

IMPROVEMENT OF BUILDING PERFORMANCE THROUGH OPTIMIZATION OF HVAC CONTROL STRATEGY

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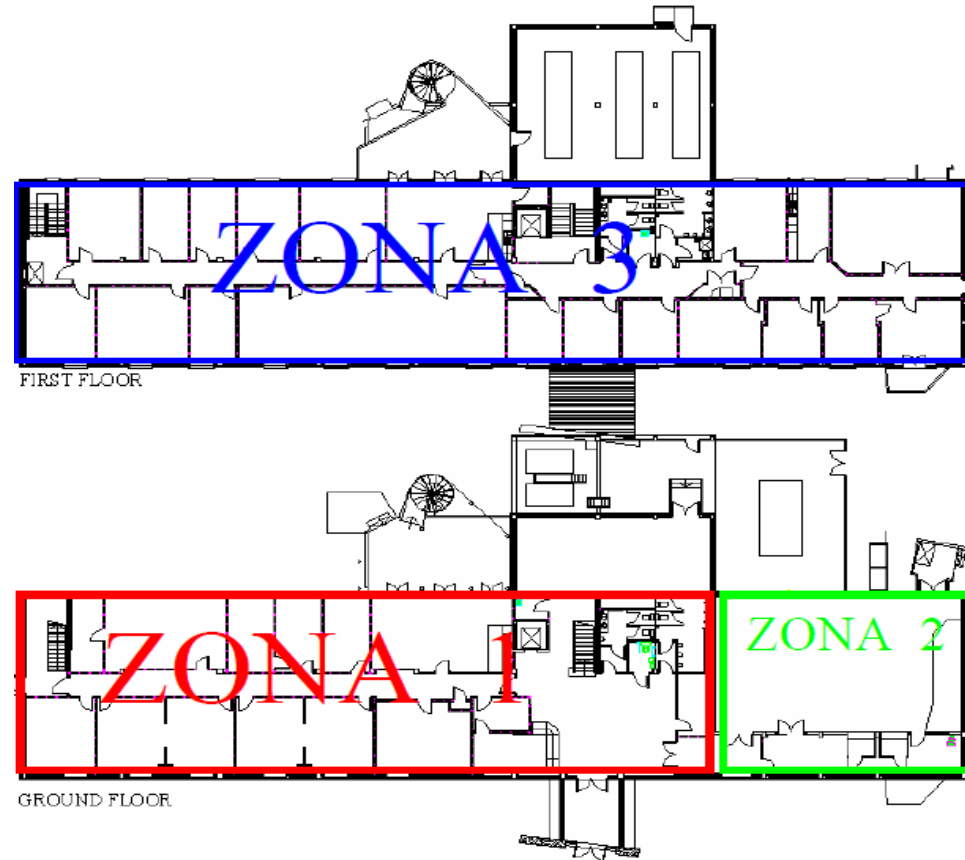
INTRODUCTION

- The building sector in the EU is the largest end-use energy consumer and responsible for more than one third of overall GHG emission – is growing
- Energy security and climate change
- EPBD / EEAP / EED - exemplary role of public bodies' buildings
- Energy savings vs. performance gap
- Adjusting control strategy according to current needs

CASE STUDY

- Building & HVAC description -

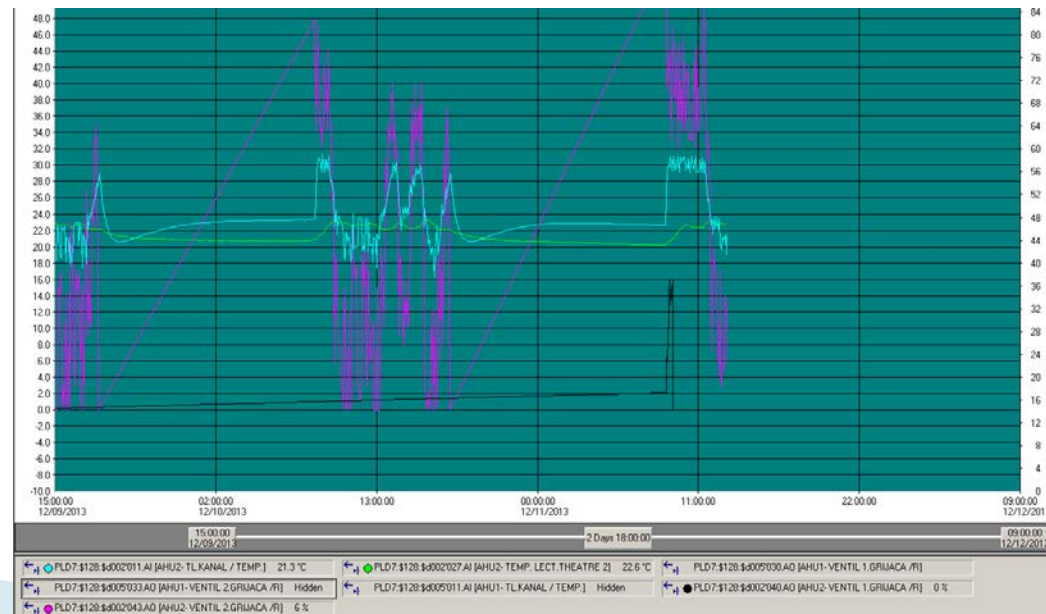
- An educational facility built-up nearby Sarajevo in 2005
- Two stores; rectangular shaped bldg; SN direction; 1 500 m²
- Three related air handling units (AHUs); mechanical ventilation with constant air volume; Run-around heat recovery system;
- Channel fan coil unit (FCU)
- Boiler room
- A building management system (BMS)



CASE STUDY

- Methodology -

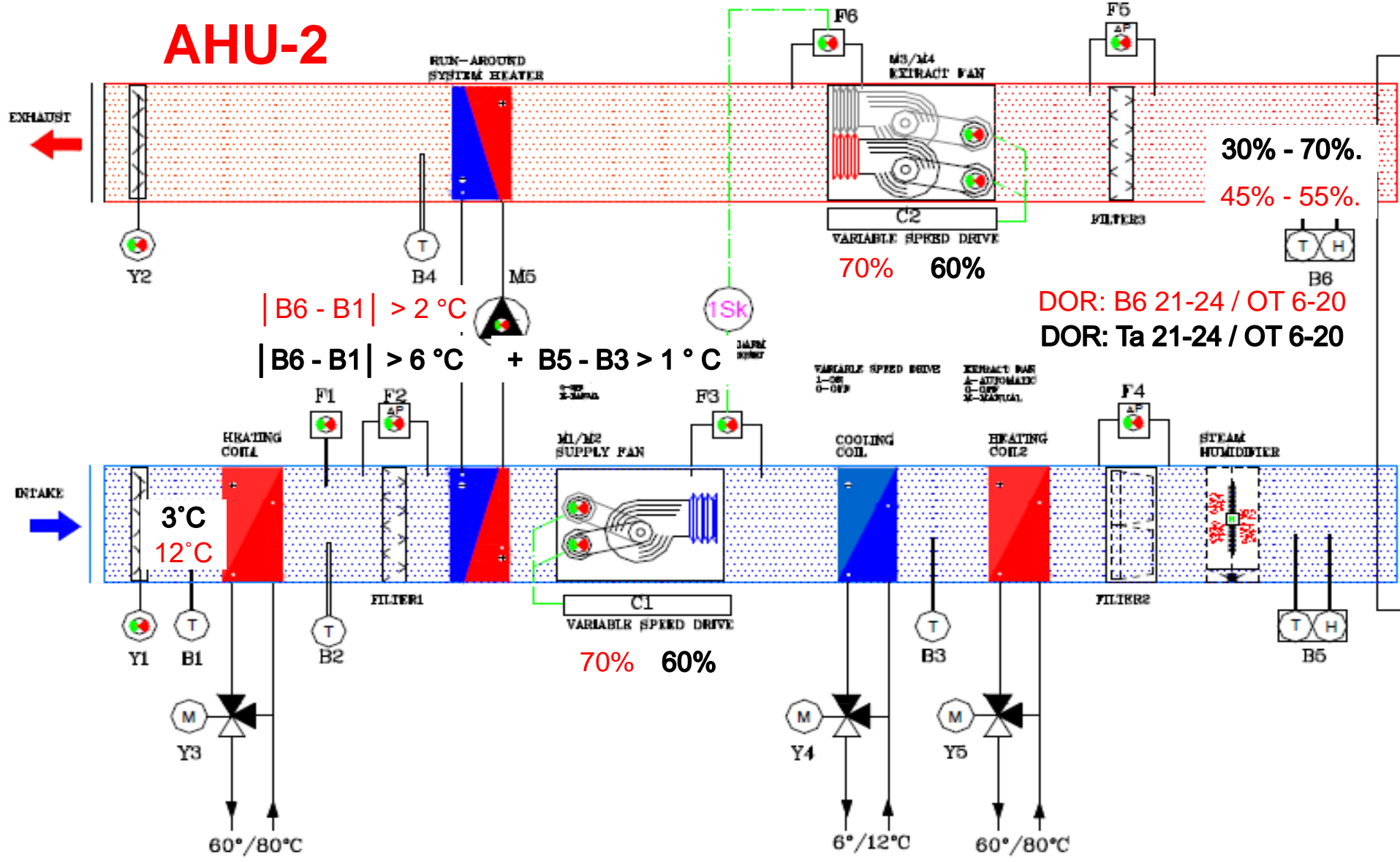
- Needs analysis (time framework, air-volume rates, temp/humid range)
- Focus on oil and electricity consumption
- Basic principles: Turn it off, turn it down remaining within thermal comfort boundaries (EN 15251)
- Users' feedbacks – faults - data collected vs. thermal comfort standards
- Trend viewer charts – basement for diagnostic and validation



CASE STUDY

- Analysis of control strategy -

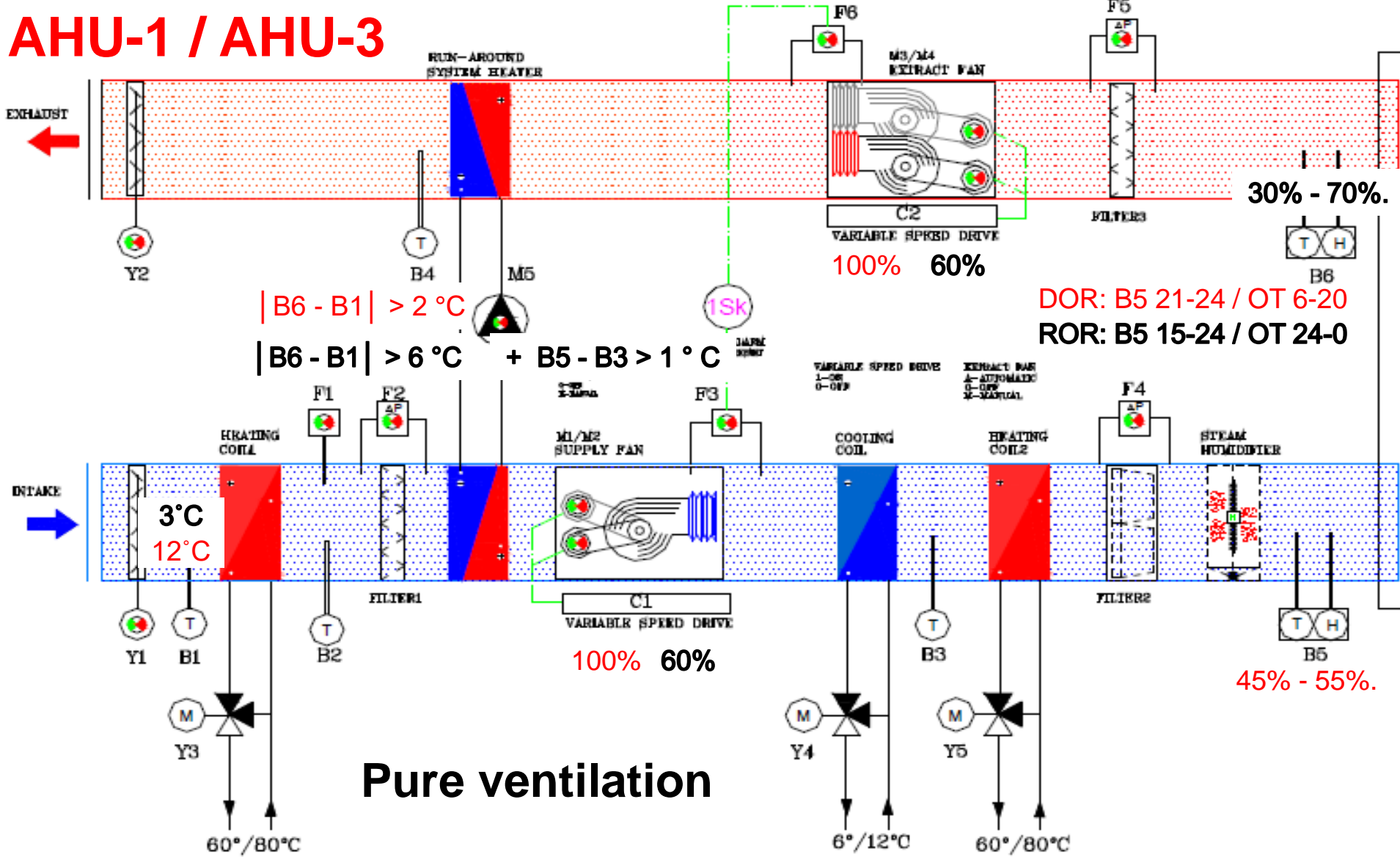
AHU-2



CASE STUDY

- Analysis of control strategy -

AHU-1 / AHU-3



Pure ventilation

CASE STUDY

- Time schedule -

- AHUs ventilation scheme
 - 06:00 – 22:00 every day
 - 08:00 – 16:00 working days + 2 hours on weekend days
- FCUs
 - Comfortable (temperature range: 21 - 24 ° C; time schedule: 06:00 - 22:00)
 - temperature range: 20.5 - 25 ° C; time schedule: 07:00 - 17:00
 - Reduce Comfortable (temp. range: 18 - 28 ° C; time sch.: 22:00 - 06:00)
 - temperature range: 18 - 28 ° C; time schedule: 17:00 - 07:00
- AHUs provide and handle fresh air when needed while FCU are reserved for additional adjustment (internal/solar gains) and for pre-heating/pre-cooling

CASE STUDY

- Results -

	Year 1	Year 2	Difference	
Oil [l]	26610	18606	8004	30.1%
Electricity [kWh]	265440	206980	58460	22.0% (37%)

DISCUSSION AND CONCLUSIONS

- HVAC energy efficiency has been increased significantly by described fine tuning
- Understanding of occupancy patterns, behavior of building users and HVAC tuning according to their needs
- Application of control strategy strongly relies on final users (rebound vs. pre-bound effect)
- Success of energy efficiency measures is directly related to understanding of mechanical as well as control segment
- Ignorance of any of those components generally leads to inadequate system performance, increased energy consumption, long repayment period and dissatisfied users

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**Thank you
for your attention!**

