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Citation for published version (APA):

Cox, C. W. J., & Loomans, M. G. L. C. (2006). Comparison of health labeling systems for dwellings in the Netherlands. In *Proceedings of the 8th Int. Healthy Buildings conference, 4 - 8 June, Lisbon, ISIAQ* (pp. 281-286)

Document status and date:

Published: 01/01/2006

Document Version:

Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
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Comparison of Health Labeling Systems for Dwellings in the Netherlands

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Summary: *In the past few years in the Netherlands, several health rating systems have been developed for labeling a dwelling with respect to the potential health risk for its occupants. In order to better understand the individual characteristics and the added value of these separate labeling systems a comparison has been made of these systems. This comparison is the basis for the development of a harmonized set of systems in which the different methodologies are combined. At first instance, the comparison was focused on the theoretical basis of the labeling system. A methodology was developed to compare and rate current and future labeling systems. Furthermore, based on the analysis of the systems, advice is given for the optimal application of the individual labeling systems. The future will learn whether the separate systems will be combined into one rating system.*

Keywords: *health rating, dwellings, labeling, indoor environment*

Category: *Design and operation of healthy buildings*

1 Introduction

In the Netherlands over the past few years several labeling systems have been developed to rate new and existing dwellings with respect to their potential health risk towards its occupants. The systems are aiming at different phases in the building process (existing buildings and new buildings (design)), different users and different goals. To improve the communication about these systems to the public in general, a project was devoted to assess the characteristics of the individual rating systems and compare the specific applicability of the individual systems, in time and towards the stakeholders in the building process. *This comparison is the basis for the development of a harmonized set of systems in which the different methodologies are combined.*

The investigated rating systems can be grouped into one of the following categories:

- Partial evaluation of the health status, linked to energy saving measures; several methods have been developed to evaluate health and comfort in relation to energy saving measures; Generally only energy related health parameters are taken into account;
- Full evaluation of health and comfort as main goal; several methods have been developed to specifically evaluate health; in general these methods are evidence-based; one method includes measurements of several parameters, but evaluation based on characteristics of building and system is also possible.
- Overall evaluation of the building quality, evaluation of health is one the sub-goals, besides e.g. sustainability and energy efficiency; The

overall methods are mainly focusing on new buildings.

The paper describes the methodology that has been developed to assess these and future (new) rating systems and presents an overview of the positioning of the currently available rating tools in the Netherlands.

The separate labeling systems have been reviewed based on the available documentation and, if available, electronic or written versions of the rating system. In interviews with the developers further indepth information was obtained. The assessment procedure and the results from this assessment have been presented and discussed with all developers in a workshop. The obtained results and conclusions were agreed on.

2 Methodology

In order to allow for an objective comparison, first a methodology was developed to judge the individual rating systems. For that a listing of, in total, 28 performance aspects was used that was developed earlier in a national project [1]. These aspects are listed in Table 1. They also formed the basis for some of the investigated rating systems. When combined they can give a comprehensive analysis of the health status of a dwelling. This approach is supported by results from a more recent European study into the rating of the health status of buildings [2].

In total nine Dutch and one European rating system have been compared. A short description of the investigated rating systems is given in the annex. In the first step, the assessment of the identified 28 performance aspects was determined. I.e., for each

system it was determined if and how a specific performance aspect was identified. In the next step an expert judgement was given of the identification procedure. This judgment focused on the objectivity and the ambiguity (indicated as the assessment depth) with which the indicator can be determined and resulted in a rating with respect to this topic (1 [best] to 5). It is regarded important that identification can take place through a procedure that does not rely, or only limited, on the expertise of the person who judges the performance aspect. Objective identification is therefore given a higher weight than a subjective one. The ambiguity concerns the fact that all necessary information is gathered to allow a reliable judgement on the individual performance aspect.

Finally, a weighting was included for those performance indicators that were rated as a higher potential risk for the health of the occupants of a dwelling. Here the risk categories as developed within the HOPE project were applied [2]. As none of the systems included all aspects mentioned in Table 1, this weighting allowed for a comparison of the rating systems on the category of aspects that were included.

3 Results

This two-step assessment approach has been performed for each individual performance aspect mentioned in Table 1 and for all the investigated rating systems. From this assessment an overall score could be presented based on the number of aspects that was assessed within one system, i.e. the completeness, and the assessment depth of these assessments.

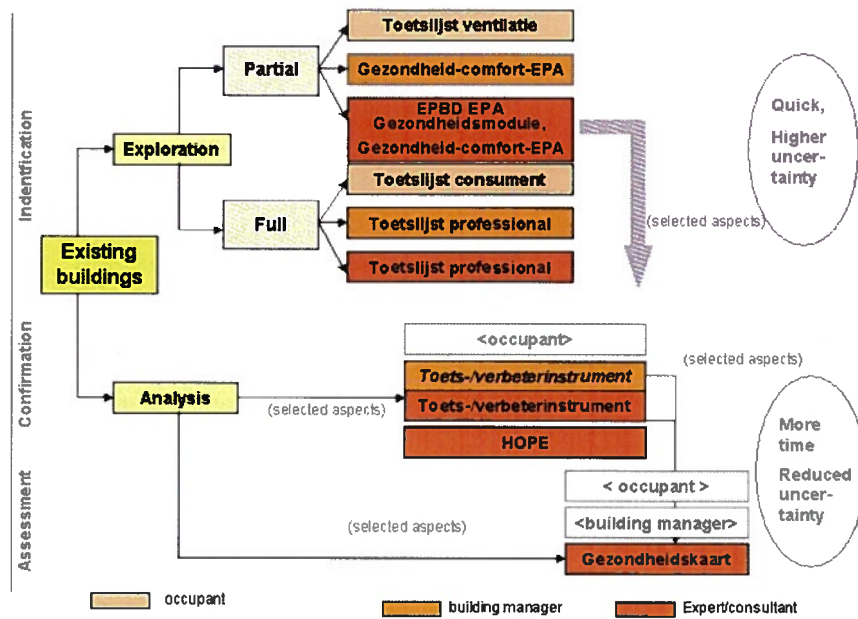
The results from this comparison (see Table 2) showed the differences between the rating systems. With respect to the completeness, one can see that none of the investigated systems covers all 28 aspects that have been identified. A low value in this case means that more aspects are rated. In new dwellings some of the investigated performance aspects are obsolete (e.g. lead). Therefore, for the systems focusing at new dwellings the maximum number of aspects is reduced (to 26). The assessment depth indicates the average rating of the objectivity and ambiguity for each aspect that is determined by the system. A low value in this case indicates a better result than a high value (1 [best] – 5 [worst]). The

Table 2. Completeness and objectivity of the separate systems.

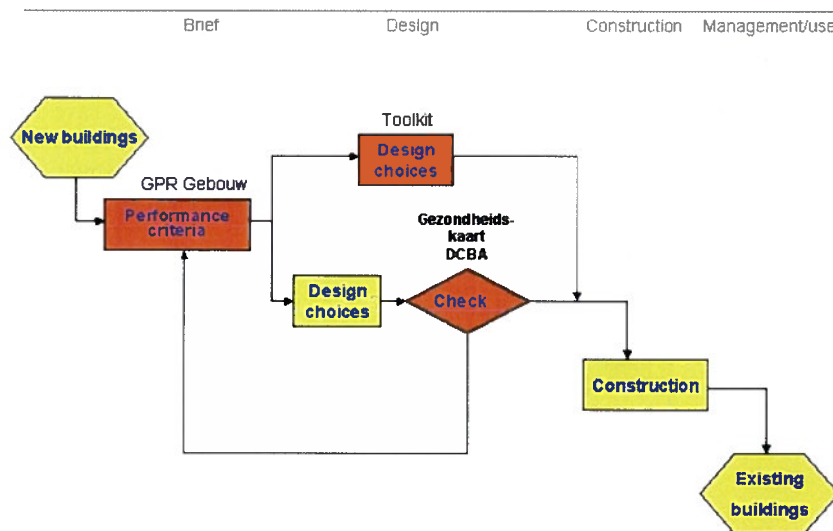
System	Completeness* (# indicators/28) ⁻¹	Assessment depth** Average
<i>Existing dwellings</i>		
Toets-/Verbeterinstrument Gezondheid Woning (TGW)	1.1 (26)	2.6
Gezondheidskaart	1.7 (16)	2.0
Toetslijst Gezond Wonen	1.1 (25)	3.6
HOPE	1.5 (19)	2.6
EPBD EPA Gezondheidsmodule	2.3 (12)	4.3
Ventilatie toets	2.8 (10)	3.9
Gezondheid-comfort-EPA	2.6 (11)	3.4
<i>New dwellings</i>		
	(# indicators/26) ⁻¹	Average
GPR Gebouw	2.2 (12)	3.6
Toolkit	1.4 (18)	3.1
DCBA	2.6 (10)	4.1

* For new dwellings some aspects are not investigated.

** A low value is better.



a. Existing dwellings



b. New dwellings

Fig. 1. Positioning of the tools for the health assessment in dwellings, see annex for short description of tools mentioned.

results show that those rating systems that adhere to the category 'Full' generally are more complete and generally have a better assessment depth.

The introduction of a weighting of the investigated aspects for each system resulted in some minor shifts with respect to the assessment depth. It identified that some of the systems focused more on

the comfort related aspects, whereas others had a focus on indoor air quality related aspects. The latter aspects generally were rated more stringent with respect to possible health effects. Therefore a better score for the assessment depth of individual air quality aspects resulted in a better overall score of the assessment depth.

The obtained results have been discussed in a workshop with the developers of the separate systems.

They agreed well with the objectives as stated by the developers.

4 Discussion

The ranking of the systems was not aiming at classifying the rating systems. Instead, it supported the application path that was developed. This application path has the following line of thinking: (1) indicating possible problems; (2) confirmation of possible problems at performance indicator level via a more in depth investigation; (3) assessment of an individual performance indicator in order to objectively determine the status of the performance indicator. This application path has been visualized in Figure 1a, for existing dwellings. For new dwellings the positioning of the available systems in the design process is shown in Figure 1b. In the workshop with the developers of the separate tools, these process paths were also agreed on.

From Figure 1 one can see that the currently available tools focus on existing dwellings. This focus is valid as one can expect that most improvement with respect to health is gained for existing buildings (scale of improvement as well as the number of dwellings that are addressed). Nevertheless, also for new dwellings such tools are important, as they may prevent unhealthy designs and therewith result in durable buildings.

It is noticed that the link from new designs to existing dwellings, i.e. the assessment of the (re-) construction of buildings, yet is missing. Given the high end solutions, the number of critical points may reduce, but their weight in the performance of the dwellings increases. Examples are the air leakage and the control of systems. This would advocate the development of support tools specifically for the construction phase or tools that find an application area over the total building life.

The ‘Gezondheidskaart’ (In Dutch: Health card) is the single tool that can be applied in the design and use phase. Nevertheless, this tool has not been designed to support this transition of use. The ‘GPR Gebouw’ (In Dutch: GPR Building) focuses on the performance requirements. This tool in principle also can be applied over the total building life. However, it needs separate assessment tools to evaluate the actual performance of a building in a certain phase.

The consecutive use of the separate systems for existing dwellings as proposed in Figure 1a relies on the similarity in the judgment of an individual indicator. This means that a ranking of ‘A’ for a certain parameter determined with a certain rating system agrees with a ranking of, e.g. ‘3 stars’ or ‘aspect not present’ from other systems. However, such a comparison between the separate tools has not been made yet. The tools have been developed and applied on an individual basis. The work described here presented the first actual comparison. Further research therefore is required in which an actual in-

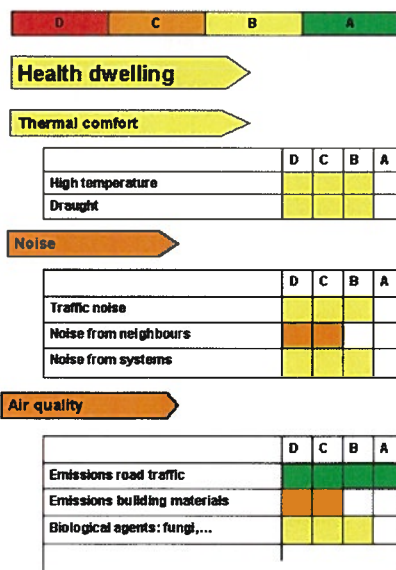


Fig. 2. Proposal for presenting the overall score, including the information for the individual aspects

situ comparison can be made. This is proposed by visiting a number of dwellings and applying the rating systems for that same dwelling.

5 Conclusion

The results show that the developed assessment methodology was able to compare rating systems that have complete different points-of-departure. The important consideration for the assessment was that performance aspects instead of building characteristics were used.

The results from the assessment indicate that the available rating systems generally do not overlap when the application path: (1) indication; (2) confirmation; (3) assessment, is applied. Generally this path also has a practical use point-of-view in terms of time and costs. The objective evaluation of the systems has been used as input for the a proposal for a harmonized set of systems for health labeling of buildings.

In a national workshop on standardization of indoor environment in buildings, it was expressed that a harmonized set of systems for health labeling of buildings should be strived for. Furthermore, a comparison of results using the different systems is advised as currently there is no guarantee that the rating of a certain performance aspect is the same for different systems. The assessment depth in this respect only should result in a margin around the rating, but should not influence the average rating value. The proposed benchmarking has not yet been performed.

Finally, it was concluded from the workshops that a rating system should result in an overall score similar to the energy performance score that is provided for new buildings. However, the information underlying this overall score should be available (for each aspect or cluster of aspects). This requires amongst others further harmonization of the presentation of parameter scores. Figure 2 gives a proposal for presenting the scores of an assessment.

The above described developments can be closely related to the developments at European level through the EPBD (Energy Performance of Building Directive). In this directive also information with respect to the health and comfort of a building should become available in order to rate energy performance measures also with respect to health and comfort.

References

[1] J. Bergs. *Performance Indicators*. DHV-report. The Netherlands. (2001).

[2] C. Cox et al. *HOPE Final report*. Delft, The Netherlands (2005). <http://hope.epfl.ch>.

Annex

The following rating systems have been investigated. For each system the category as described in the introduction is included:

-Toets-/verbeterinstrument gezondheid woningen (TGW) (In Dutch: Assessment/-improvement instrument health dwellings)

The assessment of an existing dwelling consists of a survey/inspection of the dwelling. The instrument is applied by corporations and building managers in order to obtain an indication of the quality and possible problems of an existing dwelling with respect to health. The judgment of each individual aspect is expressed in 1, 2 or 3 [best] stars. No overall assessment is given.

Category: Full

- Gezondheidskaart (In Dutch: Health card)

The 'Gezondheidskaart' is a methodology that is developed for rating existing as well as newly built dwellings. For existing dwellings, for some aspects a measurement procedure is described (e.g. noise). For new dwellings the assessment is based on design information and drawings. An assessment can be performed within 4-6 hours. The results are shown for each individual aspect (in 4 categories D, C, B or A [best]). An overall judgment is not given.

Category: Full

- Toetslijst Gezond en Veilig Wonen (In Dutch: Assessment list Healthy and Save Living)

The assessment is focused on existing dwellings. It is based on an inspection of the dwelling (for that two versions have been made: a consumer version and a professional one). The methodology not only assesses the dwelling but also the use of the dwelling. The health quality is expressed in four categories D-C-B-A[best], for five different clusters (Air quality, Thermal Comfort, Safety, Noise and Care). The user version of this assessment method is available through the internet.

Category: Full

- HOPE (Health Optimisation Protocol for Energy-efficient buildings)

The assessment is developed for existing apartment (and office) buildings. In a first step it combines an inspection of the building and services with a questionnaire. Measurements are applied for situations where the inspection is insufficient to indicate the status for a certain aspect. For each health aspect the presence or absence is indicated. Furthermore, a weighted overall assessment is given.

Category: Full

- *EPBD EPA Gezondheidsmodule*

This methodology focuses on health in relation to possible energy saving measures in an existing dwelling. It has a signal function that warns the user for possible health risks without valuing this risk. Due to the point-of-departure not all health aspects are included.

Category: Partial

- *Gezondheid comfort EPA (In Dutch: Health Comfort EPA)*

This methodology has a similar point-of-departure as EPBD EPA Gezondheidsmodule (see above). Safety and accessibility are included. The result of the assessment is in the form of an overall score for the aspect health and comfort. A subdivision is made in a global (based on the construction year) and a detailed assessment.

Category: Partial

- *Ventilatieoets (In Dutch: Ventilation test)*

Ventilation of a dwelling is essential with respect to the indoor air quality. With this test (available through the internet) users of a dwelling can check their dwelling and judge the ventilation (bad, moderate or good). This gives an indirect qualification of the indoor air quality. The test does not assess the indicated health aspects.

Category: Partial

- *GPR Gebouw (In Dutch: GPR Building)*

This tool is developed to assess the quality of a dwelling with respect to the durability. Health is one of the aspects that are addressed, besides energy, materials, waste, water and living quality. Important points-of-departure of this methodology are the use of performance requirements and the modular system. For the aspect health, the tool offers a frame that can translate a certain ambition level into actual performance requirements. The tool is specifically developed for local authorities and project developers.

Category: Overall

- *Toolkit Duurzame Woningbouw (In Dutch: Toolkit Durable Housing)*

This is a tool that has been developed to support design decisions when developing dwellings. The first part supports the communication on the quality of the building, specifically towards the project developers. Health classification is one of the issues that are dealt with. Next, it supports design decisions based on the ambition level that has been set (three categories).

Design solutions are presented for a specific materialization of the dwelling or a specific installation concept.

Category: Overall

- *DCBA methode (In Dutch: DCBA method)*

This method assesses the durability of a set of measures for the design of a dwelling. It supports the choice of measures or ambition levels with respect to durability. The measures are divided in nine themes, including Indoor environment and (social) safety. The measures are ranked in four levels with better durability. Points are used to determine the best possible (most durable) measure.

Category: Overall