

Energy Audits and Energy Efficiency Design

Financial analyses of energy efficiency measures
and renewables

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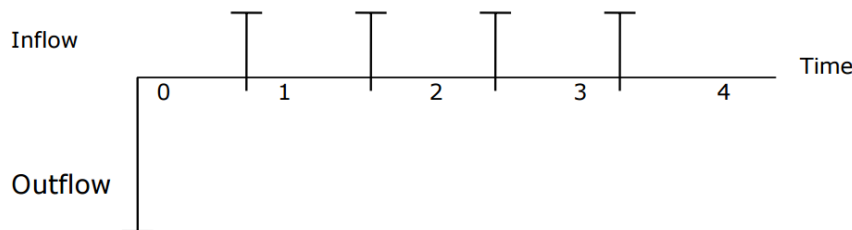
Basics and indicators

- › Investment
- › Discount rate
- › Duration of the investment

- › Net Present Value (NPV)
- › Internal Rate of Return (IRR)
- › Payback time

Basics

- › **Investment** is a decision involving expenditures and revenues for a particular activity that is expected to continue over a period of time and usually involves outflows of funds in the early periods and inflows in later periods.



- › **Discount rate** is the interest rate the investor uses in his investment calculations when amounts have to be converted in time
- › **Duration of the investment** is the expected technical lifetime of the implemented technology.

Net Present Value (NPV)

- › NPV sums up all payments relating to an investment – positive as well as negative – over a certain period of time
- › NPV incorporates the discount rate to the temporal distribution of the payments
- › Investment is **profitable** when NPV is **positive**

$$NPV = NP \cdot \frac{1 - (1 + i)^{-n}}{i} - Initial_investment$$

NPV = net present value of net payments

NP = annual net payment

n = the duration of the investment (lifetime)

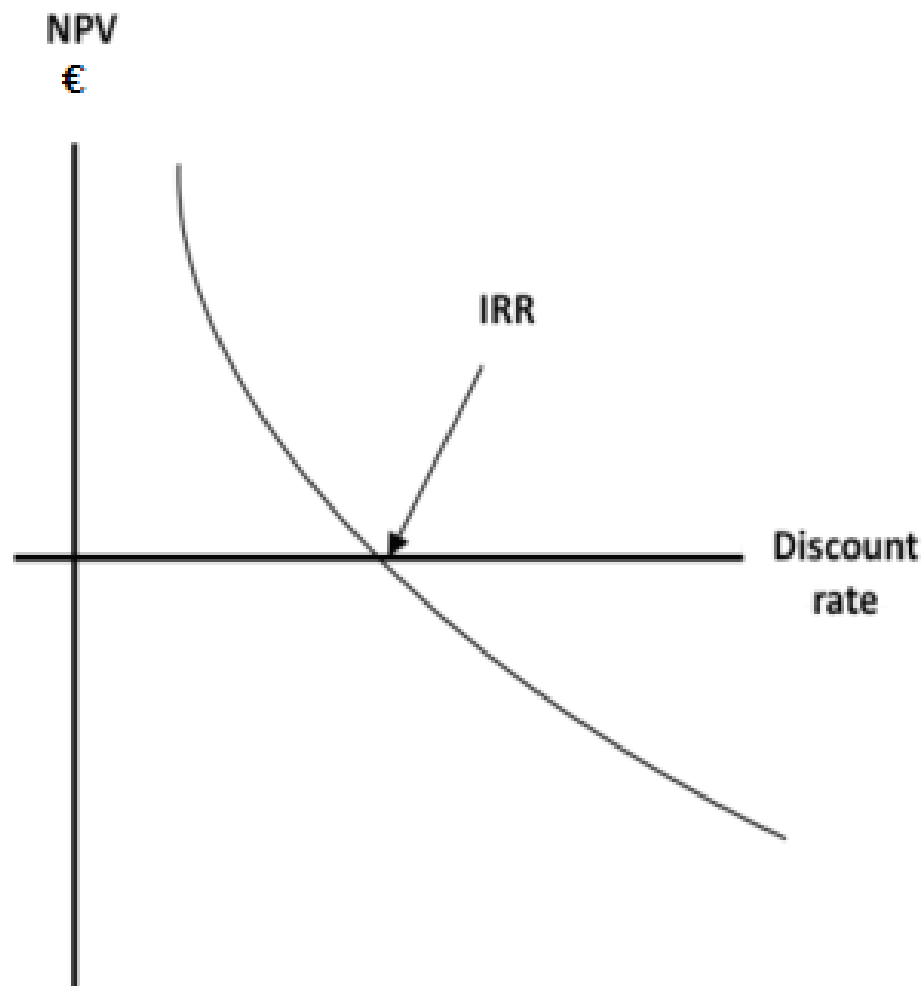
i = discount rate

Internal Rate of Return (IRR)

- › IRR of the investment is the discount rate at which the present value is 0
- › Investment is **profitable** when the IRR is **higher than the discount rate**, thus NPV is positive
- › It can be found by solving the following equation:

$$NPV = NP \cdot \frac{1 - (1 + IRR)^{-n}}{IRR} - Initial_investment = 0$$

NPV-IRR-Discount rate relation



Payback time

- › **Simple payback time** is the number of years it takes for the accumulated payments to correspond to the amount invested

$$\text{Simple payback time} = \frac{\text{Initial_investment}}{NP}$$

- › **Dynamic payback time** calculates how long it takes for the present value of the net payments to cover the investment – simple payback time with the inclusion of the discount rate
- › Investment is **profitable** if the payback time is **below the lifetime of the investment**

Profile



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Zlatko BAČELIĆ MEDIĆ

- › Experience in team management and project coordination in energy efficiency, renewable energy and new technologies implementation
- › Team leader in preparation of investment grade energy audits in public, private and industrial sectors
- › Experience in capacity building in developing countries
- › Extensive experience in technical modeling and preparation of financial analyses for energy efficiency and renewable energy projects
- › Expertise in optimization and cost-optimality in energy efficiency projects
- › Expertise in analysis and assessment of energy sectors, including energy planning
- › Project experience across SEE

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