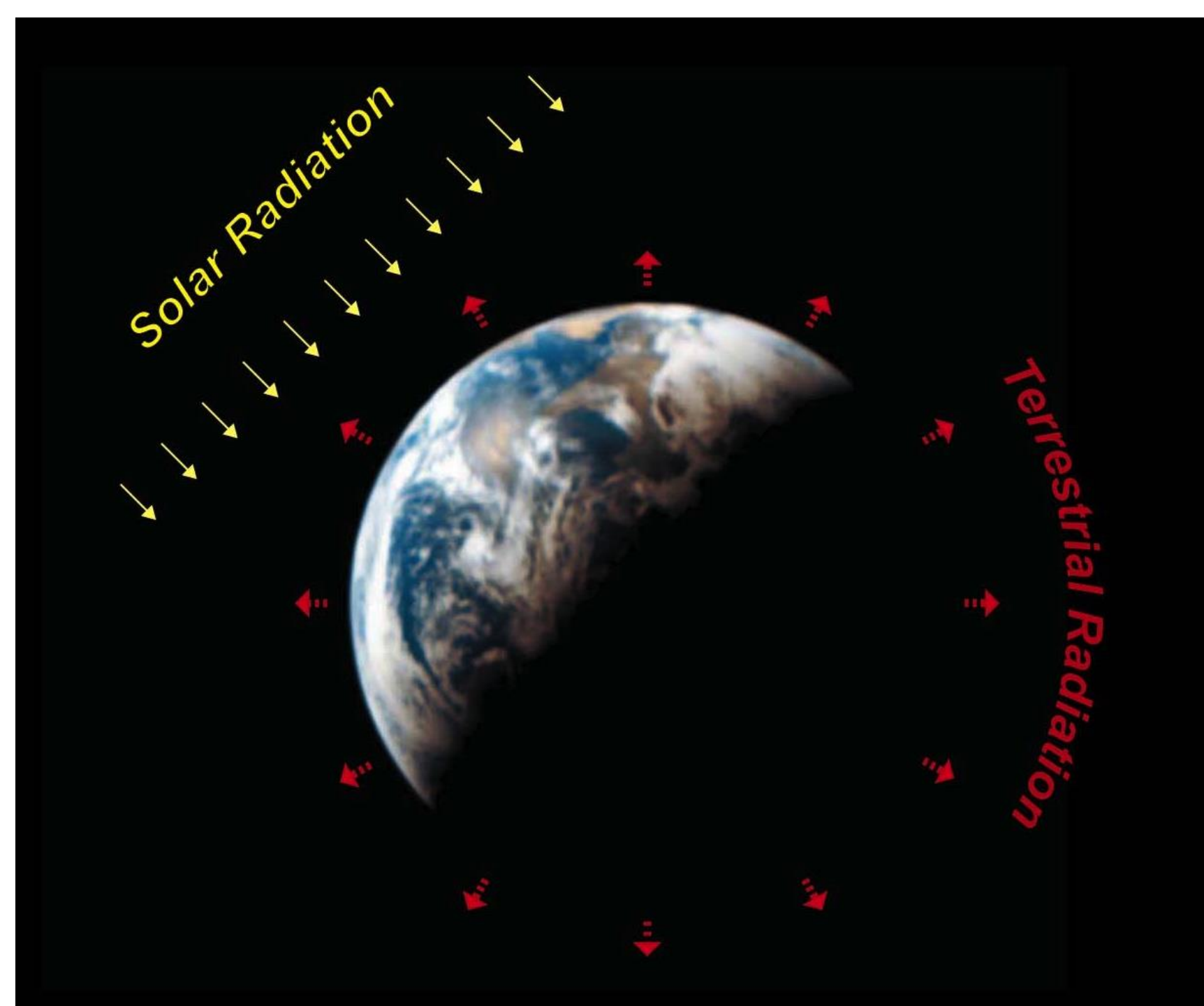
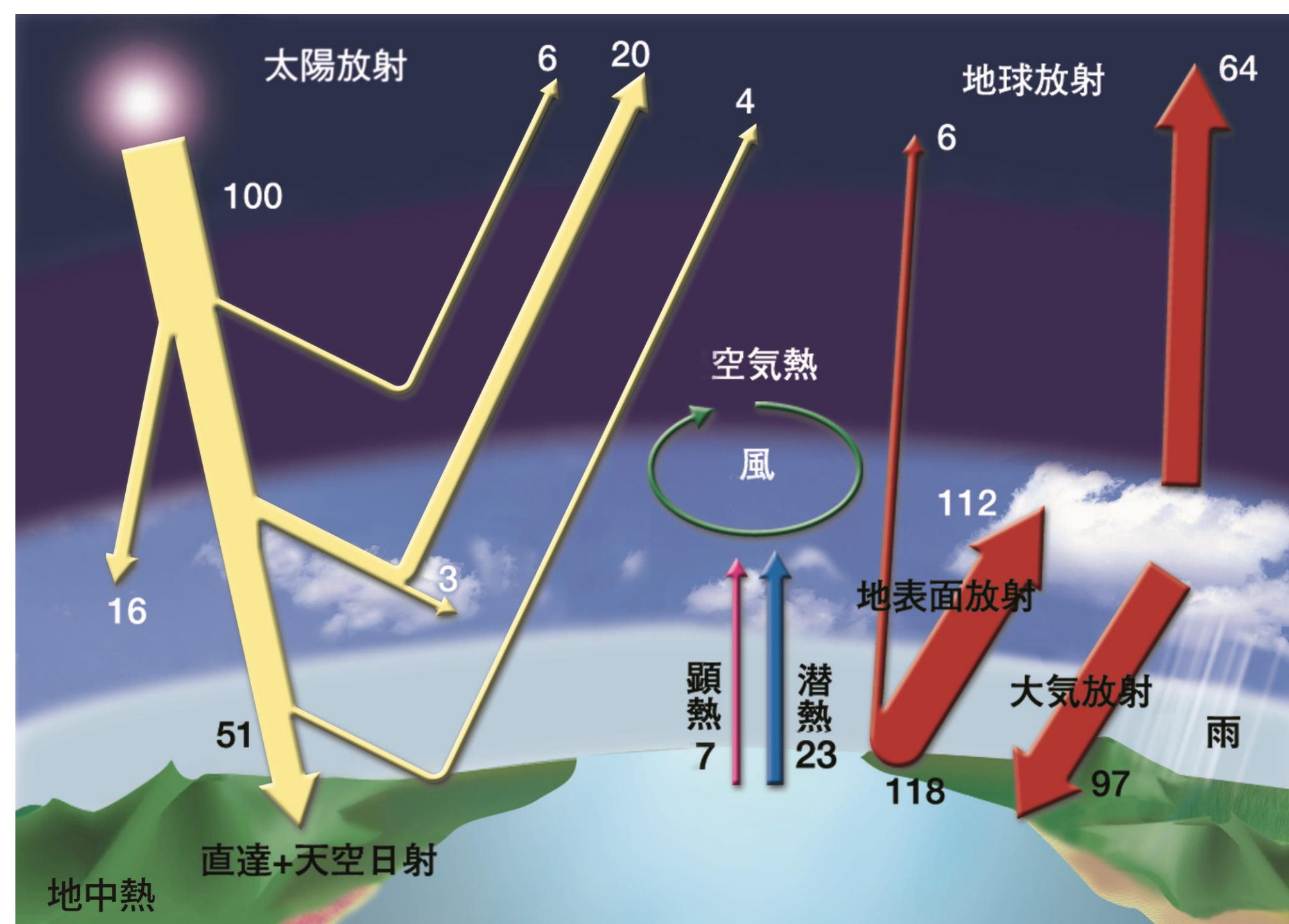


# Research and Development of Renewable Energy System for Building Thermal Utilization (NEDO)

## System Concept



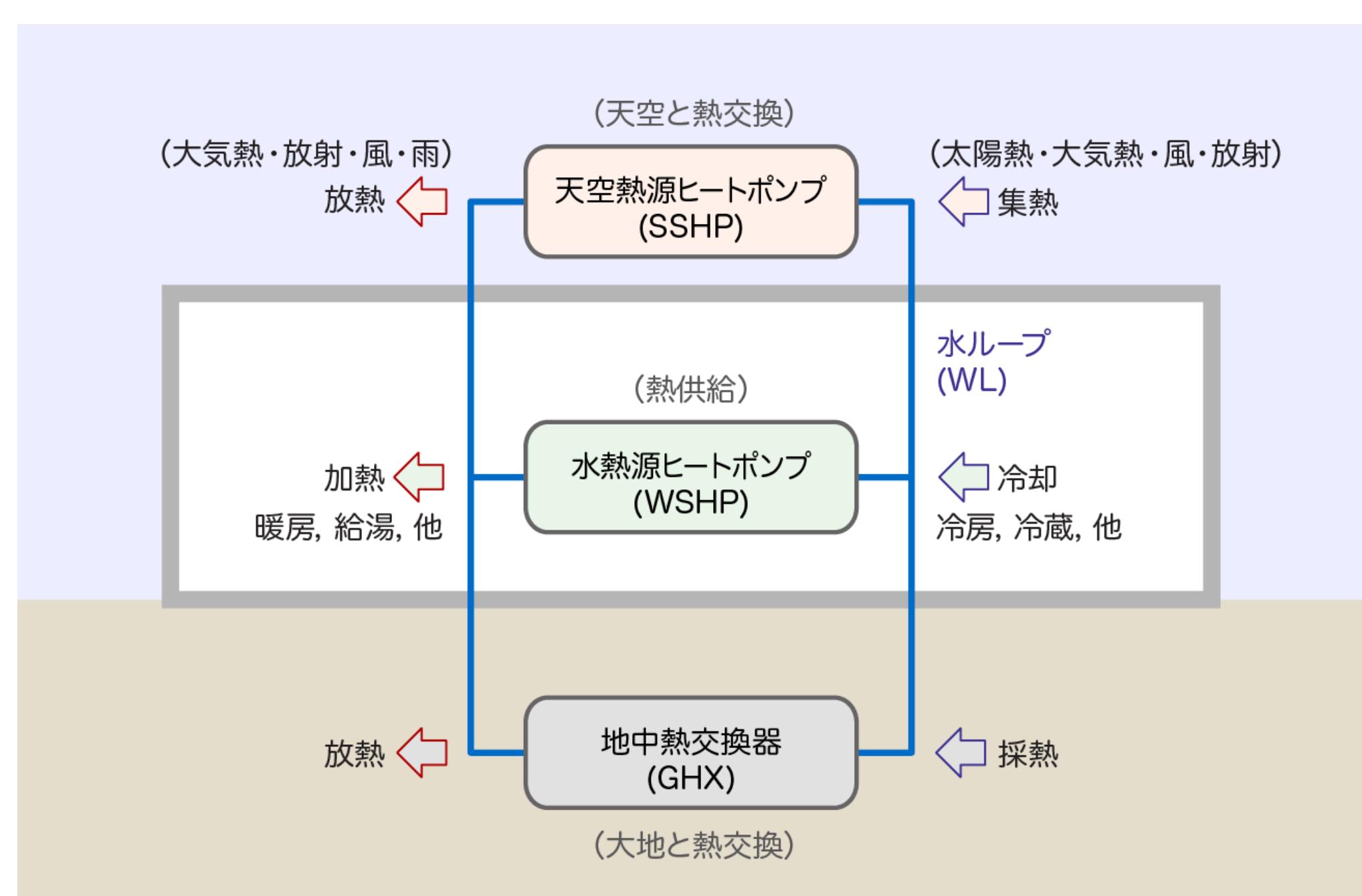
Solar radiation and terrestrial radiation are sole input and output of the Earth.



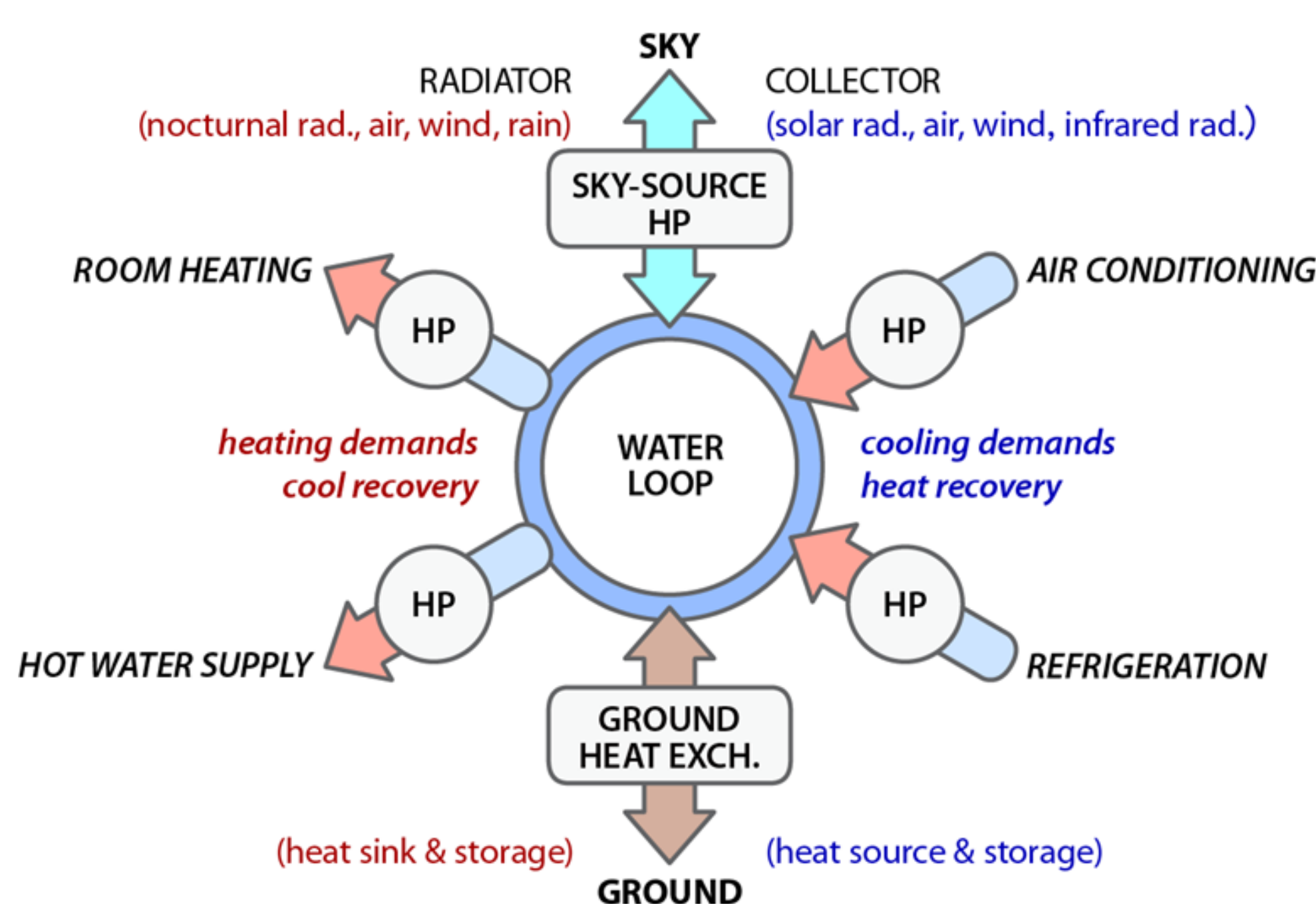
Both radiations cause energy flows in the atmosphere and generate various kinds of renewable energy.

Elements	Utilizations	Advantage & Fault
Solar Radiation	heat & power	↑ limitless ↓ intermittent
Nocturnal Radiation	heat dissipation	↓ effective at night
Outdoor Air	collection & dissipation	↑ handy ↓ inverse
Wind	heat transfer enhancement	↓ unstable
Rain Water	evaporative cooling	↓ unreliable ↑ sprinkle
Ground Heat	collection & dissipation	↑ stable ↓ not unlimited

Advantages and disadvantages of each renewable energy



Multiple-source and multiple-use system



Hot or cold rejected by heat pump is recovered, stored, and adjusted

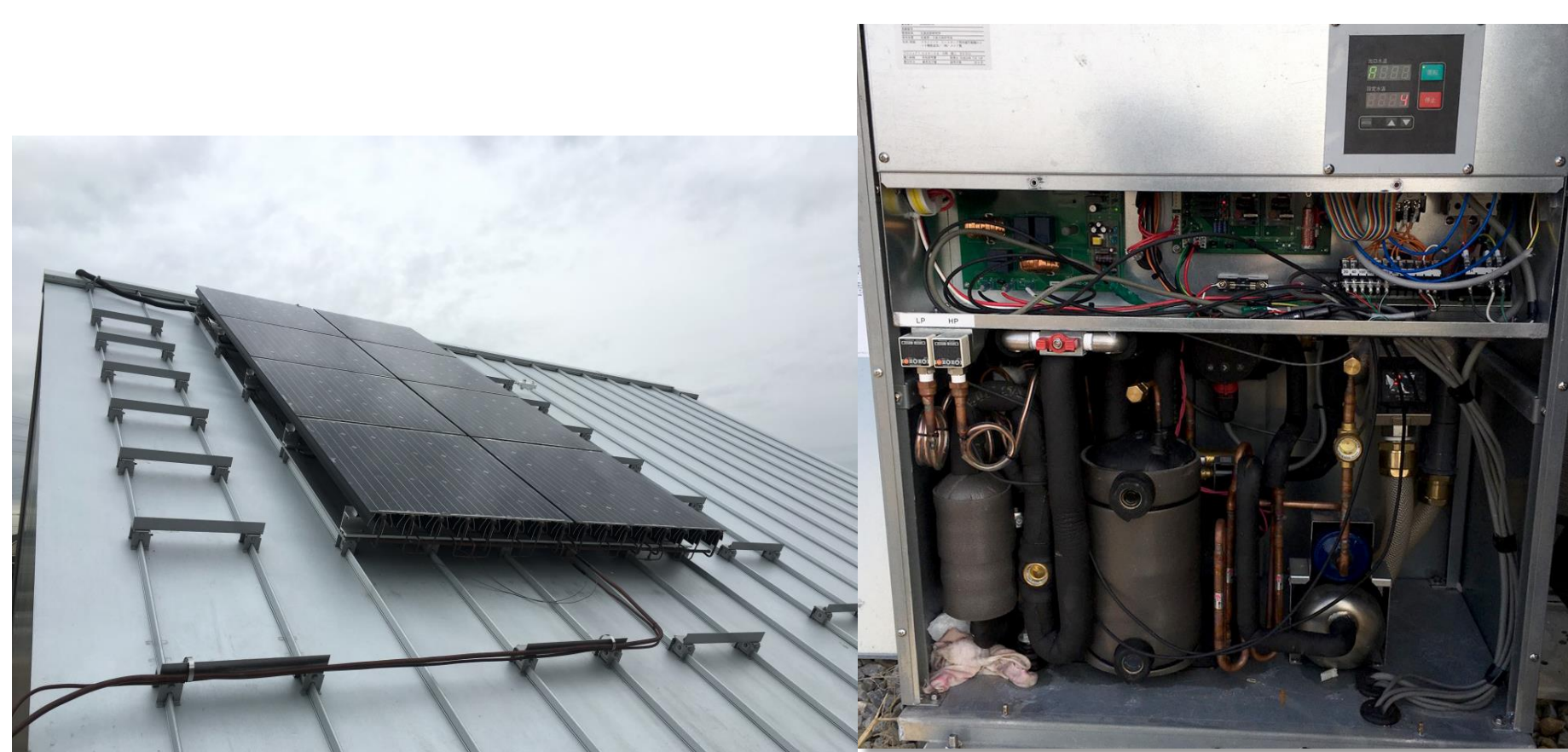
### Objective

- ◎ Global warming prevention
- ◎ Energy saving and ZEB
- ◎ Demand response
- ◎ Cheap running cost
- ◎ Long-term durability
- ◎ Comfortable indoor environment
- ◎ Regional revitalization

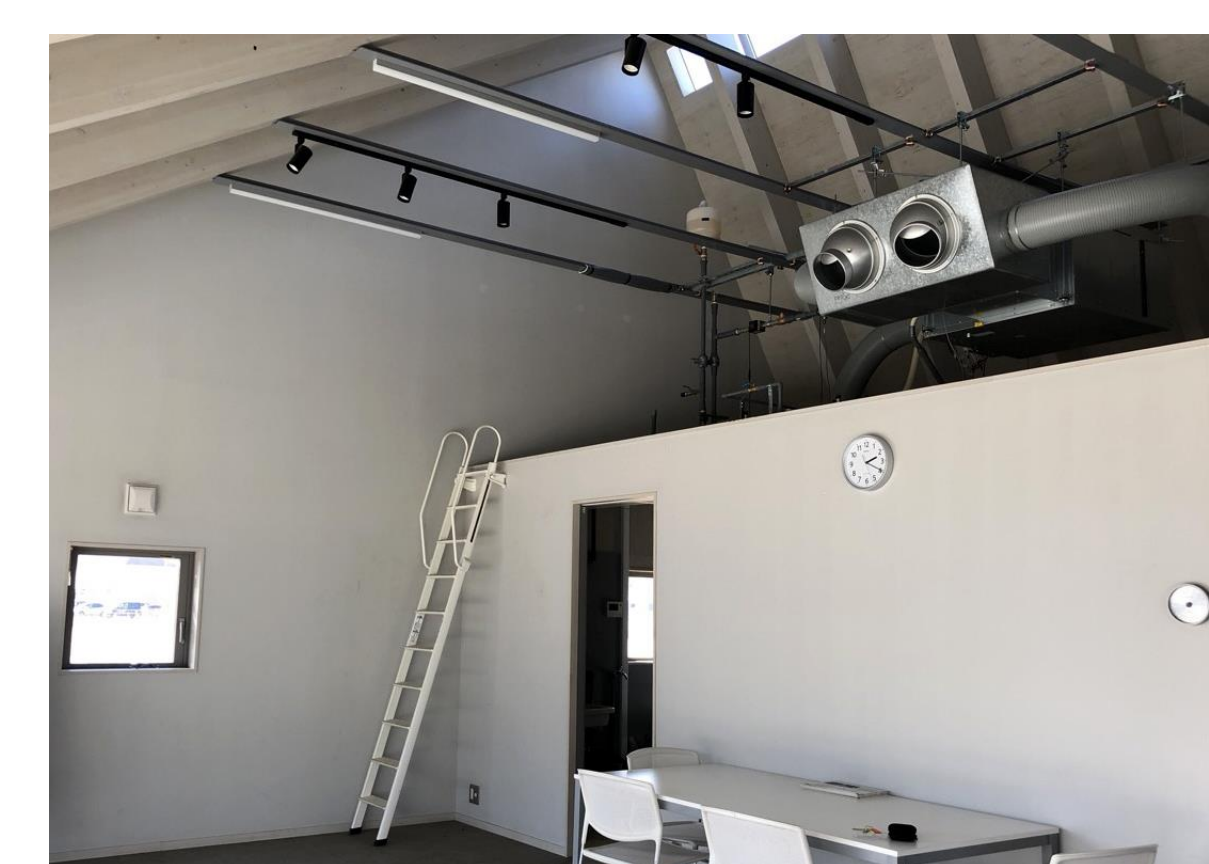
## Technology Development



Test Facility (RE House)



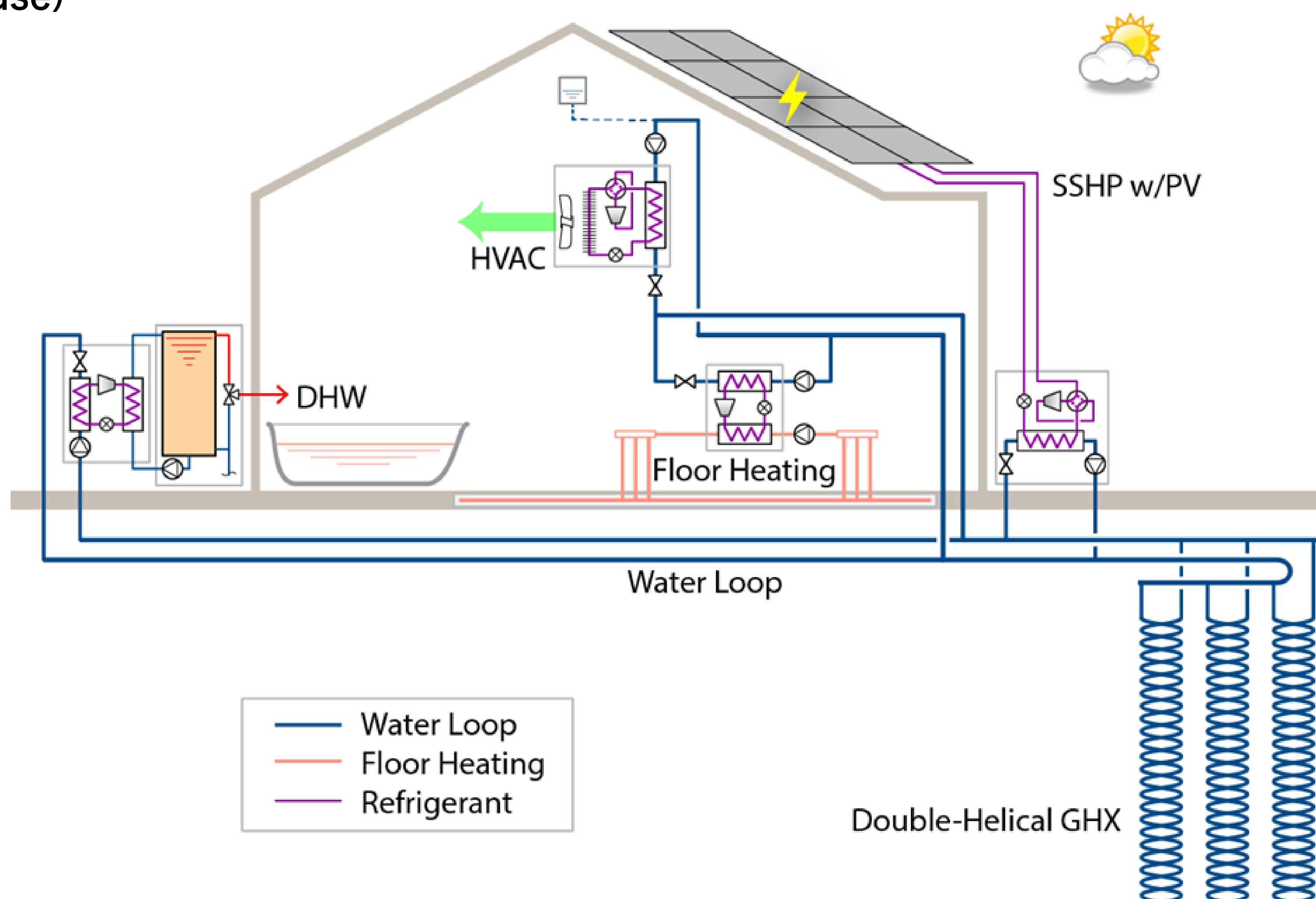
Outdoor panel and trail compressor



Interior air-conditioning

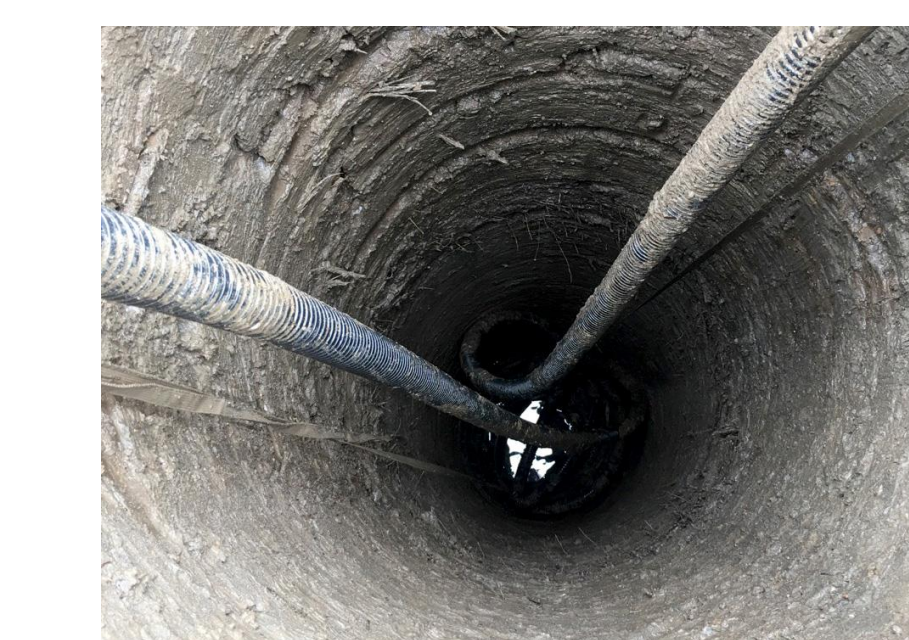


Domestic hot water experiment

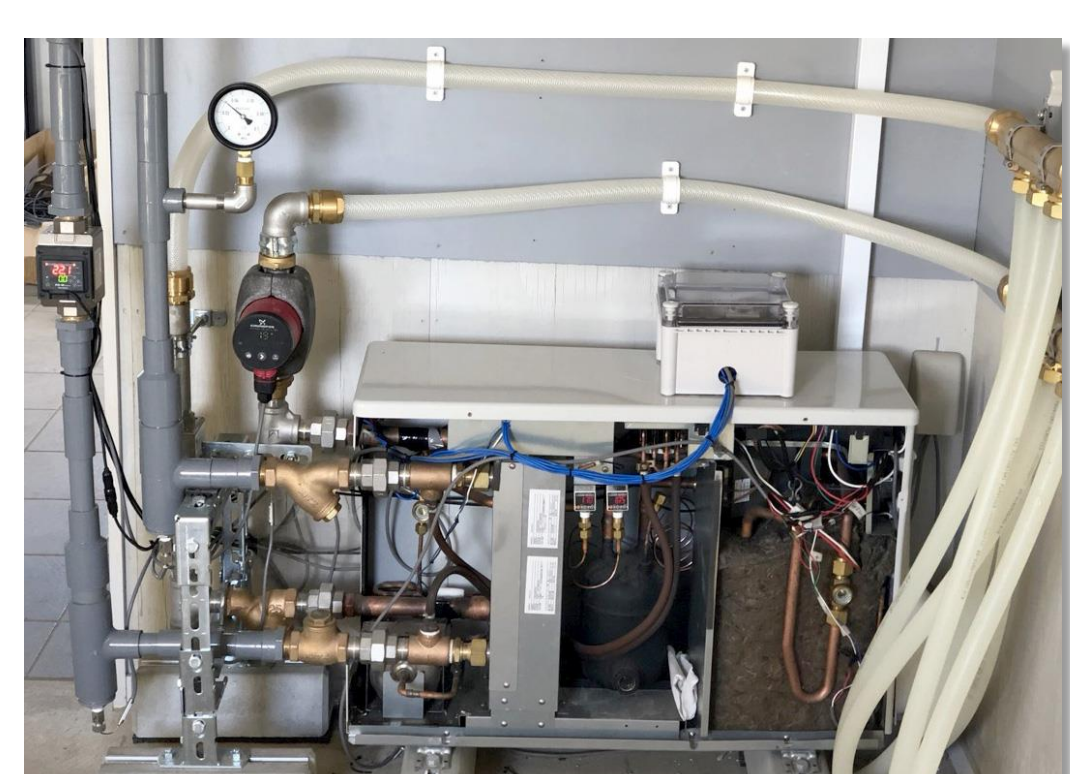


— Water Loop  
— Floor Heating  
— Refrigerant

Double-Helical GHX



Ground heat exchanger



Floor heating heat pump