

**Additional Information for
Reference Emissions**

Establishment of reference emission

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 above reference emission reductions, lighting market of Indonesia was investigated through interviews and on-sight surveys.

1) Setting of BaU

Among all types of lighting equipment, fluorescent lighting is widely used in Indonesia, as indicated in Table 1 and on-site surveys.

Table 1 : Lighting Market in Indonesia

Source	Information on Lighting Market
PT Panasonic Gobel Eco Solutions Sales Indonesia	Diffusion rate of LED in Indonesia's lighting market is approximately 20%. Meanwhile, fluorescent lighting holds a large portion of the market share. The cost of LED is more than twice of that of fluorescent lighting.

Source: Interview with PT Panasonic Gobel Eco Solutions Sales Indonesia was done by the Study Team. (2013)

2) Setting of Reference Scenario and Parameters Fixed *Ex Ante*

On-site survey results show that fluorescent lighting is used in local minimarts, and LED lighting was identified only in part of grocery stores owned by international brands whose number is gradually expanding in these years as a type of grocery store with its capacity of less than 400 m² selling area as specified in this methodology.

In order to calculate GHG emission reductions conservatively, reference emissions are determined based on LED lighting which is commercially available in Indonesia. Accordingly, top 5 manufacturers of lighting equipment in the country are identified through the interview, as indicated in Table 2.

Table 2 : Lighting Equipment Manufacturers in Indonesia

Source	Information on Lighting Equipment Manufacturers
PT Panasonic Gobel Eco Solutions Sales Indonesia	Top 5 manufacturers of lighting equipment in Indonesia are manufacturer A, B, C, D and E.

Source: Interview with manufacturer A was done by the Study Team. (2013)

The LED lighting commonly used in the type of stores under the capacity specified in this methodology is identified to be a straight type tube with color temperature between 5,000 and 6,500 K and length between 602.5 and 1,513.0 mm based on interviews and on-sight surveys. Therefore, all the lighting equipment by the manufacturers listed above available in the catalogue on their website¹²³ are surveyed as shown in the following:

Manufacturer A

No.	Category	Model Number	Type	Length (mm)	Color Temperature (K)	Luminous Flux (lm)	Rated Power Consumption (W)	Luminous Efficacy (lm/W)
1	MASTER LEDtube SA1 Gen2	MASTER LEDtube SA1 1200mm 1600lm 856 G13	(n/a)	1,212.0	5,600	1,600	19	84.2
2	MASTER LEDtube SA1 Gen2	MASTER LEDtube SA1 900mm 1150lm 856 G13	(n/a)	907.5	5,600	1,150	15	76.7
3	MASTER LEDtube SA1 Gen2	MASTER LEDtube SA1 600mm 800lm 856 G13	(n/a)	602.5	5,600	800	10	80.0
4	Essential LEDtube	ESSENTIAL LEDtube 1200mm 20W865 T8 AP I	T8	1,212.0	6,500	1,600	20	80.0
5	Essential LEDtube	ESSENTIAL LEDtube 600mm 10W865 T8 AP I	T8	602.5	6,500	800	10	80.0

Source: Data quoted from manufacturer A website and compiled by the Study Team. (2014)

Manufacturer B

No specification document was found on the website.

Manufacturer C

No.	Category	Model Number	Type	Length (mm)	Color Temperature (K)	Luminous Flux (lm)	Rated Power Consumption (W)	Luminous Efficacy (lm/W)
1	LED Energy Smart Range	LED 23/T8 1200MM/865/220-240V BX1/30	T8	1,214.0	6,500	2,250	23	97.8
2	LED Energy Smart Range	LED 18/T8 1200MM/865/220-240V BX1/30	T8	1,214.0	6,500	1,650	18	91.7

Source: Data quoted from manufacturer C website and compiled by the Study Team. (2014)

Manufacturer D

No.	Category	Model Number	Type	Length (mm)	Color Temperature (K)	Luminous Flux (lm)	Rated Power Consumption (W)	Luminous Efficacy (lm/W)
1	SubstiTUBE Basic	SubstiTUBE Basic ST8-HB4 18 W/865 1200 mm	T8	1,212.0	6,500	1,900	18	105.6
2	SubstiTUBE Basic	SubstiTUBE Basic ST8-HB5 22 W/865 1500 mm	T8	1,512.0	6,500	2,200	22	100.0
3	SubstiTUBE Advanced	SubstiTUBE Advanced ST8-HA4 20 W/865 1200 mm	T8	1,213.0	6,500	2,200	20	110.0
4	SubstiTUBE Advanced	SubstiTUBE Advanced ST8-HA5 30 W/865 1500 mm	T8	1,513.0	6,500	3,300	30	110.0

Source: Data quoted from manufacturer D website and compiled by the Study Team. (2014)

Manufacturer E

¹ <http://www.ecat.lighting.philips.co.id/l/lamps/35989/cat/>

² <http://www.gelighting.com/LightingWeb/apac/led/overview/index.jsp>

³ http://www.osram.asia/osram_asia/products/led-technology/lamps/led-tubes/index.jsp

No specification document was found on the website.

In order to ensure net emission reduction, luminous efficiency is set consecutively as a default value by adopting that of the equipment which is commercially available in Indonesia and has the most efficient value (i.e. the highest luminous efficiency). As a result, luminous efficiency of merchandise by manufacturer D (110 lm/W) is set as η_{RE} .