in multi-function. BISC combines the solar collector and the water storage tank together with one face acting as the solar absorber which absorbs solar energy and directly conducts to the water inside the storage tank. A double-glazing design is adopted to reduce the heat loss. The outer transparent cover (glass) is made of color glass for architecture requirement. 8 uni ts were installed on the roof of the lab at the Innovation and Incubation Center of NTU for field demonstration and test.

A PC-based automatic operating and control system is designed and built to monitor the long-term performance of the BISC system installed in the research. The system monitors the instantaneous performance of the BISC system all days. Hot water discharge is controlled from 18:00 to simulate the hot water load of a family. The discharge rate is 30 L at every 15 minutes with 15 minutes stop after each discharge until 22:00. That is, the discharge rate is at 60 L/hr. A 30 L backup electric water heater was connected to the BISC system. The temperature setting of the backup heater is at 55 ℃ which is fixed. The long-term test results in winter season show that about 50 % energy saving was achieved in clear days. The monitored results have also shown that the daily-total solar irradiation on a 75° tilted surface (the BISC installed angle in building) is higher than the horizontal surface, about 40-50 % higher at Ht>10 MJ/m^2day. This assures that BISC will produce more hot water in winter. This proves that the use of BISC as parapet or sun-shading canopy of a building (installation angle > 75°) is technically feasible. The test results show that the characteristic efficiency of BISC with different colors which are installed in building with 75° tilt angle is 0.34-0.39, lower than the conventional solar water heater (0.50).

The monitoring of long-term performance will be continued to find out the defects and efficiency of the system. Since BISC is part of the building, it needs a BISC with high quality in art design, high thermal performance, good manufacturing technique, and long service life (reliability). The reliability issue will be the focus of forthcoming research.

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