

### Exercices du chapitre 3 (cf. note de cours)

**3.2 The rules of the Syldavian electricity market stipulate that all participants must trade energy exclusively through the Power Pool. However, the Syldavia Aluminium Company (SALCo) and the Northern Syldavia Power Company (NSPCo) have signed a contract for difference for the delivery of 200 MW on a continuous basis at a strike price of 16 \$/MWh.**

a. Trace the flow of power and money between these companies when the pool price takes the following values : 16 \$/MWh, 18 \$/MWh and 13 \$/MWh.

b. What happens if during one hour the Northern Syldavia Power Company is only able to deliver 50 MWh and the pool price is 18 \$/MWh ?

c. What happens if during one hour the Syldavia Aluminium Company consumes only 100 MWh and the pool price is 13 \$/MWh ?

**3.4 The operator of a centralized market for electrical energy has received the bids shown on the table below for the supply of electrical energy during a given period:**

Company	Amount (MWh)	Price (\$/MWh)
Red	100	12.5
Red	100	14.0
Red	50	18.0
Blue	200	10.5
Blue	200	13.0
Blue	100	15.0
Green	50	13.5
Green	50	14.5
Green	50	15.5

a. Build the supply curve

b. Assume that this market operates unilaterally, i.e. that the demand does not bid and is represented by a forecast. Calculate the market price, the quantity produced by each company, and the revenue of each company for each of the following loads: (400 MW), 600 MW, and (875 MW).

c. Suppose that instead of being treated as constant, the load is represented by its inverse demand curve, which is assumed to have the following form:

$$D = L - 4.0 \cdot \pi$$

Where  $D$  is the demand,  $L$  is the forecasted load and  $\pi$  is the price. Calculate the effect that this price sensitivity of demand has on the market price and the quantity traded.

**3.5 The Syldavian Power and Light Company owns one generating plant and serves some load. It has been actively trading in the electricity market and has established the following position for 11 June between 10:00 and 11:00 a.m.:**

- Long term contract for the purchase of 600 MW during peak hours at a price of 20.00 \$/MWh
- Long term contract for the purchase of 400 MW during off peak hours at a price of 16.00 \$/MWh
- Long term contract with a major industrial user for the sale of 50 MW at a flat rate of 19.00 \$/MWh
- The remaining customers purchase their electricity at a tariff of 21.75 \$/MWh
- Future contract for the sale of 200 MWh at 21 \$/MWh
- Future contract for the purchase of 100 MWh at 22 \$/MWh
- Call option for 150 MWh at an exercise price of 20.50 \$/MWh
- Put option for 200 MWh at an exercise price of 23.50 \$/MWh
- Call option for 300 MWh at an exercise price of 24.00 \$/MWh

The option fee for all the option is 1.00 \$/MWh. The peak hours are defined as being the hours between 8:00 a.m. and 8:00 p.m.

The outcome for 11 June between 10:00 and 11:00 is as follows :

- The spot price is set at 21.50 \$/MWh.
- The total load of the Syldavian Power and Light Company is 1200 MW, including the large industrial customer.
- The power plant produces 300 MWh at an average cost of 21.25 \$/MWh

a. Assuming that all imbalances are settled at the spot market price, calculate the profit or loss made by the company during that hour.

b. What value of the spot market reduce the profit or loss of the company to zero ? Would this change in spot price affect any of the option contracts ?