Challenges to ventilation due to new workplace limits in Germany

Michael Delahaye
Matthias Papesch

Presentation structure

1. Introduction
2. Rules / Limit values
3. Influence on ventilation
4. Actions for ventilation
5. Conclusion

1. Introduction

Challenging workplace limits

Building / Industry

Example
Tunneling

Complication through
Peripheral conditions

Mining

Difficult
Peripheral conditions

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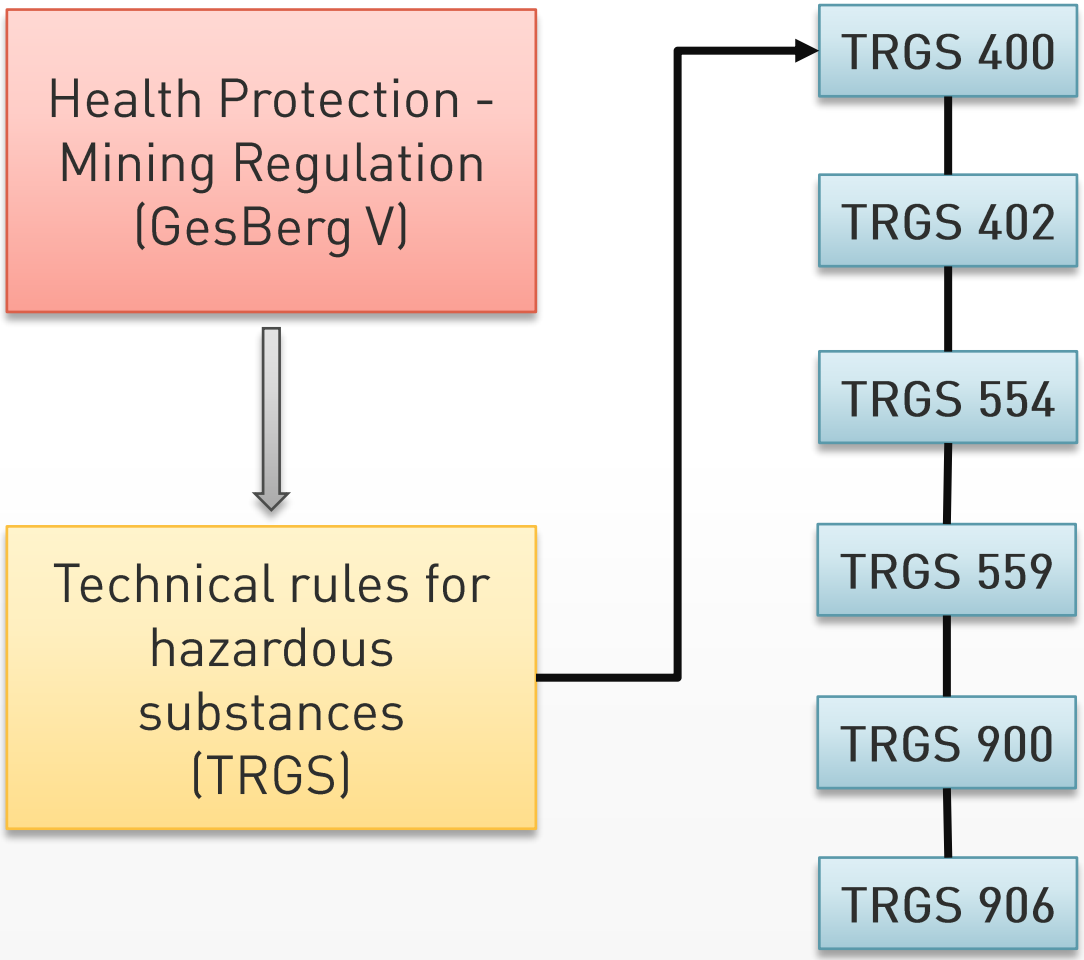
2. Rules / Limit values



TRGS 400	Risk assessment for activities with hazardous substances
TRGS 402	Determination and assessment of the hazard during activities with hazardous substances: Inhalative exposure
TRGS 554	Exhaust gases from diesel engines
TRGS 559	Mineral dust
TRGS 900	Workplace limit values
TRGS 906	List of cancer-causing activities or processes according to §3Abs.2 Nr.3 Ordinance on Hazardous Substances

2. Rules / Limit values

TRGS 900

May 2016

In force Nov. 2016

NO 2ml/m³ (ppm)

NO_2 0,5ml/m³ (ppm)

TRGS 554

May 2017

In force Nov. 2017

DME 50µg/m³ = 0,05g/m³

Transition period mining until 2021

Review of activities 2019

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3. Influence on ventilation

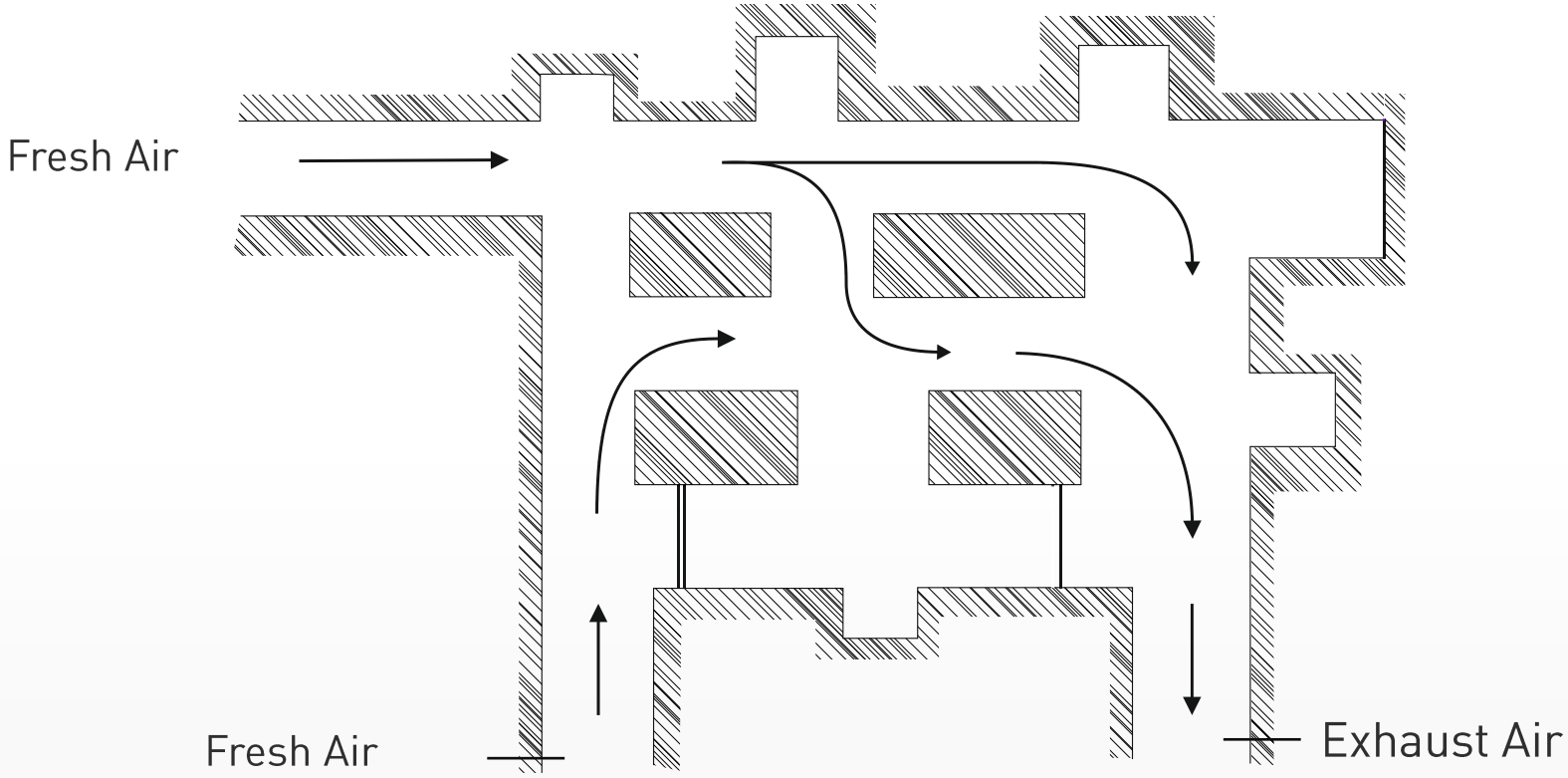
Blasting Gases

Diesel exhaust gases

Dust

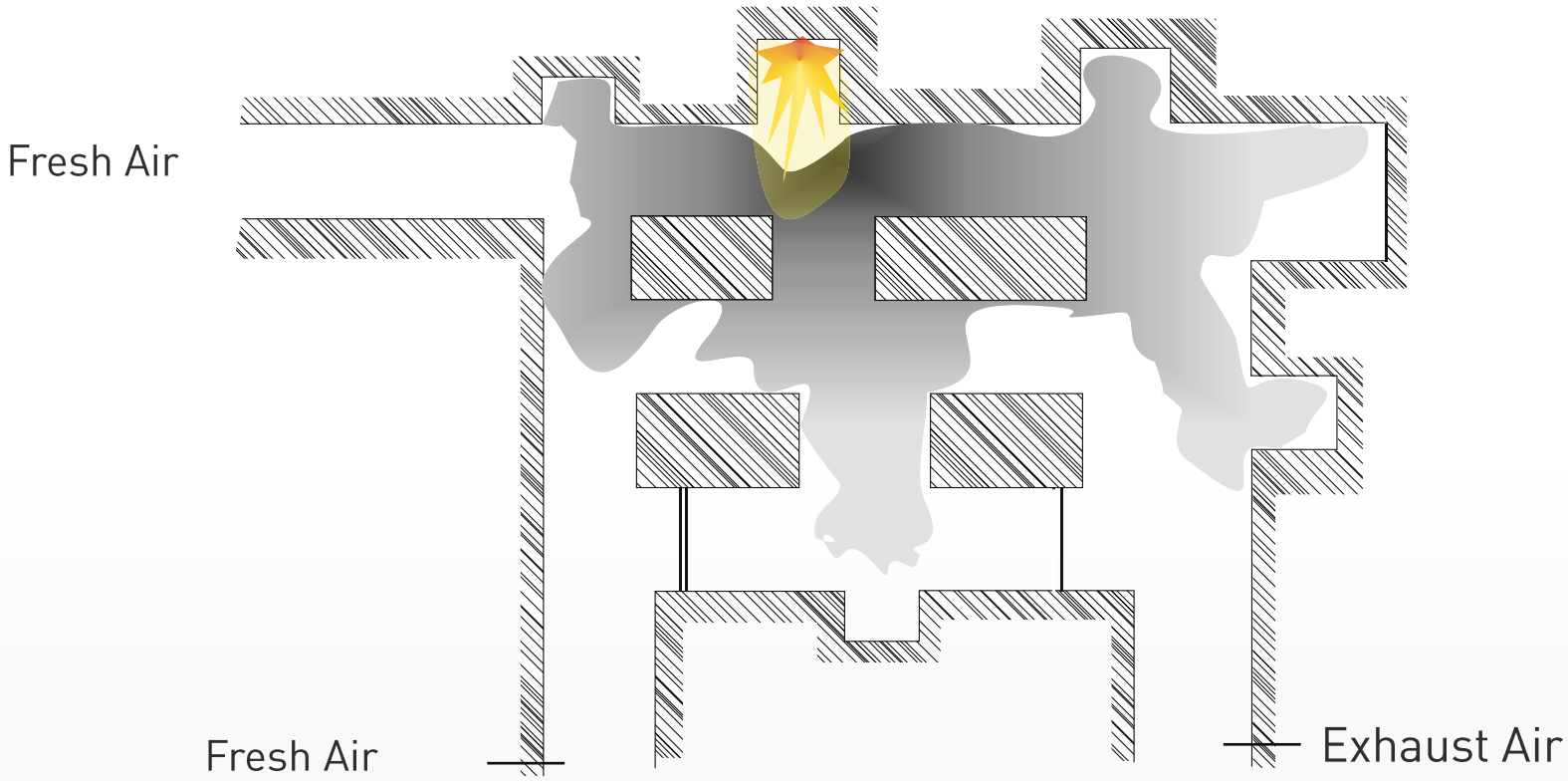
3. Influence on ventilation

Blasting Gases



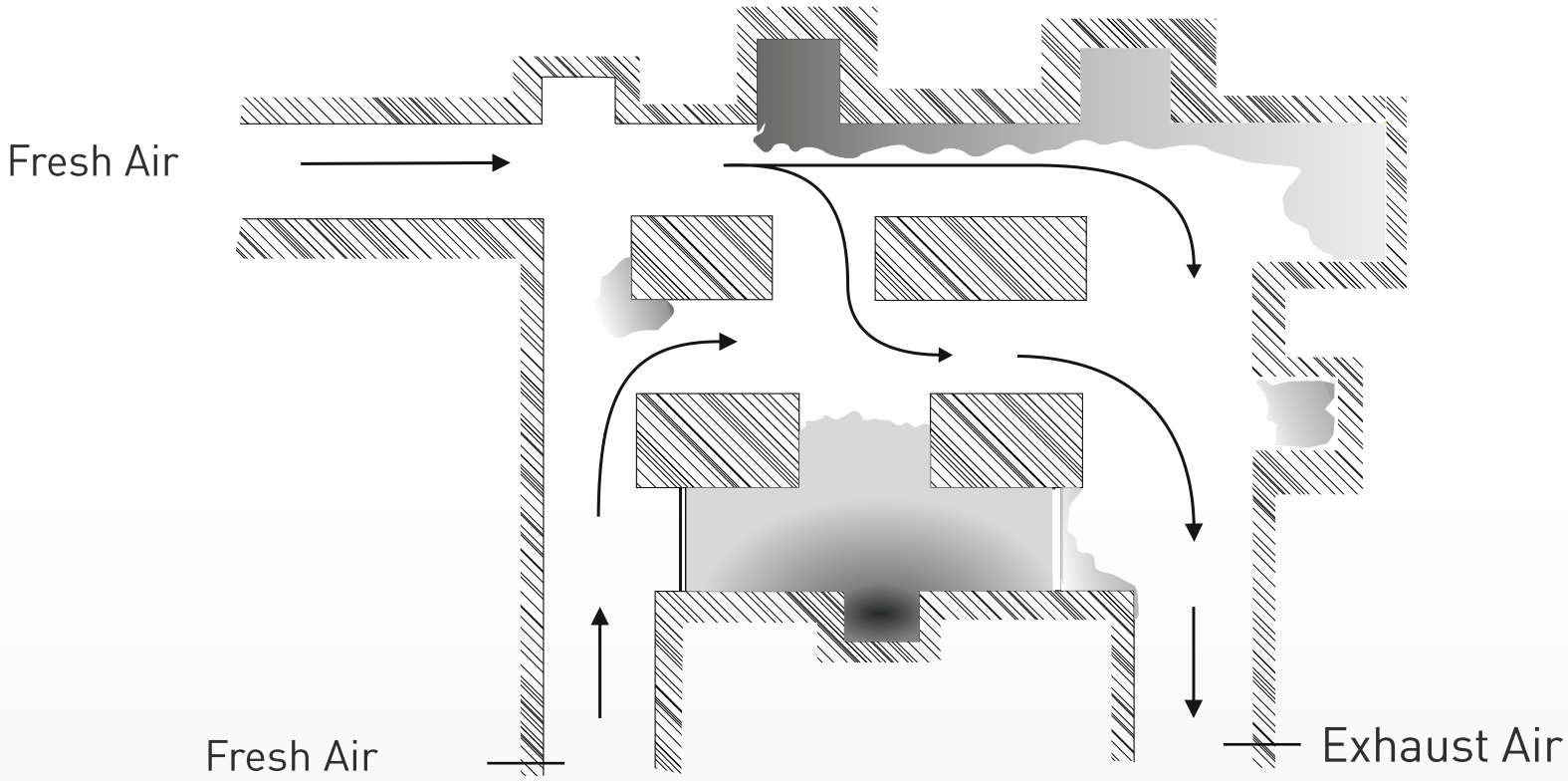
3. Influence on ventilation

Blasting Gases



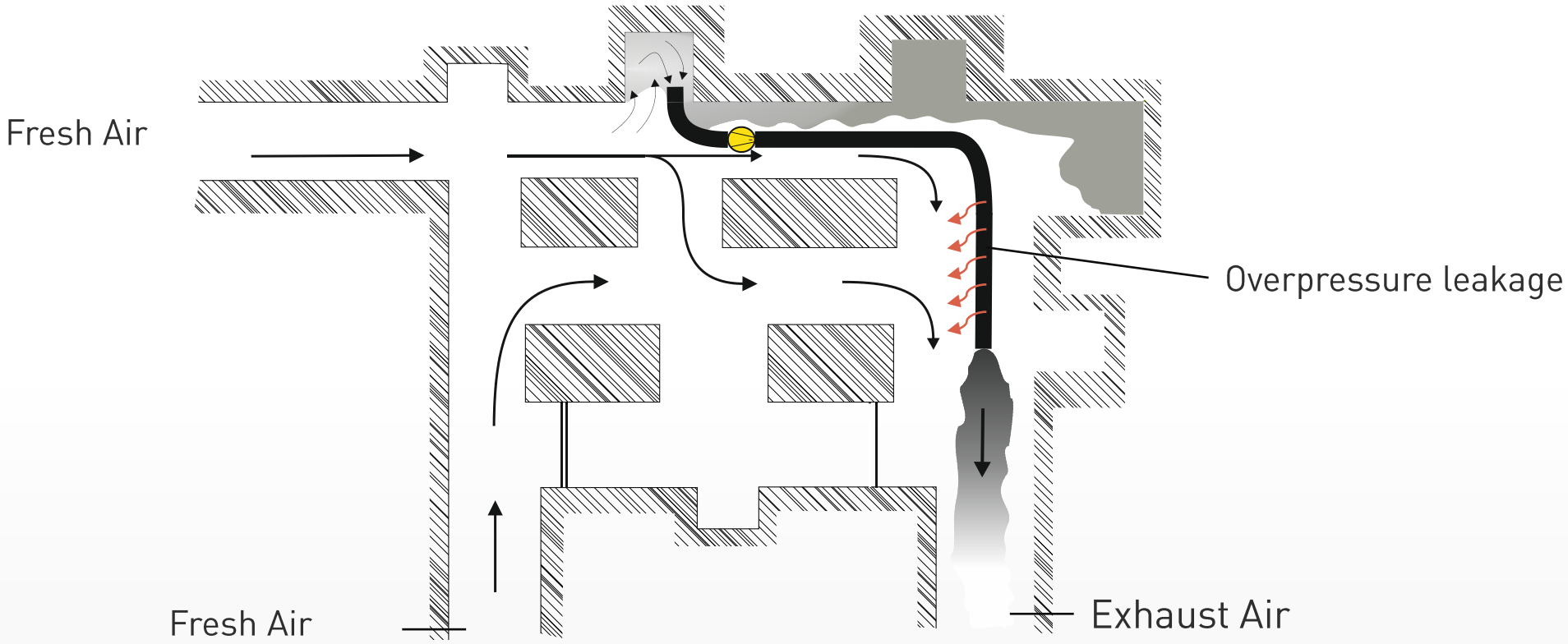
3. Influence on ventilation

Blasting Gases



3. Influence on ventilation

Blasting Gases



3. Influence on ventilation

Diesel exhaust gases

Diesel exhaust gases	Old	New Limit values	or	Motor-Optimization		Process-Optimization		Additional Alternative solutions electric vehicles Belts etc. Example
				Ex.1	Ex.2	Ex.1	Ex.2	
Vehicles Diesel	10	3	10	5	10	10	8	4 Diesel vehicles 5 Electro vehicles
Fresh Air Amount	100%	100%	330%	100%	200%	200%	180%	110%
Work process	100%	30%	100%	50%	100%	120%	100%	100%

Solution

Exemplary representation - not supported by facts

3. Influence on ventilation

Dust

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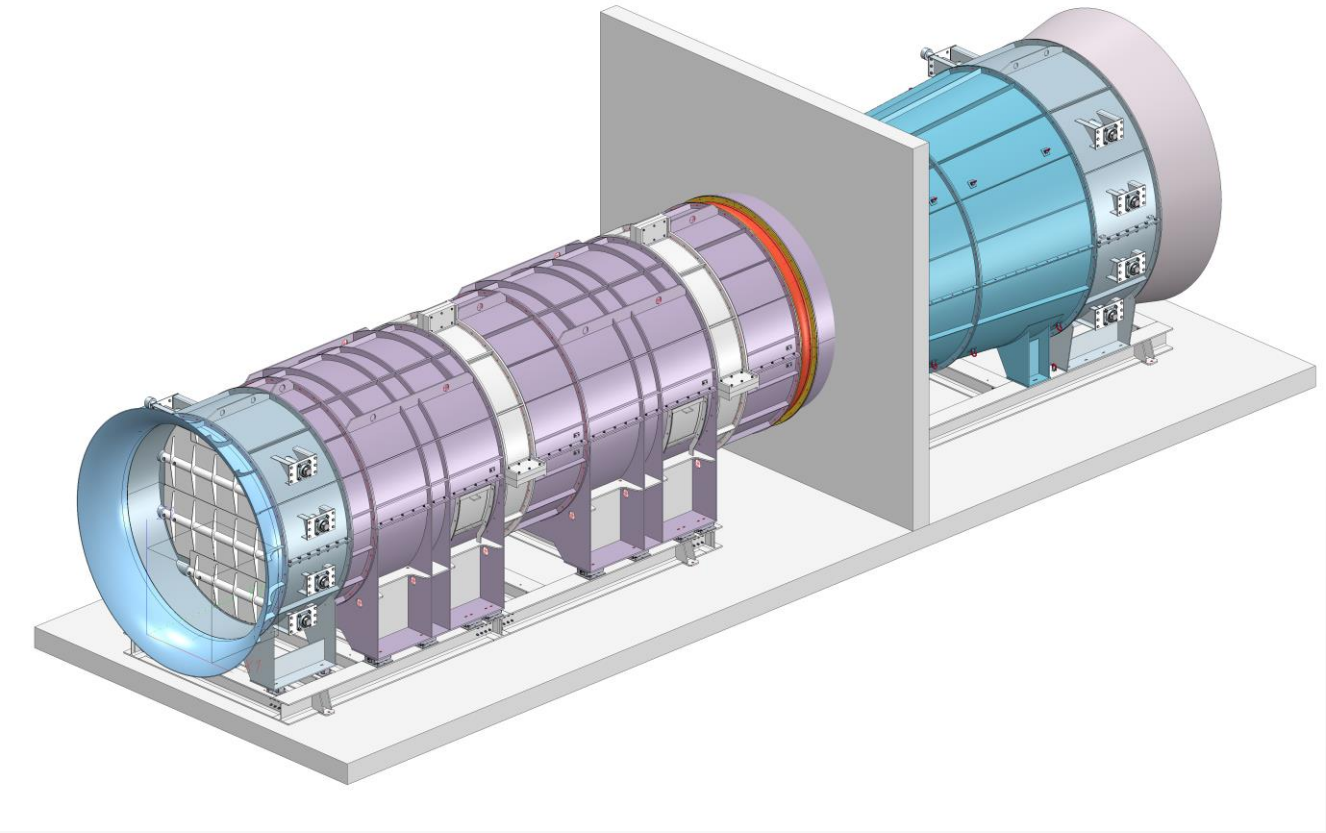


4. Actions for ventilation

Air volume increase

For the

Main weather

Pressure increase

- Stability shaft structures / shaft installations
- Higher leakage rates
- Stability weather walls / sluices
- Etc....

Higher Air velocities

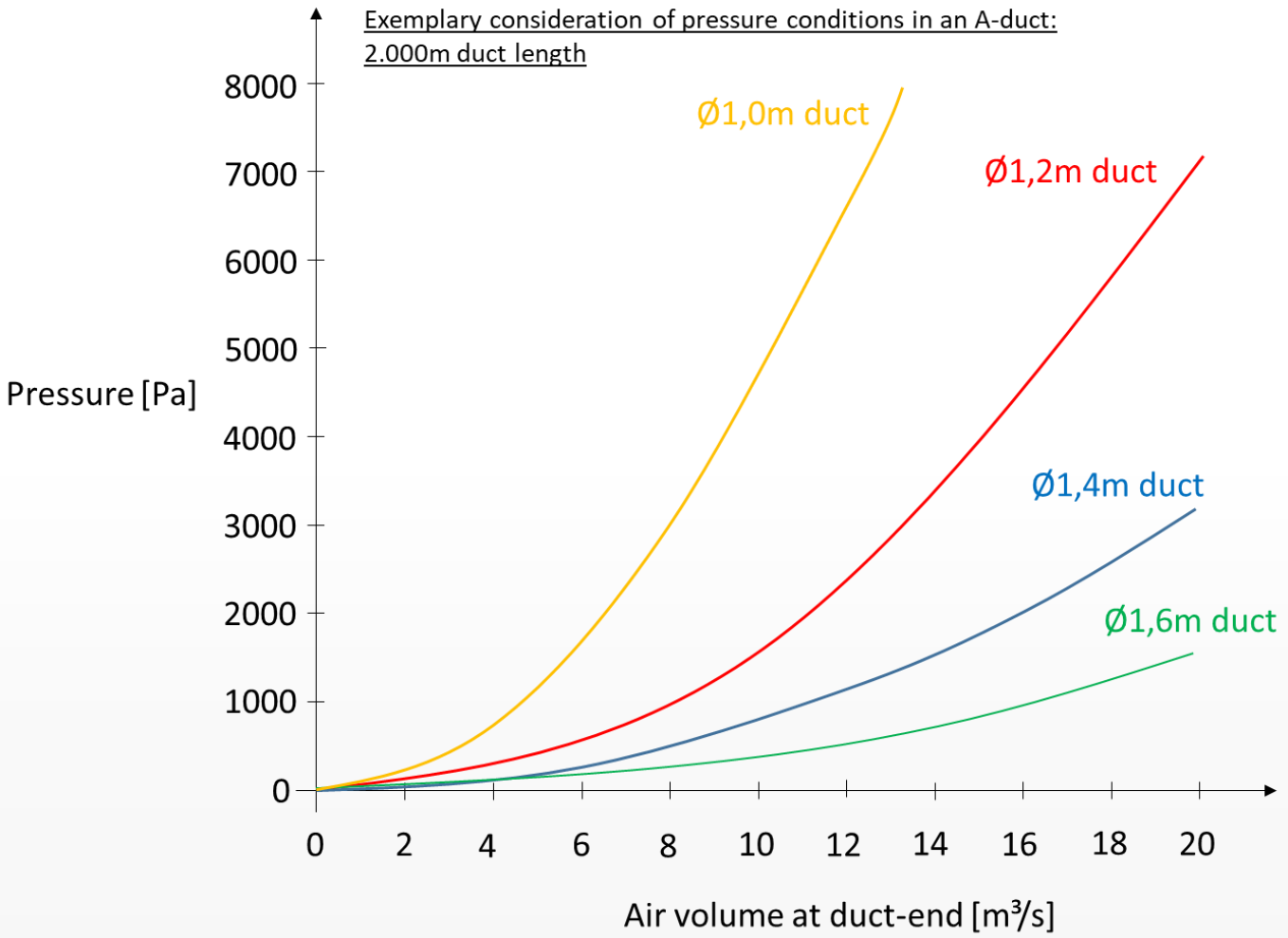
- Max. 6.0m/s in person areas
- Fine dust sets itself in motion

4. Actions for ventilation

Special ventilation

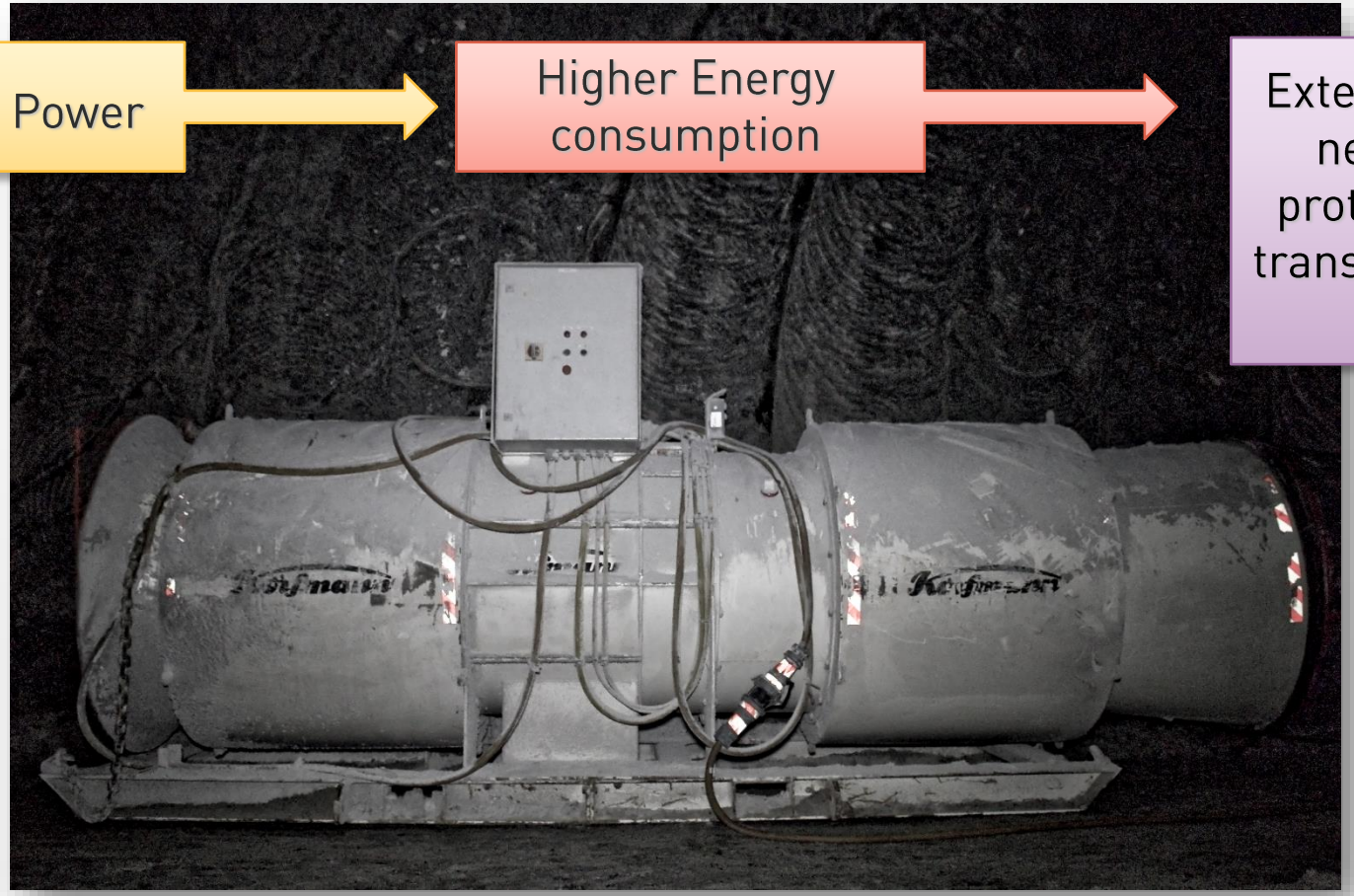
Pressure increase

by increasing the air volume



4. Actions for ventilation

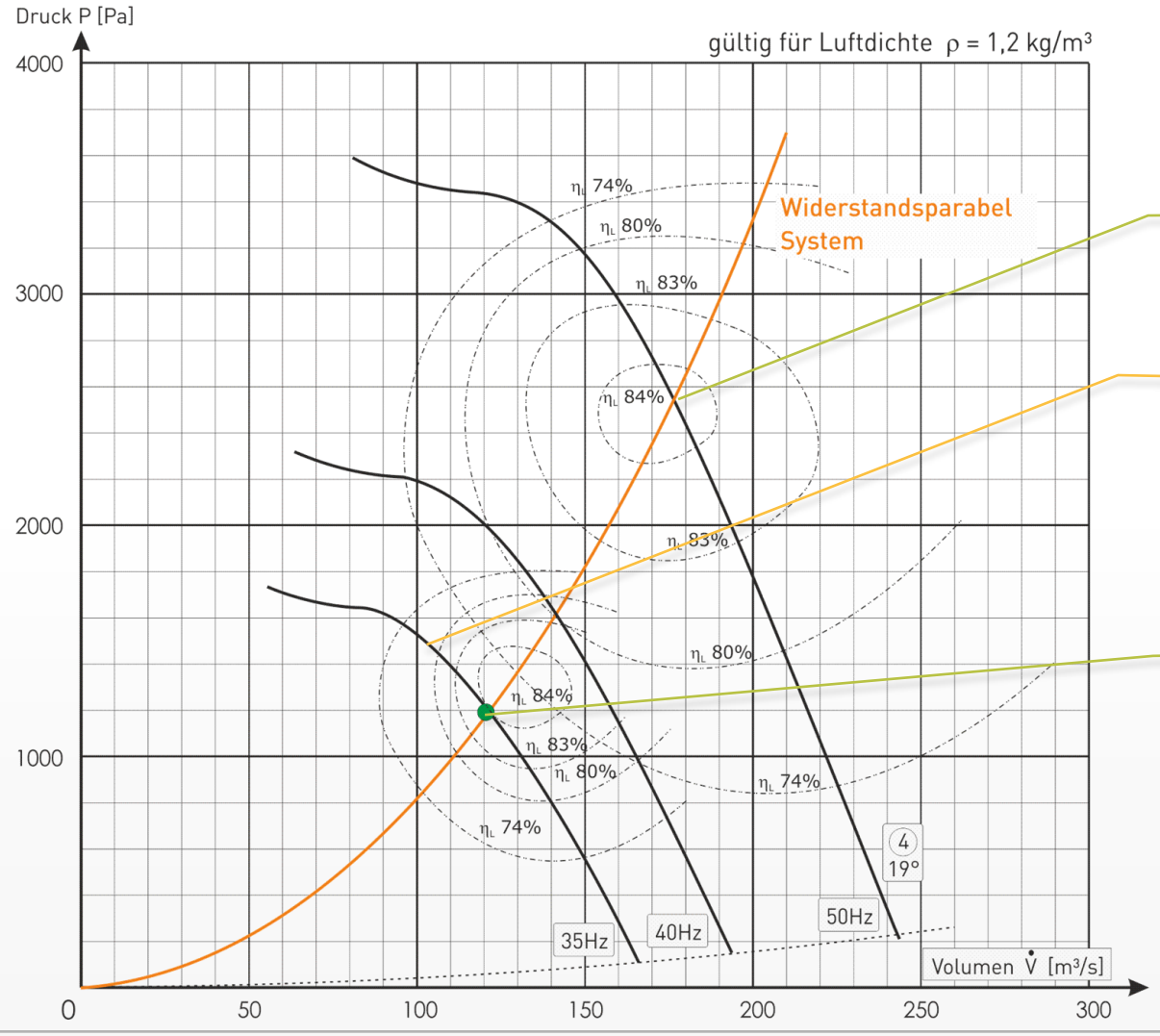
Higher Fan Power → Higher Energy consumption → Extension of energy networks, fuse protection, cables, transformer stations etc.



4. Actions for ventilation

Ventilation on Demand

Characteristic curve display
HGL
Example maintenance shift



Main operating point:
V = 176 m³/s

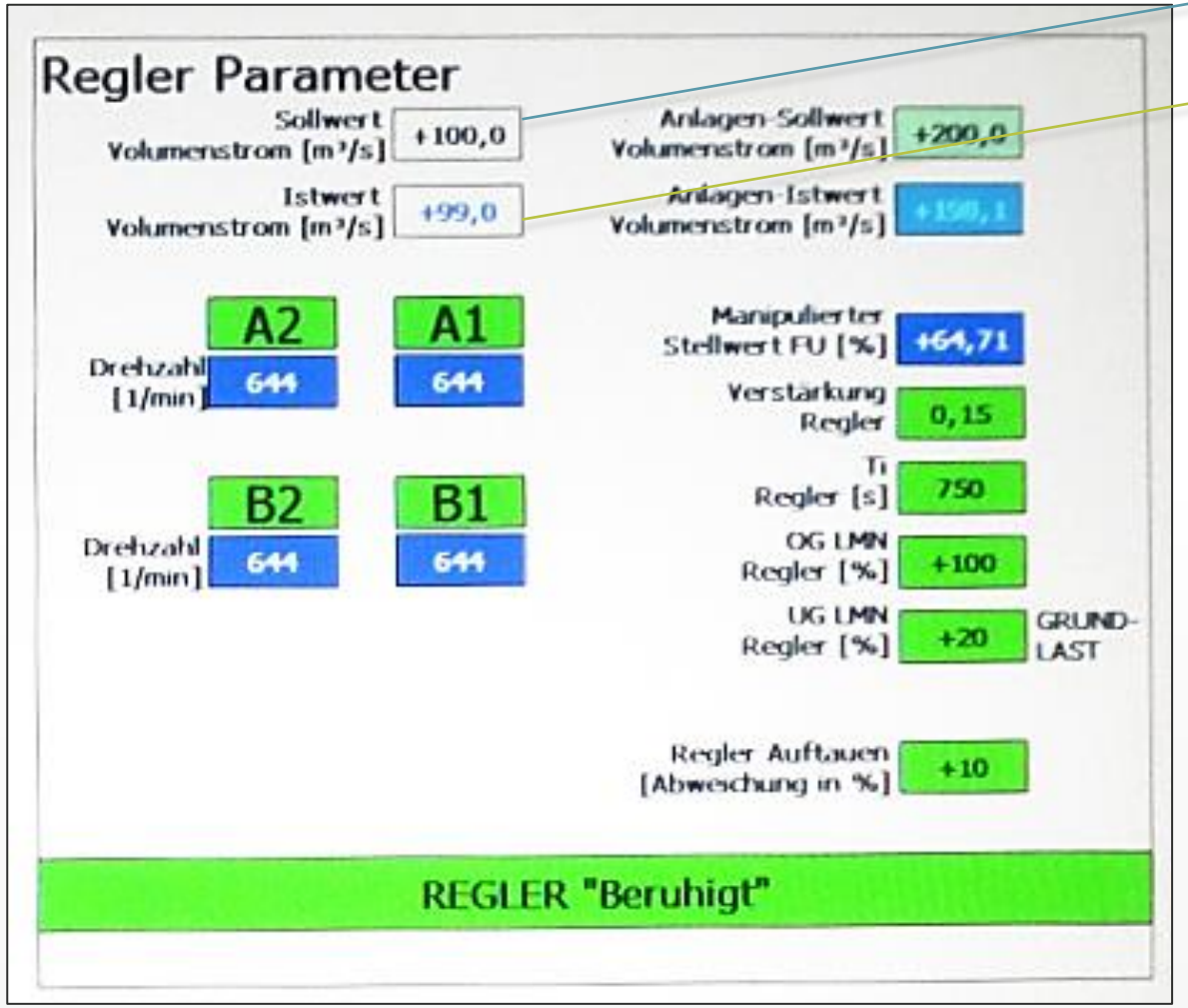
Speed control
Blade position 4

Desired
Operating point:
V = 121 m³/s

4. Actions for ventilation

Ventilation on Demand

Image detail
SPS - Control



Target value

Actual value

Control parameters

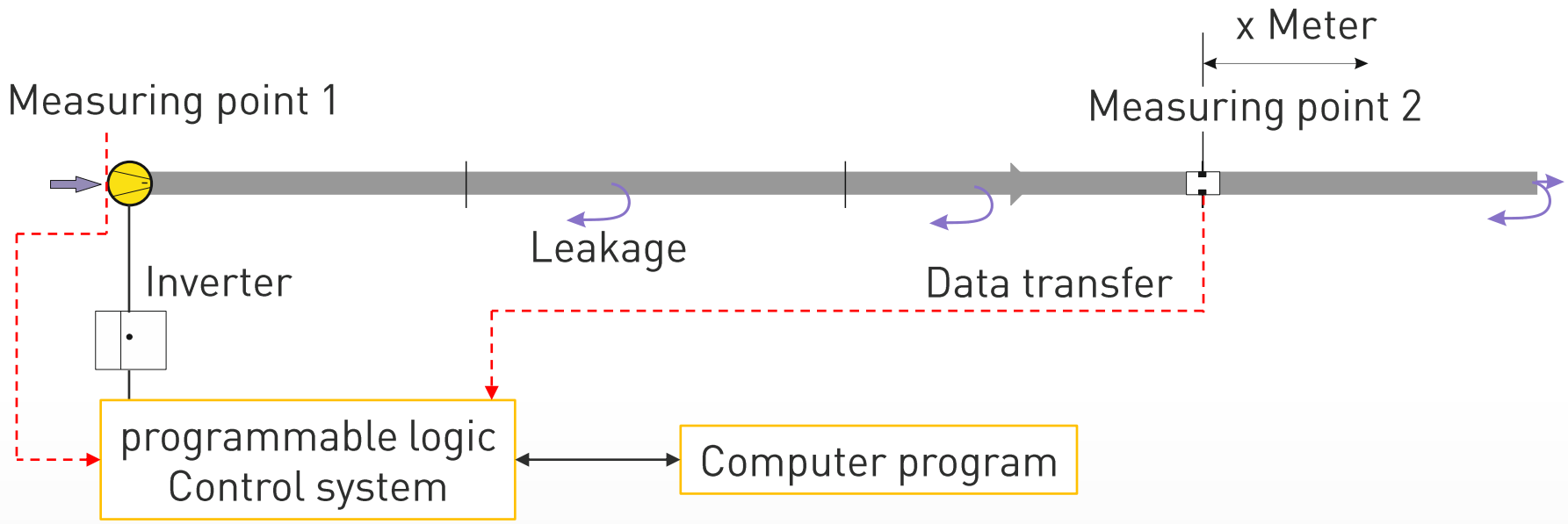
adapted to mine operation

Controller stabilization

4. Actions for ventilation

Ventilation on Demand

Illustration example system special ventilation

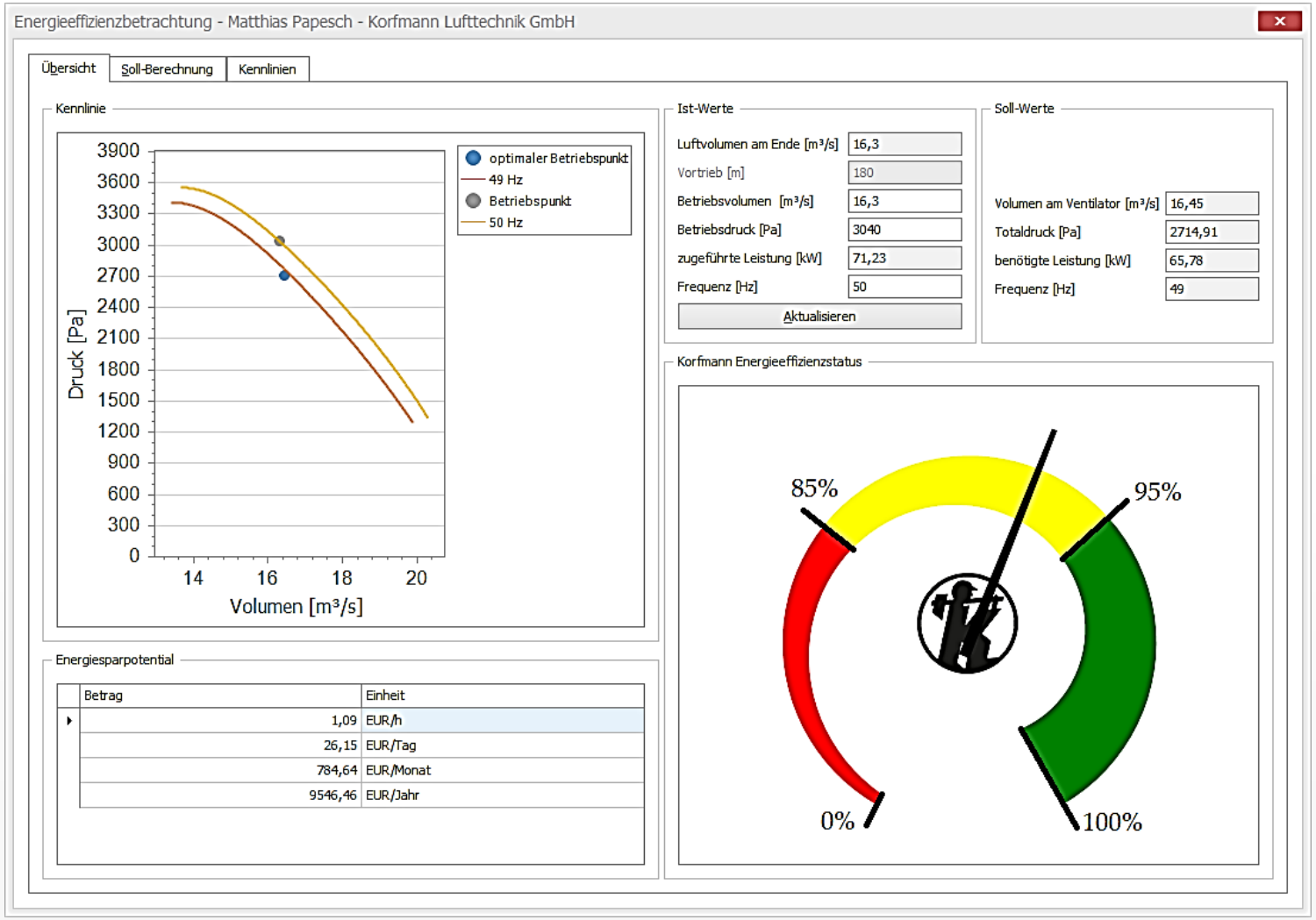


- system consists of a pre-determined fan, the duct, two measuring devices, a PLC, a frequency converter and a computer program

4. Actions for ventilation

Ventilation on Demand

Display Overview computer control Sensor controlled



4. Actions for ventilation

Demand-based control according to the required volume flow in all areas

Possible through

Communication between sensors and higher-level control

enables

Efficient, target oriented and flexible ventilation

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5. Conclusion

Goal: Full health protection with at least the same work performance

Analysis of sources and processes to reduce the weather requirements

Optimization of weather systems by integrating intelligent technology

Many thanks for your attention

„Glück Auf!“