Empowering operations with PI System

Presented by **Marcin Błasiak**
Chief Production Management Systems Specialist at PGNiG Termika

OSIsoft.

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EMEA

The Power of Data

Agenda

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

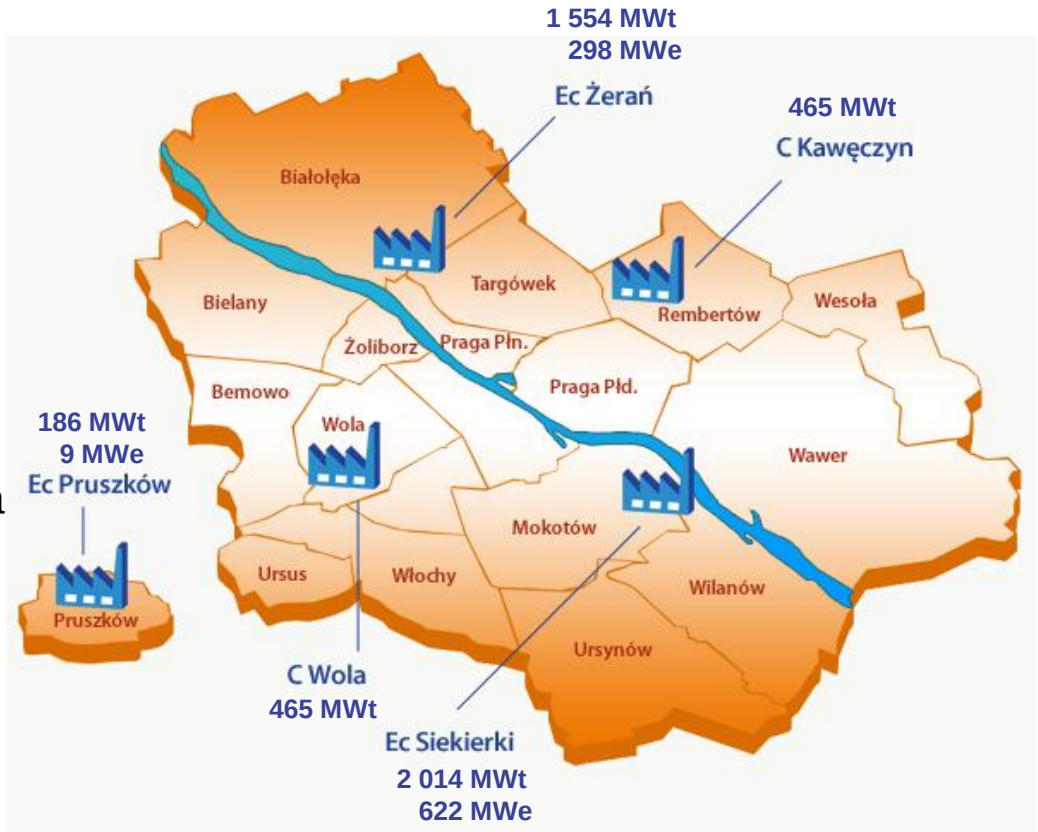
History…

- 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

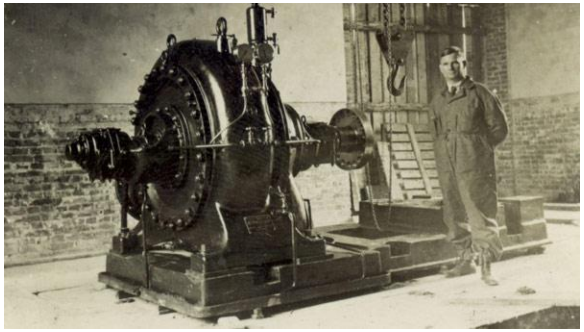
- Since January 2012 Vattenfall Heat Poland became PGNiG Termika
- 5 Power plants (3 CHP's and 2 HOB's
- **First Heat Accumulator in Poland CHP Siekierki**
- PGNiG Termika produces over **40 mGJ** of heat covering **70 %** of Warsaw's heat demand
- Annual electricity sales covers **50 %** of Warsaw's 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 technological 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…

Dispatch Centre

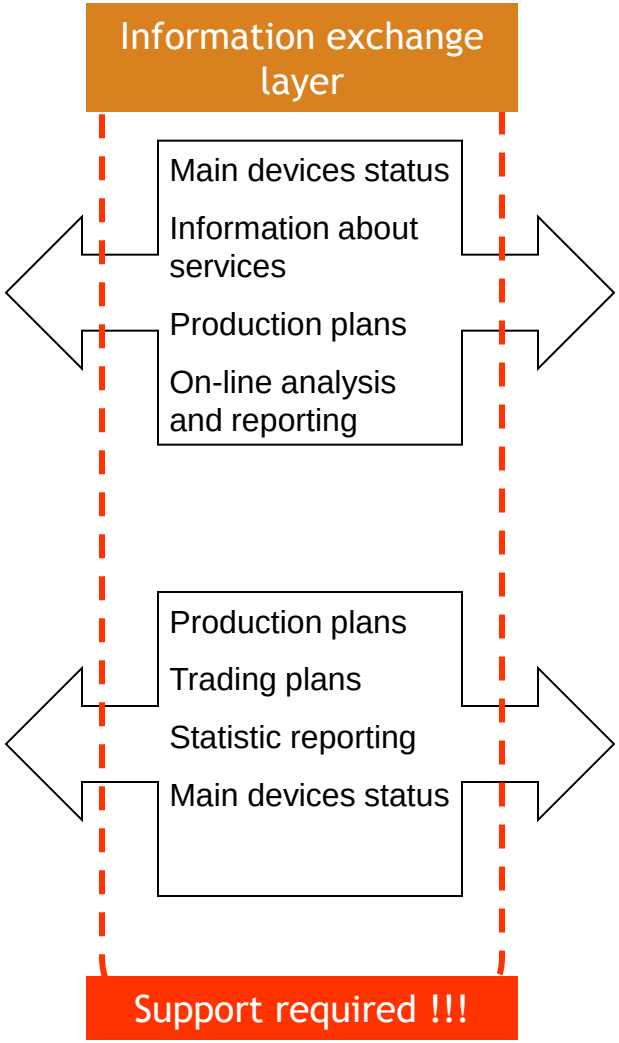
Production Planning
- short-term
- long-term

Production process control
- Emission reporting
- efficiency reporting
- on-line optimization

Production coordination

Portfolio management
- fuel register
- products register

Analysis



CHP

Production coordination

Asset Management

Distributed Control Systems

External partners

Power grid coordination

Heat network coordination

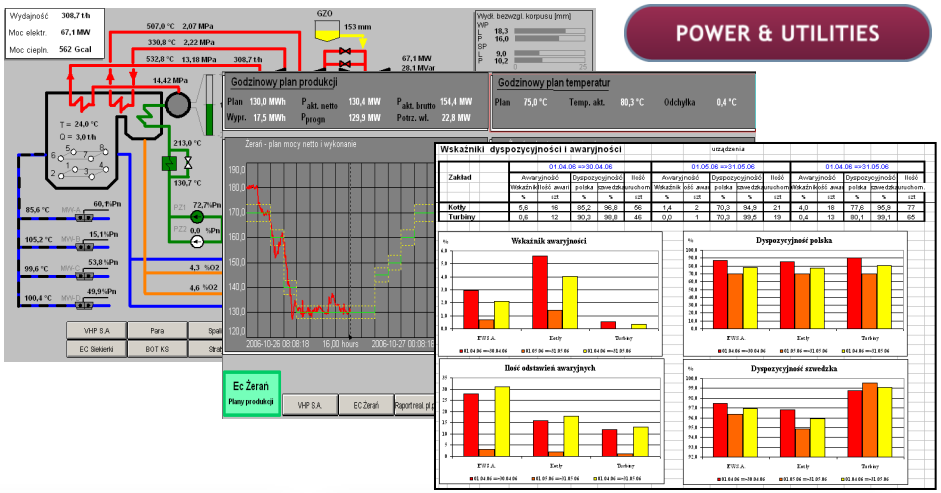
Trading

Distributed Control Systems

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

- 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

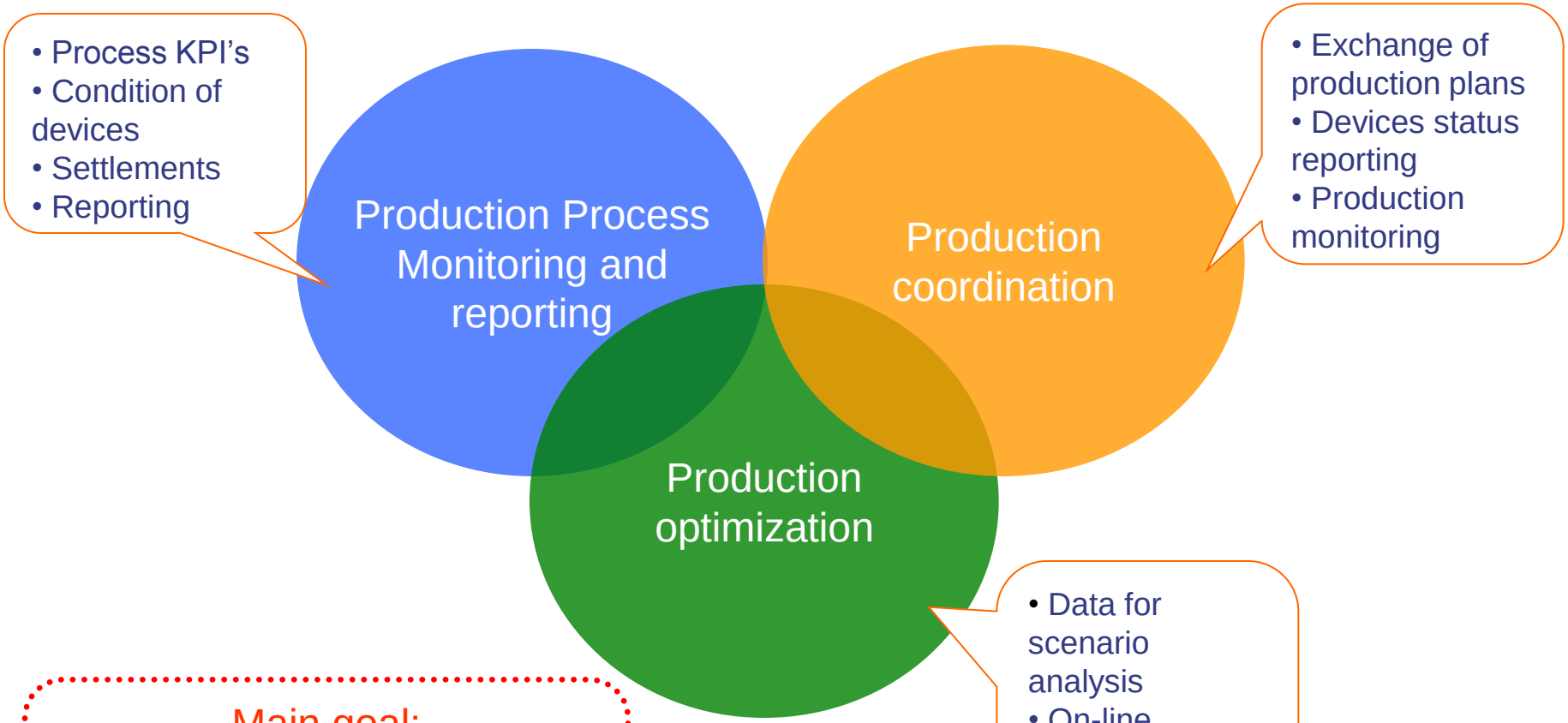
Solution

- 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

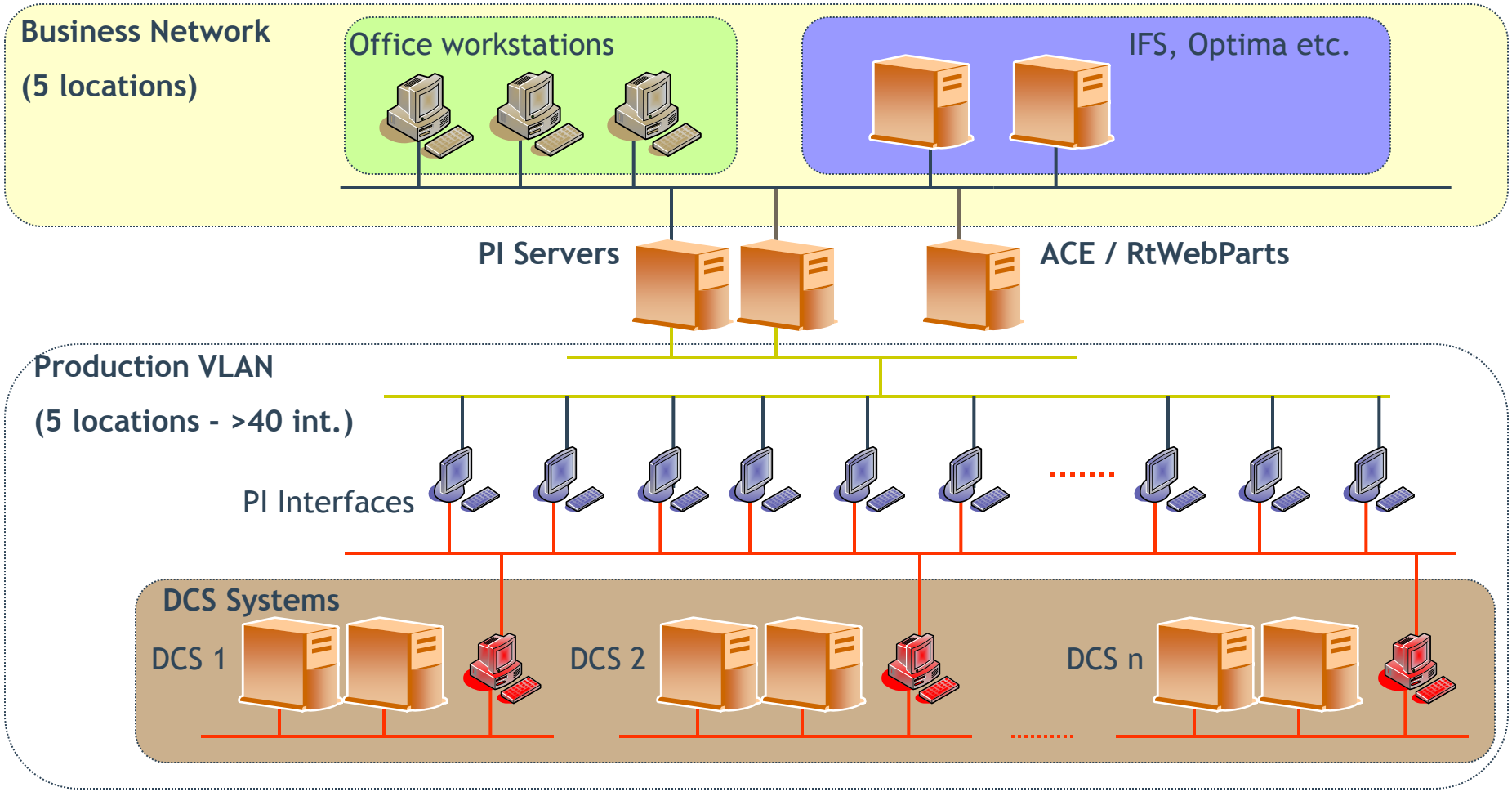
- Incrased number of analysis in the same amount of time
- Decreased variable costs caused by on-line cost calculations **(ca. 50 kEUR per year)**
- Increased efficiency in consequence of on-line efficiency calculations **(3-5 %)**
- Increased accesibilty to information about production process

Areas of benefits



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

Architecture



IT Systems in PGNiG

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

Implementation of PI System in PGNiG Termika

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 in PGNiG Termika

Installed packages:

- PI ProcessBook
- PI DataLink
- PI WebParts
- PI Notifications
- PI MCN Health Monitor
- PI ACE (Advanced Computing Engine)
- PI Module Database

Over 45.000 tags in use

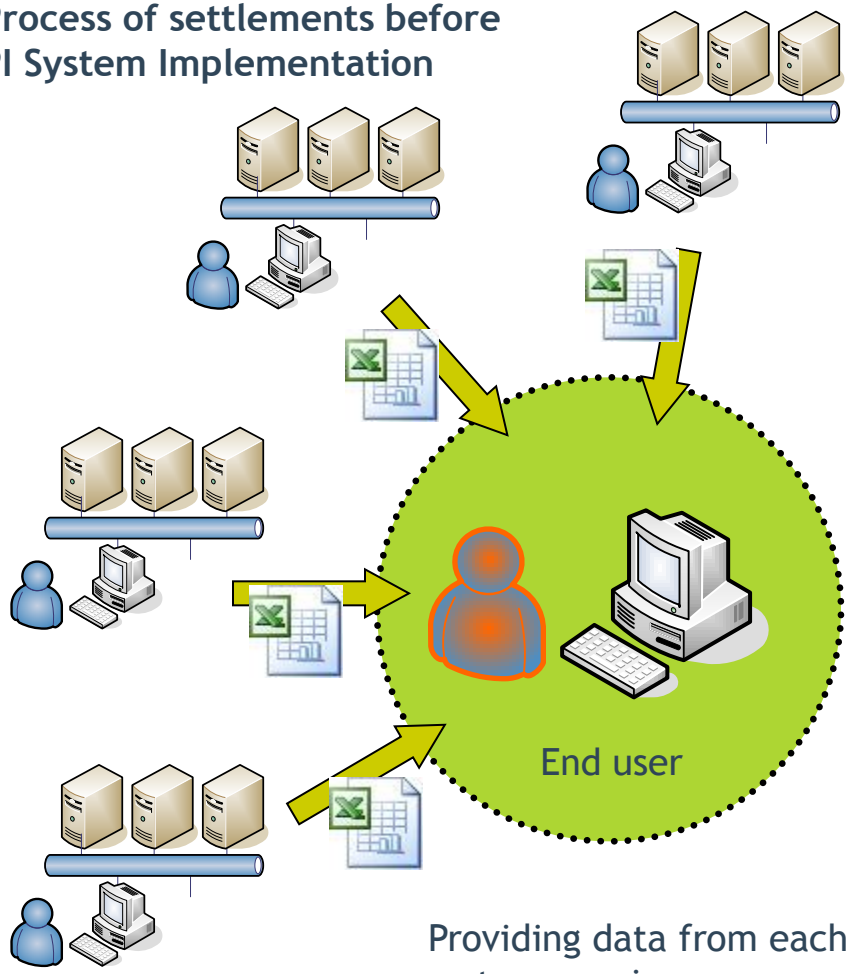
Implementation of PI System in PGNiG Termika

PI applications:

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

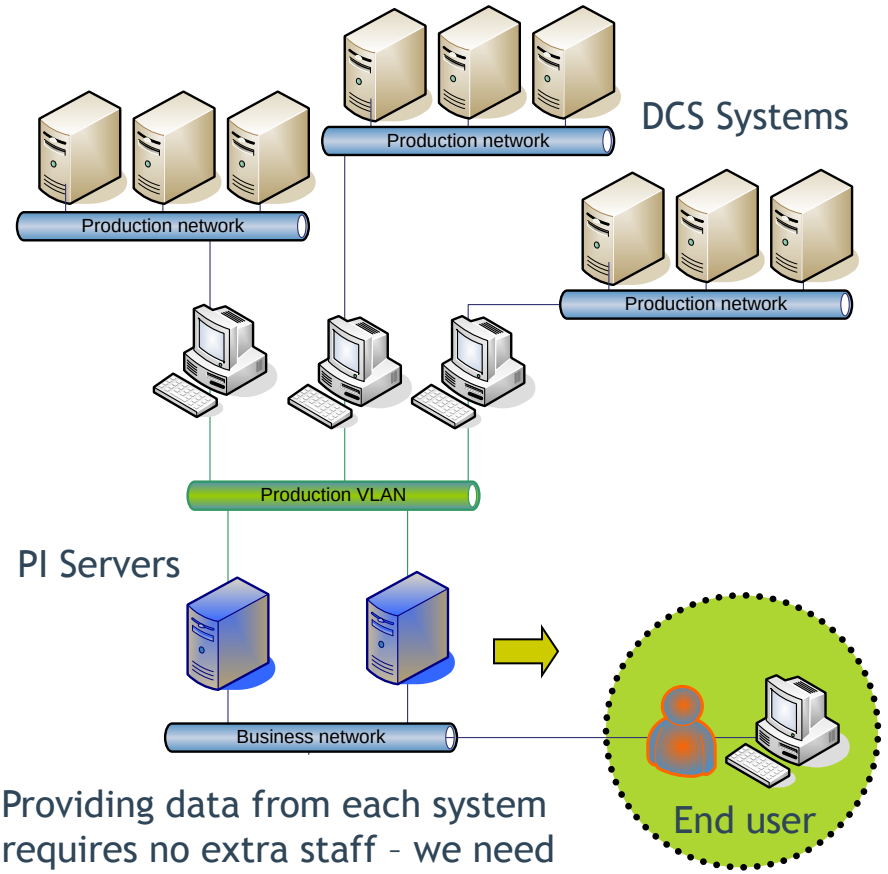
Benefits: Monitoring & reporting

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

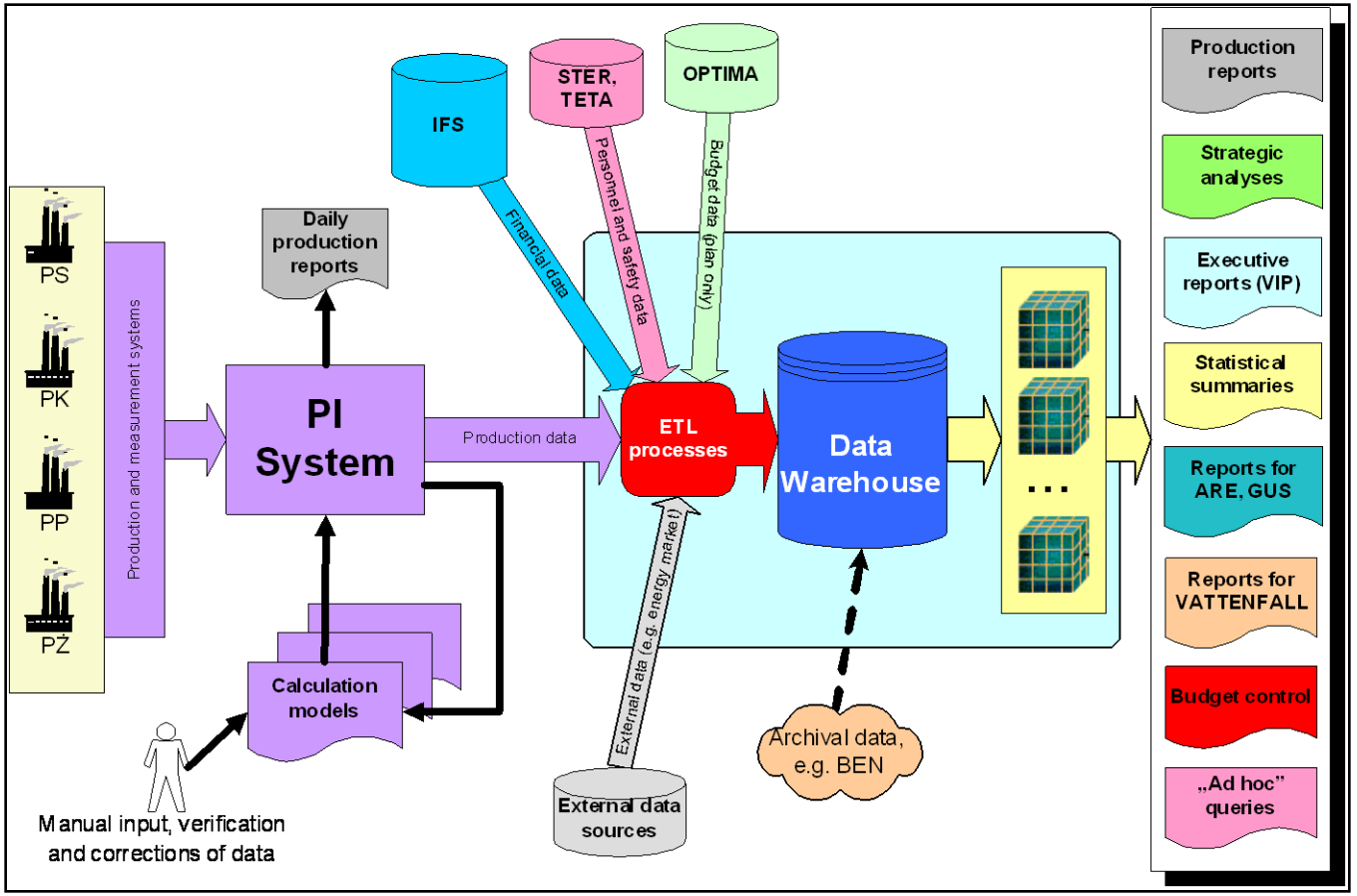


Providing data from each system requires no extra staff – we need only interface (ex. OPC).

In VHP we saved ca 500 hours per year with PI

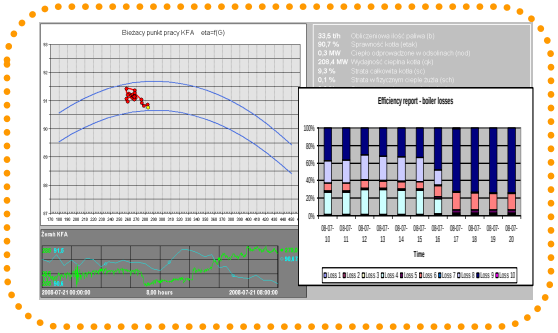
Benefits: Monitoring & reporting

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



Benefits: Optimization

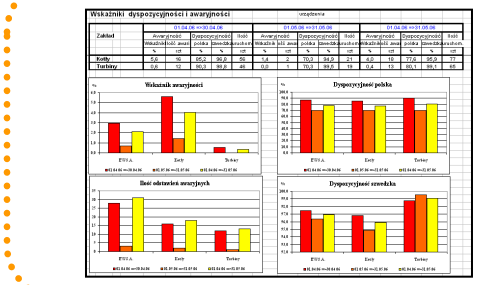
Optimal operating point
&
Condition based maintenance



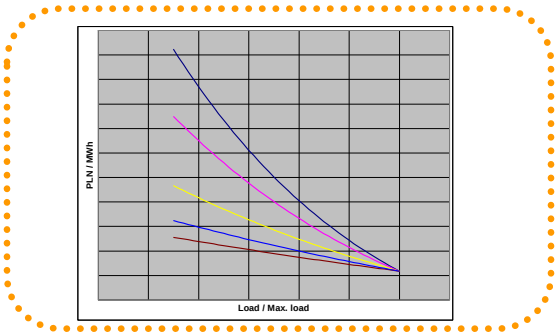
Production optimization support with PI System

On-line data analysis

KPI's

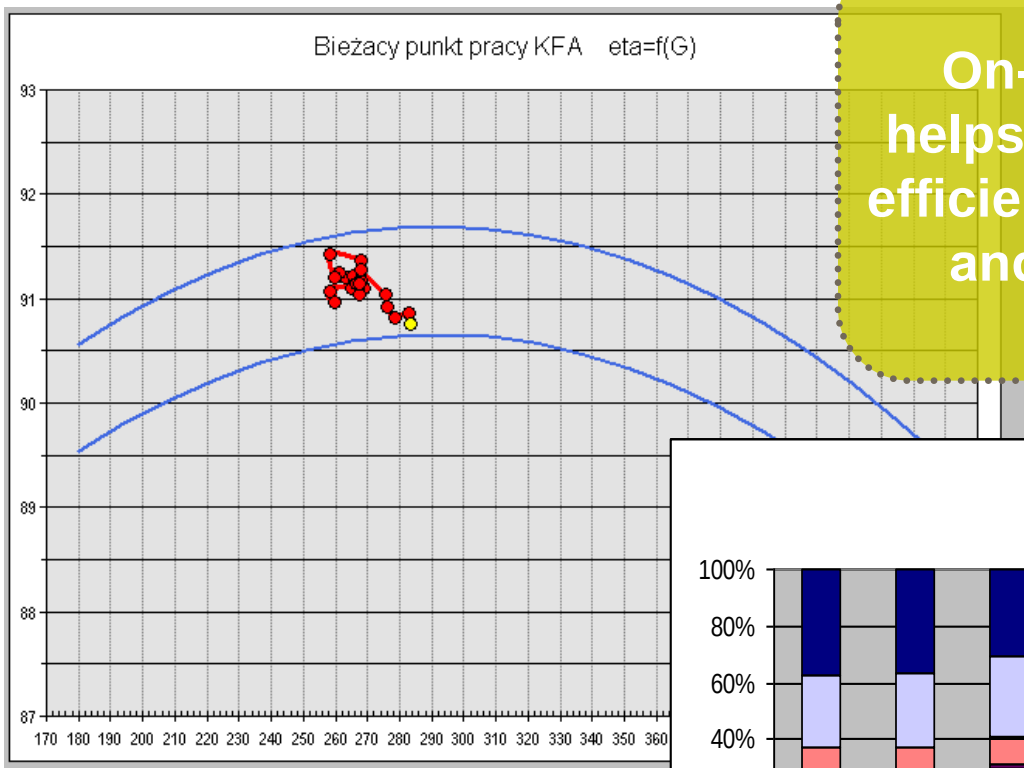


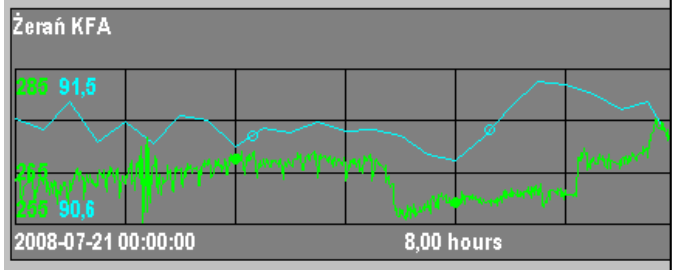
Variable cost
On-line calculation

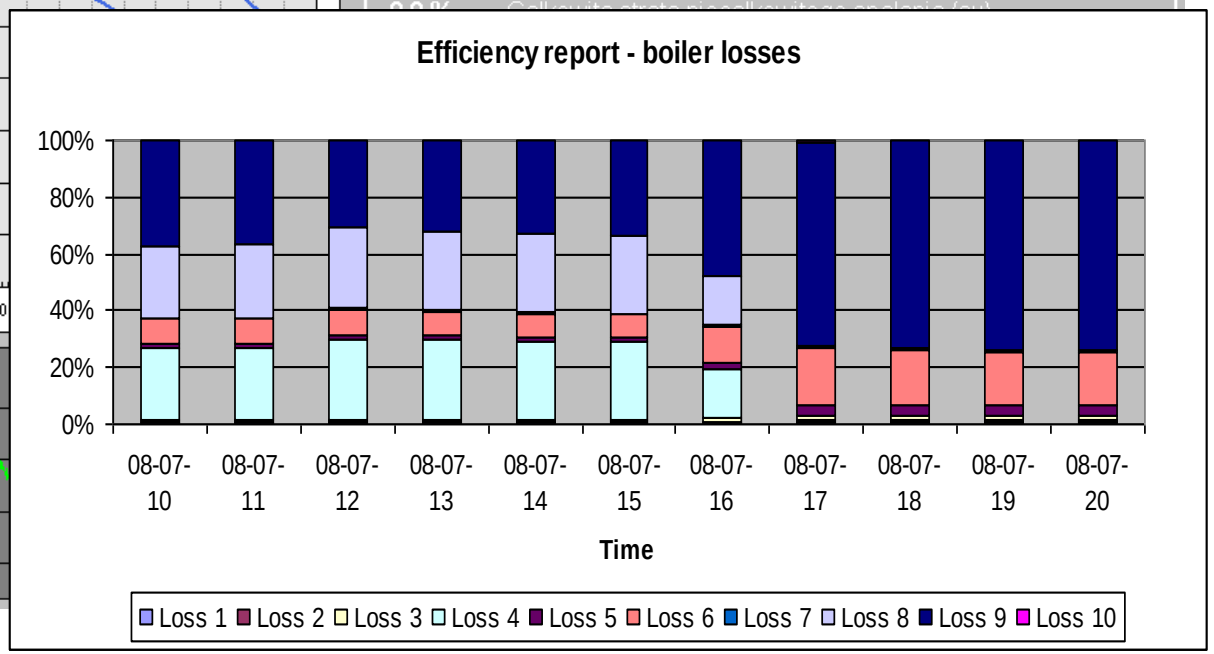


Benefits: Operating point

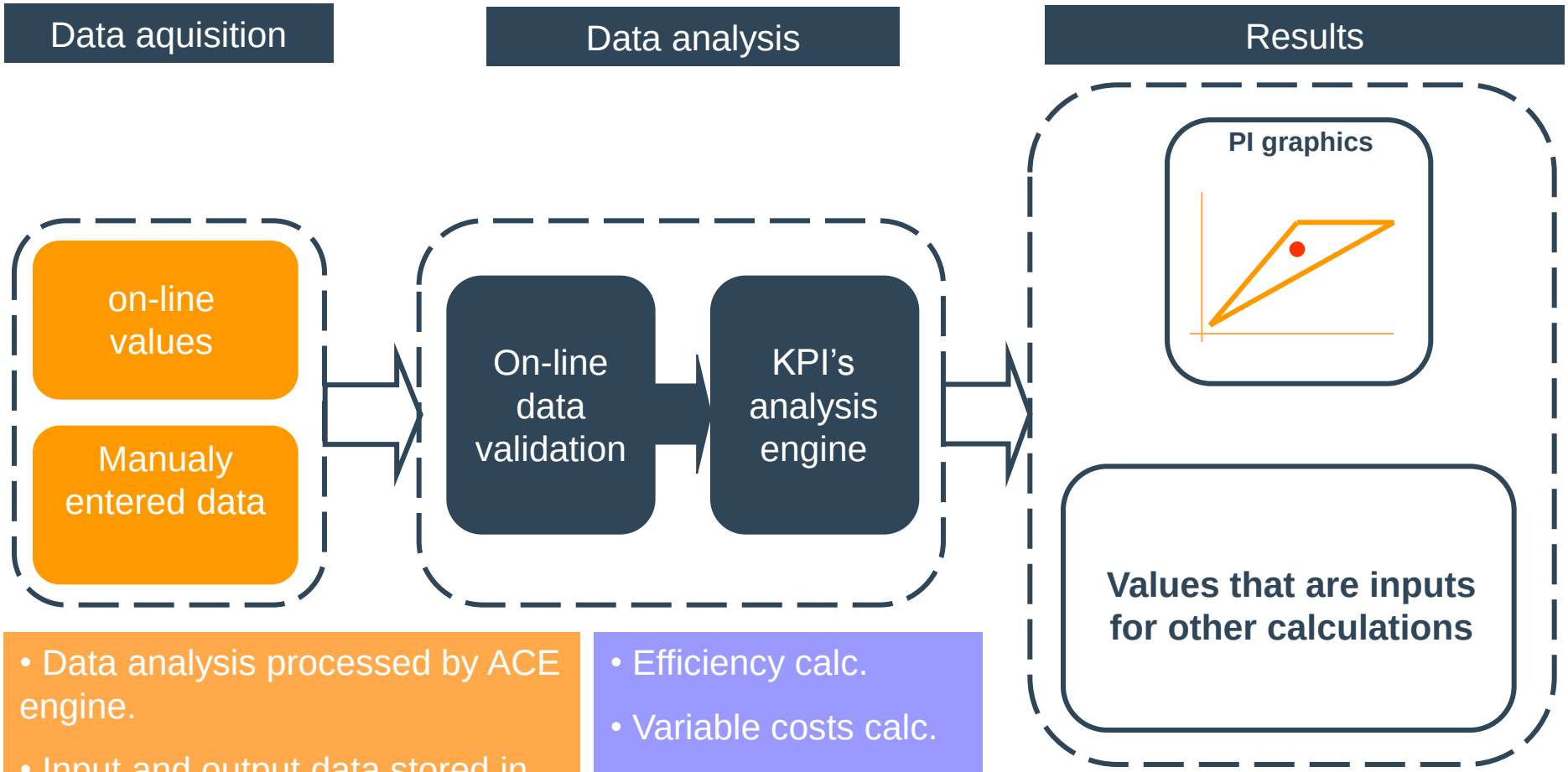
On-line efficiency monitoring helps us to operate only the most efficient units at their optimal point and save up to 2…3% of fuel







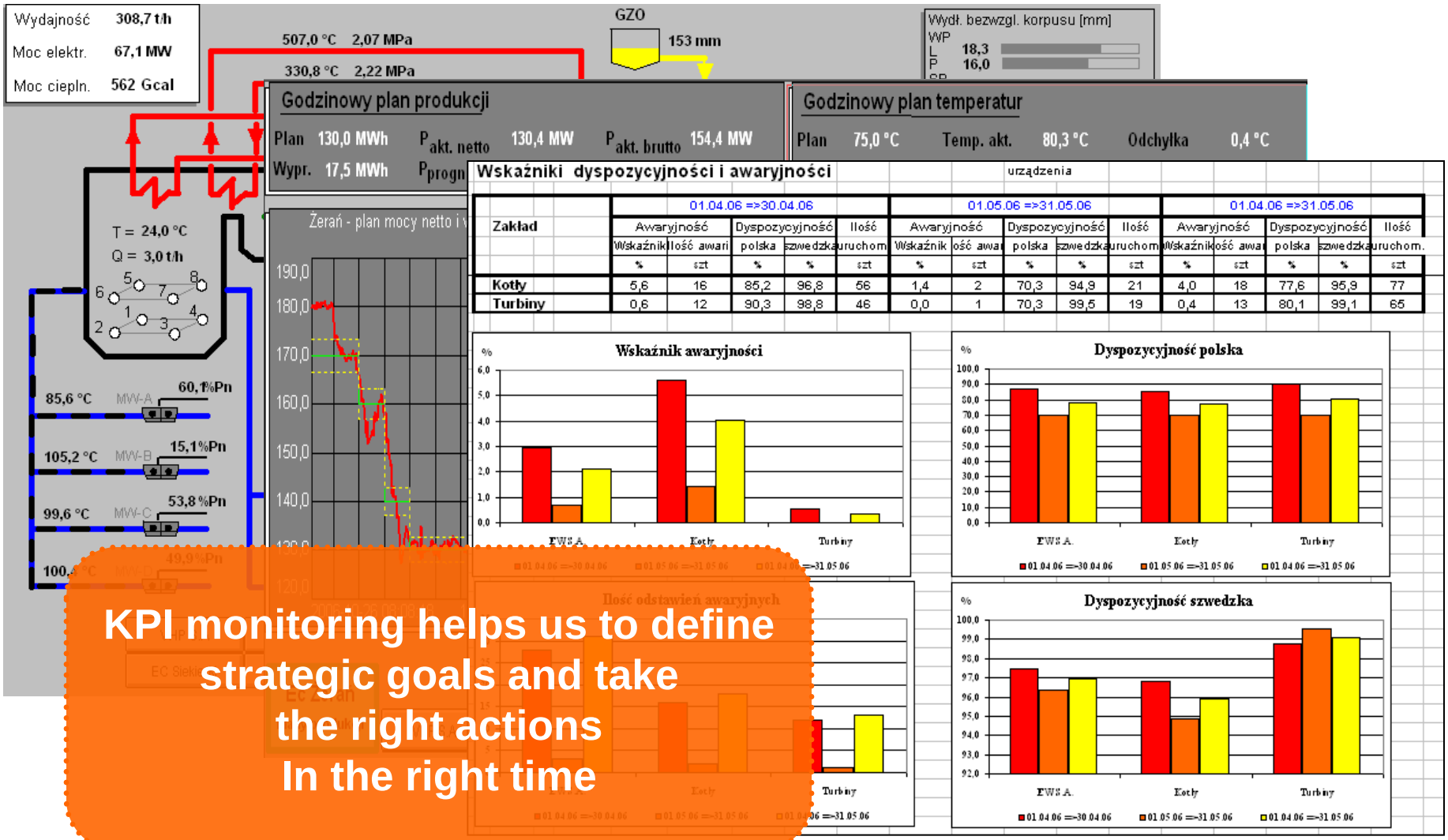
Benefits: KPI monitoring



- 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.

Benefits: KPI monitoring



KPI monitoring helps us to define strategic goals and take the right actions In the right time

Benefits: KPI monitoring

Basic info on KPI monitoring tools:

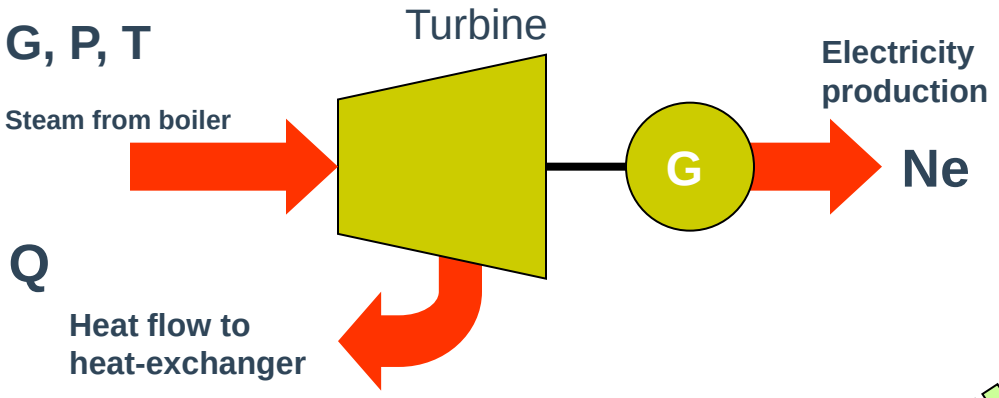
- All KPI's are calculated in PI ACE environment
- Input data come from live objects (raw data) and manual entry (manual data)
- Input data is tested and verified in validation algorithms

KPI's that are monitored:

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

Benefits: Condition based maintenance

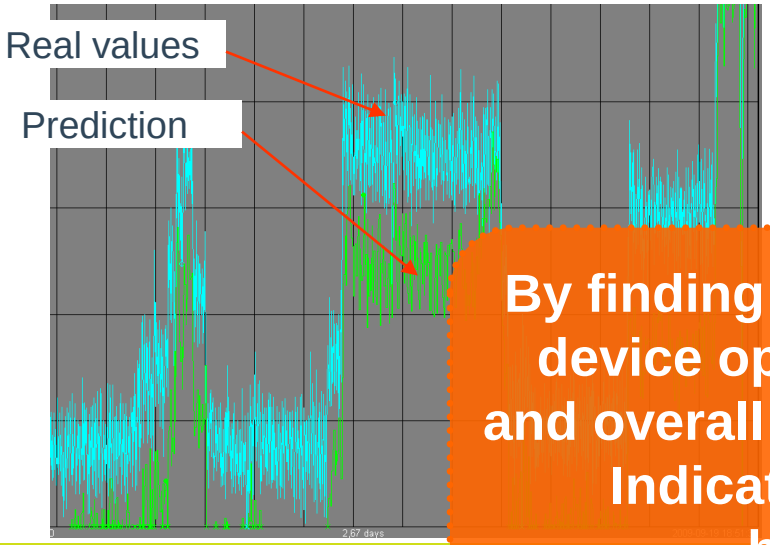
Neural networks (production parameters prediction)



3 steps to define a calculation

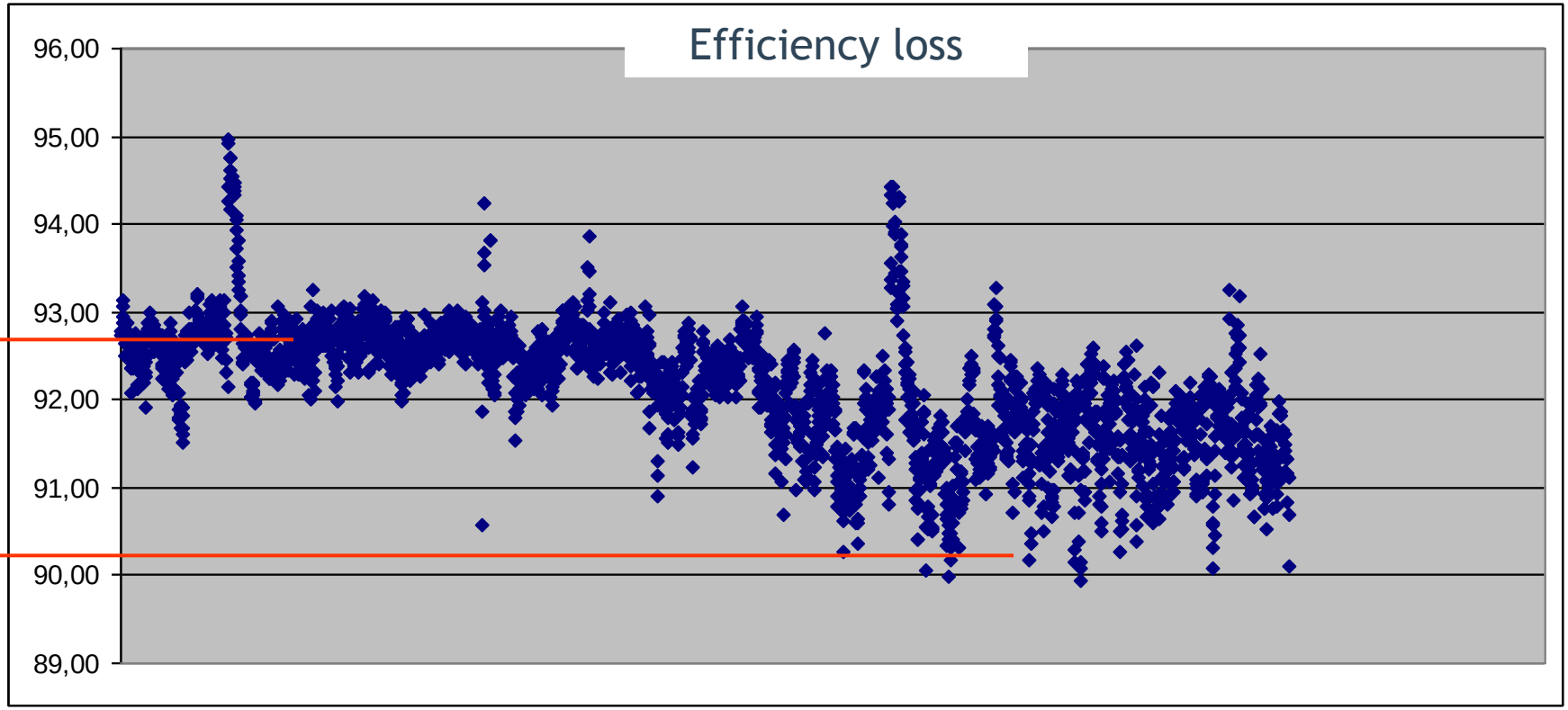
$Ne = f(G,P,T,Q)$

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



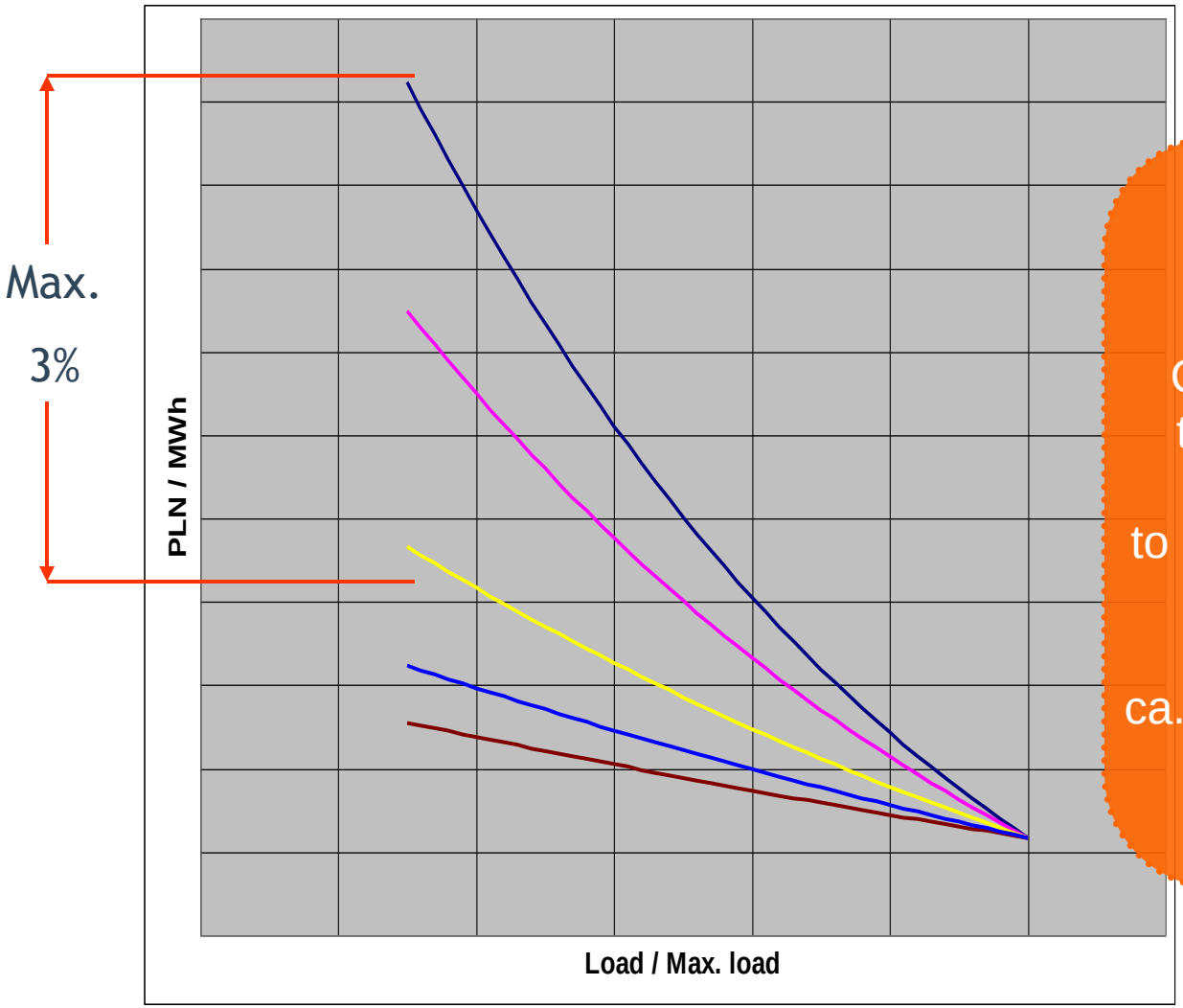
By finding relationships between device operational parameters and overall eficiency we can easily Indicate device failure or bad condition

Benefits: Efficiency monitoring



nstead 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

Benefits: Variable costs monitoring



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…

Contanct

Marcin Błasiak

marcin.blasiak@termika.pgnig.pl

+48 22 587 89 98

THANK YOU

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