

# The new evaluation index for envelope performance of commercial buildings

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## 1. Revision of the Energy Efficiency Standard

The Energy Efficiency Standard was revised in January 2013. With regards to commercial buildings, "envelope performance" and "facility efficiency (air conditioning, ventilation, hot water supply systems, lighting and elevators)" were evaluated up to the present. Regarding the latter, each facility was evaluated by old standard indexes like the CEC (energy consumption coefficient), however, by indexing the total primary energy consumption of all facilities after the revision, it became easier to objectively compare the energy saving function of the entire building. On the other hand, envelope performances continue to be indexed by old standards like PAL (perimeter annual load), and conditions that were partially different from the calculation of the primary energy consumption (for example, regional divisions and the physical property of materials) were used in the calculation process.

NILIM, and the Building Research Institute, collectively joined their respective practitioners and people of learning and experience to create a new envelope performance index (PAL\*, Palstar), which was included in the Energy Efficiency Standard in September 2013. This standard was enforced in April 2014, while the old PAL standard will be abolished in April 2015. Indexes before and after the revision are shown in Figure 1.

## 2. The new envelope performance index PAL\*

The definition of the new envelope performance index PAL\* is the same as the old standard PAL, and represents the value of the annual heating and cooling load of the building's outer periphery divided by the area of the outer

periphery. The main points that were changed include:

(1) regional divisions (2) the physical property of materials, (3) presumptions on how the room is used, (4) how the outer periphery area is defined and (5) consideration of latent heat load. As well, the standard values are of equal value to the old standard, and the standard value of PAL\* was established from the correlation of the PAL and PAL\* calculated for each building's use.

## 3. Releasing the calculation tool and transmitting information

For the purpose of rationalizing/labor saving calculations and examinations in the operations for the energy efficiency standard, this Internet-based calculation tool (Web program, Figure 2) has been released to the public for free use by anyone. As well, a homepage<sup>1)</sup> has been opened regarding technical information pertaining to energy saving standards, and each type of Web program, its explanation, and references regarding the calculation methods and prerequisite conditions of the calculation have been released.

## 4. Future developments

PAL\* is an index established from the standpoint of annual heating and cooling load, however, we would like to enhance our information pertaining to energy efficiency by examining the required envelope performance from the viewpoint of the quality of inner thermal environments.

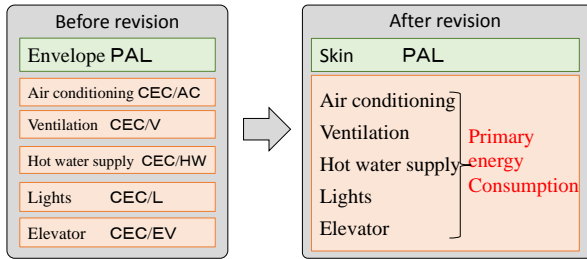


Figure 1: Index prior to the energy efficient standard revision (commercial buildings)

The screenshot shows the web interface for the PAL\* Calculation Program. At the top, it says 'PAL\* Calculation-purpose WEB Program' and 'Ver 1.2.0 (2014.10)'. There is a 'To Home' link. Below that, a message says 'When using this program to apply/report etc., please output the calculation results and all calculation processes and submit it to the examining authority etc.' A large box says 'Please drop the file here'. Below that is a 'CSV file/setting' section with a progress indicator showing steps 1 through 8. A table lists various form sections with 'Select file' and 'Not selected' buttons:

| Form                               | Select file | Not selected |
|------------------------------------|-------------|--------------|
| Form0 Basic Information            | Select file | Not selected |
| Form2-1 Air-conditioning zone      | Select file | Not selected |
| Form2-2 Outer wall structure       | Select file | Not selected |
| Form2-3 Window specifications      | Select file | Not selected |
| Form2-4 Envelope specifications    | Select file | Not selected |
| Form8 Non-air-conditioned envelope | Select file | Not selected |

An 'Upload' button is located at the bottom of the form sections.

Figure 2: PAL\* Calculation Web Program Screen

(Reference)

- 1) Technical information regarding the authorized standards in the order of energy efficiency and low-carbon buildings (Building Research Institute (cooperation: NILIM)) <http://www.kenken.go.jp/becc/index.html>