Environmental Assessment

Fachbereich 2 Informatik und Ingenieurwissenschaften

Strategic behavior – exercise

You are a project developer of a 6 MW wind turbine

- your power plant generates $E=15$ GWh per year for 20 years
- your LCOE (without profit margin) is 4.5 €-cents/kWh for 4-7, 5 €-cents/kWh for 8-9, 5.5 €-cents/kWh for 10, 4 €-cents/kWh for 2-3, 3.8 €-cents for 1
- the maximum bid is restricted to 7 €-cents/kWh
- the deposit is 30 €/kW (returned after realization)
- you face annual costs $C = 60,000$ €$+30,000n$ €with n as number of projects
- with a debt of 300,000 €/project you are bankrupt ☺
- the interest rate is 5 %

Strategic behavior – exercise

You place a bid p_j *under pay-as-bid* pricing via www.menti.com.

- Calculate your loss/(nominal) profit Π

$$\Pi = 20 \cdot (p - LCOE) \cdot E - C \qquad (1)$$

- Calculate your (nominal) average rate on return r (if there is any profit)

$$r = \frac{\Pi}{LCOE \cdot E \cdot \sum_{n=0}^{19}(1 + i)^n} = \frac{\Pi}{13.09 \cdot LCOE \cdot E} \qquad (2)$$

$\rightarrow$ for every successful project you get a new project for the next round

$\rightarrow$ the bidder with the highest rate on return receives one additional project

$\rightarrow$ you bid 5 rounds (1 round each year) with $\underline{C}$ = 72 MW and 15 groups

Strategic behavior – exercise

You place a bid p_j *under pay-as-bid* pricing via www.menti.com.

- Calculate your loss/(nominal) profit Π

$$\Pi = 20 \cdot (p - LCOE) \cdot E - C \qquad (3)$$

- Calculate your (nominal) average rate on return r (if there is any profit)

$$r = \frac{\Pi}{LCOE \cdot E \cdot \sum_{n=0}^{19}(1+i)^n} = \frac{\Pi}{13.09 \cdot LCOE \cdot E} \qquad (4)$$

$\rightarrow$ there are only two groups with 5 projects each

$\rightarrow$ the capacity $\underline{C} = 72$ MW

$\rightarrow$ you bid 2 rounds (1 round each year)