

Instructions for Investment Calculation

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1 Introduction

The 'Investment Calculation' management tool enables users to compare two investment alternatives with regard to their economic benefit. Usually a standard variant is compared with an energy-efficient variant. The calculation is carried out on a purely monetary basis, i.e. no technical data is requested. Basically, however, all kinds of investments can be compared with each other.

1.1 Instructions for use

The following instructions should be noted before the tool is used:

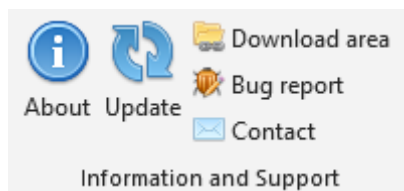
- The tool requires at least Excel 2007 (version 12.0). In general, earlier versions are not supported and not compatible.
- In order to use this tool, the attached macros must be activated.
 - Excel 2007: Office button  → Excel Options → Trust Center → Trust Center Settings button → Macro Settings
 - Excel 2010 and higher: File tab → Options → Trust Center → Trust Center Settings → Macro Settings
- Never move input cells but copy and insert ideally only the values using the function 'Paste special'. This way, existing cell formatting (including 'conditional formatting' defined in the background) are kept.
- Input cells are highlighted in yellow. When entering data, a differentiation must be made between light yellow and dark yellow cells. The light yellow cells are always necessary for the calculation; the dark yellow cells are optional. It is also possible to enter formulas into the input fields.
- The blue cells contain calculated values, and the contents cannot be altered.
- Various cells are restricted in their input ranges (e.g. percentages from 0 to 100%). In other cells, the conditional formatting (red background) draws attention to unusual values or values that have already been allocated.
- All cells and areas can be selected and copied. Separate menu functions can be used to copy graphs and edit comments.
- It is possible to show and hide rows and columns individually and alter them in size on all worksheets except the cover sheet. Please check the print layout settings before printing any worksheets. For technical reasons users are not allowed to format cell contents.

2 Investment Calculation tool

2.1 General menu options

The current version of the tool uses a ribbon called 'LEEN Tools' showing all tool-relevant options. The buttons in previous versions have been replaced to a large extent. The ribbon consists of several tabs that offer various options, sometimes depending on the selected worksheet.

2.1.1 Information and support



2.1.1.1 About

Via the 'About' button, a dialogue can be called up which shows the version information for the tool and Excel versions used. This information can be helpful for LEEN support. An indication is given behind the shown Excel version as to whether or not the tool at hand is supported. In addition, the licensor, developer and disclaimer are shown.

2.1.1.2 Update

The version status of the tool can be checked via the 'Update' button. The computer used must be online for this purpose. Here no files or other information of the client are exchanged; solely the version number of the tool used is compared with an XML file on the internet and the relevant status message provided.

2.1.1.3 Download area

A link (<http://downloads.leen-system.de>) to the LEEN download area can be called up via the 'Download Area' button in the standard browser. You may already be requested to enter your LEEN access data in the form of your user name and password directly before the browser starts.



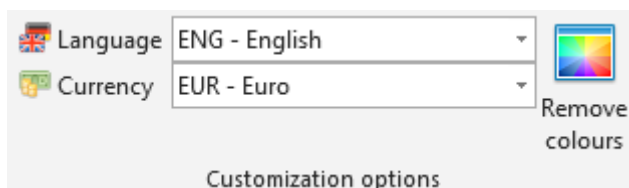
2.1.1.4 Bug report

A link (<http://bugs.leen-system.de>) to the LEEN bug tracking system can be called up via the 'Bug report' button in the standard browser for reporting a missing feature or any error that may have occurred. Here, too, you will be requested to enter your LEEN access data in the form of your user name and password before a corresponding report can be created.

2.1.1.5 Contact

The standard email programme is called up via the 'Contact' button and enables direct email contact with the LEEN Support team (support@leen-system.de).

2.1.2 Adjustment options



2.1.2.1 Language and currency

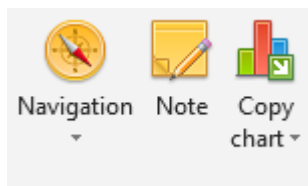
The displays in the tool can be adjusted via the 'Language' and 'Currency' list boxes at any time according to the existing entries. Here changes are only made to the respective designations in the tool. Existing figures are not automatically converted during the adjustment.

2.1.2.2 Remove colours

The background colour of input and output fields can be removed from or restored in cells on the worksheets via the 'Remove colours' button. A print-friendly display is achieved in this way. This process can take a while.

2.1.3 General worksheet options

Generally available worksheet options are described below. Individual options only available for certain worksheets are described in the corresponding sections of these instructions.

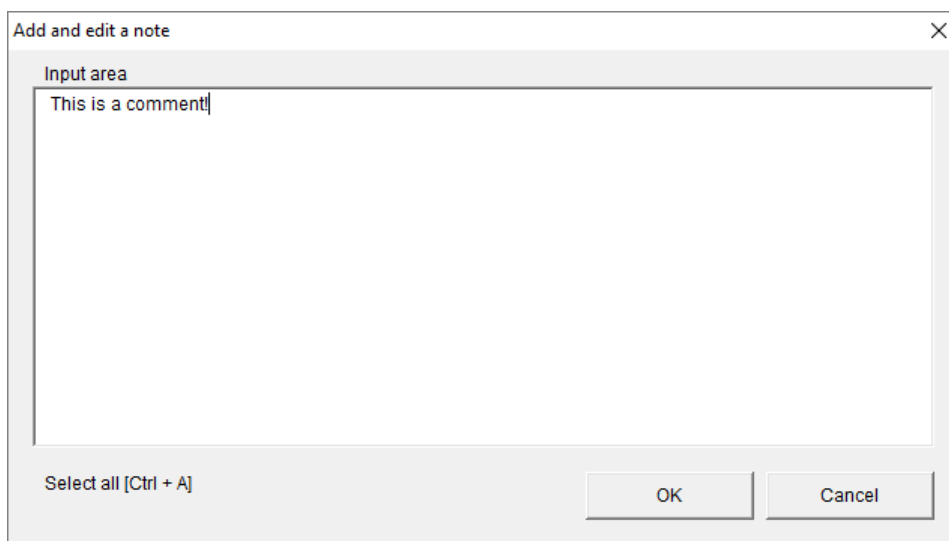


2.1.3.1 Navigation

A navigation menu containing a list of the main sections of the currently selected worksheet can be called up via the 'Navigation' button. This makes it possible to quickly switch back and forth between sections, which is particularly convenient in worksheets containing a large number of subsections. The contents of the menu change with each worksheet that is selected.

2.1.3.2 Note

A dialogue can be called up via the 'Note' button, in which comments can be created or already existing ones edited for any selected cell. If an area with several cells is selected, the comment is placed in the first top cell of the selected area. To remove a comment, the text content of the dialogue must be deleted.



2.1.3.3 Copy chart

All existing charts on the worksheet are listed in a menu via the ‘Copy chart’ button for further selection. With a click on one of the menu entries, the chart is copied to the clipboard for further use, e.g. for pasting into a Word document. The ‘Copy chart’ button only appears if the selected worksheet actually contains charts.

2.2 Cover sheet

General information on the project, site, processor, etc. is recorded on the ‘Cover’ worksheet.

2.2.1 General information, processor and measure

The project name, name of the company or organisation as well as the site and the date of processing should be entered at the start of processing. The information on project name, company and site is displayed in the subtitle of the heading on all following worksheets. Please supply your personal details to record who has processed the file and is responsible for it. Finally, information should be provided on the measure so that it can be allocated to a measures summary, if required.

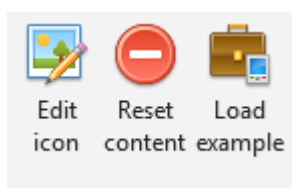
General information	
Project name	<Energy efficiency network>
Company / Organization	<Company Name Ltd.>
Site	<Company location>
Date of processing	02/11/2016

Processor	
Name	<Mr. John Doe>
Function	<Energy manager>
Phone	<0721 / 12283743>
Email	<john.doe@company.com>

Measure	
ID of measure	<MS01>
Brief description	<Insert a discription of a measure.>

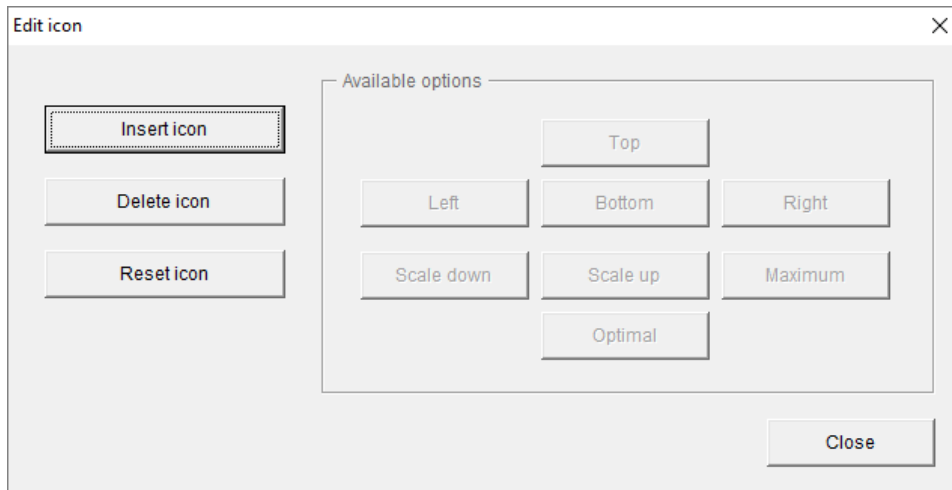
2.2.2 Cover Worksheet – Individual worksheet options

The following individual menu functions are available on the ‘Cover’ worksheet:



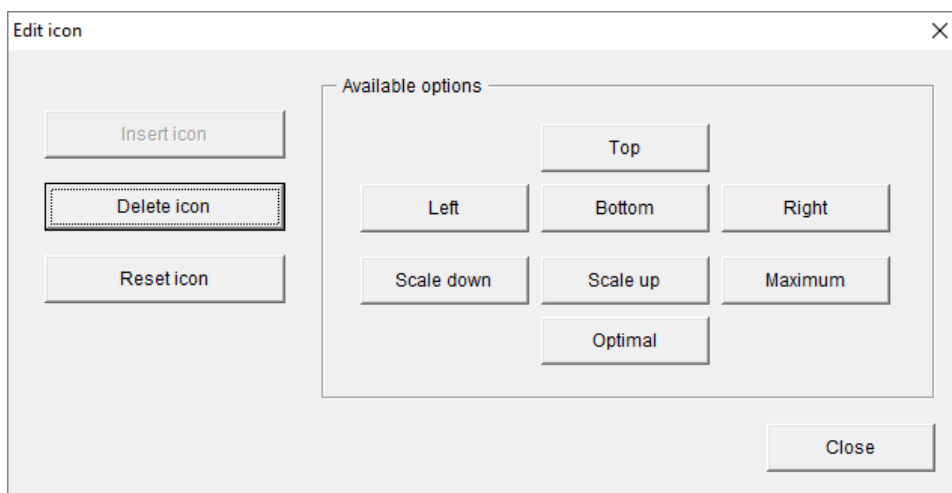
2.2.2.1 Edit icon

A dialogue can be called up via the 'Edit icon' button to edit the default LEEN icon on the 'Cover' sheet. You can integrate your own icon and show it on the Cover, hide the icon or restore the default icon display.



The path to your own image file can be provided via the 'Insert icon' button and a file selection dialogue. It is possible to specify BMP, JPG, GIF and PNG file formats. After a click on the 'Insert' button, input is requested on whether the icon to be inserted should also appear in the top right-hand corner in the headers of the worksheets that follow. The icon is then automatically placed there and scaled. This process can take a while.

As soon as you have inserted your own icon, the buttons in the 'Available options' section are activated and can then be used. Furthermore, in a certain area the position and size of the icon can be gradually adjusted. Depending on the given aspect ratio of the sheet, the size of the icon can be expanded to the maximum display area via the 'Maximum' button. The 'Optimal' button provides the option to show the icon in the best possible way in the display area (maximum utilisation of the area depending on the given aspect ratio with top right alignment).



The LEEN icon can be hidden in the cover sheet via the 'Delete icon' button. If an own icon was inserted before, it will also be removed from the cover sheet and the headers of the worksheets that follow. This process can take a while. As a result, no icon is shown at these points.

The original display of the LEEN icon can be restored via the 'Reset icon' button; the own icon is then deleted from the cover sheet and the headers of the worksheets that follow. This process can take a while.

2.2.2.2 Resetting content

The tool can be cleared completely and reset to the original state via the 'Reset content' button. All input data and comments will be irretrievably lost. A security prompt appears and must be confirmed before the data is deleted to prevent data from being accidentally removed. There is an additional prompt enabling you to exclude the cover sheet content from being deleted. This process can take a while.

2.2.2.3 Loading the example

Example data (also based on these instructions) can be loaded into the tool via the 'Load example' button for further illustration. All previous input data and comments will be irretrievably lost. A security prompt appears and must be confirmed before the data is deleted to prevent data from being accidentally removed. This process can take a while.

2.3 Calculation

Data is entered directly in the Input section. Here an existing investment or a new standard investment (Old / new) is compared with a new efficient investment (New eff.).

Input	Unit	Old / new	New eff.
Starting year		2016	
Operating life OL [years]	a	12	12
Interest rate	%	10.00%	
Amount to be invested	EUR	1,500	3,200
Residual value today (demolition costs negative)	EUR		
Residual value after OL (demolition costs negative)	EUR		
Energy costs per year	EUR/a	1,740	735
Change in energy costs per year	%		
Other costs per year	EUR/a		
Change in other costs per year	%		
Other revenues per year	EUR/a		
Change in other revenues per year	%		

In the case of an existing plant/system (Old / New), a remaining operating life must be entered; in other cases the total operating life. The efficient plant/system (New eff.) is always a new plant/system. In order to also be able to display the entire payment plan (see 2.4.2, page 13), the operating life of the investment is limited to 50 years.

The following parameters must be provided:

- 1) The starting year defines when the investment calculation begins. The starting year does not influence the results.
Range of admissible values: 2000 to 2100
- 2) The entry of the operating life (OL) of the plants/systems to be compared (in the case of old plants/systems, the estimated remaining operating life).
Range of admissible values: 1 to 50
- 3) The interest rate at which the future payments will be discounted is needed for calculating the dynamic payback period and the net present value.
Range of admissible values: 0 to 100%
- 4)
 - a) Entry of the amount to be invested including all incidental expenses (e.g. transaction expenses). In the case of old plants/systems, there are normally none. If applicable, significant repair expenses can also be entered for old plants/systems. Here a value can only be entered if there is no 'residual value of the investment today' (following row).¹
Range of admissible values: 0 to 10⁹
 - b) Entry of the residual value of the investment today. This can be the scrap value of a plant/system or also the (negative) cost of demolition or disposal. This residual value can only be entered if no investment and no residual value after expiry of the operating life are entered (see 4c).
Range of admissible values: -10⁹ to 10⁹.

Please note: This value cannot be entered for the 'New eff.' variant as here it is always a matter of a new investment.

 - c) Entry of the residual value of the plant/system after expiry of the operating life. This can be the scrap value of a plant/system or also the (negative) cost of demolition or disposal. This residual value can only be entered if there is no residual value of the investment today (see 3c).
Range of admissible values: -10⁹ to 10⁹

Please note: b) and c) are the only cases in which negative values can be entered as the residual value can be both, positive or negative (cost of disposal).
- 5)
 - a) Entry of the energy costs per year for both alternatives.
Range of admissible values: 0 to 10⁹
 - b) Entry of the changes in energy costs. They can be entered separately, e.g. where two different energy carriers are compared.
Range of admissible values: -50 to 50%

¹ Ensures that the plant/system is not immediately sold after investment.

- 6) a) Entry of the other costs per year for both alternatives.
Range of admissible values: 0 to 10⁹
- b) Entry of the rate of increase of other costs per year.
Range of admissible values: -50 to 50%
- 7) a) Entry of the other revenues per year for both alternatives. Here refunds and similar items can be taken into account.
Range of admissible values: 0 to 10⁹
- b) Entry of the rate of increase of other revenues per year.
Range of admissible values: -50 to 50%

2.3.1 Adjustment of payments over different periods

All payments (revenues and costs) apart from the one-off investment and the residual values take place during the respective operating life of the plants/systems. However, if there are payments that take place during a different period, e.g. tax relieves over a period of 5 years, these payments must be apportioned to the operating lives.

If, for instance, a tax credit amounting to €100 per year is granted over a period of 5 years for the energy-efficient variant and the plant/system has an operating life of 12 years, the credit in relation to 12 years (at an imputed interest rate of 10%) is €56 per year. This can be carried out as a subsidiary calculation in the 'Conversion of annual payment amounts' section.

Auxiliary calculation: Conversion of annual payment amounts		Unit		
<input checked="" type="radio"/> Annual payment	Amount	EUR	100	
<input type="radio"/> Investment	Years	a	5	
Annual payment based on 12 and 12 Years		EUR	56	56

This credit of €56 must be entered under 'Other revenues' in the 'New eff.' variant.

Input	Unit	Old / new	New eff.
Starting year		2016	
Operating life OL [years]	a	12	12
Interest rate	%	10.00%	
Amount to be invested	EUR	1,500	3,200
Residual value today (demolition costs negative)	EUR		
Residual value after OL (demolition costs negative)	EUR		
Energy costs per year	EUR/a	1,740	735
Change in energy costs per year	%		
Other costs per year	EUR/a		56
Change in other costs per year	%		
Other revenues per year	EUR/a		
Change in other revenues per year	%		

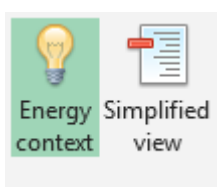
A second variant is an additional partial investment that takes place at a later stage during the term. This investment must be discounted back to the commencement date.

If in the case of a plant with an operating life of 20 years an investment is necessary after 10 years, for example, to replace a component that costs €1,000, this amount of €1,000 must be discounted over a period of 10 years, and the amount then added to the initial investment. At an interest rate of 10%, this would be €386.

Auxiliary calculation: Net present value of investment		Unit	
<input type="radio"/> Annual payment	Amount to be invested	EUR	1,000
<input checked="" type="radio"/> Investment	Year of investment	a	10
Auxiliary calculation: Net present value of investment		EUR	386

2.3.2 Calculation – individual worksheet options

The following individual menu functions are available on the ‘Calculation’ worksheet:



2.3.2.1 Energy context

Some of the designations in the entry area can be adapted according to content via the ‘Energy context’ button. If ‘Energy context’ is deactivated, the reference to energy cost, for example, is deleted and replaced with a generally applicable designation. The adaptation is only of a cosmetic nature and enables the use of the tool apart from the energy context as well.

2.3.2.2 Simplified view

The entry system can be simplified considerably via the ‘Simplified View’ button, thus enabling a quick estimation of the economic efficiency of an investment. In this variant, only the additional investment leading to the energy savings is entered. This is the difference between the investment for the standard variant, which is possibly also null, and the energy-efficient variant. Furthermore, in this case the savings in energy costs are entered and not the cost of the respective energy consumption. All other values have the same meaning as in the detailed layout.

Input	Unit	Difference
Starting year		2016
Operating life OL [years]	a	12
Interest rate	%	10.00%
Additional investment (eff.)	EUR	1,700
Energy cost savings per year	EUR/a	949
Change in energy cost savings per year	%	

Please note: When switching between simplified and detailed view, the respective changes are not taken over into the other input modus, i.e. there are always two independent calculations with their values being cached.

2.4 Display of results

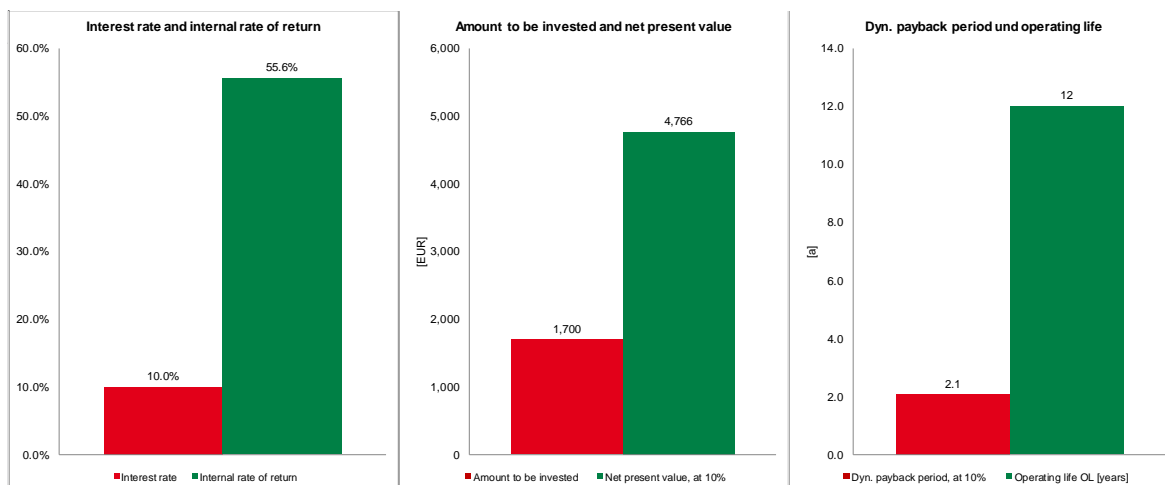
The results are displayed directly in the ‘Calculation’ worksheet.

2.4.1 Results of the comparison

The most important parameters for economic efficiency are grouped together in a table of results. The net present value (the present profit of the investment) and the internal rate of return (interest rate at which the net present value is null) are calculated as genuine profitability criteria. In addition, the static and dynamic payback periods are displayed. The static payback period is always calculated without taking interest rates and changes in prices or costs into account. The payback period proportion of the operating life (OL) is also indicated. The annual costs (including annualised investment amounts) of both variants and the resulting annual cost savings are also indicated.² Here it is immediately clear which variant is more favourable.

Results	Unit		
Net present value, at 10%	EUR	4,766	
Internal rate of return	%	55.6%	
Dyn. payback period, at 10%	a	2.1	17% of OL
Static payback period	a	1.8	15% of OL
Annual cost savings	EUR/a	700	

Then three graphs are also displayed to illustrate the results.



2.4.2 Payment plan for fictitious differential investment

The investment is also displayed in a payment plan which contains the interest payments and principal repayments as well as the occurring surpluses, assuming that the investment is debt-financed. The interest payments reflect the financing costs for the

² The annual costs incl. annualised investment amount can only be calculated in the detailed view.

borrowed capital. They are paid each year from the reduced operating and energy costs as well as the possible revenues. The remaining amount is used for principal repayment.

Payment plan for fictitious differential investment	Unit	2016	2017	2018	2019	2020	2021	2022
Time		Dec. 31	Dec. 31	Dec. 31	Dec. 31	Dec. 31	Dec. 31	Dec. 31
Loan for investment	EUR	1,700						
Annual return	EUR	-1,700	949	949	949	949	949	949
Interest payments	EUR		-170	-92	-6	0	0	0
Principal repayment (positive if interest payments > return)	EUR		-779	-857	-64	0	0	0
Residual debt	EUR	-1,700	-921	-64	0	0	0	0
Surplus	EUR	0	0	0	878	949	949	949
Discounted net present value (residual debt or surplus) as at		Dec. 31, 2016						
Net present value	EUR	4,766	0	0	660	648	589	536

Payment plan for fictitious differential investment	Unit	2023	2024	2025	2026	2027	2028	2029
Time		Dec. 31	Dec. 31	Dec. 31	Dec. 31	Dec. 31	Dec. 31	Dec. 31
Loan for investment	EUR							
Annual return	EUR	949	949	949	949	949	949	0
Interest payments	EUR	0	0	0	0	0	0	0
Principal repayment (positive if interest payments > return)	EUR	0	0	0	0	0	0	0
Residual debt	EUR	0	0	0	0	0	0	0
Surplus	EUR	949	949	949	949	949	949	0
Discounted net present value (residual debt or surplus) as at								
Net present value	EUR	487	443	402	366	333	302	0

2.4.3 Data for the 'Measures summary'

The economic key data for the investment are automatically displayed in a table from which the values can be directly copied into the 'Measures Summary'.

The operating life entered here is highlighted in red in case different operating lives were used for calculation in the programme. In such a case, the 'Total investment eff.' does not match the operating life entered here.

Please note: Provided that the economic efficiency does not change considerably, the operating lives can simply be equated without any further adjustments. This gives a useful approximation. Otherwise, a congruity of the investment terms must always be established through an auxiliary calculation for the 'net present value of an investment'.

Data for Measures Summary					
	Operating life	Total investment eff.	Additional investment (eff.)	Annual costs	Other annual revenues
In the case of residual values, a change of the interest rate in the Measures Summary after the transfer will lead to wrong results in that tool.					
Unit	a	EUR	EUR	EUR/a	EUR/a
New measure, eff.	12	3,200	1,700	56	0

In the case of residual values, a change of the interest rate in the 'Measures Summary' after the transfer will lead to wrong results in that tool.

2.5 Sensitivity analysis

The sensitivity analysis in the worksheet with the same name makes it possible to test how the economic efficiency of the investment is affected if individual parameters change. The initial value from the calculation is increased or decreased by up to 50% in a total

of 5 steps (or in yearly steps in the operating life). The calculation is carried out for one changing parameter. The other two parameters remain constant.

Three parameters can be changed in the 'Data matrix' section:

- The additional investment (difference between standard and efficient investment),
- the annual savings in cost and
- the operating life.

Additional investment (eff.)			
1,700	EUR	50%	±

Annual costs & revenues			
949	EUR	50%	±

Operating life			
12	a	5	±

Altogether, there are ten variants, which are presented in both a tabular and graphic form:

- The net present value assuming a variation in the additional investment
- The net present value assuming a variation in the annual costs / revenues
- The net present value assuming a variation in the operating life
- The internal rate of return assuming a variation in the additional investment
- The internal rate of return assuming a variation in the annual costs / revenues
- The internal rate of return assuming a variation in the operating life
- The dynamic payback period assuming a variation in the additional investment
- The dynamic payback period assuming a variation in the annual costs / revenues
- The static payback period assuming a variation in the additional investment
- The static payback period assuming a variation in the annual costs / revenues

The following example shows the change in the net present value if the amount of the additional investment is varied by $\pm 50\%$. An additional investment of €1,700 forms the initial value. The annual savings in costs / revenues and the operating life remain constant.

Net present value: variation in additional investment				
Additional investment (eff.) ± 50%			NPV	
850	EUR		5,616	EUR
1,020	EUR		5,446	EUR
1,190	EUR		5,276	EUR
1,360	EUR		5,106	EUR
1,530	EUR		4,936	EUR
1,700	EUR		4,766	EUR
1,870	EUR		4,596	EUR
2,040	EUR		4,426	EUR
2,210	EUR		4,256	EUR
2,380	EUR		4,086	EUR
2,550	EUR		3,916	EUR

