

# Half-Day Course on Heat Recovery System: Heat Pump - Hot Water System for Hotels & Hospitals

BUILDING SERVICES TECHNICAL DIVISION

reported by



Ir. Gary Lim Eng Hwa



Intrix Heat Pump installation at First World Hotel in Genting

On 22 September, 2016, a Half-Day Course on Heat Recovery System: Heat Pump - Hot Water System for Hotel & Hospital, was organised for 30 participants, including 3 committee members of the Building Services Technical Department, IEM.

The course was presented by Mr. Tee Tone Vei, Managing Director of Intrix Renewable Sdn. Bhd. who explained about the Decentralised and Centralised Hot Water Systems and the various traditional energy sources for generating hot water, such as solar, boiler and electrical heater.

Heat Pump (HP) concept and technology is well known but according to Mr. Tee, it is a challenge to achieve the highest possible energy efficiency which will result in the reduction of CO<sub>2</sub> emission to the atmosphere.

He said the concept is based on the 2nd law of Thermodynamics where free and renewable heat energy is harvested from ambient air or heat rejected from chillers at lower temperatures and turned into useful heat by adding a small amount of energy.

There are three main heat sources for HP operation in tropical countries:

1. Ambient Air (5°C-35°C)
2. Chilled Water (7°C-12°C)
3. Cooling Tower Water (30°C-35°C).

Mr. Tee then clarified the Myth of COP as a constant factor in a system as this was unattainable due to the dynamic nature. He explained: "The energy efficiency of a heat pump system is measured by Coefficient of Performance (COP), which is derived from Heat Output divided by Electrical Energy input. However, the common myth that COP=4.0 is highly misleading because COP is never a fixed value but a fluctuating ratio value instead. The higher the heat source temperature (i.e. ambient temperature), the higher the COP will be. The higher target output temperature (i.e. hot water temperature), the lower the COP will be. During system operation, this ratio value is dynamic, therefore COP value is also never constant. In fact, not only is COP

dynamic but the corresponding output capacity also varies corresponding to the two parameters. It is therefore very important to consider these parameters to design or specify a system to ensure optimum energy efficiency. In fact, a carefully designed system with consideration of the two mentioned dynamic parameters can achieve approximately 95% of equipment efficiency.”

Mr. Tee then explained the different HP systems using numerous re-circulations to reach the desired water temperature and One Pass technology, which is a more energy efficient method because it enables one-time water heating to reach the target temperature. This system is capable at maintaining a high COP at all times.

HP is a known Green Technology. Mr. Tee presented a chart comparing the annual CO<sub>2</sub> emission from various methods of generating hot water. HP (air/water-source) has the lowest emission. He then showed pictures of an actual installation at the First World Resort & Hotel in Genting, which uses the Intrix HP hot water system. This has successfully reduced 1,000 metric tonnes of CO<sub>2</sub> generated annually by using air source heat pump technology, an amount that needs roughly 45,000 trees to soak up. The project has gained recognition and is listed in the *Malaysia Book Of Record* as “The Largest Renewable Energy Hot Water System” in the region. ■