Empowering operations with PI System

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PGNiG TERMIKA

Agenda

- About PGNiG Termika
- PI System at PGNiG Termika – business case
- Examples of PI applications
- Conclusions

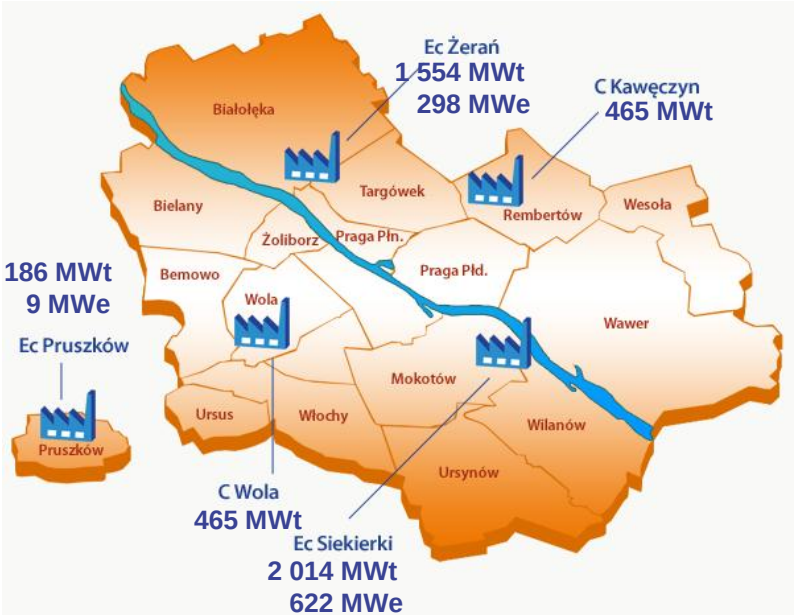
History

- 1904 – first power plant in Warsaw – CHP Powiśle
- 1914 – CHP pruszków
- 1954 – first turbine in CHP Żerań
- 1961 first turbine in CHP Siekierki
- 1974 – HOB Wola
- 1983 – HOB Kawęczyn
- 2000 – Vattenfall Heat Poland
- **2012 – PGNiG Termika**

About PGNiG Termika

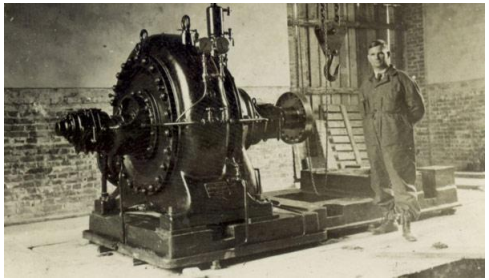
- Since January 2012 Vattenfall Heat Poland became PGNiG Termika
- 5 Power plants (3 CHP's and 2 HOB's
- **First Heat Accumulator in Poland CHP Siekierki**
- PGNiG Termika produces over **40 mGJ** of heat covering **70 %** of Warsaw's heat demand
- Annual electricity sales covers **50 %** of Warsaw's electricity consumption (cogeneration)
- PGNiG Termika supports district heating grid owned by Dalkia Polska
- Fuels: **hard coal, biomass**

1904 – first Power Plant in Warsaw



Background

The beginning …

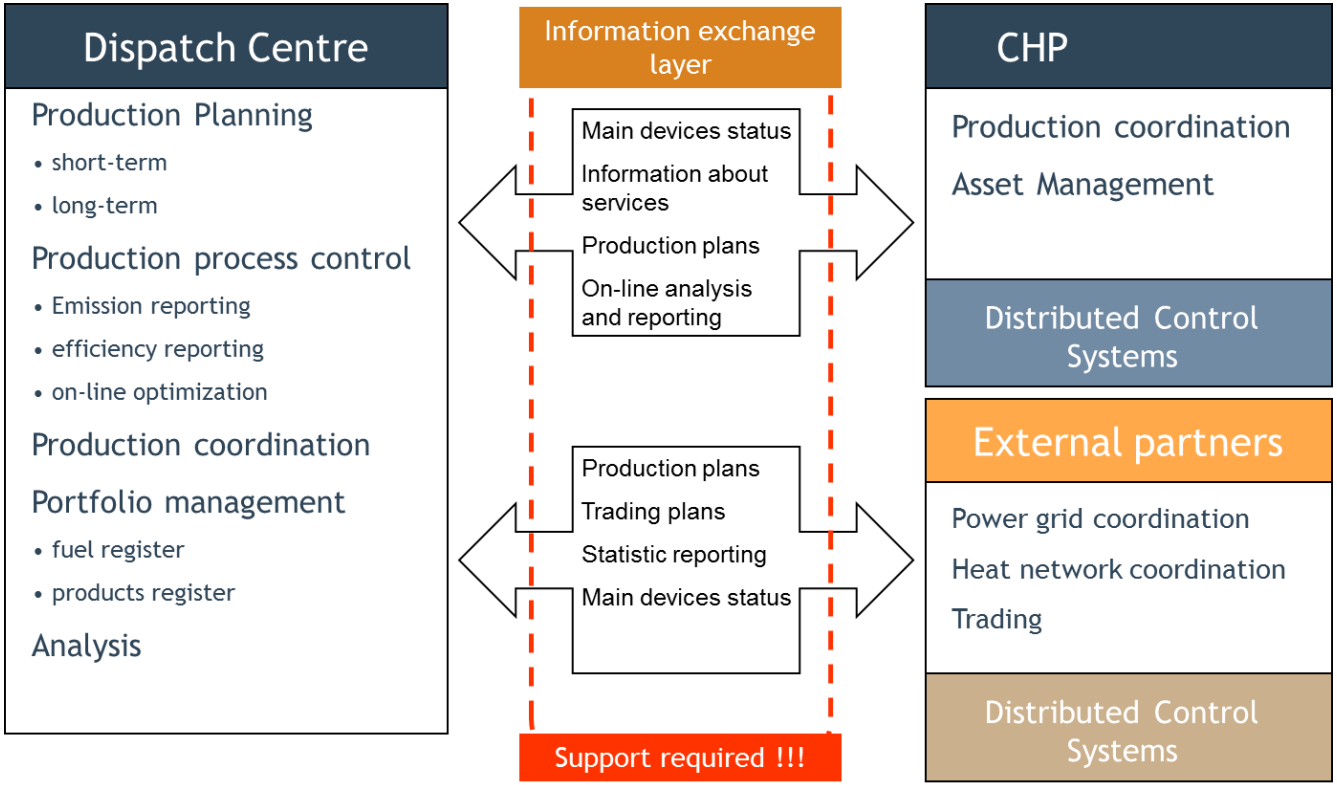


5 independent Power Plants
Lack of detailed central planning
Lack of central monitoring of production process
Not optimal production process

Target… 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

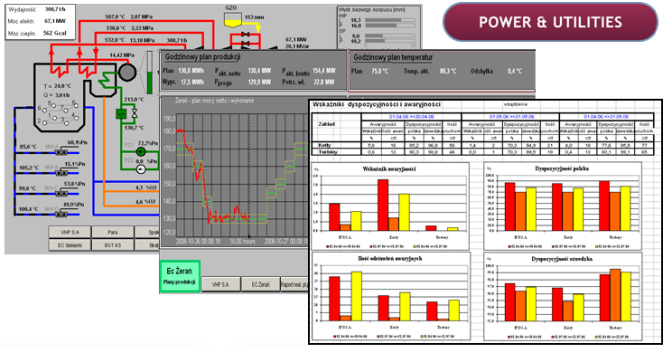
Challenge



Business case

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**"*



Customer Business Challenge	Solution	Customer Results / Benefits
• 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	• 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	• 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

Implementation of PI System

First implementation of PI System was done by PlantSoft – German based company operating mostly in Germany, Czech Republic and Poland

Implementation was done in two steps:

1. PI Server implementation with few major interfaces – apx. 2000 data streams
2. Upgrade of server cluster and 50000 data streams

PGNiG Termika has SLA with OSISoft (Server maintenance) and Plantsoft (PI applications maintenance)

Implementation of PI System

Installed packages:

- PI ProcessBook
- PI DataLink
- PI WebParts
- PI Notifications
- PI MCN Health Monitor
- PI ACE (Advanced Computing Engine)
- **PI Module Database -> PI AF**
- PI Universal File Loader
- PI ComConnector

Over 60.000 tags in use

Implementation of PI System

PI applications:

- PI ProcessBook screens
- PI Datalink reports
- Efficiency calculation and monitoring
- Reports
- Manual data storage (laboratory analysis)
- Data source for other systems

IT Systems at PGNiG Termika

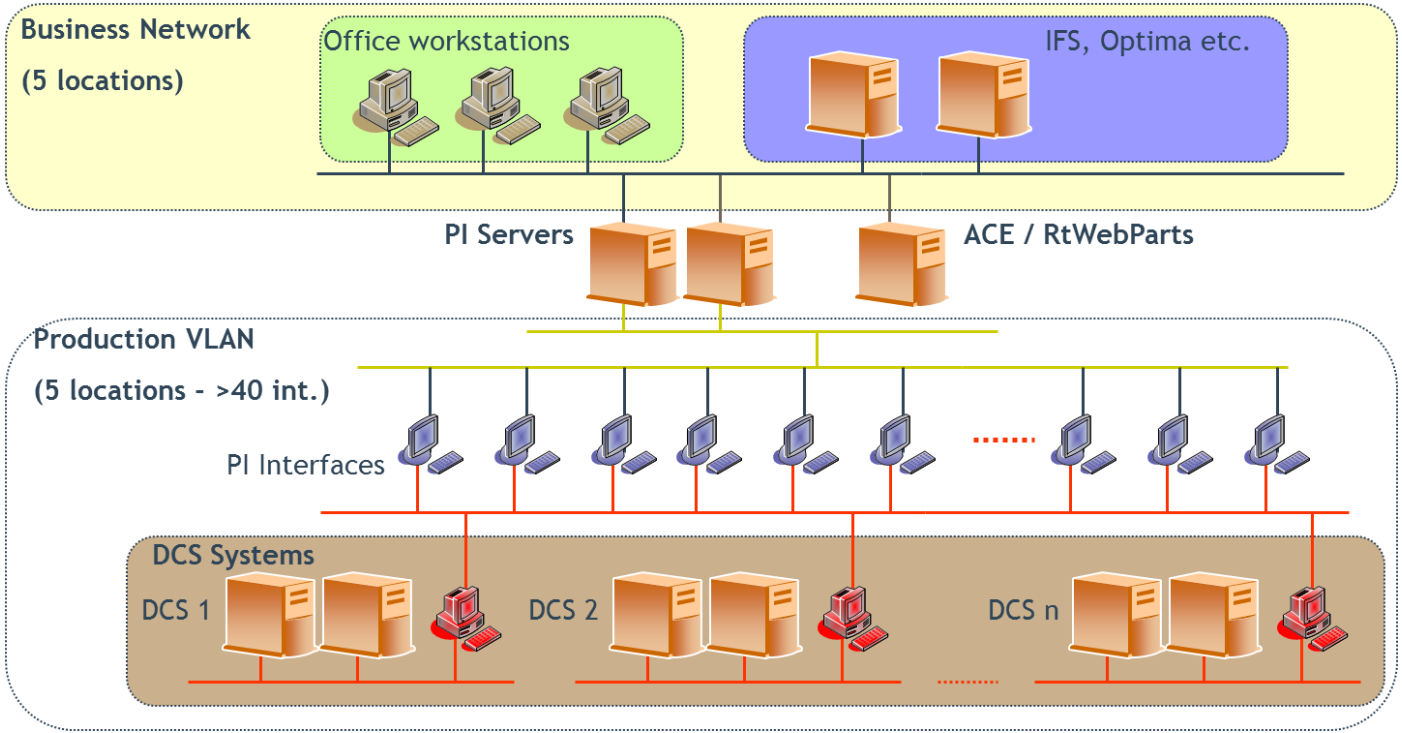
Business IT

- IFS
- Data Warehouse
- Optima Controlling
- LM system Pro
- Weibull Analysis
- RCM++
- ESSII
- BOFIT

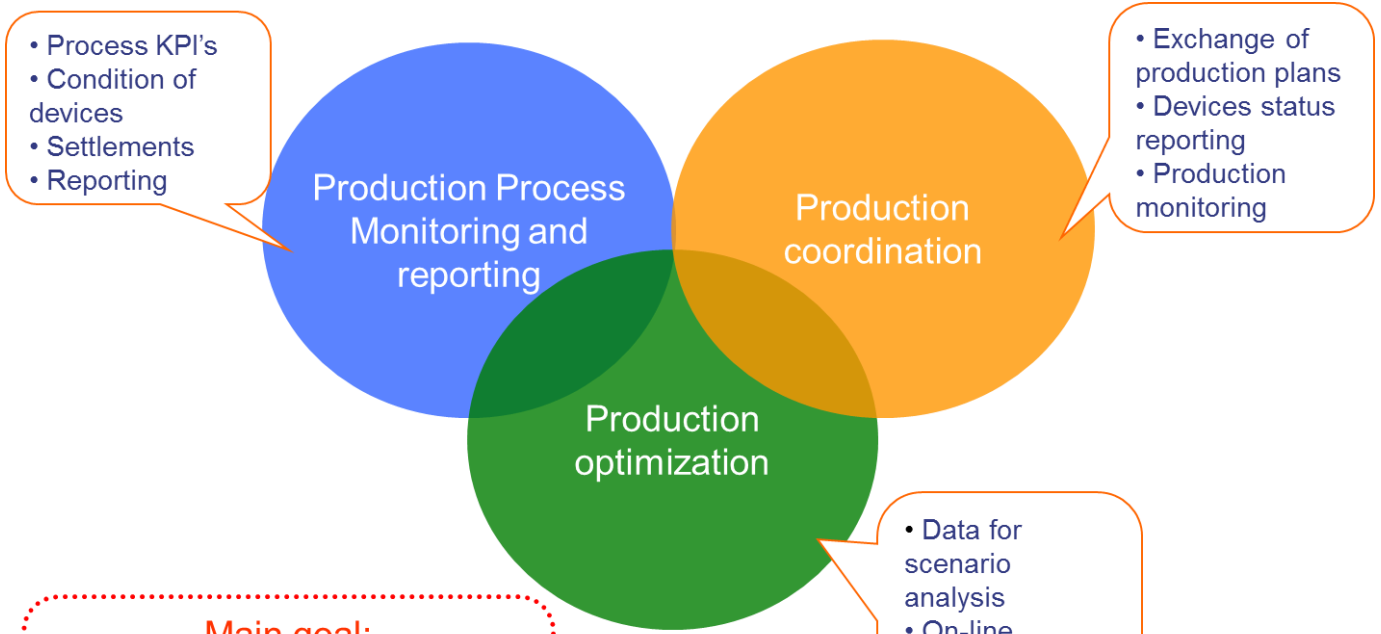
DCS Systems

- AC800xA – Melody ABB
- SYMPHONY ABB
- Ovation – Westinghouse
- MetsoDNA – Metso
- WIZCON
- Freelance 800F – ABB
- Asix - Askom

Infrastructure



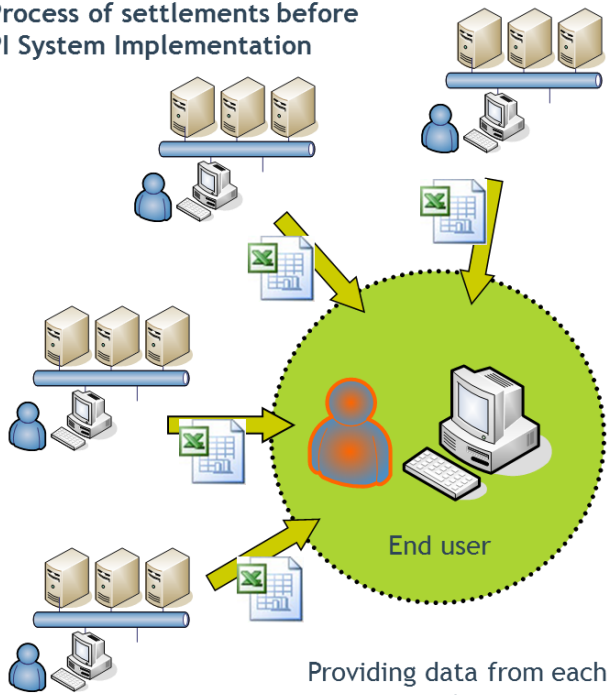
Areas of benefits



Main goal:
Implementing user-friendly and time-saving tool for data analysis and reporting

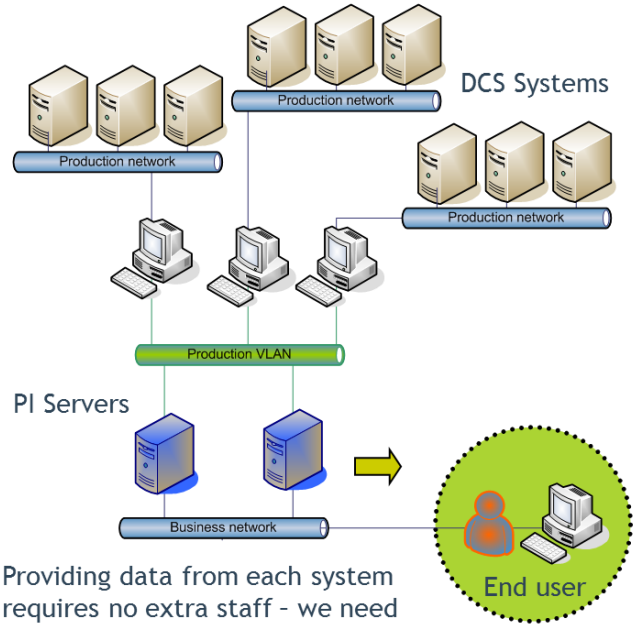
Benefits: Monitoring & reporting

Process of settlements before PI System Implementation



Providing data from each system requires a person responsible for data export

Process of settlements after PI System Implementation

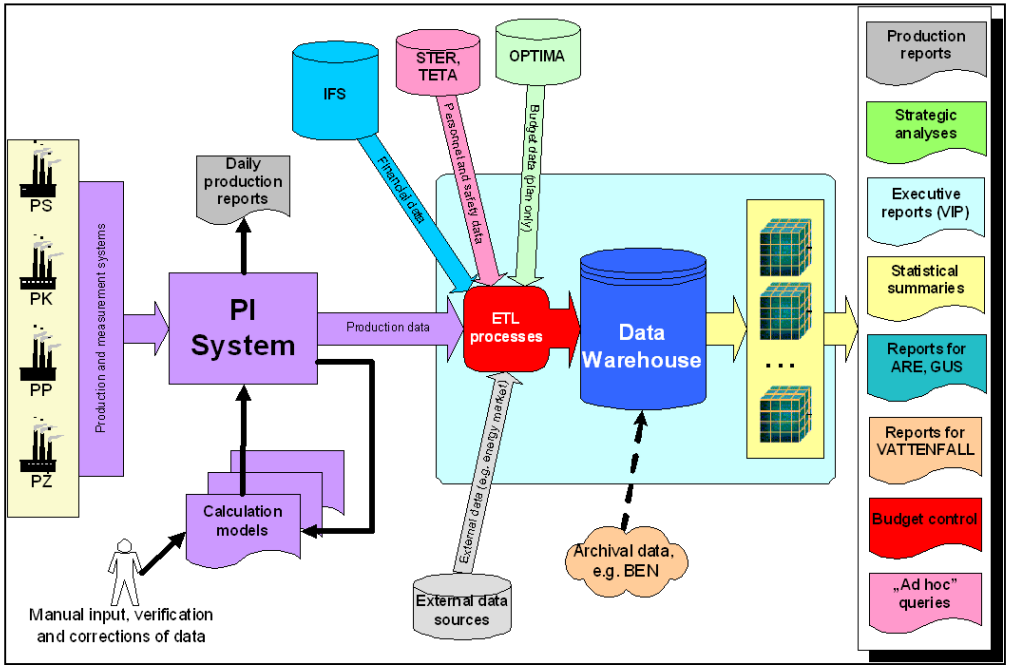


Providing data from each system requires no extra staff - we need only interface (ex. OPC).

In Termika we saved ca 500 hours per year with PI

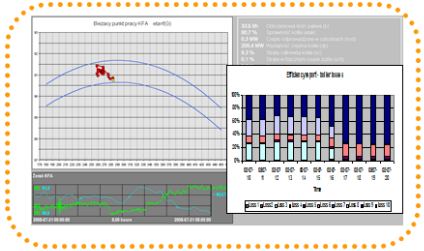
Benefits: Monitoring & reporting

PI System is an important place of data preparation for Data Warehouse



Benefits: Optimization

Optimal operating point
&
Condition based
maintenance

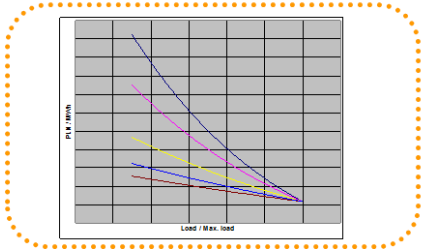


Production optimization
support with PI System

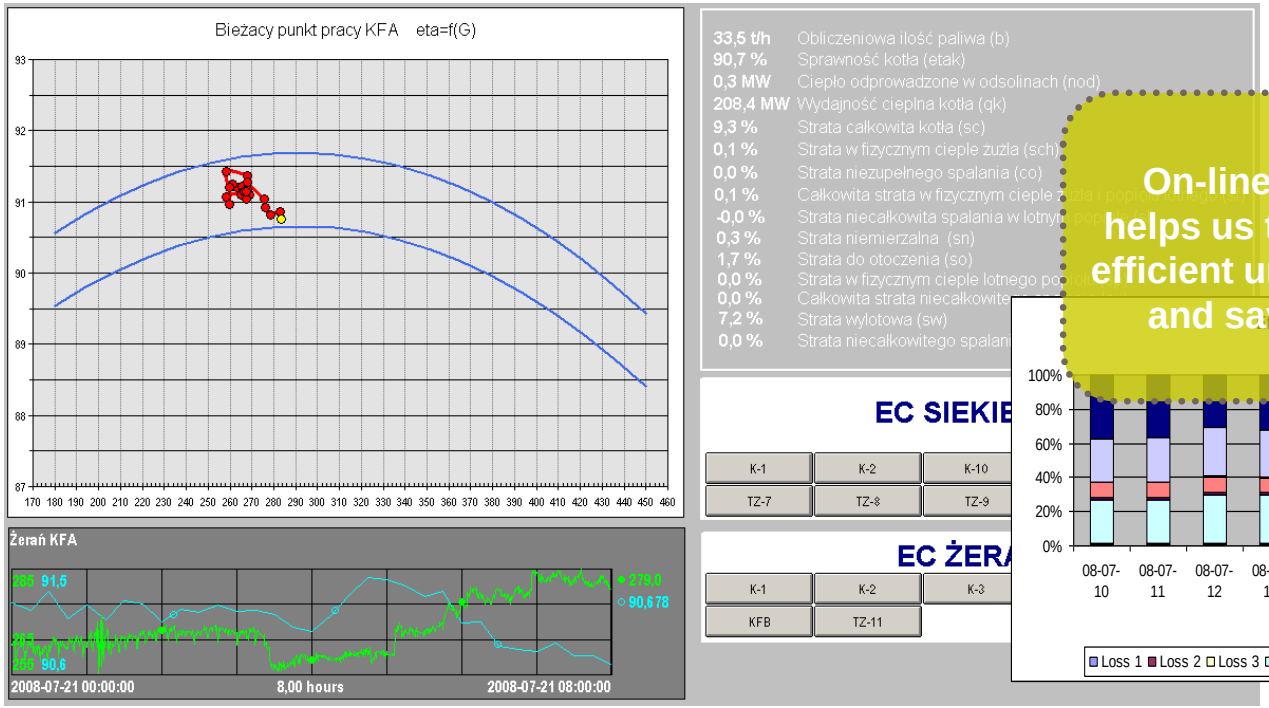
On-line data analysis

KPI's

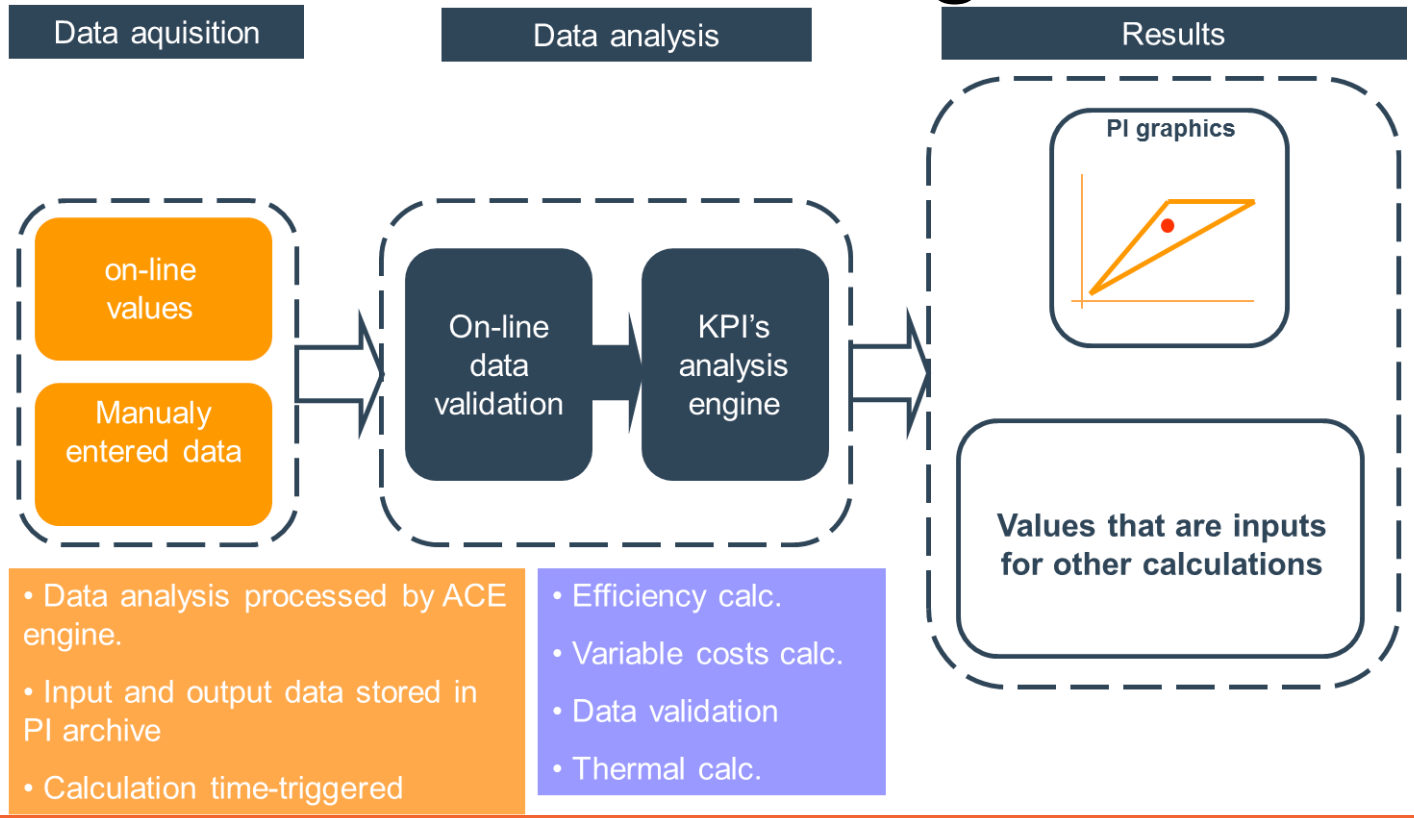
Variable cost
On-line calculation



Benefits: Operating Point



Benefits: KPI monitoring



Benefits: KPI monitoring

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Basic info on KPI monitoring tools:

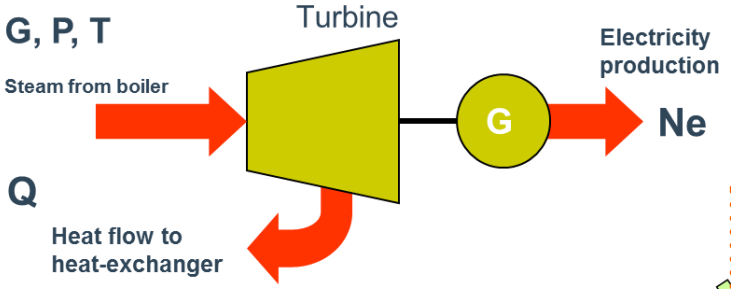
- All KPI's are calculated in PI ACE environment
- Input data come from live objects (raw data) and manual entry (manual data)
- Input data is tested and verified in validation algorithms

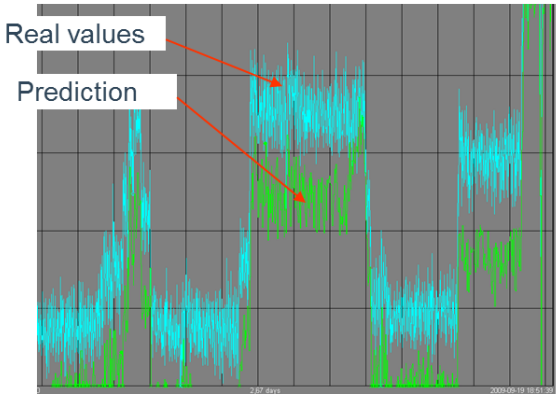
KPI's that are monitored:

- Efficiency indicators (losses, specific energy consumption, specific production costs etc.
- Performance & cindition indicators (key maintenance parameters, availability etc.

Benefits: Condition based maintenance

Neural networks (production parameters prediction)





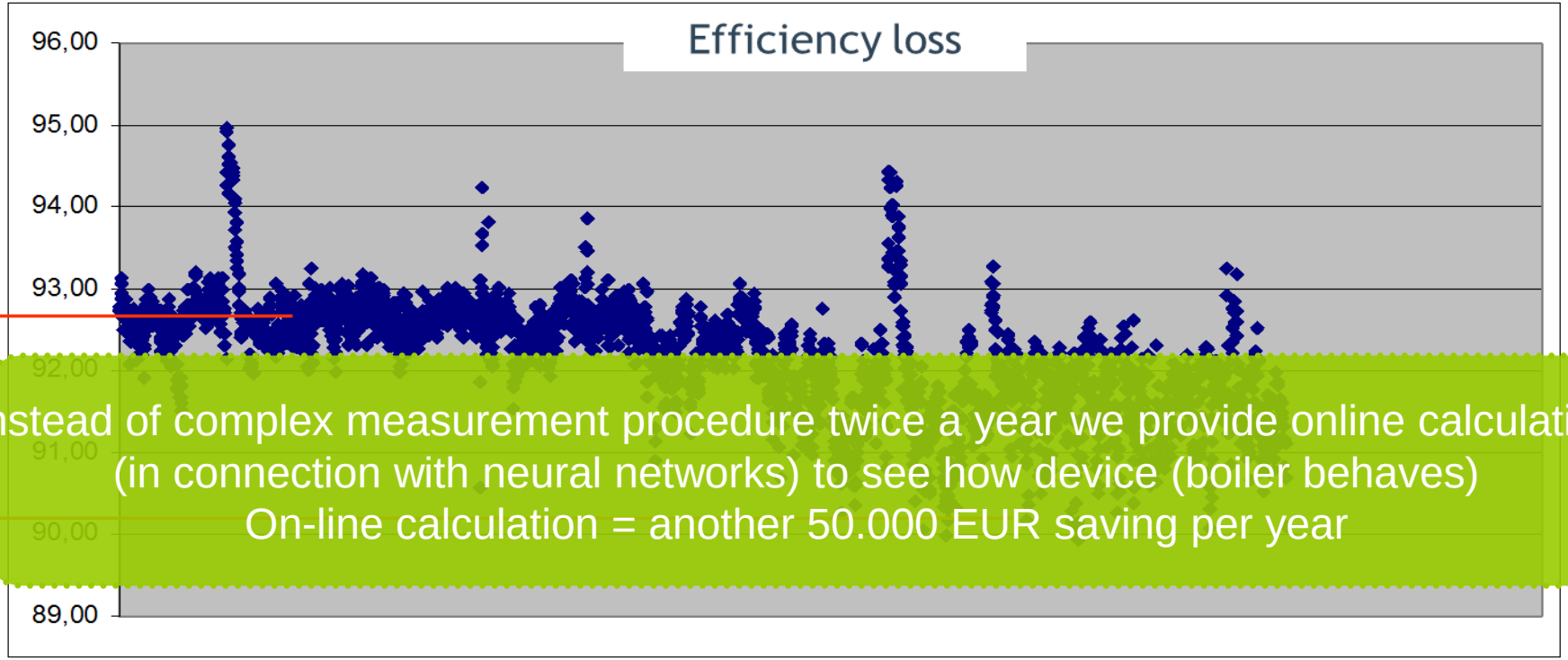
3 steps to define a calculation

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

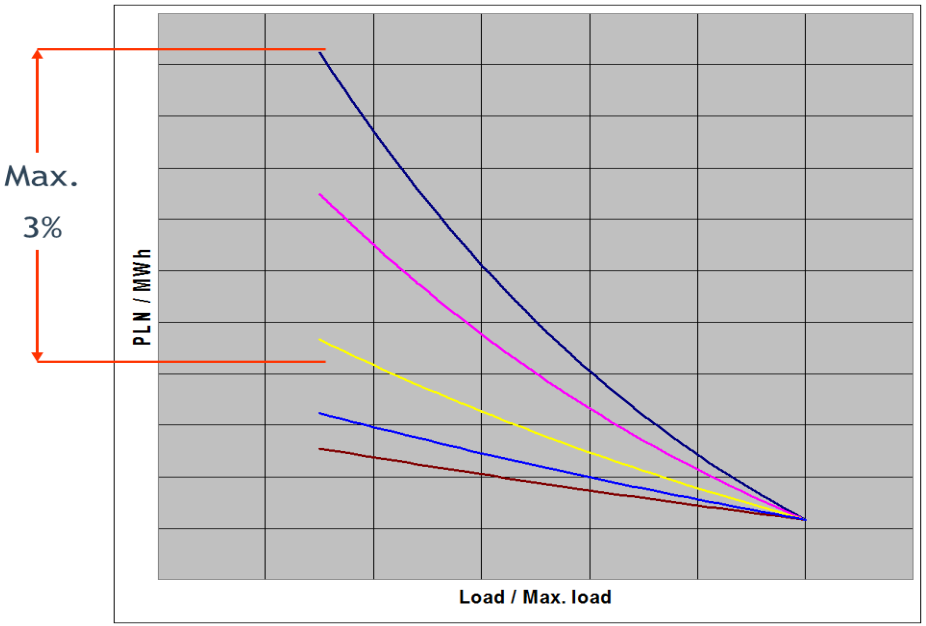
By finding relationships between device operational parameters and overall eficiency we can easily Indicate device failure or bad condition

Applying ACE calc. Into PI graphics

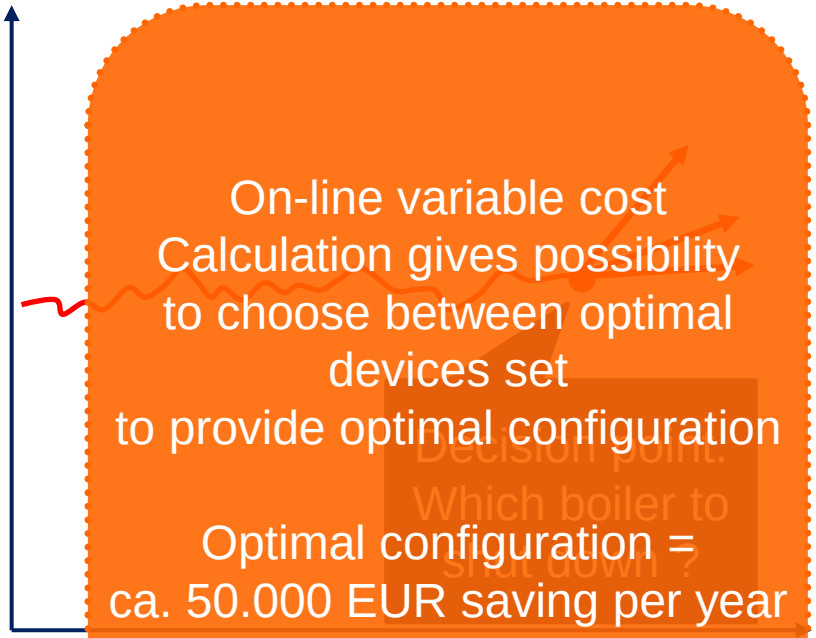
Benefits: Efficiency monitoring



Benefits: Variable cost monitoring



Variable cost in function of load



Variable cost in function of time

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

Summary of benefits

- Improvement of data storage safety.
- Improvement of efficiency and quality of analysis.
- Improvement of production efficiency.
- Improvement of data accessibility.
- Large scalability of PI System.
- Quick and easy integration with other IT Systems

…

- And many more depending on user requirements…

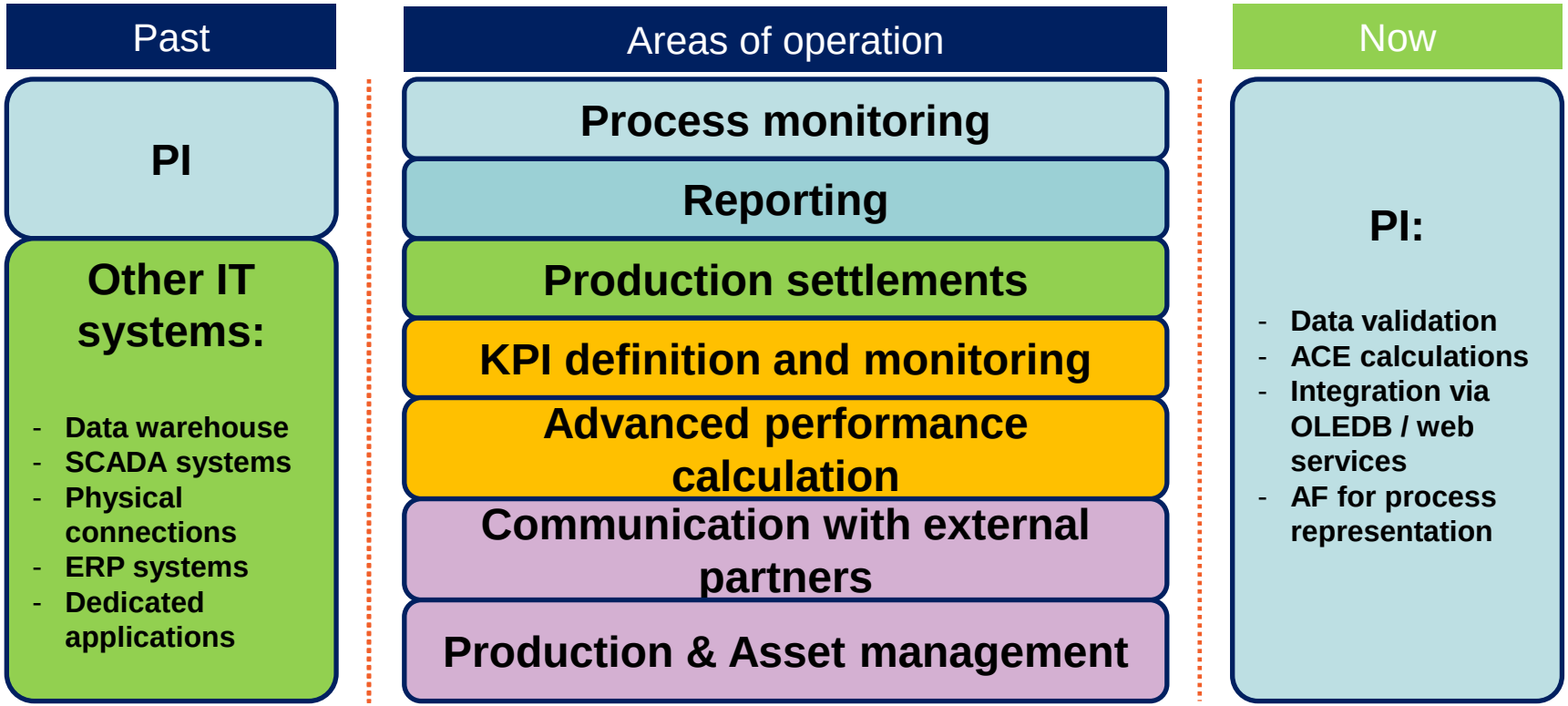
Key benefit…

What is the real benefit of PI system implementation from the perspective of a decade of operation?

Organization transformation

- „How can PI help us?” instead of „We need to implement something…”
- „Always think about synergies before you act”
- Information brings more value to organization than just storing data
- We should always give users freedom of organizing their workspace.

Transformation into a global system



New areas of development

Data exchange with partners

Before

- Data exchage via industrial protocols
- Number of data streams limited to end-edvices capacity
- Scalability requires hardware modification

After

- Communication via Web services
- Large scalability with assets consumption

PI as a system for settlements

Before

- Settlements done by many systems
- Complicated data exchange between settlement processess

After

- PI as a settlement system
- Data validates by ACE
- No data exchange problems

Communication event handling

Before

- Communication to shift engineers by email – not everybody know about production strategy
- Shift reports in excel sheets

After

- Communication via PI usiNg data streams for information visualization
- Shift reports in PI

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