

## **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 emission, the 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 Thailand because of its high performance in colour rendering property and luminous intensity. In this methodology, however, LED (Light Emitting Diode) lighting is adopted as reference equipment to ensure conservativeness because LED lighting is more energy-efficient than HID lighting.

The colour rendering property of lighting is an important element for 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 colour rendering index is equal to or higher than 85.

### **Luminous efficiency of reference lighting**

In order to establish the above reference emissions, the lighting market of Thailand was investigated through interviews. As a result, the three major manufacturers of LED lighting, which have both global and local market share of their products, are selected. The lighting equipment that meets the specification above is surveyed in the product catalogues, the specification documents or the websites of three LED lighting manufacturers (manufacturer A, B and C). There are 3,169 products in total that meet the specification mentioned above (1,353, 1,585, and 231 from manufacturer A, B and C respectively). The data are plotted in the graphs below (95% confidence interval) (Figure 1). 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 (Table 1). 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]	$0 \leq x < 40$	$x \geq 40$
Luminous efficiency of reference lighting [lm/W]	73.6	78.0



**Figure 1: Luminous efficiency of reference lighting in each range**