

Products available today for Aeration and Back Flushing



**Rotary lobe
Blower**



**High Speed
Turbo blower**



**Rotary lobe
compressors**



Serving load changes precisely. Combination of technologies.

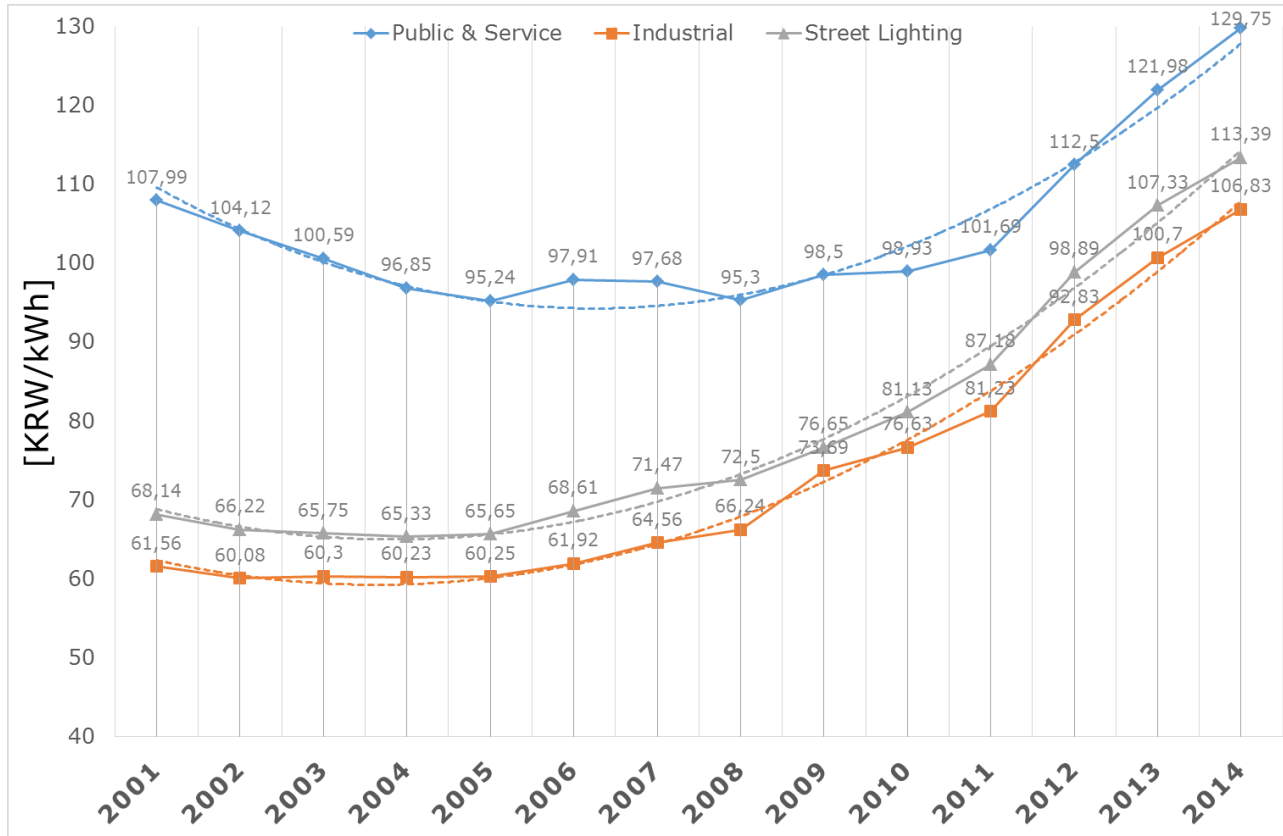


For a new efficiency in aeration basins

Technical and constructional features and the changing air consumption in the aeration basins are a challenge for the aeration technology of every sewage plant. Consequence: extreme energy consumptions. They can amount to up to 80 % of the total costs.

The solution: A combination of Rotary Lobe Blower, Rotary Lobe Compressor and High Speed Turbo technology - they serve the base loads extremely energy-saving and compensate supply peaks precisely.

Development of energy rate in Korea

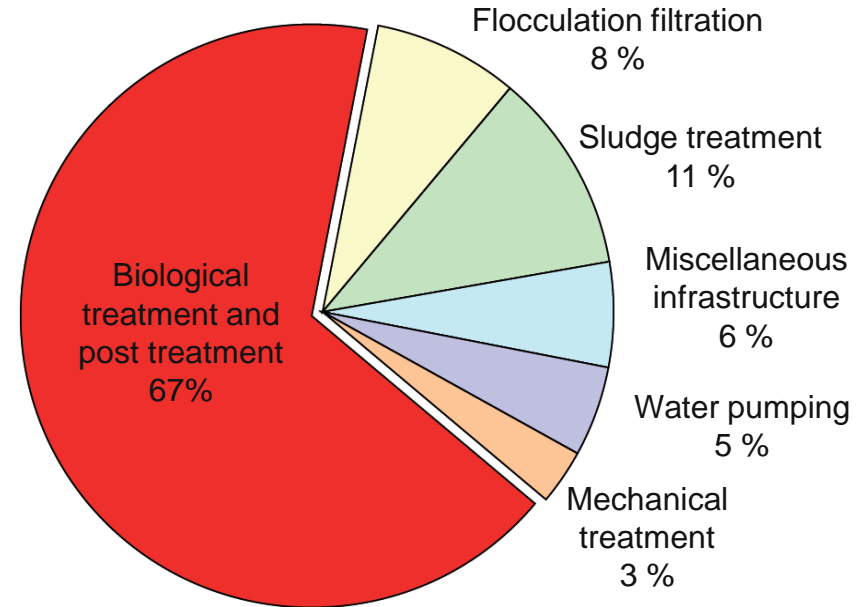


Energy consumption in WWTP



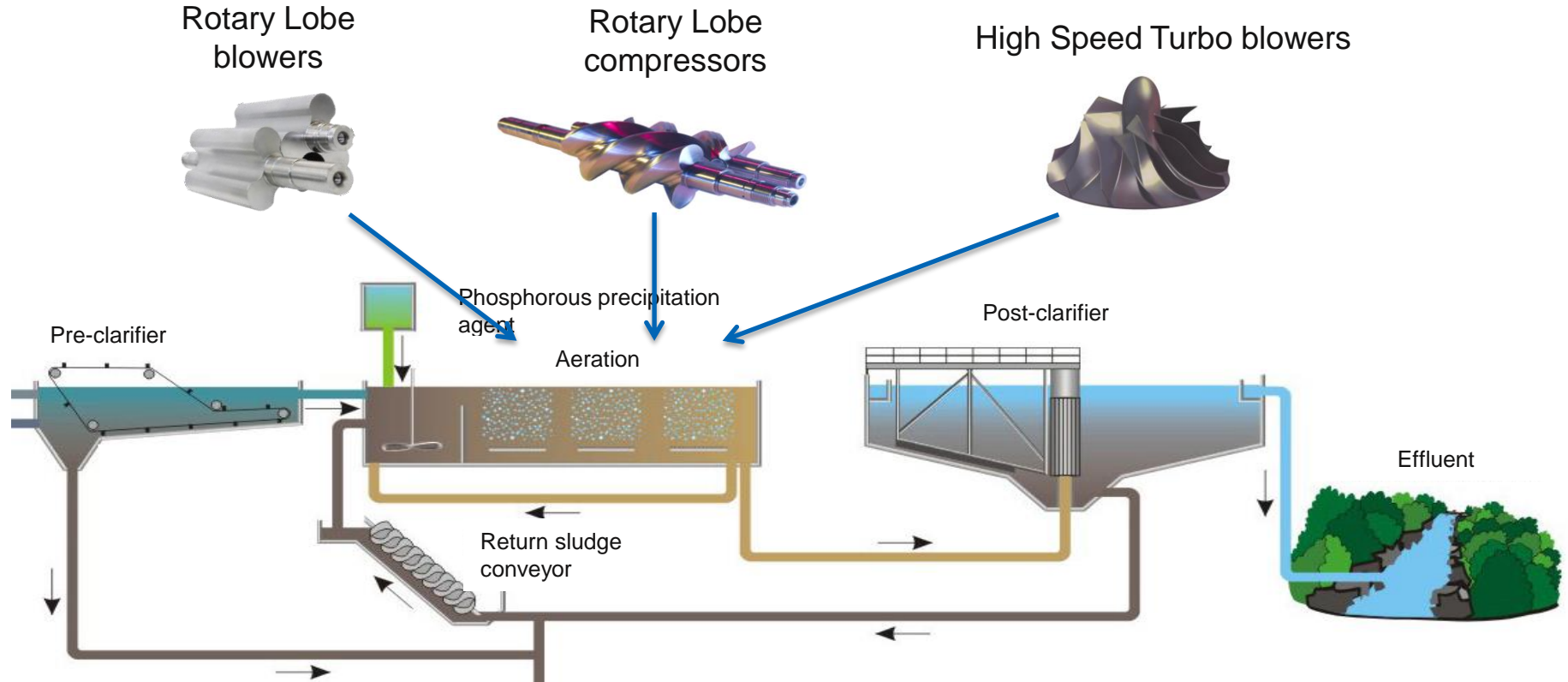
The most energy is used by the compressed-air consumption for the biological purification stage

- This graphic shows typical shares of process steps of the entire energy consumption
- In plants with biogas generation the \emptyset energy consumption for the aeration is approx. 50%
- In smaller plants the \emptyset energy consumption for the aeration is approx. 60 – 80 %



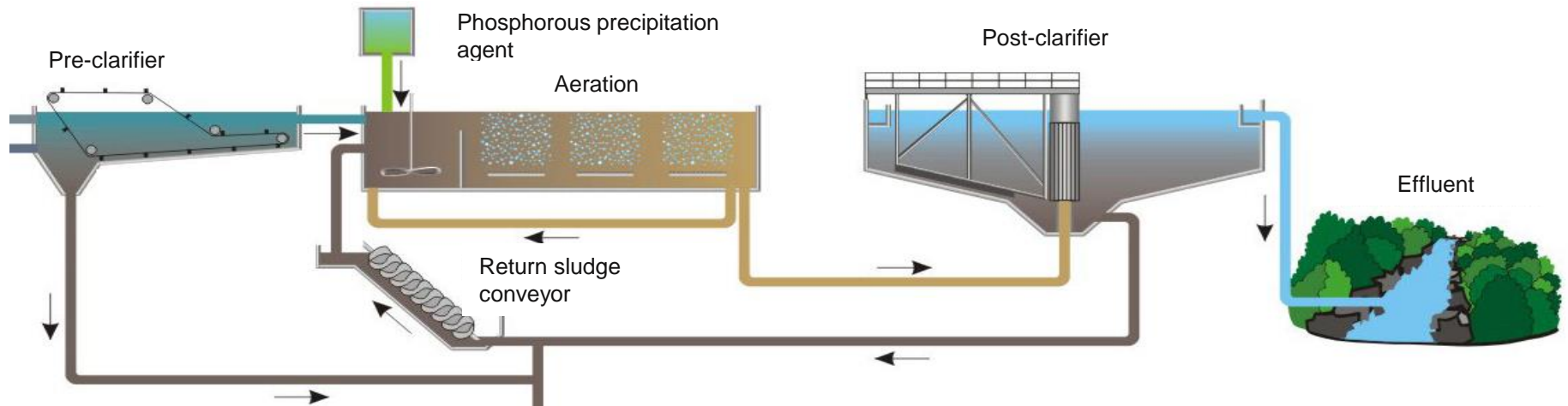
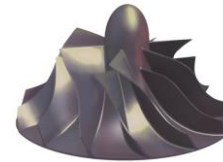
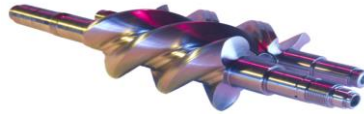
Quelle: Umweltbundesamt, Okt. 2009

Different technologies for aeration



Rotary Lobe Blower, Rotary Lobe Compressor or High Speed Turbo?

Which is the right technology?



Serving load changes precisely. Combining technologies.

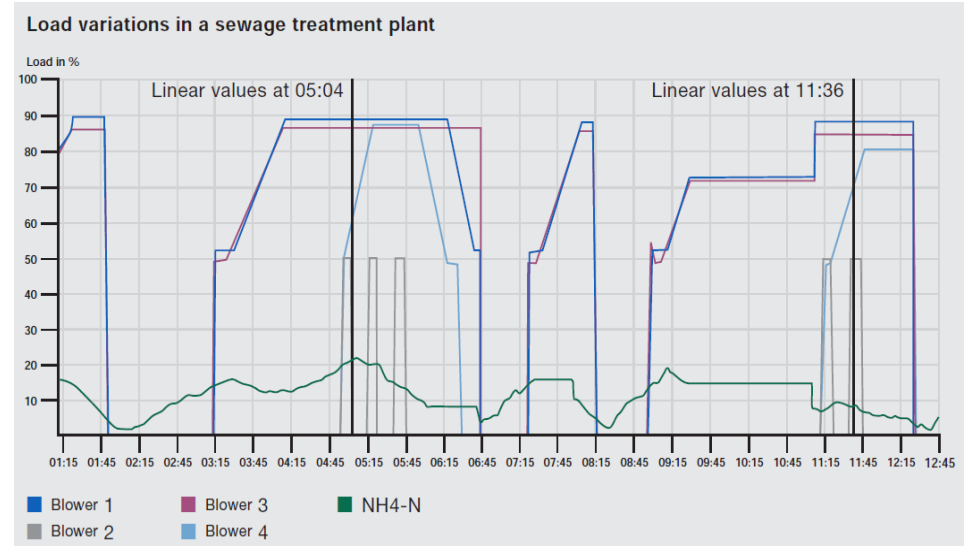


Conclusion:

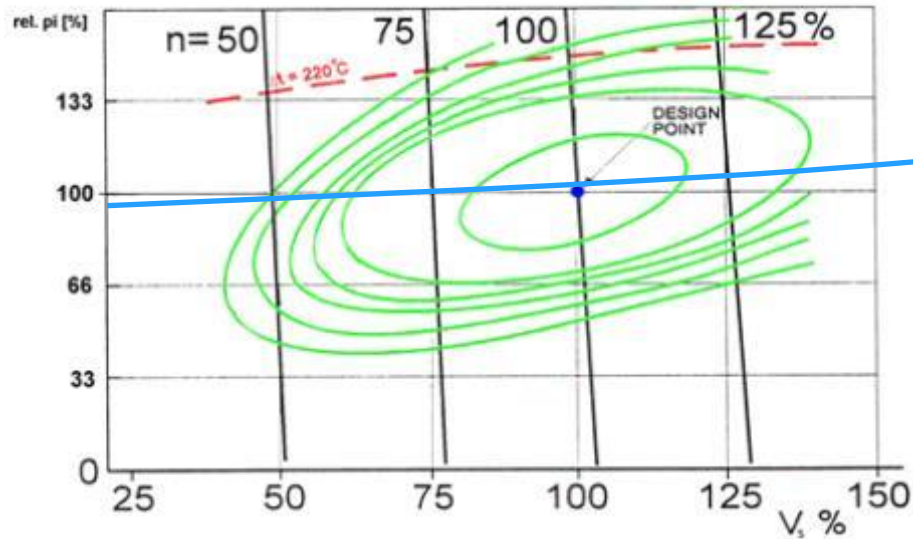
The selection of the suitable machine depends on many influences:

- Load cycles
- Volume flow ranges
- Temperatures
- Pressure variations
- Kind of operation

 **There are no general rules!**



Characteristic performance curve of a rotary lobe compressor



■ Characteristic diagram of a WWTP

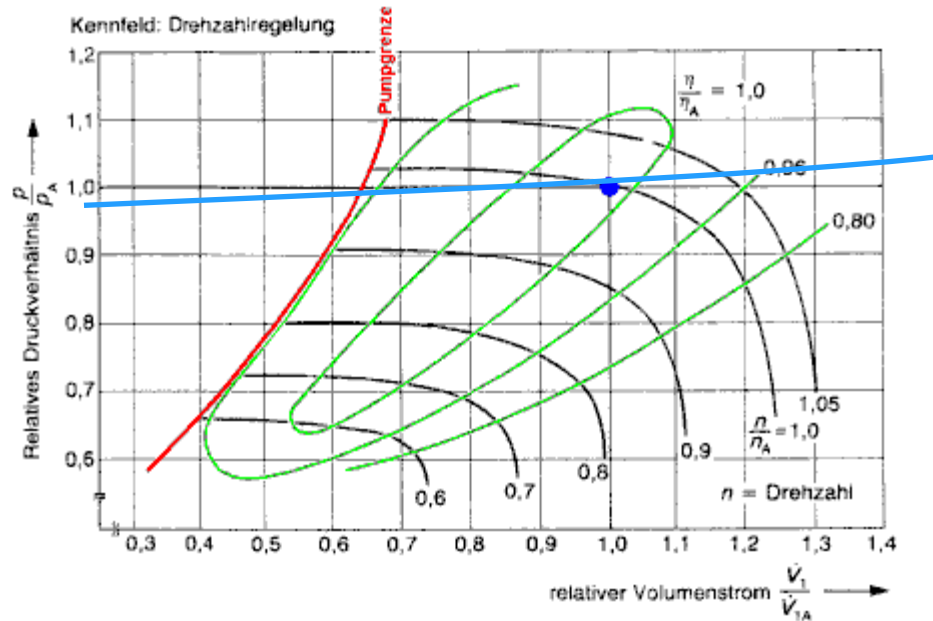
■ Characteristic curve

■ Design point

- high efficiency level ($\sim 70\%$)
- very high turndown (25% - 100%)
- high efficiency level at partial load

Source: Davidson, J.; Bertele, O.v.:
Process Fan and Compressor Selection. MechE Guides 1995

Characteristic performance curve of a high speed turbo



Power curve WWTP

Characteristic curve

Design point

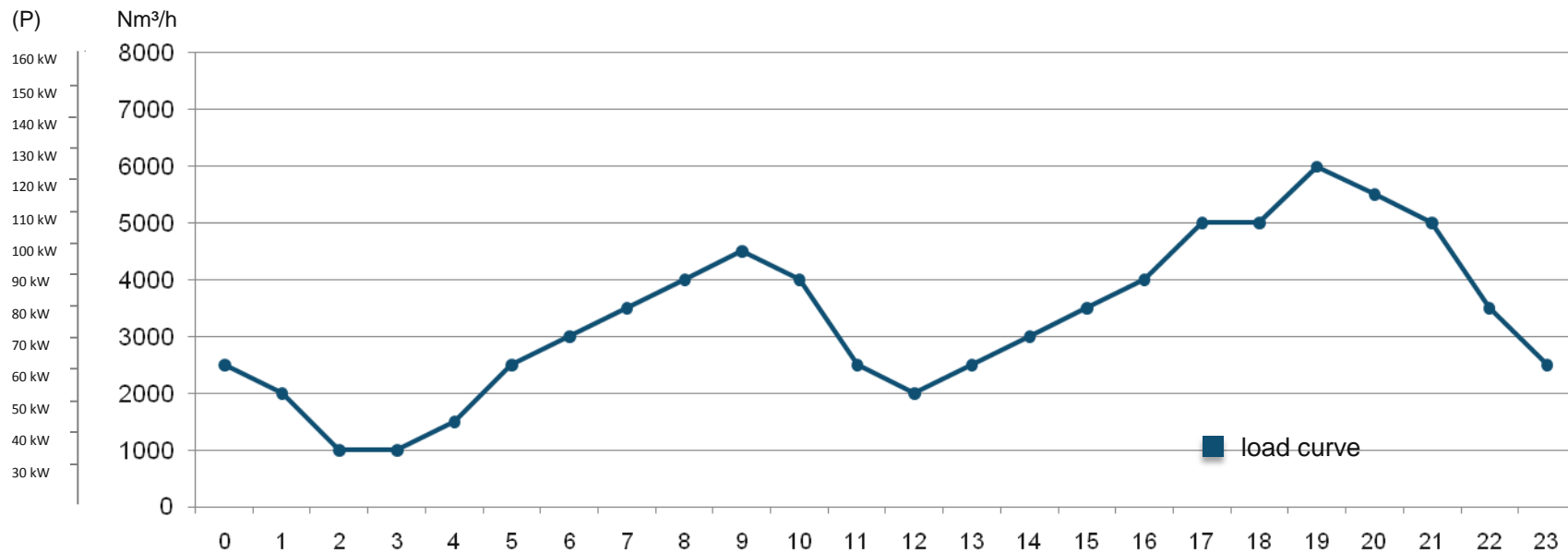
- Very high efficiency level (~78%)
- High turndown (40% - 100%)
- Low efficiency at partial load

Source: Bohl, W.: Strömungsmaschinen 1
Aufbau und Wirkungsweise. 1998

Waste water treatment: serving load changes precisely



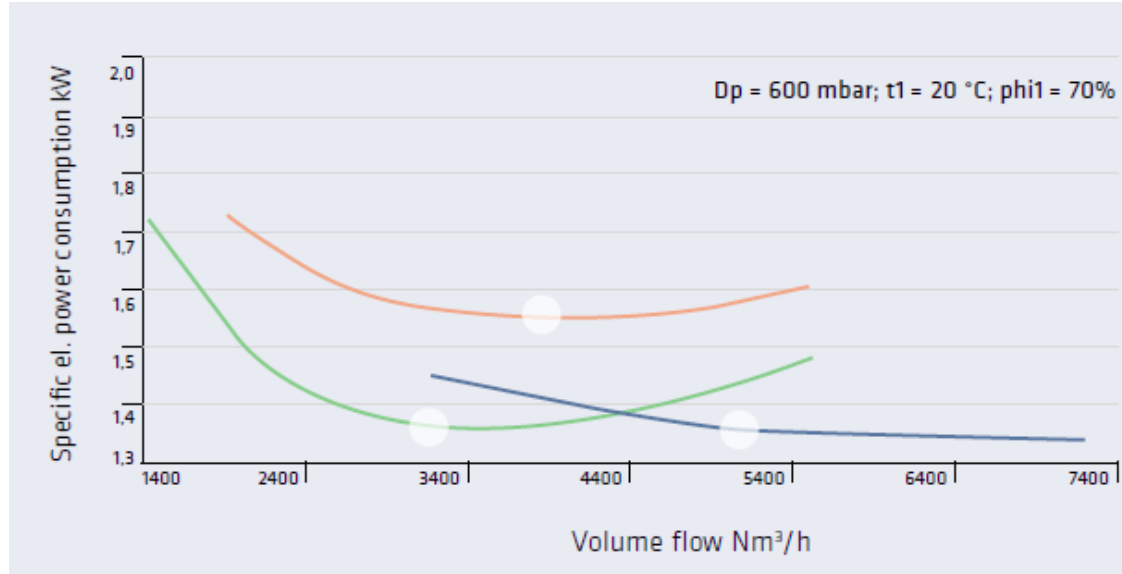
24-hour load curve



Serving load changes precisely. Combining technologies.



Blower + Compressor + Turbo



Rotay Lobe Blower

Rotary Lobe Compressor

High Speed Turbo

Integrated approach:

- efficiency
- turn down
- efficiency at partial load
- investment and service costs



innovative control system

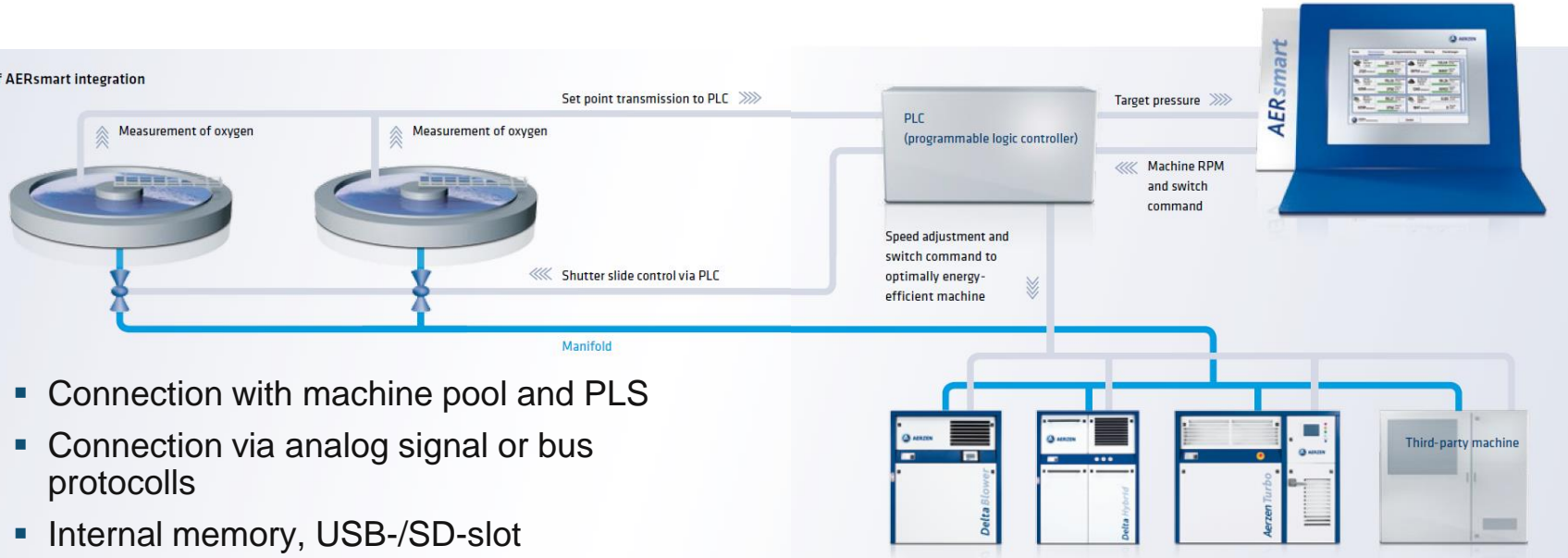
From the best to the very best performance



Smart Control: innovative control system



Example of AERsmart Integration



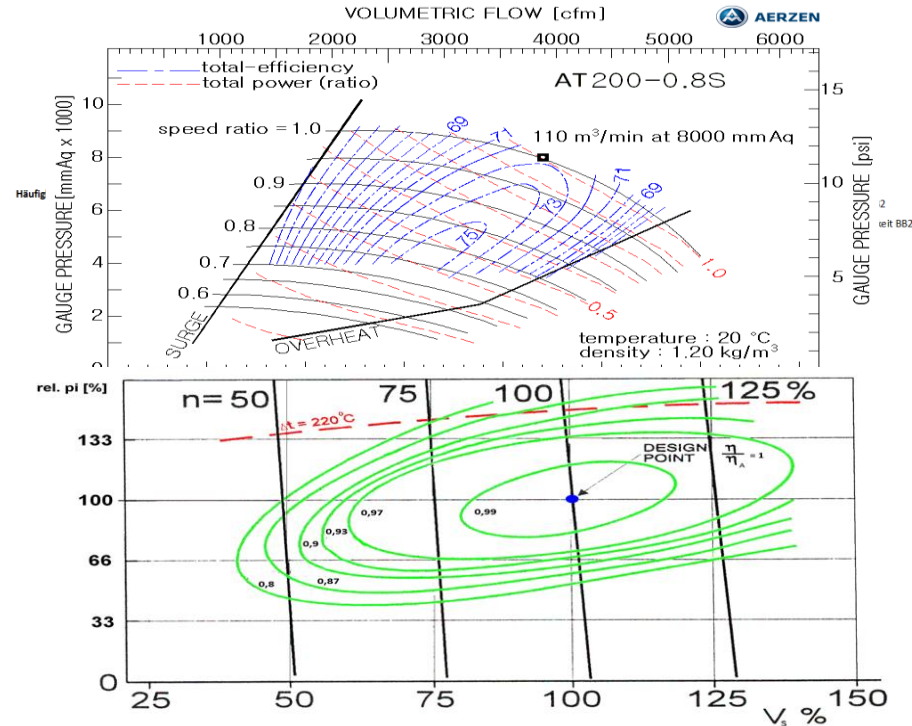
- Connection with machine pool and PLS
- Connection via analog signal or bus protocols
- Internal memory, USB-/SD-slot
- Embedded Webserver for data transfer via Internet
- Remote diagnostics

Smart Control – Function principle

The Algorithm

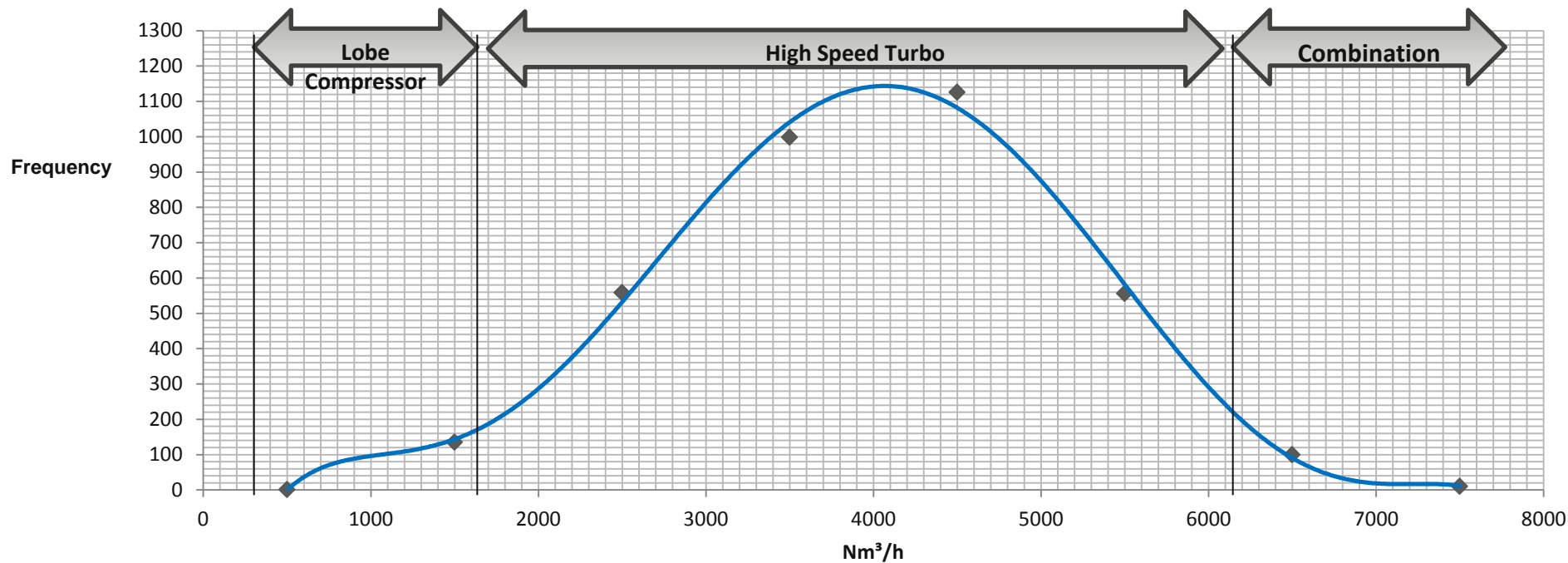
- Load based control of highest possible efficiency
 - Regardless which technology, or blower combination is installed.
- Continuous calculation of the highest overall efficiency
- Add / remove machines from the process and exact/optimal distribution of the required air load to each single machine to end up with the....

➡ Highest overall efficiency!!!



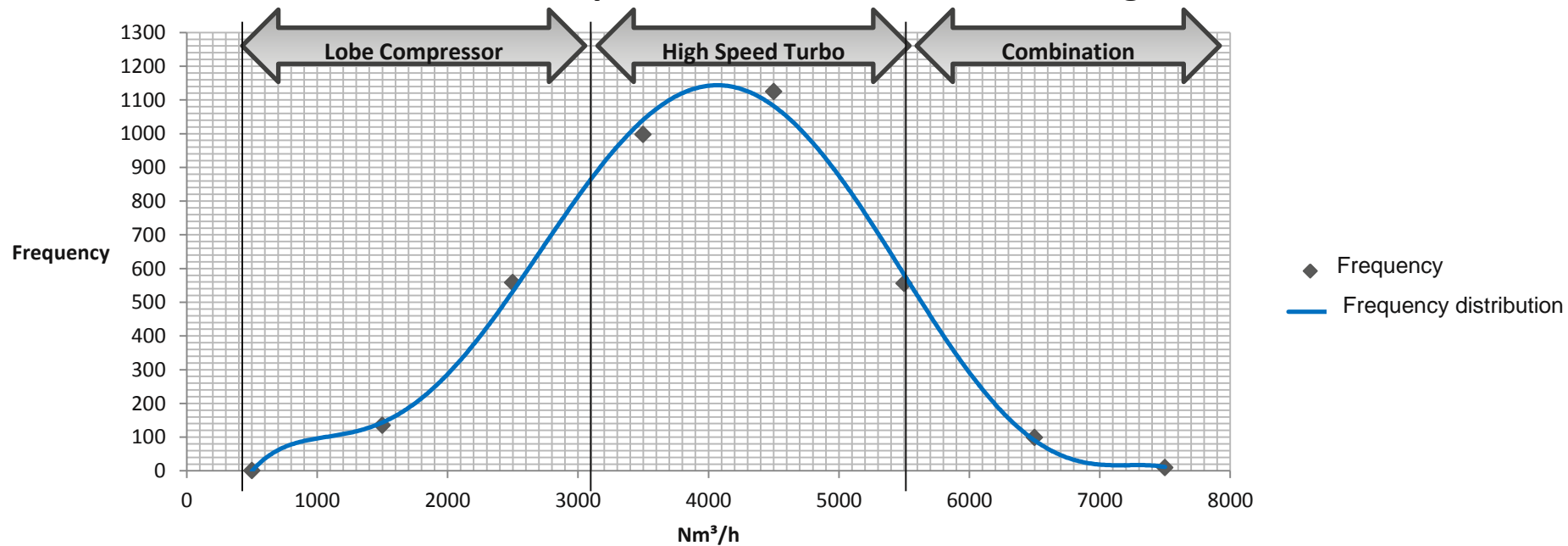
Smart Control Function principle

Combined operation with non efficient “Switching”




Smart Control Function principle

Combined Operation with efficient Switching!



Smart Control – load cycles and efficiencies combined function

 **Continuous calculation of the highest total efficiency!**

 **Optimal distribution of the load (required airflow) within the machine pool!**

 **Additional savings of up to 15%!**

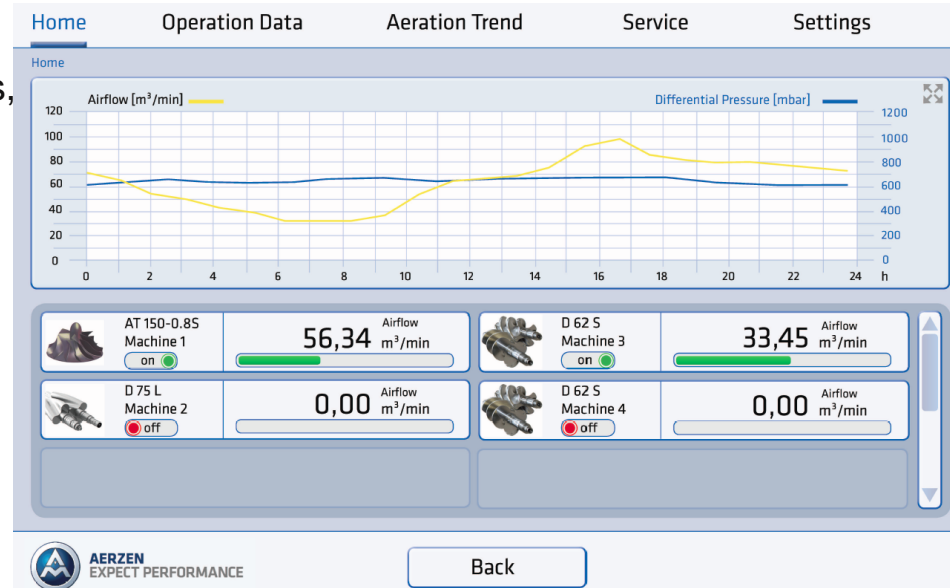
Smart Control – for a new level of efficiency

- The algorithm and precise integration of the machine performance maps
- Highest levels of efficiency, close to the optimum. Efficiency increases up to 15%
- Manage load cycles efficiently and with pinpoint accuracy
- Multiple technologies combined, both displacement and turbo machines
- Integration of third-party equipment
- Central control of up to 12 machines

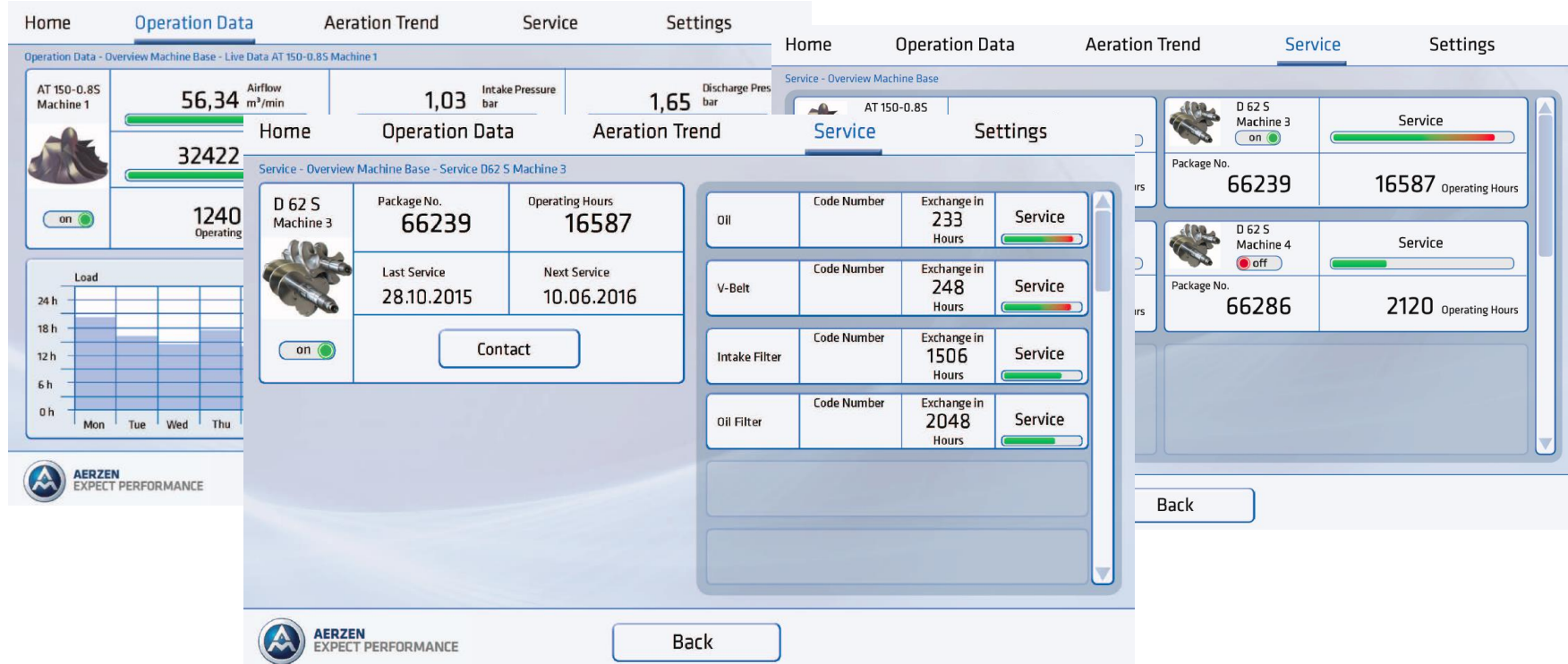


Comprehensive visualization and analysis

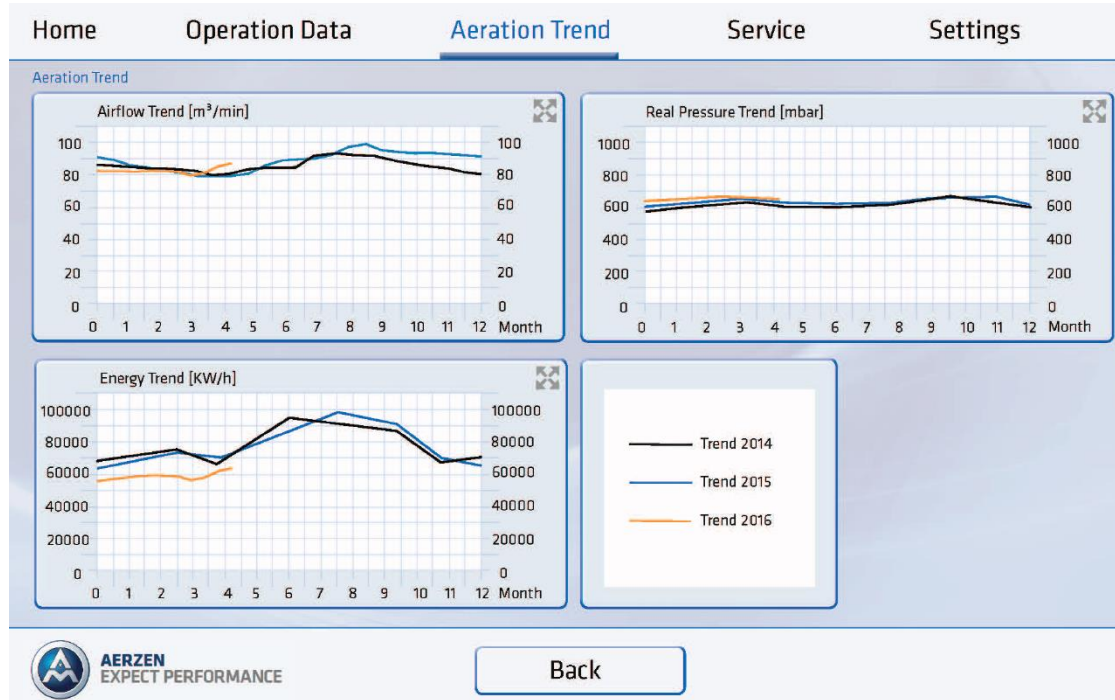
- Display and recording of the required air volumes, machine pressures, temperatures, power consumptions, machine data
- Display in real time, trend analysis, comparison of yearly values
- Reporting functionalities
- Service and maintenance intervals of the integrated machines, predictive maintenance
- Comprehensive energy analysis and checks
- Basis for water 4.0



Comprehensive visualization and analysis



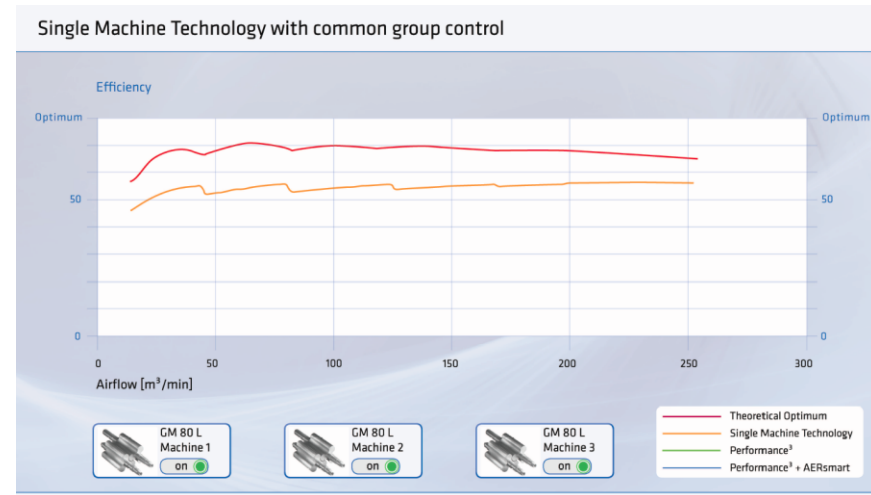
Comprehensive visualization and analysis



**360°-view on the
plant, complete
transparency over the
life cycle and highest
efficiency!!!**

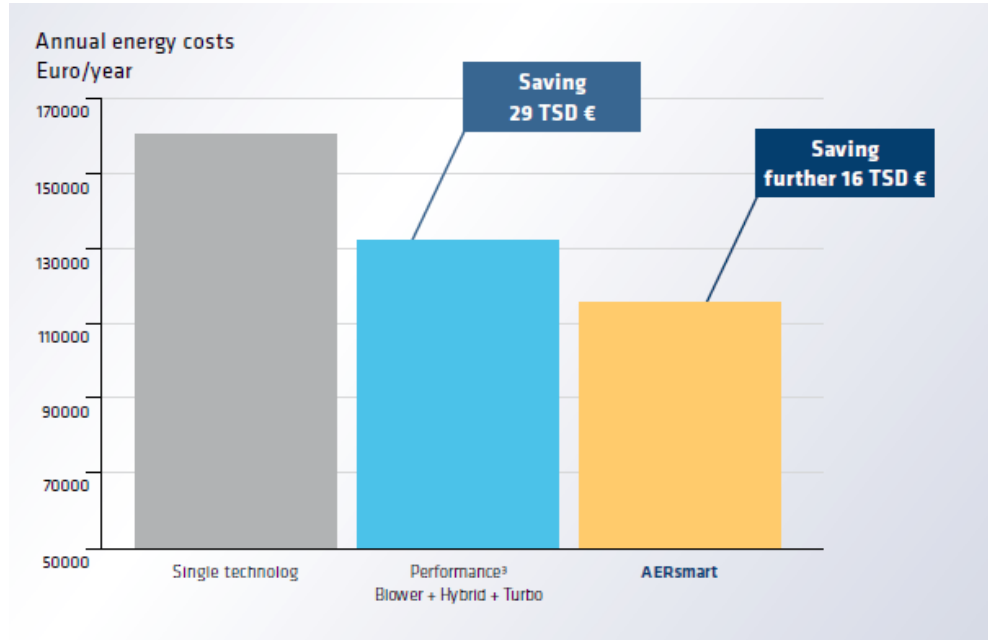
Unique features of Smart Control

- Multi Technology + Smart Control is new and unique to the market
 - Efficient control that drives **every** technology to the theoretical optimum!
- Other manufacturers just selling “group controls” without further logging features and „Multi“-technology consideration.
 - No transparency and loggings to investigate plant progress
 - No control of the maximum possible overall efficiency.



Cost saving facts. Very short Return-On-Invest

Real reference at a plant of 100,000 PE (population equivalent)



The potential for significant energy savings is tremendous!
The initial invest is already compensated after few years!



Reference plant Rheda-Wiedenbrück, Germany

Waste water treatment plant Rheda Wiedenbrück



Project overview

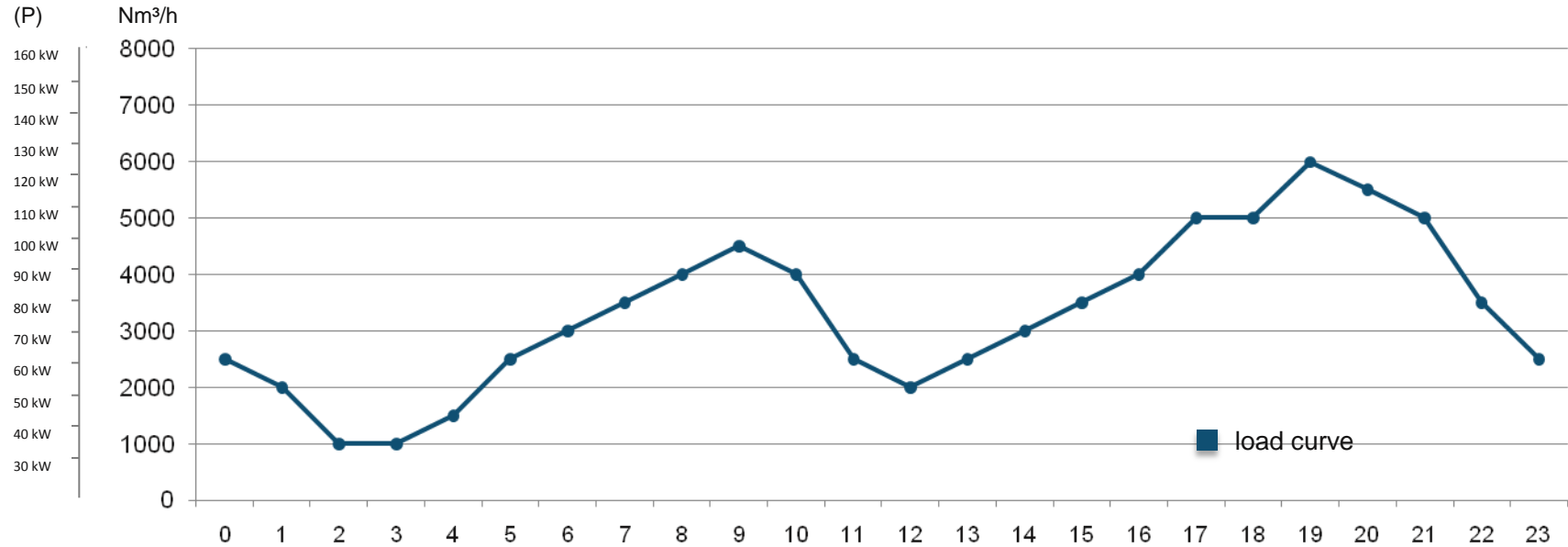
- Municipal wastewater treatment plant
- 326,000 population equivalents (incl. industrial waste water)
- 2 x rotary lobe blower (since 1998)
- Energy-autonomous wastewater treatment plant (investments for biogas and aeration)
- Installation of 1 x compressor + 1 x high speed Turbo (operational since July 2014)



Waste water treatment plant Rheda-Wiedenbrück



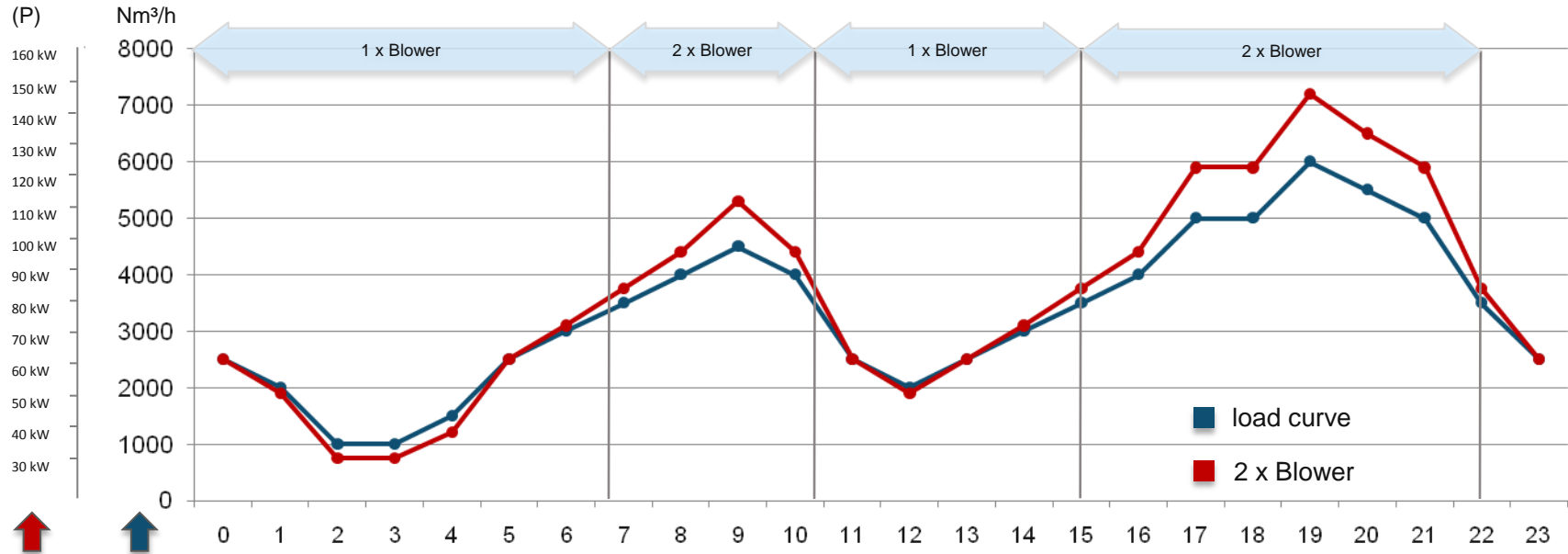
24-hour load curve



Waste water treatment plant Rheda-Wiedenbrück



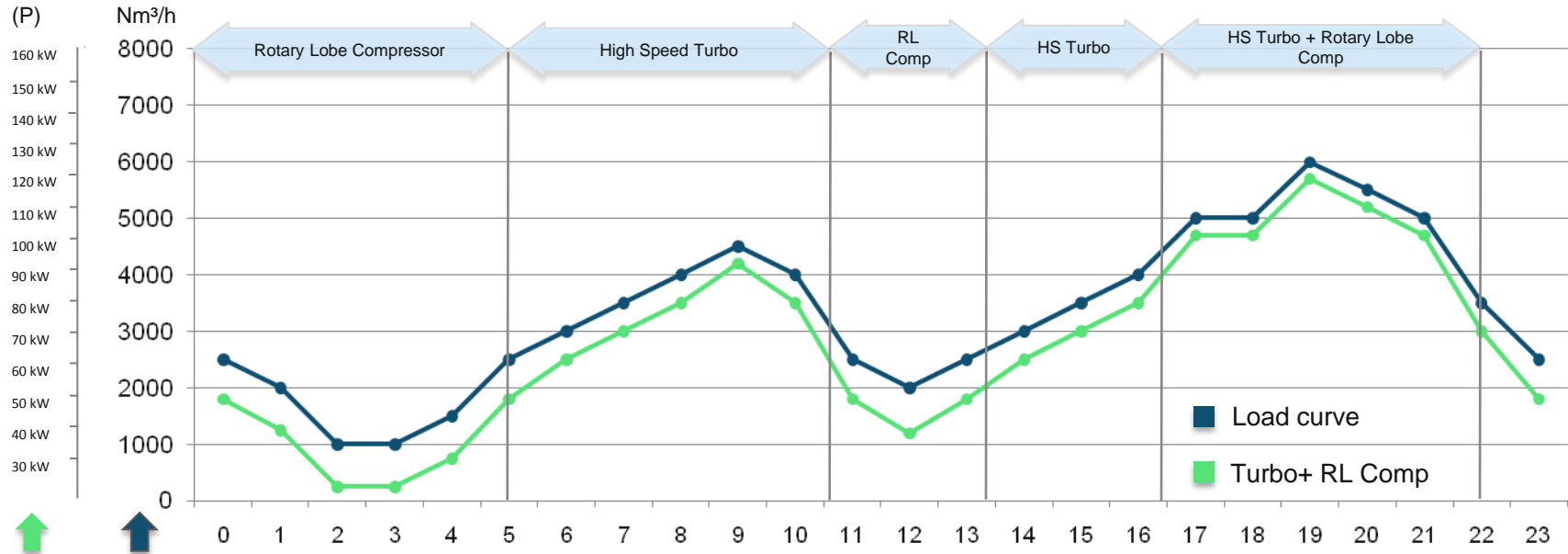
Application of 2 x Rotary Lobe Blower



Waste water treatment plant Rheda-Wiedenbrück



Combination of High Speed Turbo and Rotary Lobe Compressor and Smart Control

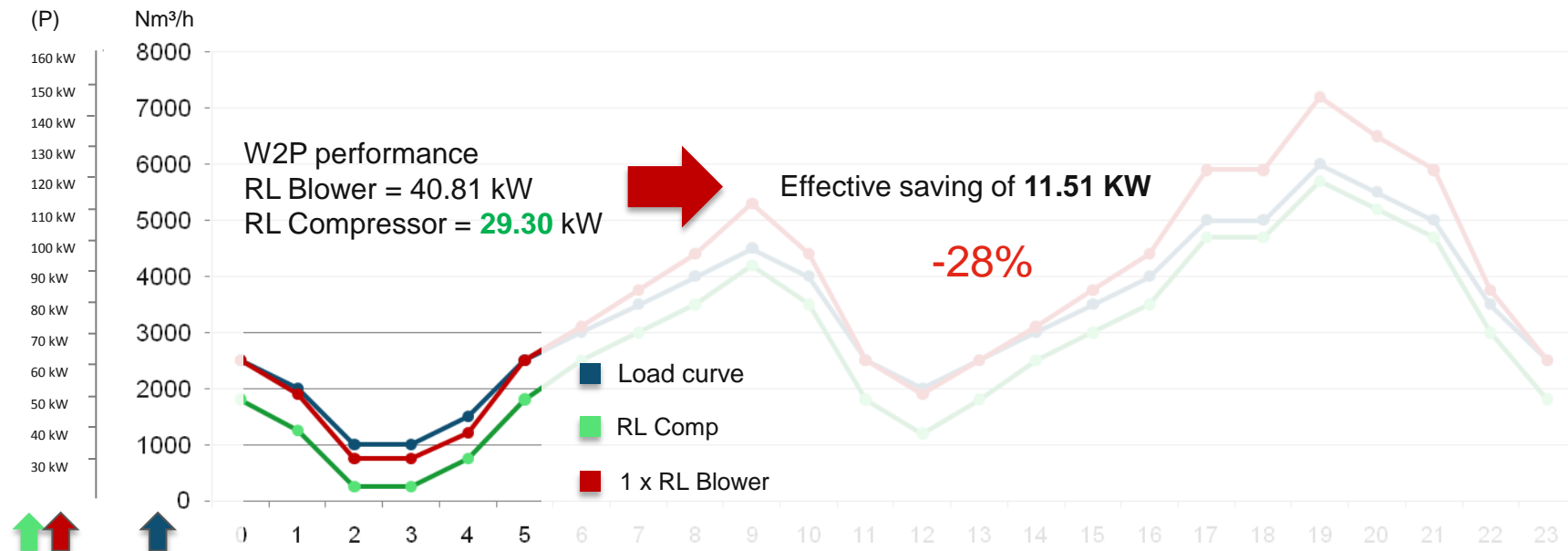


Waste water treatment plant Rheda-Wiedenbrück

Energy saving of the load ranges



Low load operation

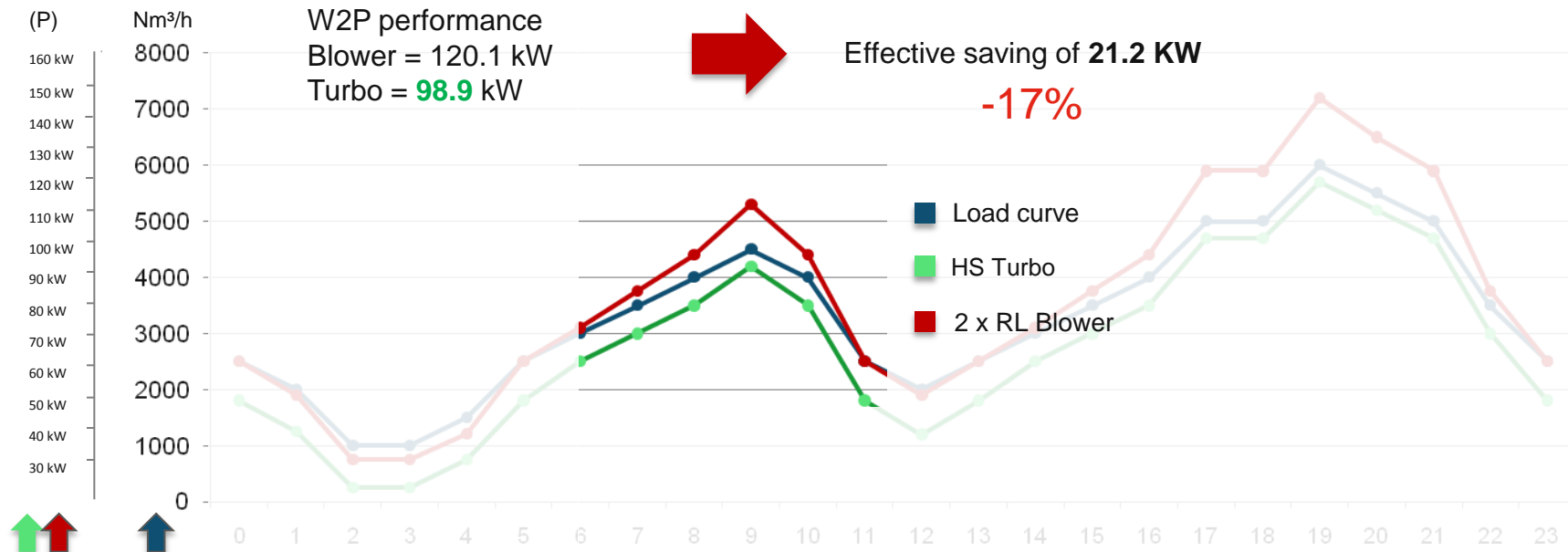


Waste water treatment plant Rheda-Wiedenbrück

Energy saving of the load ranges



Medium load operation

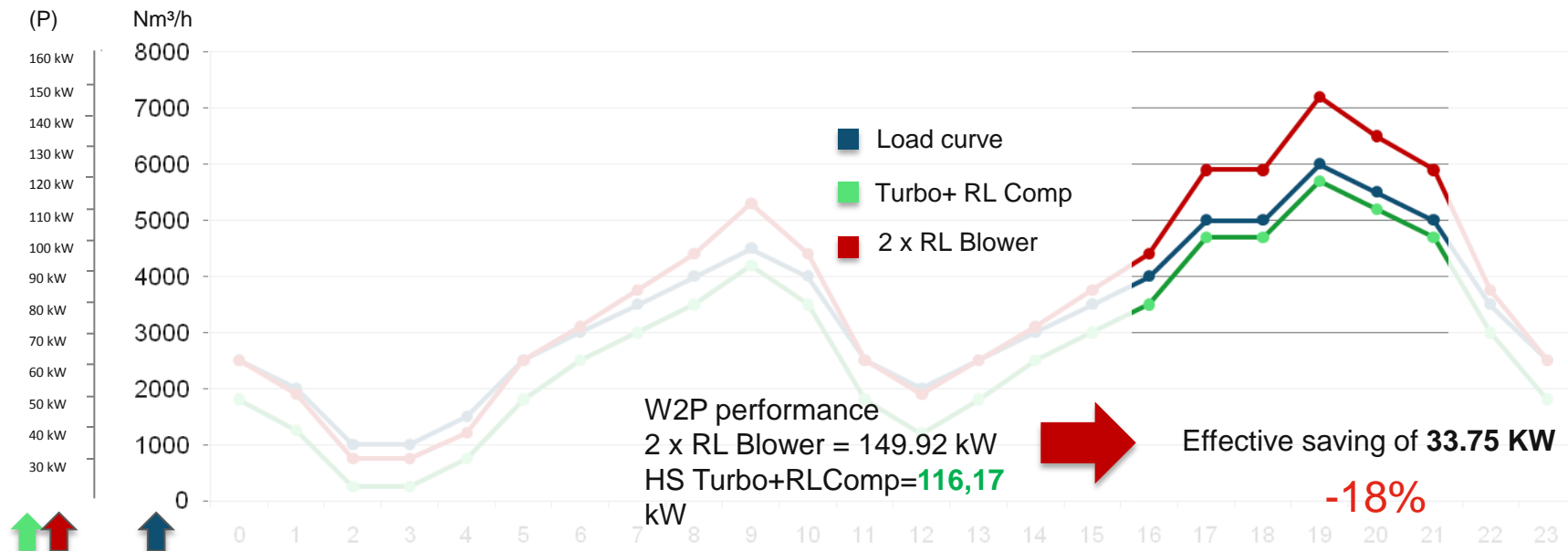


Waste water treatment plant Rheda-Wiedenbrück

Energy saving in the load ranges



High load operation

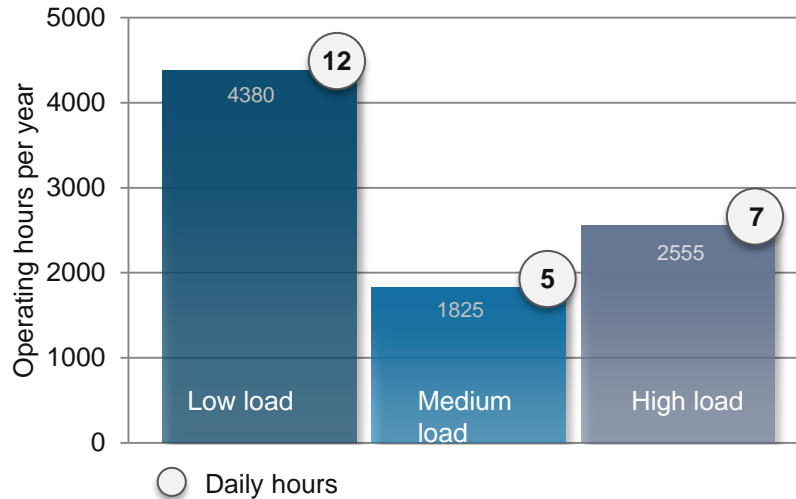


Waste water treatment plant Rheda-Wiedenbrück

Cost saving of the load ranges



Distribution of loads within one year



Annual saving:

Low load: 11,091 € (11.51 KW)

Medium load: 8,511 € (21.2 KW)

High load: 18,942 € (33.75 KW)

Total: **38,544 €**