

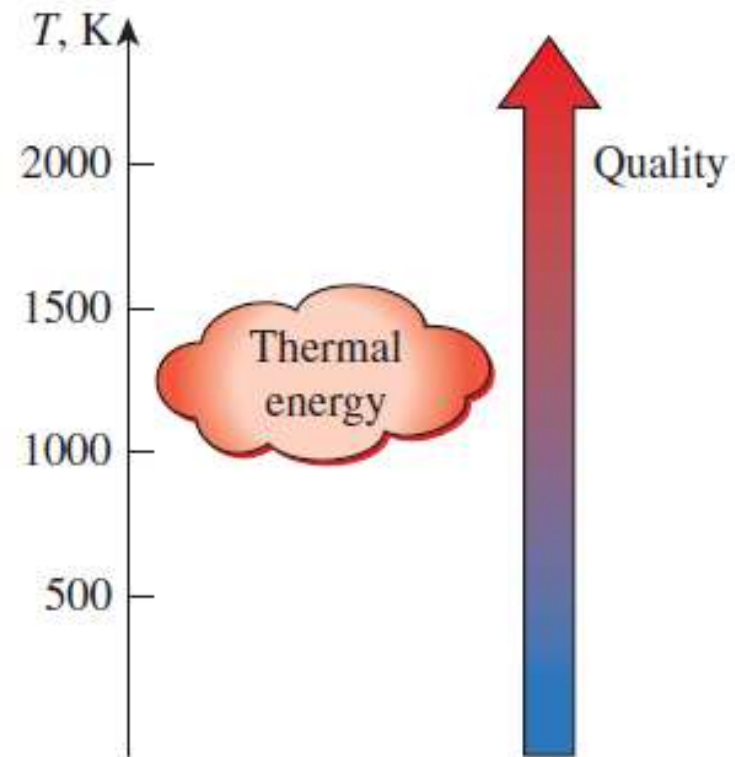
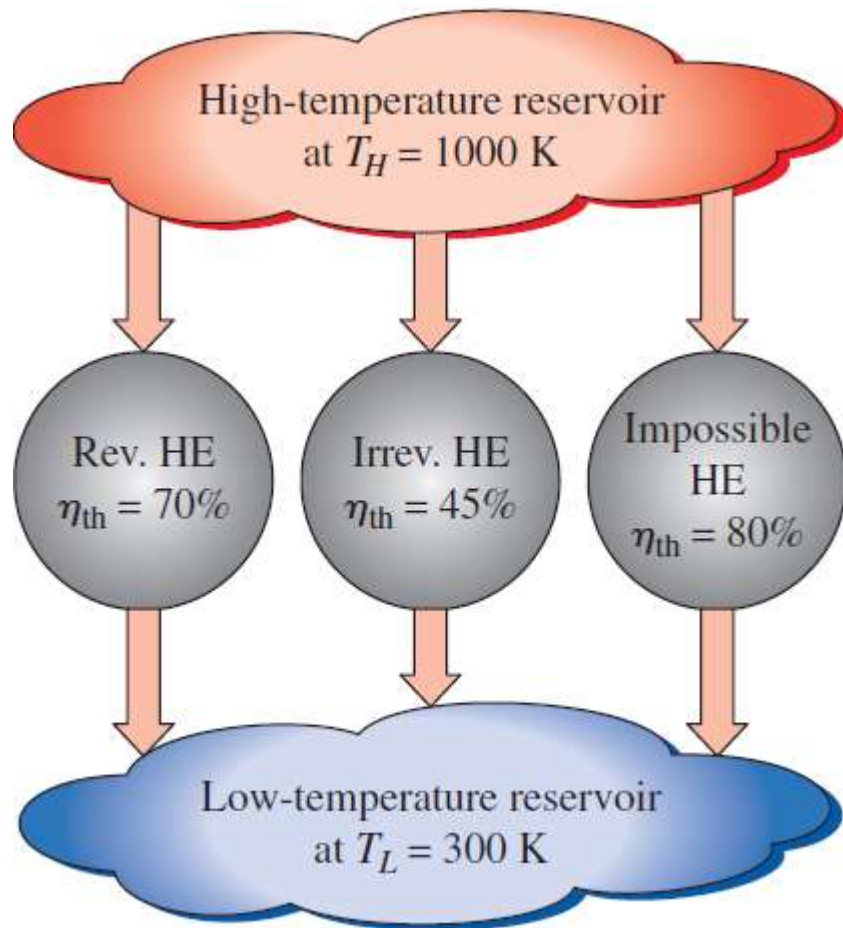
Carnot Refrigerator & Heat Pump

Raj Pala,

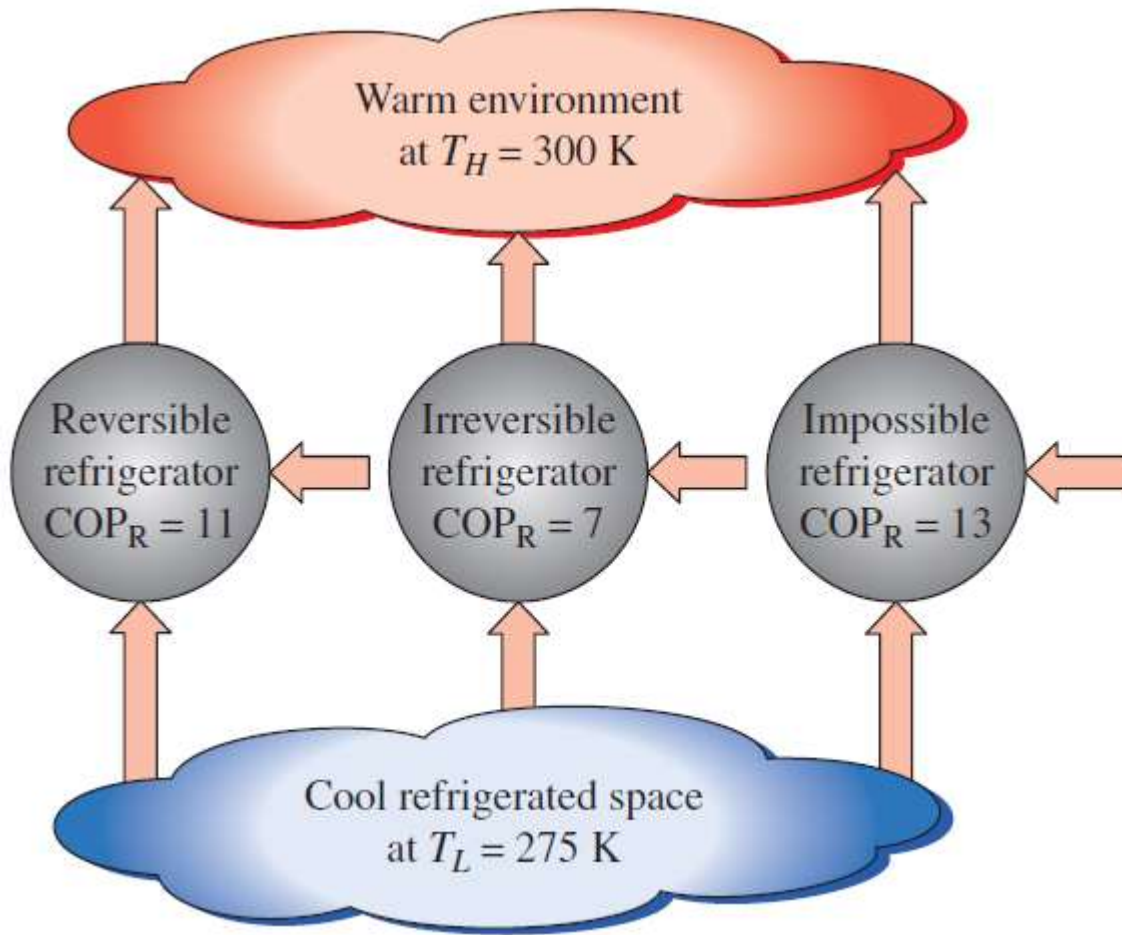
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Previous lecture: Carnot heat engine & Quality



Carnot Refrigerator & Heat Pump



$$\text{COP}_R = \frac{1}{Q_H/Q_L - 1}$$

$$\text{COP}_{\text{HP}} = \frac{1}{1 - Q_L/Q_H}$$

$$\text{COP}_{R,\text{rev}} = \frac{1}{T_H/T_L - 1}$$

$$\text{COP}_{\text{HP},\text{rev}} = \frac{1}{1 - T_L/T_H}$$

$$\text{COP}_R \begin{cases} < \text{COP}_{R,\text{rev}} \\ = \text{COP}_{R,\text{rev}} \\ > \text{COP}_{R,\text{rev}} \end{cases}$$

irreversible refrigerator

reversible refrigerator

impossible refrigerator

What's next?

- Entropy!