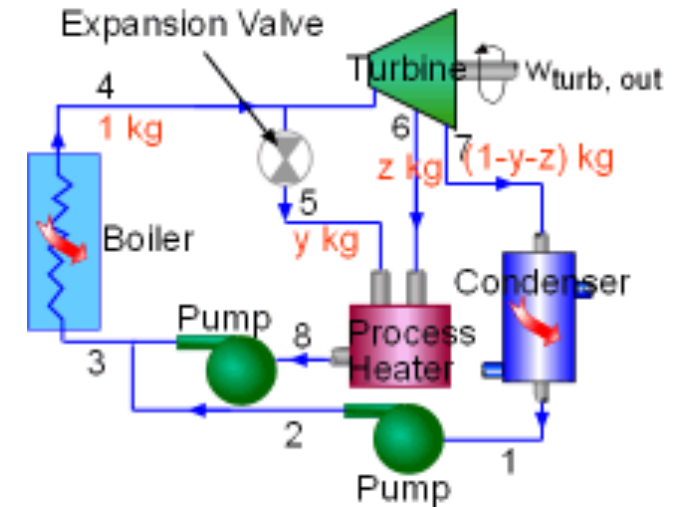


Process heater (cogeneration)

- Some industries need simultaneously various forms of energy. For example :
 - Electricity
 - Heat (to heat water, or a building, etc)
- A cogeneration plant allows to provide both forms thanks to a turbine that provides electricity and a process heater that provides heat
- Depending on the demand on electricity or heat,
 - (1) some steam is extracted to the turbine and then the condenser (1-y-z)
 - (2) some steam is extracted from the turbine to the process heater (z)
 - (3) remaining steam goes to the process heater (y)
- A cogeneration plant efficiency is given thanks to the utilisation factor $\epsilon_u = \frac{\dot{W}_{net} + \dot{Q}_{ph}}{\dot{Q}_{in}}$



Process Heater

- Fluid leaves the process heater as a saturated liquid (X=0)
- Energy extracted by process heater : energy conservation equation

$$\dot{E}_{in} = \dot{E}_{out} \quad \dot{Q}_{ph} = \dot{m}_3 h_3 - (\dot{m}_1 h_1 + \dot{m}_2 h_2)$$

