

## Energy concept summary

### Title of the energy concept: Changing the OAH VAV system with active chilled beams

Topic area choice and topic marking in blue:

- ( ) **Building** e.g. Insulation, change of windows, Low-energy-buildings
- ( ) **Electrical energy** e.g. Light, Compressed air, Electrical drives, Cooling machines, Load management
- ( x ) **Heat** e.g. Heating, Process heat, Heat recovery, **Air conditioning**, Combined heat & power
- ( ) **Renewable energy** e.g. Solar technology, Wood-fired plants, Biogas, Geothermal energy
- ( ) **Management** e.g. Energy buying, Contracting, Emission trade, Energy data management systems



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 Branch and NACE-Code(s):43.22,Heat and airconditioning  
 Products/Services: engineering, consulting  
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### Energy concept description:

#### Base situation

In a new 100-bed hospital project with a useful area of 10000 m<sup>2</sup>, which provides inpatient facilities, including operation rooms, intensive care, patient's rooms. In a first project all patients rooms were air conditioned with 100 % AHU or with combination of fan coils / 100% dedicated AHU-s. The hospital management recognized that a properly designed air conditioning and ventilation system was paramount to its success in eliminating air borne infections, as well as meeting its need for energy efficiency.

#### Aims

The HVAC energy in a hospital is more than 2,5 times greater than a commercial buildings. The single greatest consumer of energy is for heating / cooling of supply air which is necessitated by the high ventilation rates required in healthcare facilities. The aim was to reduce the quantity of outside air used in classical hospital solution for air-conditioning. Chilled-beam system have gained wide acceptance as an alternative to traditional variable-air-volume (VAV) systems. This interest is fueled largely by chilled beams' energy-saving potential, ease of use, low maintenance, and minimal space requirements. This is first project in Macedonia with active chilled beams who will be practically implemented.

#### Optimization

Many measures was proposed and one of those was the implementation of active chilled beams in all wards, administration, hospital rooms were recirculation of air it's allowed. The aim of this energy concept will be only hospital rooms because here energy saving potential it's greatest.

#### Proposal solutions

- Two AHU-s air volumes indented for patient rooms to be reduced from 24000 m<sup>3</sup>/h to 9000 m<sup>3</sup>/h, from VAV system to active chilled beams system.
- The temperature of the cooling medium for active chilled beams should be from 16 to 18°C. Evaluation of possibility the cooling medium for CB to be cooled from PHE directly from well water source(well water temperature it' 14-15°C) instead with water from the chillers.
- The benefit from use of 6 way Belimo valves for active chilled beams and Belimo energy valves EPIV for AHU-s heat exchangers.

#### Effects

Lower energy use for heating/cooling of primary air from the AHU-s, downsized ductwork/equipment, energy reductions of up to 50 percent, optimum comfort and IAQ, quiet operation, eliminated or reduced reheat

#### Challenges

Condensation prevention, cleanliness,building envelope

### Picture(s) of plant, Base situation etc.

#### Results:

Energy saving potential [kWh/a]: **677280**  
 Energy source: **Electricity**, mostly from lignite coal  
 Cost reduction potential [Euro/year]: **70.000**  
 CO<sub>2</sub>- saving potential [t/a]: **64**  
 (please fill in conversion factor: 0.95 kg CO<sub>2</sub> per kWh)

Investment costs [Euro]: 121000 €  
 Pay-back time [Years]: 2 years  
 Chance of implementation:  
 ( x ) high ( ) middle ( ) low  
 or date of implementation