

**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, air conditioning system market of Indonesia was investigated through interviews and on-sight surveys.

1) Setting of BaU

2 types of air conditioning system, wall mounted type and ceiling cassette type, are used in grocery stores in Indonesia. Most of the air conditioning systems circulating in the country are non-inverter type. Market research was conducted on the 2 types of air conditioning systems above, and 4 major manufacturers are identified respectively, as indicated in Table 1.

**Table 1 : Air Conditioning System Market in Indonesia
(Wall Mounted Type)**

Source	Information on Air Conditioning System Market
PT Panasonic Gobel Indonesia	Inverter type air conditioning systems holds a very small amount of share (approximately 5%), and most of the air conditioning systems are non-inverter type (approximately 95%). Top shares of the wall mounted type are from manufacturer A, B, C and D, as indicated in Figure 1.

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

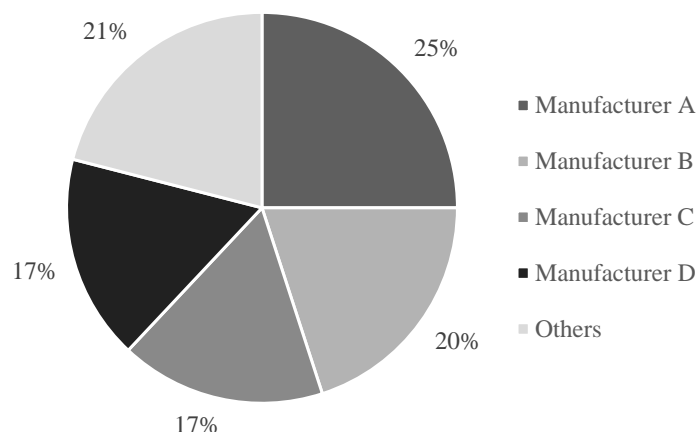


Figure 1 : Market Share of Wall Mounted Type Air Conditioning System

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

**Table 2 : Air Conditioning System Market in Indonesia
(Ceiling Cassette Type)**

Source	Information on Market Share of Air Conditioning System
PT Panasonic Gobel Indonesia	4 major manufacturers of the ceiling cassette type air conditioning system are mainly manufacturer E with approximately 60% market shares, and the rest are manufacturer A, C and F.

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

Generally speaking, it is assumed that the existing old type air conditioning system will be used continuously in case that the project is not implemented because of avoiding new investment for air conditioning system replacement / new installation of air conditioning system. In addition, it is safe to say that the existing air conditioning systems are of non-inverter type, since they have 95% market share for wall mounted type as stated in Table 1 above, and inverter type is not listed in most of the catalogs of ceiling cassette type which are currently available in the Indonesian market of major manufacturers in Table 2. Therefore, the usage of non-inverter type air conditioning systems by the major manufacturers stated in Figure 1 and Table 2 above are set as BaU.

2) Setting of Reference Parameters Fixed *Ex Ante*

In case of new installation, it is assumed that products from the major manufacturers above will be chosen. Figure 2 shows the COP of the air conditioning systems by these manufacturers which are currently available in the Indonesian market ^{1,2,3,4,5}. The values of cooling capacity and rated power consumption used in the calculation of COP are obtained from product catalogs, specification documents or website of the manufacturers.

¹ <http://www.lg.com/id/air-conditioner>

² <https://www.sharp-indonesia.com/products/perlengkapan-rumah-tangga/air-conditioner/ac>

³ <http://www.panasonic.com/id/consumer/home-appliances/air-conditioners.html>

⁴ <http://www.daikin.co.id/products/commercial/skyair/index.jsp>

⁵ <http://www.panasonic.com/id/consumer/home-appliances/air-conditioners.html>

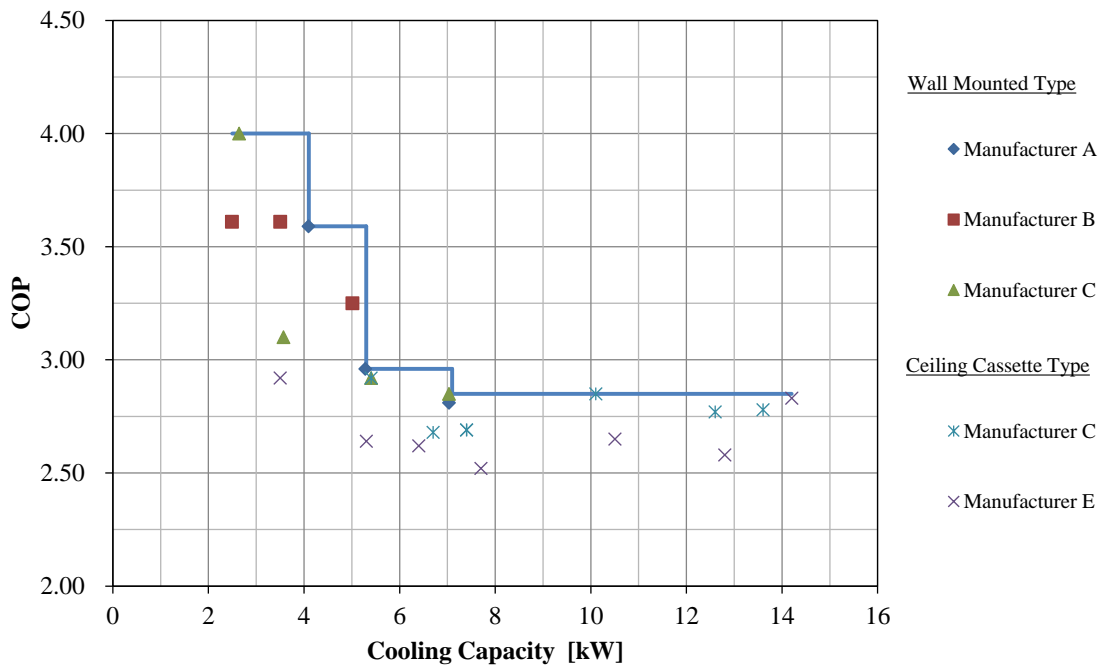


Figure 2 : COP of Air Conditioning Systems available in the Indonesian market

Source: Data quoted from official websites and compiled by the Study Team. (2014)

Based on Figure 2, the COP of reference air conditioning system is conservatively set *ex ante* in the following manner to ensure the net emission reductions.

1. The COP value tends to decrease as the cooling capacity increases.
2. The reference COP, at a certain cooling capacity, is set at a maximum value in the respective cooling capacity range.
3. The maximum values of COP in the respective cooling capacity ranges are defined as COP_{RE} , as indicated in Table 3.

Table 3 : COP for Reference Air Conditioning System (COP_{RE})

Cooling Capacity [kW]	Reference COP
$2.5 < x \leq 4.1$	4.00
$4.1 < x \leq 5.3$	3.59
$5.3 < x \leq 7.1$	2.96
$7.1 < x \leq 14.2$	2.85