Standards for energy efficient installations - the Swedish Building Code

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1. SYNOPSIS

This paper reports the methods in implementing building standards for energy efficient installations.

2. INTRODUCTION

New buildings in Sweden are among the most energy efficient in the world. The Swedish Building Code have been successful in this aspect. Unfortunately, some codes have increased the electricity demand, for instance the demand for heat recovery of exhaust air (1), that in some cases is a de facto push for heat pumps.

In new buildings, electricity has turned up as a big or even major part of supplied energy. A trend that will not make the decision for settling the nuclear power easier.

As a result of the NUTEK program for "teknikupphandling" (procurement) new de facto standards for efficient lighting, ventilation, white goods etc. have emerged among property owners involved.

3. METHOD

A good opportunity to implement the most energy efficient technology for ventilation, lighting, cooling, water circulation etc. is to set up compulsory regulations for new buildings. Then marginal costs for the efficient technology then usually pays off within reasonably time periods and professional architects and constructors are involved.

This is also a god opportunity to implement new standards to an otherwise conservative branch.

As conditions and purposes differs a lot between different buildings and knowledge and experiences of very efficient installations are limited it has been found wise not to put up compulsory standards in the Swedish Building Regulation Code. Also these components and systems are part of a relative fast progress for better efficiency. This mean that the optimum choice will change every year. The solution is to implement a non specific rule in the building code and then guide the property owner and constructor how to comply with this rule by giving a more specific guidance in a separate report, that will be easier to update.

The report (guide) includes the following recommendations (soft "standards"):

Ventilation: Specific Fan Power (kW/m3/s)	
CAV-system with heat recovery	2,5
CAV-system, no recovery	2,0
Exhaust only system with heat pumps	1,25
Exhaust only system	0,7

VAV-system might be efficient with even 25% higher spec. fan power if the air volumes will vary significantly. For systems smaller than 0,8 m3/s the given figures are not adequate.

Lighting (Watt/m2)	Efficient choice	Very eff. choice
Workspace	12	9
Not primary space	8	5

These recommendations is for normal lighting conditions as in office rooms, class rooms, etc. and excludes extra desk lighters. In rooms with special demands these figures are not adequate (laboratories, light-demanding industrial

work, etc.). "Not primary space" means corridors, stairways and other spaces with less lighting demand. The suggested standards are easy to comply with high frequency ballast's.

Constructors might instead choose the "very efficient standard", but then more competent lighting designs might be needed.

Automatic controls are suggested for all installations where the occupants can't be expected to take charge of the manual control.

Pumps: speed regulation is the efficient choice when pump volumes vary over time.

Climatization: For normal purposes cooling (usually CFC-based) compressors are not to be needed in Sweden if good building performances are conducted and energy efficient installations for ventilation, lighting and office equipment are chosen. That means that arrangements for keeping the sun-heat outside is important and that the cool outdoor air in night-time (usually about 10 centigrade lower in Swedish night-time) has to be involved and the indoor construction has to bee sufficient exposed for the heat daytime and cool night-time.

Appliances: In Sweden appliances are usually installed in the new houses that are built. Most appliances (white-goods) are tested and the results are reported in a special publication that are updated two times a year ("Mr Eloff Wattless") with its specific energy use noted. The level for an acceptable efficiency has been set around the median level. For freezers and refrigerators this is defined as the best specific energy use plus 0,5 (kWh/litre, temperature corrected volume).

The washing machines ought to use less than 0,6 kWh/kg (correlated to the methods used in the tests) and the centrifuge capacity at least 1000 r/min.

Office Equipment, use the TCOII/NUTEK standards for monitors and other office equipment and "NUTEK buyers guide" at the next buy. Possible energy use for an average office room might be less than 100 kWh/year instead of today's 500 kWh/year - level.

4. CONCLUSIONS ON THE IMPACT

The property owners, the constructors are now going to be informed aboute the recommendations (soft "standards") here described. We don't now at this point, if they will incorporate the "regulations" as their own standards when they are not compulsory, if they will effect the market to be more aware about the energy aspects of the installations, how much this will be a signal for the manufacturors to bring more efficient products out on the market, and how much this will help to set new standards even for the retrofit market.

A rough estimation only for ventilation and lighting in commercial buildings is 10 - 15 kWh/m2 ,year.

5. ENDNOTES

1. The building code gives the opportunity to build houses more efficient in other ways, as long as the buildings energy demand will not exceed the energy demand of a reference building.