Additional Information on the Proposed Methodology
"Installation of gas engine cogeneration system with absorption chiller to supply electricity, heating energy and cooling energy"

1. Market share of chiller manufacturer in Thailand

In Thailand, chiller manufacturers, such as Johnson Controls-Hitachi, Toshiba Carrier, Daikin Applied, York and Trane occupy relatively high market share in chillers market according to interviews with technical experts of chillers in Japan.

2. Research on the COP values of chillers in Thailand

2.1 Catalogue COP values

However the market size of centrifugal chiller is not quite large at the moment, it is expected that it will expand in Thailand as its economy grows. It is also expected that the same chiller manufacturers who already have certain market share of other chiller types (e.g. screw chiller) will continue to occupy high market share in centrifugal chiller market in the future. Therefore, catalogue COP values of centrifugal chillers sold by those manufacturers are collected except for York and Trane because of the following reasons.

- COP values which are calculated with the same conditions are not obtained for York
- Chillers by Trane have a refrigerant that is going to be phased out by Montreal Protocol

As a result, total 62 COP values of centrifugal chillers ranging from 300 USRt to 1,300 USRt, provided with the same temperature conditions, are obtained.

2.2 Determination of the reference COP values

It is observed that similar COP values fall into a certain cooling capacity range. Therefore, four cooling capacity ranges are set to determine the reference COP values for each range. The most efficient COP, which has the largest value, in each capacity range is selected as the reference COP and is shown in Table 1 below in red circles.

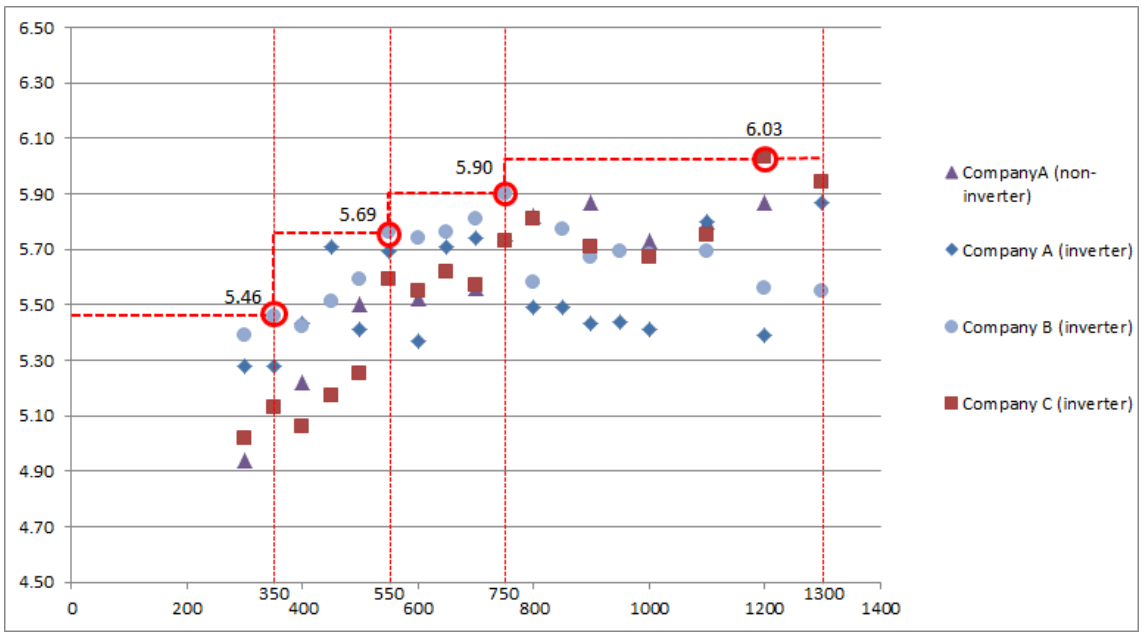

Figure 1: COP values of centrifugal chiller marketed in Thailand

The reference COP for each cooling capacity range is determined and shown in Table 1 below. ("x" in the table represents cooling capacity per unit.)

Table 1: Established $COP_{RE,i}$ for the proposed methodology

Cooling capacity per unit (USRt)	x≦350	350<x≦550	550<x≦750	750<x≦1,300
$COP_{RE,i}$	5.46	5.69	5.90	6.03