



THE ENERGY ENGINEERING COMPANY



AVAT AUTOMATION

Intelligent control solutions for energy efficient industry

Dr. Gerhard Ranegger

SMART ENERGY

Pioneer in gas engine control systems and decentral energy systems.



Almost 30 years of digitalization in the energy sector

THE

- Flexible control technology for large gas/dual-fuel engines, CHP and energy plants for stationary and marine applications
- Consulting, planning, engineering and commissioning

13.000 +
ENGINE &
CHP CONTROLS

ENERGY

- Wide application base and know-how spectrum
- Working in agile multi-discipline development teams

ENGINEERING

- In-house development of highly dynamic hardware components and application software
- Collaboration with research institutes and industry associations

120 +
EMPLOYEES

40 +
DISTRICTS

200 +
MARINE DF CONTROLS

COMPANY

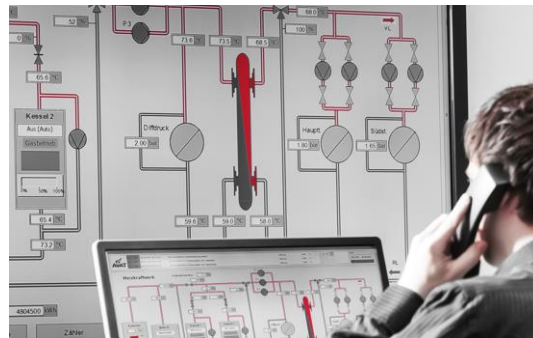
- More than 25 years experience in decentralized energy systems and marine controls
- Owner-managed company and 100% independence

AVAT AUTOMATION GMBH

Concept, Components, System and Solution



Intelligent Solutions for decentralized Energy systems



Energy Automation Solutions

- Intelligent & modular products & complete systems
- AVAT expertise in energy market power supply
- Solution for energy supplier and power plant construction

Complete
automation
and controls
projects

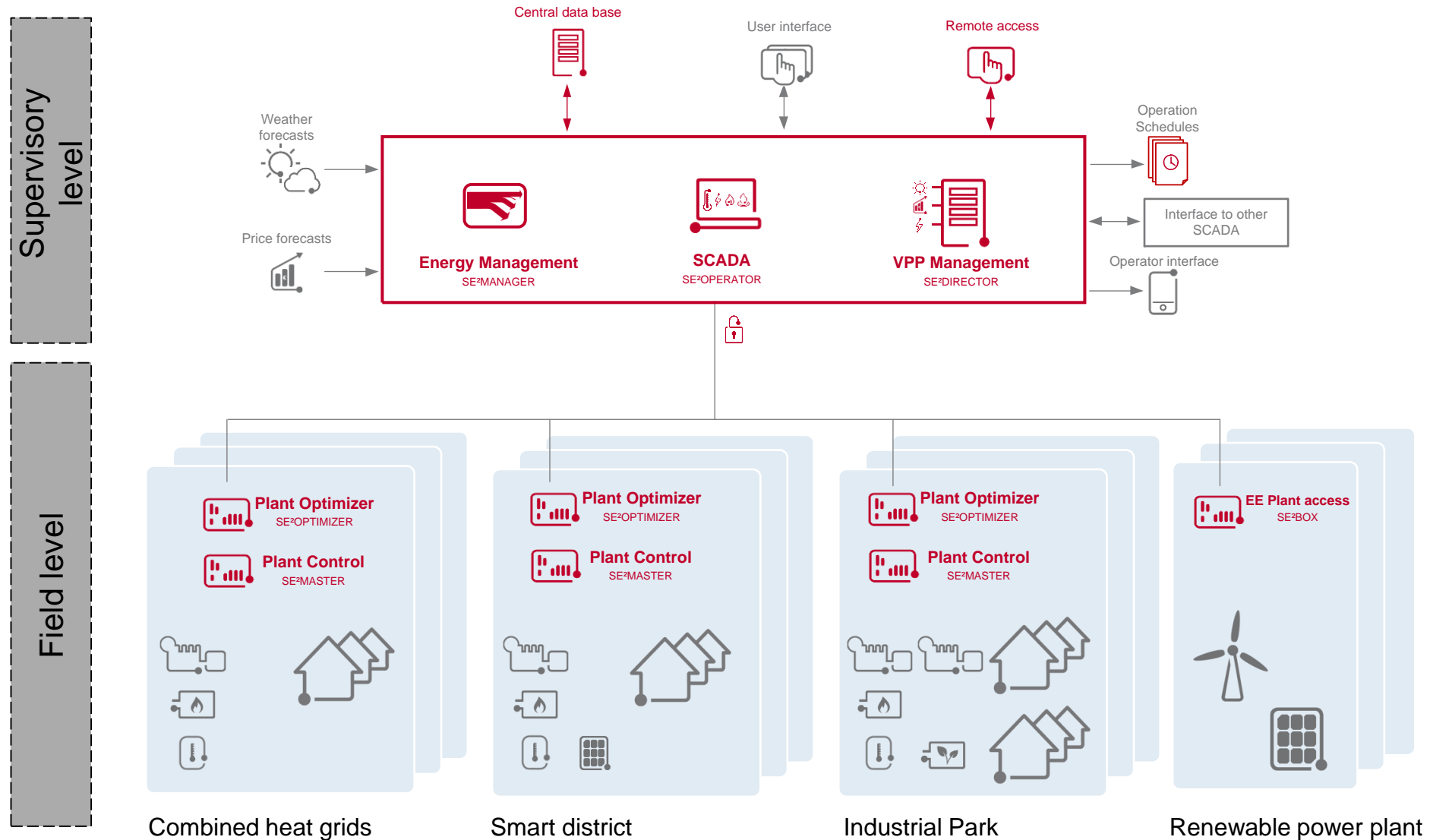
Engine Control Systems

- Technology leadership
- Expertise in gas engine and combustion technology
- openECS – open engine control system
- Supplier for series production to engine OEMs

+ 12.500
Systems
+ 80 countries

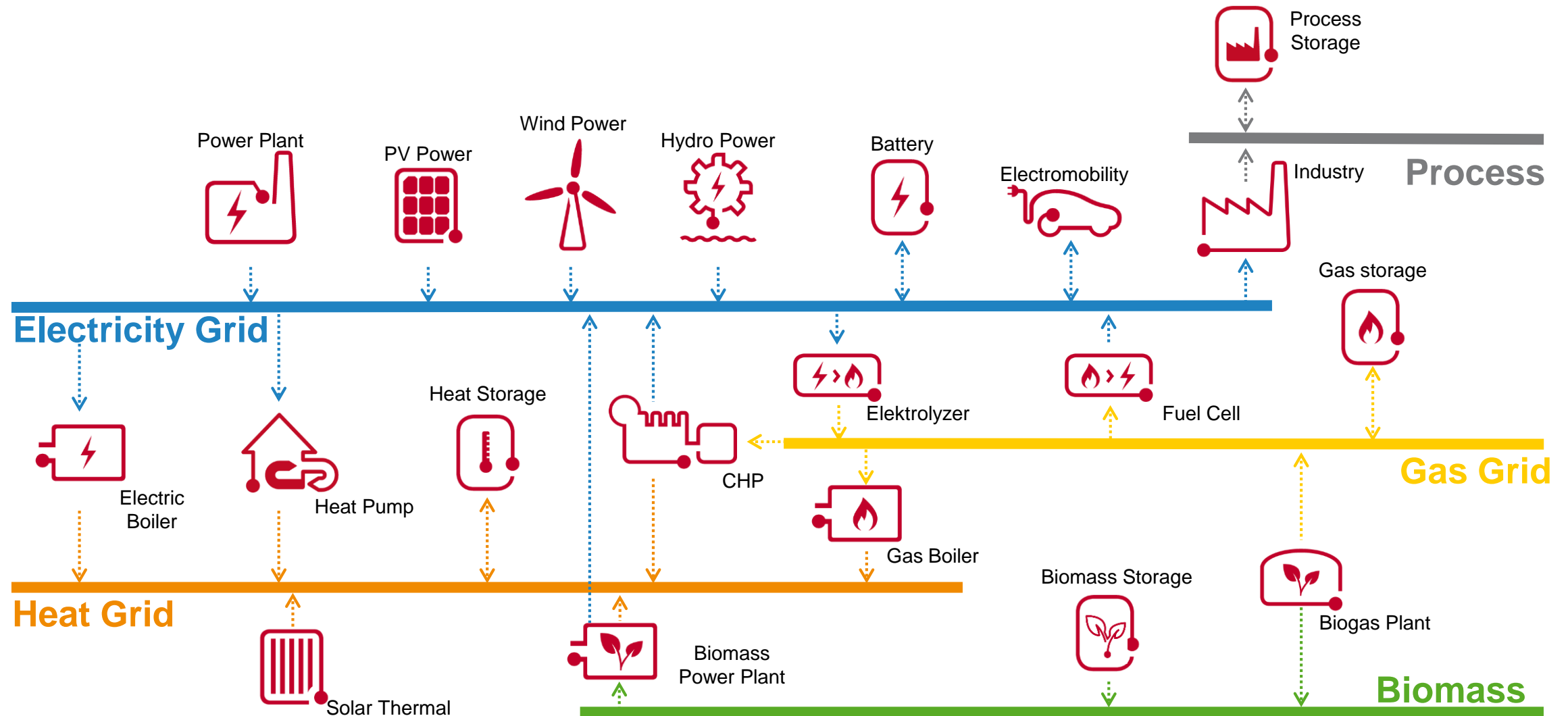
DECENTRAL ENERGY SYSTEM

Modular and scalable on all levels



INTEGRATED ENERGY SYSTEM

Automation through all energy sectors

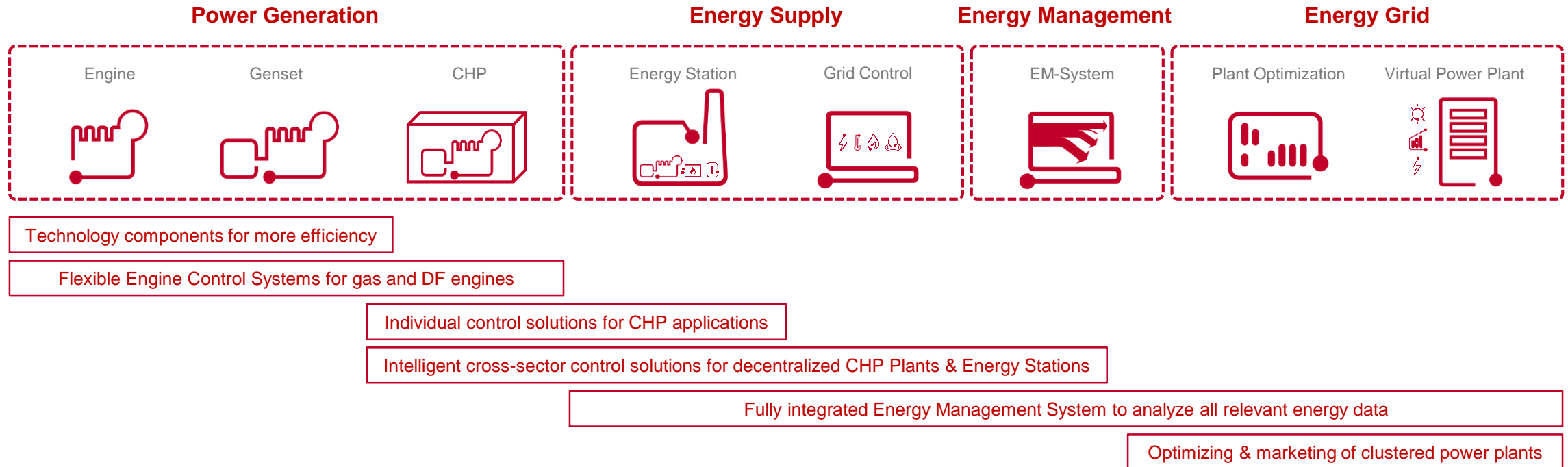


DISTRIBUTED ENERGY SYSTEMS

Portfolio from Power Generation, Energy Supply and Management to Virtual Grids



throughout modular and scalable



Comprehensive data access

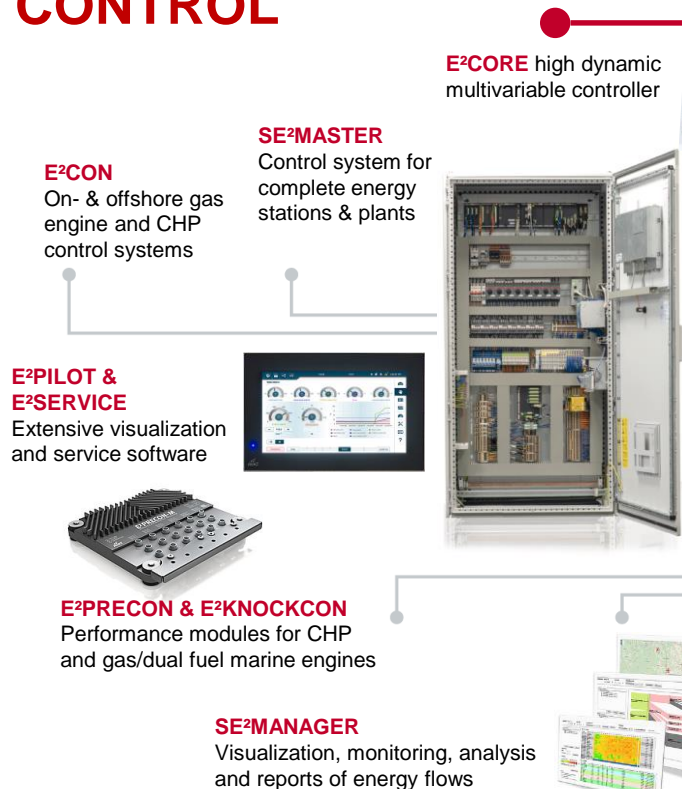
(Digitalization for: Virtual services, remote access, predictive maintenance, cloud solutions,)

PRODUCT PORTFOLIO

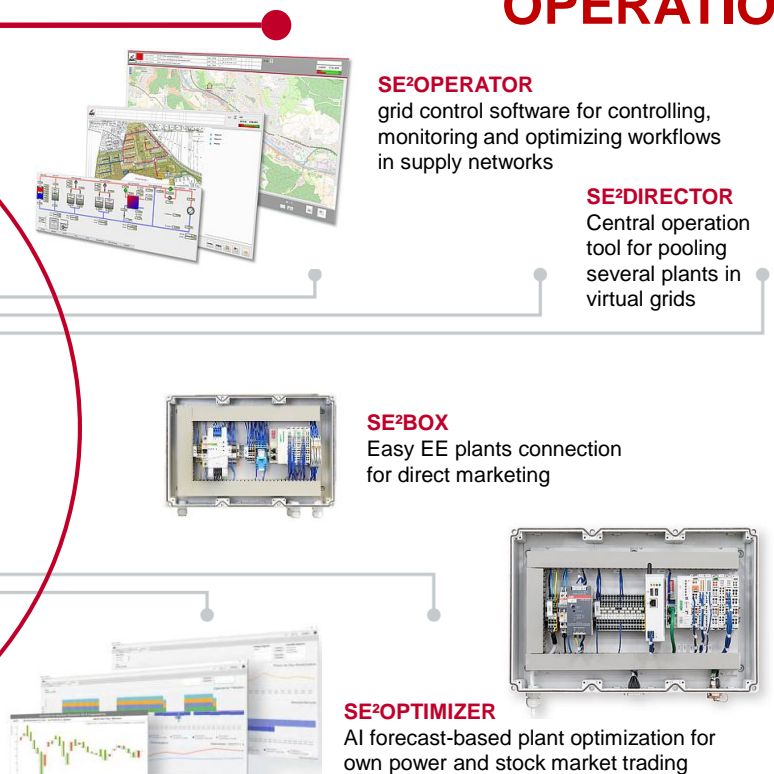
Control, operate, manage, optimize – consistently digital, modular and scalable.



CONTROL



OPERATION

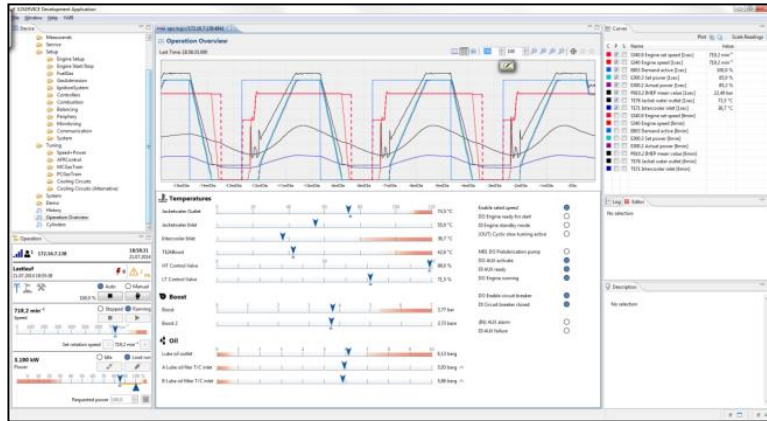


MANAGEMENT

OPTIMIZATION

ENGINE AND ENERGY CONTROL SYSTEM

AVAT open platform and visualization



E²SERVICE
professional PC service tool

Virtual Service Center
secure remote access, alarming,
status information



E²PILOT
multi-touch
operator interface



PREDICTIVE OPTIMIZATION TASK

Input, Output and Restrictions of Decentralized Systems



Plant restrictions

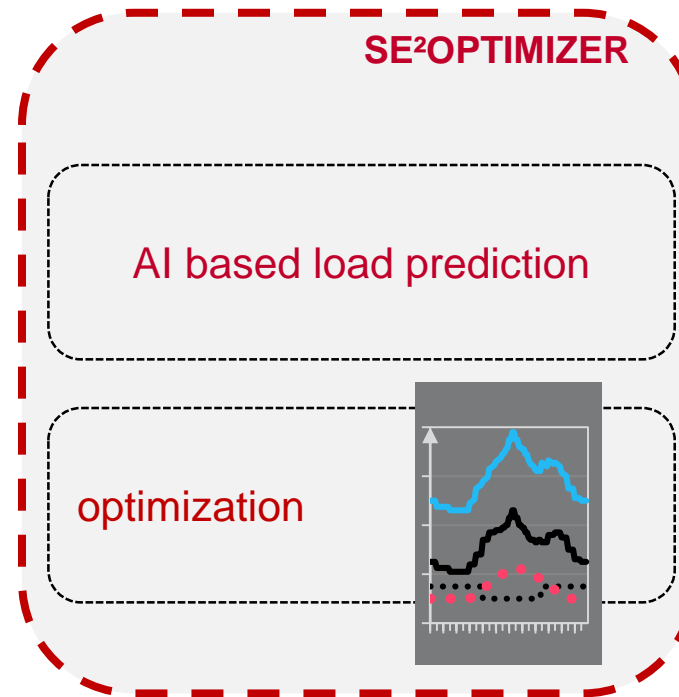
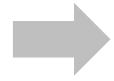
commercially



regulatory



technically



Predicted Schedule



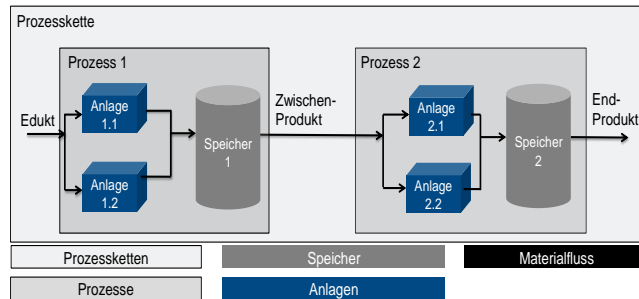
time stamp & Power

SYSTEM BASED ENERGY OPTIMIZATION

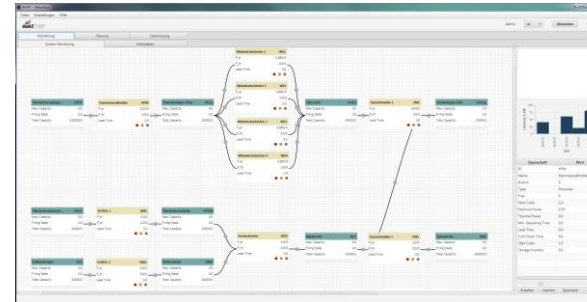
Plant modelling and flow chart for optimization process



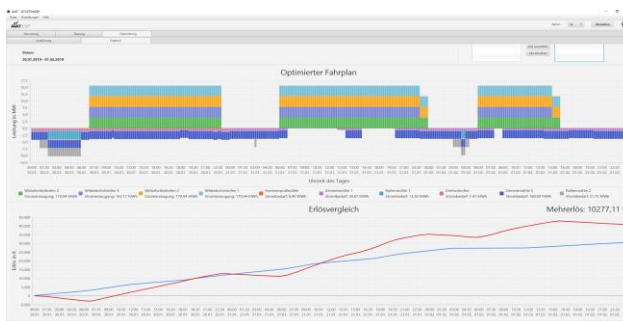
Process flow chart



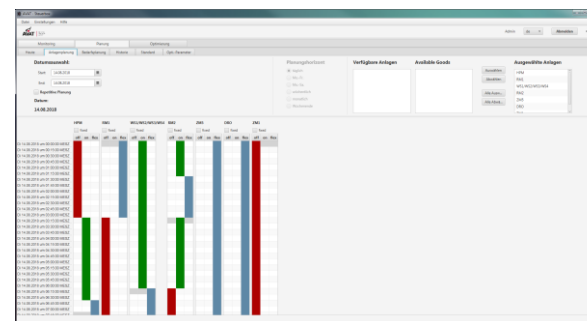
Digital modelling



Optimized process



Definition of boundary conditions



SMART DISTRICT

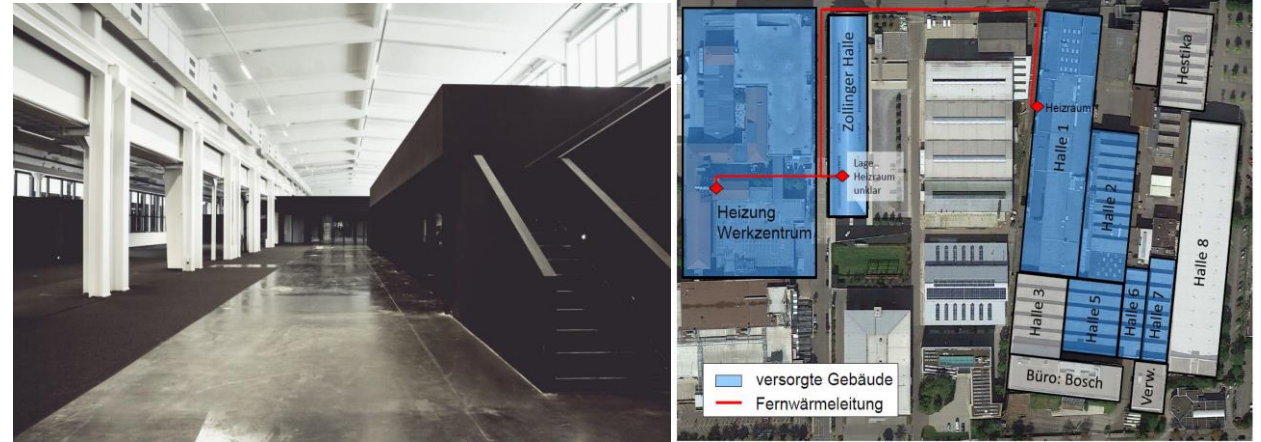
Energy Harbour West, Ludwigsburg, Germany



Hybrid integration of CHP, PV,
Storage and cooling CHP

AVAT Scope of supply AVAT

- Energy Engineering, Commissioning
- SE²MASTER – Energy station controller
- SE²OPERATOR – SCADA system SCADA
- SE²OPTIMIZER – Overall plant optimization (plus epex spot)



1 x 330 kW_{el}, MAN



2 x 1,9 MW_{th}



1 x 110 kW_{th}



1 x 500 kW_{th} (KKM)



1 x 380 kW_{th} (KKM)



57 m³



~ 500 kWp



120 kWh 电池蓄电



2 x 50 kW
> 200 kW

Smart Grid Research project

- Energy station (Power, Heat, Cooling energy)
- Sector coupling (Thermal, Power and Mobility)
- Generation and Load management
- Modular Battery storage and PV integration
- Integrated Energy Management system

PLANT OPTIMIZATION

Police-Academy Biberach, Baden-Württemberg



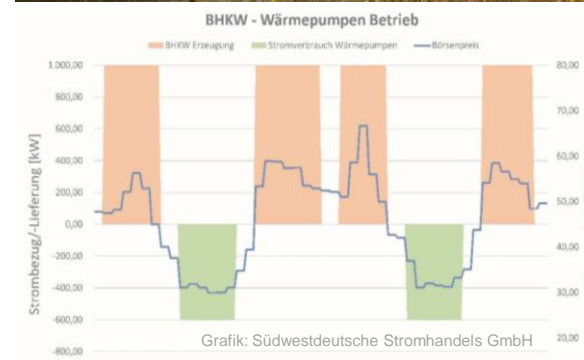
	2 x 405 kW _{el} , 680kW _{th}		1 x 400 m ²
	1 x 1,75 MW _{th}		2 x 100 m ³ (HT)
	1 x 405 kW _{th}		1 x 500 m ³ (NT)
	1 x 80 kW _{el} / 350 kW _{th}		

> 50 % savings of primary energy and increased margins through VPP connection



Hybrid-Plant (VPP)

- Innovative, hybrid Energy-Infrastructure
- Smart Energy Management:
VPP connected for day-ahead price optimization



SCALABLE IN AMOUNT PER CITY ...

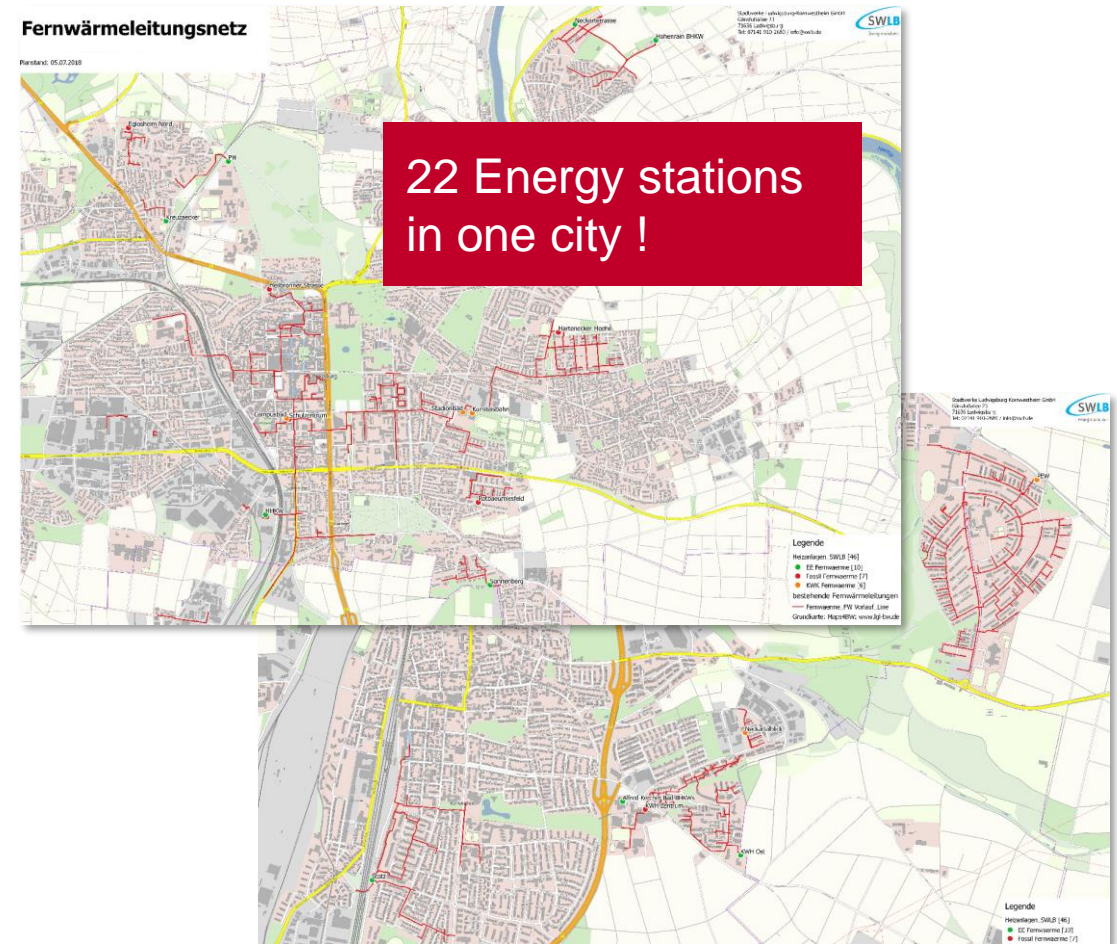
Ludwigsburg-Kornwestheim – Integration of 22 Energy Plants



Heat Grid:	14, total 67 km	Wood heating plant:	1
CHPs:	16	Solar thermal plant:	1
Gas Boilers:	34	Cooling supply:	2
Heat pumps:	4	VPP connected CHPs:	3
Pellets heating:	2		

Energy Supply (heat and power)

- AVAT Grid Control (SCADA)
- Fully automation of 22 Energy stations
- Control and regulation of heat grid coupling
- Control and regulation of district heating



GERMANIES LARGEST SOLAR THERMAL PLANT

Stadtwerke Ludwigsburg-Kornwestheim



14.800 m², ~ 9 MW_{th}



~ 2000 m³ (H=20 m, Ø14 m)



~ 5 km new District heating pipes

District heating expansion with integration of large-scale solar thermal and large-scale thermal storage

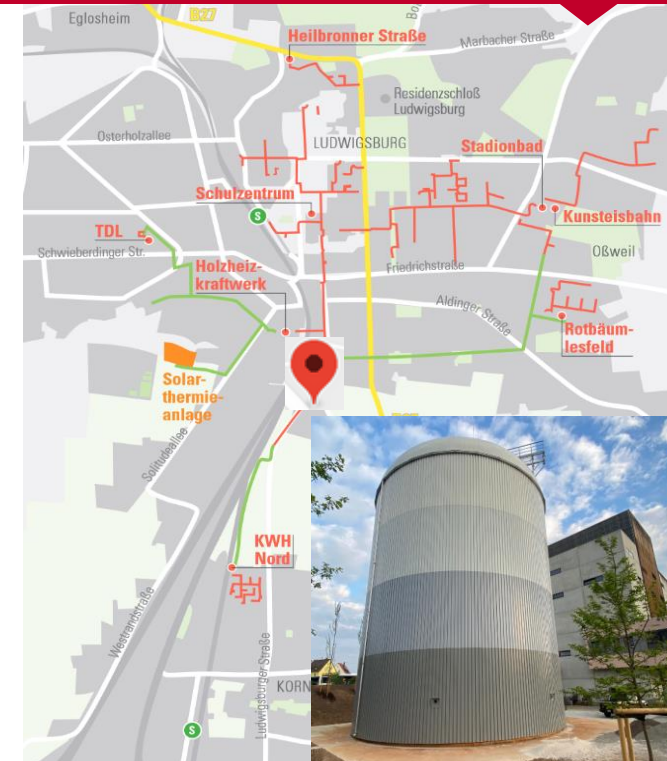
- Extension of district heating network to Kornwestheim
- Integration of local heating islands: LB-Rotbäumlesfeld, TDL (Technische Dienste LB), Kornwestheim-Nord

- Overall control concept
- Feed-in control solar thermal/biomass/CHP
- Storage management of large-scale thermal storage
- District heating network control
- Extension & optimization of existing CHP plants

Light house project SolarHeatGrid

Invest 15 Mio EUR; BMWI-funding 10 Mio EUR

Municipal climate protection project



»» Legende

geplante Solarthermieanlage,
Standort Römerhügel
Leitungen SolarHeatGrid

Anlagen SWLB
Fernwärmeleitungen Bestand
swlb.de



Gefördert durch:



Bundesministerium
für Umwelt, Naturschutz,
Bau und Reaktorsicherheit

aufgrund eines Beschlusses
des Deutschen Bundestages



NATIONALE
KLIMASCHUTZ
INITIATIVE

REFERENCES

Many companies have already crossed their sectors with us – this gives you peace of mind.



Energy Plant Engineers, Constructors & Service Suppliers



Gas & Dual Fuel Engines and Genset Manufacturers

Municipal and Utility Energy Producers in Germany



Industries & governmental and Research organisation

PARTNERSHIP FOR LITHUANIA AND ESTONIA

Many firms have already crossed their sectors with us – this gives you peace of mind.



We cross it.

We want you ...



We handle it.

... as our partner



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THANK YOU!

THE ENERGY ENGINEERING COMPANY