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Meeting New Regulatory & Financial Challenges Through Asset Framework with Sigmafine

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Conference Theme and Keywords



Agenda



- About Uniper
- Business Challenge
- Solution
- Product Capabilities vs. Business Requirements
- Business Impact
- Summary & Lessons Learned



About the company

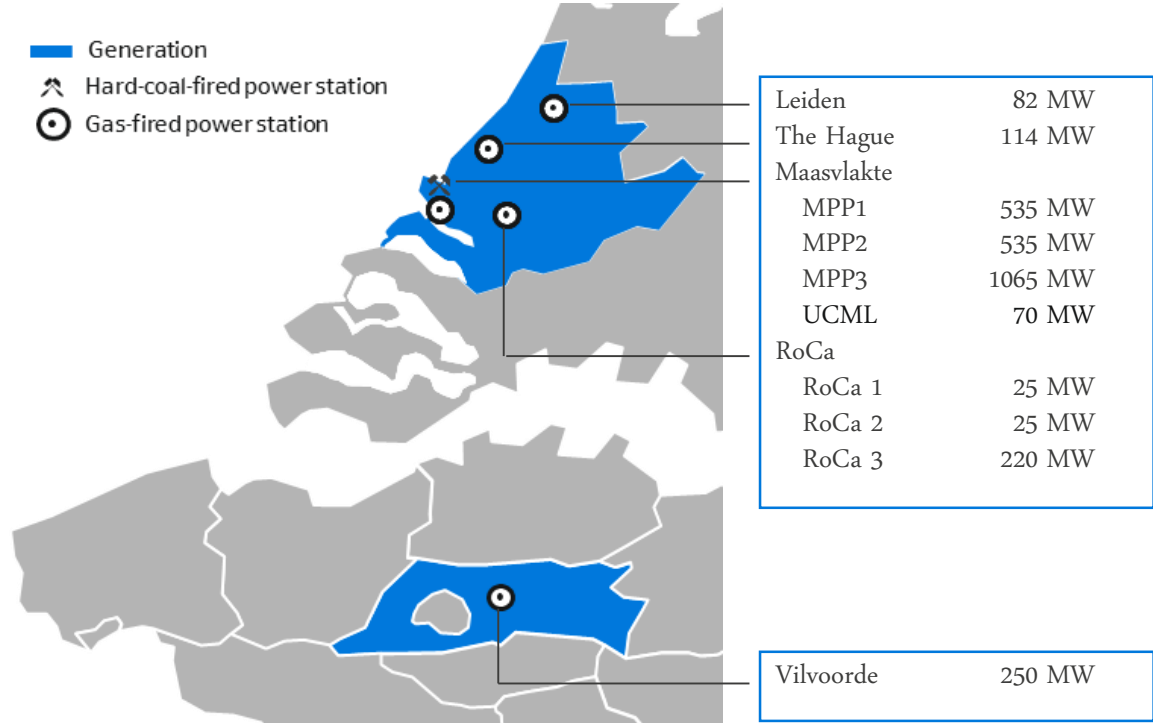
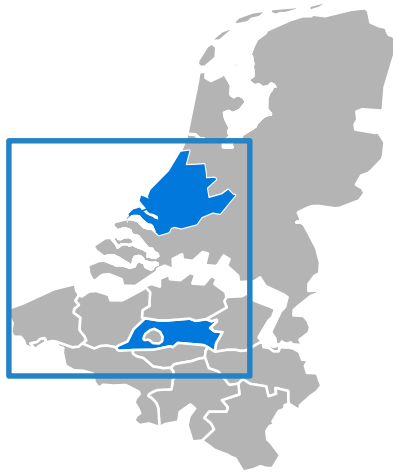


About Uniper



- Public Company Formerly E.ON / IPO Q3-2016
- Uniper Benelux (UBX)
 - Power & Heat generation
 - Sales B2C & B2B
 - Netherlands and Belgium
- 2 900 MW Installed capacity (UBX)
 - 2 100 MW Coal,
 - 800 MW Gas
- Dusseldorf ➡ Short & Long term planning & optimization
- Rotterdam ➡ Operations, Local power & heat dispatch, Sales

Uniper Benelux Generation

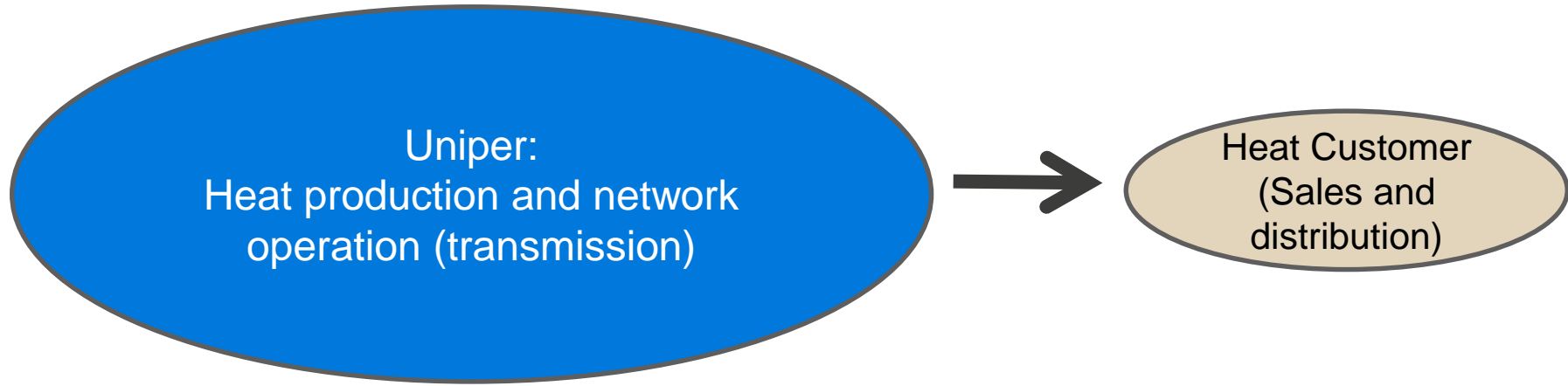


Combined Heat & Power business

- Long term heat contracts
 - Delivery of heat
 - Operation of networks
- Single Heat Customer
- Multiple Heat Producers
- UBX Heat capacity
 - 500 MW CHP
 - 500 MW Heat Boilers
- Maasvlakte Co-siting



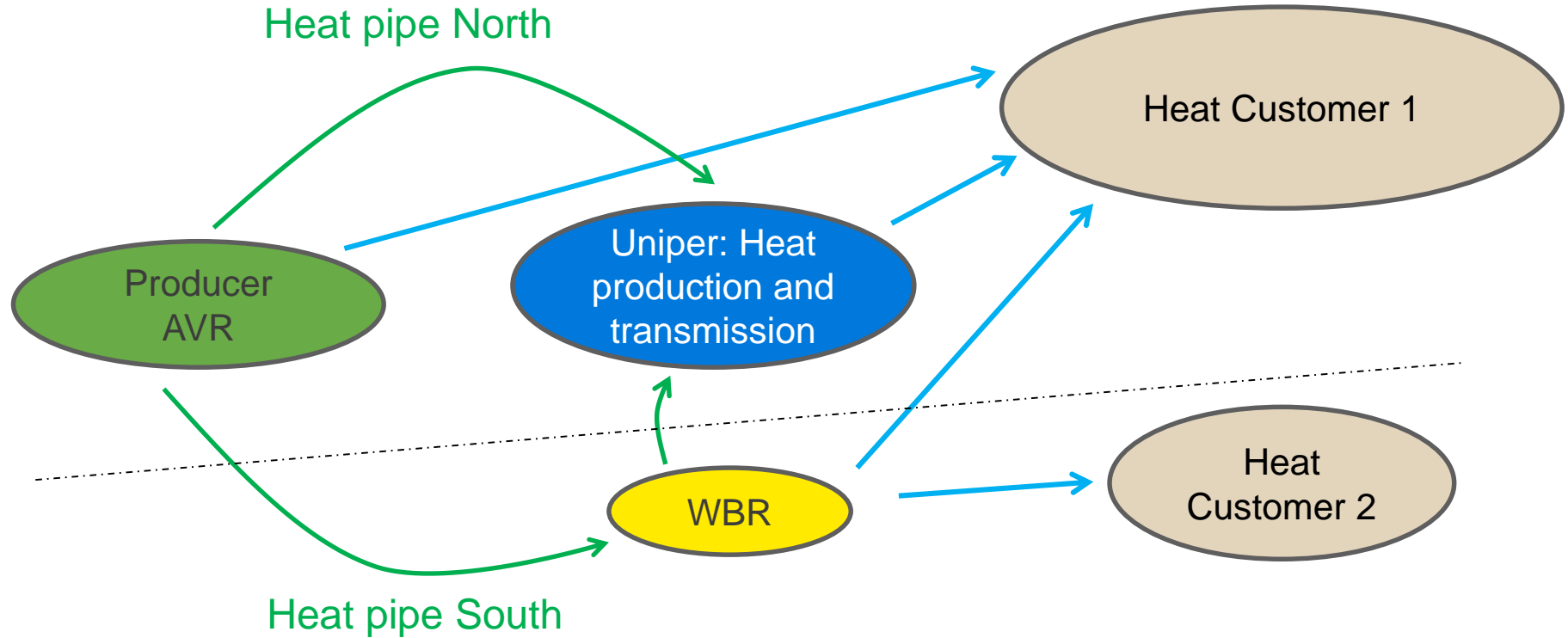
Changing position in Heat market



District Heating Rotterdam before 2014

- UBX had delivery commitment
- UBX was single producer

Changing position in Heat market



Operational & Business Challenges



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UBX Business Environment

Hourly Validation



Uniper Operational Data Requirements

- UBX needs to validate (accountable, compliancy) process measurements:
 - 11 power transactions
 - 36 heat transactions
 - 10 validated emissions to air for city production sites
 - 3 validated heat loss to aqueous streams
- Approximate 150-250 internal measurements per site

Current way of validating generation data

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Business Challenges

1. Improve response time (to market changes) / in validation process
2. Profit maximization based on balance of heat, power and steam
3. Timely provision of verified and auditable data to all trading partners
4. Operate within environmental permit limits



Solution



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Technical Solution: PI System & Sigmafine



- **PI AF - Structure the asset to meet business needs**
- **PI DataLink - Extract data to Excel**
- **PI Notification - Automate email notification for meters operating outside their validity**
- **PI ProcessBook: visualization of the asset based model**
- **SF Server**
 - **Energy Balance Calculation**
 - **Automatic Unit of Measure conversion**
- **SF Scheduler – Automation based validation & reconciliation periods (hourly, daily, monthly)**





Uniper-Benelux Energy Balance

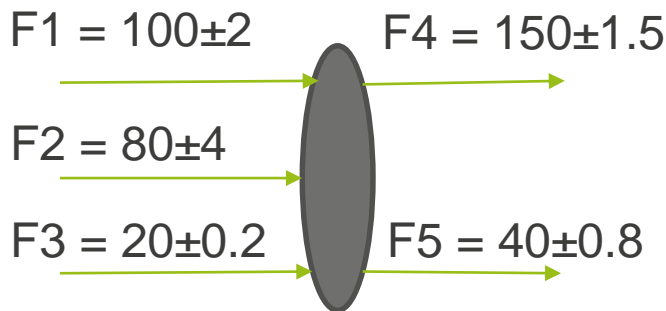


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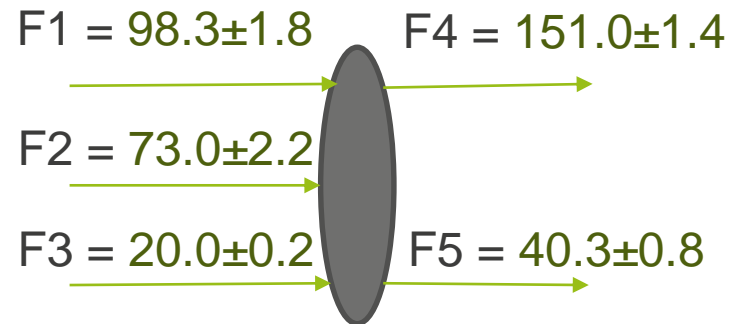
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Power and Heat Market: Data quality needs

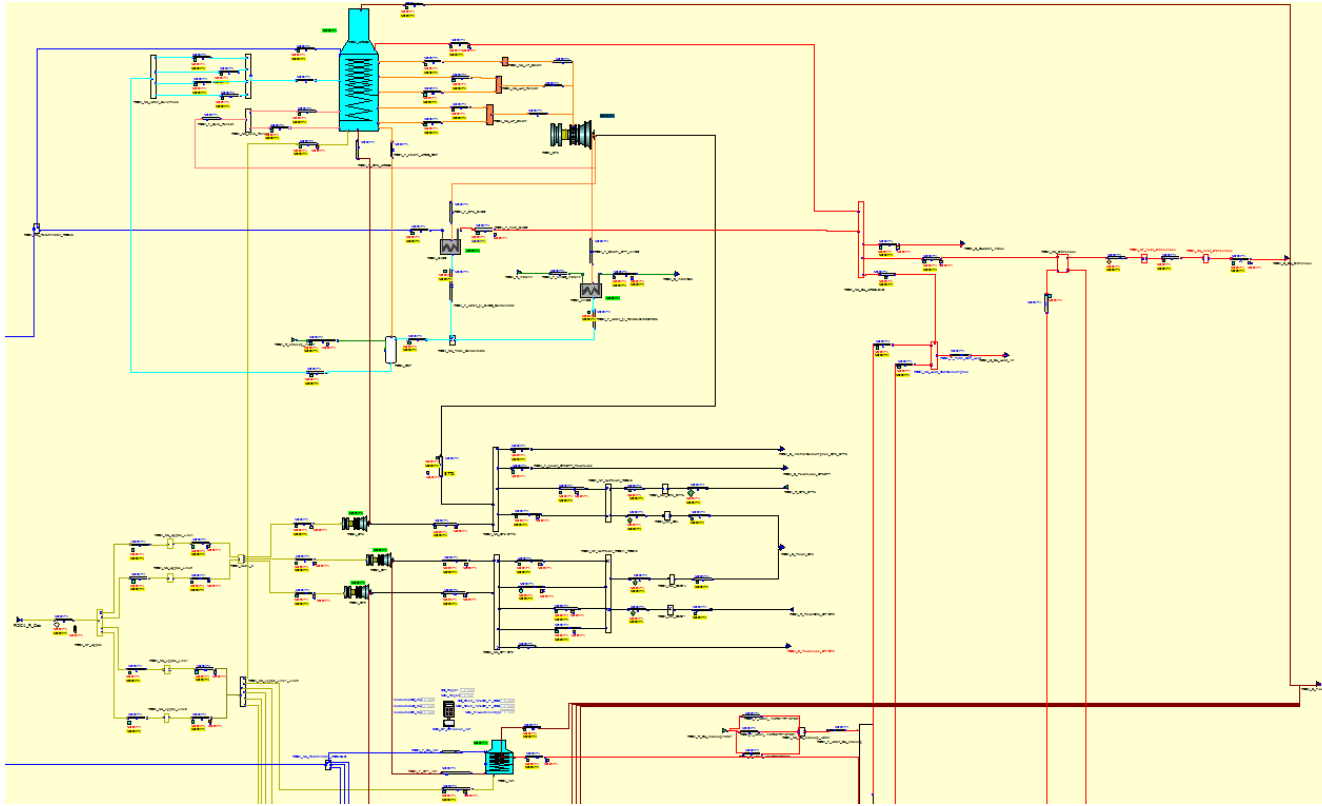


Measured Imbalance = +10



Reconciled Imbalance = 0

Energy Balance: Combined Power & Heat site



Energy Balance



Reconciled data



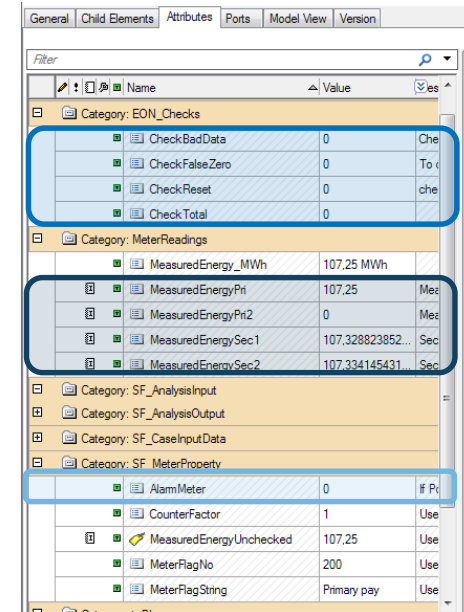
Publish validated data



Improve business and
operational decisions

AF Structure - Input

1. PI AF attributes covers multiple measurements
2. PI AF attributes captures data scientist standard checks (delta violation, freezing, no data)
3. Uses OSIsoft PI Notifications sends alarm emails for important measurements errors (including emissions)



The screenshot shows the 'Attributes' tab of the PI AF software. It displays a list of attributes organized into categories. The 'EDN_Checks' category is highlighted with a blue box, showing attributes like 'CheckBadData', 'CheckFalseZero', 'CheckReset', and 'CheckTotal'. The 'MeterReadings' category is also highlighted with a blue box, showing attributes like 'MeasuredEnergy_MWh', 'MeasuredEnergyPri', 'MeasuredEnergyPri2', 'MeasuredEnergySec1', and 'MeasuredEnergySec2'. The 'SF_MeterProperty' category is highlighted with a blue box, showing attributes like 'AlarmMeter', 'CounterFactor', 'MeasuredEnergyUnchecked', 'MeterFlagNo', and 'MeterFlagString'.

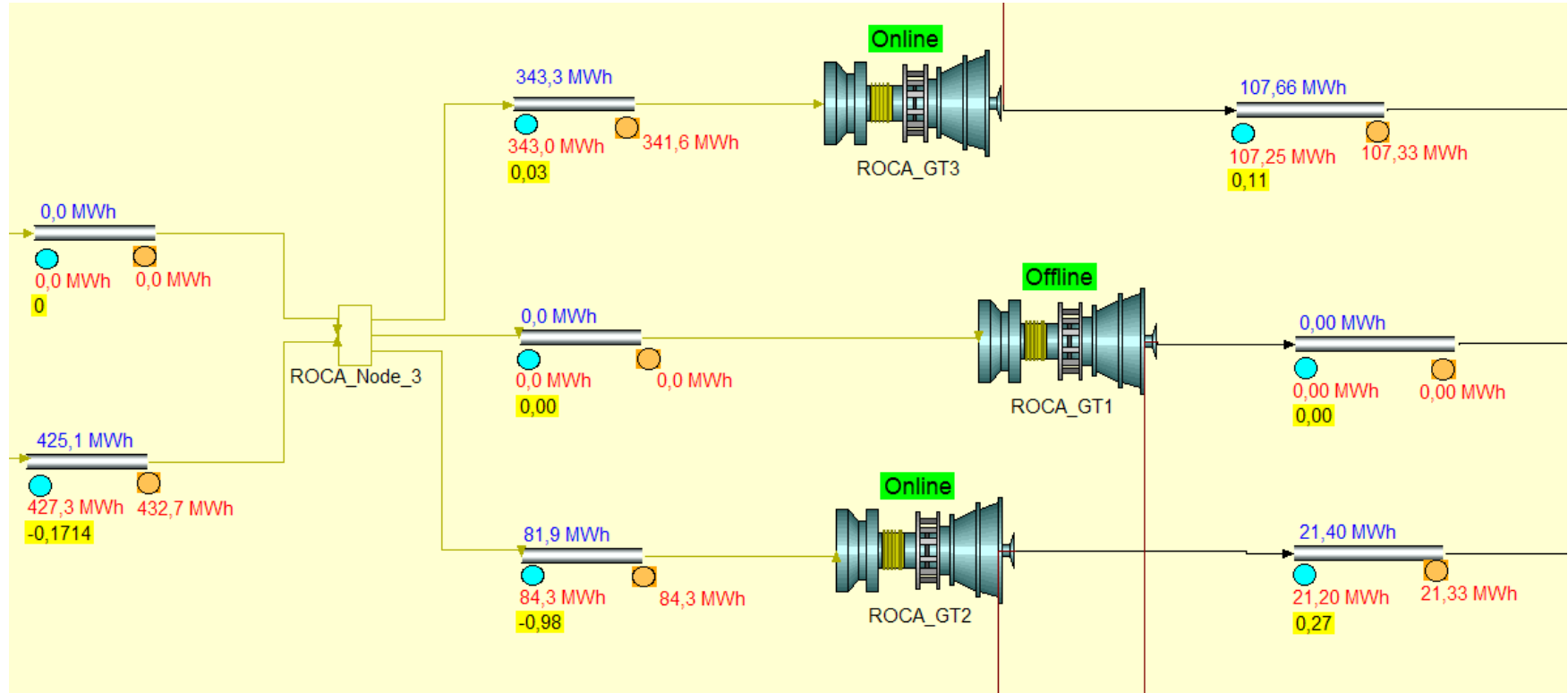
Category	Name	Value	Unit
EDN_Checks	CheckBadData	0	Che
	CheckFalseZero	0	To c
	CheckReset	0	che
	CheckTotal	0	
MeterReadings	MeasuredEnergy_MWh	107.25 MWh	
	MeasuredEnergyPri	107.25	Mea
	MeasuredEnergyPri2	0	Mea
	MeasuredEnergySec1	107.328823852	Sec
	MeasuredEnergySec2	107.334145431	Sec
SF_MeterProperty	AlarmMeter	0	If Pr
SF_MeterProperty	CounterFactor	1	Use
SF_MeterProperty	MeasuredEnergyUnchecked	107.25	Use
SF_MeterProperty	MeterFlagNo	200	Use
SF_MeterProperty	MeterFlagString	Primary pay	Use

AF Structure - Output

1. Sigmafine calculates reconciled energy and associated tolerance
2. Sigmafine produces measurement data quality KPI for data scientist
3. Sigmafine produces balance point quality KPI for Operations manager

Name		Value
Category: SF_AnalysisOutput		
InferredStatus		
ReconciledEnergy		39.90383055 MWh
ReconciledEnergyInfluence		0
ReconciledEnergySolvability		R
ReconciledEnergyStatus		
ReconciledEnergyTolerance		0.88952485 MWh
ReconciledEnergyCorrection		-0.77859914 MWh
ReconciledEnergySolvability		0
ReconciledEnergyStatus		
ReconciledEnergyTest1		-0.5583
Category: SF_AnalysisInput		
EnergyTolerance		1.42388503914407 MWh
MeasuredEnergy		40.6824296898307 MWh
Category: <None>		
BalanceTest		1.191
DX0		42.3021131833755 %
DX1		1.41688916864712 %
DX2		1.29740701248447 %
DX3		2.61011413593531 %

Making data trustable: The Sigmafine way



Energy balance

Before

- Balances are calculated in excel using PI DataLink
- Separate boundary balance (gas or power or heat)
- Manual repairs or alternative meter selection for missing values/errors
- Process monthly interval

Now

- Sigmafine integrates natively to PI System
- Single energy balance model with data reconciliation containing all process units (gas, power, heat)
- All data sources (PI Server & external) considered in model
- (Near-) real time balance

- **Operations Benefits**
 - Monthly → Daily (intraday) Balancing
 - Timely validated operations data with financial impact
 - Daily maximization of heat dispatching
 - Faster Billing & Reporting to customers
- **Financial Benefits**
 - Power/heat optimization valued to approx. 4%-6% of heat contract value
 - Expected €300-500 k annually

*Optimize the heat optimization and dispatch also depending on other parallel projects

Life of the Data Custodians

Before

Manual and Time consuming monthly data validation process

Manual data import from different sources (PI Server, TSO, Gas grid)

Manual identification and resolution of data gaps, meter defects

Manual selection of the “best” redundant measurements points

Time spent to resolve “Ambiguities” related to Compliance and Billing (consumption & production)

After

Daily automatic data validation and reconciliation

Automatic import into Sigmafine from all the data sources

Automatic data correction

Automatic filtering and selection of the best measured data

Faster, **validated** view on financial impact of operations

Improve integrity of Business Process by delivering timely & accurate information

COMPANY and GOAL

UBX performance engineering department is responsible for processing, validating, correcting and releasing unambiguous generation data



CHALLENGE

Current manual work processes limits the data availability to monthly intervals

- Time consuming data processing with manual corrections
- Lack of focus on data and metering quality

SOLUTION

Combining PI AF and Sigmafine to automate data validation and reconciliation

- Hourly intervals combining different data sources
- Pre programmed model runs to match delays of availability

RESULTS

Single source of truth for generation data, available at shorter intervals/delays

- Data version capture made available company wide for reporting, invoicing, business analyses
- Increasing data quality over versions



Tangible Improvement of the outcome of Business Process & Decisions

COMPANY and GOAL

UBX Heat business under stress of declining margins. Unambiguous generation data increasingly important for steering business dispatch/operations



CHALLENGE

Suboptimal heat operation/dispatch due to lack in clear view of financial impact decisions

- Ambiguous data availability
- 1 month delay of validated 'fiscal' data
- No link between operation decisions and finance

SOLUTION

Implementing automated data validation and reconciliation system

- Single source of truth available within 1 day
- Automatic reports with actual financial impact of operations/ dispatch

RESULTS

Improvement opportunity (300-500 k€ annually)

- Improve short term operations/dispatch
- Faster invoicing, limiting amounts outstanding
- Linking operational decisions to financial results



Contact Information



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Questions

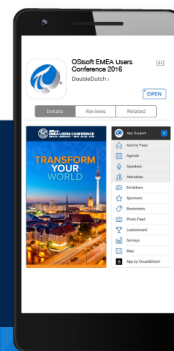
Please wait for the
microphone before asking
your questions



State your
name & company

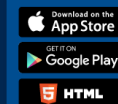
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감사합니다

谢谢

Danke

Merci

Gracias

Thank You

ありがとう

Спасибо

Obrigado



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