

MSCI 261

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$$2. a) CTF = 1 - \frac{td(1+i/2)}{(i+d)(1+i)}$$

$$= 1 - \frac{(0.22)(0.20)(1+0.14/2)}{(0.14+0.20)(1+0.14)}$$

$$= 0.8785$$

$$CSF = 1 - \frac{td}{(1+d)}$$

$$= 1 - \frac{(0.22)(0.20)}{(0.14+0.20)}$$

$$= 0.8706$$

$$\text{real MARR} = \frac{1 + \text{MARR}_{\text{nom}}}{1.02} - 1$$

$$= 11.76\%$$

$$b) \quad CTF \cdot P(A/P, 11.76\%, N) + Mx(P/A, g, 11.76\%, N) \\ (1-t)(A/P, 11.76\%, N) + (1-t)A - S \cdot CSF(A/F, 11.76\%, N)$$

$$\left(\frac{Mx}{1+g} (P/A, \frac{1+11.76\%}{1+g} - 1, N) = Mx(P/A, g, 11.76\%, N) \right)$$

c) next page

c) EAC_{diesel}

$$1500k \cdot 0.8785(A/P, 11.76\%, 30) + \frac{600x}{1+0.015} \left(P/A, \frac{1+0.1176}{1+0.015} - 1, 30 \right)$$

$$(1-0.22)(A/P, 11.76\%, 30) + (1-0.22)40k - 200k(0.9706)(A/F, 11.76\%, 30) \\ = 191085 + 525x$$

EAC_{wind}

$$7600k(0.8785)(A/P, 11.76\%, 30) + \frac{3x}{1.015} \left(P/A, \frac{1+0.1176}{1+0.015} - 1, 30 \right)$$

$$(1-0.22)(A/P, 11.76\%, 30) + (1-0.22)12k - 120k(0.8706)(A/F, 11.76\%, 30) \\ = 822788 + 2.524x$$

combining

$$191085 + 525x = 822788 + 2.524x$$

$$x = 1209 \text{ hours}$$

d) The generation using wind should be used, since the coefficient for x is much smaller.

3. a) $\frac{54000}{1.086} = 49723.8$

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1996 $42000 \times (1-0.059) = 44478$

$$49723.8 \times (1.059) = 52657.5$$

$$\left(\frac{52657.5}{44478} \right)^{0.05} - 1 = 0.85\%$$

$$b) \text{ after: } 0.035 \times (0.7) \\ = 2.45\%$$

$$\text{real-after} = \frac{1 + 2.45\%}{1.009} - 1 \\ = 1.54\%$$

$$c) \text{ avg rate: } \left(\frac{113.5}{101.8} \right)^{1/2} - 1 \\ = 1.566\%$$

$$\therefore CPI_{2004} = 100 (1 + 0.01566)^{12} \\ = 120.50$$