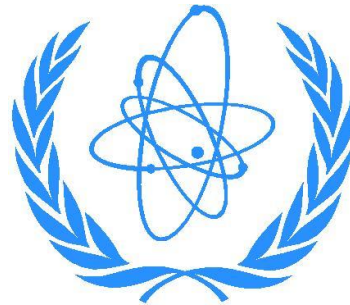


Workshop on the Advice on financial schemes for D&D,
RWM and SF at NPPs

DISCOUNTING MEANING OF DISCOUNT RATE

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DISCOUNTING

Money has time value

- ❑ money in different years should be recalculated to the same year to be comparable

Easy example: money (1000 EUR) now or next year,
opportunity to invest for 10% (e.g. interest rate on bank
savings account)

money now equals next year $1000 \cdot (1 + 0,1)^1 = 1100$

money next year equals now $1000 \cdot (1 + 0,1)^{-1} = 909,1$

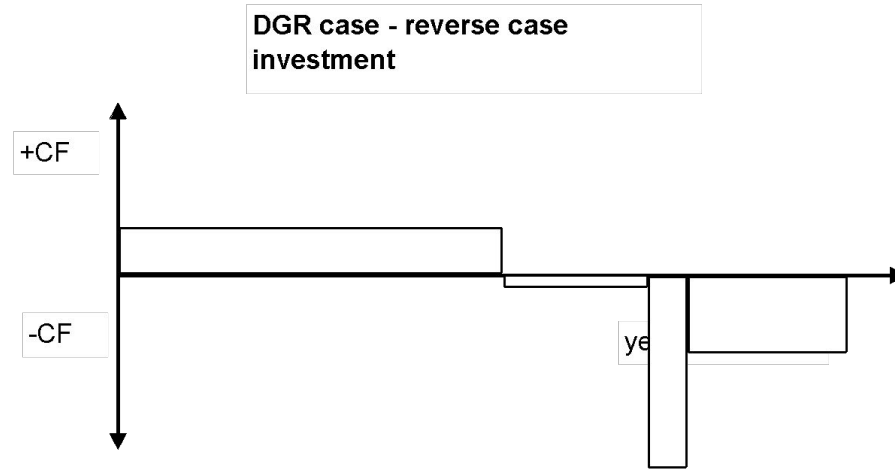
CLASSICAL INVESTMENT



Entrepreneurial investment

- ❑ Investment first, then project generates “money” - i.e. positive cash flows
- ❑ Discount has meaning of opportunity cost - i.e. return on other possible investment for given investor and given type of business (includes risk compensation)

DGR CASE



Reverse investment

- ❑ Money savings first – e.g. fee imposed on power generation
- ❑ Investment then follows
- ❑ Discount rate has meaning of possible and “safe” appreciation of cummulated financial means on Nuclear account

APPRECIATION OF MEANS ON NUCLEAR ACCOUNT

- ❑ Really existing money are cummulated on Nuclear Account
- ❑ They invested into financial products – e.g. into governmental bonds, bank savings account etc.
- ❑ Investment bring interest or coupon (form of interest) – in **nominal value** (like savings)

DISCOUNT AND INFLATION

- ❑ **Unfortunately we cannot exclude inflation from our calculations (when doing economic effectiveness calculation)**

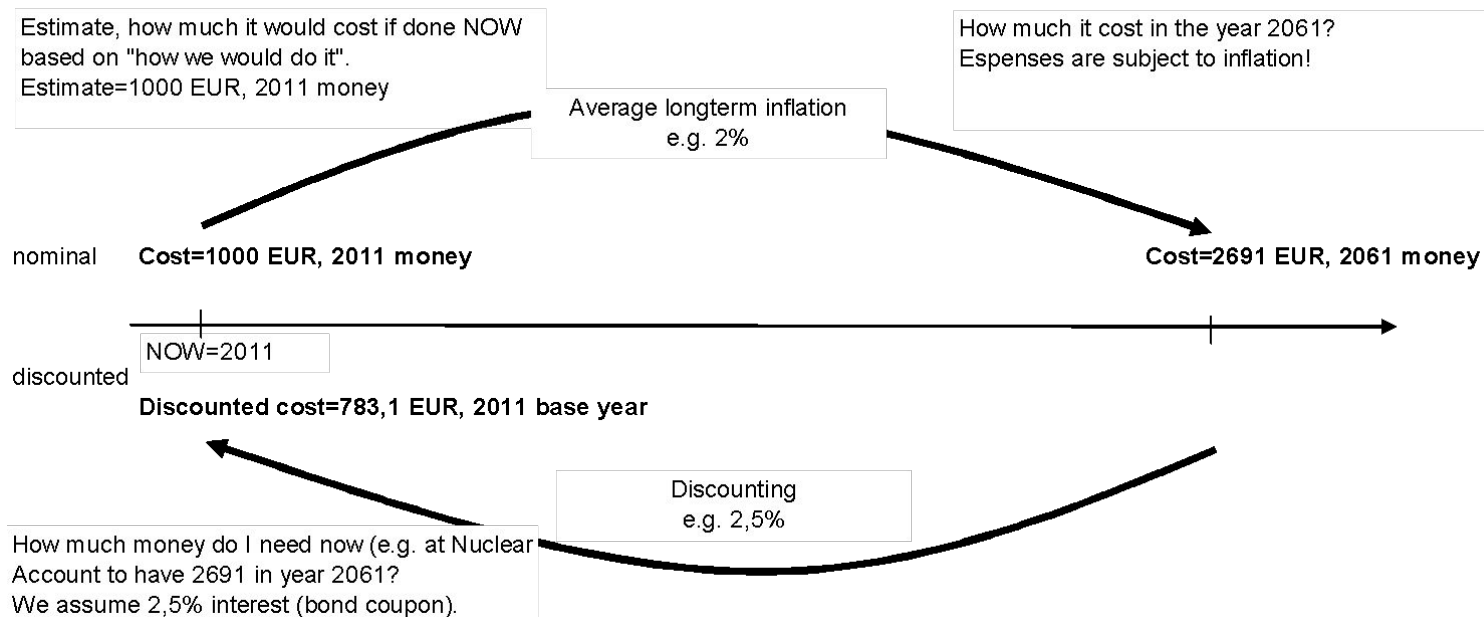
Business investment:

- ❑ our operational expenses are subject to inflation
- ❑ we pay income tax based on difference between revenues and cost
 - ❑ revenues growth with the inflation, operational cost too (possibly differently), but depreciation as part of total cost are fixed
- ❑ if we neglect inflation, we overestimate role of depreciation as tax shield

DISCOUNT AND RAO MANAGEMENT

- Example. We need to do something in year 2061.
- Cost estimate in 2011 prices – e.g. 1000 EUR (if doing it now). How much it cost in 2061? How much money do I need now to have this amount in 2061?

$$M_{2061} = 1000 \cdot (1 + 0,02)^{50} = 2691M_{\text{discounted}} = 2691 \cdot (1 + 0,025)^{-50} = 783,1$$



DISCOUNT – REAL AND NOMINAL

- Example as before. We try to avoid the inflation
 - No influence of inflation on our 1000 EUR investment (i.e. 2061 prices equal to 2011 prices)
 - But still we have to take into account appreciation of sources on nuclear account
 - We have to **take out inflation from the interest rate** obtained (in nominal value) – discounting with real discount

$$(1 + r) = (1 + i) \cdot (1 + r_r) \Rightarrow \frac{(1 + 0,025)}{(1 + 0,02)} - 1 = r_r = 0,004902$$

$$M_{\text{discounted}} = 1000 \cdot (1 + 0,004902)^{-50} = 783,1$$

FEE AND INFLATION

$$NPV = \sum_{t=1}^{T_h} CF_t \cdot (1 + r_n)^{-t} = 0 \quad CF_t = c_{\min t} \cdot Q_t - V_t$$

$$\sum_{t=1}^{T_h} fee_t \times Q_t \times (1 + r_n)^{-t} = \sum_{t=1}^{T_h} Expenses_t \times (1 + r_n)^{-t}$$

$$fee_t = fee_0 \cdot (1 + inf)^t \text{ and } (1 + r_n) = (1 + inf) \cdot (1 + r_r)$$

$$fee_0 = \frac{\sum_{t=1}^{T_h} Expenses_t \cdot (1 + r_n)^{-t}}{\sum_{t=1}^{T_h} Q_t \cdot (1 + r_r)^{-t}}$$

For practical reasons we assume fee_0 as the fee in first year and in next years this fee is increased with the inflation

- future cost are defined by the reference project, we need cumulative sum in given year
- fixed fee – would caused high fee at the beginning to avoid money shortage