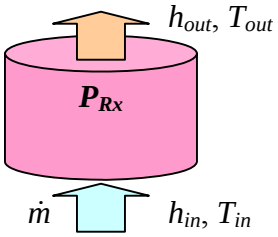
POWER GENERATION

Heat Transfer from Reactor to Coolant

$$P_{Rx} = \dot{m}\,(h_{rx-out} - h_{rx-in})$$
$$= \dot{m}\,c_p\,(T_{cool-out} - T_{cool-in}) = \dot{m}\,c_p\,\Delta T \qquad [PWRs\ only!]$$



Mass Flow Rate

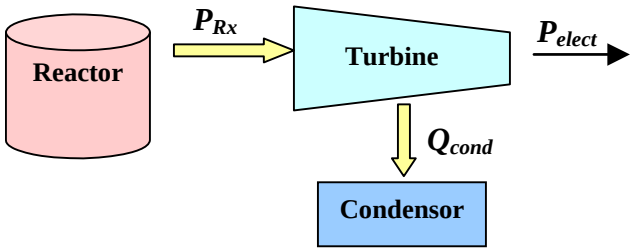
$$\dot{m} = \rho_{cool}\ A_{flow}\ v_{cool}$$

Thermal Efficiency (η_{th})

$$\eta_{th} = \frac{P_{elect}\ \ [MWe]}{P_{Rx}\ \ [MWt]} = 1 - \frac{Q_{cond}}{P_{Rx}}$$

Condenser (Waste) Heat Rejection

$$Q_{cond} = P_{Rx}\,(1-\eta_{th}) = P_{elect}\left(\frac{1}{\eta_{th}} - 1\right)$$



Capacity Factor (CF)

$$CF = \frac{Total\ energy\ generated\ over\ time\ period}{(Plant\ rating)\,(Time\ period)} = \frac{\int_0^T P_e(t)\,dt}{P_{e,\max}\ T}$$

Availability Factor ($AF \geq CF$)

$$AF = \frac{Integrated\ electrical\ energy\ output\ capacity}{Total\ rated\ energy\ capacity\ \ for\ \ period}$$