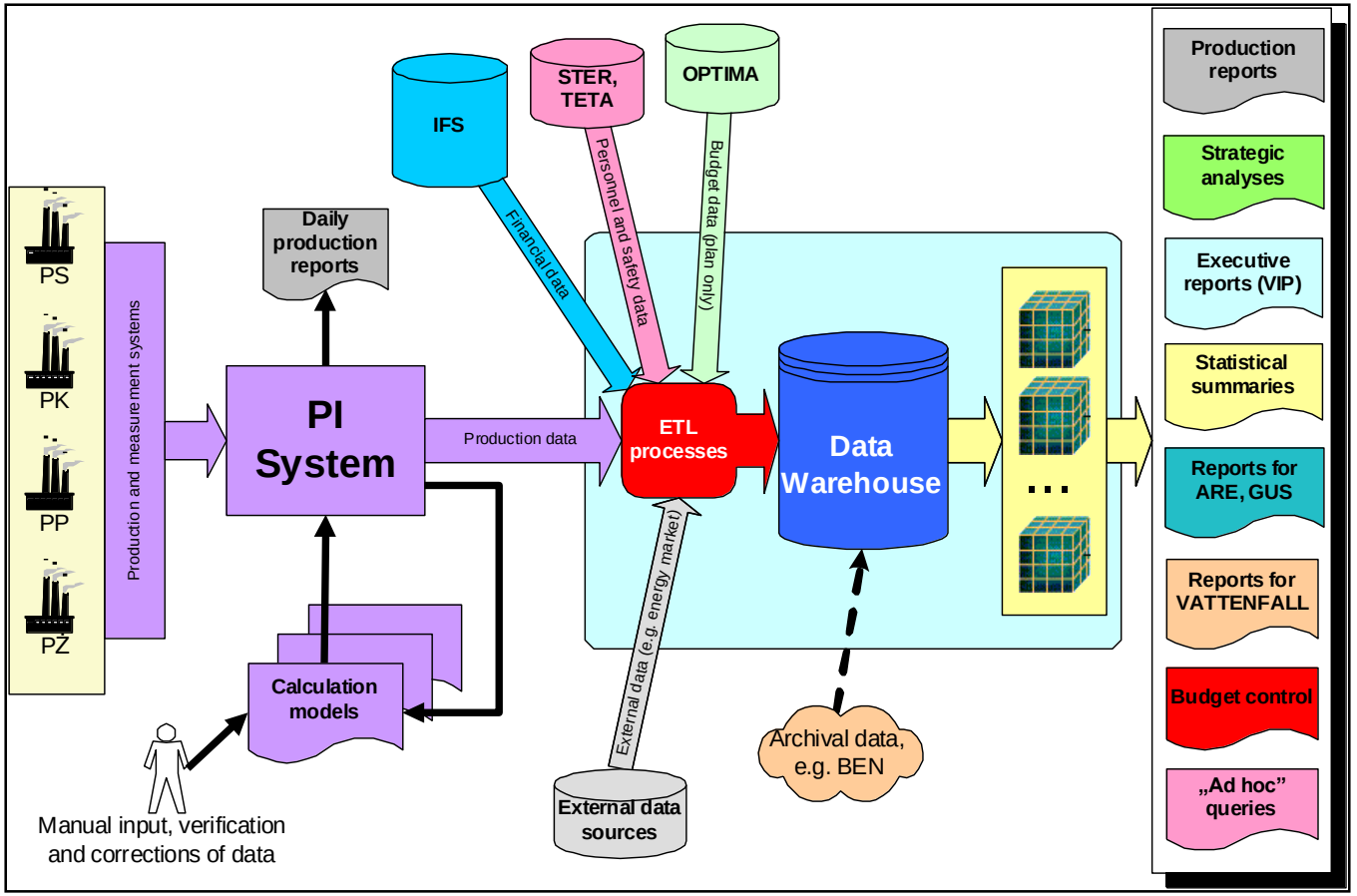
3 steps to define a calculation

$$Ne = f(G,P,T,Q)$$

1. Model definition – Neural networks
2. Translating model into ACE module
3. Applying ACE calc. Into PI graphics

Examples of PI System utlization in Vattenfall Heat Poland

PI System is an important place of data preparation and storage in the process of Data Warehouse feeding.



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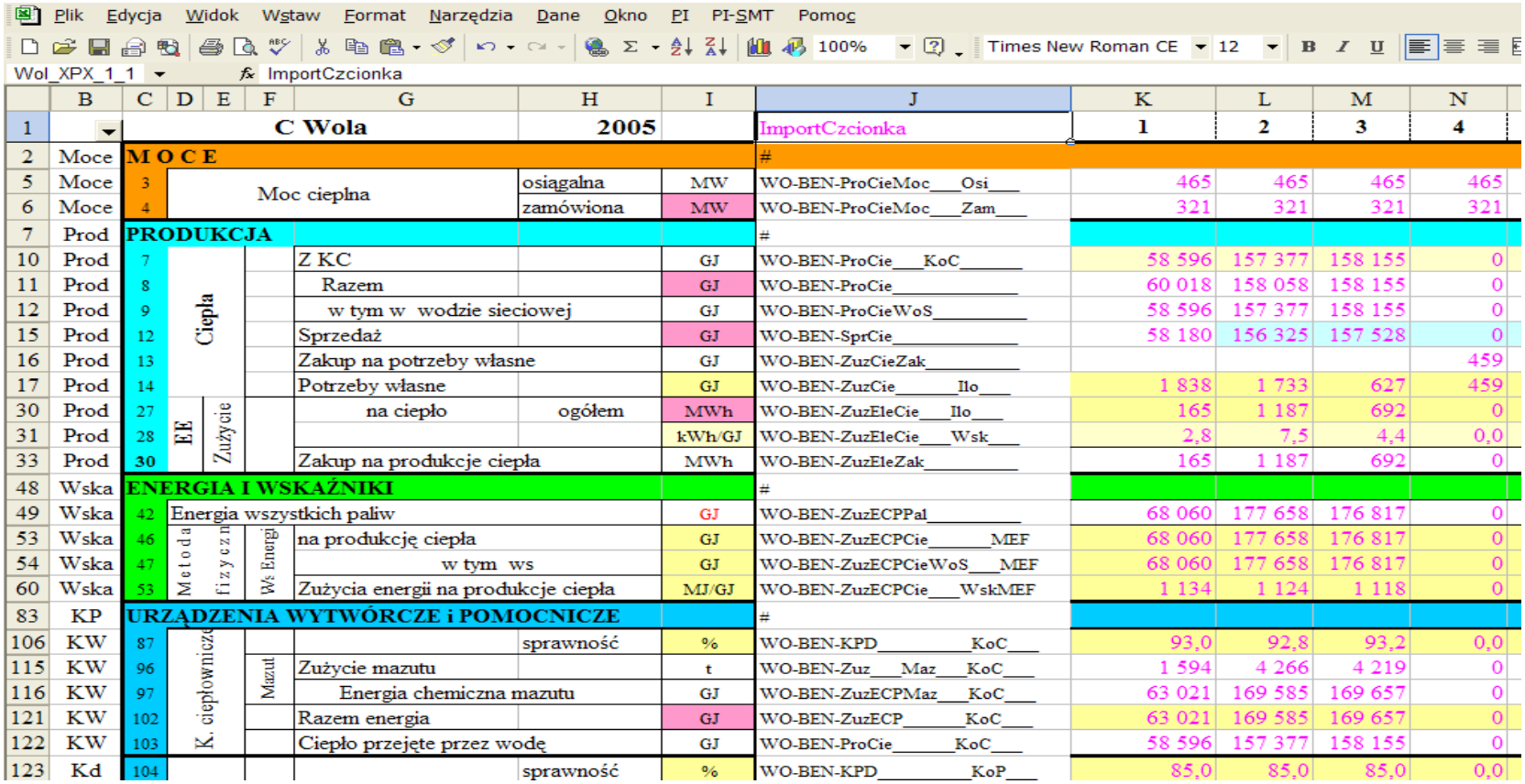
Examples of PI System utlization in Vattenfall Heat Poland

XPX (Excel to PI) Data Input



Plik Edycja Widok Wstaw Format Narzędzia Dane Okno PI PI-SMT Pomoc

Wol_XPX_1_1 | ImportCzcionka

	B	C	D	E	F	G	H	I	J	K	L	M	N
1		C Wola					2005		ImportCzcionka	1	2	3	4
2	Moce	MOCE							#				
5	Moce	3				Moc cieplna	osiągalna	MW	WO-BEN-ProCieMoc___Osi___	465	465	465	465
6	Moce	4					zamówiona	MW	WO-BEN-ProCieMoc___Zam___	321	321	321	321
7	Prod	PRODUKCJA							#				
10	Prod	7	Ciepła			Z KC		GJ	WO-BEN-ProCie___KoC_____	58 596	157 377	158 155	0
11	Prod	8				Razem		GJ	WO-BEN-ProCie_____	60 018	158 058	158 155	0
12	Prod	9				w tym w wodzie sieciowej		GJ	WO-BEN-ProCieWoS_____	58 596	157 377	158 155	0
15	Prod	12				Sprzedaż		GJ	WO-BEN-SprCie_____	58 180	156 325	157 528	0
16	Prod	13				Zakup na potrzeby własne		GJ	WO-BEN-ZuzCieZak_____				459
17	Prod	14				Potrzeby własne		GJ	WO-BEN-ZuzCie_____Ilo___	1 838	1 733	627	459
30	Prod	27	EE	Zużycie		na ciepło	ogółem	MWh	WO-BEN-ZuzEleCie___Ilo___	165	1 187	692	0
31	Prod	28						kWh/GJ	WO-BEN-ZuzEleCie___Wsk___	2,8	7,5	4,4	0,0
33	Prod	30				Zakup na produkcje ciepła		MWh	WO-BEN-ZuzEleZak_____	165	1 187	692	0
48	Wska	ENERGIA I WSKAŹNIKI							#				
49	Wska	42	Energia wszystkich paliw					GJ	WO-BEN-ZuzECPPal_____	68 060	177 658	176 817	0
53	Wska	46	Metoda fizyczn		We Energi	na produkcję ciepła		GJ	WO-BEN-ZuzECPCie_____MEF	68 060	177 658	176 817	0
54	Wska	47				w tym ws		GJ	WO-BEN-ZuzECPCieWoS___MEF	68 060	177 658	176 817	0
60	Wska	53				Zużycia energii na produkcje ciepła		MJ/GJ	WO-BEN-ZuzECPCie___WskMEF	1 134	1 124	1 118	0
83	KP	URZĄDZENIA WYTWÓRCZE i POMOCNICZE							#				
106	KW	87	K. ciepłownicz				sprawność	%	WO-BEN-KPD_____KoC___	93,0	92,8	93,2	0,0
115	KW	96			Mazut	Zużycie mazutu		t	WO-BEN-Zuz___Maz___KoC___	1 594	4 266	4 219	0
116	KW	97				Energia chemiczna mazutu		GJ	WO-BEN-ZuzECPMaz___KoC___	63 021	169 585	169 657	0
121	KW	102				Razem energia		GJ	WO-BEN-ZuzECP_____KoC___	63 021	169 585	169 657	0
122	KW	103				Ciepło przejęte przez wodę		GJ	WO-BEN-ProCie_____KoC___	58 596	157 377	158 155	0
123	Kd	104					sprawność	%	WO-BEN-KPD_____KoP___	85,0	85,0	85,0	0,0

Data from amnual analysis or calculations is transferred from excel sheet directly to PI archive

Examples of PI System utlization in Vattenfall Heat Poland

Benefits from PI installation:

Important data from production area **SECURED**
Improved quality and efficiency of analysis process
Improved efficiency of production process
Possibility of central dispatching
IT tool easily accessible for end users
Large possibilities of user interface customization
Installed platform integrates data form many systems

Thank you

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