Supporting Strategic Initiatives at MOL with the PI System Infrastructure

Presented by Tibor Komroczki

MOL Group

MOL Group is a leading international, integrated oil and gas company from Hungary, the heart of Europe, with over 75 years' experience and a proven track record.

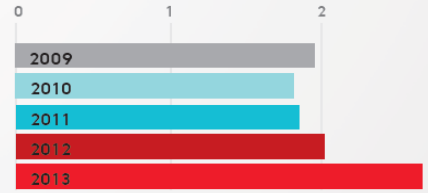
MOL Group's Downstream Division operates 6 production units with a total capacity of 20.9 mtpa refining and 2.1 mtpa petrochemicals with more than 1900 service stations under 8 brands in 11 CEE countries, all supported by a far-reaching logistics system and driven by Supply Chain Management.

NET REVENUE
USD 24.1 BN

EBITDA
USD 2.3 BN

OPERATING CASH FLOW
USD 2.7 BN

CAPEX
USD 1.2 BN



MOL Group

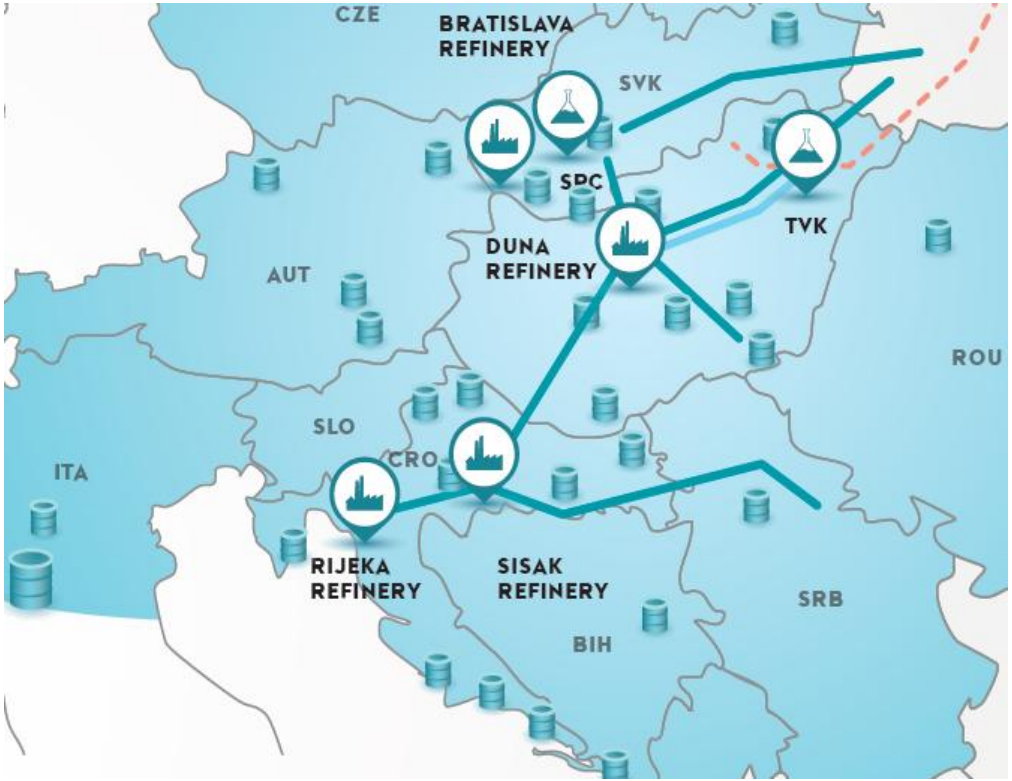
40 COUNTRIES
OPERATIONS IN EUROPE, MIDDLE EAST, AFRICA AND ASIA.

38 MILLION BARRELS
OF OIL-EQUIVALENT HYDROCARBONSARE PRODUCED ANNUALLY WHICH COULDFILL A TANKER TRAIN 1,206 KM LONG.

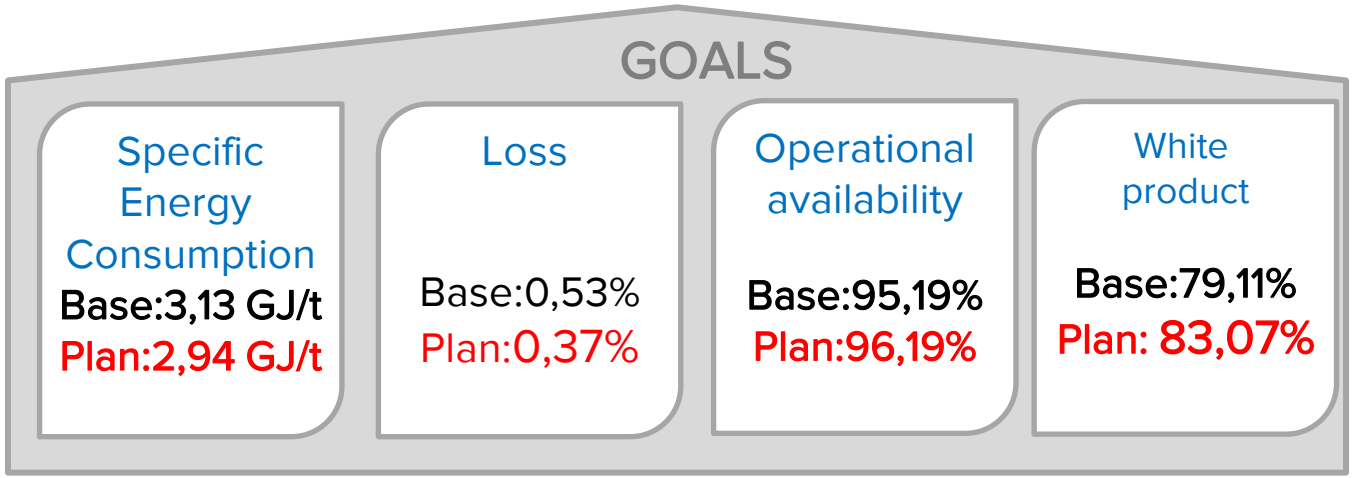
750.000 TRANSACTIONSOF RETAIL CONSUMERS
PER EVERY YEAR WE SERVE THE EQUIVALENT OF THE ENTIRE POPULATION OF BRASIL,COLOMBIA AND BOLIVIA ALL TOGETHER

REFINING

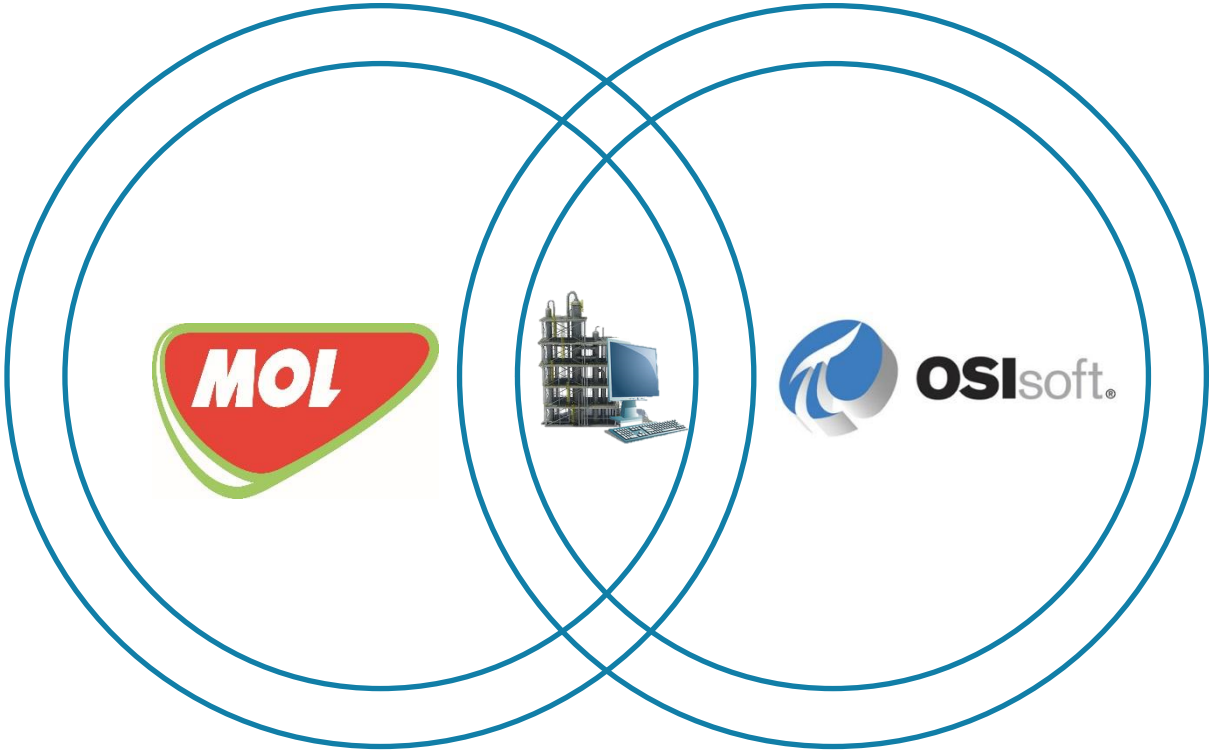
	Capacity in mtpa	NCI Index
Duna refinery	8.1	10.6
Bratislava refinery	6.1	11.5
Mantova refinery*	2.6	8.4
Rijeka refinery	4.5	9.1
Sisak refinery	2.2	6.1



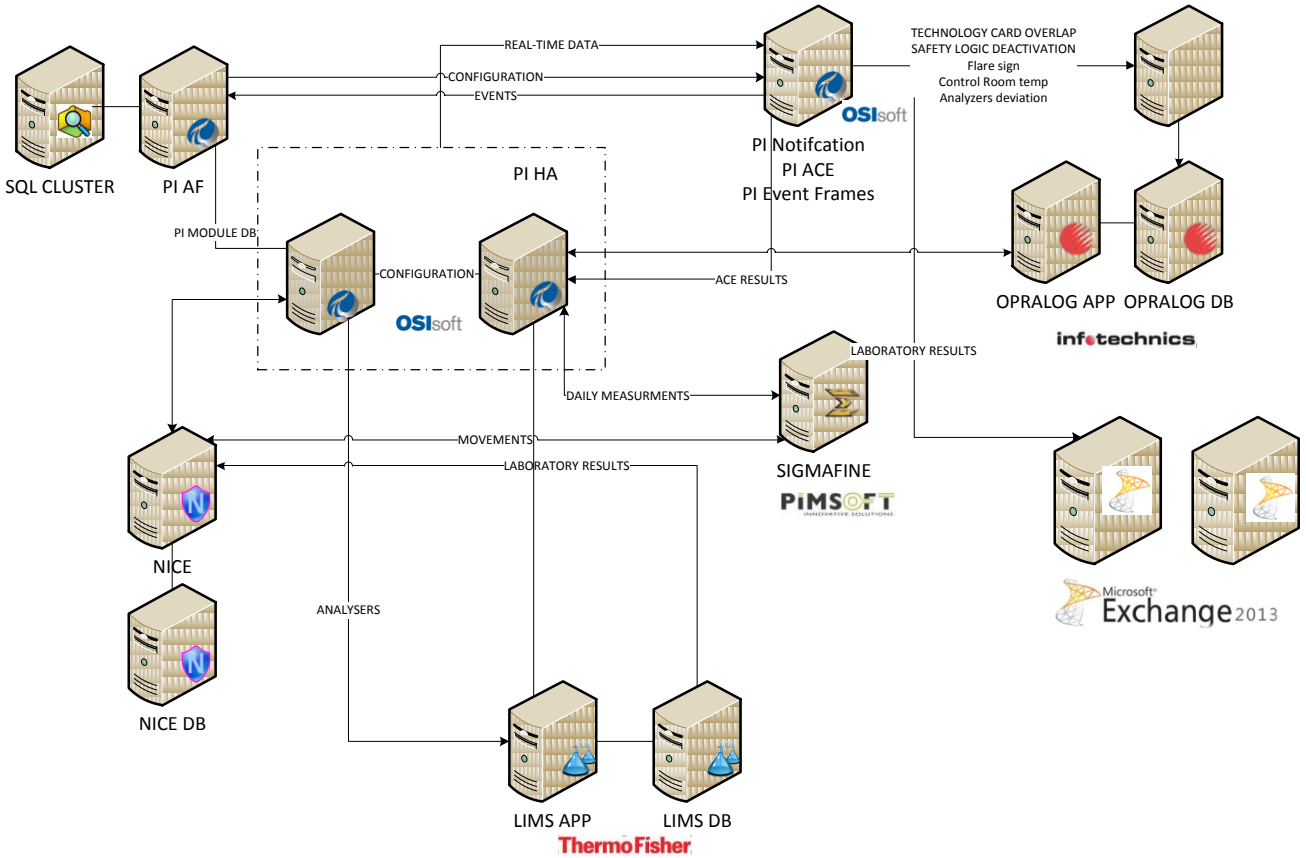
Focus areas of Next Downstream program



Asset Framework (AF)



MOL AF structure

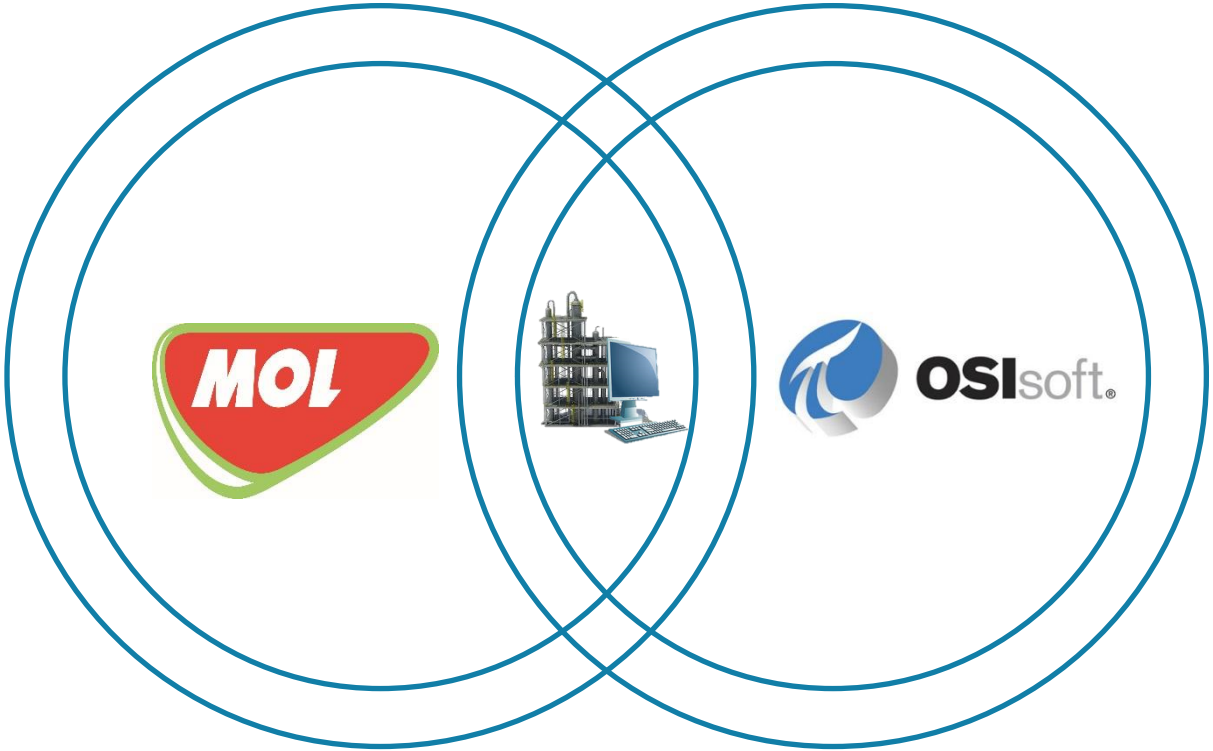


MOL AF structure elements

- Interlock statuses
- Operating envelopes
- Alarm management
- Energy KPI breakdown (6 tiers)
- Column Dashboards
- Normal mode of control loops
- APC monitoring

- Energy Monitoring
- CH, Utilities and Energy balances
- Flare activities
- Corrosion control
- Crude Blending Control
- Natural Gas and Fuel gas forecasting
- Control rooms' temperature

Solutions



Interlock statuses

Problem

- Overridden interlocks mean unsafe operation
- There are thousands of interlocks and override switches
- The number of disabled interlocks have to be kept on the lowest possible level

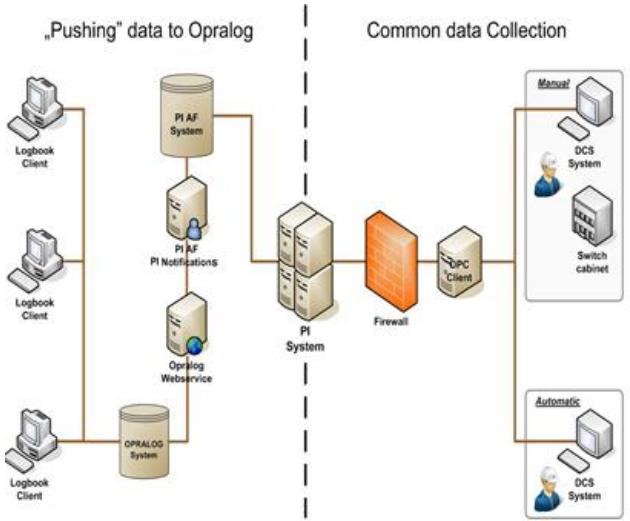
Solution

- Central system
- Available for every users
- System Structure:
  - MOS, POS Statuses stored in PI Server
- Unit Structure, Descriptions, interlock names stored in AF
- Calculation in Performance Equations
- Results in Excel Report and shift logbook

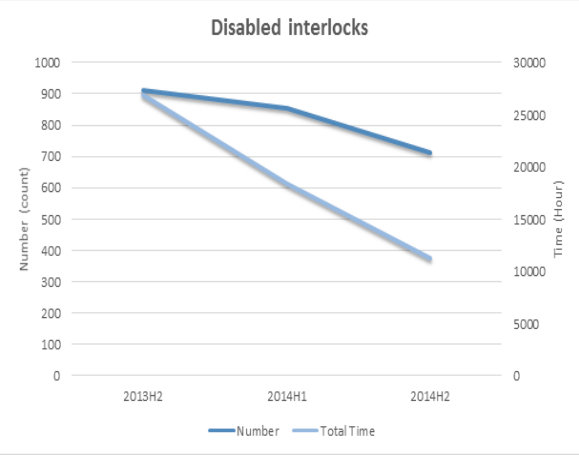
Interlock statuses

- Automatic data entry for every interlock override event
- Description field for comments (Why disabled?)
- Information transfer between shifts
- Possibility for reporting of events and causes

- Connecting to PI Server with PI SDK (Visual Basic scripts)
- Comprehensive report about the:
  - Units → Asset Teams
  - Blocks → Process Safety Management experts
- Data in the report:
  - Number of interlock events
  - Period of interlock events



Interlock program benefits



Switched off interlocks more than 1 day	2013 (H2)	2014 (H1)	2014 (H2)
Pcs.	912	852	714
Days	26.924	18.434	11.256

Total switched off interlocks	2013 (H2)	2014 (H1)	2014 (H2)
Pcs.	2172	2123	1909
Days	29.668	21.900	11.436

*2013 /11 pcs. shutdowns = 84 lost operation hours

Calculated loss based on EDC is **1.000.000 €**

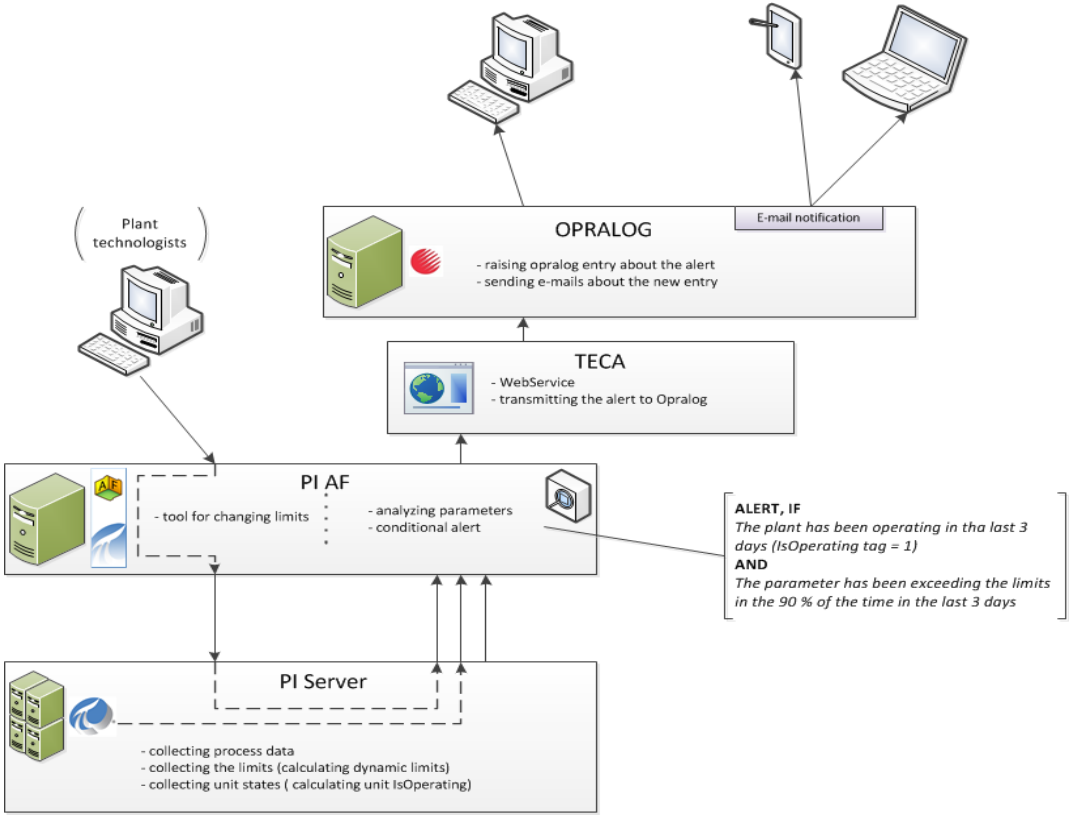
EDC: Equivalent Distillation Capacity – Solomon study

	2013 (H2)	2014 (H1)	2014 (H2)
Interlock relevant events (pcs.)	111	51	32
Unit shutdowns due to interlocks (pcs.)*	11	2	4

*2014 /6 pcs. shutdowns = 32 lost operation hours

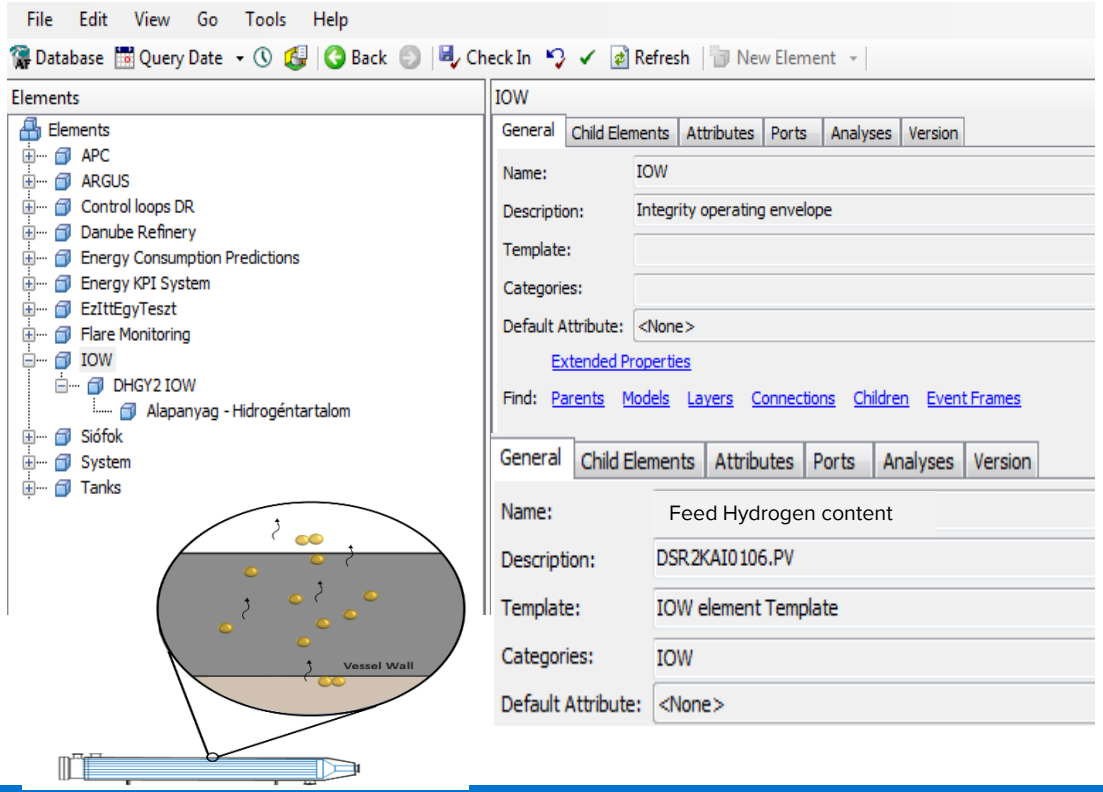
Calculated loss based on EDC is **300.000 €**

Operating envelopes – techno card



- Technological card parameter definition in AF level
- Data storage in Data Archive level
- AF Technological card limit data evaluation
- AF & Opralog connection via Web service
- Opralog notification about Technological cards' entries

Integrity Operating Window



- Operating limits, parameters assigned to process variables that can effect the reliability of the units.
- KPI monitoring prevent high temperature hydrogen attack, which occurs when hydrogen atoms diffuse into carbon steel and react with the carbon to form methane. The methane accumulates in the steel and causes stress and fissures.

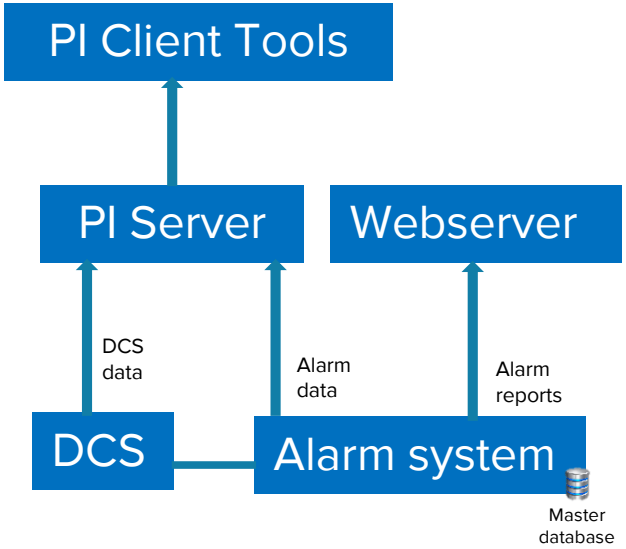
Alarm management

Move the alarm systems from its traditional reactive state to a predictive state

Modification PLCs and interlocks
New POS switches
Enable shelved alarms
DCS display's modification
Temporarly (168 hours) shelved BADPV alarms
Inhibition of the „Not necessary" alarms

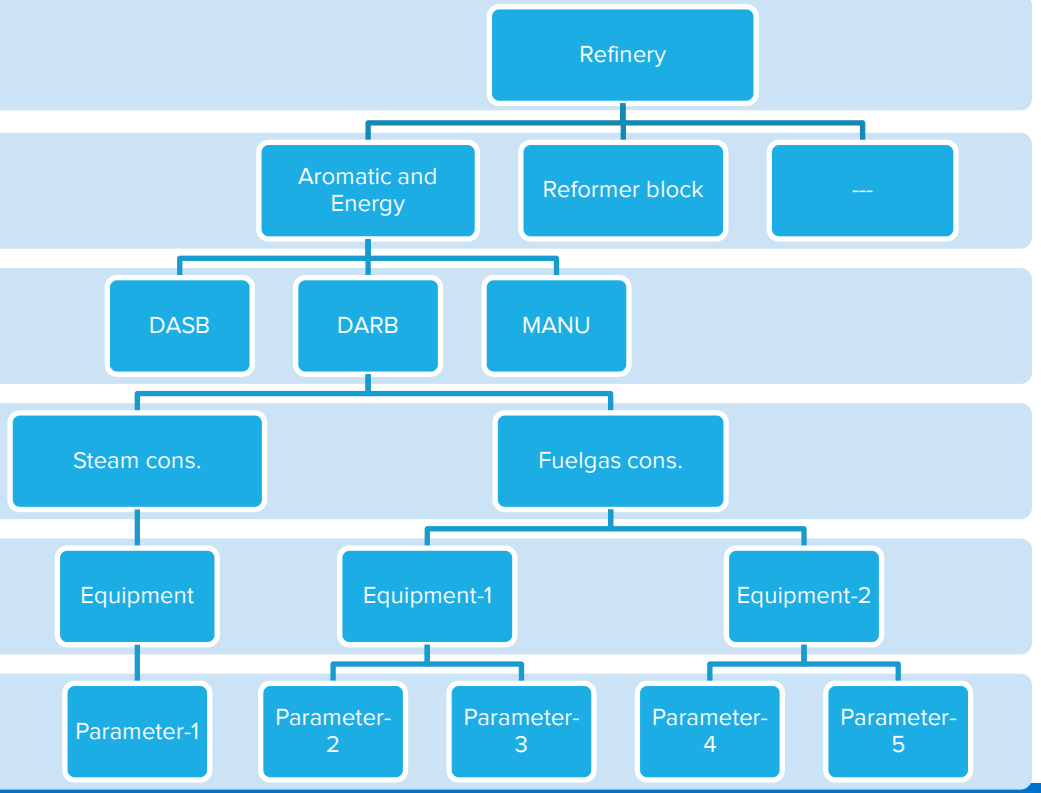
New packages (first out –shut-down alarm;
restart sequences -> alarms only when stuck them)

- •Furnaces
- •Compressors
- •Electrostatic Precipitator (ESP)
- •NIR analyzers

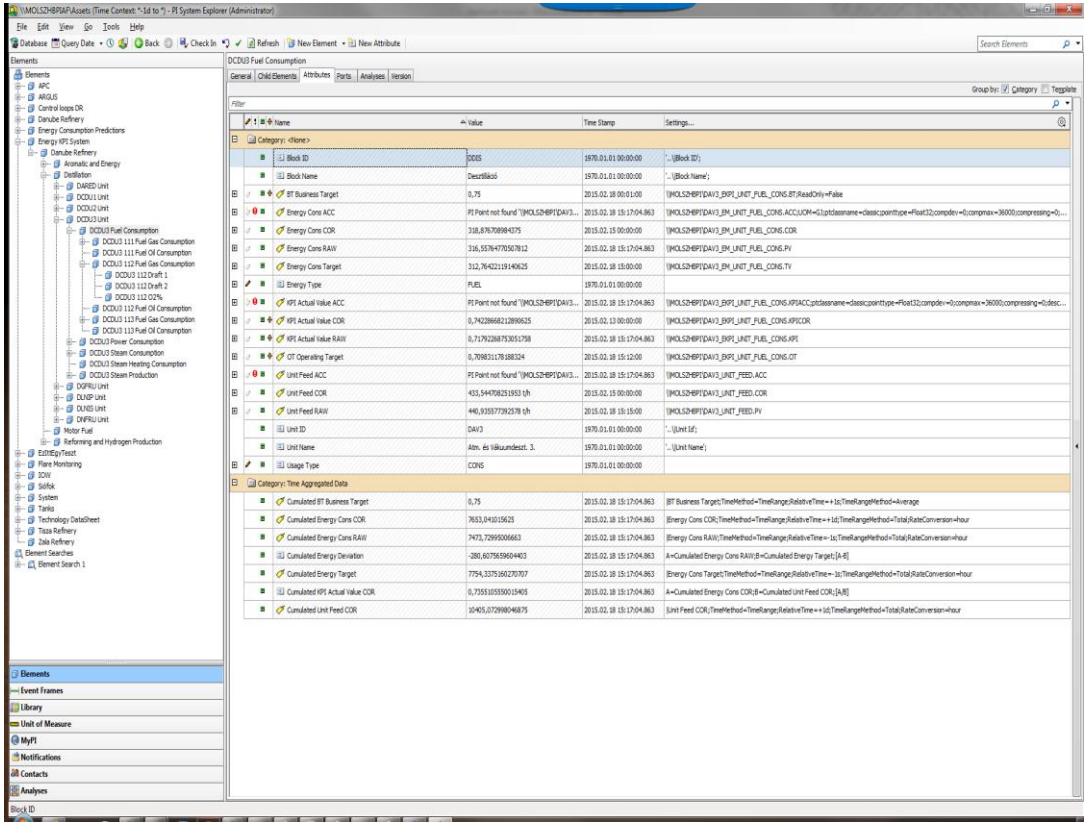


KPI breakdown

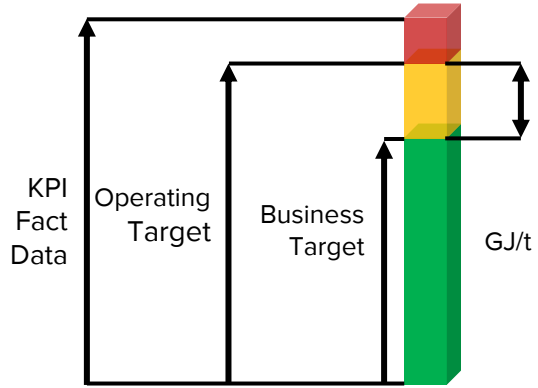
Group	Number of indicator	Hierarcy
Tier-1	1	
Tier-2	7	
Tier-3	49	
Tier-4	150	
Tier-5	500	
Tier-6	2000	



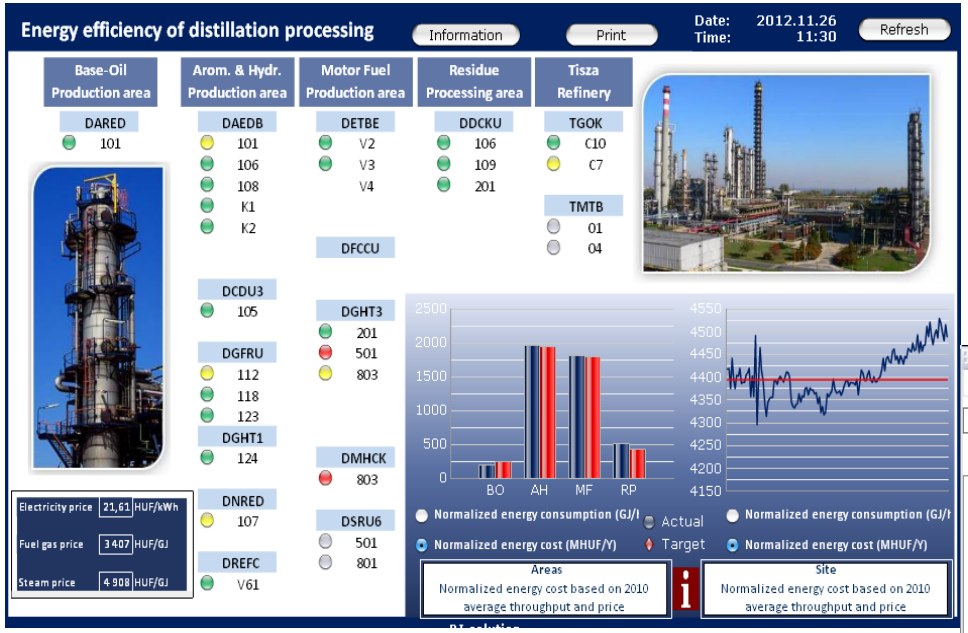
Energy monitoring



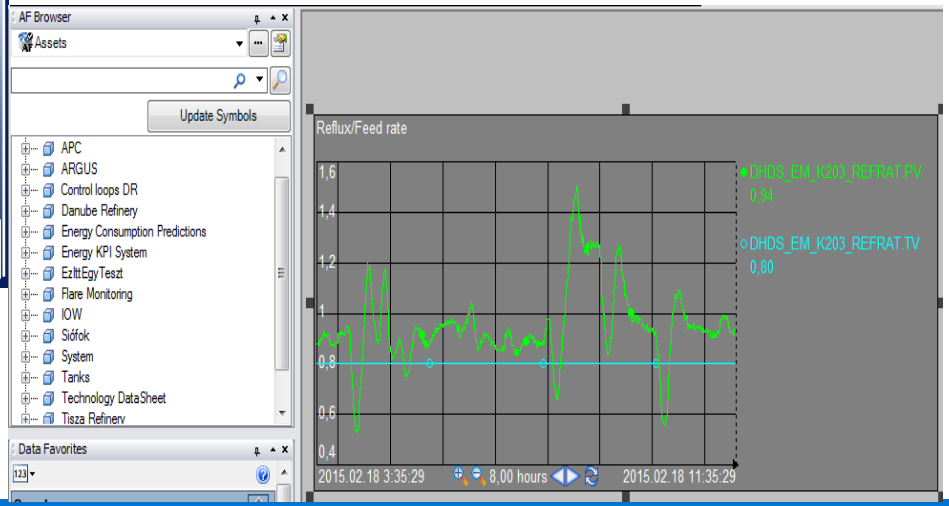
- Operating target can be achieved by proper operation
- Business target can be reached with projects or development
- The fact data calculation must be unified, public and transparent
- Standard tools are needed for the online monitoring and periodic reporting



Column dashboard



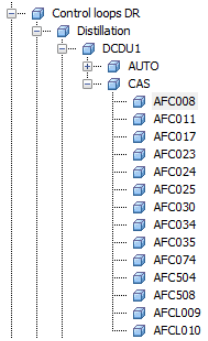
- Expected total savings
  - 2% of steam and fuel gas consumption
  - 3.5 M EUR/y operational cost reduction
  - 20,000 t/y CO2 reduction

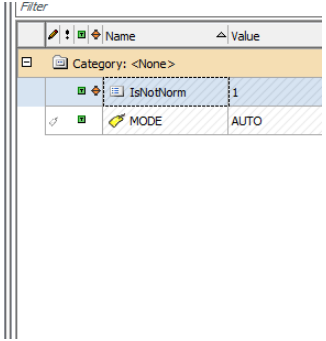


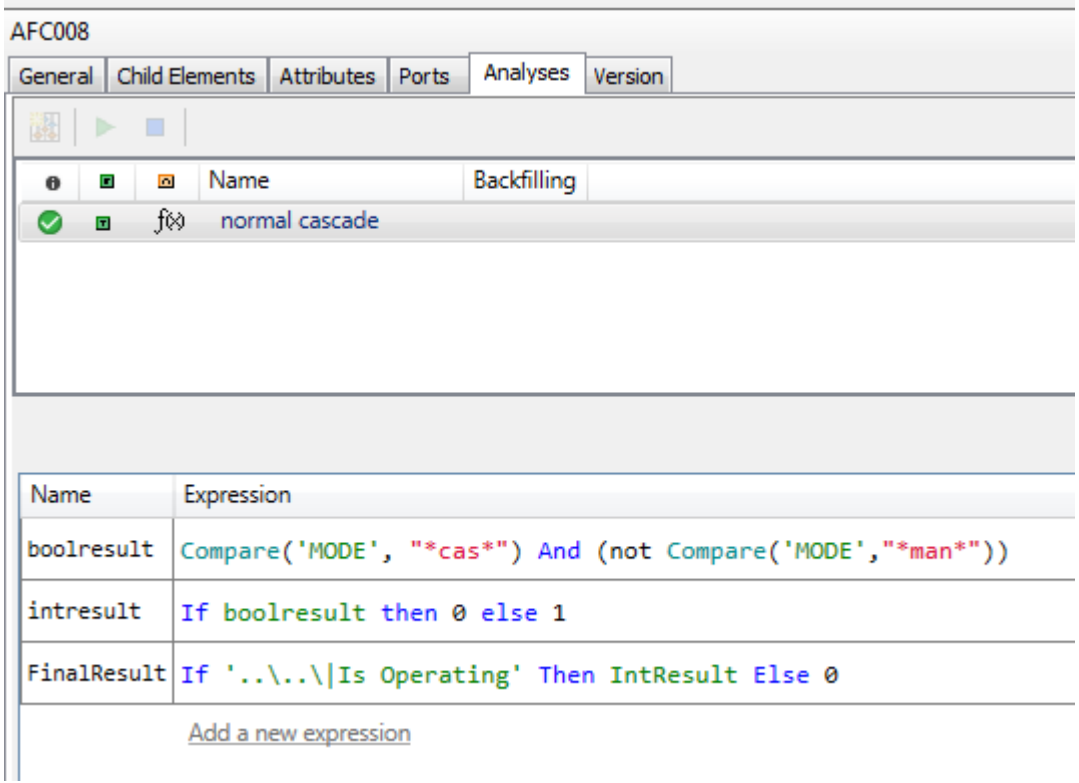
Future plan:

- KPI completion with Energy monitoring data
- AF structure establishment

Normal mode of control loops

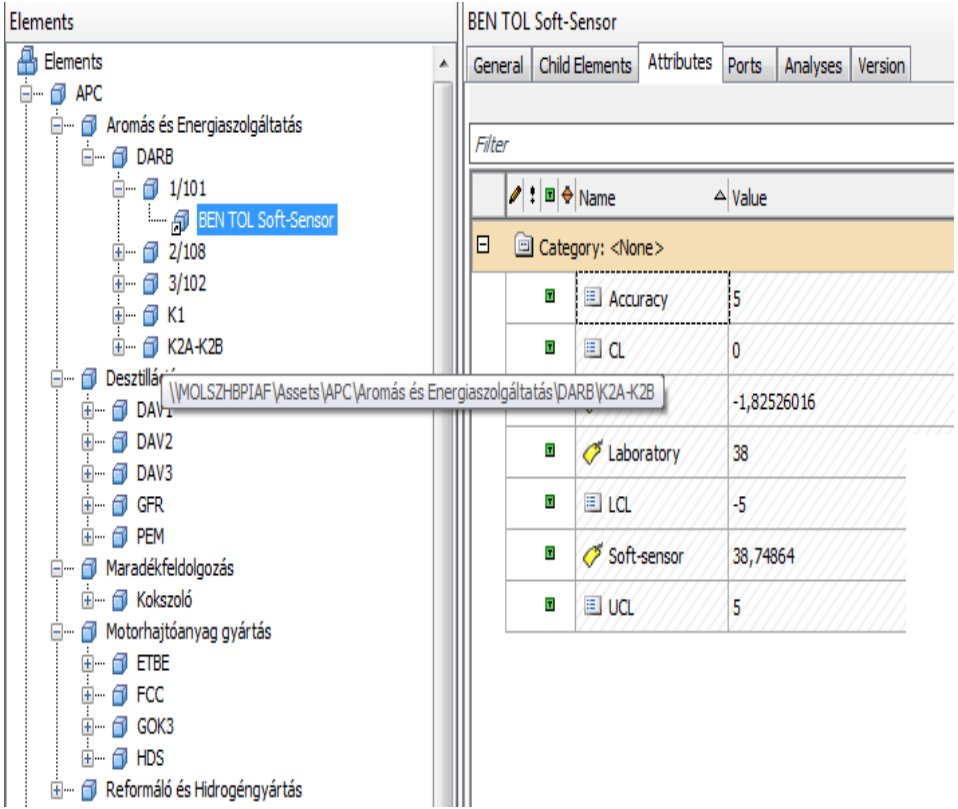






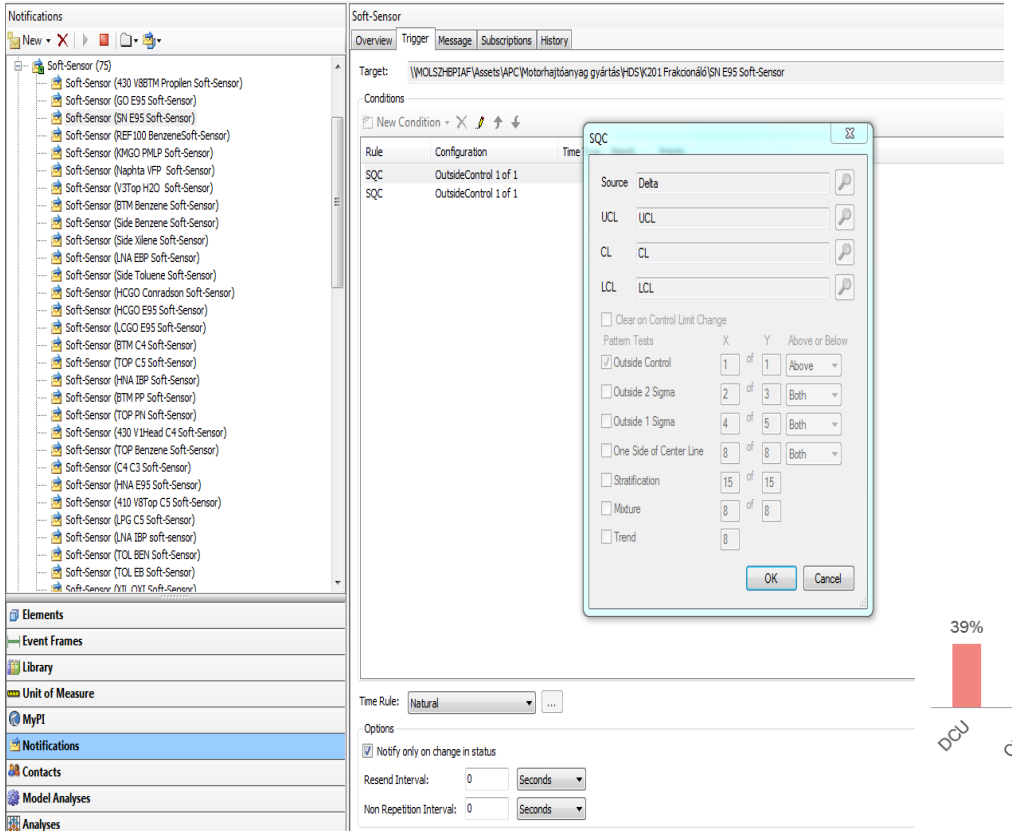
- Collect data in a structured form
- Diagnose performance problem
- Report result

APC monitoring



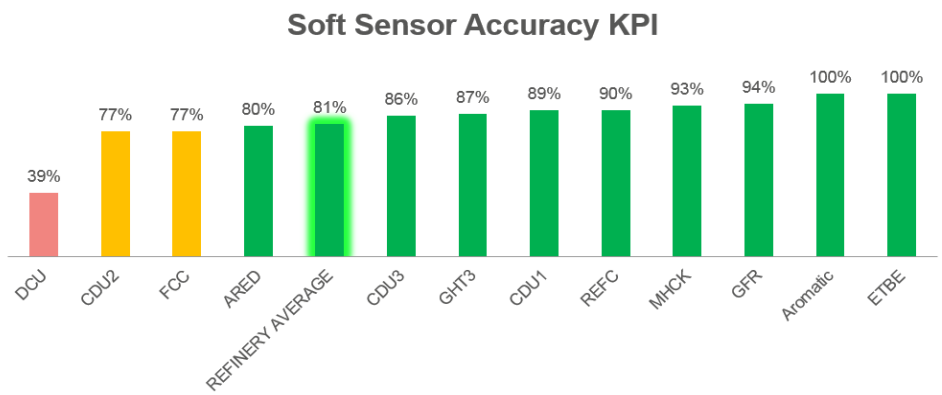
- System has high availability
- Non-availability reasons:
  - Measurement errors
  - Software hardware maintenance

Soft – sensor notification

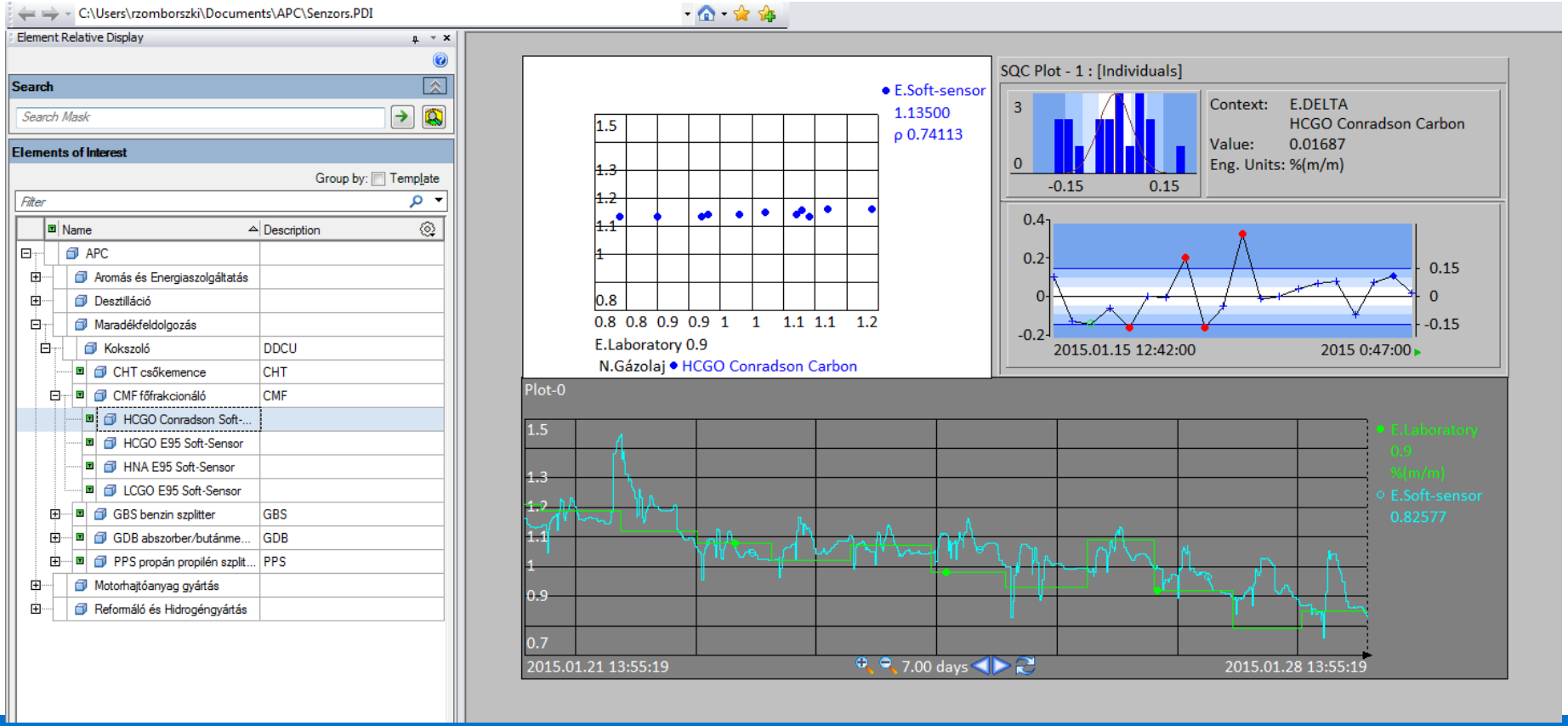


Soft sensor accuracy:

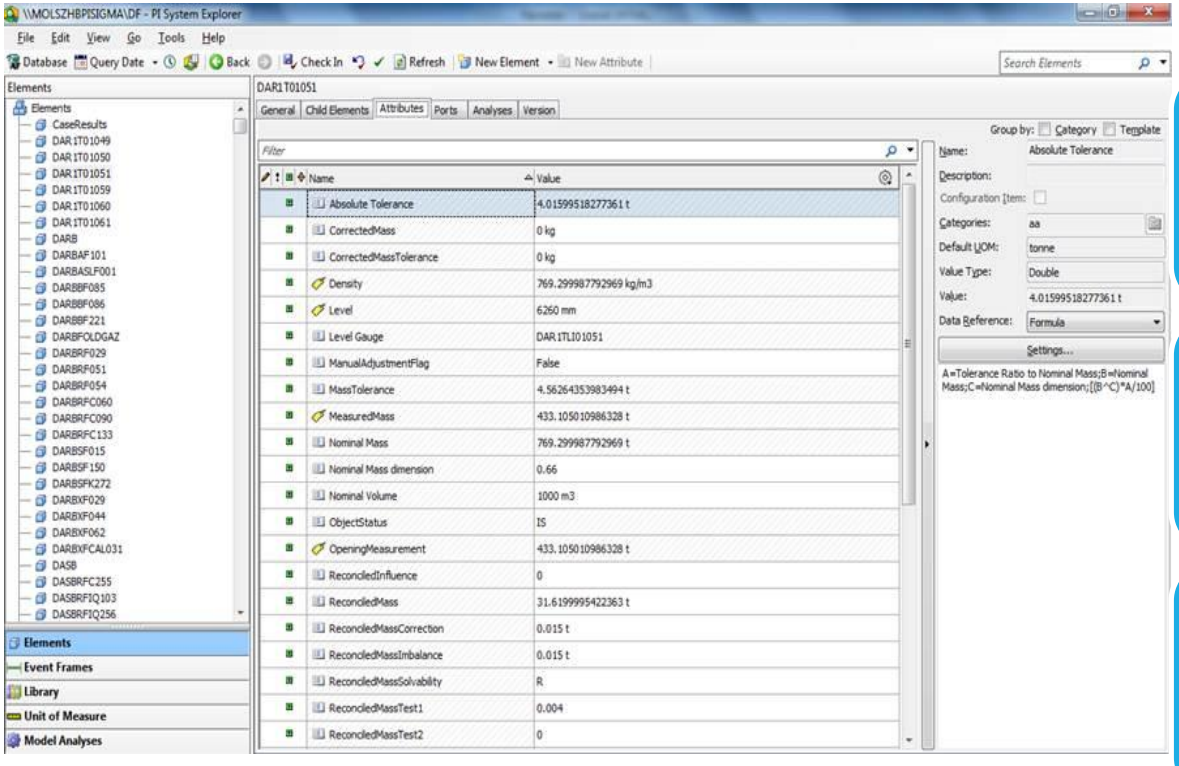
- Accuracy of quality estimations. (If the accuracy is low, APC can not be used.)
- Accuracy effected by measurement errors and major operation change



Soft-sensor monitoring via PI ProcessBook



CH, Utilities, and Energy balances

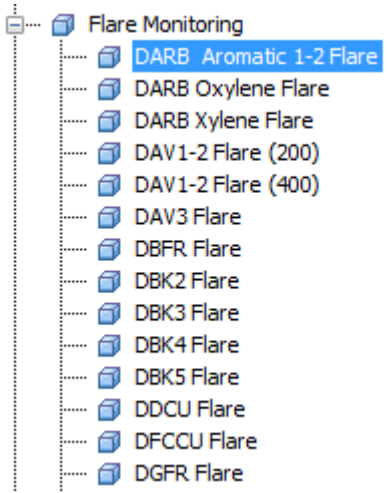


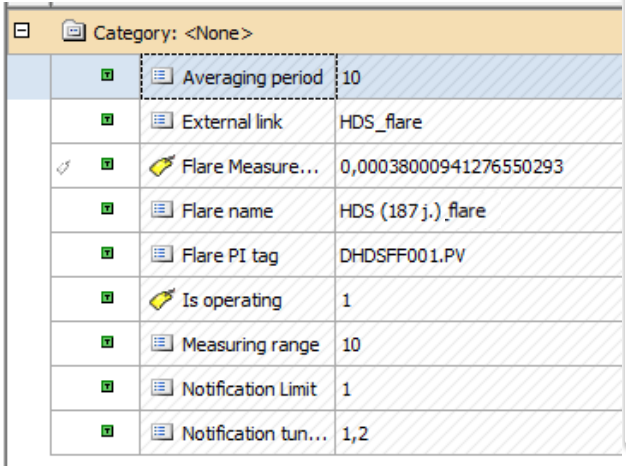
Sigmafine performs the functions of data validation by running a configurable series of analyses on a model built with OSIsoft's AF.

PI System Explorer is another tool that you can use to build/edit a model and run analyses on it.

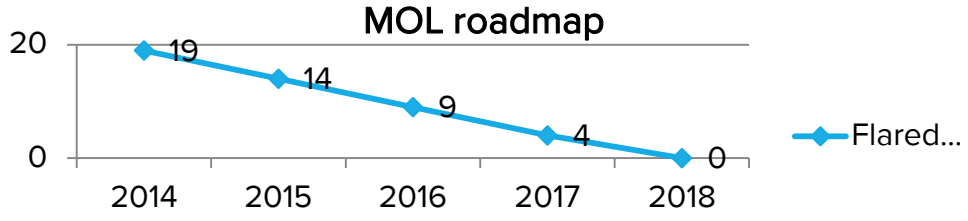
Sigmafine tank attribute store Refinery daily balance managed via AF environment.

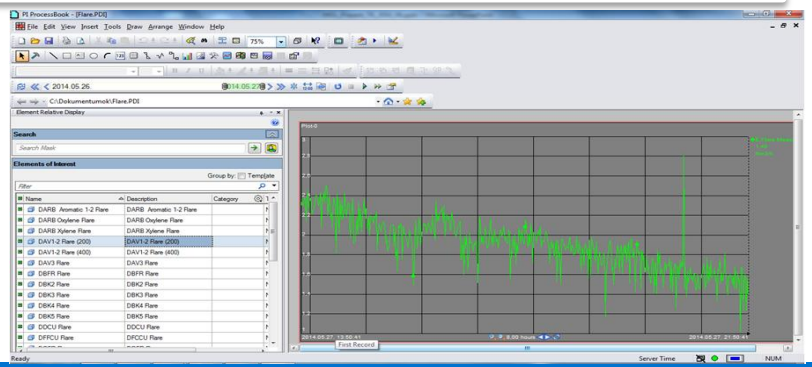
Flare activities





- In 2013 MOL initiated E-flare program- which uses PI client tools and Opralog logbook application – to record flaring activities
- Aim of the project to reduce the losses by 5-10 % supported by a full PDCA cycle establishment.





Natural Gas Consumption Prediction

BackGround

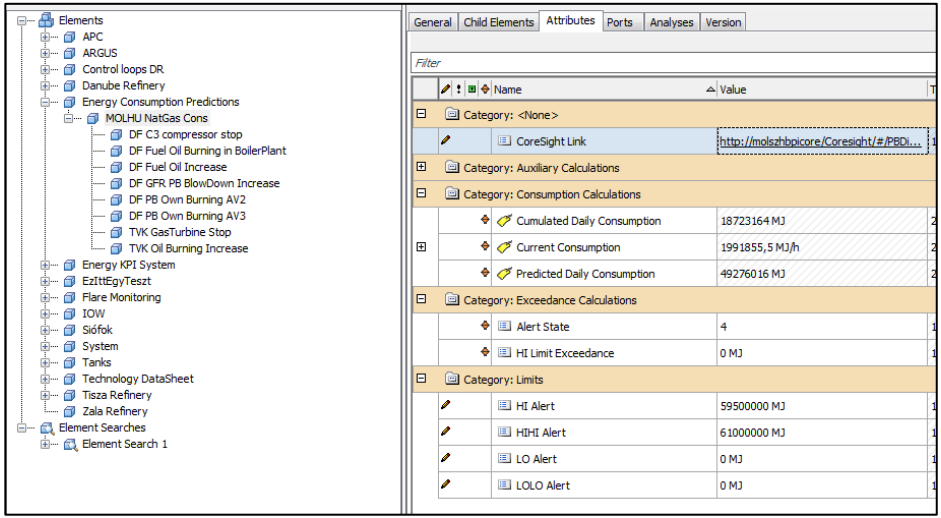
- Huge saving possibilities in the decrease of contracted natural gas daily maximum amount

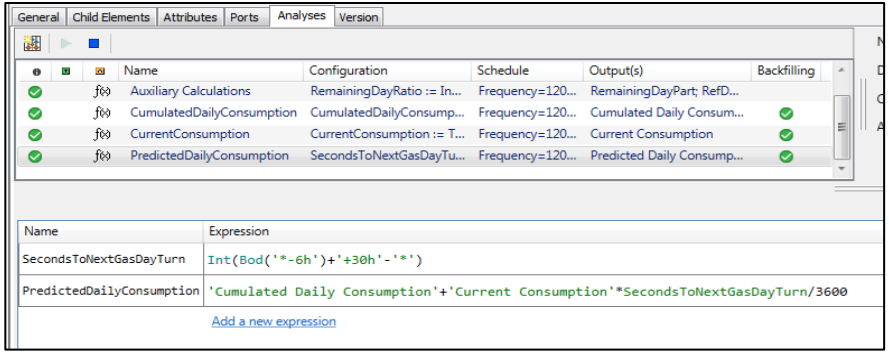
Problem

- High penalty on daily amount exceedance
- Alerting system was needed

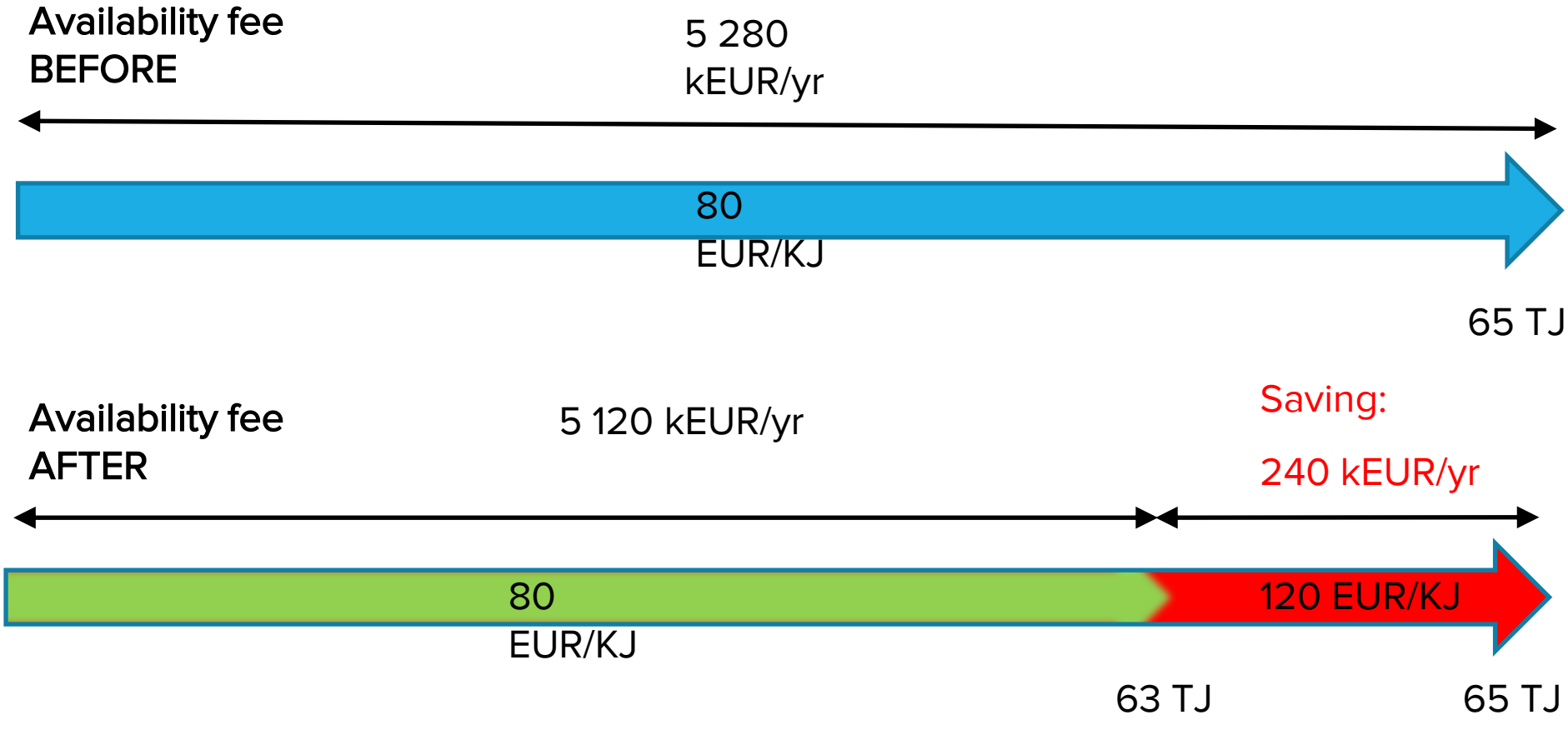
Solution

- Consumption prediction calculations in PI Analysis
- Detailed information on PI Coresight display (about consumption, prediction, contacts of decision makers)
- E-mail alerting system in Notifications





New Availability Contract



System in action

Problem

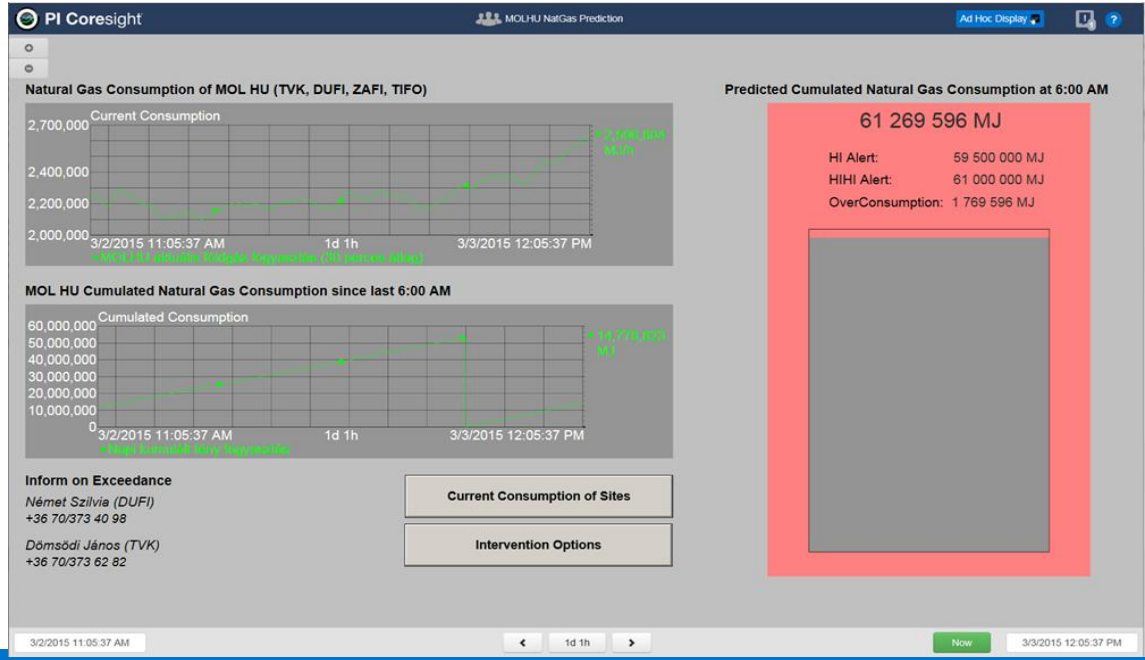
- Unit startup in both of our sites
- Problems during startup resulted in unexceptedly high gas consumption

E-mail alert

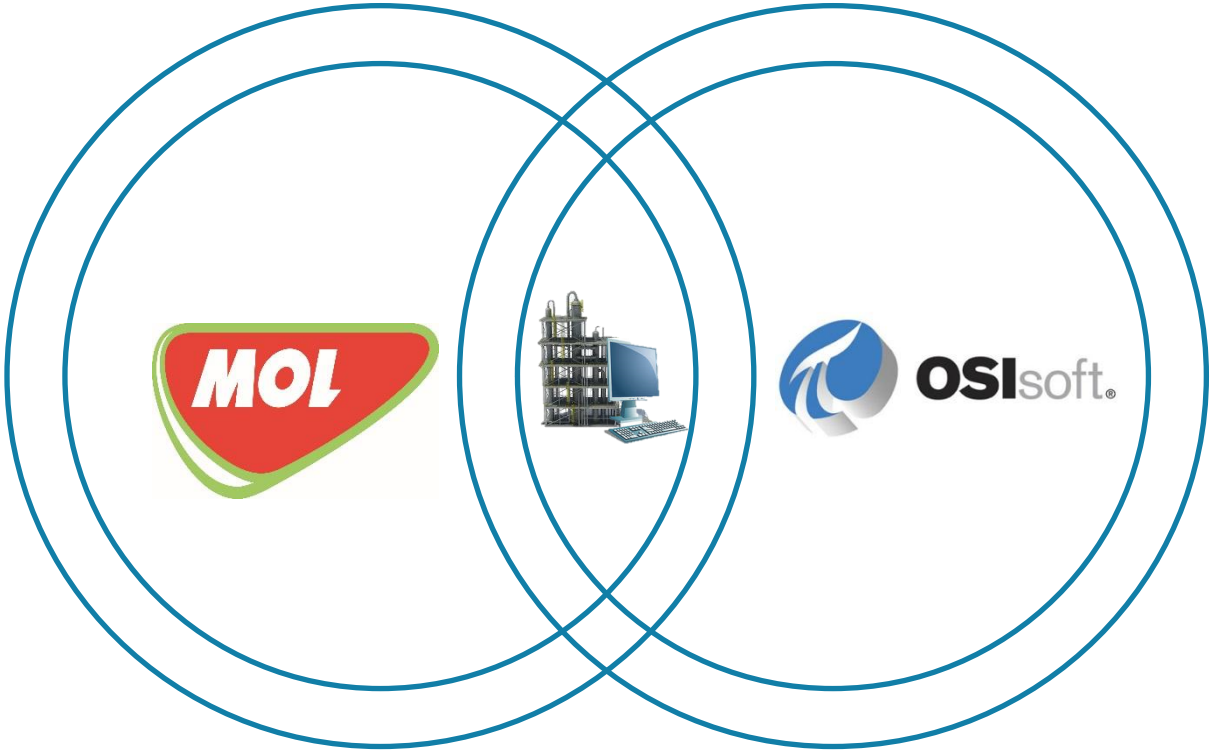
- The dispatchers and managers were informed in e-mail
- Communication started about the intervention possibilities
- Cooperation between sites (200 km distance) to find the cheapest intervention

Further improvement possibility

- High availability AF Analytics solution

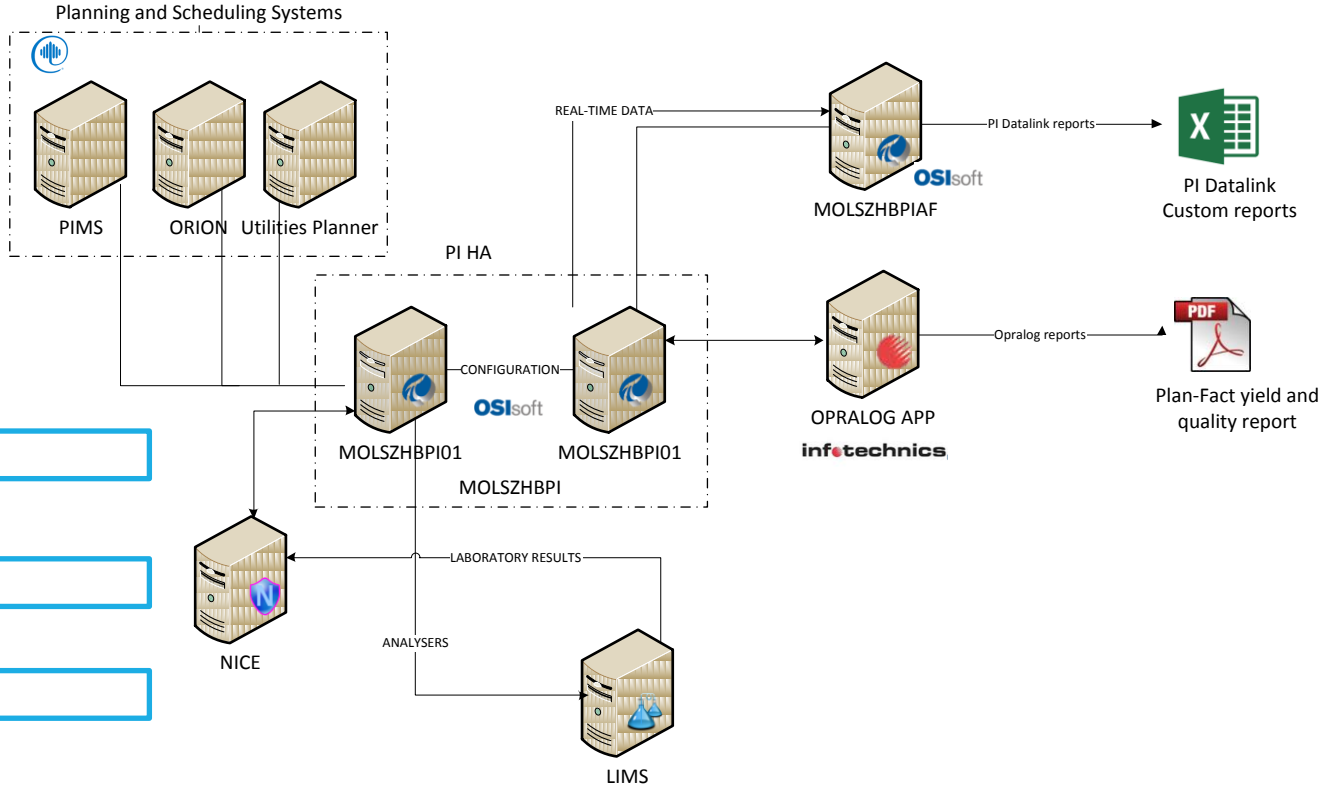


Future



Future Data

Testing with Planning and Scheduling Data



- Simplier Architecture
- Better Collaboration between SCM & Production
- PI System is the main report provider

Summary

„High achievement always takes place in the framework of high expectation. „

Charles Kettering

Business Challenges

A. Corporate Initiatives – e.g. Lean manufacturing, ISO 50001 implementation

B. Technological support for different DS areas

C. Process goals – increases yield, improved efficiency

Solution(s)

A. New data warehouse & report establishment, structured data visualization

B. Corrosion & crude blending control via AF

C. Monitoring flaring activity, energy consumption

Results and Benefits

A. Goals and Initiatives Achieved

B. The Measurable Value Realized

C. Transparent business objectives and prcesses

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MOL, PLC

Questions

Please wait for the microphone before asking your questions

State your
name & company

THANK YOU