



UNIVERSITY OF GOTHENBURG



AKADEMISKA HUS

# Energy saving project – with multiple positive effects

*Laboratory for Experimental Biomedicine  
University of Gothenburg, Sweden*



ISCN Award winner Excellence in Buildings  
Singapore June 2013

[www.gu.se](http://www.gu.se)



# Laboratory for Experimental Biomedicine: cuts energy, saves money, improves work environment and animal welfare

In a joint project, the  
Sahlgrenska Academy and the  
property owner, Akademiska  
Hus, carried out several major  
energy efficiency measures.

A project part of the university  
climate action plan with the  
goal to reduce green house gas  
emissions by 20% by 2015.

## University of Gothenburg

Core Facilities at the Sahlgrenska Academy

**MORGAN LIDÉN**

Head of administration

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Veterinary

## Akademiska Hus

**STELLAN OLSSON**

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Project coordinators



EMAS  
VERIFIED  
ENVIRONMENTAL  
MANAGEMENT  
Reg.nr. S-000256



Reg.nr. 3750M

## Facts about University of Gothenburg

### 8 faculties – 43 departments

- The Sahlgrenska Academy – pharmacy, medicine, odontology and health care sciences
- The Faculty of Science
- The Faculty of Arts
- The Faculty of Fine, Applied and Performing Arts
- The Faculty of Social Sciences
- School of Business, Economics and Law
- The Faculty of Education
- The IT Faculty

- 38,000 students, 26,400 full-time students
- 179 educational programmes
- 2,130 courses
- 5,900 employees
- 381,000 square meters building area
- 600 million Euro total income/revenue





# Background

- The Laboratory for Experimental Biomedicine (EBM), house a large number of animals for medical research. EBM has 9000m<sup>2</sup> and was built in 1995-98
- The building has the highest energy consumption of all the buildings at the university, 1325 kWh/m<sup>2</sup>, which costs approx. 1,5 million USD per year.
- Other facilities in university campus use approx. 225 kWh/m<sup>2</sup>

# Mission for 2009-2013

- **Better work environment for animal technicians !**
- **Increased animal welfare !**
  - Secured environment in the IVC-racks
  - Operational alarm system of the IVC-racks
  - Prevent spread of infections between cages
- **Lower environmental impact !**
  - Reducing energy with 25% until 2013
  - No use of fossil natural gas
- **Economic savings !**

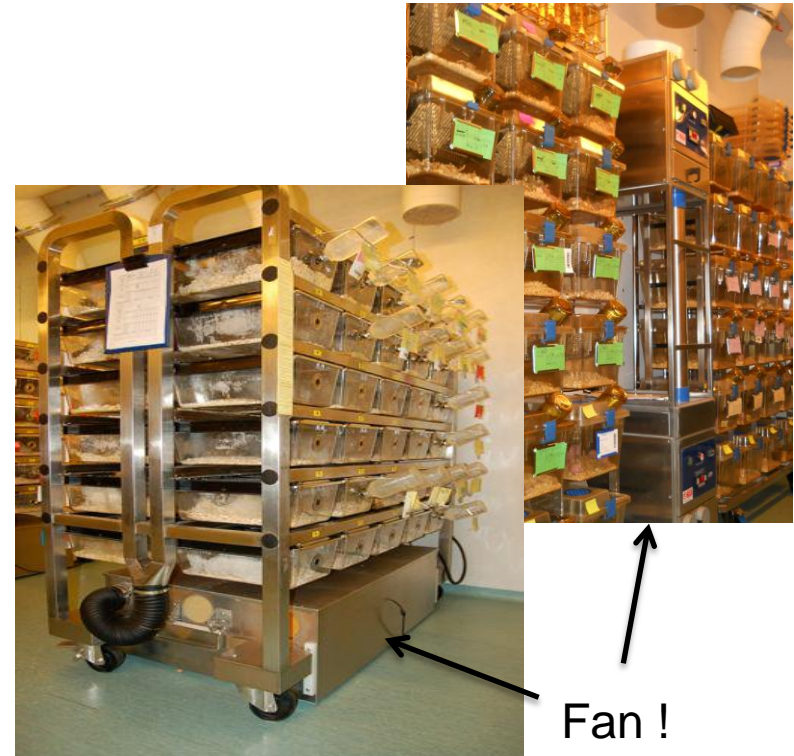


**IVC-rack  
Individual  
Ventilated Cages**

# Better work environment

## VENTILATION BEFORE CHANGES

- Animal-rooms were ventilated by changing the air 20 times/hour, in order to secure clean air in the room (other buildings 0,5-2 times/h)
- **Humidity** was produced by steamboilers and spread in the room by the ventilation.
- A fan on each IVC-rack transferred the air from the room into the cages.



# Better work environment

## VENTILATION AFTER CHANGES

- IVC-racks **directly connected** to the central ventilation system, instead of one fan per rack.
- Because of the direct connection, a **minimum production of humidity** was needed.
- **Air-circulation** in the room was lowered from 20 times/hour to **5 times/hour.**



# Better work environment

## MEASUREMENTS

- Measurements of: mouse allergen, organic dust, ammonia, carbon dioxide, humidity and temperature, were done at different airchanges/hour.
- The measurements pointed out risks when technicians change dirty cages in the animal-rooms.
- Especially when cages are stacked into each other, personnel were exposed to a puff of air with a high allergen content.
- With a lower aircirculation in the animal-rooms the risk will increase to a high level.



# Better work environment

## WORKING STATIONS

By placing *Laminar AirFlow (LAF) modules* in the animal-rooms, the work environment was secured from allergens.



LAF-bench and LAF-wardrobe



LAF-roof with an ergonomic working area

# Increased animal welfare

## Secured environment in the IVC-racks

Measurements were done at:

- different numbers of air-changes in the room
- with connection to the central ventilation



## Operational alarm system of the IVC-racks

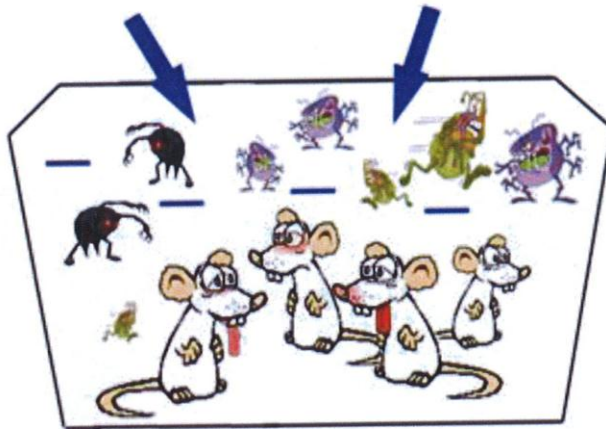
Each rack was connected to:

- the alarm for the central ventilation
- internal alarm with red/green lights in the corridor and a connection to the alarm computer

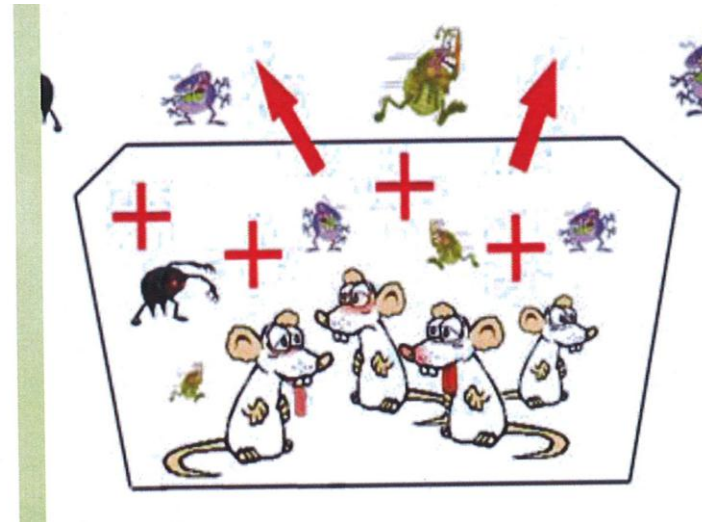


# Increased animal welfare

Prevent spread of infections in the animal-room



**NEGATIVE PRESSURE**  
**Infections remain in the cage – no spread.**



**POSITIVE PRESSURE**  
**Infections are spread in the room**

# Lower environmental impact REMOVING THE USE OF GAS

**New Steamboilers** producing steam and hot water for washing, autoclaves and moistering.

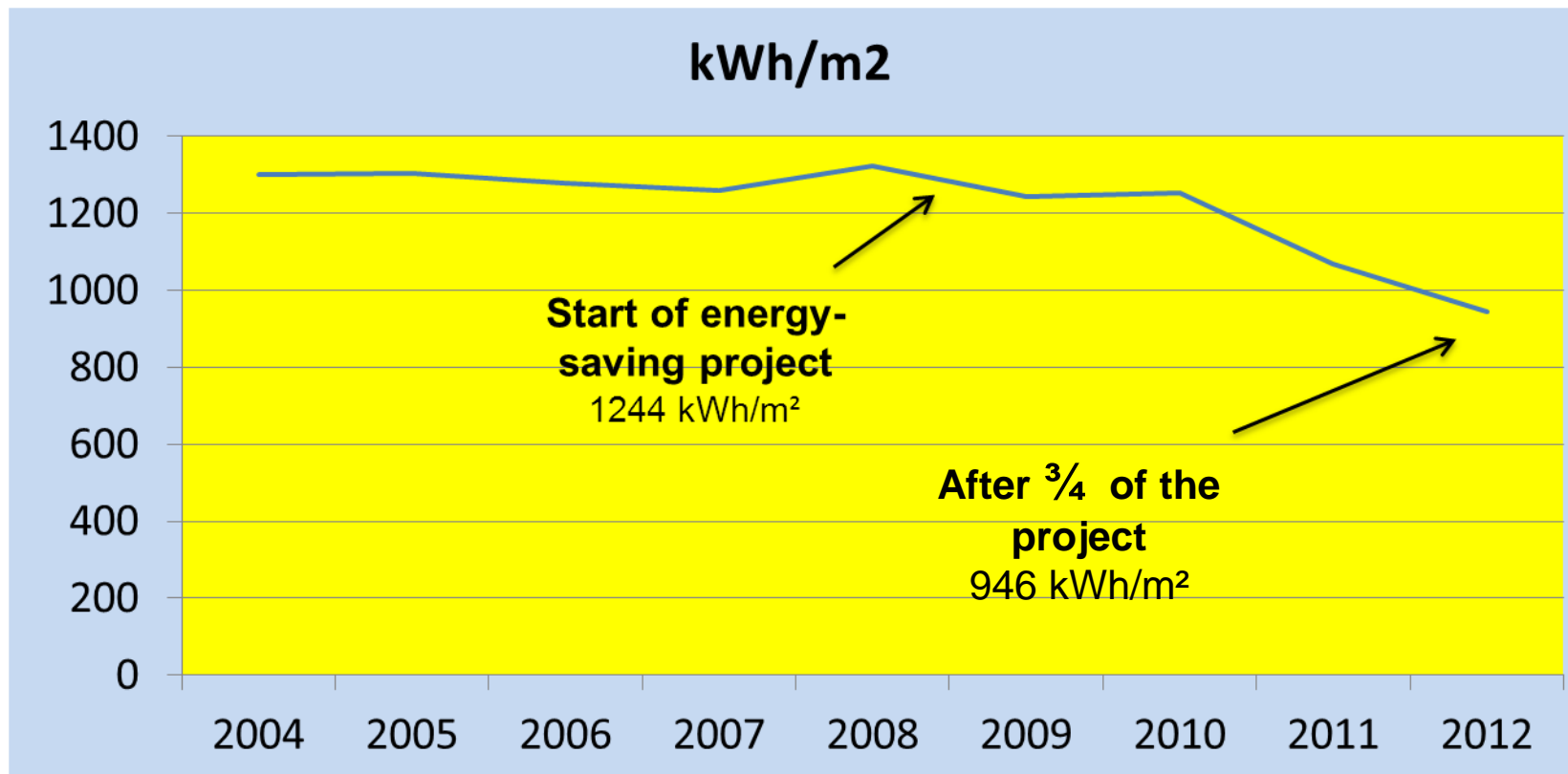
**Energy use** changed from gas to green electricity

- By removing the use of fossil natural gas, carbon dioxide emissions fell by just over 300 tons during the year.



# Lower environmental impact

## ENERGY CONSUMPTION





# Economy

## INVESTMENTS PAID BY ENERGY SAVINGS

### INVESTMENTS (Payback time 10 years)

- New IVC-racks
- Laminar airflow modules
- New Washing facility
  
- Adjustment of ventilation
- Steamboilers

**All investments paid by reduced energy costs**

*(appr. 400.000 USD per year)*

**Rental adjustment**

financed by reduced service costs and increased incomes

*(appr. 300.000 USD per year)*

# Mission accomplished

- **Better work environment for animal technicians !**
  - Measured and secured environment for technicians in the animal rooms **OK!**
- **Increased animal welfare !**
  - Secured environment in the IVC-cages **OK!**
  - Operational alarm system of the IVC-racks **OK!**
  - Prevent spread of infections between cages **OK!**
- **Lower environmental impact**
  - Reducing energy with 25% until 2013 **OK!**
  - No use of fossil natural gas **OK!**
- **Economic savings !**
  - Investments paid by the energy-saving costs **OK!**



# Summary

In **a joint project**, the Sahlgrenska Academy and the property owner, Akademiska Hus, carried out several major energy efficiency measures.

- **Reduces energy consumption** at EBM by 24 percent between 2009 and 2012, which corresponds to 375 000 USD per year.
- Removing the use of fossil natural gas, **reduced carbon dioxide emissions** from EBM by just over 300 tons in year 2012.
- Connecting the **central ventilation directly to the animal racks** is an innovation, developed by our technicians and has not been done anywhere else, as far as we know.
- This **project is unique** because it saves energy and money and it improves the work environment and the animal welfare, in the same time
- During 2013, adjustments and analyses will be done in order to fulfill the first part of the project and to set up **new goals for a second part**.





# Thank you for your attention !

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## Sustainability at University of Gothenburg

[www.gu.se/miljo](http://www.gu.se/miljo) & [www.sustainabilityreport.gu.se](http://www.sustainabilityreport.gu.se)

