Pilot project Finland
Pohjankaleva student house

Jari Palonen

Helsinki University of Technology, Finland

HELSINKI UNIVERSITY OF TECHNOLOGY
Laboratory of Heating, Ventilation and Air Conditioning

INVESTMENTS FOR ENERGY EFFIENCY IN APARTMENT BUILDINGS IN FINLAND

- REPLACEMENT OF OLD HOT AND COLD WATER SYSTEM
  - 20-25% LESS WATER
- REPLACEMENT OF OLD WINDOWS
  - OUTDOOR AIR VENTS MANDATORY
  - CLEANING OF EXHAUST AIR DUCTS
  - INCREASED ENERGY USE

QA-SYSTEMS IN FINLAND

- NO TOTAL QA-SYSTEMS LIKE SQUARE
- SEVERAL WELL DEFINED TOOLS FOR SPECIAL PURPOSES

Sub-QA-methods before design process

- Simple energy analyse
  - 50% paid by the Finnish goverment
- Simple technical analysis
  - 50% paid by the Finnish goverment
- Detailed conditions survey
  - Outdoor walls
  - Moisture and mold problems
  - Plumbing and water systems
  - Indoor air and ventilation
  - Electrical installations

Sub-QA-methods during design process

- Guidebook how to design healthy apartment building
- Guidebook how to design new low energy residential building (2009) (Jarek Kurnitski et al)
- Indoor climate classification 2008
  - If you want build better than required by the building code
- Over 1000 low-emitting (VOC’s + odors) building materials M1-mark
- Designbook for clean supply air systems

Sub-methods during renovation

- Moisture control during consruction work
- Dust control during construction work
- Guidelines for how to build a clean ventilation system
- How to clean building before occupancy

Sub-methods during operation

- MAINTENANCE HANDBOOK
  - MANDATORY
- ENERGY CERTIFICATION
  - ANNUAL
  - BETWEEN 10 YEARS
- CONDITIONS SURVEYS

POHJANKALEVA

POHJANKALEVA STUDENT HOUSE

- Built 1970
- Shared WC and bathroom in corridors
- First renovation in 1993
- Windows, fresh air vents
- Number of unrent rooms increasing
  - 10 % in 2007
  - 20 % in 2008
  - 50 % during summer

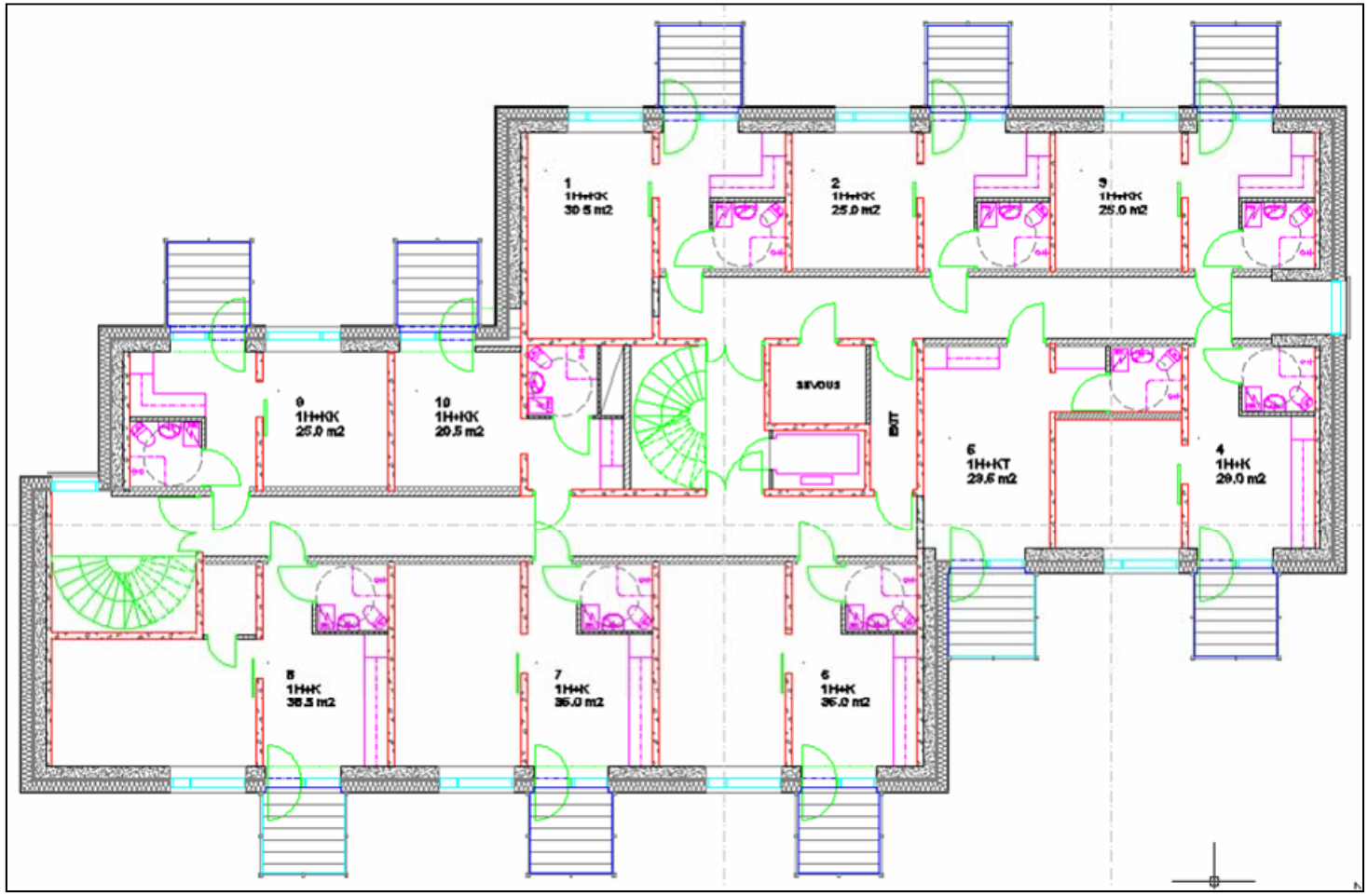
Evaluation of building

- Occupants questionnaire
  - IAQ-problems
  - If tenants are ready to pay higher rent
    - Private bathroom
    - Own balcony
    - More saunas
- Conditions surveys
- Energy analysis.

Results

- Ouestionnaire study
  - Draught during winter caused by outdoor air vents in window fame
  - Too warm during summer
  - Private bathroom and WC 10-20 €/month extra
- Building is in relatively good conditions
- Investments needs during next 19 years 200 €/m2
  - Deeper analyses required concerning outer walls
- Energy analysis
  - Better than average apartment building from 1970.
  - 170 kWh/m2
- Ventilation
  - Exhaust air flow rates were lower than design values
  - Great variations beteen rooms

New layout


1
1H+KK
30.5 m2
2
1H+KK
25.0 m2
3
1H+KK
25.0 m2
9
1H+KK
25.0 m2
10
1H+KK
20.5 m2
SEVOUS
EXIT
6
1H+KT
29.6 m2
4
1H+K
29.0 m2
8
1H+K
36.5 m2
7
1H+K
36.0 m2
5
1H+K
36.0 m2

(Allmost) Passive building in North Finland

- The goal is to reach passive house standard level which in northern Finland is 30 kWh/m^2 per year for heating energy (domestic hot water 25 kWh/m^2). (Design outdoor temperature -35 ^oC)
- TES-elements (wooden) for walls (0.15 w/m2,K)
  - TES-project
- Regenerative heat recovery (rotating heat wheel)
  - 80-85% efficiency
  - Needs odor filter + normal filter before heat wheel in exhaust air duct
  - Special permit from the city of Oulu
- Air leakage rate n_{50} <0.6 1/h

Contractors

- NCC Finland
  - Cost are fixed in round table discussions
  - Special permit from Finnish Housing Fund
- TES elements will be manufactured in North Finland

Design team

- The largest housing design consult in Finland, Optiplan, will coordinate the design process.
  - Energy simulation
  - Simulation of room temperatures
- Local consults must be used because of expensive travelling costs between Southern and Northern Finland.
- The Buildings Regulations Department of the city of Oulu will be present during design and construction meetings.
- HUT
  - How QA system is used?

QUALITY CONTROL DURING CONSTRUCTION

- Moisture control and protection
- Dust control plan
  - Clean ventilation system
- TES-elements will be tested (air tightness) in before delivered to construction site
- Measurements in construction site; thermal performance, air leakages, moisture in structures

Updated timetable

- Renovate of demolish?
- Renovate, costs 1600 €/m2
- No balconies at all
  - Solar protection?
- NCC Finland will start August 2010.
- New students August 2011