1.1 The economic calculation

To investigate the economic viability two different methods are used. A simple payback time and a more detailed net present value (NPV) method are used.

Simple payback time

The most commonly used indicator for the cost-effectiveness of energy saving projects is the "Simple Pay-back Time". This is the ratio of the capital cost to the net annual earnings of the project.

The simple pay-back time (PT) is given by the expression:

$$PT = I / (S – M)$$

where

I:	is the total cost of the installation (extra cost compared with a conventional installation).
S:	annual savings.
M:	annual maintenance cost.

This – simple pay-back time - is thus the number of years over which the sum of annual revenues from the energy savings becomes equal to amount of initial investment.

Net present value - NPV

An improvement to the simple pay-back assessment is to consider the discounted value of the annual savings. The Net Present Value (NPV) method used in evaluating investments whereby the net present value of all cash outflows (such as the cost of the investment) and cash inflows (returns) are calculated using a given discount rate.

An investment is acceptable if the NPV is positive.

$$NPV = S_o – M_o – I_o > 0$$

where

S_o =	f_{npv} * yearly savings
M_o =	f_{npv} * yearly maintenance costs
I_o =	Investment

The real discount rate is calculated as

$$r_r = \frac{r_n \cdot (1-t) - i}{1+i}$$

The net present value factor is calculated as

$$f_{NPV} = \frac{1-(1+r_r)^{-n}}{r_r}$$

where

r_n	= calculation interest rate
t	= tax rate
i	= inflation rate

Other economical terms

Several economic terms can be derived from the NPV. They are based on the same calculations, but focus is on other aspects of the economical result. Three terms are:

- exact payback time (in contradiction to the simple pay-back time this is taking into account, inflation, interest rates, etc.)
- internal interest rate (when NPV is = 0)
- energy saving price, € / kWh (the theoretical price of the saved energy – to be compared to the actual energy cost)