

Heating System Selection

Why do we need to heat buildings?

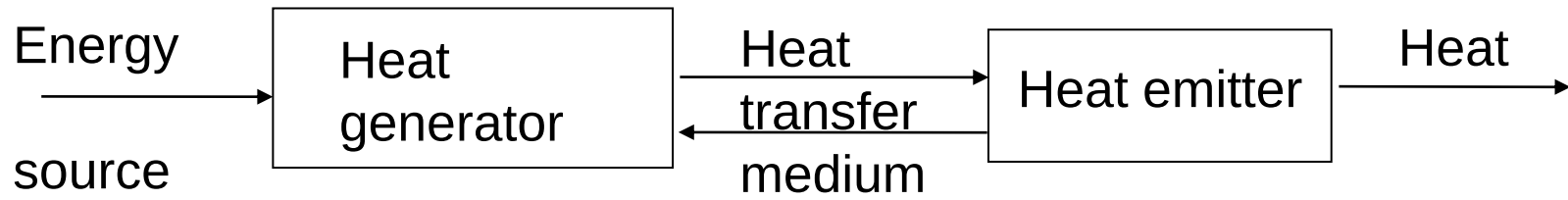
Ultimately within domestic and commercial buildings to maintain thermal comfort conditions for building Occupants.

To maintain any given temperature we need to compensate for heat losses from:

- the building fabric
- Infiltration/ventilation

Selection Criteria

- Cost, availability and CO₂ intensity of fuels
- Building size and use
- Available space/integration
- Capital and operating costs



Energy Transfer Media

- Air
 - specific heat capacity 1.012 kJ/kg/K
 - density 1.205 kg/m³
- Water
 - specific heat capacity 4.186 kJ/kg/K
 - density 1000 kg/m³
- Steam
 - refer to steam tables for particular cond.*
- *Any others?*

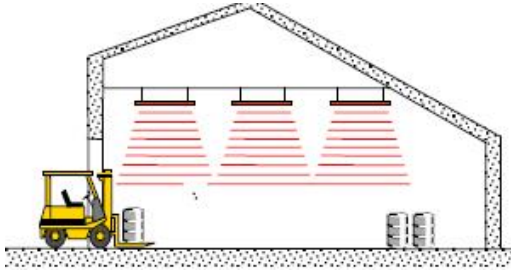
Categories of Heating

- Mainly Radiant
- Mainly Convective

Radiant Heating Types

- Infrared Halogen Plaques
- Infrared Gas-fired Plaques
- Gas-fired Radiant Tubes
- Steam/MTHW Tubes
- LTHW Ceiling Panels
- Underfloor Heating

Radiant Heating Examples



Individual gas-fired radiant-tube heaters in a postal depot. These heaters are linked to external flues. (Picture courtesy of Ambirad Ltd.)



Source: BSRIA Illustrated Guide to Mechanical Services

Source: National Coal Museum

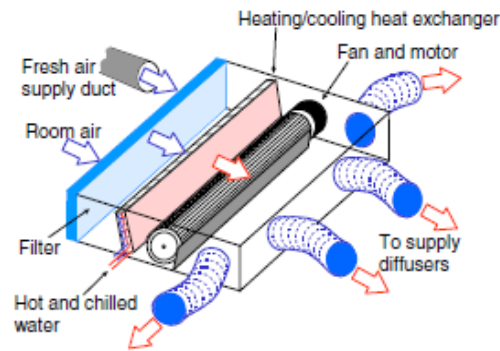
Convective Heating Types

- Gas/oil fired unit air heaters
- Fan convector heaters
- Fan Coil units
- Heat pumps splits)
- Air handling unit
- Direct fired air handling unit
- Radiators (*also radiant heat*)

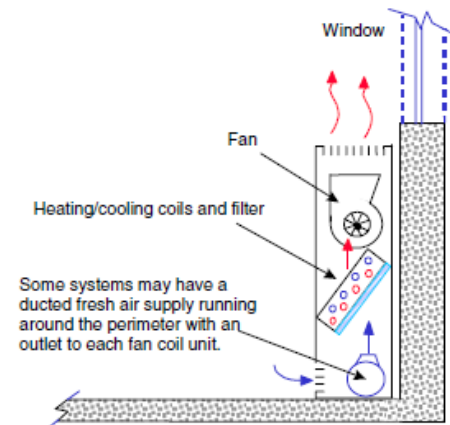
Convective Heating Examples



Free-standing warm air unit heater with a flue. (Picture courtesy of Powrmatic Ltd.)

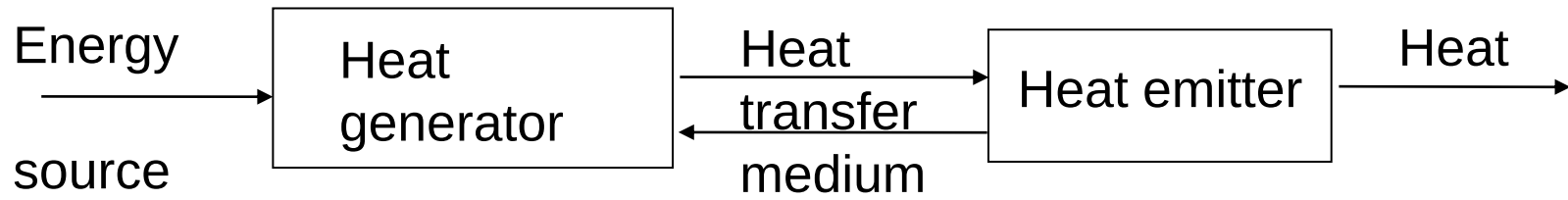


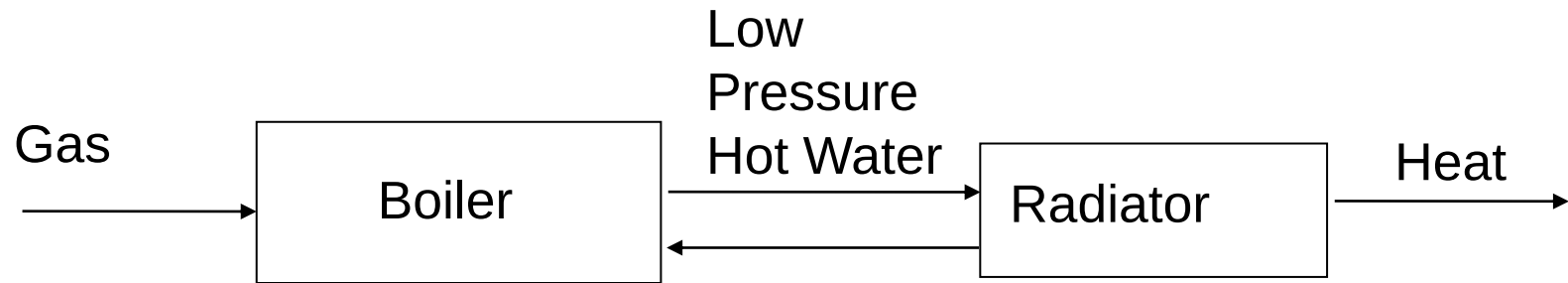
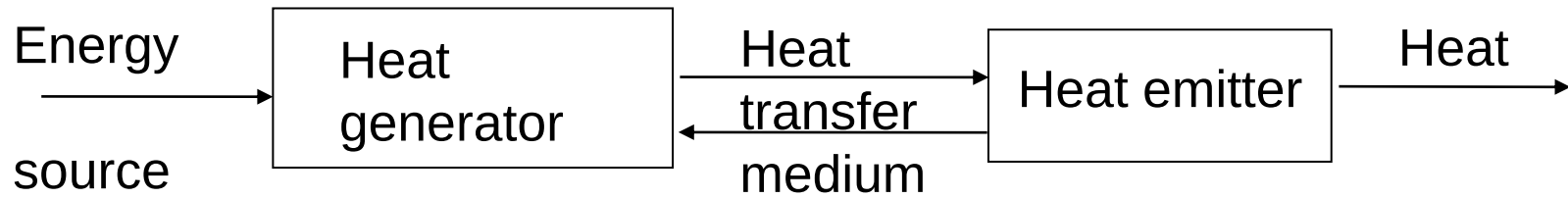
Basic configuration of a high-level fan-coil unit. Several air supply spigots are typically provided, enabling good flexibility regarding the routing and number of supply diffusers that can be connected to the unit.

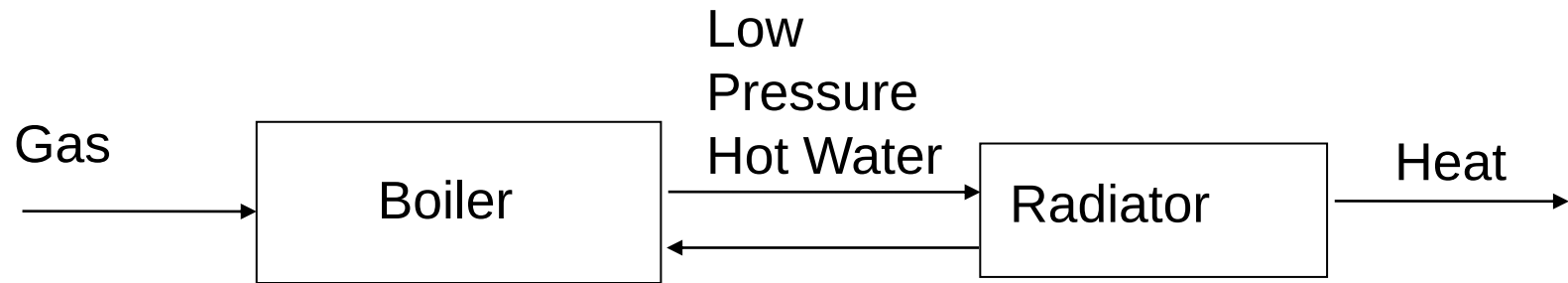
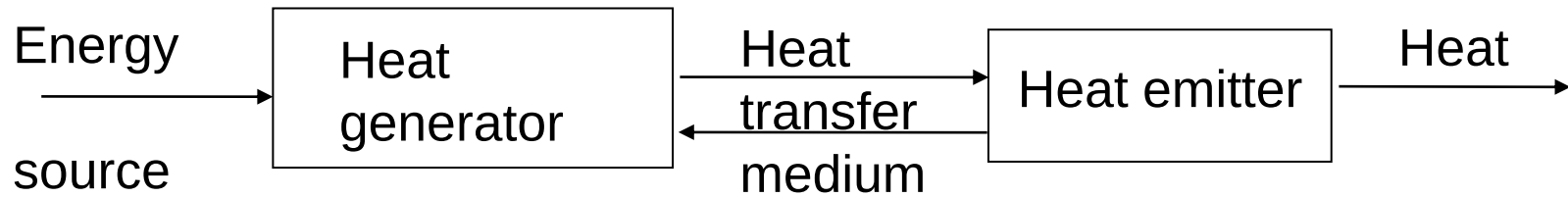


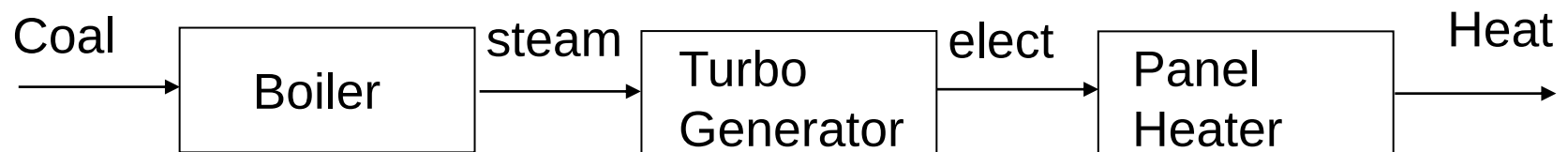
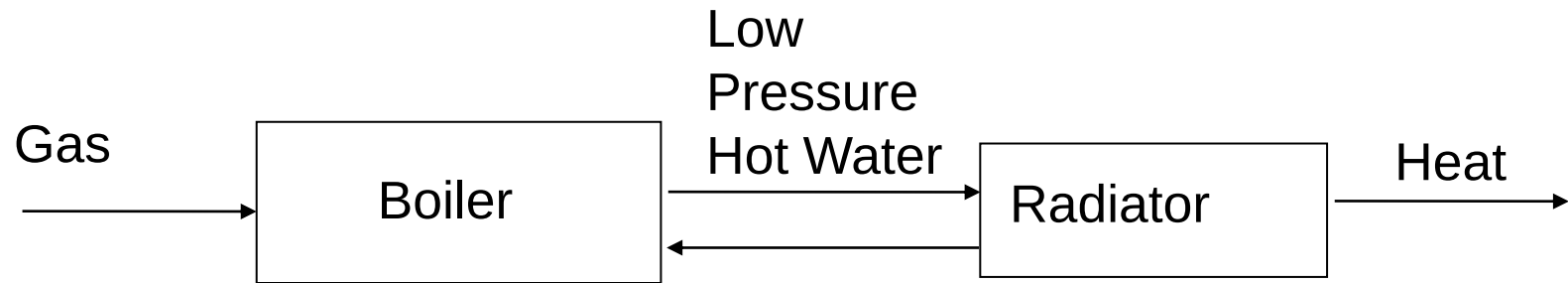
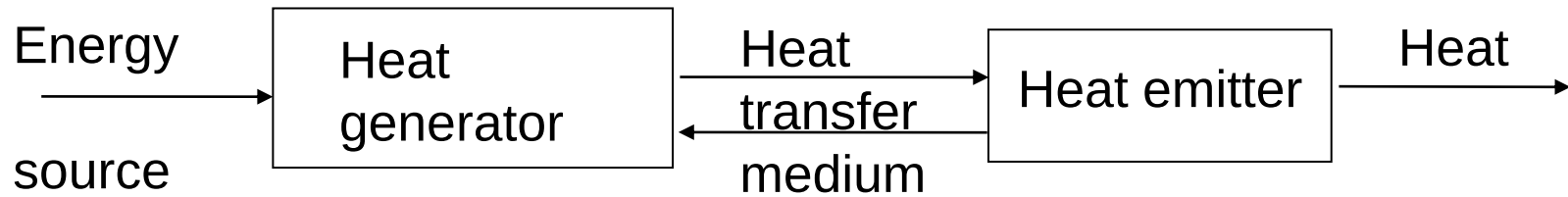
Basic configuration of a perimeter fan-coil unit.

Source: BSRIA Illustrated Guide to Mechanical Services









Energy Source		Transfer Media		Heat Emitter	
Gas	*	* LPHW	*	* Radiators	
Oil	*	* HPHW	*	* Convectors	
Coal	*	* Steam	*	* Fan Convectors	
Solar	*	* Air	*	* Radiant Panels	
Wind	*	* Refrigerant	*	* Embedded Pipes	
Tidal	*	* Electricity	*	* Embedded Panels	
Geothermal	*			* Unit Heaters	
Hydro	*			* Air Heaters	
Biomass	*				
Nuclear	*				

Church

- High Ceiling
- Short Hours of Occupancy
- High Air Leakage

Nursery School

- Average Ceiling Height
- Long Hours of Occupancy
- Average Air Leakage

Swimming Pool

- High Ceiling
- Long Hours of Occupancy
- Average Air Leakage

High Bay Warehouse

- High Ceiling
- Long Hours of Occupancy
- High Air Leakage

Village Hall

- Average Ceiling Height
- Used for Sports Activities
some Evenings, Social
Events at Weekends
- High Air Leakage

Iron Works Museum

- Average Ceiling Height
- Transient occupants
- Average Air Leakage

Further Reading

- BSRIA – The Illustrated Guide to Mechanical Building Services