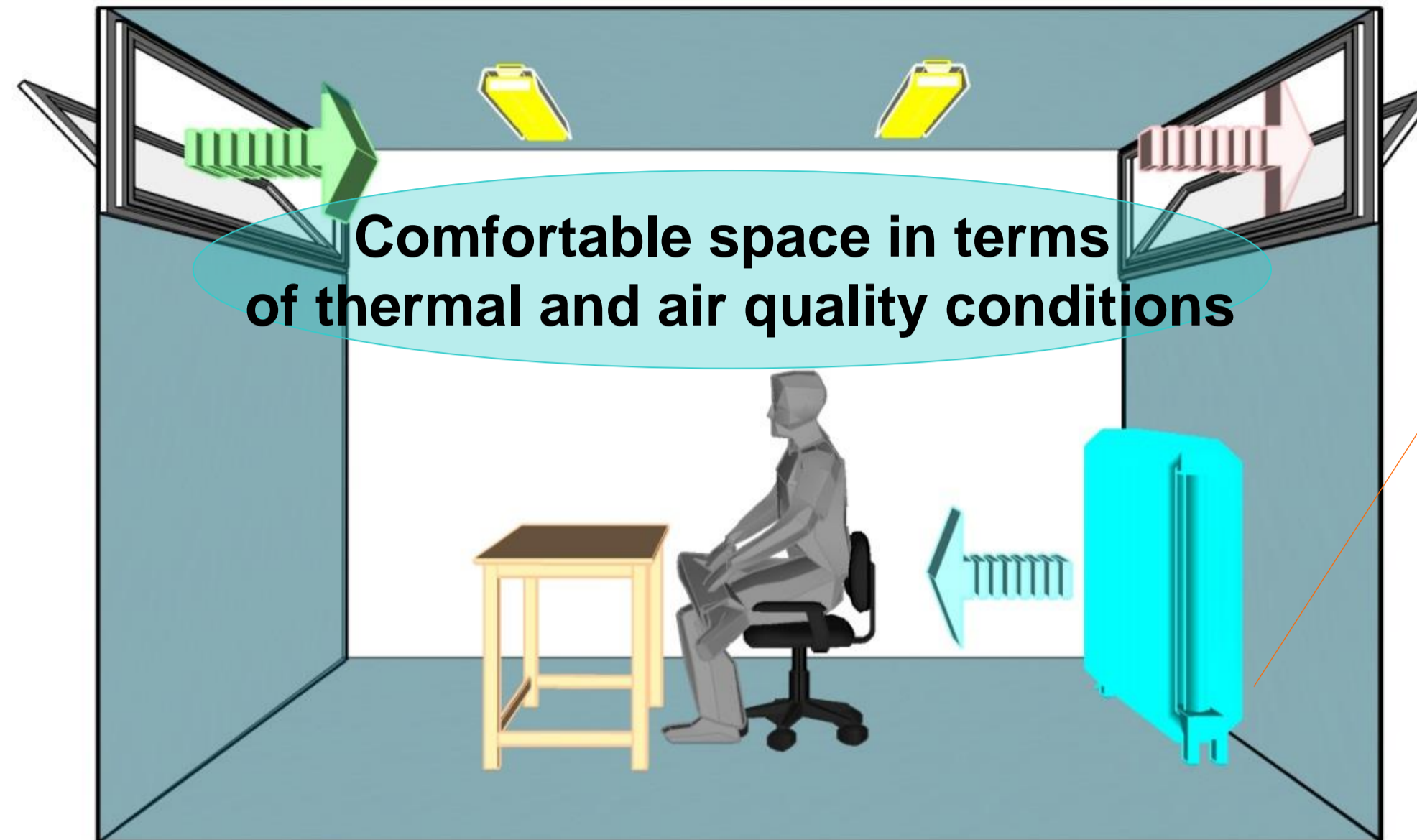


## Introduction

### Concept of the hybrid system

#### Ventilator

Fresh air



#### Ventilator

Efficient elimination of heat and pollutant

#### Radiant cooling panel

A radiant cooling panel is applied

- 1) Low energy consumption
- 2) Make easily comfortable space

Control indoor humidity by a radiant panel

### System configuration

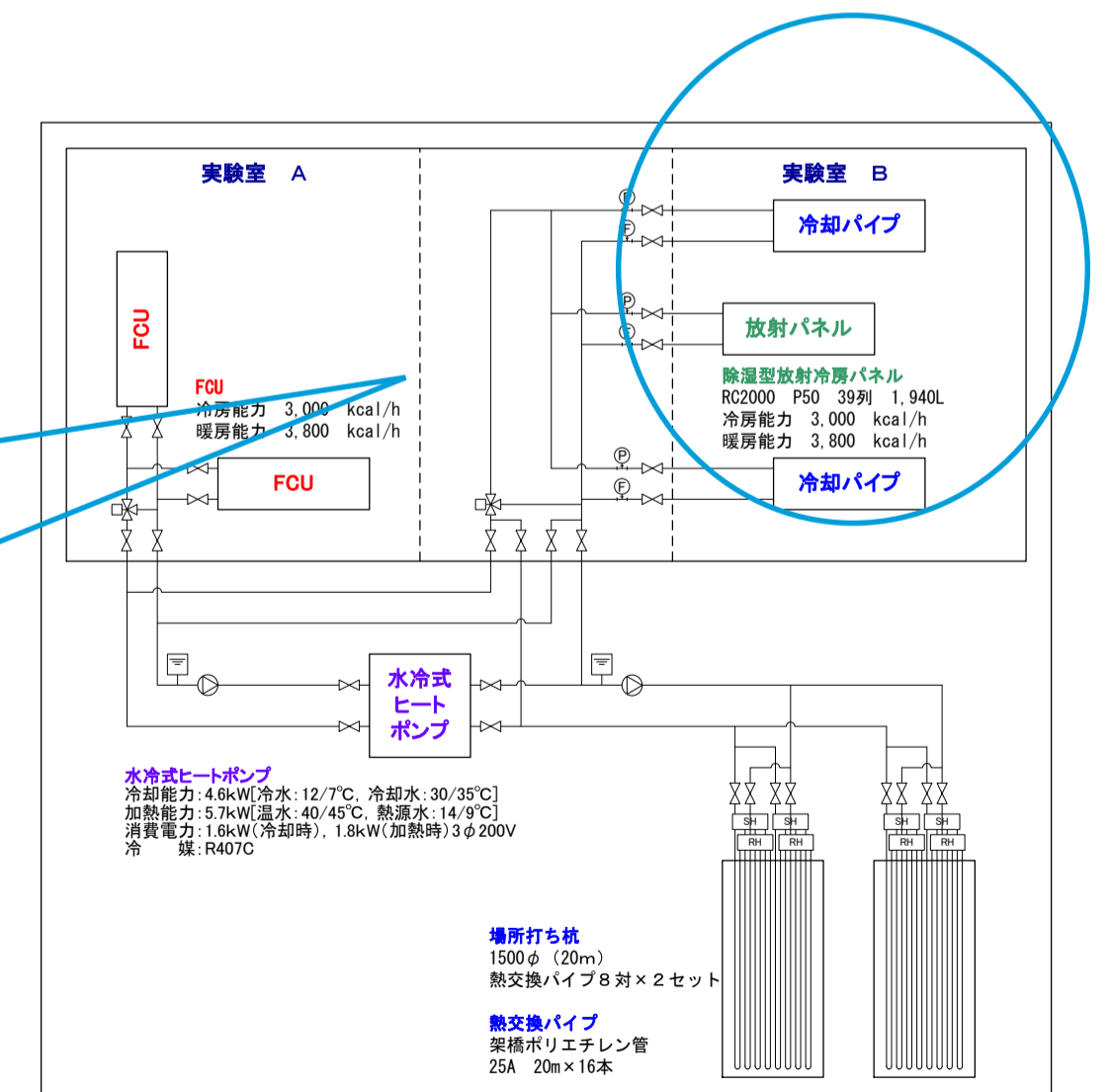
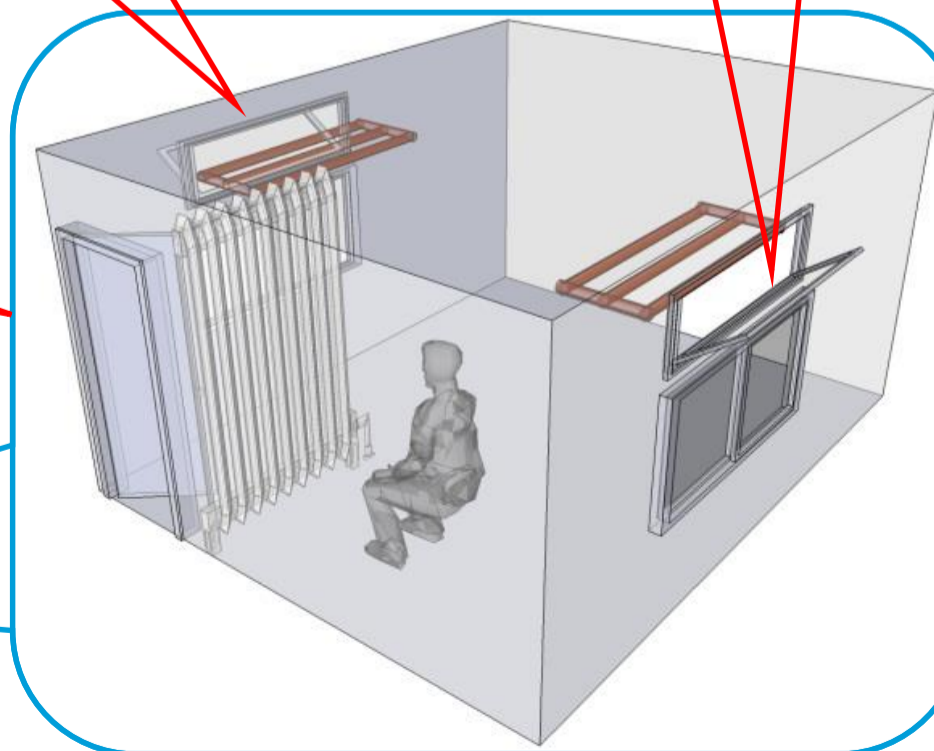
#### Radiant panel



#### Cooling pipe



#### Ventilator



## Numerical simulation

### Comparison of results of numerical simulation and experimental equipment

In a low temperature radiant heating system, it is expected to reduce energy consumption due to storage functions of walls.

### Numerical simulation for indoor thermal environment

Evaluation for the effects of insulation materials to indoor thermal condition

- Comparison of numerical simulations and experimental equipment
- Validation of the accuracy of the simulation
- Assimilation of the fundamental of the radiant panels

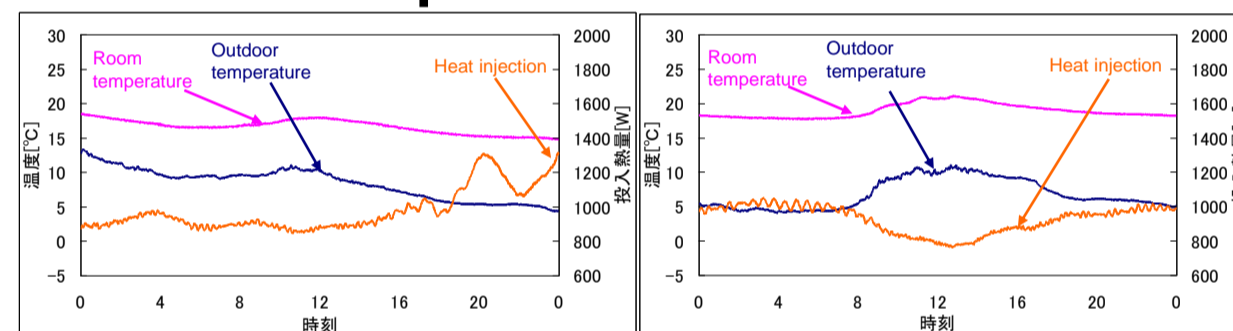
### Experiment for indoor thermal environment

#### • Benefits of insulation materials

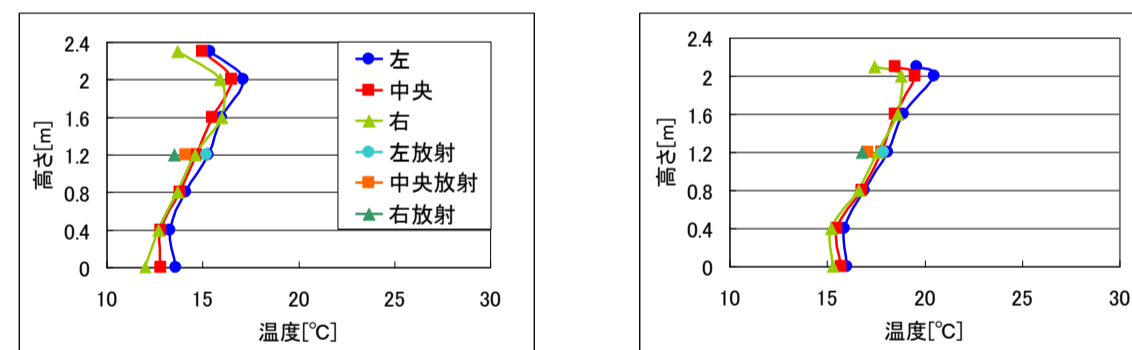
	Without any insulations	After insulation*
Wall	1.35 W/m <sup>2</sup> K	0.31 W/m <sup>2</sup> K
Ceiling	2.73 W/m <sup>2</sup> K	0.35 W/m <sup>2</sup> K
Floor	0.82 W/m <sup>2</sup> K	0.27 W/m <sup>2</sup> K
Window	6.33 W/m <sup>2</sup> K	Curtain

\*Measure by thermography

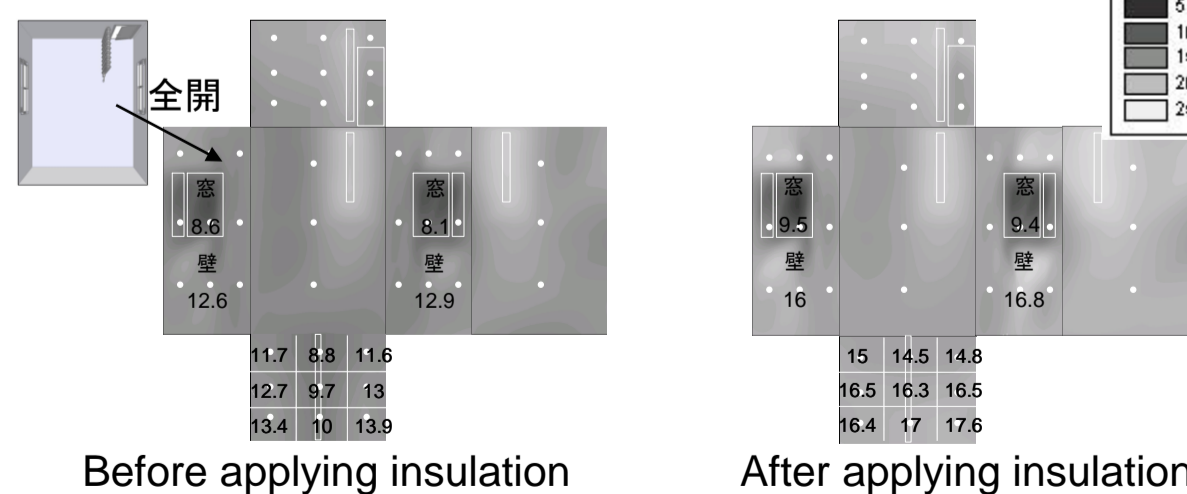
#### • Room temperature



#### • Vertical temperature distribution

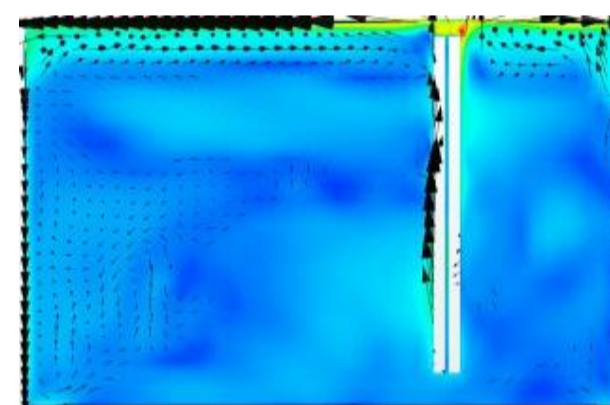


#### • Temperature distribution of wall

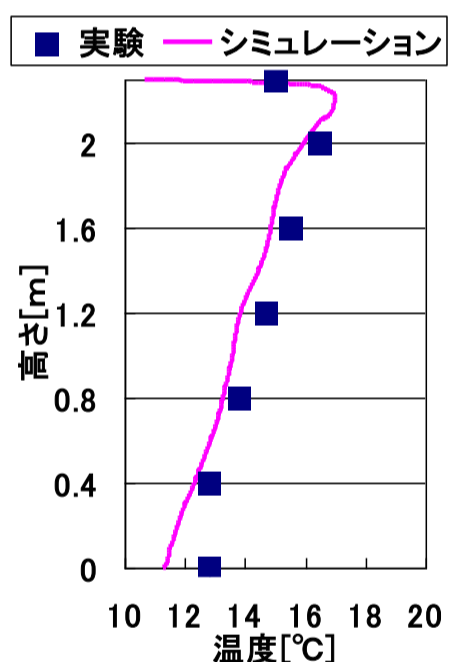
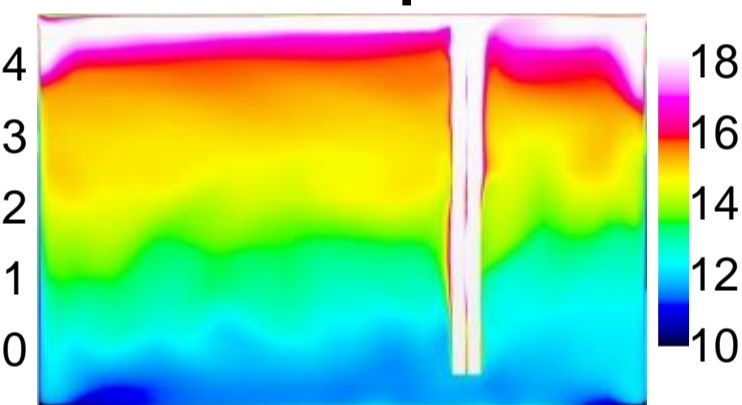


### Numerical simulation vs experimental result

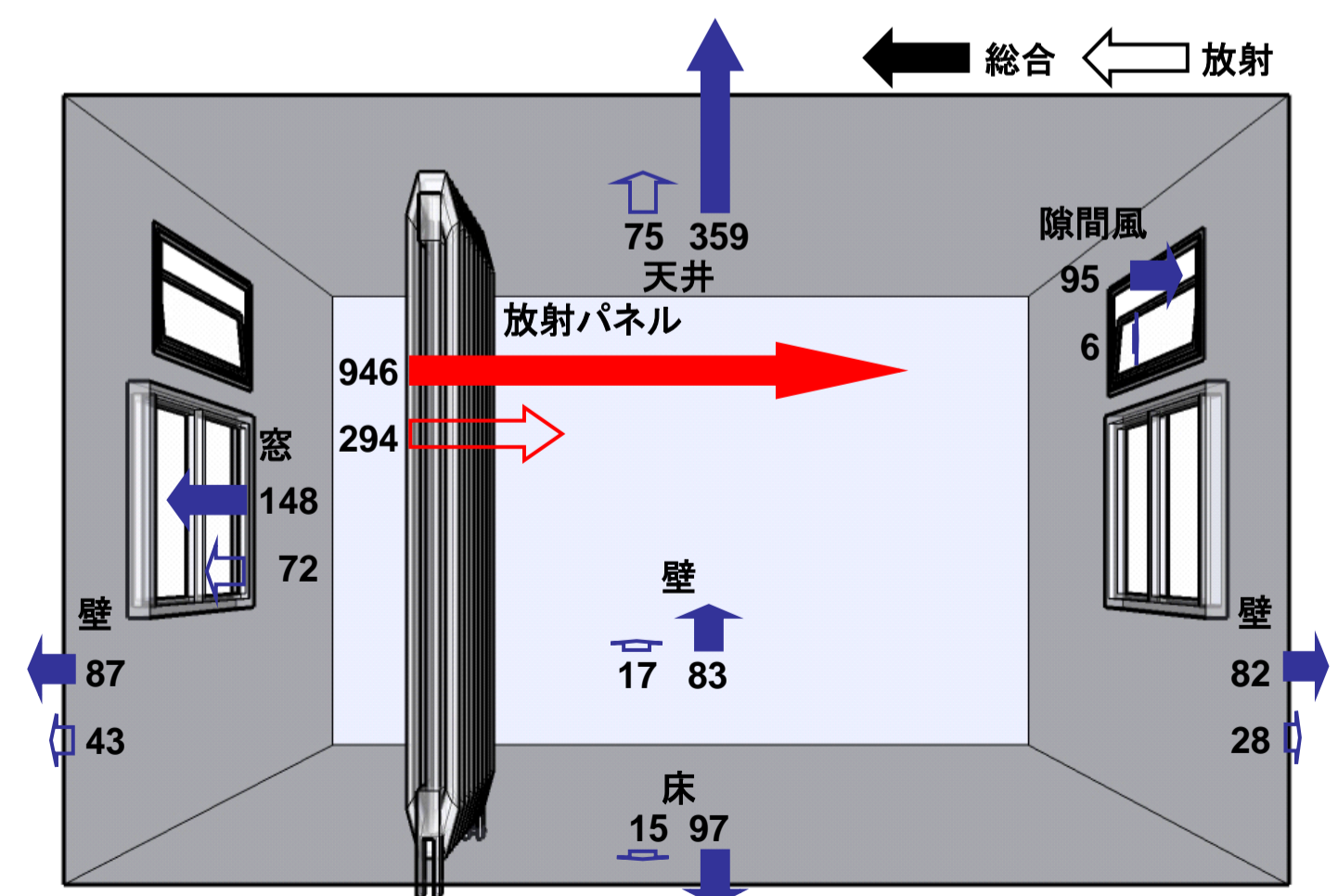
#### • Air flow distribution



#### • Temperature distribution



#### • Heat balance [W]



Prediction of the room temperature was available