



2) TE RADI 3 SATI PUKOTI SKAGON (100 MW MIKIPUNA + 300 MW OSTATKA)

$$b) W_v = 100 \cdot 19 + 200 \cdot 17 + 300 \cdot 13 + 100 \cdot 9 + 100 \cdot 7 + 100 \cdot 3 = 11100 \text{ MW}$$

$$T_v = 19 \text{ h}$$

$$P_v = P_{\text{max}} - P_{\text{min}} = 1500 - 600 = 900 \text{ MW}$$

$$L = 1,2\beta$$

$$L + \beta = \frac{2W_v}{T_v \cdot P_v} \Rightarrow L + \frac{L}{1,2} = \frac{2 \cdot 11100}{19 \cdot 900} \Rightarrow L = 0,708$$

$$D = 80 \text{ m} \Rightarrow R = 40 \text{ m}$$

$$P_N = 1,5 \text{ MW}$$

$$\lambda_g = 0,4 \text{ t} ; c_{pg} = 0,444 ; v = 8 \text{ m/s}$$

$$\lambda_N = 0,13 \text{ t} ; v_N = 11 \text{ m/s}$$

$$\rho = 1,225 \text{ kg/m}^3 ; \eta = 0,96$$

$$d) \quad m = \frac{W_{\text{uk}}}{8760 \cdot P_N}$$

$$P_g = \frac{1}{2} \cdot c_{pg} \cdot \rho \cdot A \cdot v^3 = \frac{1}{2} \cdot 0,444 \cdot 1,225 \cdot 40^2 \cdot \pi \cdot 8^3 = 693534 \text{ W}$$

$$W_{\text{uk}} = \eta \cdot (P_N \cdot \lambda_N + P_g \cdot \lambda_g) = 0,96 (1,5 \cdot 10^6 \cdot 0,13 \cdot 8760 + 693534 \cdot 0,4 \cdot 8760)$$

$$= 3993 \cdot 10^6 \text{ Wh}$$

$$m = \frac{3993 \cdot 10^6}{8760 \cdot 1,5 \cdot 10^6} = 0,304$$

$$2) \quad c_{PEM} = \frac{2 \cdot P_N}{\rho \cdot A \cdot v_N^3} = \frac{2 \cdot 1,5 \cdot 10^6}{1,225 \cdot 40^2 \cdot \pi \cdot 11^3} = 0,366$$

$$c_{PE15} = \frac{2 \cdot P_N}{\rho \cdot A \cdot v^3} = \frac{2 \cdot 1,5 \cdot 10^6}{1,225 \cdot 40^2 \cdot \pi \cdot 15^3} = 0,194$$



$$\underline{A_{\text{povrsina}} = 5,5 \text{ km}^2}$$

a)  $P_N = 2 \text{ MW}$ ,  $v_N = 11 \text{ m/s}$ ,  $c_{pe} = 0,4$

$$m = 0,33$$

$$S = 1,225 \text{ kg/m}^3$$

$$\underline{A_{uk} = 20 \cdot A_{akt}}$$

$$m = \frac{W_{uk}}{8760 \cdot P_N} \Rightarrow W_{uk} = 8760 \cdot m \cdot P_N = 8760 \cdot 0,33 \cdot 2 \cdot 10^6 = 5,7816 \cdot 10^3 \text{ kWh}$$

$$P_N = \frac{1}{2} \cdot c_{pe} \cdot S \cdot A_{akt} \cdot v_N^3 \Rightarrow A_{akt} = \frac{2 \cdot P_N}{c_{pe} \cdot S \cdot v_N^3} = \frac{2 \cdot 2 \cdot 10^6}{0,4 \cdot 1,225 \cdot 11^3} = 6133 \text{ m}^2$$

⊗ JEDAN AGREGAT IMA POUKUPNO:  $A_{uk} = 20 \cdot A_{akt} = 20 \cdot 6133 = 122664 \text{ m}^2$

⊗ KOLIKO AGREGATA MOŽEHO STAVITI NA POUKUPNO OD  $5,5 \text{ km}^2$ :

$$N = \frac{A_{\text{povrsina}}}{A_{uk}} = \frac{5,5 \cdot 1000^2}{122664} = 44,84 \approx 44$$

⊗ KOLIKO ENERGIJE PROIZVEDE 44 AGREGATA:  $W' = 44 \cdot W_{uk} = 44 \cdot 5,7816 \cdot 10^3 \text{ kWh}$

$$W' = 2,544 \cdot 10^4 \text{ kWh}$$

⊗ UDILO ENERGIJE U U CIPLOM SUSTAVU HRVATSKE:

$$UDIO = \frac{W'}{W_{\text{ukv}}} = \frac{2,544 \cdot 10^4}{20 \cdot 10^{12}} = 0,00127 = 1,27\%$$

$$b) \eta_{\text{двигателя}} = 14\% = 0,14$$

$$H_{\text{ног}} = 1600 \text{ кккал/м}^2$$

$$\eta_{\text{двигателя}} = 0,85$$

$$\eta_{\text{поведения}} = 1,35$$

$$A_{\text{ок}} = 5 \cdot A_{\text{акт}}$$

$$W_{\text{год}} = H_{\text{ног}} \cdot \eta_{\text{двигателя}} = 1600 \cdot 10^3 \cdot 0,14 \cdot 0,85 \cdot 1,35 = 257\,040 \text{ ккал/м}^2$$

$$A_{\text{акт}} = \frac{A_{\text{размнож}}}{5} = \frac{5,5 \cdot 1000^2}{5} = 1,1 \cdot 1000^2 \text{ м}^2$$

$$W_{\text{леопард}} = W_{\text{год}} \cdot A_{\text{акт}} = 257\,040 \cdot 1,1 \cdot 1000^2 = 2,827 \cdot 10^{11} \text{ ккал}$$

$$UDIO = \frac{W_{OK}}{W_{HRV}} = \frac{2,827 \cdot 10^{11}}{20 \cdot 10^{12}} = 0,0141 = 1,41\%$$

c)  $H = 11 \text{ m}^2/\text{kg}$

$M = 15 \text{ t/h}$

$\eta = 0,33$

$$W_T = M \cdot H \cdot A'_{\text{izdvojeno}} = 11 \cdot 10^6 \frac{\text{J}}{\text{kg}} \cdot 15 \cdot \frac{1000 \text{ kg}}{10000 \text{ m}^2} \cdot 5,5 \cdot 1000^2 \text{ m}^2 = 3,075 \cdot 10^{13} \text{ J}$$

$$W_E = \eta \cdot W_T = 0,33 \cdot 3,075 \cdot 10^{13} = 2,99 \cdot 10^{13} \text{ J}$$

$$UDIO = \frac{W_E}{W_{HRV}} = \frac{2,99 \cdot 10^{13} \text{ J}}{20 \cdot 10^{12} \text{ W} \cdot 3600 \text{ s}} = 4,153 \cdot 10^{-4} = 0,042\%$$



(27.)

$$V = 130 \cdot 10^6 \text{ m}^3$$

$$W_E = 60 \text{ GWh} = 60 \cdot 10^9 \cdot 3600 \text{ Wh}$$

$$\eta_{\text{transm}} = 0,88 ; \eta_{\text{pump}} = 0,6$$

a)  $H_H = ?$

$$P_E = \eta_{\text{transm}} \cdot \rho \cdot g \cdot H_H \cdot Q ; P_E = \frac{W_E}{t} , Q = \frac{V}{t}$$

$$H_H = \frac{P_E}{\eta_{\text{transm}} \cdot \rho \cdot g \cdot Q} = \frac{\frac{W_E}{t}}{\eta_{\text{transm}} \cdot \rho \cdot g \cdot \frac{V}{t}} = \frac{60 \cdot 10^9 \cdot 3600}{0,88 \cdot 1000 \cdot 9,81 \cdot 130 \cdot 10^6} = 132,5 \text{ m}$$

b)  $W_{\text{pump}} = \frac{W_E}{\eta_{\text{transm}} \cdot \eta_{\text{pump}}} = \frac{60 \cdot 10^9 \cdot 3600}{0,88 \cdot 0,6} = 4,03 \cdot 10^{14} \text{ Wh}$

c)  $t = 1 \text{ DAN}$

$$W_{\text{ur}} = 0,3 \text{ GWh}$$

$$t_H = 7 \text{ h} , P_H = ?$$

$$m = \frac{t_H}{t} = \frac{7}{24} = 0,292$$

$$P_H = \frac{W_{\text{ur}}}{24 \cdot P_H} \Rightarrow P_H = \frac{W_{\text{ur}}}{24 \cdot m} = \frac{0,3 \cdot 10^9}{24 \cdot 0,292} = 42857143 \text{ W}$$

28.  $P_E = 220 \text{ MW}$

$\eta = 0,45$ ,  $m = 0,75$

$H = 25 \text{ MJ/kg}$

$w(C) = 0,67$  ;  $w(S) = 0,02$

a)  $m(\text{CO}_2) = ?$

$$m = \frac{W_E}{8760 \cdot P_E} \Rightarrow W_E = m \cdot 8760 \cdot P_E = 1,4454 \cdot 10^{12} \text{ Wh}$$

$$m_{\text{GROSS}} = \frac{W_E}{\eta \cdot H} = \frac{1,4454 \cdot 10^{12} \cdot 3600}{25 \cdot 10^6} = 208\,137\,600 \text{ kg}$$

$$m(\text{CO}_2) = m_{\text{GROSS}} \cdot w(C) \cdot \mu_{\text{CO}_2} = 208\,137\,600 \cdot 0,67 \cdot 3,667 = 511\,371\,188 \text{ kg}$$

b)  $m_{\text{DESUFGAS}} = 5000 \text{ t}$

$$m(\text{SO}_2) = m_{\text{GROSS}} \cdot w(S) \cdot \mu_{\text{SO}_2} = 208\,137\,600 \cdot 0,02 \cdot 2 = 8\,235\,504 \text{ kg}$$

$$\eta = \frac{m(\text{SO}_2) - m_{\text{DESUFGAS}}}{m(\text{SO}_2)} = \frac{8236 - 5000}{8236} = 0,393$$