

# S. Kato LAB.

## [Control of air environment in sustainable society]

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Engineering of architecture and urban environment

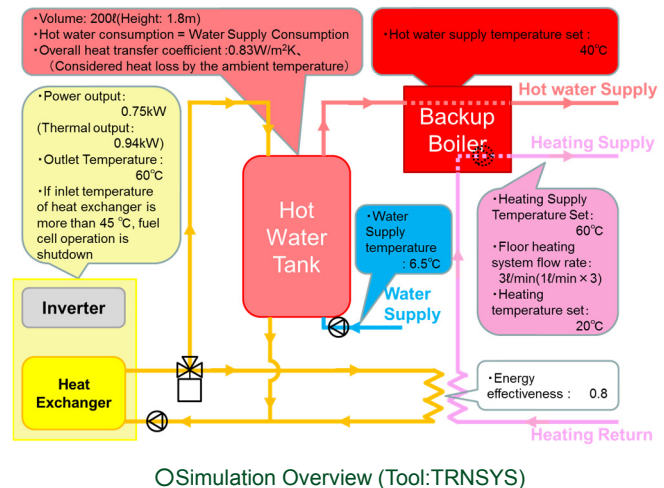
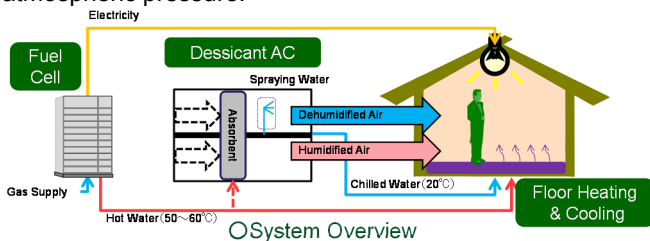
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### Energy Saving and Comfortable Heating and Cooling System using Co-generation

Heat use in the residential, most of the thermal use is space heating and water heating. In summer however, cooling demand is greater, the heat source of cooling should also be considered. Regarding the use of heat by cogeneration, it is a fundamental requirement. As a device of heating and cooling heat source by using the waste heat from cogeneration, the absorption chiller has been spread.

However, the problem of the size of the equipment and the use of lithium chloride is not suitable for the residential use. In recent years, an adsorption chiller has been developed using adsorbent such as silica gel. However, it is difficult to apply in the residential in terms of maintenance which is a need to keep the vacuum state. Desiccant air conditioner is using the same adsorbent of silica gel and has been widely used in humidity control. It can be supplied to the cooling heat source by spraying water to create dry air at atmospheric pressure.

The purpose of this study is to develop a prototype of the desiccant air-conditioning systems utilizing the adsorption refrigeration cycle in atmospheric pressure with cogeneration for residential use. Chilled water temperature obtained by spraying water in dry air at atmospheric pressure is about 20 °C, does not reach at 5 ~ 7 °C for space cooling which uses convection. It can be solved in combination with radiation cooling.



### Research on Air Environment and Thermal Environment in Truck Cabin

#### Background

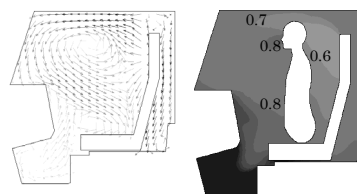
- The space is very narrow and is all perimeter zone in the warm-temperature environment of the truck cabin. The characteristic of the truck space is that it is easy to be affected by neighboring environment because of body heat transfer and sunlight. when it parks under the hot weather for a long time, the temperature inside the truck will be increased to a high level. Thus the improvement of warm-temperature environment in a truck cabin is necessary.

- The comfortable environment in a truck cabin is important for the truck driver spending long time in the inside of truck. Until now there are few cases that studies on ventilation efficiency and breathing air quality (quality of the air which the person inhales) of the air conditioning air.

#### The Aim of this research

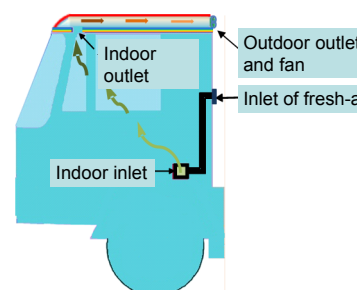
- to analyze the ventilation efficiency and the breathing air quality in the truck cabin to make the cabin air environment good for the health of the crewman.
- The double-layered ceiling system with airflow is designed to improve the thermal environment in a truck Cabin.

#### ○ Air velocity and ventilation efficiency



- air velocity and ventilation efficiency
- up-ward airflow of human
- breathing air quality

#### ○ Double-layered Ceiling system in truck cabin



- the improvement of thermal environment
- the decrease of ceiling temperature
- the parameter of double-layer ceiling
- the heat balance of walls in the main cases