



Energy Efficient and Healthy Buildings

Monica Gullberg, ÅF process

Magnus Bengtsson, National Board of Housing,
Building and Planning

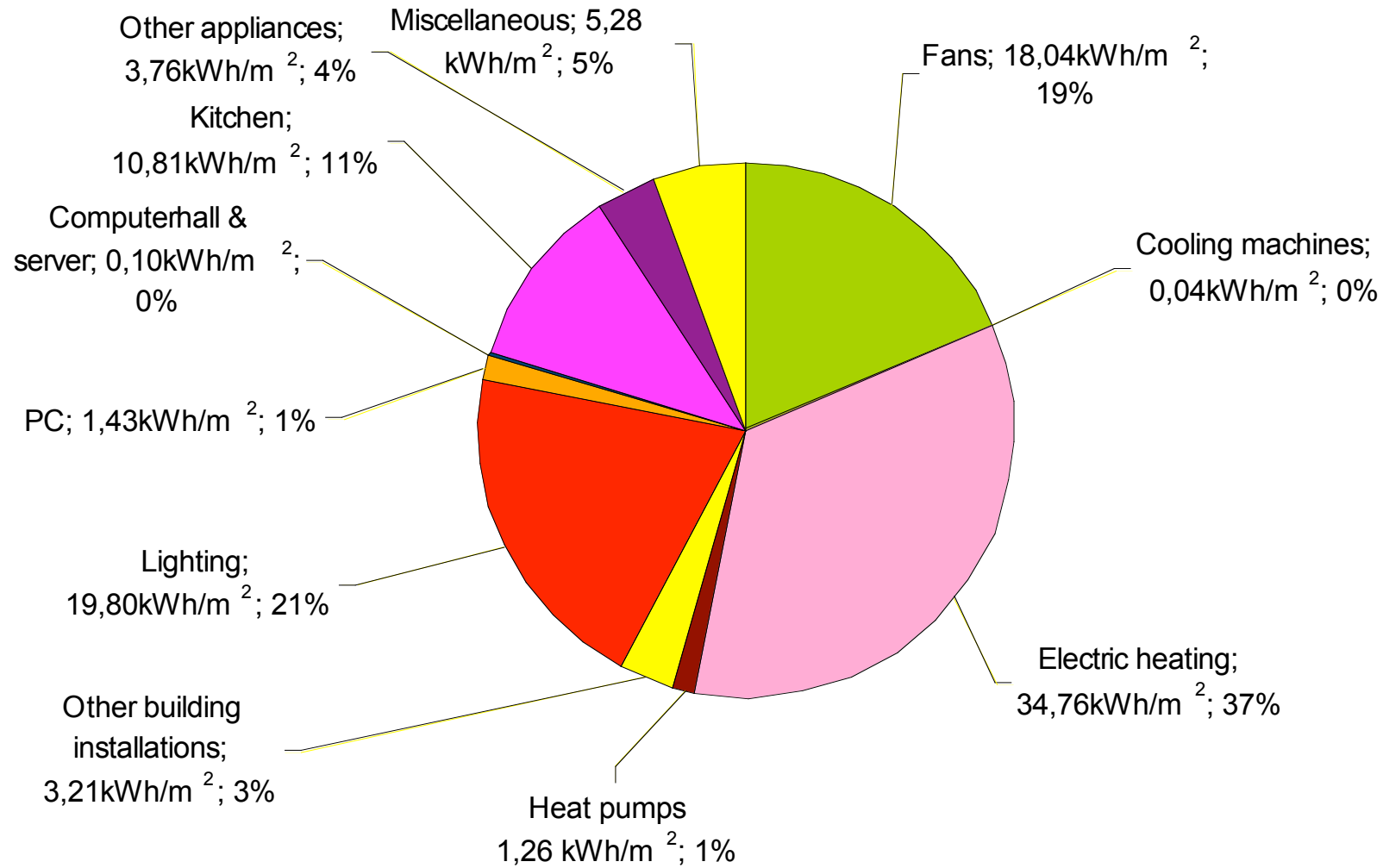
Nikolaj Tolstoy, National Board of Housing, Building
and Planning

Egil Öfverholm, Swedish Energy Agency

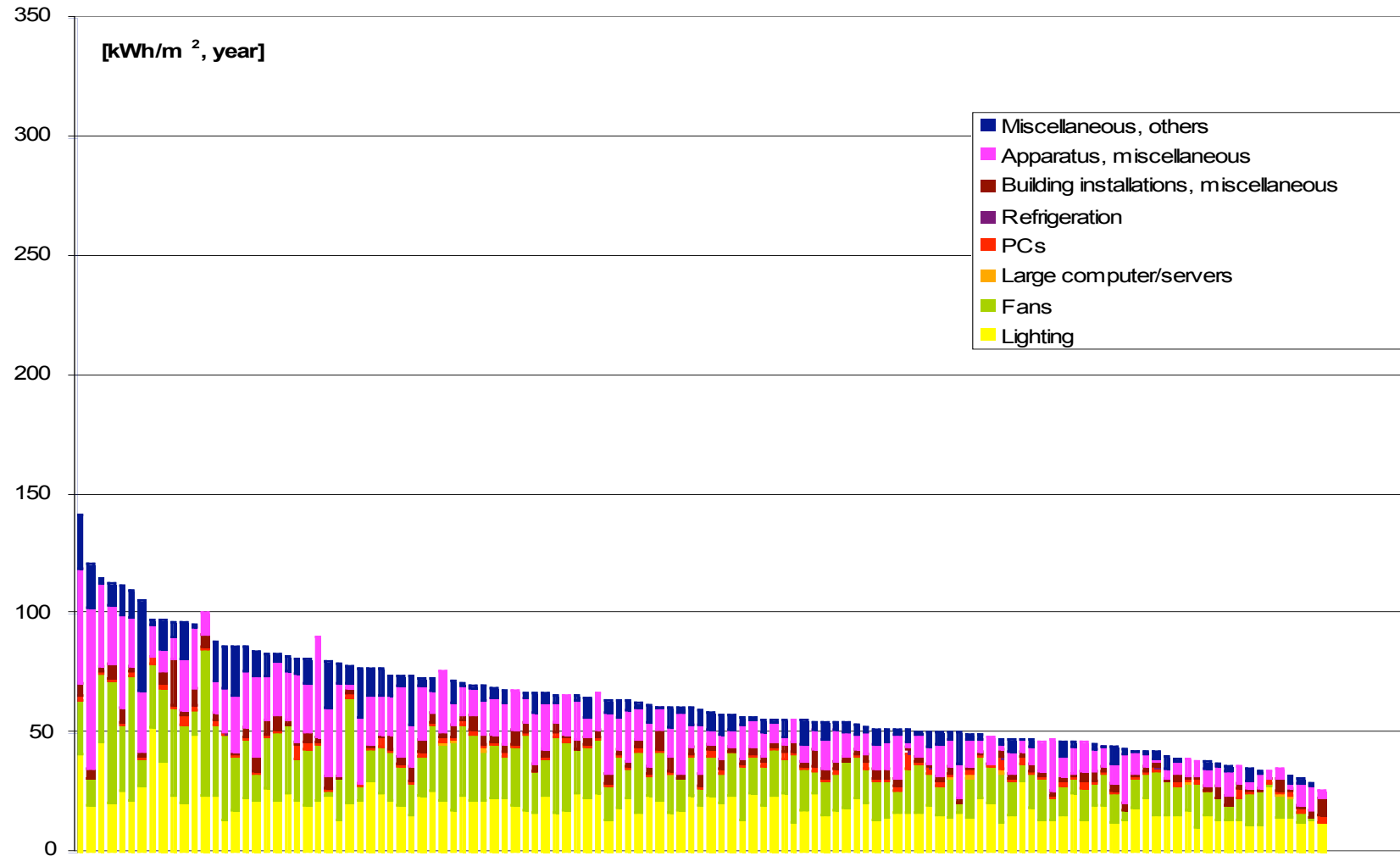
Purpose - energy

- Evaluate existing measures
- Find new efficient measures
- Survey energy demand and find efficiency potentials
- Make better forecasts for energy demand and CO2 emissions
- Develop basic data for the buildings performance directive
- Information activities on energy efficiency in buildings
- etc...

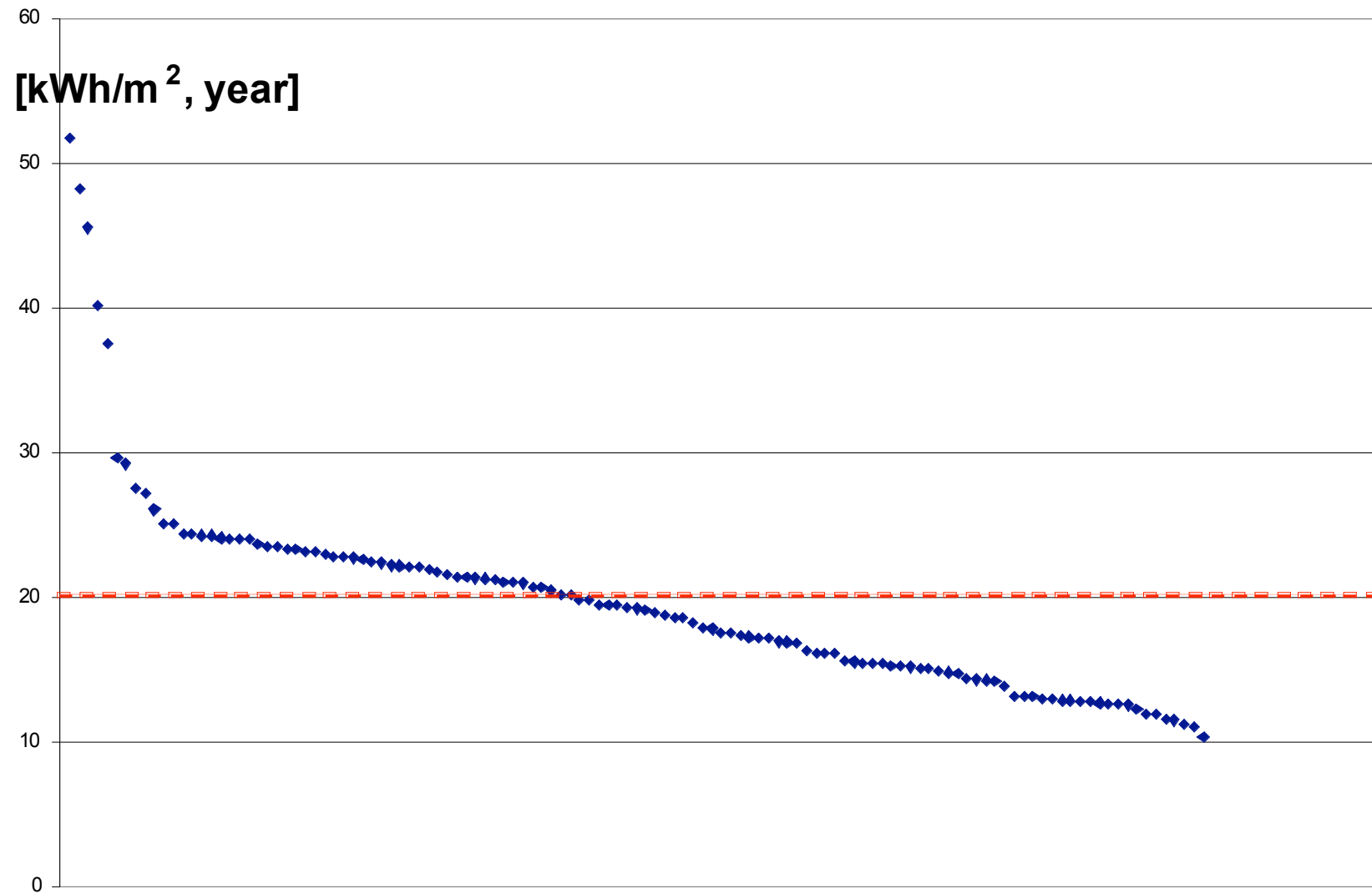
Electricity demand - Schools



Electricity demand

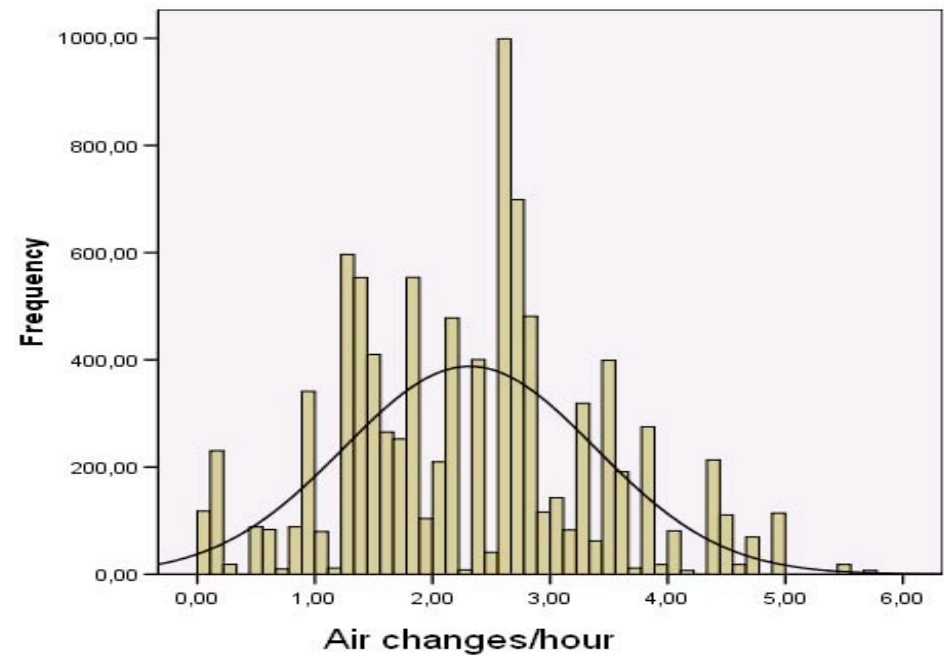
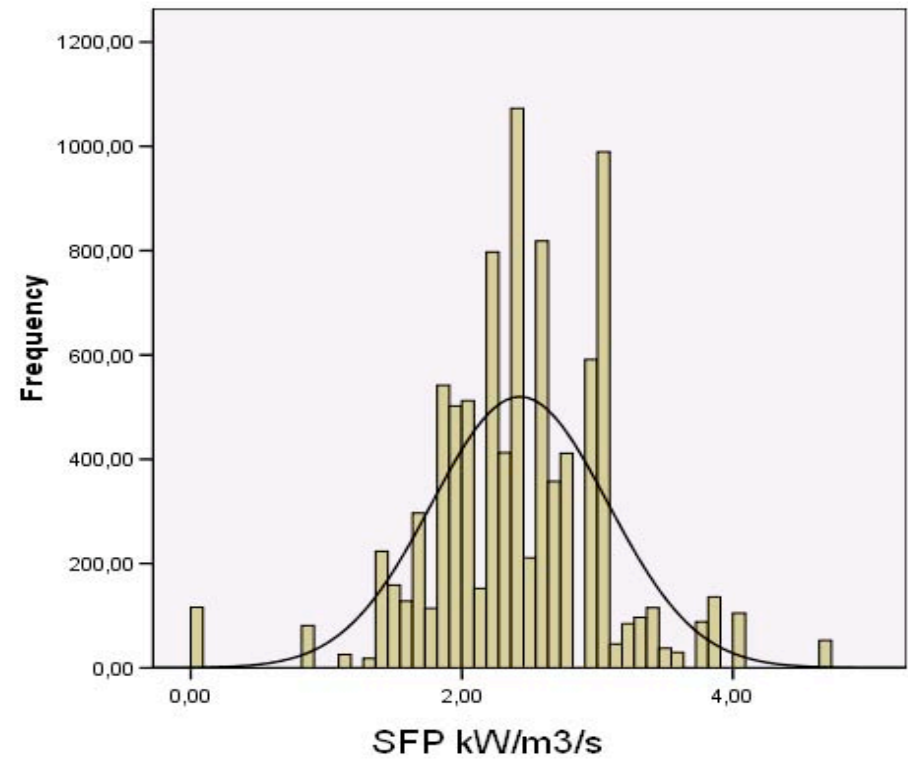
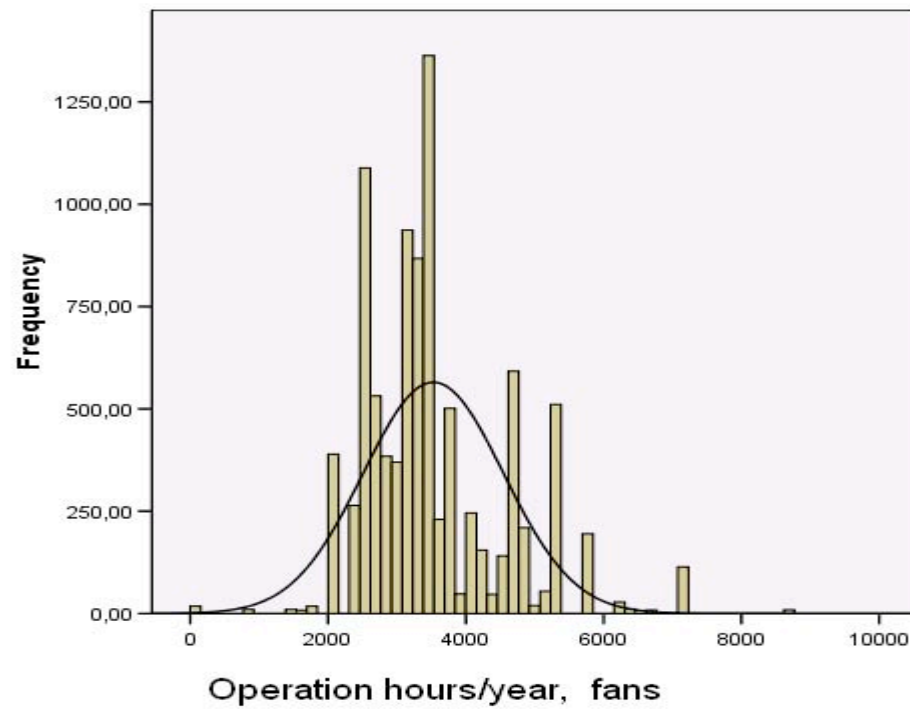


Lighting, annual specific electricity [kWh/m²], distribution and mean.



Energyefficiency possibilities

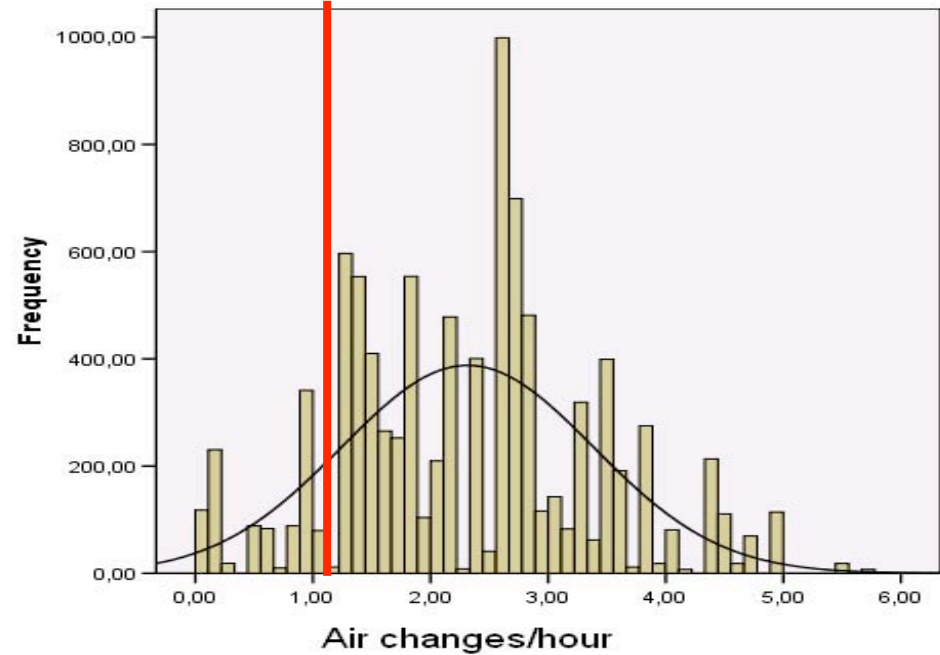
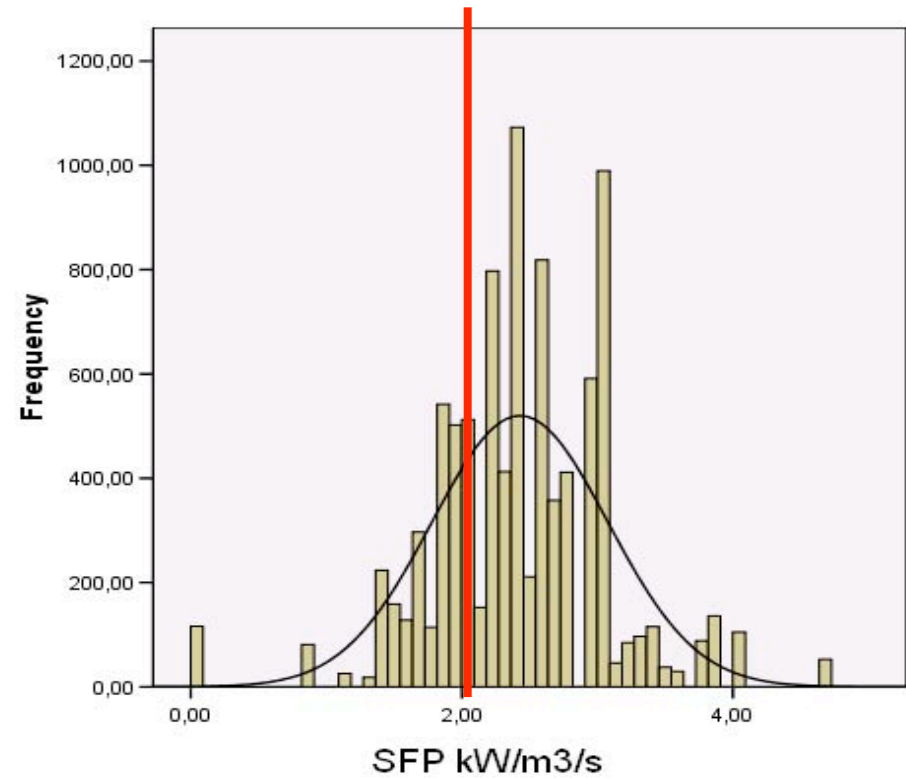
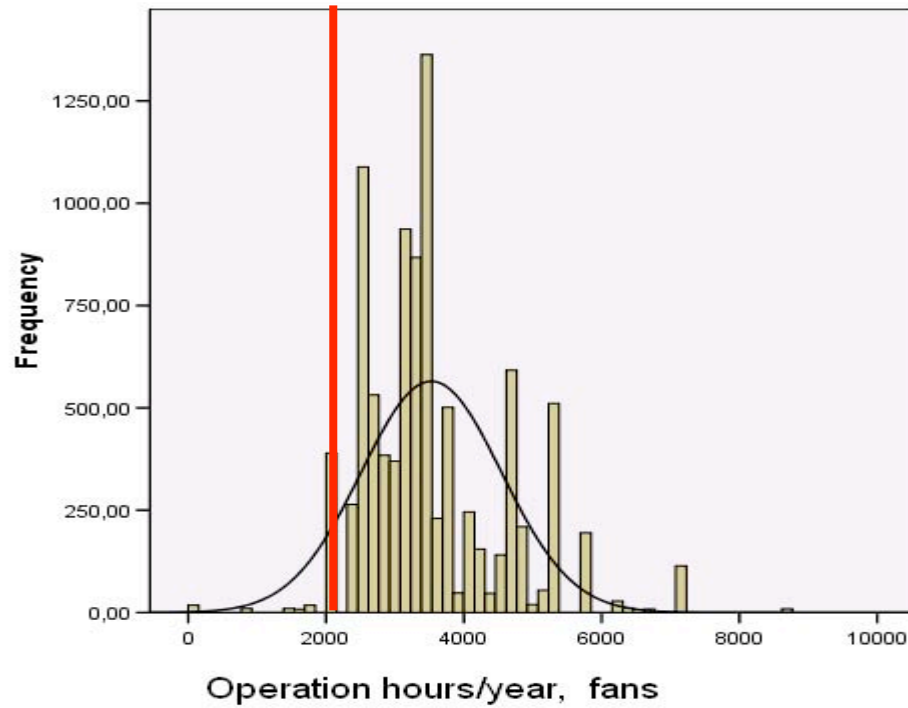
- ventilation



Energyefficiency possibilities

- ventilation

Operation h.	8,2 kWh/m ²
SFP	2,9 kWh/m ²
Air changes	9,2 kWh/m ²



Purpose of the environment survey

- Enable follow up of the in-door environment in comparison to the building regulations
- Search for a connection between energy use and in-door environment
- Gain experience for similar future studies that are under way

Indoor environment in STIL-2

- Survey
- Questionnaires'
- Long-term measurements
 - Radon
 - Temperature, indoor and out
 - Relativ humidity, indoor and out

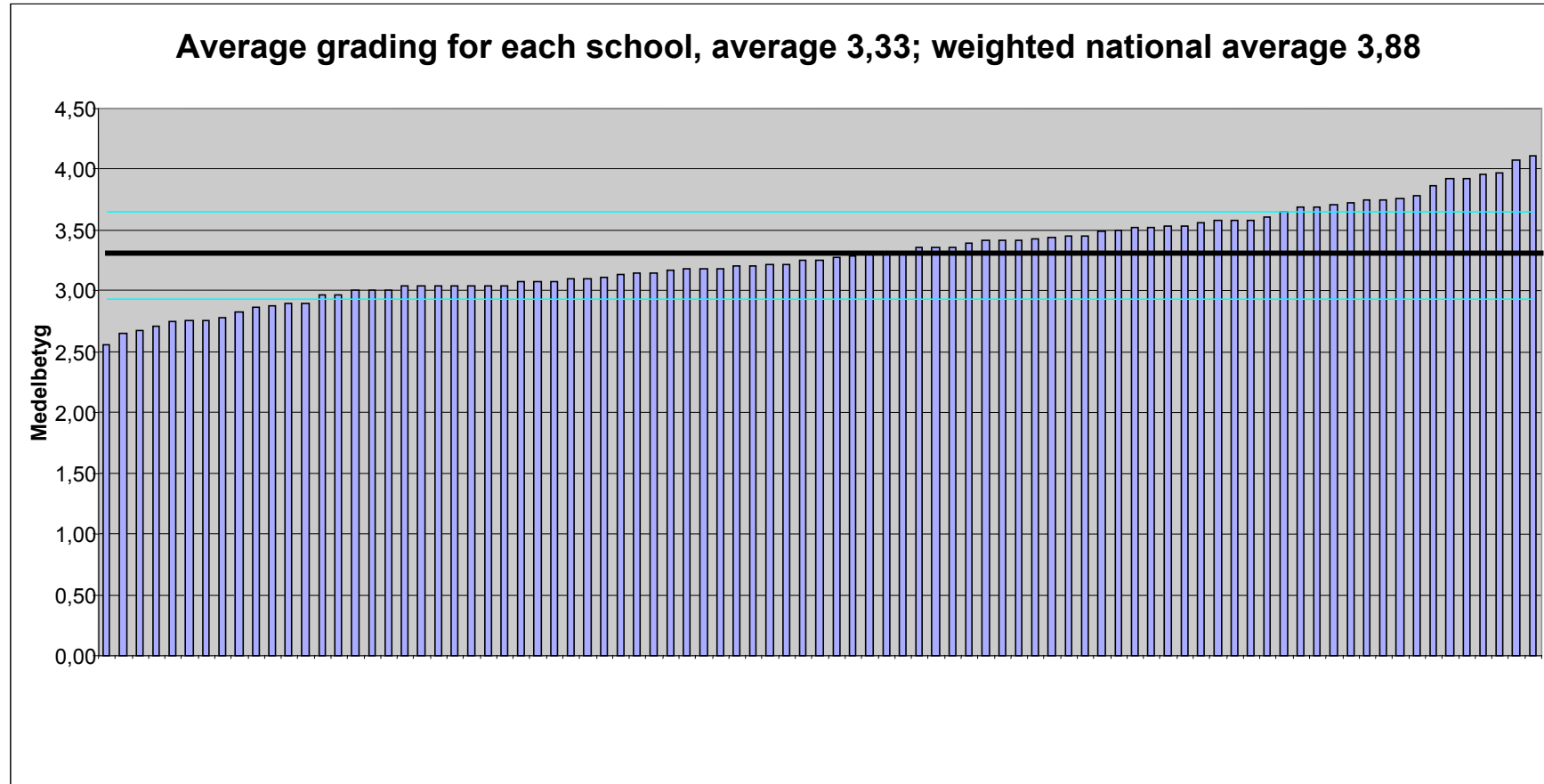
Indoor environment, eight gradings of the technical status

- Magnetic fields
- Lighting
- Legionaries decease
- Sound
- Moisture
- Air quality
- Thermal environment
- Cleaning efficiency

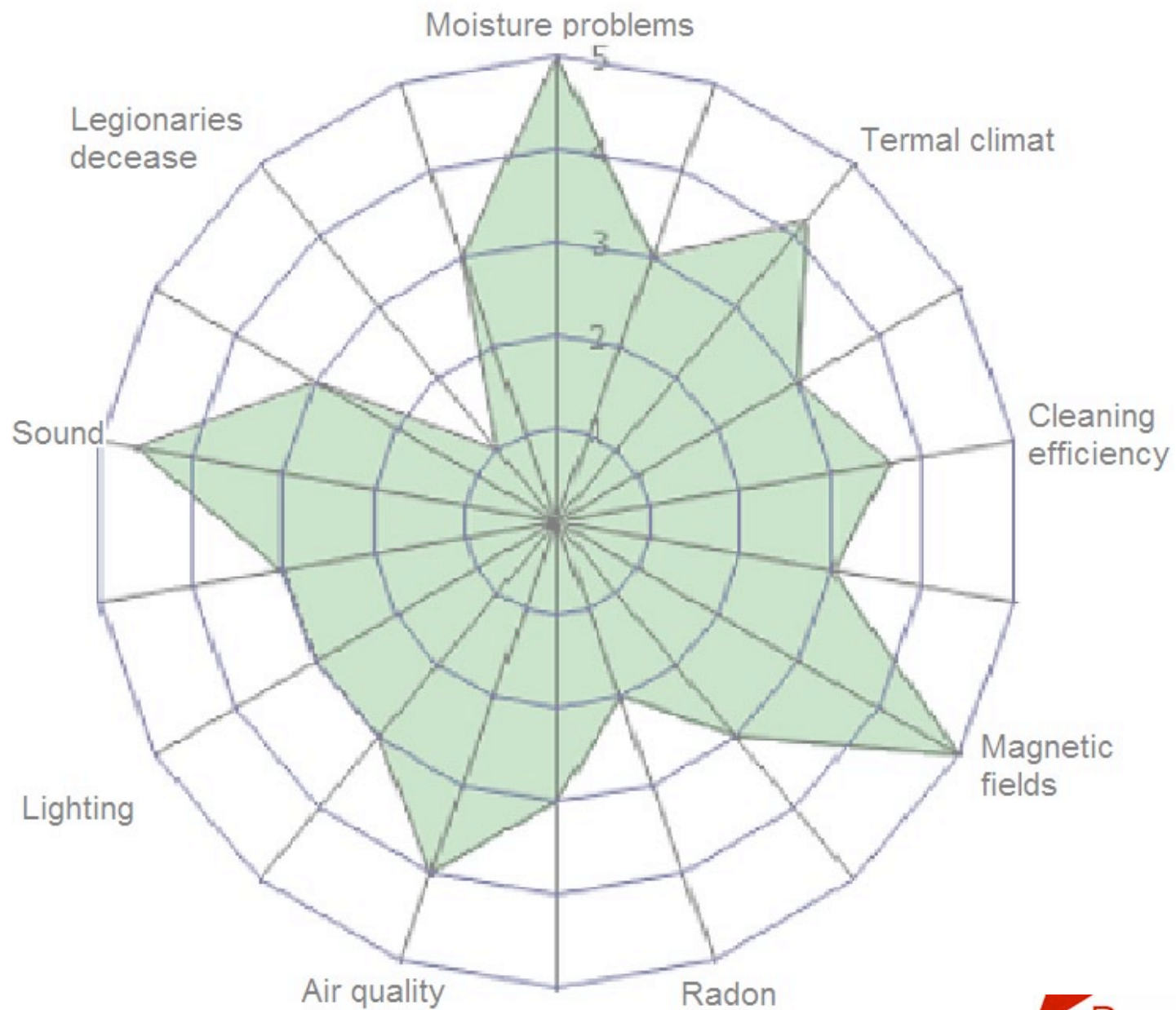
Questionnaires

- Personal data
- Working environment
- Working conditions
- illness/ailments
- School environment

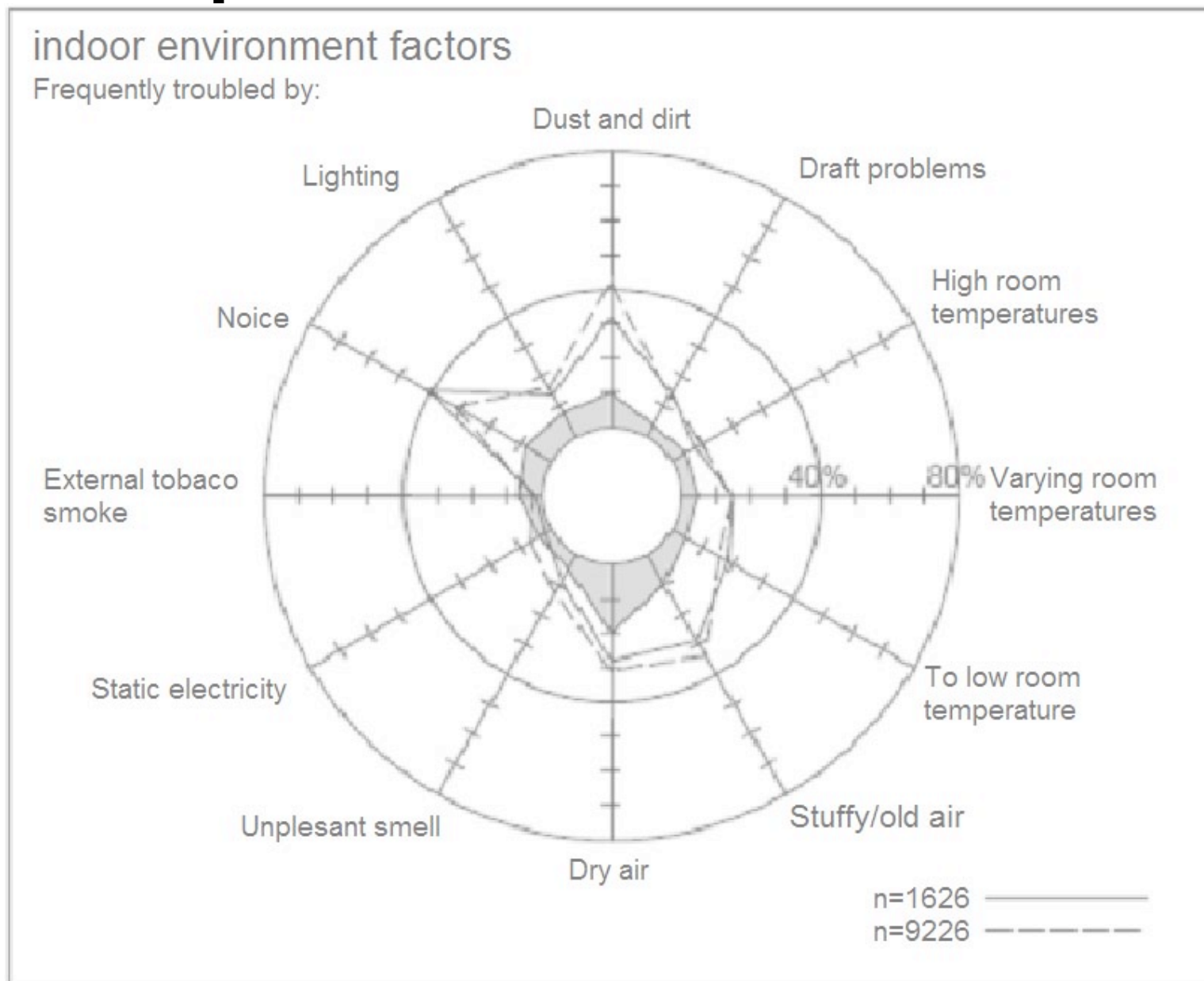
Result indoor environment



Result indoor environment



Result questionnaire



Pearson correlation analysis

User response	Audit Indoor climate	Audit energy
Thermal Climate	Thermal Air Climate	U-value, average
Air Quality	Air Quality	SFP+airflow + op. hours
Noise	Noise	Window area
Complaints	Lighting	Lighting
	Average score	Total energy
		Pupils
		Teachers/employees
		Pupils/teachers
		Area/pupil
		Building, year + installation year

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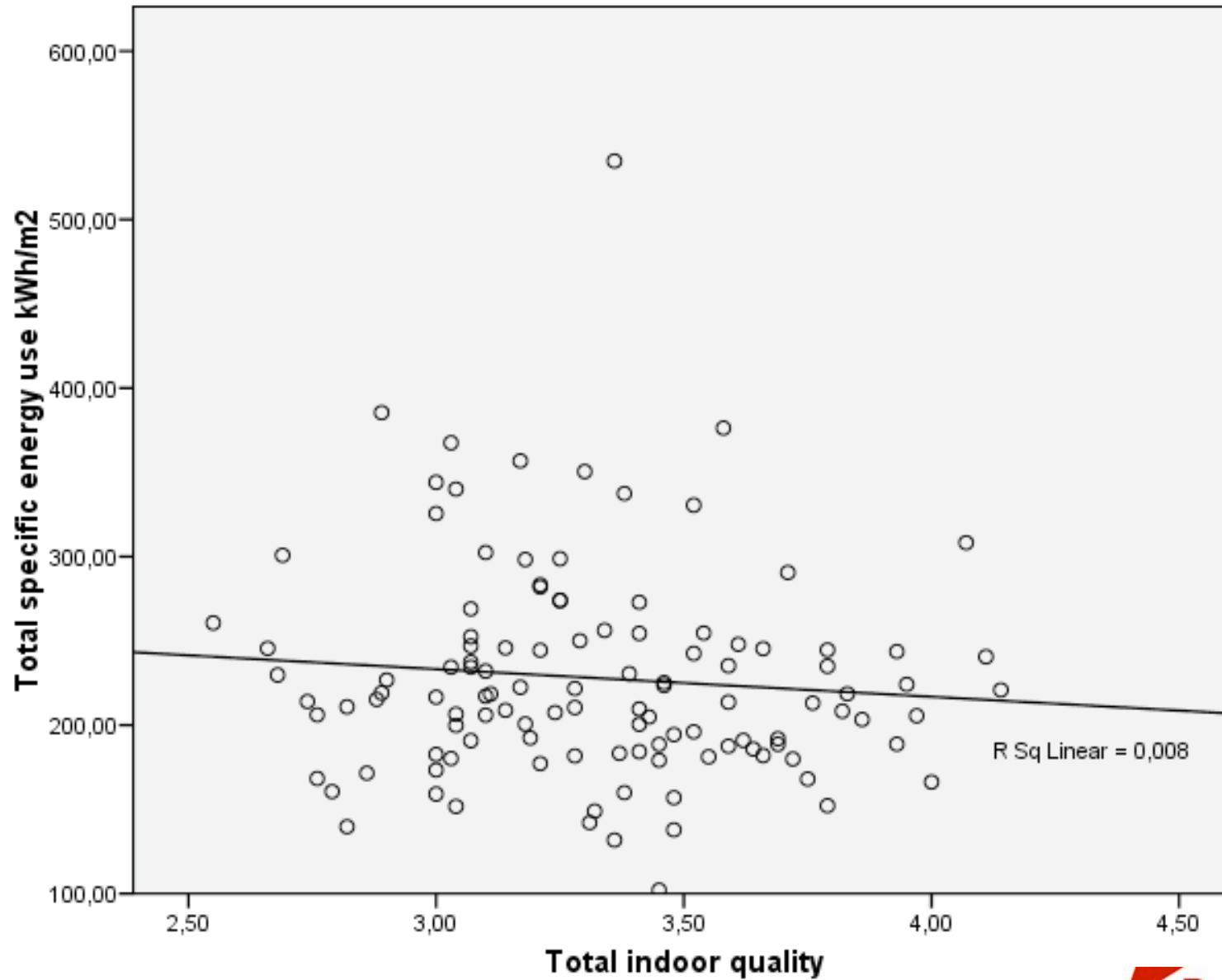
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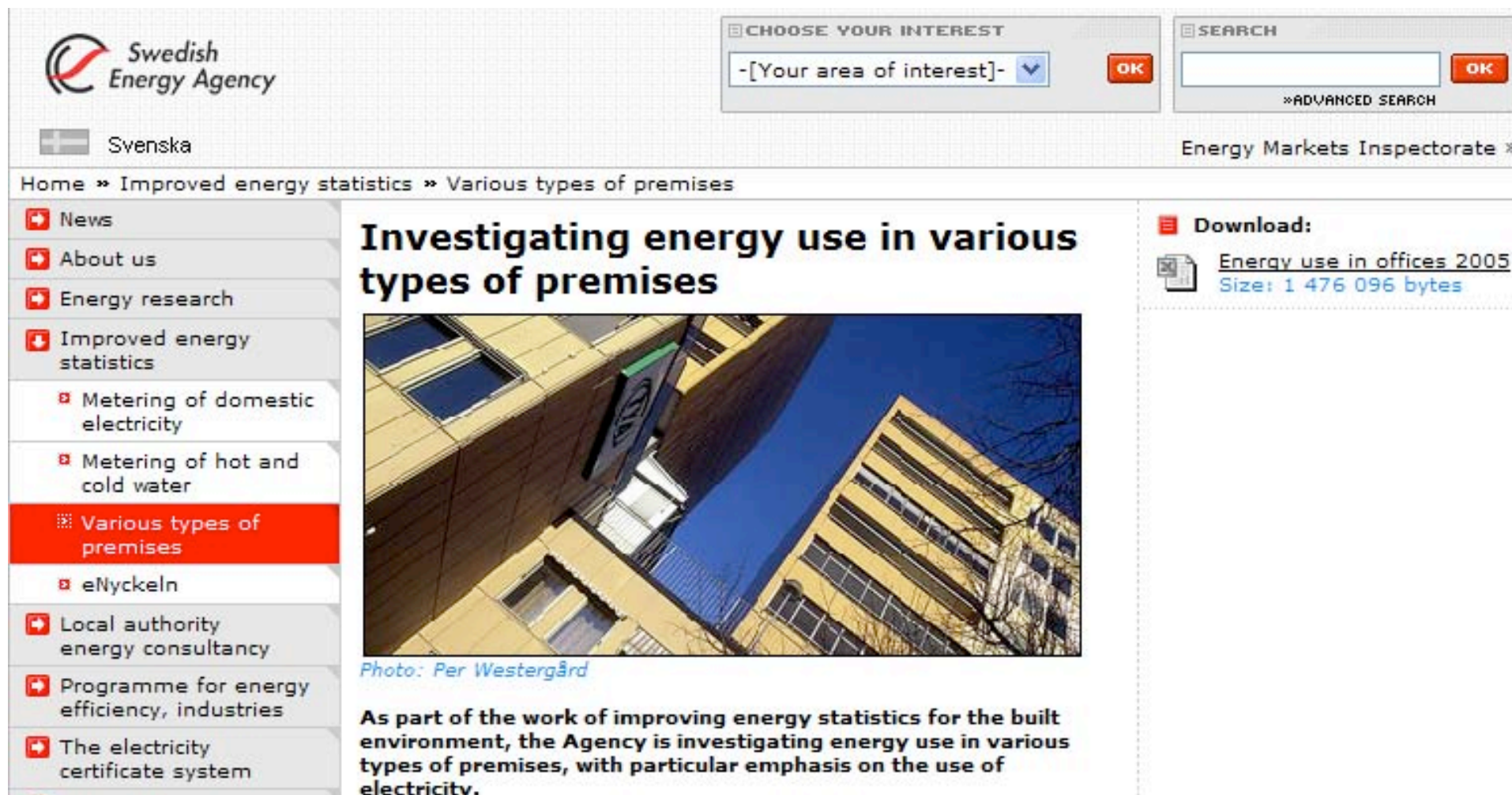
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No contradiction between good indoor environment and energy efficiency



More info can be found at: www.energimyndigheten.se



The screenshot shows the Swedish Energy Agency website. At the top left is the logo for the Swedish Energy Agency. To the right are search and interest selection tools. Below the header is a navigation menu with a sidebar on the left containing various categories. The main content area features a news article titled "Investigating energy use in various types of premises" with a photograph of a modern building. A download link for a document titled "Energy use in offices 2005" is also visible.

Swedish Energy Agency

Svenska

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 - Metering of domestic electricity
 - Metering of hot and cold water
 - Various types of premises**
 - eNyckeln
- Local authority energy consultancy
- Programme for energy efficiency, industries
- The electricity certificate system

Investigating energy use in various types of premises

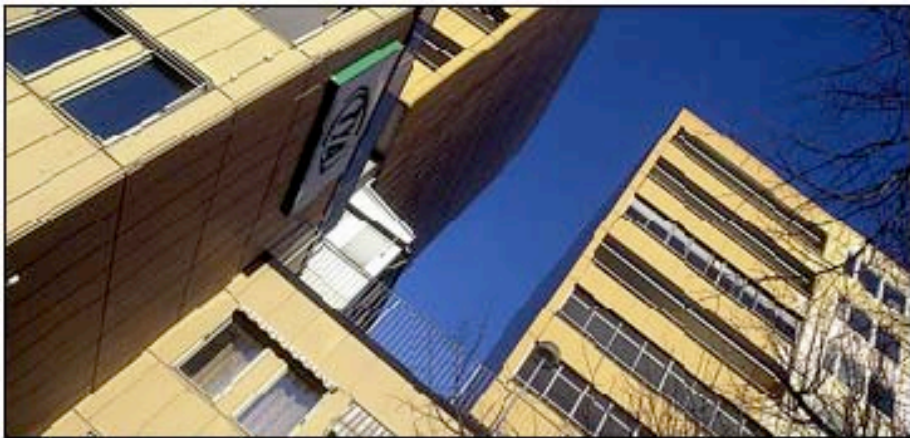


Photo: Per Westergård

As part of the work of improving energy statistics for the built environment, the Agency is investigating energy use in various types of premises, with particular emphasis on the use of electricity.

Download:
Energy use in offices 2005
Size: 1 476 096 bytes