ENERGIMYNDIGHETENS BESTÄLLARGRUPP
FÖR ENERGIEFFEKTIVA FLERBOSTADSHUS

SABO

Energimyndigheten

CIT Energy Management AB
A Chalmers Industriteknik Company



Technical procurement of heat recovery systems in existing apartment blocks in Sweden

Åsa Wahlström
CIT Energy Management

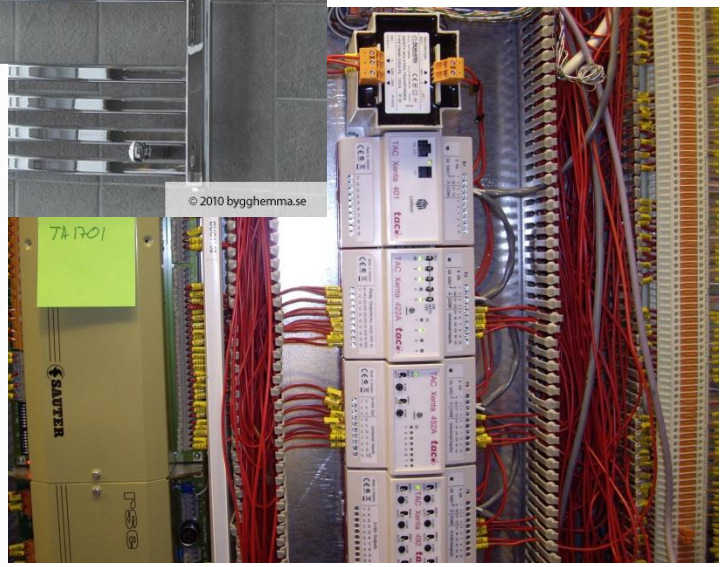
Technical procurement of products

Heating	10
Tap water devices	3
Ventilation	5
white goods	9
Lighting	6
Industry	11
Other	7



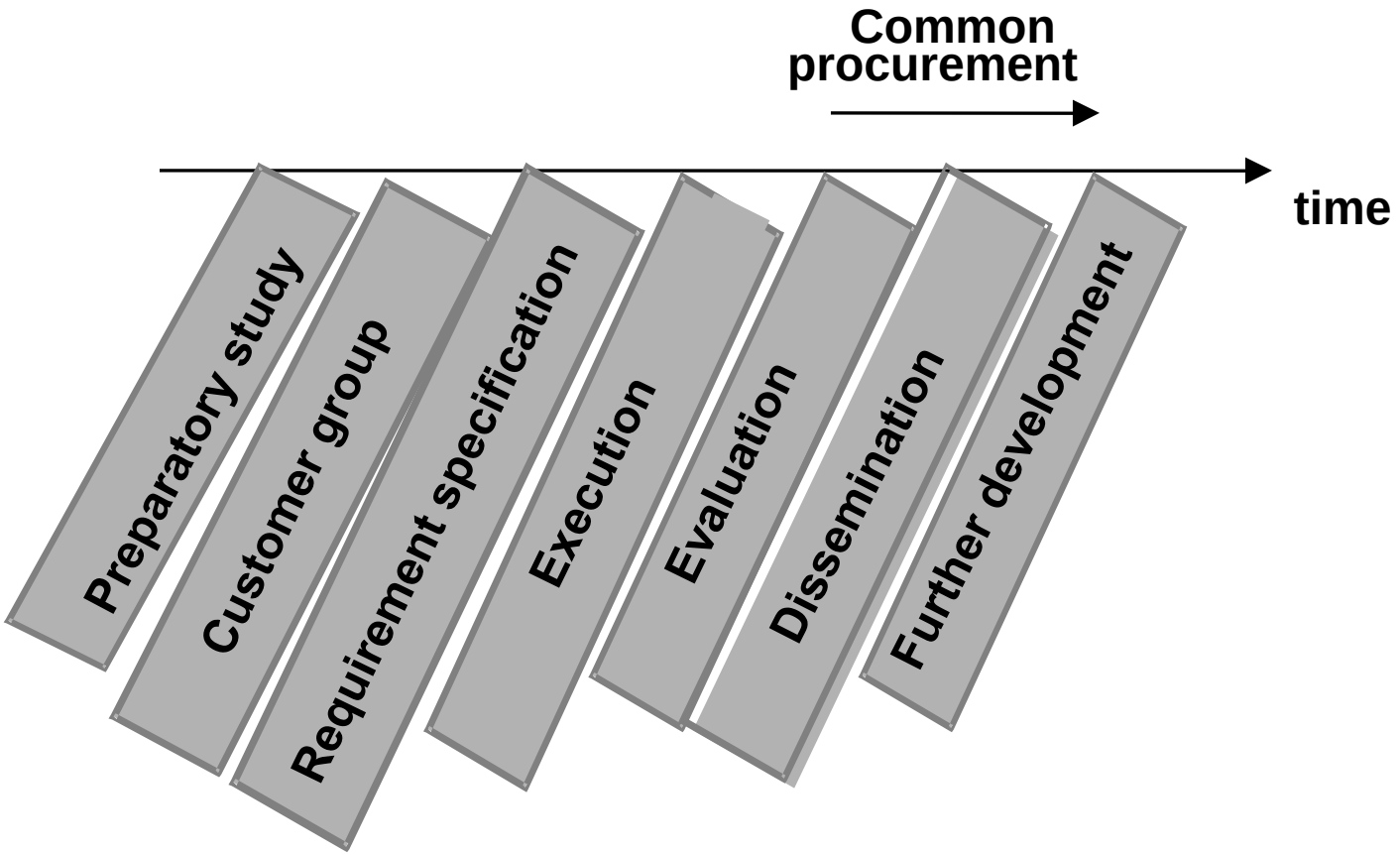






An effective instrument for energy efficiency

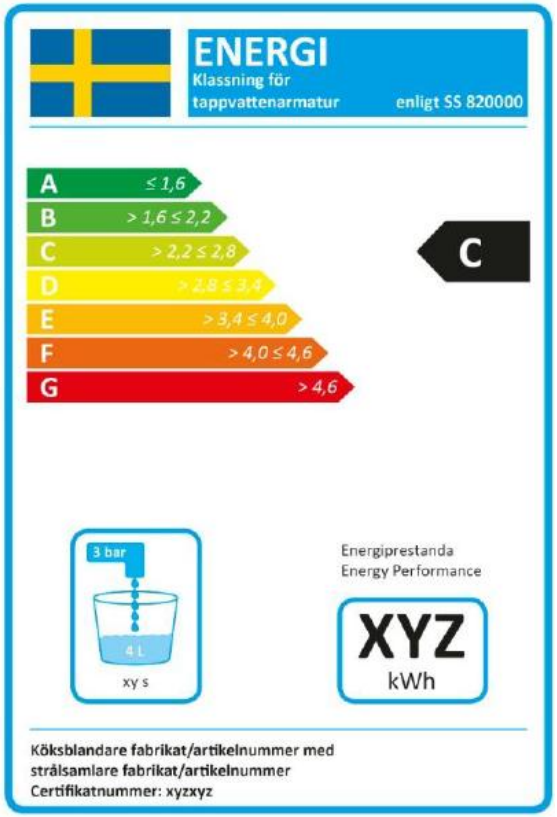
Technical procurement – a process



2000 - 2012

From technical procurement to energy labeling





2008 preparatory study – great potential

Heat recovery

Roof insulation

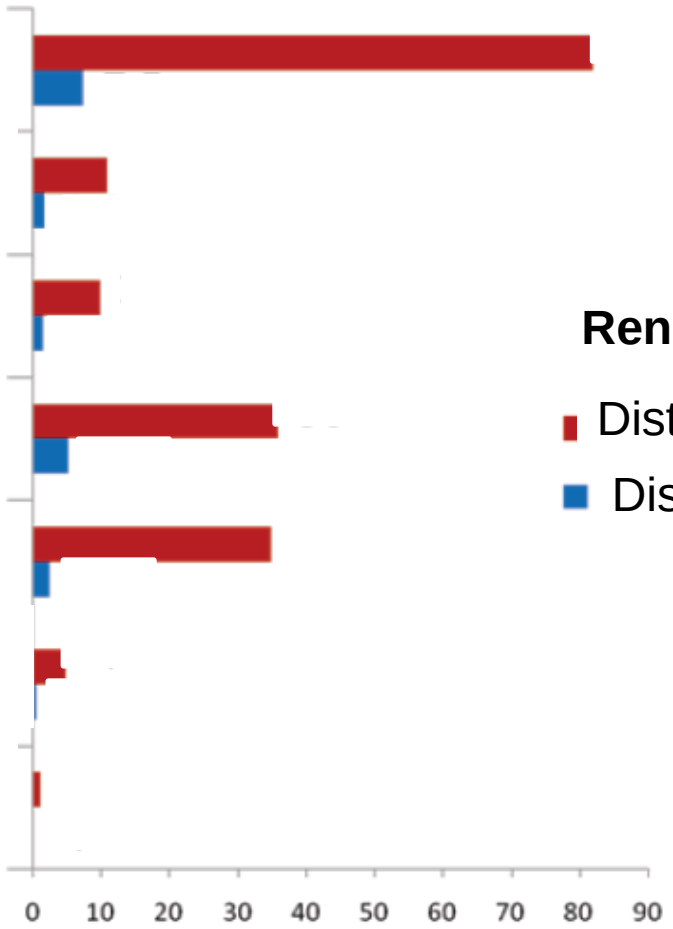
Foundation

New windows

Facade insulation

External wall

New balconies



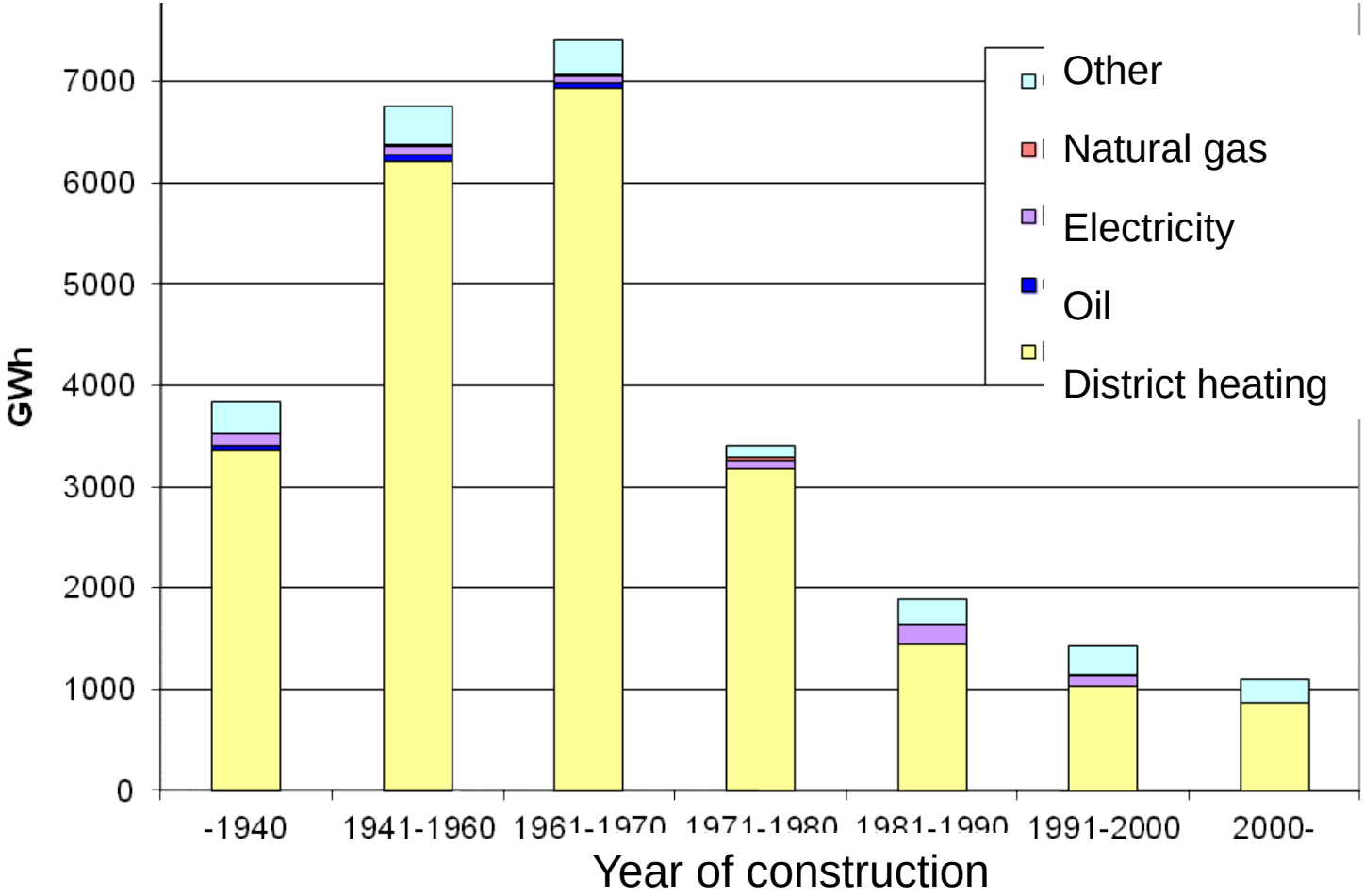
Elecytricity use
+ 1.7 kWh/m^2

Renovation example

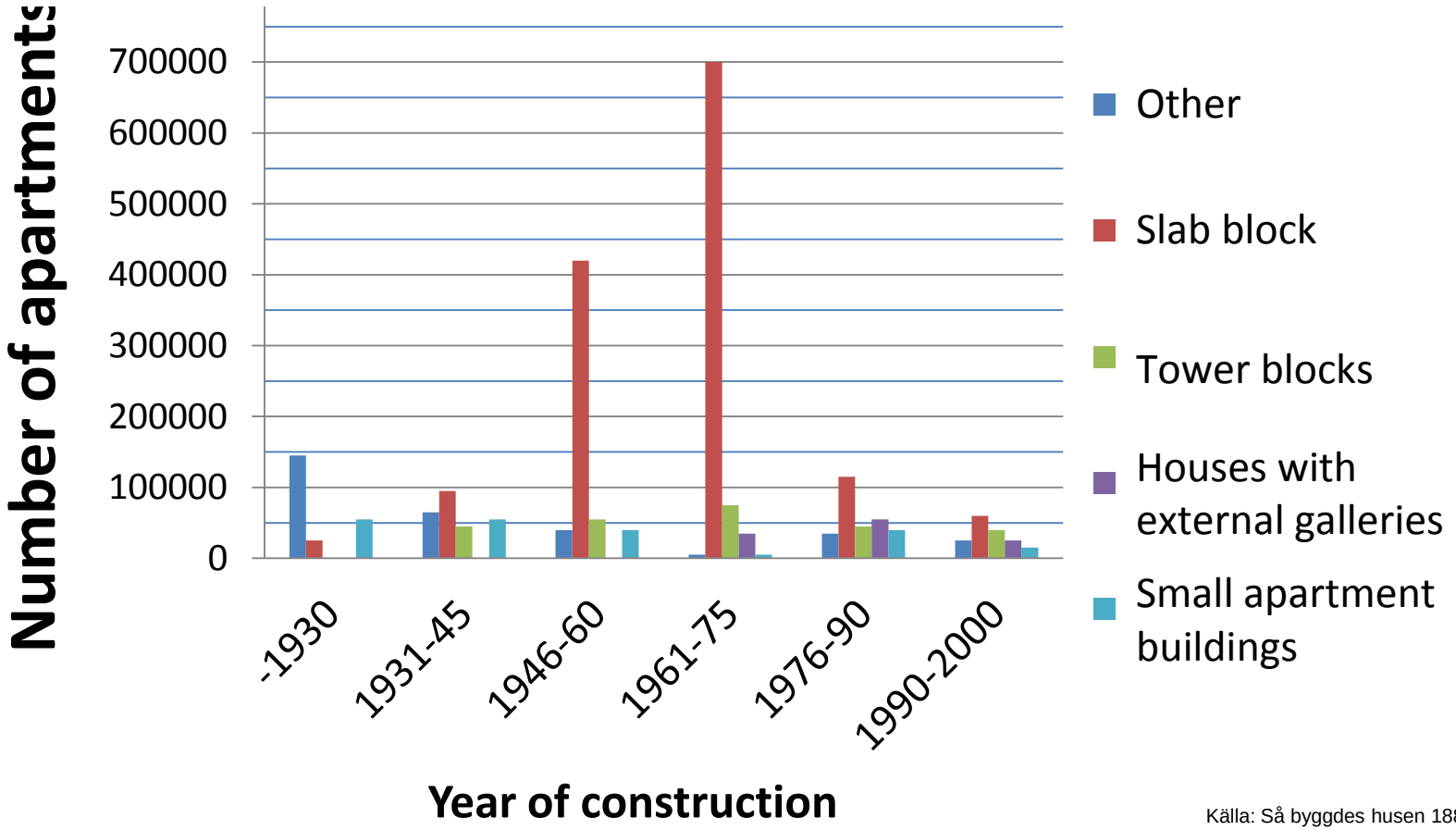
District heating before

District heating after

2008 preparatory study – similar systems



2008 preparatory study – possible to make repeatable



Källa: Så byggdes husen 1880 - 2000, femte upplagan. C. Björk, P. Kallstenius & L. Reppen (2003)


P
1 tim

2008
no demand
no supply





-from product to system approach
- operational experiences



Establish a customer group

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HELSINGBORGS HEM

Stockholmshem

HYRESBOSTÄDER I VÄXJÖ AB

huge

FAMILJEBOSTÄDER

Heat recovery















Objectives

- Introduce companies on the market that offers complete system solutions
- Development and costs reduction
- Improve operation experiences (installation, service and maintenance)
- Show the energy saving potential

Main requirements

- Energy efficiency
- Costs
- Indoor environment
- Design and function
- Installation
- Operation and maintenance



Technical procurement

Stage 1: Procurement of systems to demonstration buildings according to requirement specification

- Air to air heat exchanger
- Exhaust air heat pump

Stage 2: Installation and evaluation in demonstration buildings. One year of measurements. Improvement of requirement specification.

Stage 3: Continuation of public procurement (general agreement) according to the new requirement specification of buildings

Heat recovery with air to air heat exchanger











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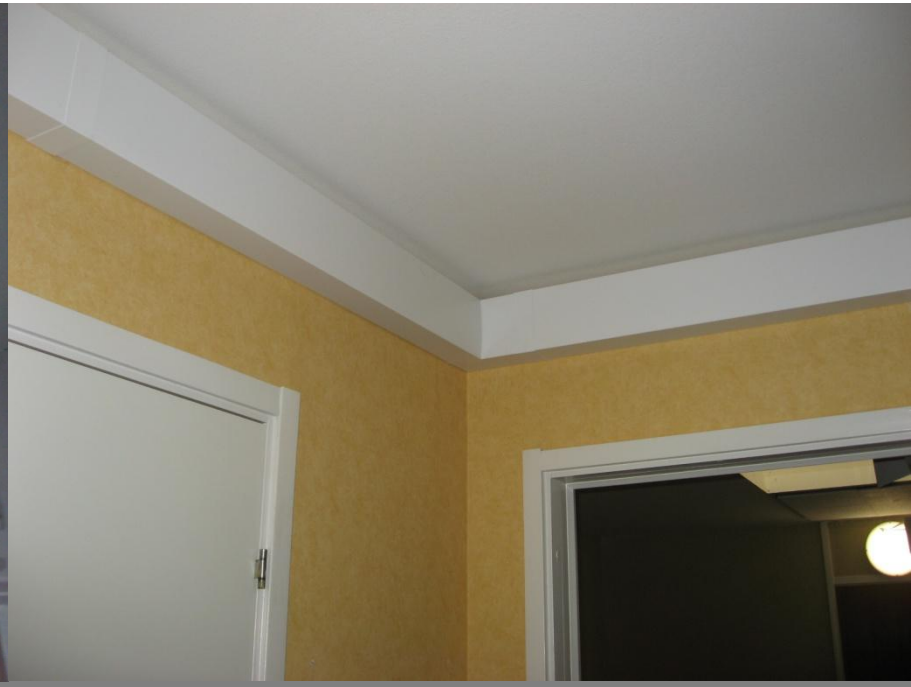
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Duct systems in the apartments

Design and function





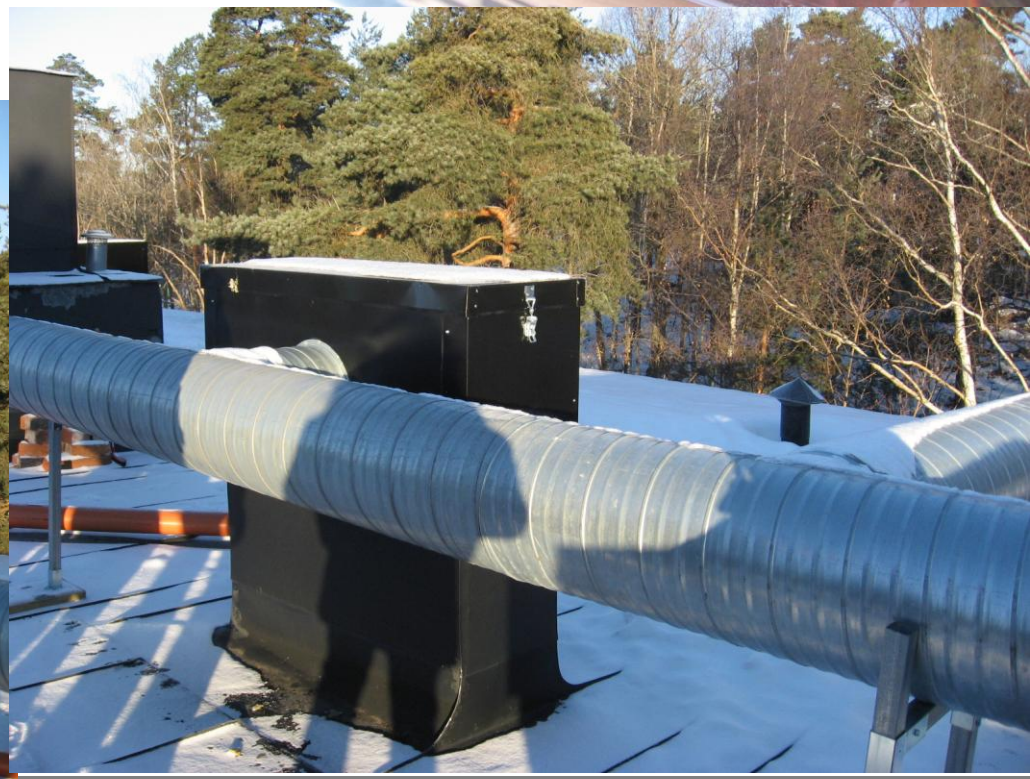
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Exhaust air heat pump

Outdoor heat pump with improved efficiency by a condenser
















KAMRÖRSBATTERI 15m
KAMRÖRSBATTERI

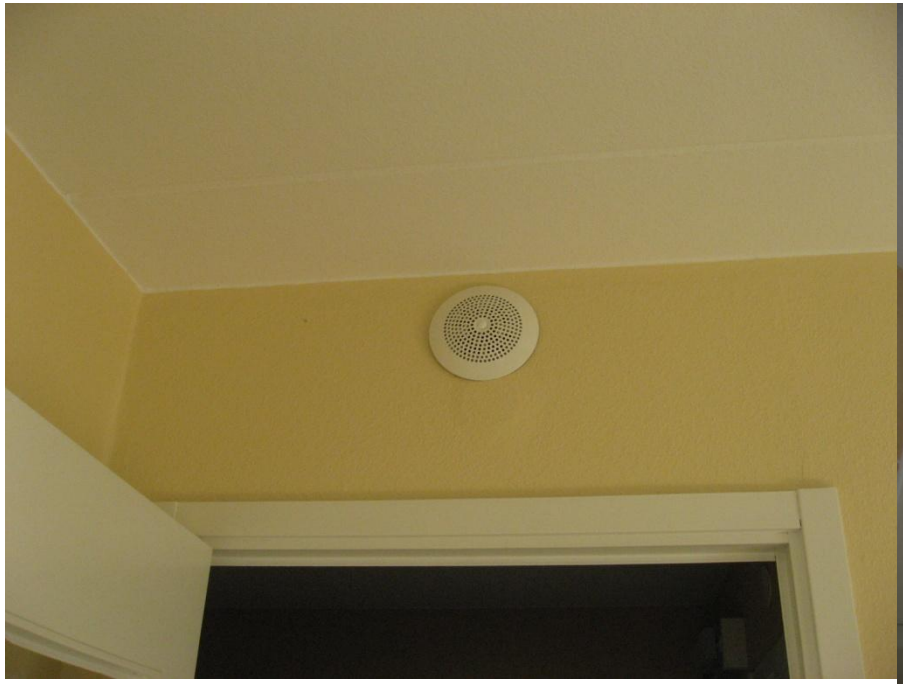


Original exhaust brick duct



Improved indoor climate







Make the building envelope tight
Air to air heat exchanger : preheated supply air
Exhaust air heat pump: supply air behind radiators

Examples of typical energy savings

Air to air heat exchanger	Exhaust air heat pump
Increase of electricity: 6 kWh/ m^2A_{temp}	Increase of electricity: 49 kWh/ m^2A_{temp}
Decrease of district heating: 45 kWh/ m^2A_{temp}	Decrease of district heating: 168 kWh/ m^2A_{temp}

Promised cost savings

- Present value costs - Pay back of 12 years
- Discount rate 4%
- Electricity 0.11 Euro/kWh (4% increase)
- District heating 0.07 Euro/kWh (2% increase)
- 2600 Euro per apartment

Experiences



- Procurement of a complete system
- Technical improvements/ system improvements
- Commissioning difficult
- Need of in-house experts
- Possible to find space
- Possible with limited disturbance of the tenants
- Information to tenants crucial
- Investment costs
- Early spread – a market has started to be established

- An instrument for short and long term improvements



We only get one chance to do this right

