Additional information on reference emissions

Reference equipment

In the JCM, net emission reductions have to be ensured by setting reference emissions below BaU or setting project emissions higher than real project emissions by implementing the project. In order to establish the reference emissions, lighting market was investigated through interviews and the report published by a research company.

According to an interview, HID (High-Intensity Discharge) lighting is generally used for lighting equipment in indoor facilities in Indonesia in case that high performance in color rendering property and luminous intensity are required. In addition, the surveys conducted by the Indonesian Electrical Lighting Industry Association and United Nations Environment Programme (UNEP) demonstrate that conventional HID lighting, fluorescent lighting and Compact Fluorescent Lamps (CFL) are commonly chosen as lighting equipment in indoor facilities[1]. In this methodology, however, LED (Light Emitting Diode) lighting is adopted as reference equipment to ensure conservativeness since LED lighting is more energy efficient than HID lighting, fluorescent lighting and CFL.

The color rendering property of lighting is an important element for the visual performance in certain indoor facilities. For example, ISO 8995-1 (CIE S 008/E) standard requires its value to be no less than 80 in indoor facilities such as food industry, retailing, printing, restaurants, hotels, libraries, health care premises, educational buildings, and those listed in the standard. As for the type of lighting equipment, downlight or spotlight is generally installed in the indoor facilities.

Based on these background information and assumption on the indoor facilities which require high visual performance, this methodology specifies the LED lighting equipment to be a downlight or spotlight type lighting whose color rendering index is equal to or higher than 85.

Luminous efficiency of reference lighting

The four major manufacturers of LED lighting which have global supply of their products are selected based on a survey report on the global LED market statistics. The lighting equipment that meets the specification above is surveyed in the product catalogues, the specification documents or the websites of four LED lighting manufacturers (manufacture A, B, C and D) that have the global market of LED lighting. There are 1,063 products in total that meet the specification mentioned above (703, 184, 133 and 43 products from manufacturer A, B, C and D respectively). The data are plotted in the graphs below. Luminous efficiency of these

[1] <http://www.aperlindo.org/303848389>
<https://www.lites.asia/files/otherfiles/0000/0469/Regional_efficient_lighting_market_assessment_in_ASEAN_annex-included_3Nov2016.pdf>

LED lighting has the negative correlation with rated power consumption (statistically significant, $p < 0.05$).

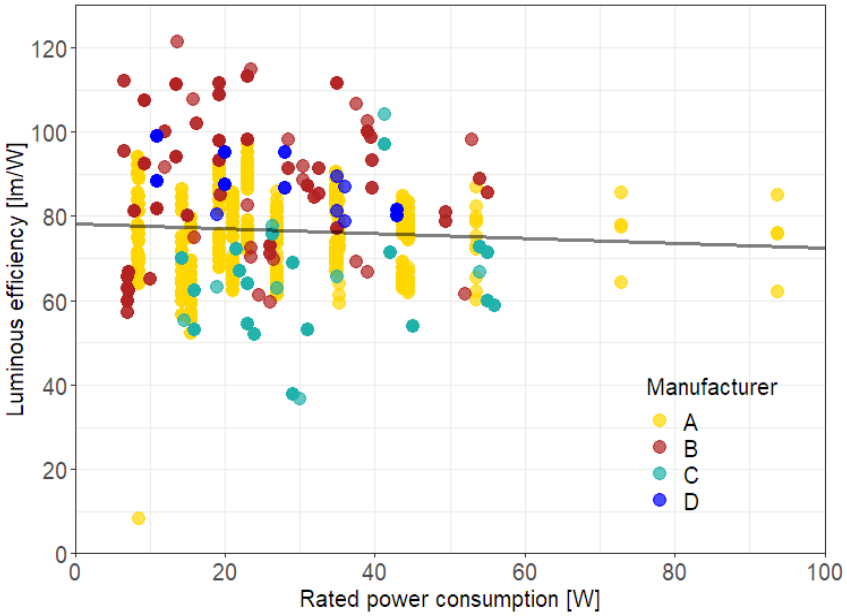

Figure 1: Luminous efficiency and rated power consumption of LED lighting

Source: Data from LED lighting manufacturer websites

Therefore, rated power consumption is divided into ranges, and luminous efficiency of reference lighting is set in each range of rated power consumption. The average value of luminous efficiency of LED lighting from all the manufacturer is applied in each range as shown below. The average value is selected for the draft methodology since setting LED as reference lighting already ensures conservativeness.

Table 1: Luminous efficiency of reference lighting

Rated power consumption [W]	0≤x<20	20≤x<40	40≤x<60	60≤x<80	x≥80
Luminous efficiency of reference lighting [lm/W]	77.2	77.6	73.7	76.3	74.8

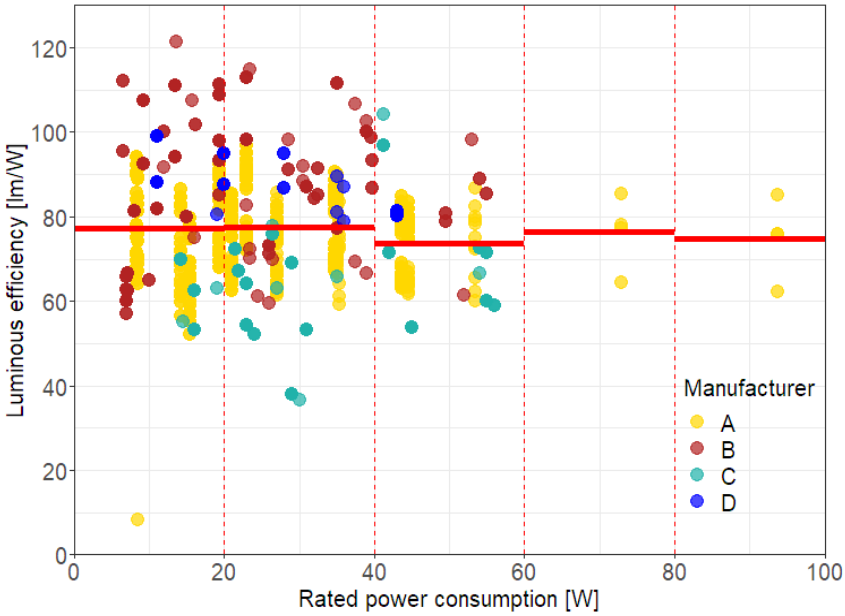

Figure 2: Luminous efficiency of reference lighting in each range