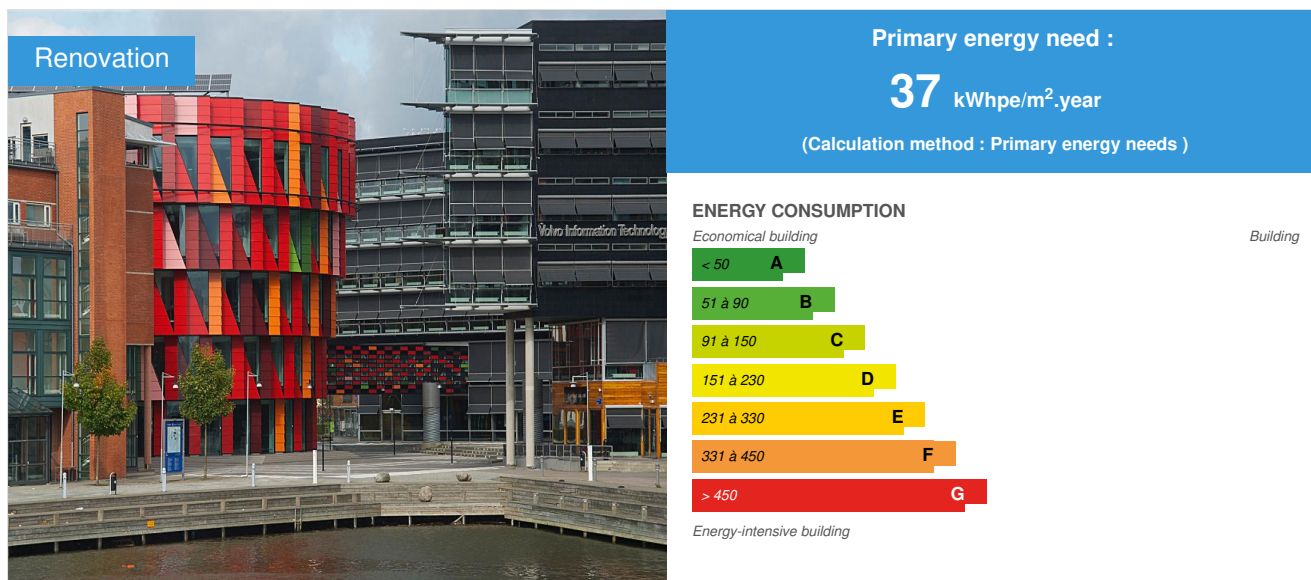


# Kuggen. Ecopilot, energienous building automation system

by Ulf Falkenby / 2015-06-30 20:19:29 / International / 11745 / EN



**Building Type** : Office building < 28m  
**Construction Year** : 2011  
**Delivery year** : 2014  
**Address 1 - street** : 412 96 GOTHENBURG, Sweden  
**Climate zone** : [Dfc] Wet subarctic, cool summer, severe winter

**Net Floor Area** : 4 898 m<sup>2</sup> Useful area (es)  
**Construction/refurbishment cost** : 50 000 €  
**Cost/m<sup>2</sup>** : 10.21 €/m<sup>2</sup>

Proposed by :



## General informations

### KabonaAB

Kabona is a company which works with energienous energy building automation and the company's head office is located in Borås, Sweden. Kabona was founded in 2001 and has long-standing and solid experience, which has formed the basis of our innovative and energy smart product Ecopilot. Since 2012 Kabona has been owned by Investment AB Latour which is registered on the Stockholm Stock Exchange under Large Cap.

### Project property Kuggen, Lindholmen Göteborg – independent evaluation of Ecopilot in a modern office building

The project's aim is a thorough evaluation of special functions for integrated control of heating, cooling and ventilation, specifically adapted to utilise the building's thermal inertia. Kabona refers to a long series of projects where Ecopilot has resulted in energy savings of 25%, with retained or improved quality of the indoor climate. However, no independent evaluation of the system has been conducted yet, which is the aim of this project.

### About the building

The building Kuggen is an office building of 4,898 m<sup>2</sup> divided on 5 floors and was put into operation in 2011. From the start, even before Ecopilot, the building had good energy performance and has been certified in accordance with the EU programme for energy-efficient building, Green Building.

Installation of the new superior control system, Ecopilot, was conducted on 27 August 2014 and this evaluation focused on how this has impacted the indoor environment, energy consumption and operation.

### The building's performance before Ecopilot

According to the energy statistics of 2013 from Göteborg Energi, Kuggen's energy consumption is 37 kWh/m<sup>2</sup> peryear for heating (temperature corrected) and 9 kWh/m<sup>2</sup> for districtcooling. In 2013 the consumption of property electricity amounted to 27 kWh/m<sup>2</sup>year and business electricity to 28 kWh/m<sup>2</sup>. The results of consumption before and after Ecopilot are presented under conclusion below.

### Evaluation

The evaluation was performed by an independent party, CIT Energy Management AB, without links to the supplier of Ecopilot. In order to ensure correct installation and operation of the system, CIT collaborates with both Chalmersfastigheter and Kabona. This evaluation covers six months (the time period September 2014 – February 2015).

## See more details about this project

<https://sv.wikipedia.org/wiki/Kuggen>

<http://www.energi-miljo.se/artikelem/ny-styrning-viktig-kugge-for-miljon/>

## Stakeholders

### Stakeholders

Function : Other consultancy agency

CIT Energy Management AB

Lars Ekberg; lars.ekberg@cit.chalmers.se

<http://www.energy-management.se>

### Contracting method

Other methods

## Energy

### Energy consumption

Primary energy need : 37,00 kWhpe/m<sup>2</sup>.year

Primary energy need for standard building : 55,00 kWhpe/m<sup>2</sup>.year

Calculation method : Primary energy needs

CEEB : 0.0004

Breakdown for energy consumption : 37 kwh/m2/year - heating

9 kwh/m2/year - cooling

27 kwh/m2/year - property electricity

Initial consumption : 73,00 kWhpe/m<sup>2</sup>.year

### Envelope performance

Envelope U-Value : 1,00 W.m<sup>-2</sup>.K<sup>-1</sup>

More information :

About envelope U-value:

We dont have any numbers but I have to write something down to get futher on with in this form.

The building its a Green Building classification

### More information

All kwh above was BEFORE we installed the Ecopilot.

Energy savings with Ecopilot:

Heating: -49%

Cooling: -50%

Property electricity: -30%

### Real final energy consumption

Real final energy consumption/m<sup>2</sup> : 42,00 kWhfe/m<sup>2</sup>.year  
Real final energy consumption/functional unit : 42,00 kWhfe/m<sup>2</sup>.year  
Year of the real energy consumption : 2 013

## Renewables & systems

### Systems

#### Heating system :

- Urban network
- Heat pump

#### Hot water system :

- Heat pump
- Solar Thermal

#### Cooling system :

- Urban network
- VAV Syst. (Variable Air Volume system)

#### Ventilation system :

- Natural ventilation
- Free-cooling

#### Renewable systems :

- Solar Thermal
- No renewable energy systems

#### Other information on HVAC :

Existing heating, cooling and ventilation systems

The building is ventilated with a VAV system (Lindinvent), which is controlled based on presence and CO<sub>2</sub>. There is also a connection to radiator valves for sequence control of heating/cooling. The air handling unit (Fläkt Woods) is equipped with rotating recovery and speed control. There is also a small unit which supports a few fume cupboards and local exhausts. This unit has fluid coupled heat recovery. The building has a radiator system and district heating is the primary heat source. However, there are two supplementary heat sources:

1) Solar collectors on the roof heat the hot service water. The solar heat is measured separately and data is easily available in the computerised control unit (CCU). Two meters allow measurement of the warm water consumption.

2) An outdoor air heat pump heats the return on the secondary side. This also has separate meters through CCU.

The building's cooling system is supported with district cooling. The cooling consumption is measured. Electricity for property management is measured separately from business electricity. Business electricity is measured separately for each floor (5 floors)

### Smart Building

#### BMS :

See description about Ecopilot

**Users' opinion on the Smart Building functions :** The quantity of heat produced from the heat pump differs markedly from the autumn of 2014 compared to the previous year, and if these values are included the total heat saving is approximately 50% for the six months. The quantity of consumed district cooling during the period with Ecopilot (September 2014 – February 2015) was approximately 50% lower than without, but as the cooling demand was low during this period an evaluation with higher outdoor temperatures needs to be conducted in order to draw general conclusions.

Property electricity declined by 30% during the period with Ecopilot and parts of the saving are linked to the heat pump being in operation to a lesser degree.

Without Ecopilot Sep 2013 – Feb 2014 (MWh)

With Ecopilot Sep 2014 – Feb 2015 (MWh)

Diff (MWh)

Energy saving (%)

District heating consumption

82.88

43.15

-39.73

-48 %

Temperature corrected district heating consumption

87.67

49.53

-38.14

-44 %  
Heat from heat pump  
90.58  
44.49  
-46.09  
-51 %  
Total heat consumption  
173.46  
87.64  
-85.82  
-49 %  
District cooling  
6.37  
3.20  
-3.17  
-50% (5)  
Property electricity (incl. electricity for heat pump)  
85.20  
59.82  
-25.38  
-30 %  
Business electricity  
75.31  
78.32  
3.01  
+4%  
(5) Does not cover the summer season with greatest need of cooling and therefore it is difficult to draw conclusions about the saving.

The conclusions which could be drawn are that the requirements for the indoor environment are fulfilled with Ecopilot and that with the new control you have greater variations in the room temperature and air flow, especially during the summer drop, but that the greater variation takes place outside the comfort periods.

At Kabona we look forward to contributing to property owners in Europe lowering their energy consumption to the lowest level possible in a cost-efficient manner, with a payoff of approximately 3–5 years.

## Environment

### Urban environment

Kuggen is located in a business area close to the water.

There are many opportunities for public transportation. The bus station is just outside the building, 50 meters, and it takes only 9 minutes to the city center of Gothenburg.

## Products

### Product

Ecopilot

Kabona AB

Ulf Falkenby; ufa@kabona.com

<http://www.ecopilot.com>

Product category :

Ecopilot is a new system with integrated control of ventilation, heating and cooling. Ecopilot functions brilliantly, both for new production and existing properties where we over-modulate existing BMS. The system particularly takes into account heat storage in the building and thereby counteracts the need of, in a short duration, alternating from heating to cooling, and vice versa. Ecopilot optimises energy with respect to internal loads, weather forecast, indoor temperature, wind impact and sun insolation.

They are very happy about the huge energy savings that we have accomplished

The conclusions which could be drawn are that the requirements for the indoor environment are fulfilled with Ecopilot and that with the new control you have greater variations in the room temperature and air flow, especially during the summer drop, but that the greater variation takes place outside the comfort periods.

There is a full report from this study that you can get from Mr Lars Ekberg at CIT Management

<https://www.construction21.org/data/sources/users/15156/ecopilot-picture-awards.pptx>



## Construction and exploitation costs

Cost of studies : 40 000 €

Subsidies : 8 000 €

## Health and comfort

### Indoor Air quality

The conclusions which could be drawn are that the requirements for the indoor environment are fulfilled with Ecopilot. At Kabona we look forward to contributing to property owners in Europe lowering their energy consumption to the lowest level possible in a cost-efficient manner, with a payoff of approximately 3–5 years.

## Contest

### Reasons for participating in the competition(s)

This summary is for both categories:

#### Kabona AB

Kabona is a company which works with brilliant energy building automation and the company's head office is located in Borås, Sweden. Kabona was founded in 2001 and has long-standing and solid experience, which has formed the basis of our innovative and energy smart product Ecopilot.

#### Our unique product – Ecopilot

Ecopilot is a new system with integrated control of ventilation, heating and cooling. Ecopilot functions brilliantly, both for new production and existing properties where we over-modulate existing equipment. The system particularly takes into account heat storage in the building and thereby counteracts the need of, in a short duration, alternating from heating to cooling, and vice versa. There are currently approximately 320 installed Ecopilots. For more information about the product and our customers, please logon to [ecopilot.com](http://ecopilot.com)

#### Project property Kuggen, Lindholmen Göteborg – independent evaluation of Ecopilot in a modern office building

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The evaluation was performed by an independent party, CIT Energy Management AB, without links to the supplier of Ecopilot. This evaluation covers six months (the time period September 2014 – February 2015).

#### Conclusion

	Without Ecopilot Sep 2013 – Feb 2014 (MWh)	With Ecopilot Sep 2014 – Feb 2015 (MWh)	Diff (MWh)	Energy saving (%)
District heating consumption	82.88	43.15	-39.73	-48 %
Temperature corrected district heating consumption	87.67	49.53	-38.14	-44 %
Heat from heat pump	90.58	44.49	-46.09	-51 %
Total heat consumption	173.46	87.64	-85.82	-49 %
District cooling	6.37	3.20	-3.17	-50% (5)
Property electricity (incl. electricity for heat pump)	85.20	59.82	-25.38	-30 %
Business electricity	75.31	78.32	3.01	+4%

(5) Does not cover the summer season with greatest need of cooling and therefore it is difficult to draw conclusions about the saving.

The conclusions which could be drawn are that **the requirements for the indoor environment are fulfilled with Ecopilot**. At Kabona we look forward to contributing to property owners in Europe lowering their energy consumption to the lowest level possible in a cost-efficient manner, with a payoff of approximately 3–5 years.

### Building candidate in the category





Low energy renovation



Smart Buildings

