

- Nu: Oljepanna, EOT, $\eta_p = 87\%$, Ånga 20 ton/h, 16 bar, 200°C
Kondensat, 120°C, mättad

$$t_{\text{drift}} = 6500 \text{ h/år}$$

$$C_{EOT} = 271 \text{ kg/MWh bränsle}$$

- Efter: Kraftvärme, naturgas, $\eta_{\text{Tot}} = 82\%$, $\alpha = 0.65 \frac{\text{MWh el}}{\text{MWh värme}}$

$$C_{NG} = 203 \text{ kg/MWh bränsle}$$

- Referensel kol kondens, $\eta_{el} = 42\%$, $\eta_{\text{distr}} = 96\%$

$$C_{kol} = 327 \text{ kg/MWh bränsle}$$

$$\dot{Q}_{\text{ånga}} = \dot{m}_{\text{ånga}} (h_{200^\circ\text{C}, 16 \text{ bar}} - h_{120^\circ\text{C}, \text{mättad}}) = \frac{20000}{3600} (2828 - 503,8) = 12,91 \text{ MW värme}$$

Panna

$$C_{\text{panna}} = \frac{C_{EOT}}{\eta_{\text{panna}}} = \frac{271}{0,87} = 311 \text{ kg CO}_2/\text{MWh bränsle}$$

Kraftvärme

$$C_{\text{onsite}} = C_{NG} \left(\frac{1 + \alpha}{\eta_T} \right) = 203 \left(\frac{1 + 0,65}{0,82} \right) =$$

Referensel

$$C_{\text{offsite}} = \frac{\alpha}{\eta_{\text{distr}} \eta_{el}} \cdot C_{kol}$$

$$\Rightarrow C_{\text{CHP}} = C_{\text{onsite}} - C_{\text{offsite}} = -119 \text{ kg CO}_2/\text{MWh värme}$$

$$\therefore \Delta C = C_{\text{panna}} - C_{\text{CHP}} = 311 - (-119) = 430 \text{ kg/MWh värme}$$

$$\Delta C_1 = \Delta C \cdot \dot{Q}_{\text{ånga}} \cdot t_{\text{drift}} = 36,1 \text{ kton CO}_2/\text{år}$$