

# Energy upgrading measures improve also indoor climate

Foldbjerg, Peter; Knudsen, Henrik N.

*Published in:*
REHVA Journal

*Publication date:*
2014

*Document Version*
Publisher's PDF, also known as Version of record

# Energy upgrading measures improve also indoor climate

PETER FOLDBJERG
Energy and Indoor Climate,
VELUX A/S
peter.foldbjerg@velux.com

HENRIK N. KNUDSEN
Senior researcher, Danish Building Research Institute (SBi), Aalborg University
hnk@sbi.dk

A new survey shows that the economy is what motivates Danish owners of single-family houses the most to start energy upgrading, and that improved indoor climate is also an important factor. After the upgrading, homeowners experience both improved economy and indoor climate. Measurements in a number of new low-energy houses show that it is possible to obtain good thermal comfort and air quality in well-insulated houses even with large window areas. This experience is useful in the upgrading of existing homes.

**Keywords:** energy retroits, indoor climate, occupant satisfaction, questionnaire, homeowner.

In a questionnaire survey on energy upgrading among owners of single-family houses and rowhouses, mainly from 1960 to 1979, in a municipality north of Copenhagen, it appears that altogether at least 60% of the homeowners would like more knowledge about how to save on their energy bill. (Photo: Karl Grau Sørensen).

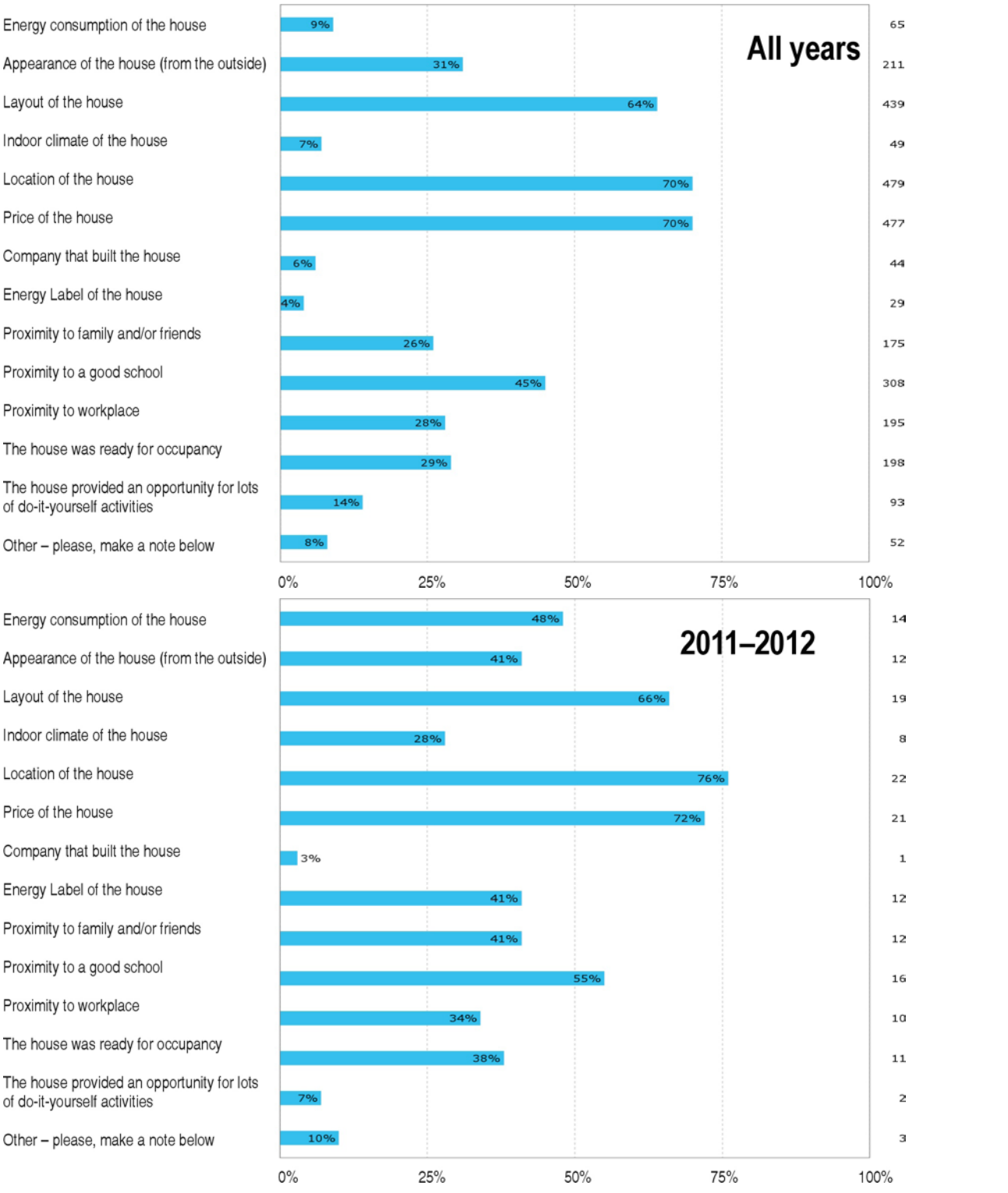
As part of the Danish 2012 Energy Agreement, it was decided that the Government should prepare a comprehensive strategy for energy upgrading of the Danish building stock. As part of the implementation of the strategy, the Minister for Climate, Energy and Building established a network for energy upgrading in 2012, which submitted a calatogue of initiatives to the Minister in May 2013. Among other things, the network identified an urgent need for renovation of Danish homes, not least the many single-family houses built in the 1960s and 1970s. The catalogue also points out that focus should centre not only on energy savings, but also on possible positive side effects like an improved indoor climate.

This article describes a survey carried out among homeowners with the purpose of clarifying incentives, barriers and experiences when making energy upgradings. The accompaning article describes the experience of thermal comfort and air quality in newly built low-energy houses, which can be of relevance for renovations.

## Homeowners' motivation and experiences of energy upgrading

Even though the possible benefits are many, it is only a few homeowners who venture into major energy upgrading projects. This is the background for a questionnaire survey among 1,990 randomly selected homeowners in the municipality of Furesø, north of Copenhagen. The survey focused on the incentives and barriers that they might experience in relation to venturing into energy upgrading of their home and the possible benefits they experienced after having upgraded their home, e.g. in relation to the indoor climate. A total of 683 households participated in the survey resulting in a response rate of 34%. It included responses from homeowners who had already carried out energy upgradings (22%) and

**Question 1.** When you bought your house, what was most important for your choice?

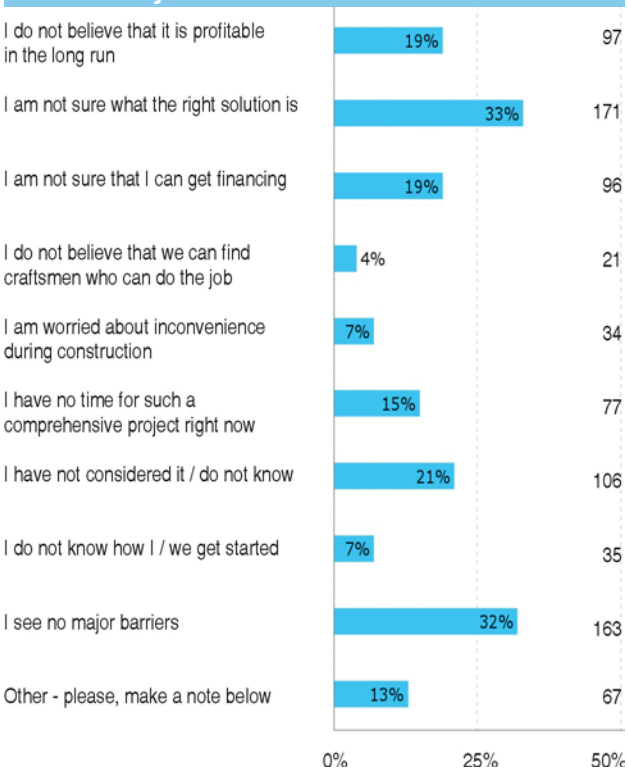



homeowners who were already making some kind of energy upgrading (19%).

## More focus on energy and indoor climate

Among the homeowners who had bought their house within the last couple of years (2011–2012), there is a tendency that energy consumption and indoor climate have become more important than earlier, **Question 1**. What was most important for the homeowners, when they chose the house they own today, was location, price and interior layout. Energy consumption and energy label used to be of little importance as only 4–9% refers to it.

**Question 2.** From your knowledge of energy upgrading, what do you consider the largest barriers for you?



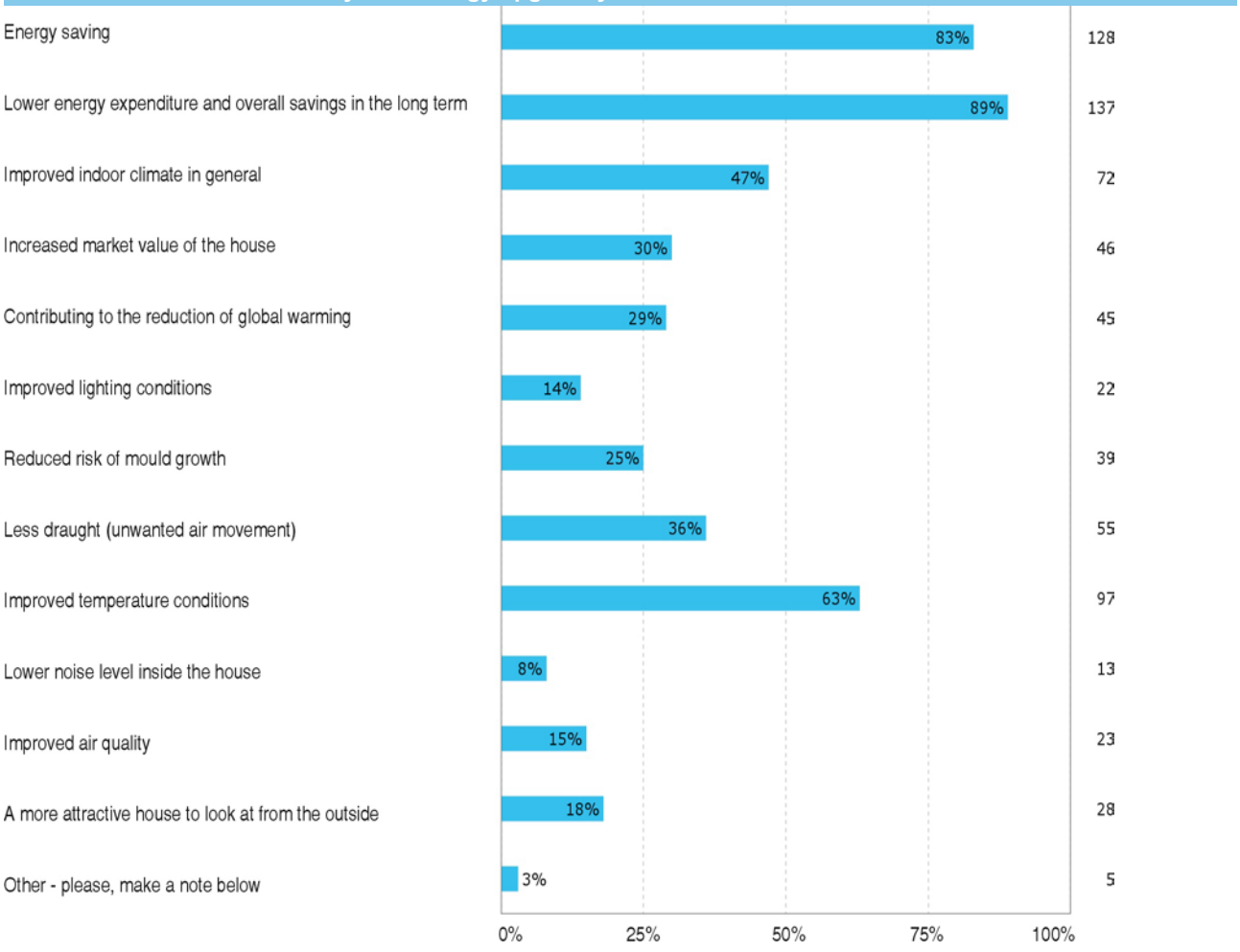

It should be noted, however, that the energy label was not introduced until 1979 and was not really known among house buyers until the mid 1980s. Moreover, only 7% found the indoor climate important. Considering only the relatively few homeowners (29), who bought their house in 2011 or 2012, there is a development that the energy consumption/energy label and indoor climate of the house is becoming more important (48/41% and 28%).

## Homeowners unsure of what is the best solution

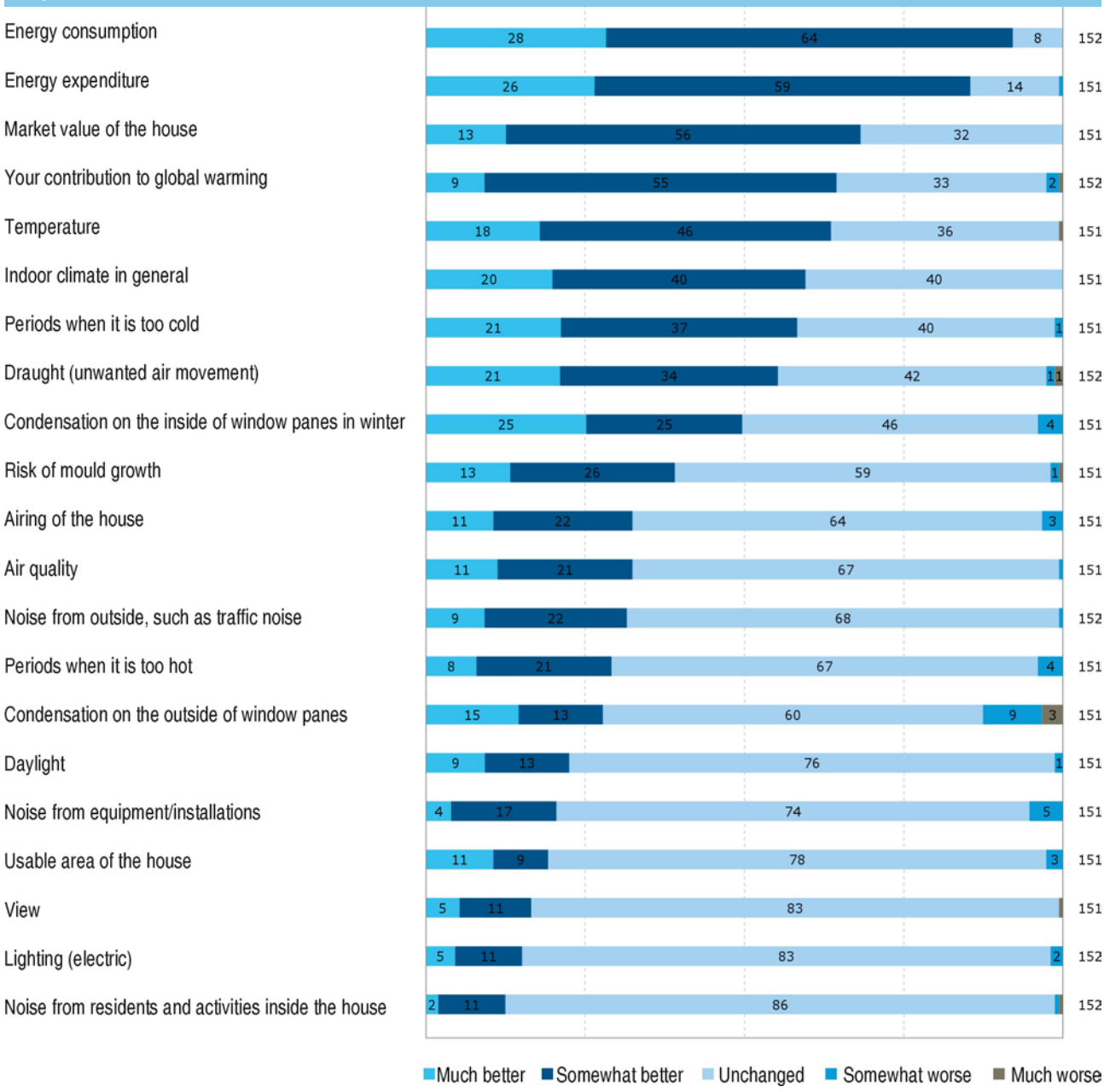
Energy upgrading is complicated and this is also how it is perceived by many homeowners, **Question 2**. When it comes to barriers to energy upgrading, one third of the homeowners state that they are unsure of what is the right solution. As regards economy, one fifth doubt that they can get financing and another fifth do not believe that energy upgrading is profitable in the long run.

Consequently, there is a need to assist homeowners by showing the potential of their houses, the relevant solutions and clarification of how renovation is financially viable. The better the economy of an energy ugrading, the faster the homeowner will reach the decision to go ahead.

**Question 3.** What motivated you to energy upgrade your home?



**Question 4.** After you have energy upgraded your house, to what degree have the following conditions improved or worsened?




## Economy is the most important factor, next comes the indoor climate

Significant savings on the energy bill is the greatest motivation for homeowners to start energy upgrading of their house, **Question 3**. Next follows a wish for better temperature conditions, better indoor climate in general and less draught. Only then follows increased market value of the house and the wish to reduce global warming. The availability of investment grants, tax deduction and a reasonable payback time can help motivate homeowners.

## Homeowners pleased with the energy upgrading

The homeowners who carried out energy upgradings, have an overall positive experience of the energy upgrading of their house. This appears from the fact that 87% of the homeowners would recommend others to energy upgrade their house and 93% are satisfied with the way the energy upgrading was carried out.

Add to this that the homeowners experience that a lot of conditions have improved after the upgrading, **Question 4**.

The large majority experience improvement of the energy consumption, cost of energy, market value of the house and contribution to global warming. Then they experience improvements of the temperature (64%), indoor climate in general (60%), periods when it is too cold (58%), draught (55%) and condensation on the inside of the panes in winter (50%). So, it is possible to choose renovation measures that not only reduce the energy consumption, but also added value in form of i.a. an improved indoor climate. These measures include improved insulation, change of windows, improved tightness and ventilation.

## Conclusion

In a strategy to increase the number of homeowners who venture into a major energy upgrading of their house, the demonstrated positive side effects, more than energy savings, should be included in the communication to motivate homeowners. The barriers should be reduced by "taking the homeowners by the hand" and helping them to choose relevant energy-saving solutions as well as clarifying the financial consequences and opportunities.

The survey among homeowners clearly shows that economy is a decisive factor for initiating an upgrading project, but also that improved indoor climate is a marked added value that the homeowners want and which they would also experience after energy upgrading of their home. ■

## References

Energy retrofit - Incentives and barriers among homeowners in Furesø Municipality, report in Danish, for more information see www.sbi.dk.

Search for "husejere energirenoverer" for more information and link to the report.

Indoor climate perceived as improved after energy retrofitting of single-family houses, paper (submitted) for the Indoor Air Conference 2014.

Network for energy upgrading: http://www.ens.dk/byggeri/energirenoveringsnetvaerk.