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Solar Air-conditioning System Using Single-Double Effect Combined Absorption Chiller

Kawasaki
Hajime Yabase,
Kawasaki Thermal Engineering Co., Ltd.
yabase_h-kte@corp.khi.co.jp
Kiyoshi Saito,
Waseda University
saitowaseda@gmail.com
Muhammad Idrus Alhamid,
University of Indonesia
mamak@eng.ui.ac.id

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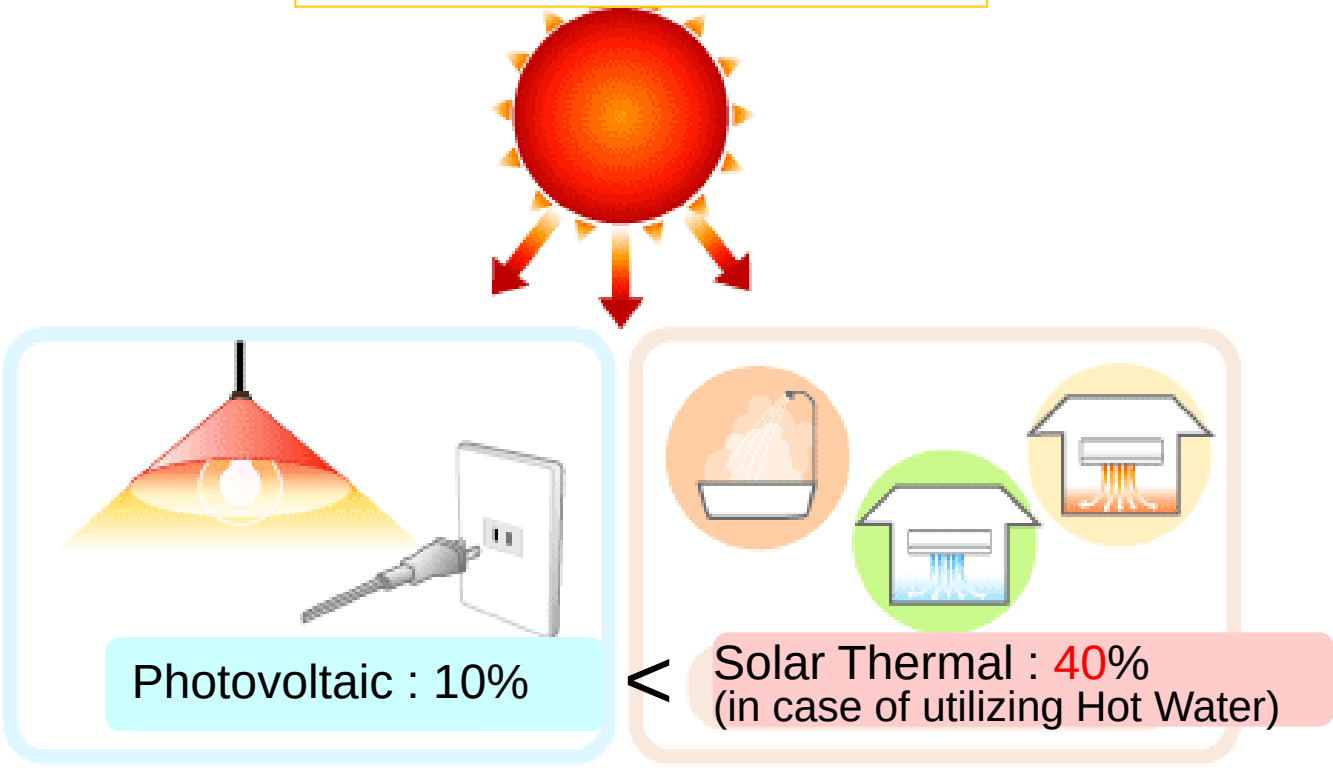
1. Solar System

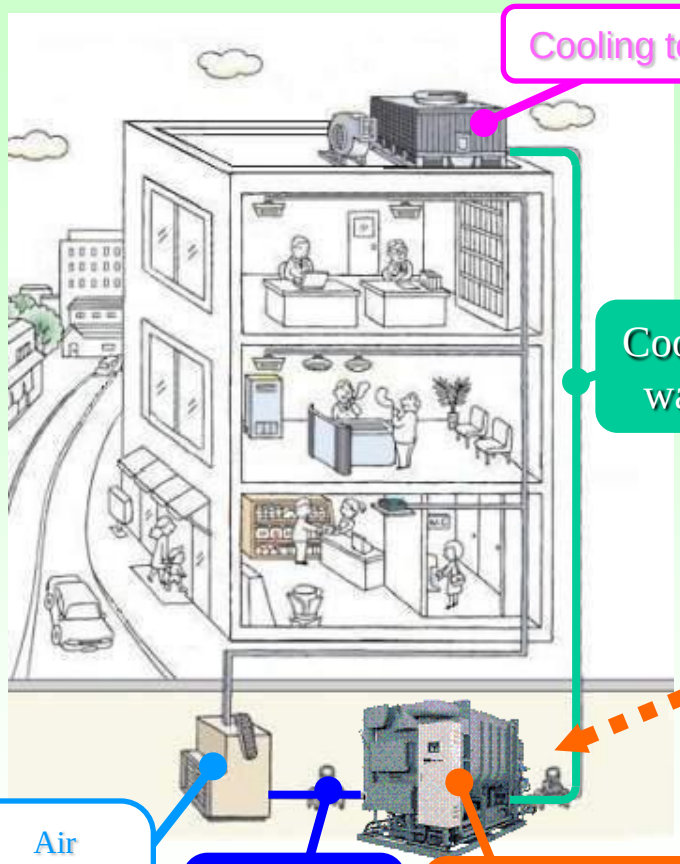
The efficiency of Solar Thermal is better than that of Photovoltaic.

Efficiency of Solar Energy



From HP of NEDO
http://app2.infoc.nedo.go.jp/kaisetsu/neg/neg02/index.html#elmtop

2. What's Absorption Chillers?



☆Special Feature

① **Freon-Free air** conditioning machine (Refrigerant = Water)

② Much less power consumption than electric chiller.

③ Various Energy Sources can be utilized.

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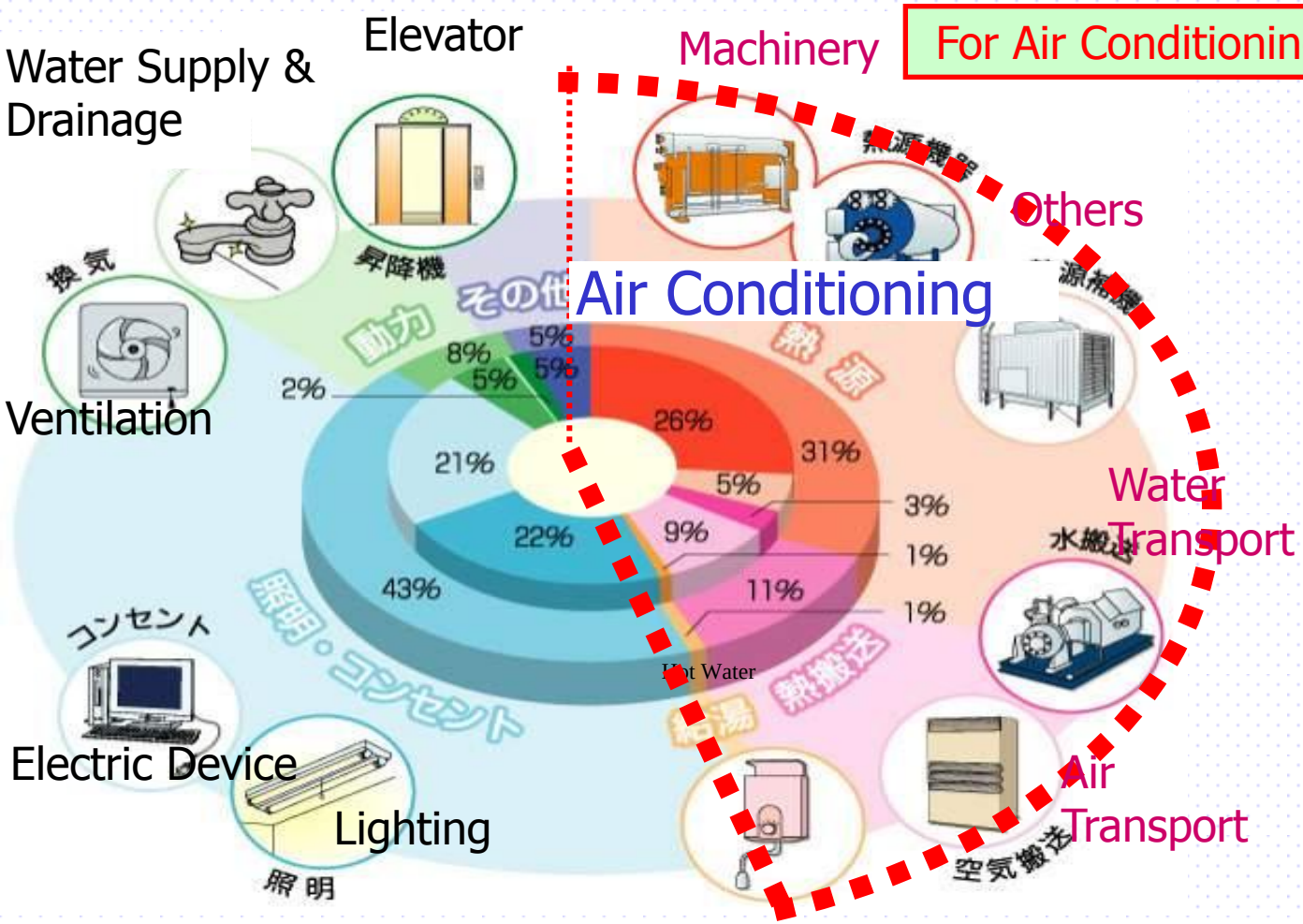
2. What's Absorption Chillers?

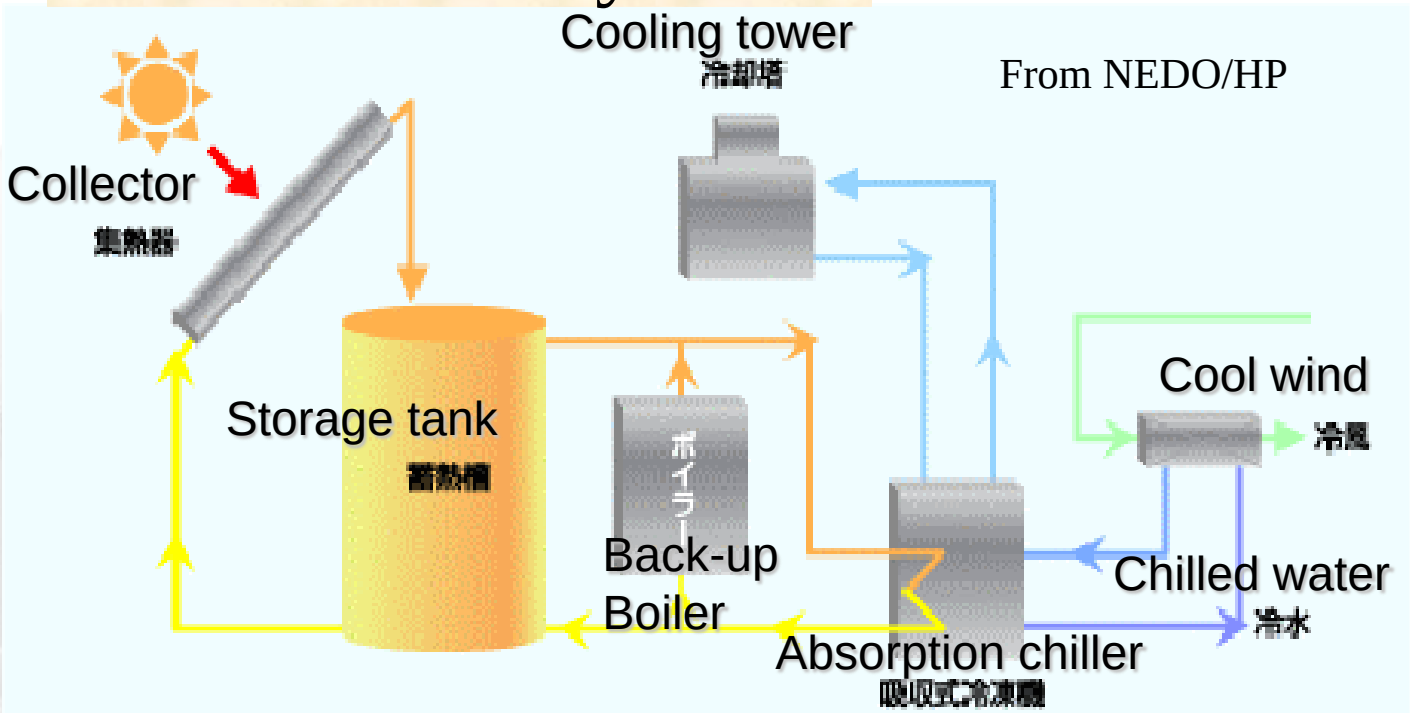
Energy Use Composition in Buildings in Japan



By HP of The Energy Conservation Center, Japan

3. Solar Cooling Applications

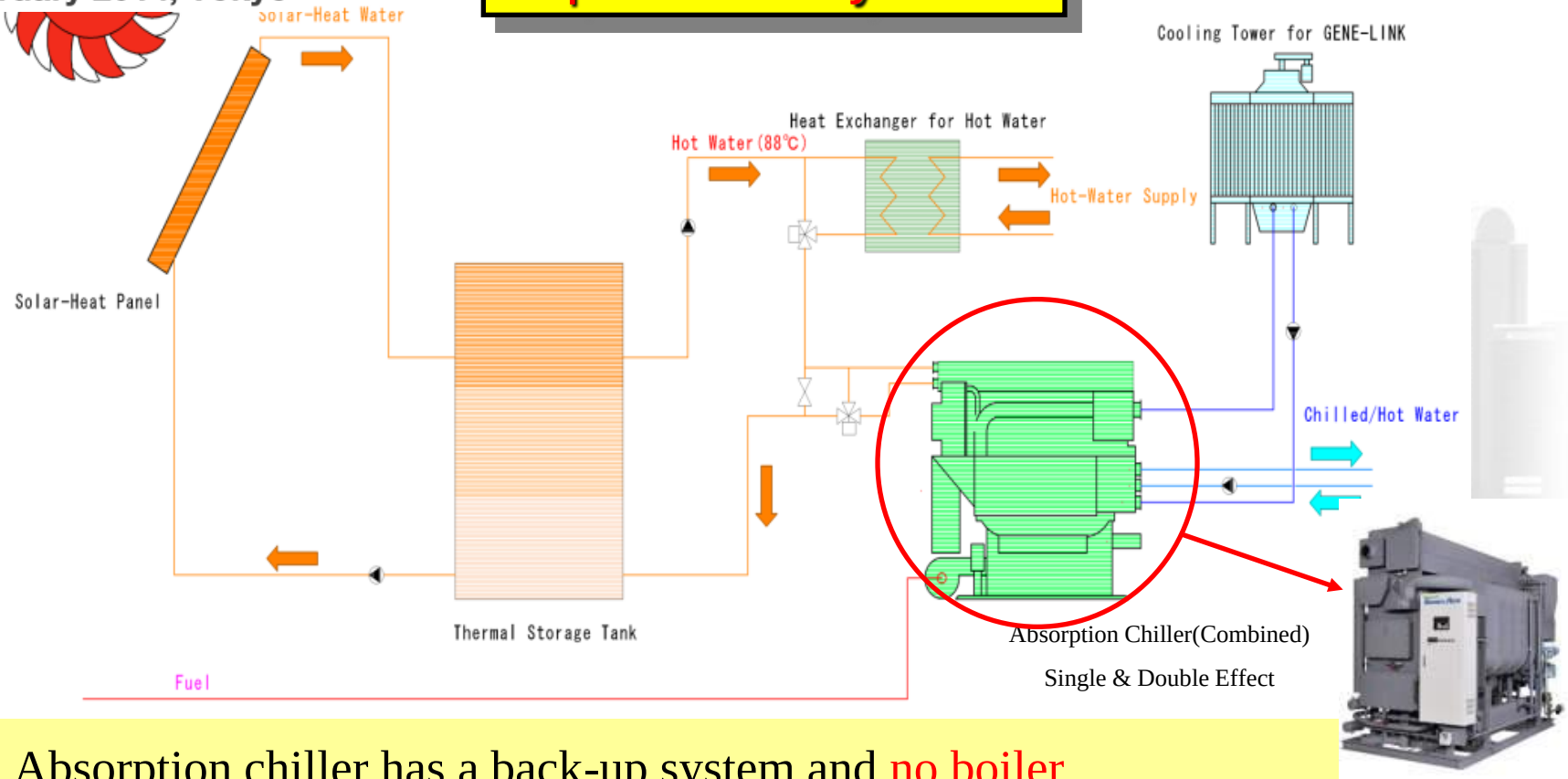
Conventional System



1. Complicated system with a boiler for the back-up of hot water supply
2. Complicated control system to adjust hot water supply in accordance with the fluctuation of load and solar heat Low
3. efficiency of absorption chiller(single effect)

3. Solar Cooling Applications

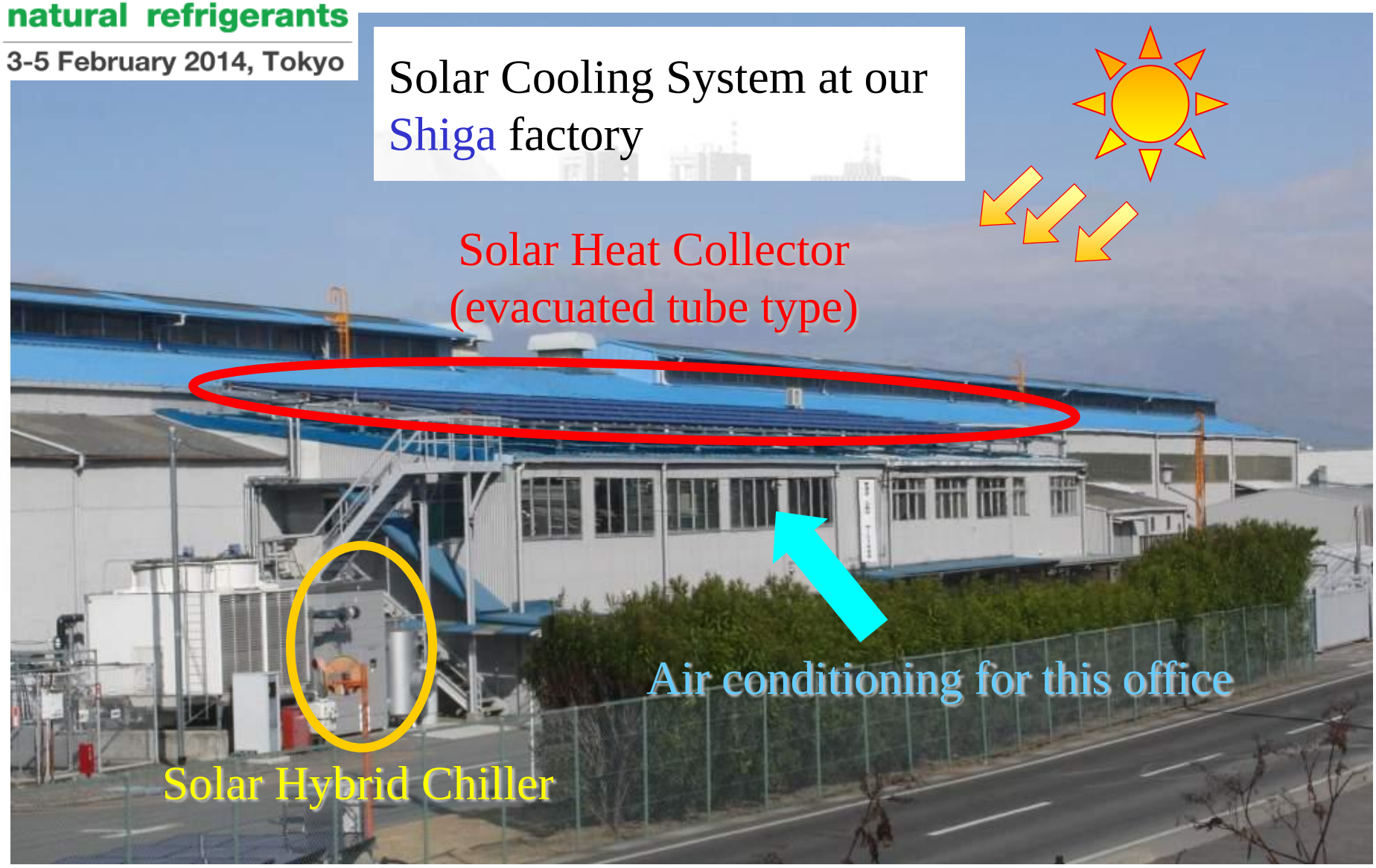
Improveent System



1. Absorption chiller has a back-up system and no boiler
2. Absorption chiller is automatically moved to combustion for the stable supply
3. of chilled water High efficiency of absorption chiller (Double Effect)

3. Solar Cooling Applications

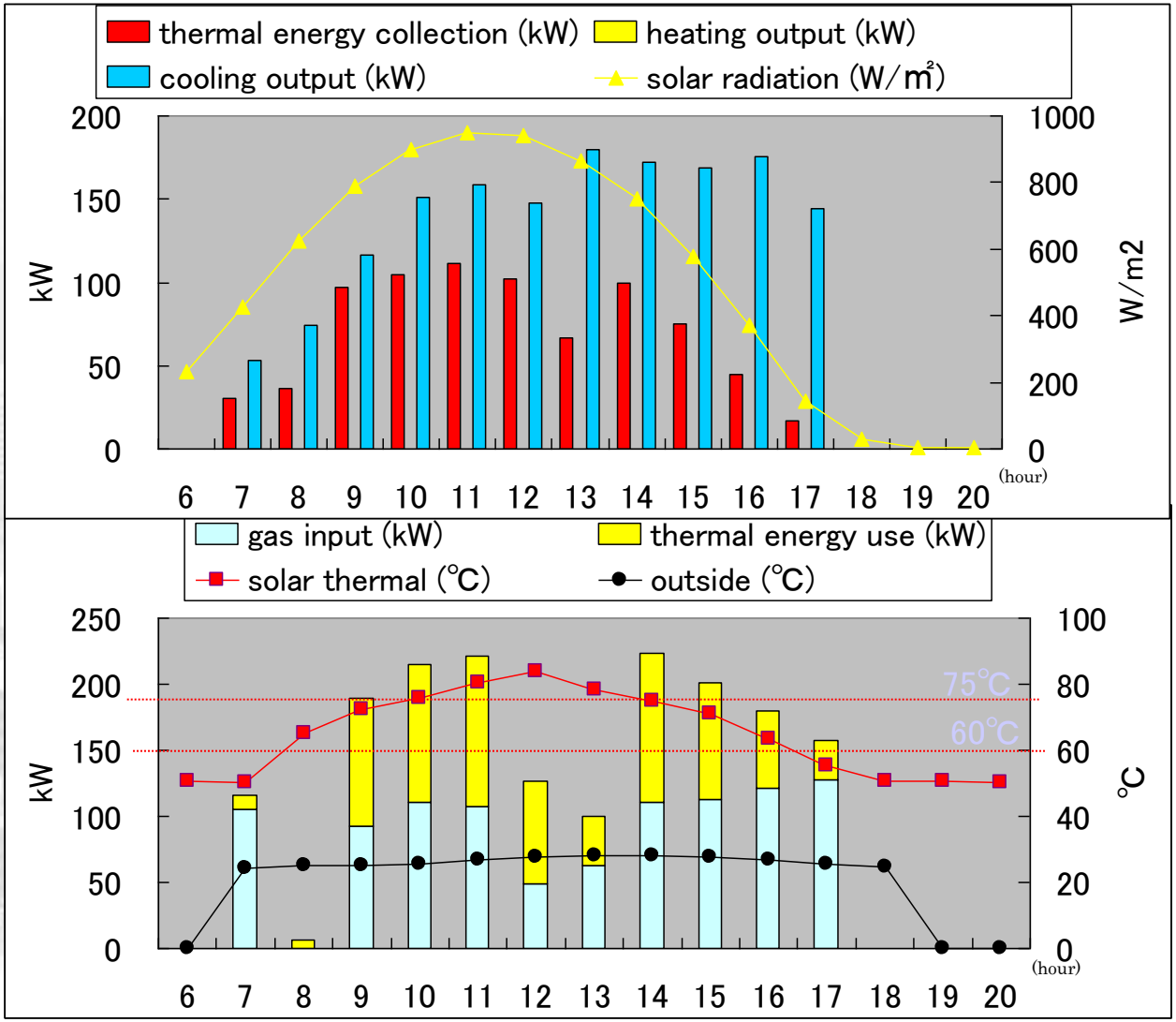
Solar Cooling System at our Shiga factory



3. Solar Cooling Applications

Evaluation status and results in Shiga (1)

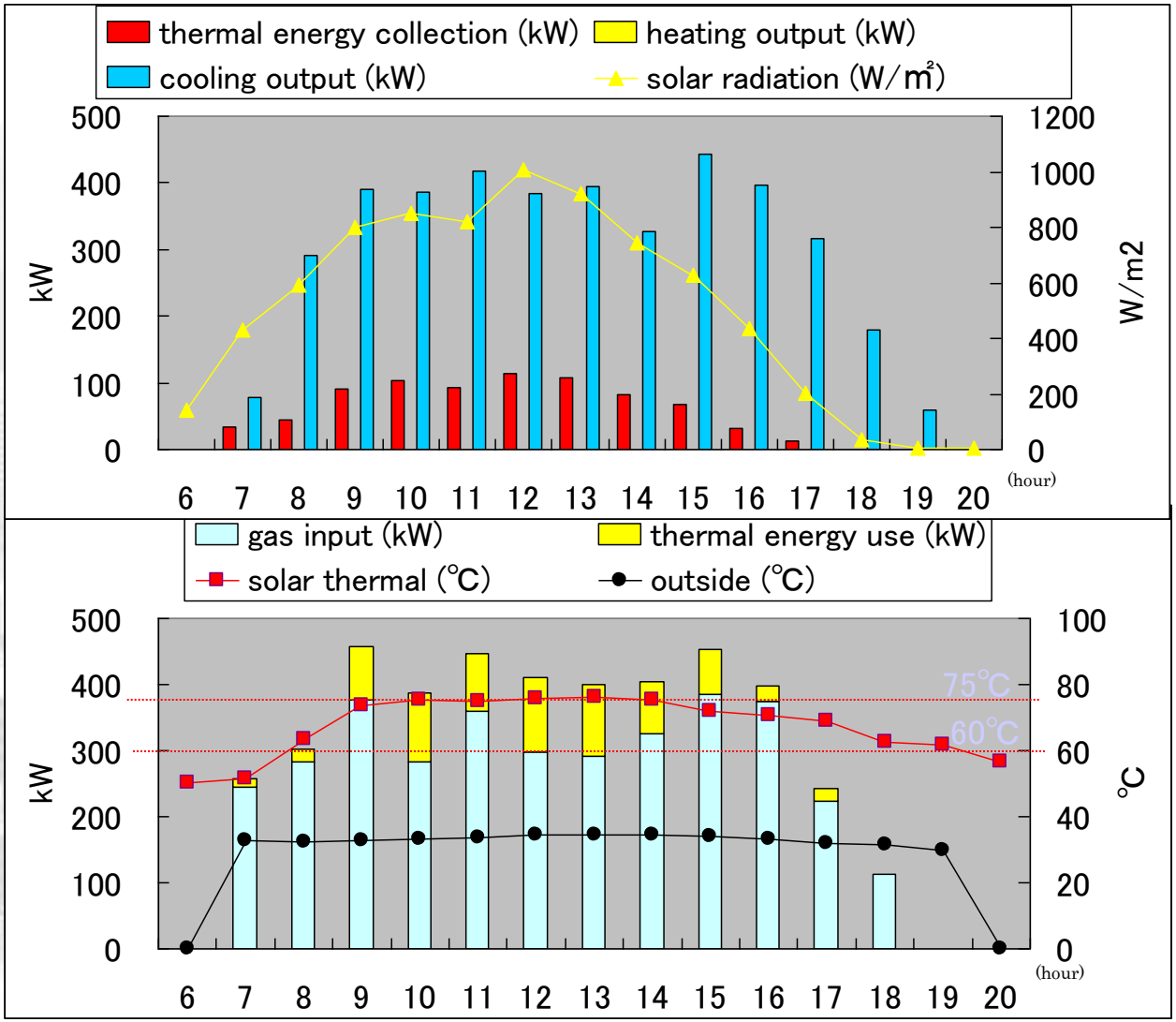
- 20th May
- Max temp : 28.4°C , air-conditioning loading factor :23%
- hot water obtained from the solar energy collector is used at 60～83℃
- Enabled gas amount to be reduced by 25%



3. Solar Cooling Applications

Evaluation status and results in Shiga (2)

- 28th July
- Max temp : 34.5°C , air-conditioning loading factor :60%
- hot water obtained from the solar energy collector is used at 60～75℃
- Enabled gas amount to be reduced by 11%

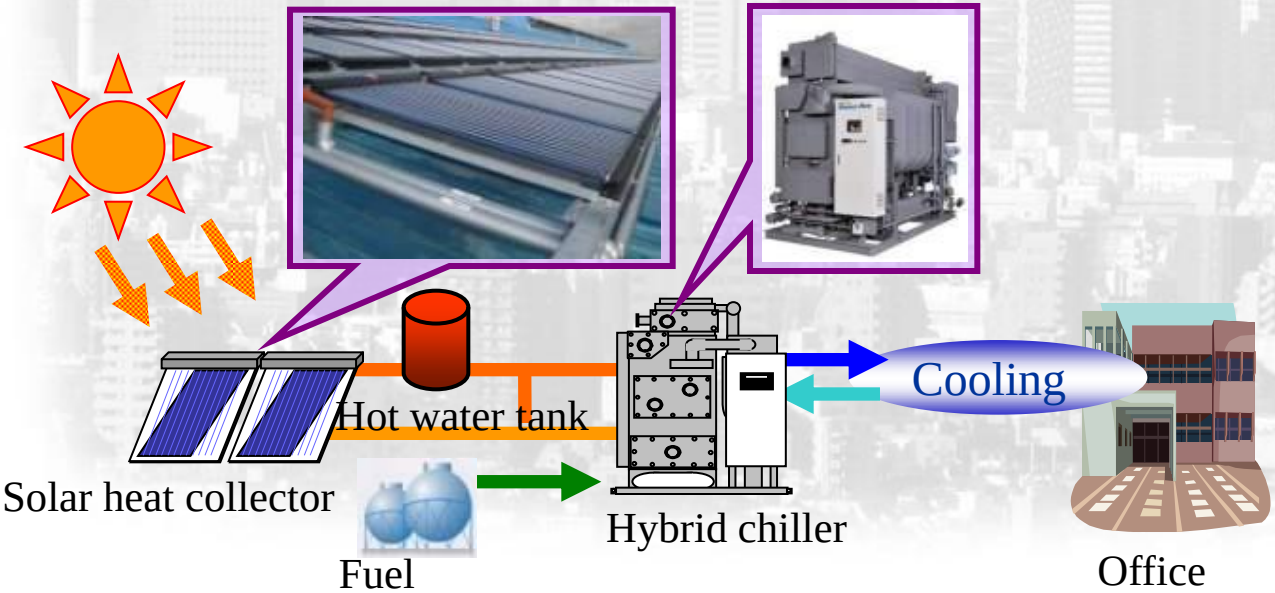


3. Solar Cooling Applications

Solar Cooling System in University of Indonesia (UI) is started from Jan. 2014

"Entrusted business on the technical cooperation for co-benefit type solar-aided air-conditioning system in Indonesia during the fiscal years 2013."
sponsored by Ministry of Environment Japan.

This project includes detail designing of a solar cooling absorption chiller system utilizing solar energy with the prospect that the system prevails and expands in Indonesia, and includes studying measures for growth of the system in Indonesia by holding a local workshop and a year-end progress meeting.




New Building of University of Indonesia

3. Solar Cooling Applications

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Verification of the effect relating to verification test of a solar cooling absorption chiller system utilizing solar energy in UI (1)

Comparison equipment specification

	Solar absorption chiller	Conventional electric chiller
Chiller	Solar absorption chiller x 1 Capacity 281kW Fuel gas consumption:(Hh=9080kcal/m^3_N) With solar using :14.0m^3_N/h Not solar using:20.5m^3_N/h Electricity consumption:2.25kW	Electric chiller x 1 Capacity 281kW Electricity consumption: 70.25kW(COP=4)
Facility	Solar hot water pump No.1:1.5kW Solar hot water pump No.2:0.75kW Radiator:1.5kW	

Comparison between solar absorption chiller and conventional chiller【RP basis】

		Electric chiller	Solar absorption chiller
Amount of Energy	Electricity	183,600 kWh	16,369 kWh
	Fuel gas	- m^3_N	45,974 m^3_N
Energy cost	Electricity	181,257,972 RP	16,535,437 RP
	Fuel gas	- RP	96,085,660 RP
	Total	**181,257,972** RP	**112,621,097** RP
	Difference	-	-68,636,875 RP
	rate	100 %	62 %
CO_2emission	Electricity	183,049 kg-CO_2	16,320 kg-CO_2
	Fuel gas	- kg-CO_2	88,730 kg-CO_2
	Total	**183,049** kg-CO_2	**105,050** kg-CO_2
	Difference	-	-77,999 kg-CO_2
	rate	100 %	57 %

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Thank you very much!

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