

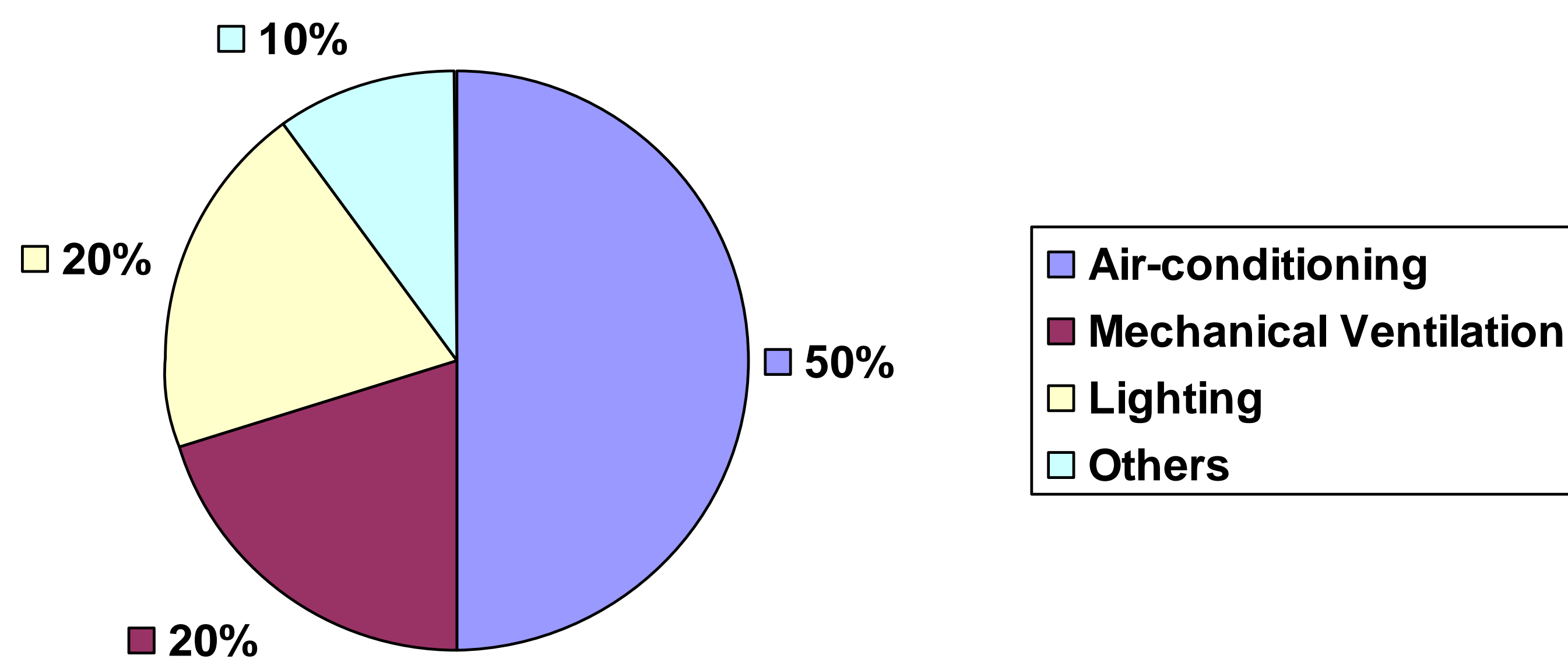
Energy Efficient HVAC Processes and Control

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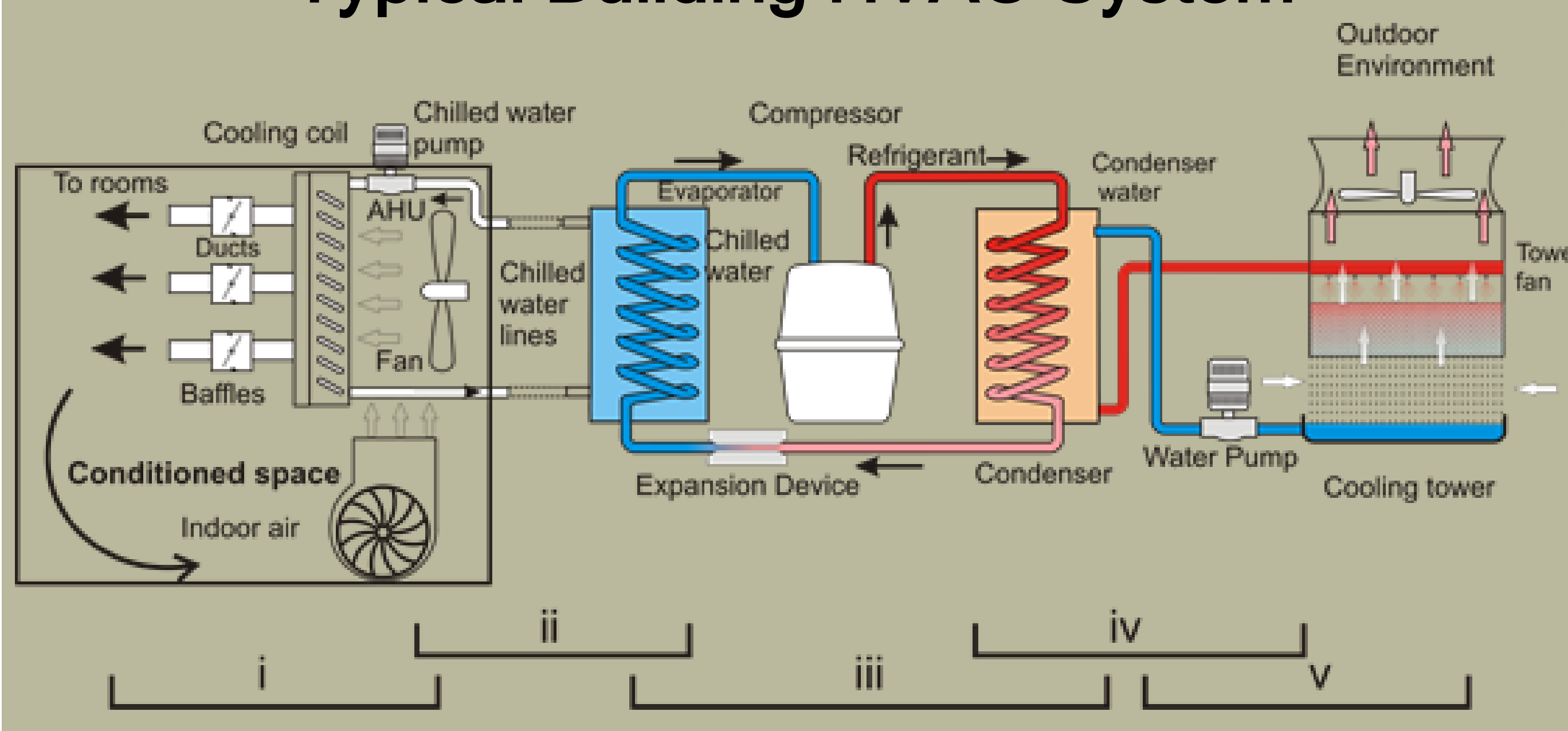


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Building Energy Consumption

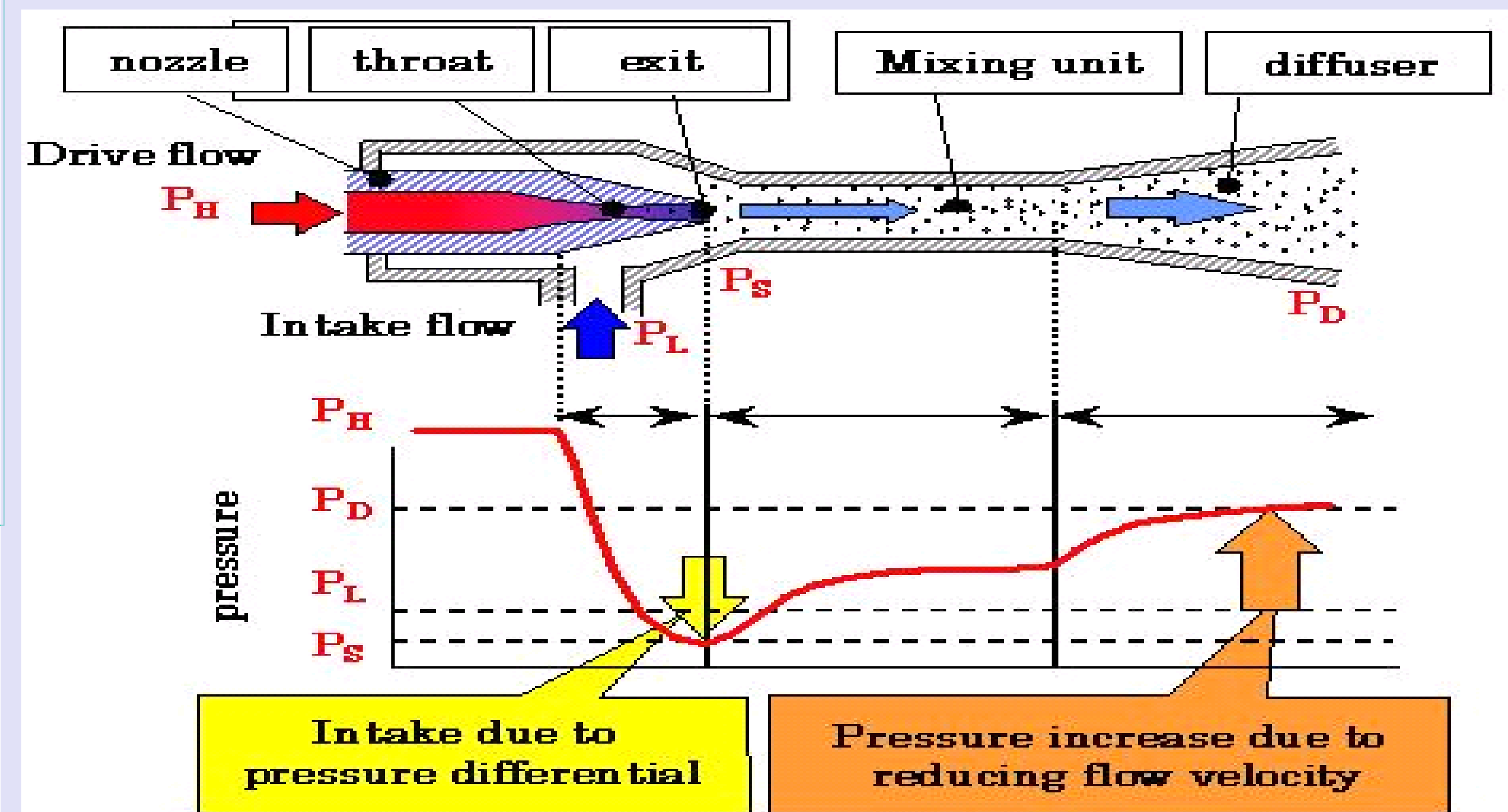


Typical Building HVAC System



Waste/Renewable Energy Assisted Cooling

Ejector air-conditioner use low energy heat (80-150°C) to generate cooling



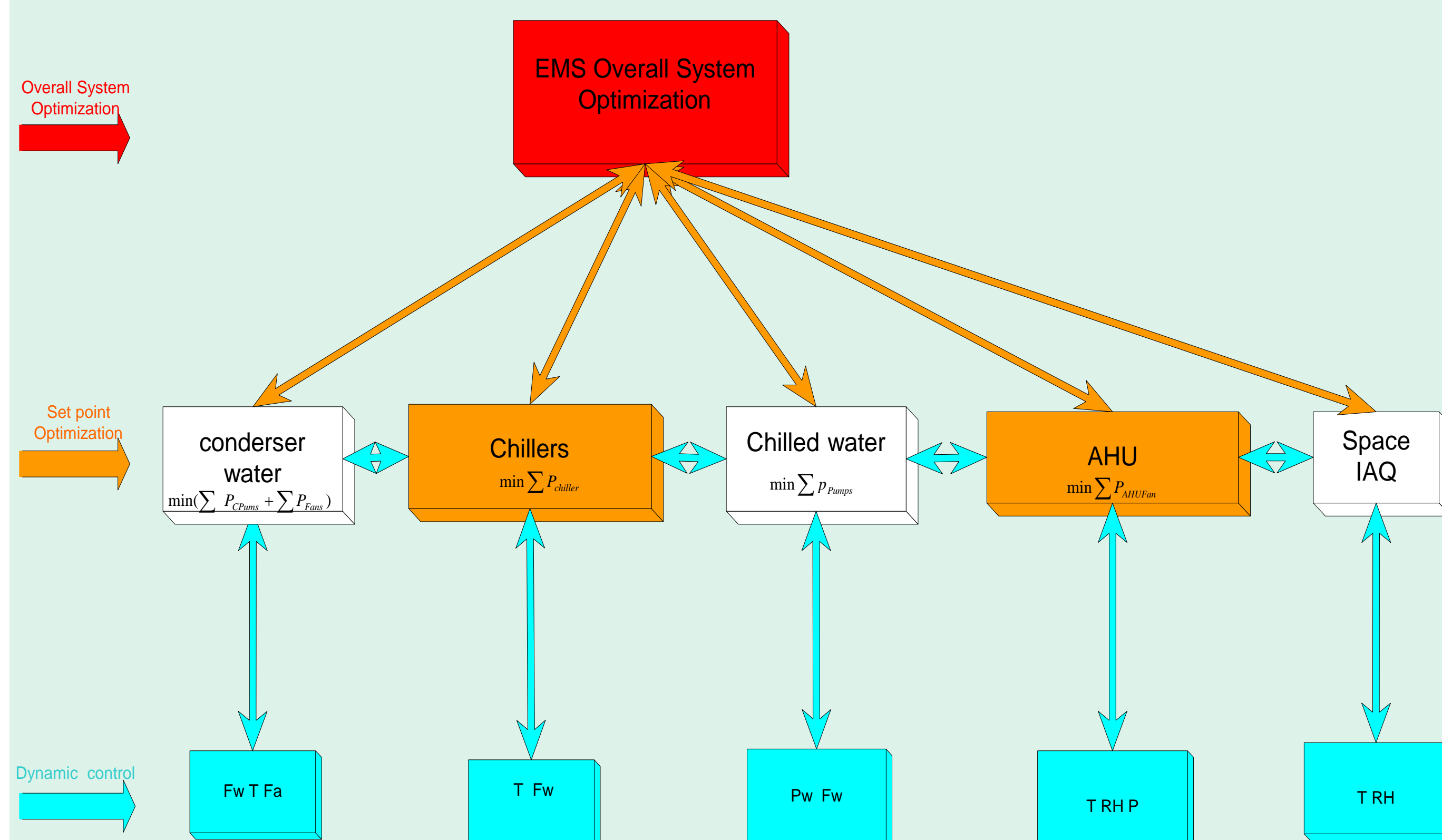
Novel Roof-mounted Solar Energy Assisted Double Cycle Refrigeration for Energy Efficient Building Air-conditioning Systems

Novelty: First real system built and tested

Deliverables: For the system to achieve 30% improvement on COP over conventional system.

EMOCS for Building HVAC Systems

HVAC System Optimization Structure

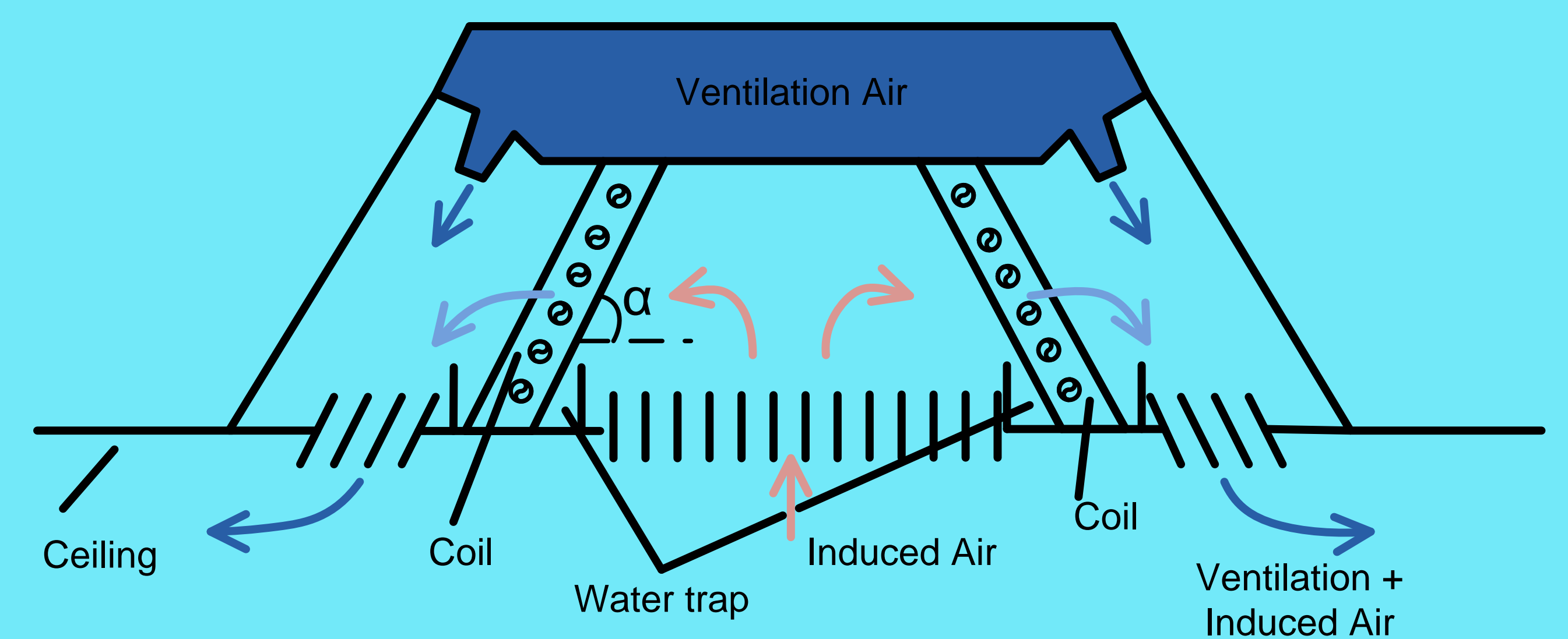


Cooperative Pressure Control

- The air pressure at each inlet of a room is influenced by others, so the individual PID controller is not efficient
- The problem can be considered as a network flow control problem
- Cooperative control techniques are developed to achieve faster response for each local cooling space and better energy efficiency

ACB Based HVAC Systems

Active Chilled Beam can achieve 25%–30% energy savings in cooling compared with VAV systems widely adopted in Singapore.



Chiller Waste Heat Based Liquid Desiccant Dehumidification System

Needs for Dehumidification:

- Lower humidity levels in occupied spaces
- Reduced condensation on cooling coils, drain pans and duct work

Recover the waste heat from compressor for regeneration

Using the waste heat from compressor to heat exhaust air for regeneration