

HVAC in the recast EPBD – inspection, advice, or monitoring?



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Introduction

The original Energy Performance of Buildings Directive requires regular inspection of heating and air-conditioning systems, with the alternative of energy efficiency advice for heating systems only. The recast Directive allows greater flexibility: advice instead of inspection can be given for air-conditioning as well as heating, and in both cases automatic monitoring systems can be introduced to reduce the frequency or intensity of inspection. The Member States of the European Union are now considering whether or not to take up these new options in their individual decisions about how to implement the Directive at national level.

HVAC under the recast Energy Performance of Buildings Directive

The recast Directive has new provisions for regular inspection of heating and cooling systems. The definition of what has to be inspected has been changed, and the scope and contents of the inspection report have been specified in greater detail. For example, some references to “boilers” have been widened to “heating systems”. Most importantly, there are new alternatives: energy efficiency advice can now be offered instead of regular inspection of air-conditioning systems, and for both heating and cooling systems automatic monitoring can become a partial substitute for inspection. These alternatives would reduce inspection costs for building owners individually and might prove to be more cost-effective routes to energy saving nationally.

Advice on heating and air-conditioning systems

Advice rather than inspection of heating systems has always been accepted as an alternative implementation of the Directive, and about half of the EU Member States have chosen it for transposition of the first EPBD (2002). By “advice” is meant general information on efficient heating systems, not specific to a particular building, with the

aim of promoting improvements to energy performance. This is distinct from advice given with detailed knowledge of a particular installation, as that normally has to be preceded by an inspection or audit of some kind. It is necessary to show that, on a national scale, the overall impact on energy saving is broadly equivalent.

Member States with a history of regulation for heating appliances (such as “chimney sweep” laws) tended to favour inspection schemes and others preferred advice. But the distinction is not clear-cut, and EPBD Concerted Action did not get simple answers to questions about which option had been chosen. In practice there are a number of mixed regimes in which inspection is compulsory in some circumstances (governed by system type, size, fuel) while advice is given in others.

Now, under the recast Directive, the “advice” alternative can be chosen for air-conditioning systems too. This brings air-conditioning into line with heating, and indeed the relevant wording of Article 15 (*Inspection of air-conditioning systems*) of the new recast Directive is almost identical to that of Article 14 (*Inspection of heating systems*). Advice is expected to cover modification and replacement of existing systems, and alternative solutions (that may include inspection) to assess efficiency and sizing. And of course the overall impact of giving advice must be equivalent to inspection.

Regular inspection

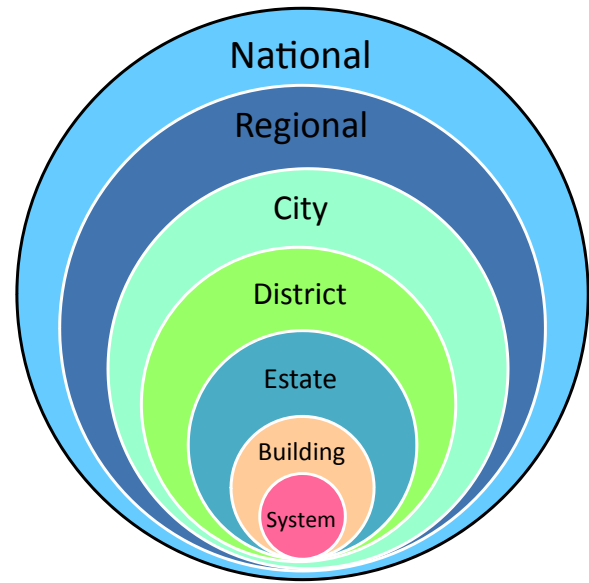
In contrast to advice, the requirements for inspection schemes are set out in some detail. For inspection there are three clauses of the Directive covering system size limits, frequency of inspection, and the need to assess system efficiency and plant size relative to demand. There is an obligation to produce an inspection report, which must include recommendations for improvement, and may (though not must) compare performance with that of a new system of the same type and best alternative type. The report is to be handed over to the owner or tenant of the building, and by implication must therefore be written in terms he can reasonably be expected to understand. An independent control system has to be established to verify a statistically significant percentage of the inspection reports.

Electronic monitoring and control

Now there is a third option, to the extent that automatic monitoring can be recognised as a partial substitute for inspection. Monitoring and control is mentioned in three places in the recast Directive, sending a strong signal that it is regarded as having significant energy saving potential.

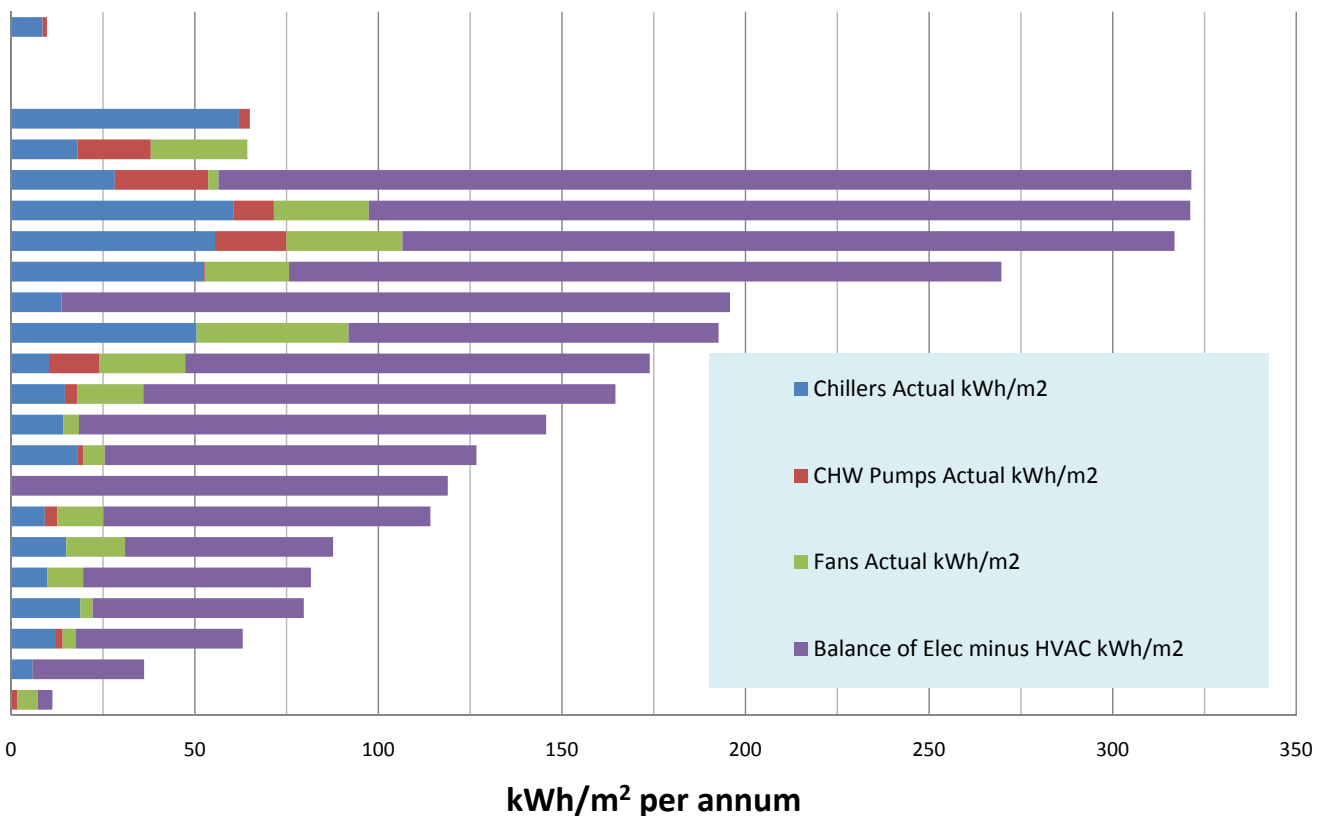
The requirements for HVAC inspection say that the frequency of inspections may be reduced, or the intensity of them lightened, where an electronic monitoring and control system is in place. For technical building systems (defined as heating, cooling, ventilation, hot water, lighting) another part of the Directive says Member States shall encourage intelligent metering systems and may encourage the installation of active control systems such as automation, control and monitoring systems that aim to save energy.

Intelligent metering is the subject of a separate policy initiative under the Energy Services Directive, but in this context its purpose is to enable building monitoring rather than supply consumer information. Electronic monitoring and control is already well established in non-domestic buildings in the form of building management systems (BMSs), though they are not always installed with the primary aim of saving energy.



Levels of inspections, advice, and monitoring.

If monitoring is to become a credible substitute for inspection it will have to be done on a large scale and made widely available, allowing buildings to be compared with one another. Although energy data is collected by existing BMSs, it is not normally stored for long term analysis nor transmitted to a general database from which large numbers of installations can be analysed sys-



AC system components energy use in different buildings

tematically. Data from a large number of buildings over long periods is needed to enable benchmarks to be developed, technical building systems compared, and their energy performance ranked. Badly performing building systems can then be singled out for further attention.

A pilot project to do that is iSERV (*Inspection of HVAC systems through continuous monitoring and benchmarking*), funded by Intelligent Energy Europe, which is designed to carry out continuous monitoring of 1 600 buildings in 20 Member States. The data collection and transmission arrangements are simple and so the project has a low entry cost for participants. iSERV is a large project that expects to create a valuable dataset on energy usage by HVAC systems across Europe, and it hopes to spawn a number of similar schemes that will continue in operation once the project has finished.

Next steps in implementation

It remains to be seen how many Member States will choose the advice option for air-conditioning. Seven of them have said they are considering doing so, subject to a favourable assessment of the relative costs and benefits. While inspection can be carried out cheaply if combined with servicing, the requirement for the inspection report to include an assessment of plant sizing and efficiency may call for skills beyond those of a normal service technician. The Directive makes clear that inspection must be carried out by qualified or accredited experts, in an independent manner. Advice, in the form of general information not requiring a building visit, can be provided to everyone more cheaply but might not have the same impact. Member States have to consider what form advice will take and how they will be able to demonstrate to the European Commission, in a report to be prepared every three years, that the impact on energy saving is at least as great as if inspection had been carried out instead.

The Directive may provide the stimulus to set up wide area building monitoring schemes, if Member States do indeed “reduce or lighten” the financial burden of plant inspection where monitoring is installed. It is not known how many intend to allow for this explicitly when they transpose the Directive into national legislation in July this year.

Conclusions

What will Member States choose – inspection, advice, monitoring, or a mixture? Will large monitoring schemes emerge to make the third alternative a realistic option, and who will take the initiative in creating them? These questions are the subject of continuing interest and discussion in EPBD Concerted Action.

Inspection has the advantage of enabling recommendations for improvement to be given from knowledge of the current state and configuration of each installation. Recommendations can be made specific and relevant. But this is expensive unless combined with other on-site activity. It also carries a number of further obligations, which are more onerous in the recast Directive. Compulsory inspection of all installations at regular intervals, even those found to be in good order on the previous occasion, does not make best use of available resources: furthermore it may be viewed by customers as an imposition and treated simply as a compliance exercise.

Advice avoids the expense of sending highly trained personnel to site but is uncertain in its reach. The energy saving impact of both inspection and advice is difficult to measure, needing surveys to reveal how building owners have reacted. “Equivalence reports” (prepared by Member States who choose the advice option) have to assess and compare impact, and for the hypothetical inspection option that was not chosen it can only be speculative. The most recent equivalence reports of June 2011 are being analysed, and may later be summarised in an overview from the European Commission.

Wide area monitoring is a fairly new idea, not yet developed and probably not “ready to go” by July 2013 (the date that the new legislation is applied to most buildings). Meanwhile it is important not to exclude the option by drawing up national legislation too narrowly in 2012. New regulations can use conditional wording, such as “...an inspection scheme, with frequency of inspection modified for buildings that are part of an approved monitoring scheme...”. An approved scheme would need to be linked to some more limited form of inspection, targeted at the worst performing buildings, and it is here that inspection has the best prospect of encouraging improvement. Unlike advice, a monitoring scheme in conjunction with limited inspection does not have to be proved to have equivalent impact to a full inspection scheme. The necessary qualifications for an “approved monitoring scheme” can be settled later once more experience has been acquired, and this is a topic to which EPBD Concerted Action will return to help the EU Member States reach decisions.

References

- Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (recast).
- iSERV website www.iservcmb.info
- REHVA Journal January 2012: Ian Knight: Assessing electrical energy use in HVAC systems. 