FINANCIAL CALCULATIONS

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EFFECT4buildings Final Conference

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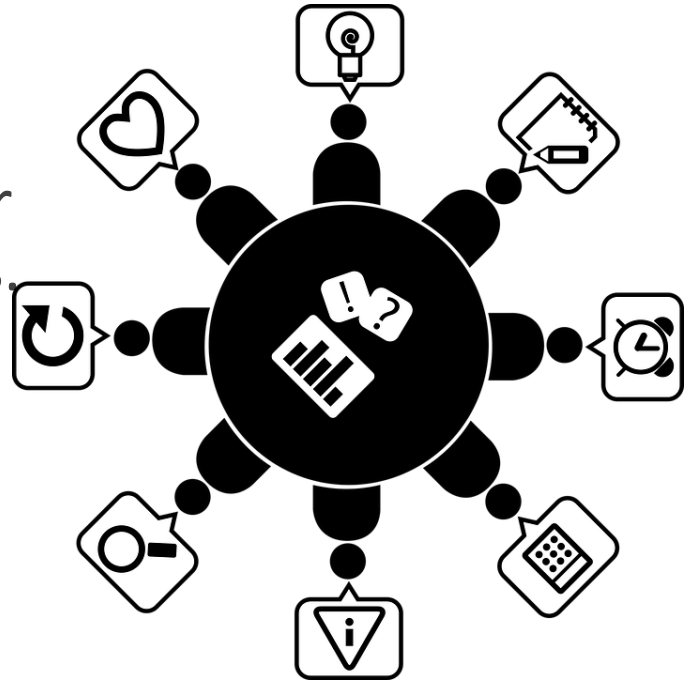
Justifying of Financial calculations

- Target of financial calculations is to get for better understanding of energy efficiency investment profitability.
- Building managers need more varieties and better ways of calculating the profitability of investments.
- The main purpose of financial calculations are facilitate decision making to actually implement energy efficiency investments



Project has developed

- Financial calculation tool in excel format and in online tool
- Guidelines for calculation tools and methods
- Training material

Calculation methods of excel based tool

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Payback time
Investment cost divided by the annual savings

Cash flow
The sum of costs and profits for each time period

Discount rate
The rate between our valuation for todays money over next year's money.
Value of money decreases in time (inflation)

NPV, net present value
Sum of all future discounted cash flows is called net present value

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
discount factor	1	0,95	0,91	0,86	0,82	0,78	0,75	0,71	0,68	0,64	0,61	0,58	0,56	0,53	0,51	0,48	0,46	0,44	0,42	0,40
discounted cash flow	100	95,24	90,70	86,38	82,27	78,35	74,62	71,07	67,68	64,46	61,39	58,47	55,68	53,03	50,51	48,10	45,81	43,63	41,55	39,57

IRR, internal rate of return
The discount rate that makes investments net present value to 0.

Why exactly this tool?

Easier to compare different possible solutions

- **Several calculation methods** for comparing alternative energy efficiency measures
- **Visualize** the benefits of energy saving measures
- Results presented also in **numbers**

-> Facilitate energy efficiency decision making

Some Inputs…

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Inputs (Fill in green cells)		
An Energy effeciency measure	Ventilation system with heat recovery	Geothermal heat pump system
Lenght of life cycle/ / Technical lifetime (years)	20,00	20,00
IMPACT OF THE MEASURE	Ventilation system with heat recovery	Geothermal heat pump system
ELECTRICITY-DATA	Ventilation system with heat recovery	Geothermal heat pump system
Price of Electricity (€/kWh)	0,120	0,120
Change of purchased amount of electricity(kWh/year)	2 000	170 000
CO2-emissions of the electricity (kgCO2/kWh)	0,20	0,20
Option 1. Estimation for electricity price change (%/year)	3,00 %	3,00 %
Option 2. Estimation for electricity price change (%/year)	6,00 %	6,00 %
HEATING ENERGY- DATA	Ventilation system with heat recovery	Geothermal heat pump system
Price of heating energy (€/kWh)	0,090	0,090
Change of purchased amount of heating energy (kWh/year)	-130 000	-500 000
CO2-emissions of the heating energy (kgCO2/kWh)	0,16	0,16
Option 1. Estimation for heating energy price change (%/year)	3,00 %	3,00 %
Option 2. Estimation for heating energy price change (%/year)	6,00 %	6,00 %

Estimations for energy/water price changes in future
- > sensitivity analysis

Results..

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REDUCTION OF CO2-EMISSIONS	Ventilation system with heat recovery	Geothermal heat pump system
Reduction of CO2- emissions (kgCO2/year)	20 400	46 000
Reduction of CO2-emissions / CO2-emissions before measures (%)	16 %	35 %
Reduction of CO2- emissions during the Life cycle (kgCO2)	408 000	920 000

NON- ENERGY BENEFITS	Ventilation system with heat recovery	Geothermal heat pump system
Decrease cost due the Non-energy benefit (€/year)	8 200	0
Pay back time 2 (year), includes the effects of non-energy benefit (for example decrease health costs)	7,96	8,64

FINANCIAL RESULTS	Ventilation system with heat recovery	Geothermal heat pump system
Pay back time (year)	13,65	8,64
Internal rate of return, IRR (%)	2,06 %	8,28 %
Internal rate of return, IRR (%), Option 1. Energy/water prices change	5,24 %	11,39 %
Internal rate of return, IRR (%), Option 2. Energy/water prices change	8,29 %	14,43 %
Net Present Value, NPV (€)	-51 933	65 892
Net Present Value, NPV (€), Option 1. Energy/water prices change	-2 699	165 449
Net Present Value, NPV (€), Option 2. Energy/water prices change	63 833	304 738
Cash flow (€)	1 339	203 612
Cash flow (€), Option 1. Energy/water prices change	86 343	374 897
Cash flow (€), Option 2. Energy/water prices change	203 427	620 443

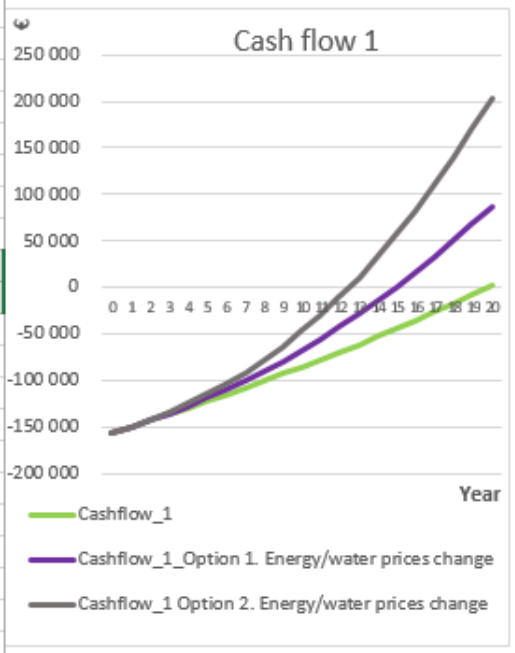
Reduction of CO2-emissions compared to situation before measure

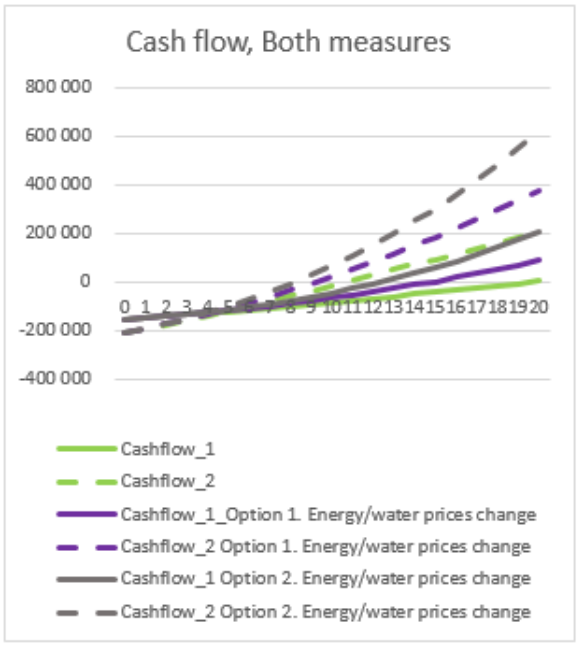
Impact of non - energy benefits to the payback period

Impact of energy / water price developments to the profitability of measures

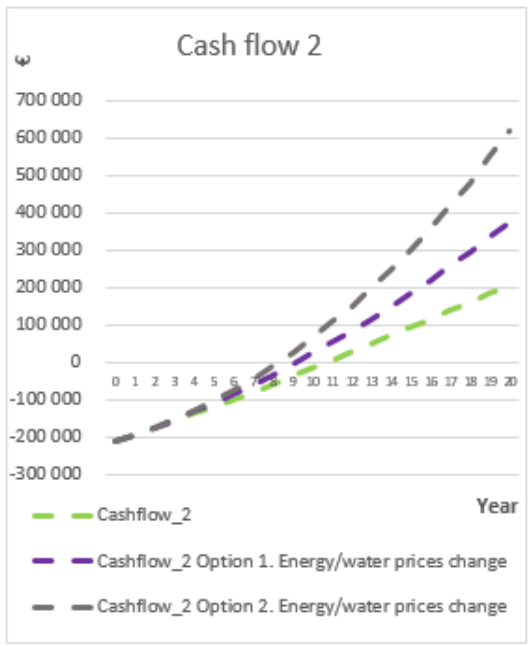
Package of charts

Ventilation system with heat recovery

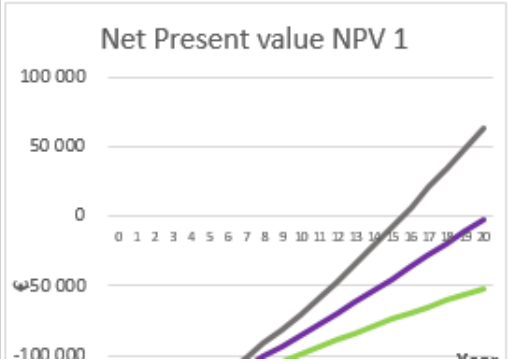


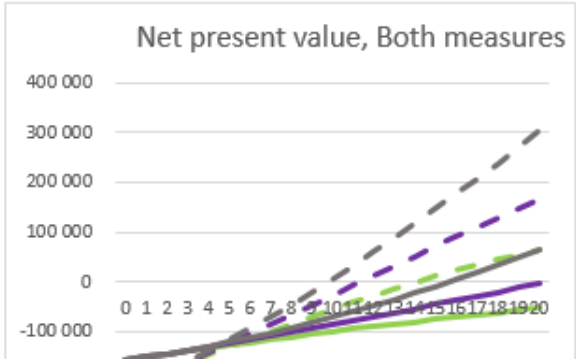


Geothermal heat pump system

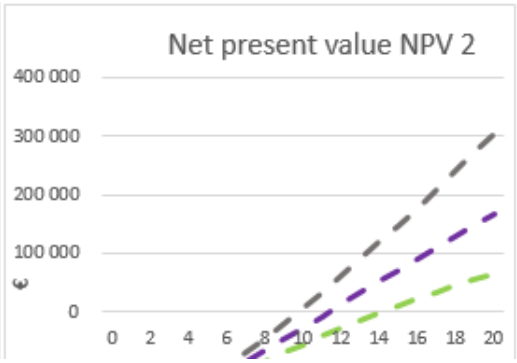


Ventilation system with heat recovery





Geothermal heat pump system



The results of the second operation are shown in dashed lines - - - -, which makes reading easier, especially in the middle diagram, where both actions are shown.

The green line represents a situation where the energy prices will not rise in the future

Violet: prices rise 3% per year

Gray: prices rise 6% per year