



Energy Management for Water Applications

Gilbert Schreiber @ [siemens.at/water](https://www.siemens.at/water)

Your Siemens Support



Siemens AG

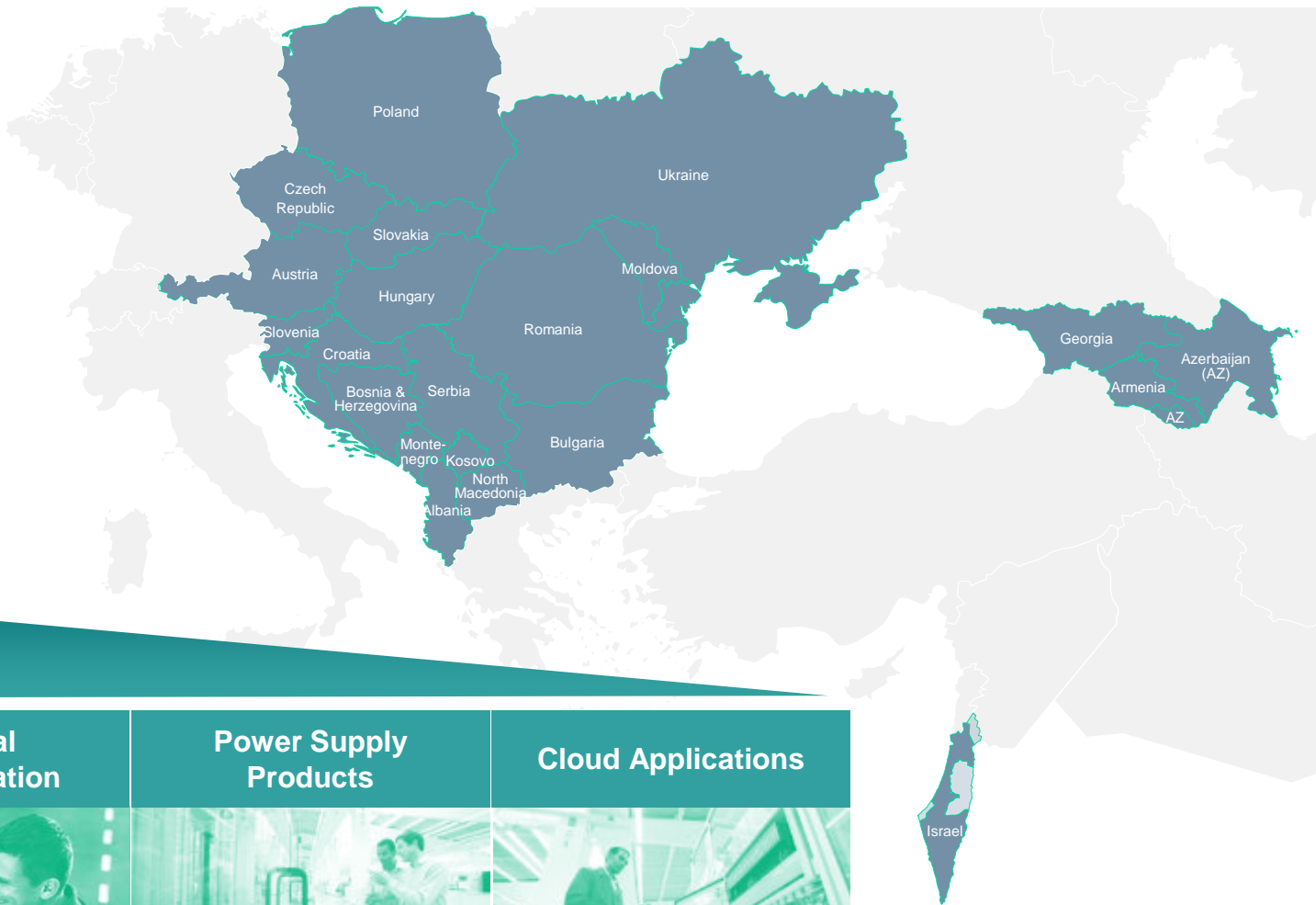
Smart Infrastructure



Digital Industries



Process Automation



Automation and Engineering



Process Instrumentation



Industrial Communication



Power Supply Products

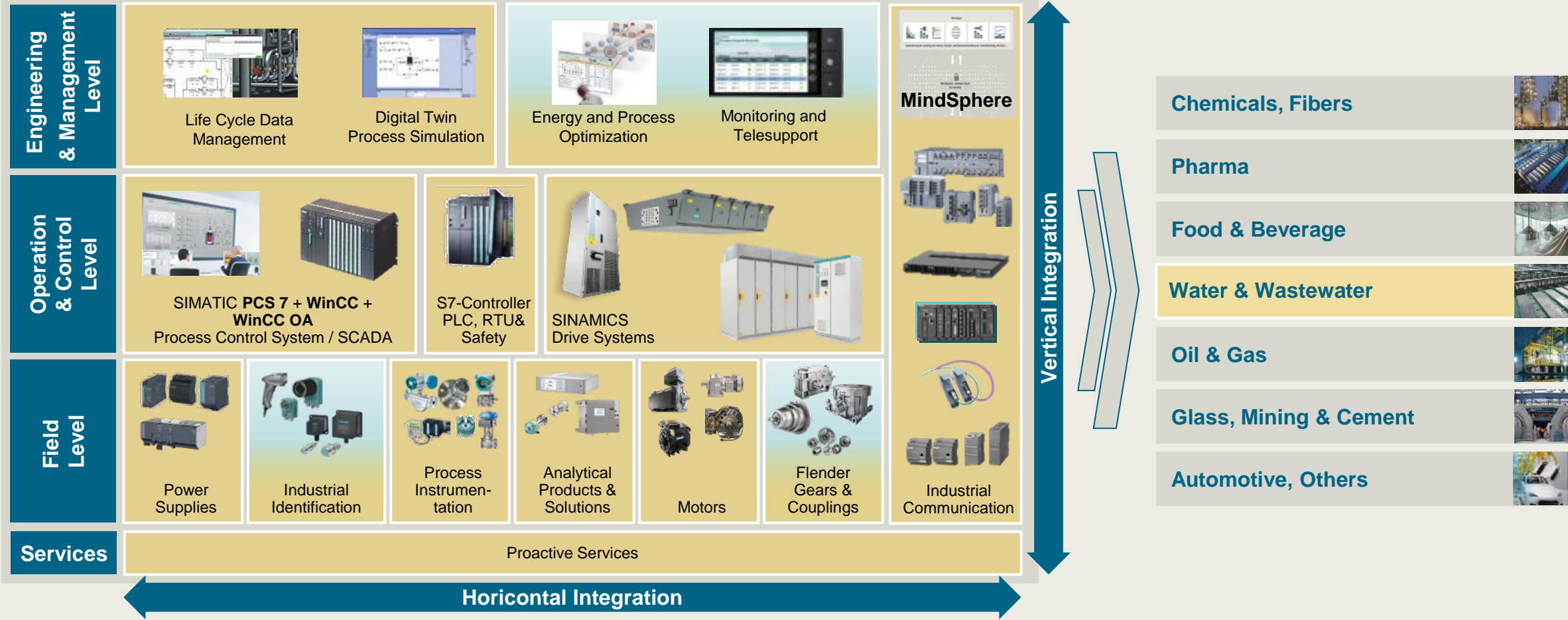


Cloud Applications

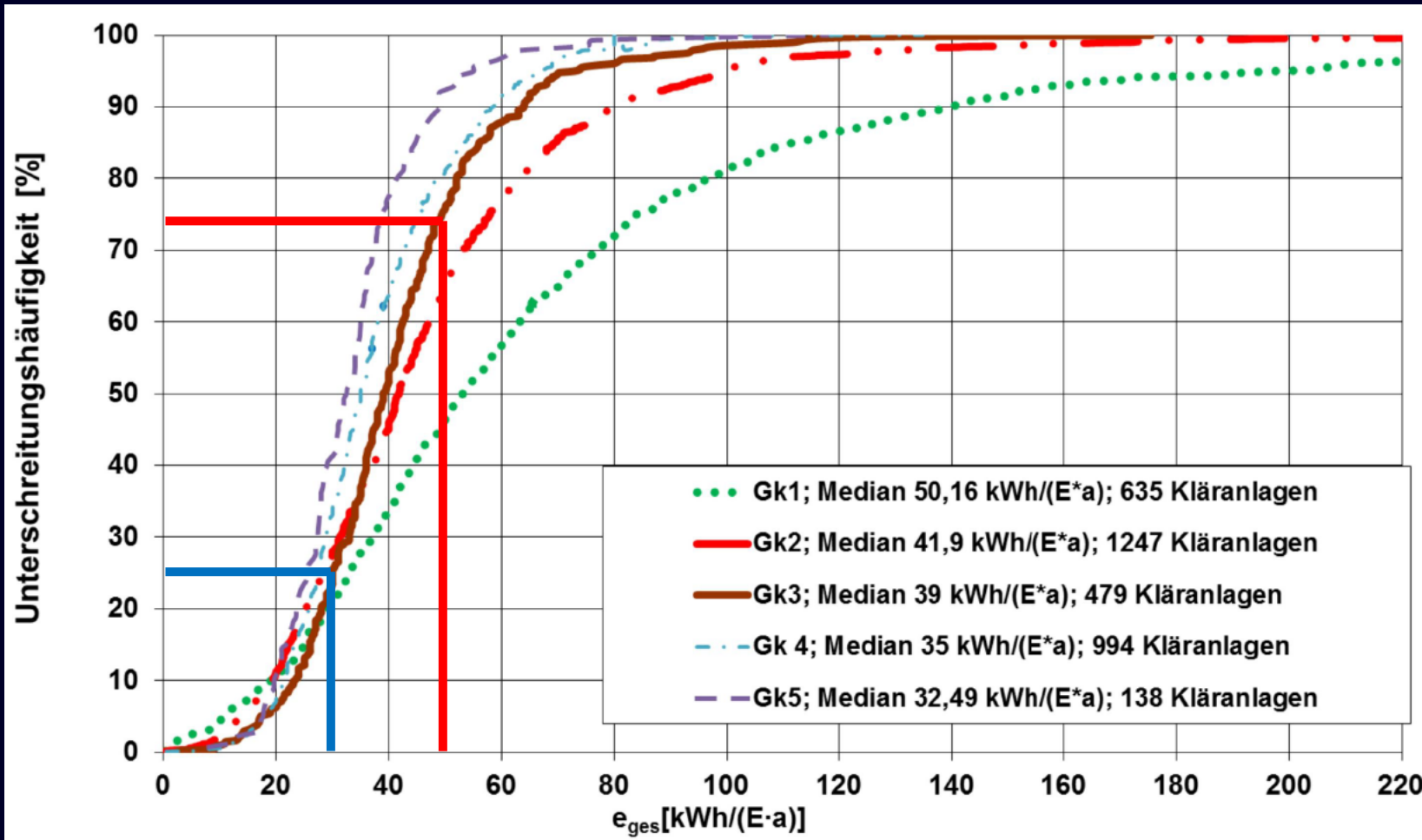


Industries and Services

Vertically Integrated Project Approach



Potential for Energy Savings in Wastewater According to DWA A 216



Source: DWA A 216

Savings Potential!



25% of all plants (GK3) have a specific consumption of less than 30[kWh/PE a]

75% of all plants have an average consumption of 50[kWh/PE a]

Average saving potential is 40%

Potential for Germany:
Total consumption 4.4 TWh/a
Saving Potential 150 Mio €/a!

Let's start...

Success Factors

Requirements

Create Transparency

Make energy flows transparent, on plant and machine level

Balance complete process consumption, generation and energy flows

Contextualize consumption & generation to load and circumstances, create cost transparency

Identify operational and process related weak points

Low maintenance, non-optimal operation set-points, recognize deviation from baseline

Monitor & analyze utilities

Optimize generation and process, use advanced baseline features, like regression analysis

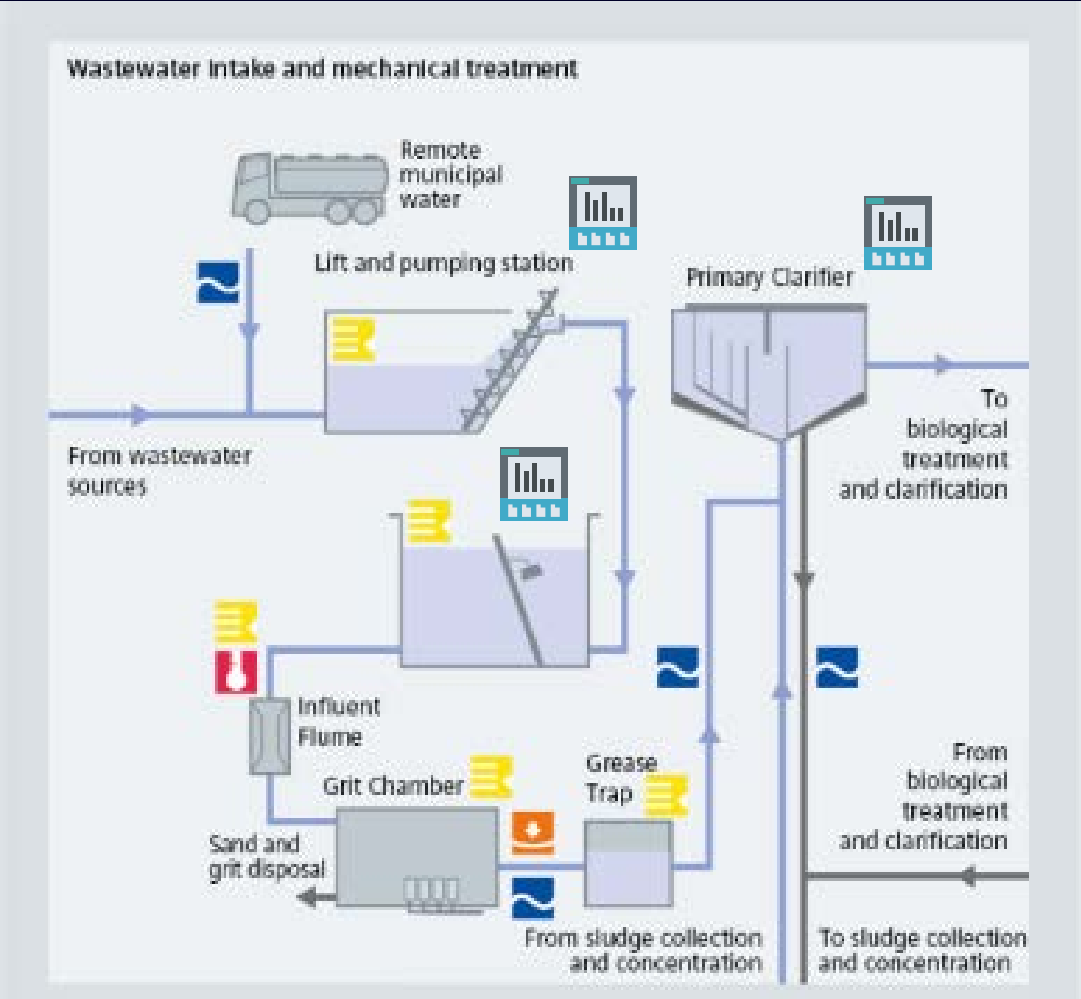
Optimize energy procurement

Analyze existing tariffs, help to find the optimal contract

Peak load

Reduce consumption peaks, avoid high costs for power price

Create Transparency by Implementing a Comparable KPIs



Example EnPI acc. to DWA 216

$$e_{mech. treat.} = \frac{E_{mech. treat.}}{EW_{inhabitant}} \left[\frac{kWh}{EW a} \right]$$

$e_{mech. treat}$ Consumption mechanical treatment per PE/EW & year

$E_{mech. treat.}$ Consumption mechanical treatment (pump, clarifier & screen) [kWh]

$EW_{inhabitant}$ Capacity of plant in PE/EW

Visualize Energy Flows in Your Plant e.g. via Energy Manager Pro

Energy Monitoring

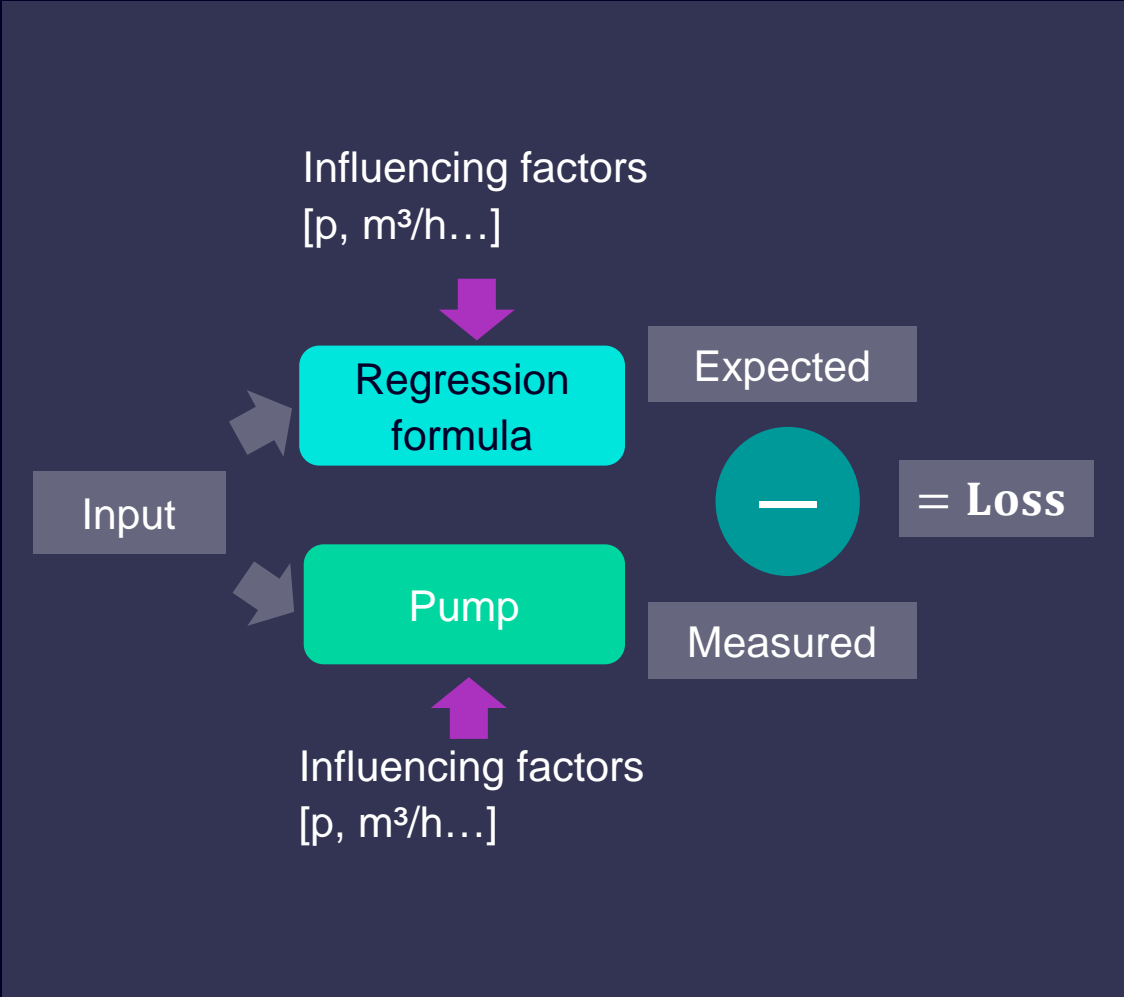
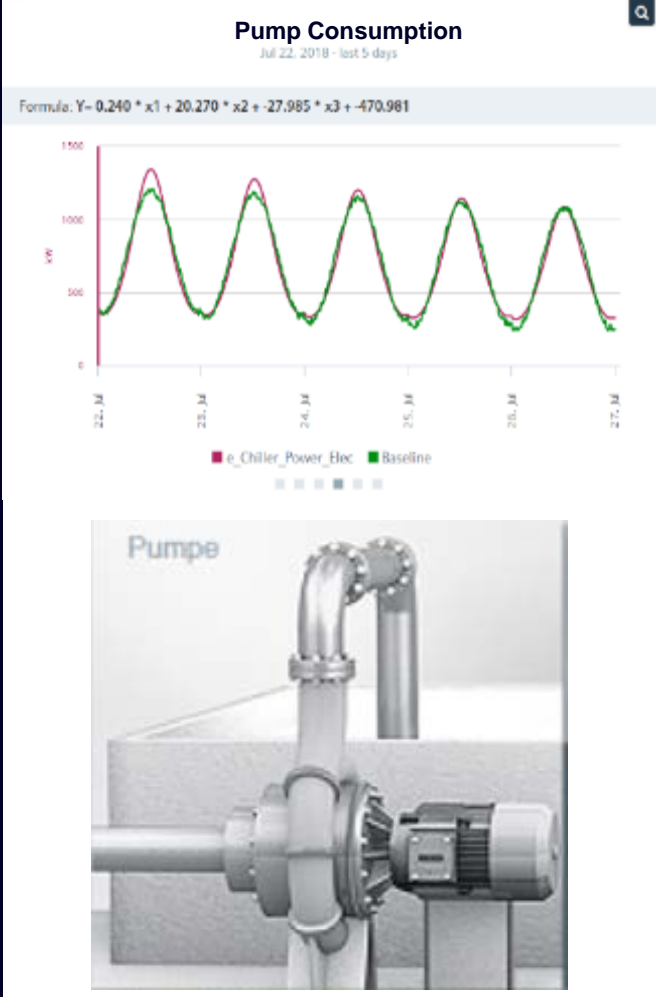
- Reduced engineering effort
- Simple Display functionalities combined with integrated analysis capabilities in Web Client
- Create energy visibility (main consumer, energy behavior, standby consumption,..)
- Availability of a very flexible web dashboard
- Integrated statistic and analysis functionalities



Monitor & Analyse Utilities

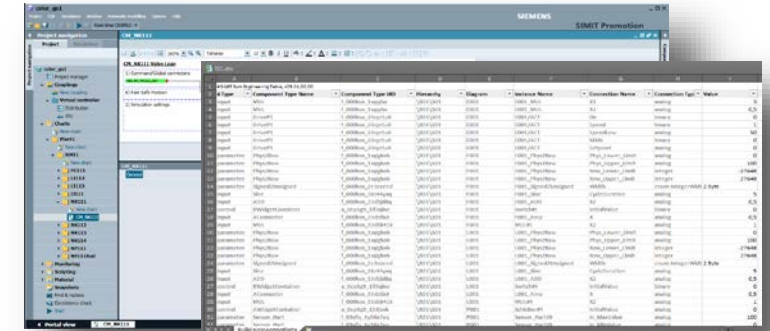
Pump Monitoring

- Consumption
- Performance
- Base line management
- Cost
- Efficiency

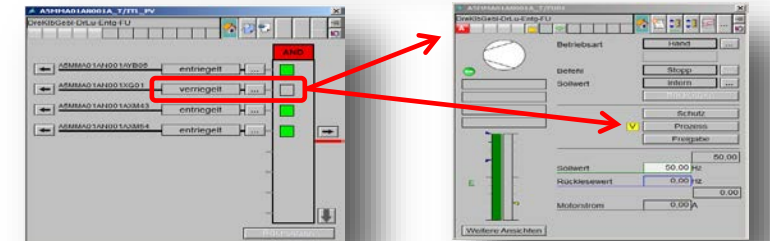


Wastewater Treatment Plant Vienna, Project EOS

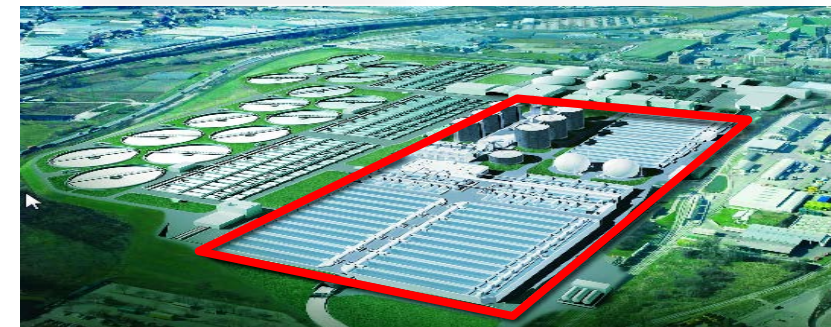
Customer profile	<ul style="list-style-type: none"> • ebswien Hauptkläranlage Ges.m.b.H. • 42 ha area, 1% electricity consumption of Vienna, Capacity: 4 Mio. PE
Project information	<ul style="list-style-type: none"> • From 2020 on energy independence, 15 GWh electricity, 42 GWh heat • Project duration: 2015 – 2020
Challenges of the customer	<ul style="list-style-type: none"> • Migration during full operation of the plant • Same functionality and visualization of the standardized PCS 7 solutions as the former solution (system Cegelec)
Siemens solution	<ul style="list-style-type: none"> • Simulation of complete plant operation via digital twin (SIMIT) • Tool-based migration of process control software (about 25,000 function modules) • Existing user interfaces were based on PCS7 standard library and made updatable • Conversion of the system hardware and energy supply (about 35 automation systems) • Implementation of instrumentation
Customer benefit	<ul style="list-style-type: none"> • Reliability from the day of the migration on, all I / Os correctly connected! • Already defined fallback scenarios not needed in all 11 migrations! • Plug & Play migration of up to 4,000 process objects in just a few hours • Customer familiar with the handling of plant control right from the start • Energy autarky by utilization of energy from sludge



SIMIT Bulk Engineering mit Excel

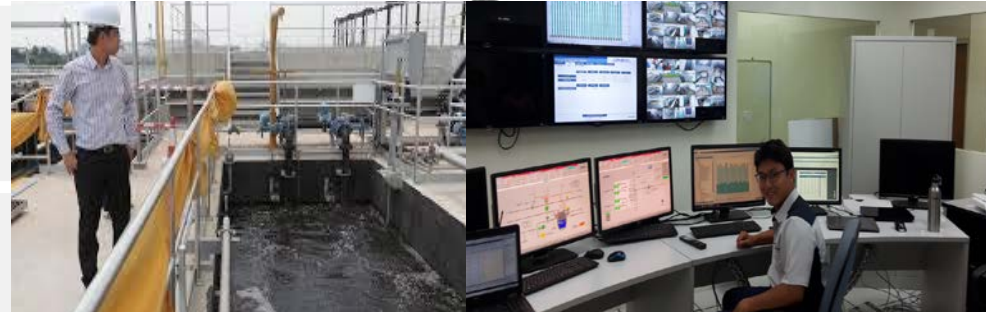


Interlock und funktionaler Check

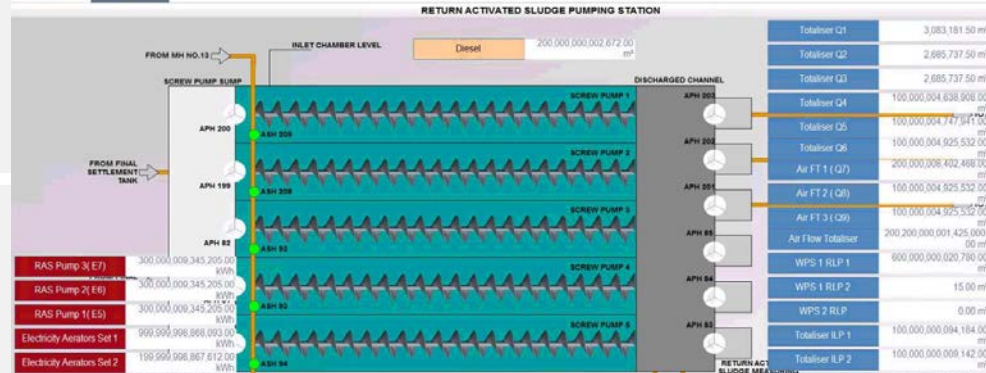


Public Utilities Board Singapore

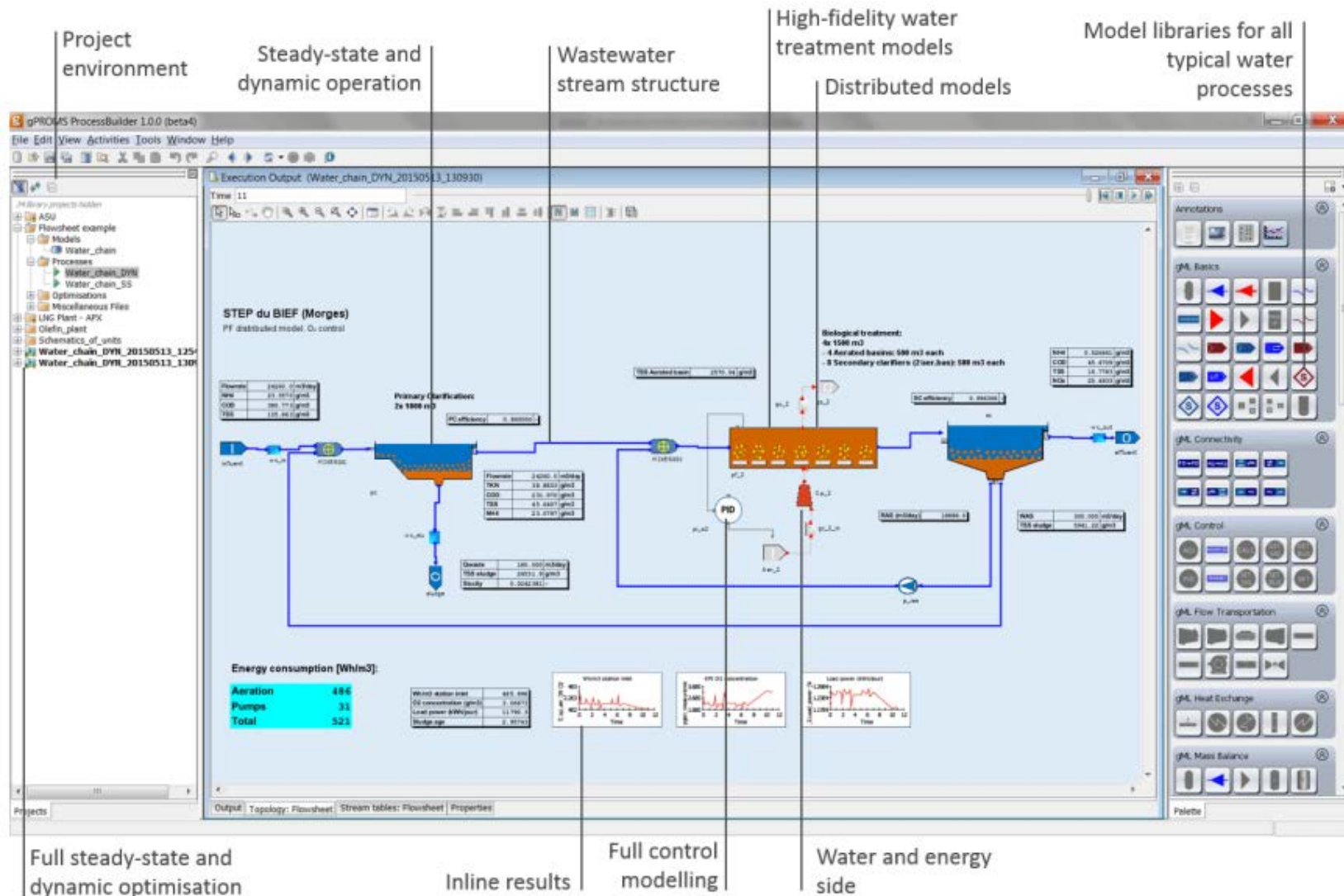
Customer profile	<ul style="list-style-type: none"> Public Utilities Board Singapore (PUB) - Ministry of Environment and Water Management Deep Tunnel Sewerage System (completed by 2025), three sewer systems of total length approx. 100 km in approx. 55 m depth treated wastewater will be reused up to 50%, reducing the space required by the water facilities by 50% to 150 hectares
Project information	<ul style="list-style-type: none"> Project duration: 03/2017 – 04/2017 Jurong wastewater treatment plant: Processing of approx. 125,000 m³ wastewater / day for use in industry System roll-out to another three plants by local partners
Challenges of the customer	<ul style="list-style-type: none"> no transparency about energy consumption as a decisive cost factor Integration of existing energy measurement technology Project handling via local system integrator
Siemens solution	<ul style="list-style-type: none"> KPI Definition, planning of energy management Implementation of SIMATIC EnMPRO and ca. 1.000 Energy Tags SIMATIC WinCC V7.x / redundant operation on 2 servers SIMATIC S7-1500 control unit Training of operators
Customer benefit	<ul style="list-style-type: none"> central energy management system for four different wastewater treatment plants, spread over Singapore increased efficiency in the total energy use ongoing process optimization through data transparency



OVERVIEW	AERATORS	SDB	ILS P1 & P2	CBC 1	WPS 1	BIO GAS ENGINE	UASB	MBR
PST	RAS PUMPS	FST	ILS Ph3	CBC 2	WPS 2	INLET WORKS	GWRF	DIGESTER
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Dynamic Process Model for a small WWTP in Croatia

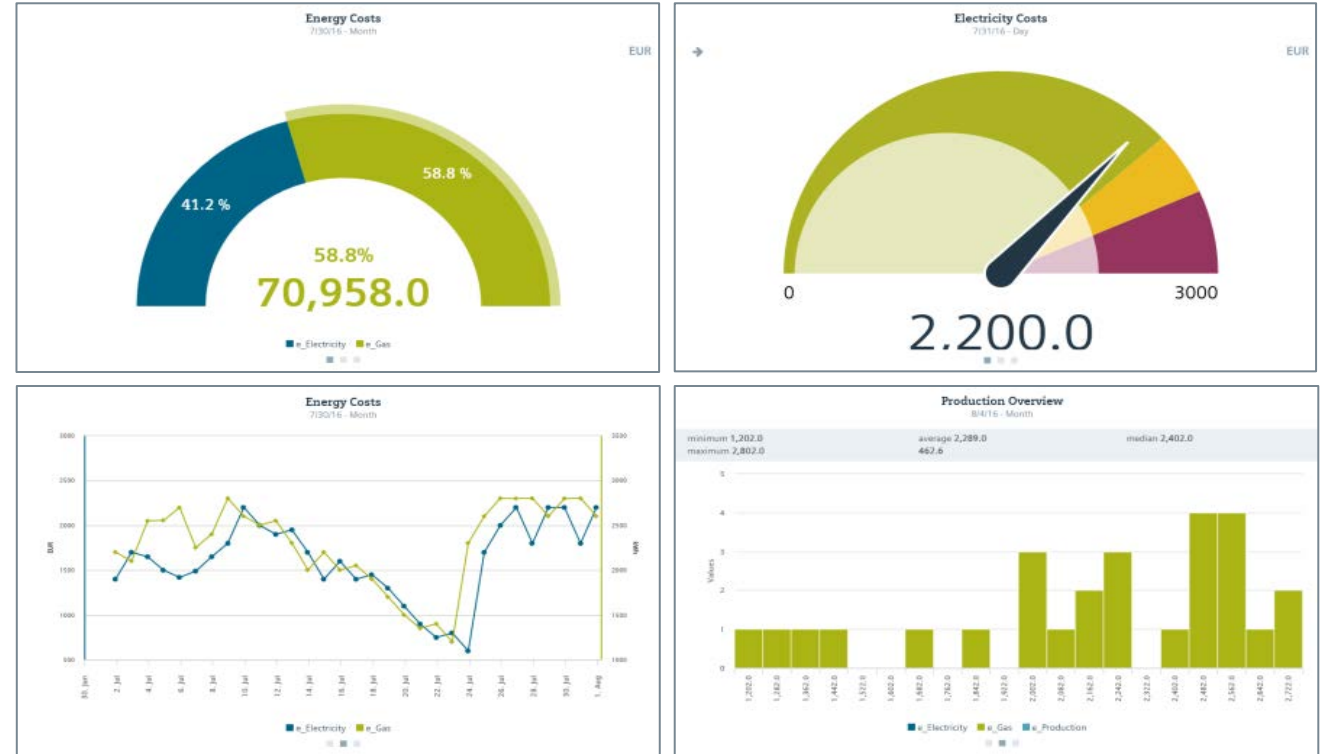


Benefits

- ✓ Support of all common models and processes for water and wastewater
- ✓ Simulation-supported decision-making aids for system planning and operation (e.g. simulation of what-if scenarios during ongoing system operation)
- ✓ Optimization function with regard to procedures and costs

Our Conclusions

- Take care about measuring right and continuous
- Add knowledge to data (Standards, KPIs)
- Create easy transparency “one picture”
- Connect to people
- Follow a process like:



Measure

Capture of Data

Monitor

Transparent Presentation

Control

Data Analysis and Control

Manage

Managing the Overall Situation

Siemens Energy Management Tools

All information in one place

- Content
 - Product information
 - Tutorial videos
 - Links to application examples
 - Links to manuals
 - References
- Updated continuously



SIMATIC Energy Management

With the modular product portfolio for energy transparency of Siemens throughout the whole company.



Energy measurement

Energy measuring is the base of every energy management system and is ideal for integrating into the automation environment.



Energy data acquisition

Reliable energy data acquisition is a requirement for every energy management system.



Energy efficiency evaluation for machines

The standardized efficiency evaluation enables integration of status-based analysis of energy data into machines without great effort.



Energy analysis

In addition to increasing the efficiency of production, energy analysis must also meet legal requirements. Monitoring, archiving and documentation are important criteria for this.



Customer references

Learn more about the SIMATIC energy management projects.

<https://support.industry.siemens.com/cs/de/en/view/109765100>

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