

Energy efficiency improvement with building automation system and facility management tools

Johanna Jalas
Pöyry Building Services Oy
Finland

Introduction

- Pöyry
 - Global engineering and consulting company
 - Three business groups:
 - Forest industry
 - Energy
 - Infrastructure & Environment
 - 7 300 employees in over 45 countries



Introduction

- Pöyry Building Services Oy
 - Complete range of engineering and real estate consulting services
 - Commercial and office buildings, public and industrial building projects
 - 250 employees in Finland, Russia and Estonia
 - HVAC engineering
 - Electrical engineering
 - Building automation
 - Consulting in real estate and facility management, maintenance and environmental issues, for example services:
 - Technical surveys
 - Commissioning
 - Energy audits



Introduction

- Johanna Jalas
 - M.Sc (Tech) Building engineering (building economics and facility management)
 - Consultant and group manager, Real estate consulting group, Oulu
 - Consulting assignments: facility management, maintenance, technical surveys, indoor air quality etc.
 - Previously research scientist at VTT (Technical Research Centre of Finland, Facility Management Research Team, Oulu) and Oulu University of Applied Sciences

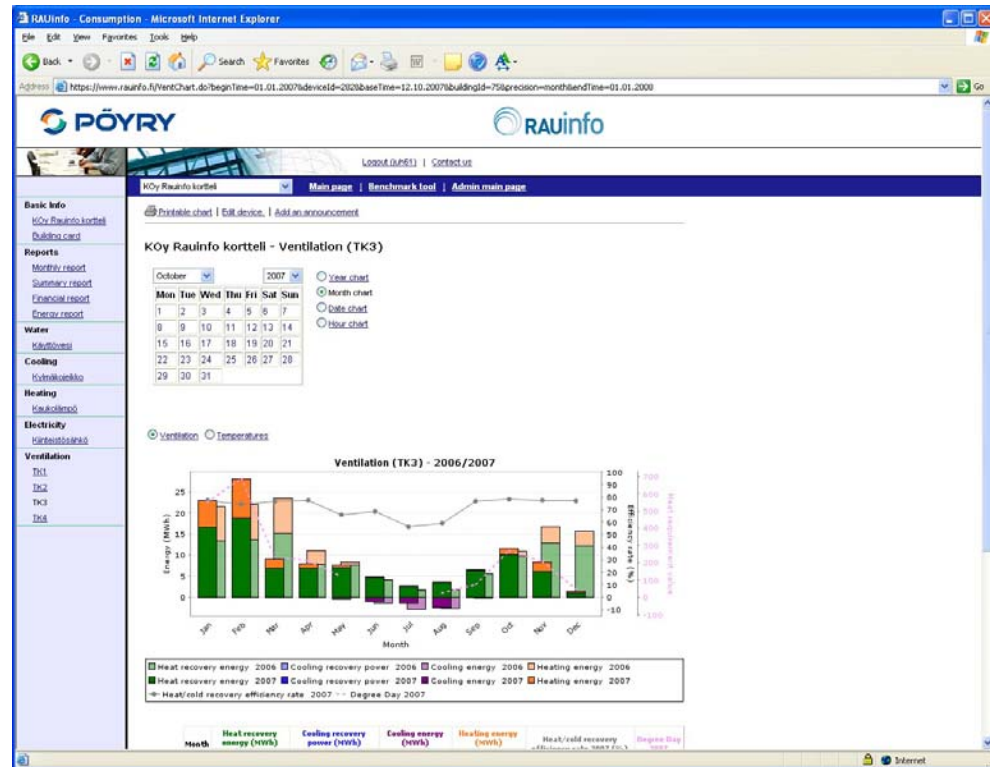


Our ways of work

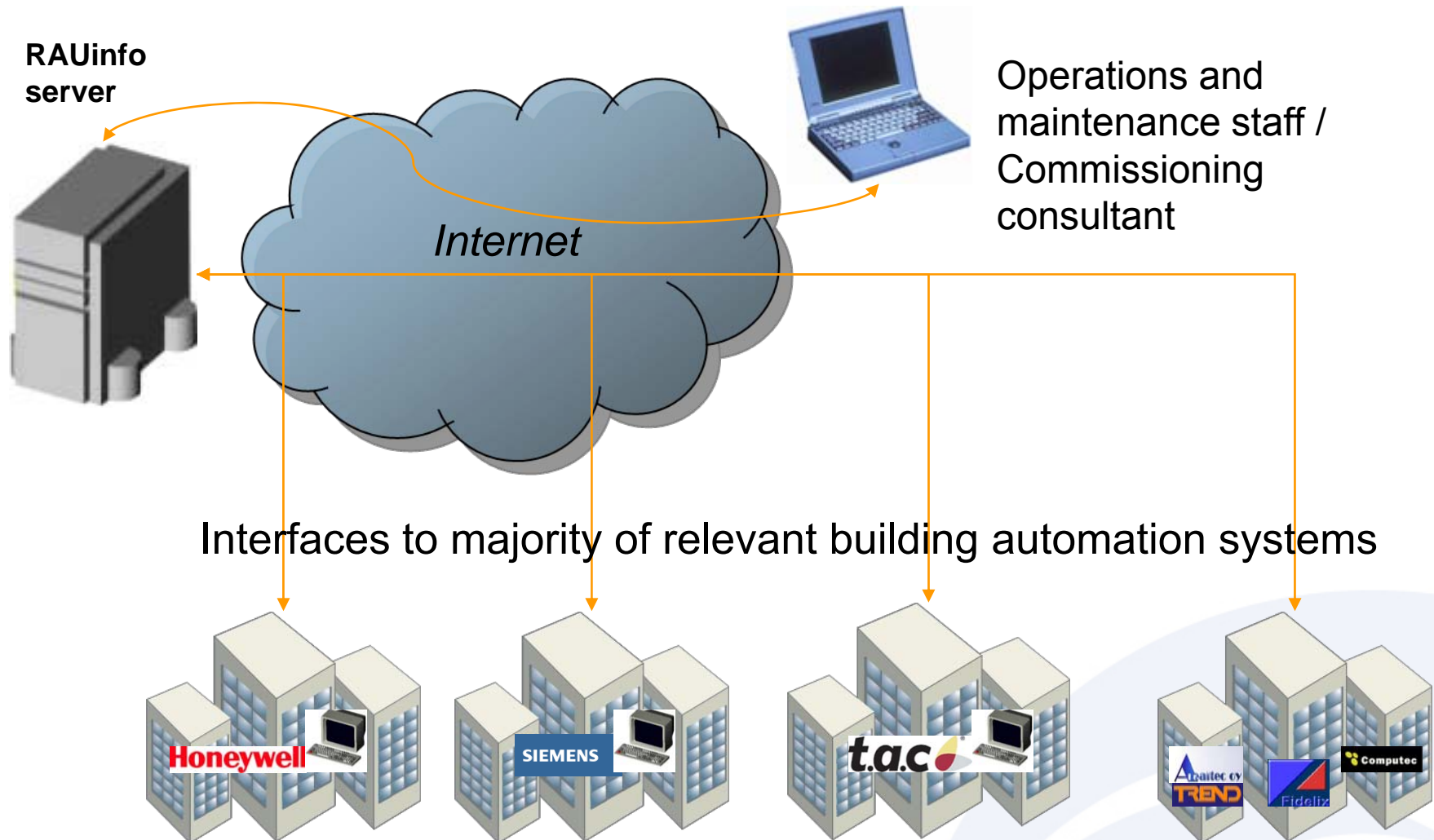
A brief introduction to our ways and tools to improve energy efficiency

RAUinfo Commissioning service

- Internet based portal for information management
 - Accessibility from all over the world
 - Open information change between parties
- Information gathered directly from the building automation system
 - No investments
 - No labour needed
- Remote assistance and consulting
 - Live aid for service personnel
 - Consultant checks the operation
 - Monthly reports of the findings



RAUinfo System architecture



Customers

- Real estate companies
 - Commercial buildings
 - Office buildings
 - Business parks
 - Shopping malls
- Senate Properties (governmental buildings)
 - University buildings
 - Office buildings
- Communities
 - Schools
 - Kindergartens

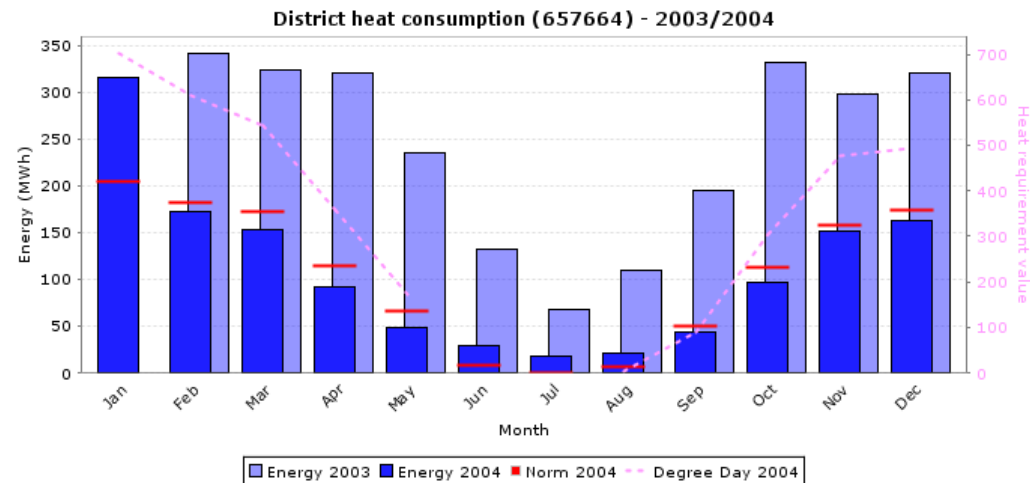
Examples

Real life problems from our clients

Example (1/5)

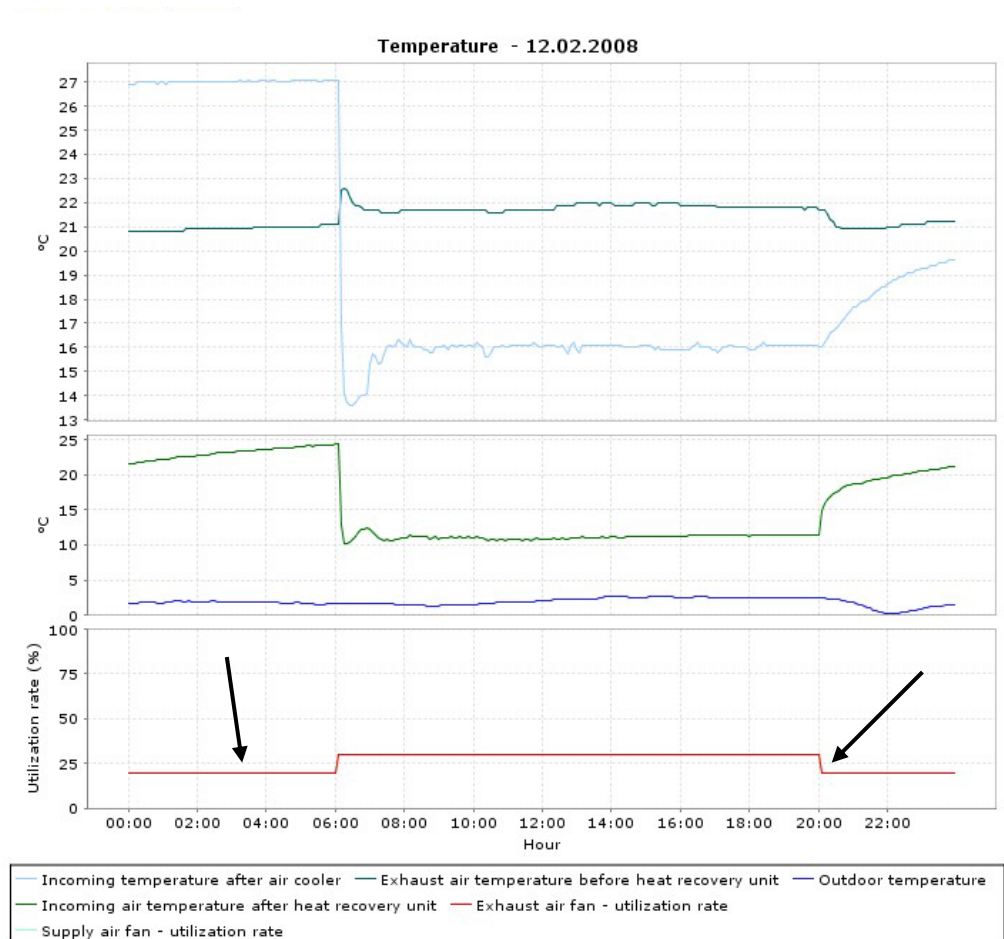
- Manual operation of control valves
 - remainings of a renovation
- Subject
 - Office building
 - Heating costs match the budget → "OK"
 - Short analysis of the consumption data tells another story
 - Valves switched to automatic operation
 - Cost reduction 30 000 € / year
- Cure
 - **Analyze** and benchmark the consumption
 - Find the reasons for differences

Cost reduction 30 000 € / year



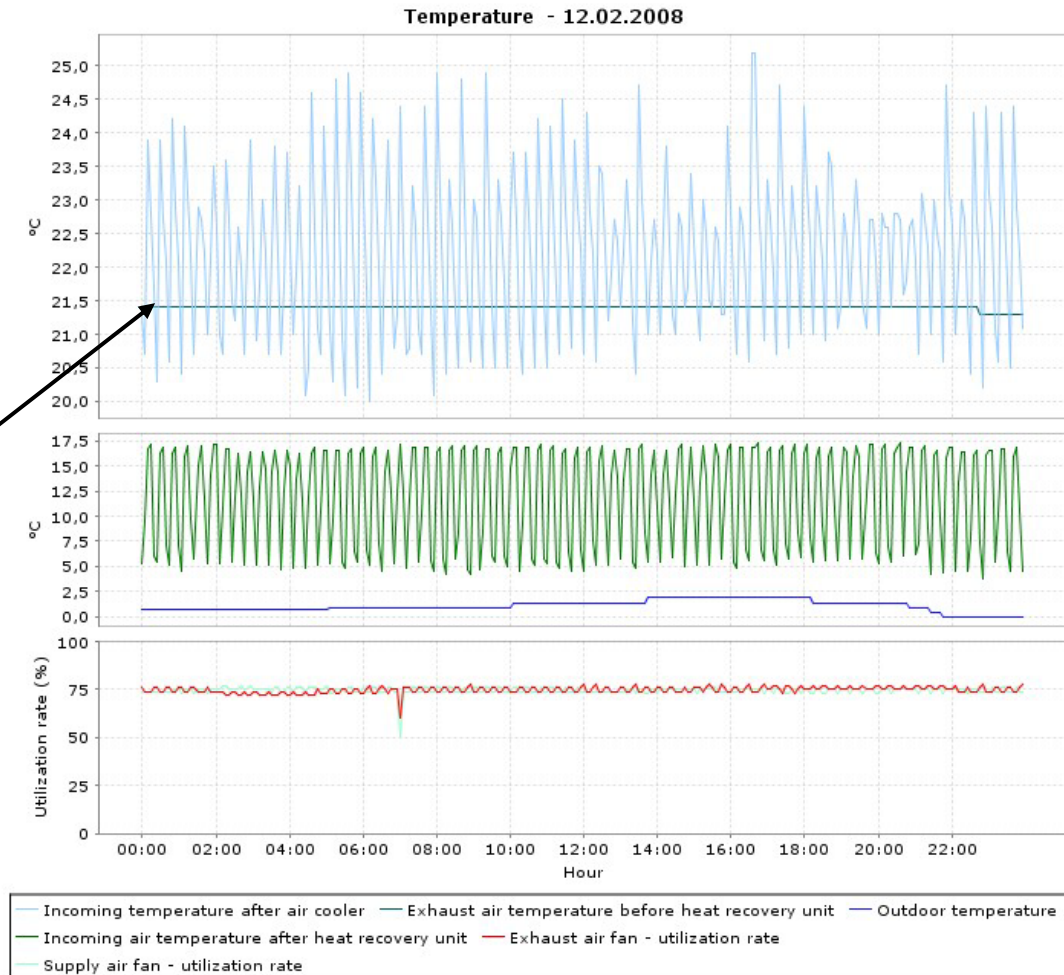
Example (2/5)

- Minimum operation rates of ventilation
- Object
 - University building
 - Classroom ventilation unit
 - Operating time 6:00-20:00
 - Trend shows that ventilation is running 24/7
 - Ventilation locked to 20 % minimum in night-time
 - About 40 % waste of heating energy
- Cure
 - **Analyze** the trends of actual time schedules



Example (3/5)

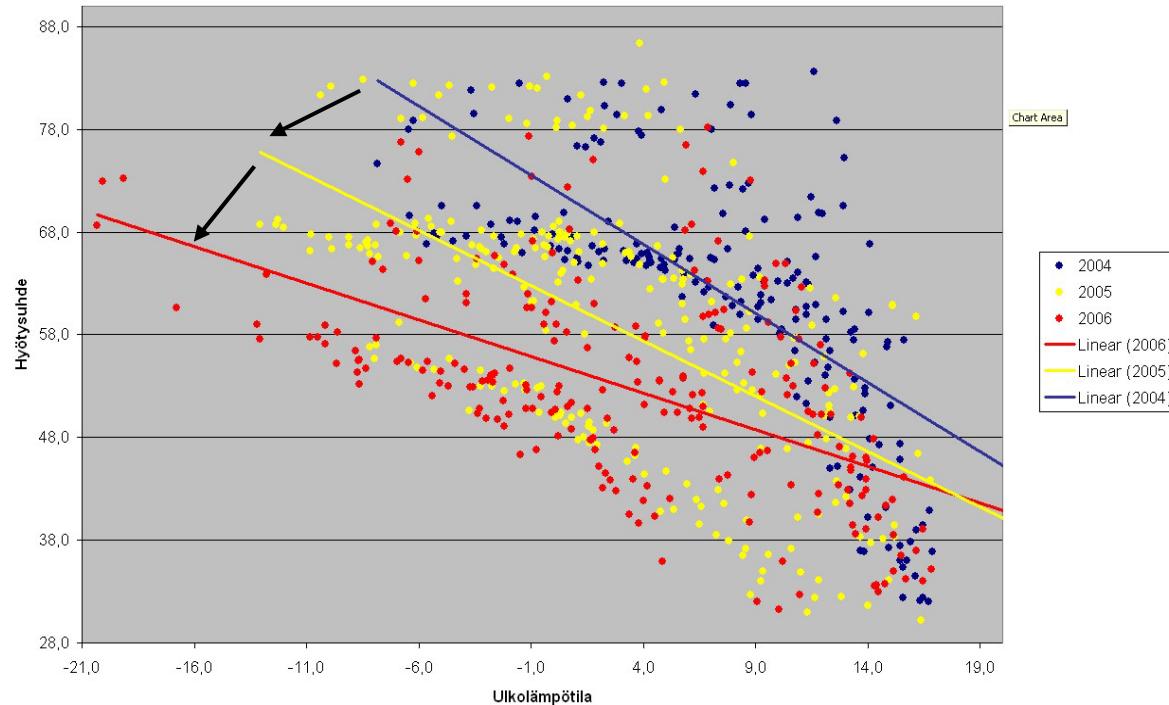
- Bad controls waste energy!
- Object
 - Ventilation of an archive building
 - Humidity and temperature very crucial
 - Temperature quite stable
 - Controls terribly wrong
- Cure
 - **Analyze** trends of all temperatures of the ventilation units
 - Don't be satisfied only with good conditions!!



Example (4/5)

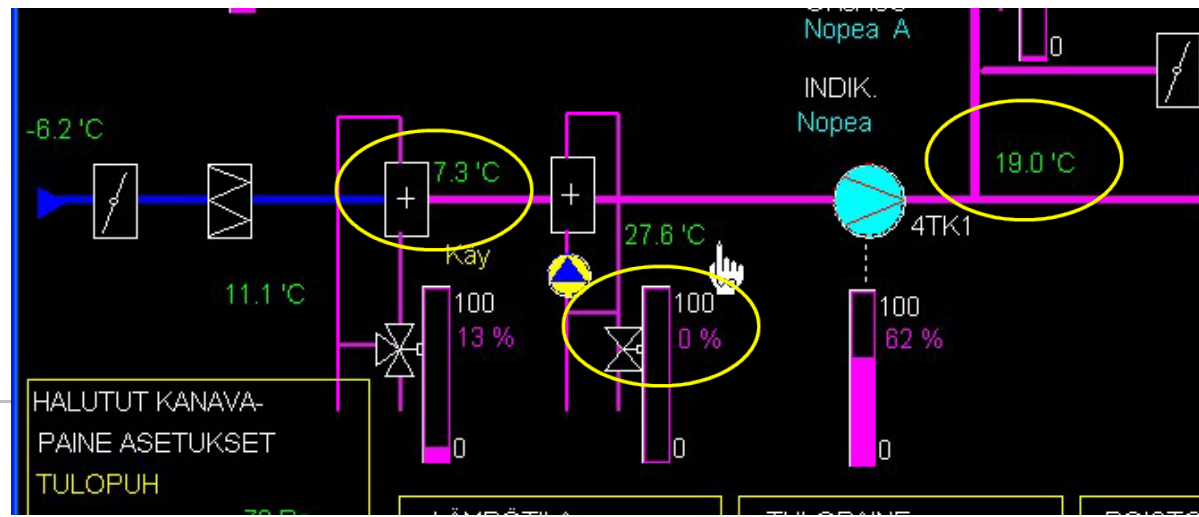
- Long term analysis helps to determine service intervals
- Object
 - Office building, built 2003
 - Heat recovery efficiency slowly degrading
 - Heat recovery wash 1500 €
 - Optimal interval every two years!
- Cure
 - **Analyze** also the long term trends
 - Slow changes can be easily seen in long term visualizations

Heat recovery efficiency rate compared to outdoor temperature in 2004-2006



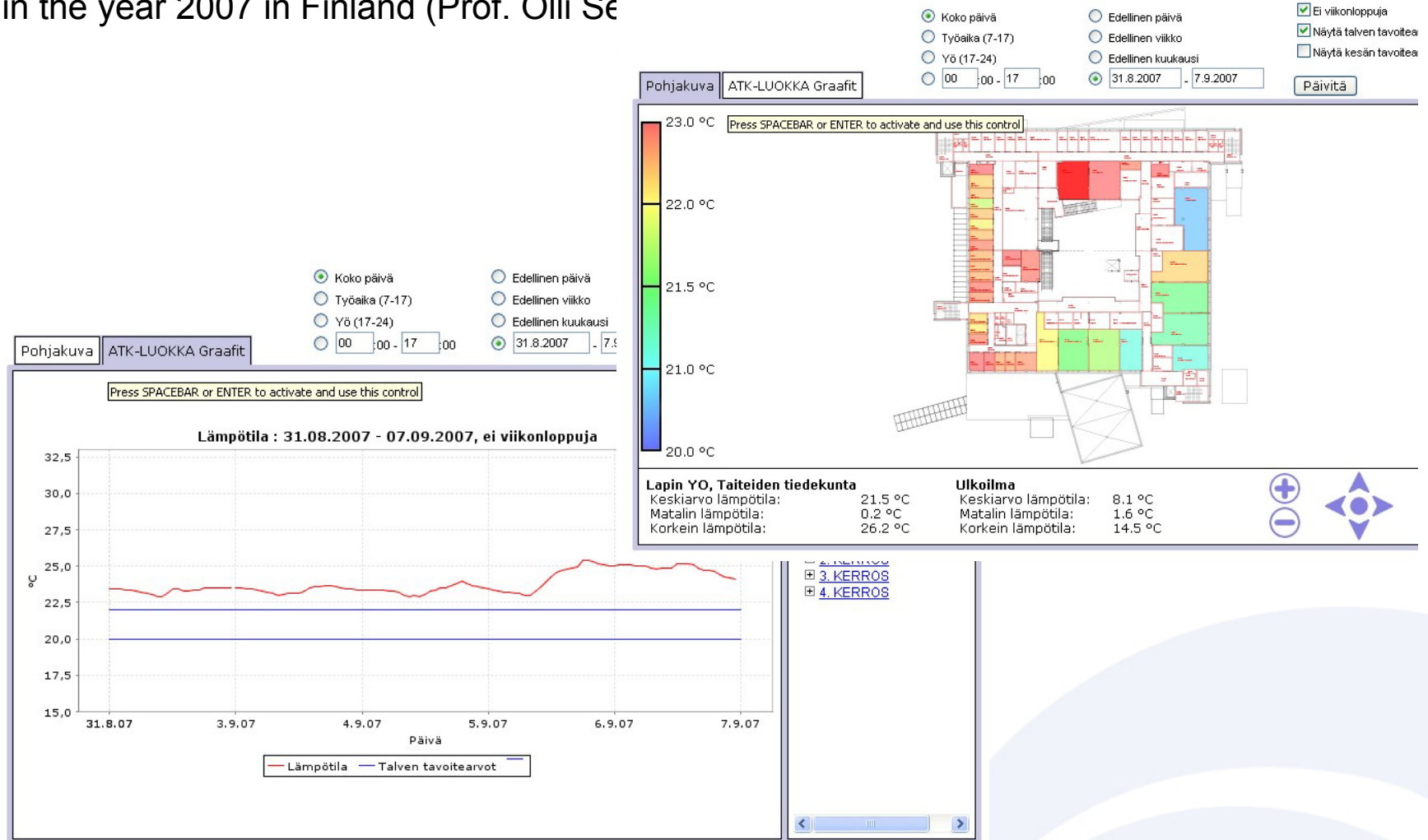
Example (5/5)

- Don't rely on alarms only. Check the temperatures (and the process in overall) also
- Object
 - Heating valve is closed
 - Temperature is still warming
 - Heating valve is jammed
- Cure
 - **Analyze** the trends
 - Compare the valve positions and their correlation to temperature changes
 - Helps also to avoid simultaneous heating and cooling



IEQ tool for monitoring the actual conditions

- Costs caused by poor indoor environmental quality are estimated to be 1,5...3 billion euros in the year 2007 in Finland (Prof. Olli Se



Ask yourself these questions

- Can you improve building performance without any investments?
 - Building automation system gives a great deal of information
- Do you utilize all the potential?
 - Could you do better?
- How to be more efficient?
 - Do you have enough time and resources to improve energy efficiency?
- Do you know your building?
 - E.g. are you able to determine the target energy consumption?
- "Don't just do something – Sit there! (and think)"
 - John S. Oakland

Conclusion

A brief summary

Conclusions

- Building automation system yields a whole lot of info
 - There are various possibilities to estimate and improve energy efficiency
- Trend history is very useful – use it wisely!
- Some possible tasks if you have doubts
 - Check the minimum values for fans (also trends)
 - Check the heat recovery efficiency rate changes during the last couple of years
 - Or start a logging to make this in future
 - Check the process temperatures in addition to the conditions
 - Benchmark metrics and explain the differences to yourself
 - Learn to use the trends even better. It makes your work much easier.
- Energy efficiency is not rocket science!

Thank you for your time

Questions?



POYRY