What's new in Invest for Excel version 3.8

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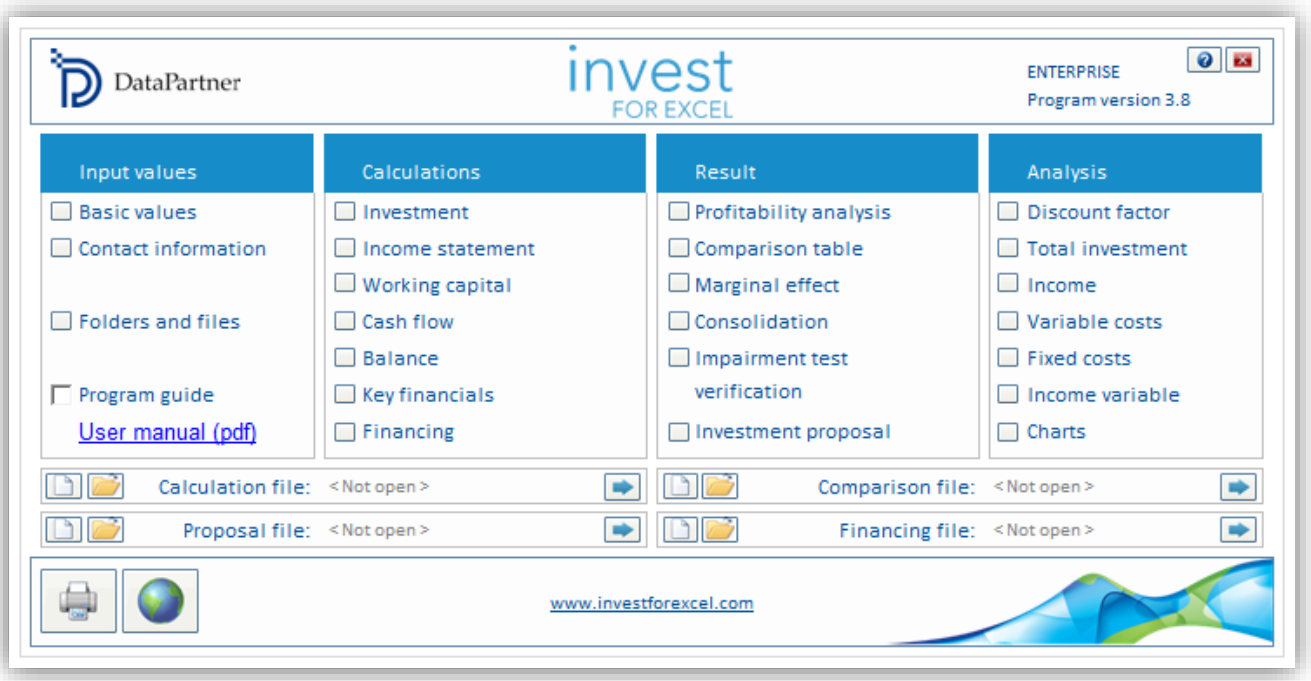
Version 3.8

Invest for Excel version 3.8 (compilation 3.8.001) introduces new features, consolidates features and fixes implemented after version 3.7 compilation 3.7.001 and includes a new digital signature.



Microsoft Excel versions supported

Invest for Excel 3.8 is supported for Microsoft Excel versions 2007, 2010, 2013 and 2016 (including Office 365 desktop) for Windows Vista, Windows 7, Windows 8, Windows 8.1 and Windows 10.

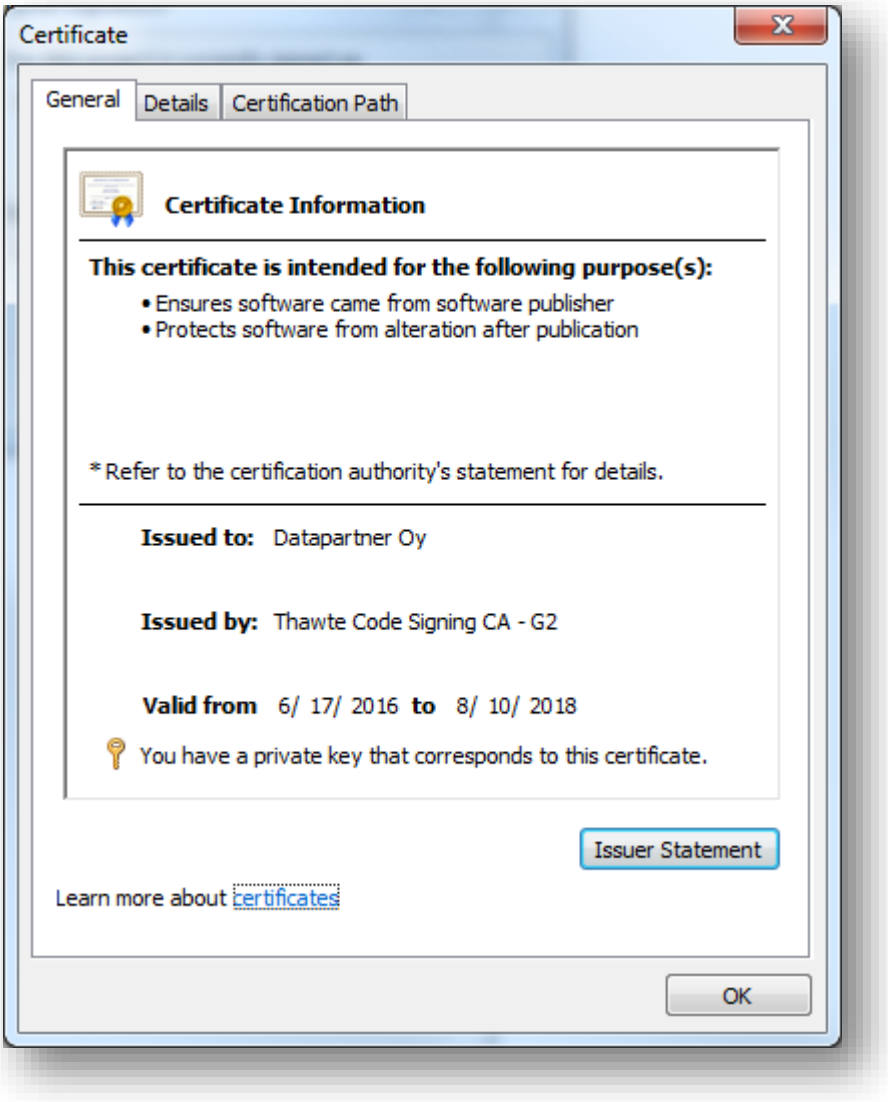
Optimizations for speed

Optimizations have been implemented to speed up program execution and calculation. This will be most clearly noticeable in Office 2013 and Office 2016 which use SHA-2 class, SHA512 algorithm for sheet protection.

The new sheet-protection algorithm is much slower than the SHA-1 class sheet protection used in Office 2010 and Office 2007.

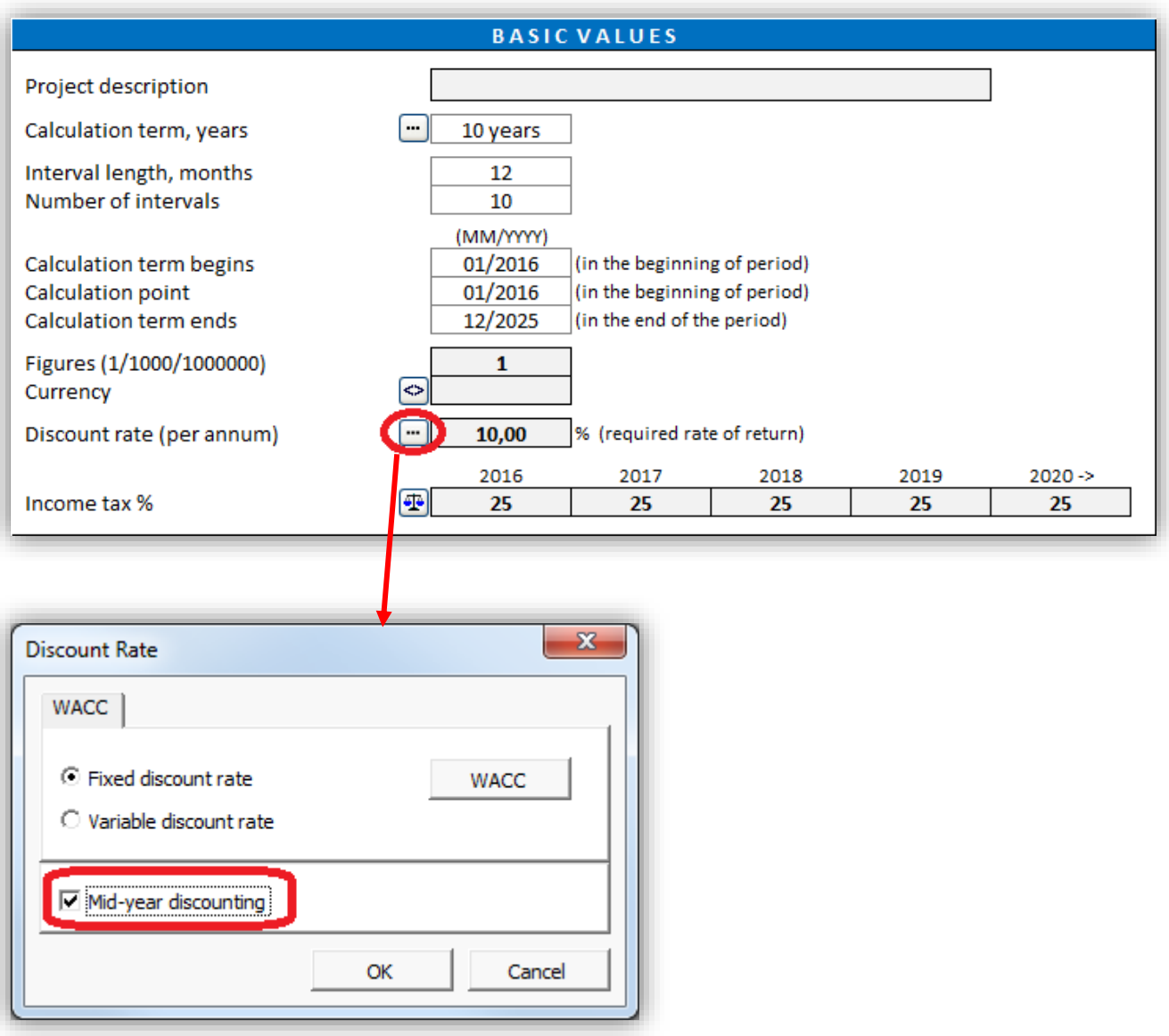
Digital signature valid until 2018

Invest for Excel program code is currently signed with a digital signature which is valid until August 10, 2018.



Mid-year discounting

As an alternative to standard end-of-year discounting, mid-year discounting can be used. To turn on mid-year discounting, open the “Discount Rate” dialog box from the “Basic Values” table of the calculation file and check “Mid-year discounting” in the dialog box.



Formula:

$$\text{Discount factor (mid-year)} = \frac{1}{(1 + \text{Discount rate})^{(n - 0.5)}}$$

$$\text{Discount factor (end-of-year)} = \frac{1}{(1 + \text{Discount rate})^{n}}$$

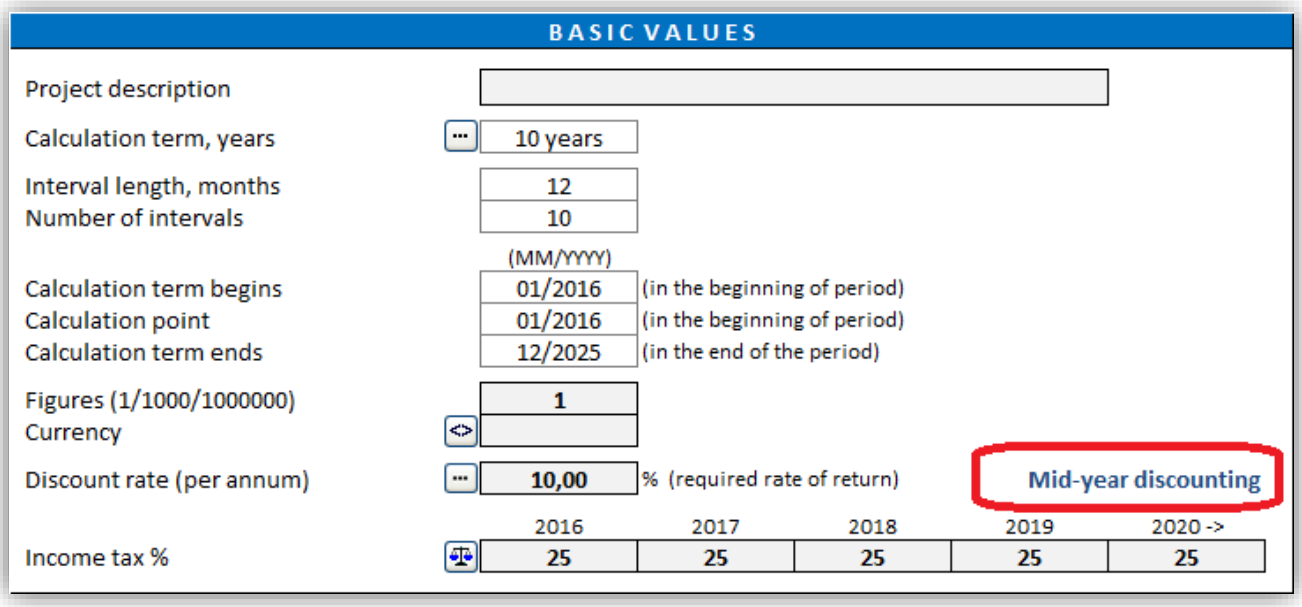
Where:

n = year in the projection period
0.5 = is subtracted from n in when mid-year discounting is used.

Zero-period and Residual value are unaffected and are calculated the same way in mid-year discounting and end-of-year discounting.

Extrapolated residual value is calculated as end-of-year cash flows in both mid-year discounting and end-of-year discounting.

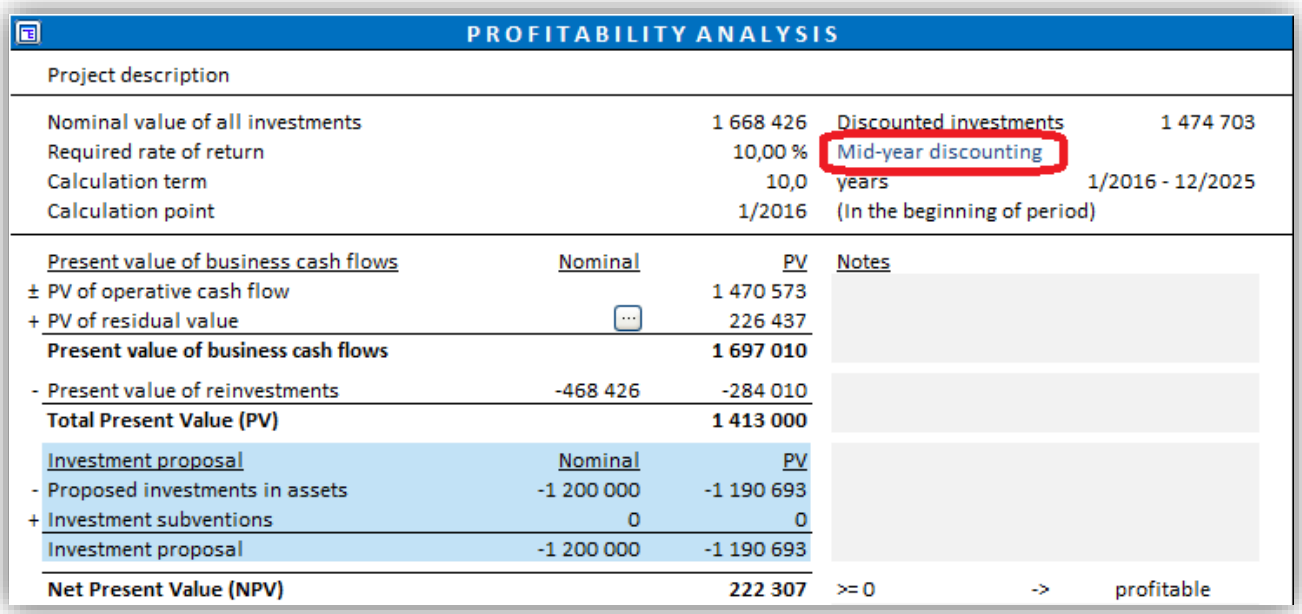
Mid-year discounting should not be used when shorter periods are used in a calculation.
When mid-year discounting is used, information of this is shown in the Basic Values and Profitability analysis.



BASIC VALUES

Project description			
Calculation term, years	10 years		
Interval length, months	12		
Number of intervals	10		
	(MM/YYYY)		
Calculation term begins	01/2016	(in the beginning of period)	
Calculation point	01/2016	(in the beginning of period)	
Calculation term ends	12/2025	(in the end of the period)	
Figures (1/1000/1000000)	1		
Currency			
Discount rate (per annum)	10,00	% (required rate of return)	Mid-year discounting

	2016	2017	2018	2019	2020 ->
Income tax %	25	25	25	25	25



PROFITABILITY ANALYSIS

Project description

Nominal value of all investments		1 668 426	Discounted investments	1 474 703
Required rate of return		10,00 %	Mid-year discounting	
Calculation term		10,0	years	1/2016 - 12/2025
Calculation point		1/2016	(In the beginning of period)	

Present value of business cash flows	Nominal	PV	Notes
± PV of operative cash flow		1 470 573	
+ PV of residual value		226 437	
Present value of business cash flows		**1 697 010**	
- Present value of reinvestments	-468 426	-284 010	
Total Present Value (PV)		**1 413 000**	

Investment proposal	Nominal	PV
- Proposed investments in assets	-1 200 000	-1 190 693
+ Investment subventions	0	0
Investment proposal	-1 200 000	-1 190 693

Net Present Value (NPV)	**222 307**	>= 0	-> profitable

Example of mid-year discounting vs. end-of-year discounting (discount rate is 10%):

Mid-year discounting:

CASH FLOW STATEMENT

	1/2016	12/2016	12/2017	12/2018	12/2019	12/2020	Residual
Months per interval		12	12	12	12	12	(12/2020)
Income	0	-175 000	420 000	428 400	436 968	445 707	0
Income tax	0	0	-83 250	-84 845	-86 477	-88 147	0
Cash flow from operations	**0**	**-175 000**	**336 750**	**343 555**	**350 491**	**357 561**	**0**
Asset investments and realizations	-1 000 000	-200 000	-20 000	-20 200	-20 402	-20 606	836 007
Free cash flow (FCF)	**-1 000 000**	**-375 000**	**316 750**	**323 355**	**330 089**	**336 955**	**836 007**
Discounted free cash flow (DFCF)	-1 000 000	-357 548	274 554	254 799	236 459	219 434	519 095
Cumulative discounted free cash flow	-1 000 000	-1 357 548	-1 082 995	-828 195	-591 736	-372 302	**146 793**

NPV = 146 793

End-of-year discounting:

CASH FLOW STATEMENT

	1/2016	12/2016	12/2017	12/2018	12/2019	12/2020	Residual
Months per interval		12	12	12	12	12	(12/2020)
Income	0	-175 000	420 000	428 400	436 968	445 707	0
Income tax	0	0	-83 250	-84 845	-86 477	-88 147	0
Cash flow from operations	**0**	**-175 000**	**336 750**	**343 555**	**350 491**	**357 561**	**0**
Asset investments and realizations	-1 000 000	-200 000	-20 000	-20 200	-20 402	-20 606	836 007
Free cash flow (FCF)	**-1 000 000**	**-375 000**	**316 750**	**323 355**	**330 089**	**336 955**	**836 007**
Discounted free cash flow (DFCF)	-1 000 000	-340 909	261 777	242 941	225 455	209 222	519 095
Cumulative discounted free cash flow	-1 000 000	-1 340 909	-1 079 132	-836 191	-610 736	-401 513	**117 581**

NPV = 117 581

Monte Carlo simulation

Monte Carlo simulation can be used to evaluate the risk of one or more variables of a project. Random numbers are entered in the variable cell(s) to calculate the distribution of result values. Variables are expected to have a normal distribution, i.e. any value in the specified range between minimum and maximum value is valid.

As an example, one big uncertainty of a wind power plant could be the selling price of electricity.

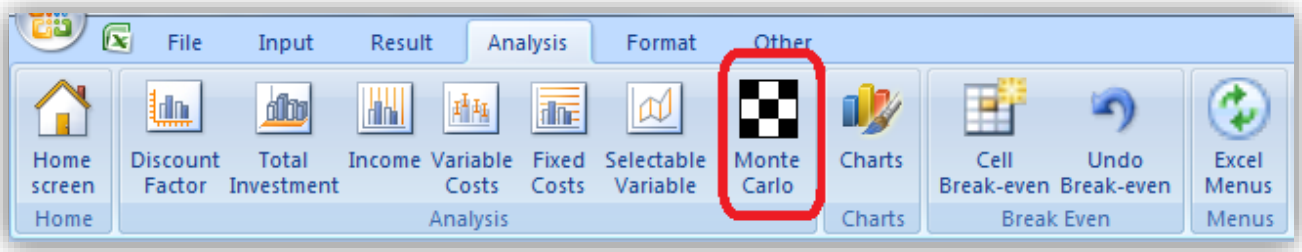
INVESTMENTS (-) / REALIZATIONS (+)

Imputed depreciation	Depr.-%	7/2017	12/2017	12/2018	12/2019	12/2020	12/2021
Months per interval			6	12	12	12	12
1 **Turbines**		-600 000	-2 400 000				
Depreciation (straight line)	6,67%			-200 000	-200 000	-200 000	-200 000
Book value		600 000	3 000 000	2 800 000	2 600 000	2 400 000	2 200 000
2 **Connection fee**		-22 000	-88 000				
Depreciation (straight line)	6,67%			-7 333	-7 333	-7 333	-7 333
Book value		22 000	110 000	102 667	95 333	88 000	80 667
3 **Costs of establishing**		-100 000	-400 000				
Depreciation (straight line)	6,67%			-33 333	-33 333	-33 333	-33 333
Book value		100 000	500 000	466 667	433 333	400 000	366 667
Investments		-722 000	-2 888 000	0	0	0	0
Realizations		0	0	0	0	0	0
Depreciation		0	0	-240 667	-240 667	-240 667	-240 667
Realization profit (+) / loss (-)		0	0	0	0	0	0
Book value		722 000	3 610 000	3 369 333	3 128 667	2 888 000	2 647 333

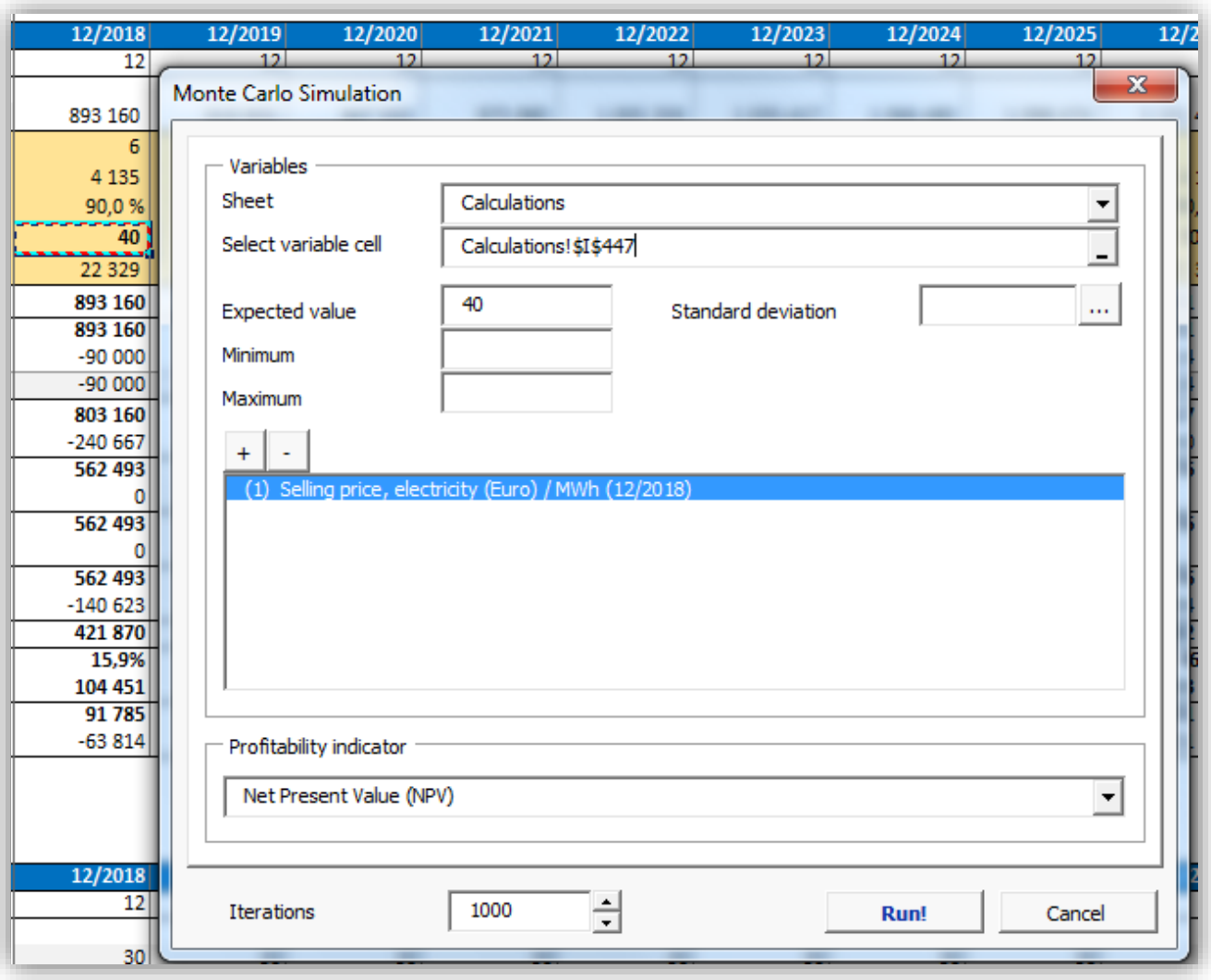
INCOME STATEMENT

€	7/2017	12/2017	12/2018	12/2019	12/2020	12/2021
Months per interval		6	12	12	12	12
Income specified:						
Electricity income		0	893 160	919 955	947 553	975 980
+ Turbines			6	6	6	6
• Capacity (MWh) turbine / year			4 135	4 135	4 135	4 135
• Utilization rate			90,0 %	90,0 %	90,0 %	90,0 %
• **Selling price, electricity (Euro) / MWh**			40	41,20	42,44	43,71
Production, MWh			22 329	22 329	22 329	22 329
Income	0	0	893 160	919 955	947 553	975 980
Gross margin	0	0	893 160	919 955	947 553	975 980
Fixed costs	0	0	-90 000	-92 700	-95 481	-98 345
Operational costs			-90 000	-92 700	-95 481	-98 345
EBITDA; Operating income before depreciation	0	0	803 160	827 255	852 072	877 635
Depreciation	0	0	-240 667	-240 667	-240 667	-240 667
EBIT; Operating income	0	0	562 493	586 588	611 406	636 968

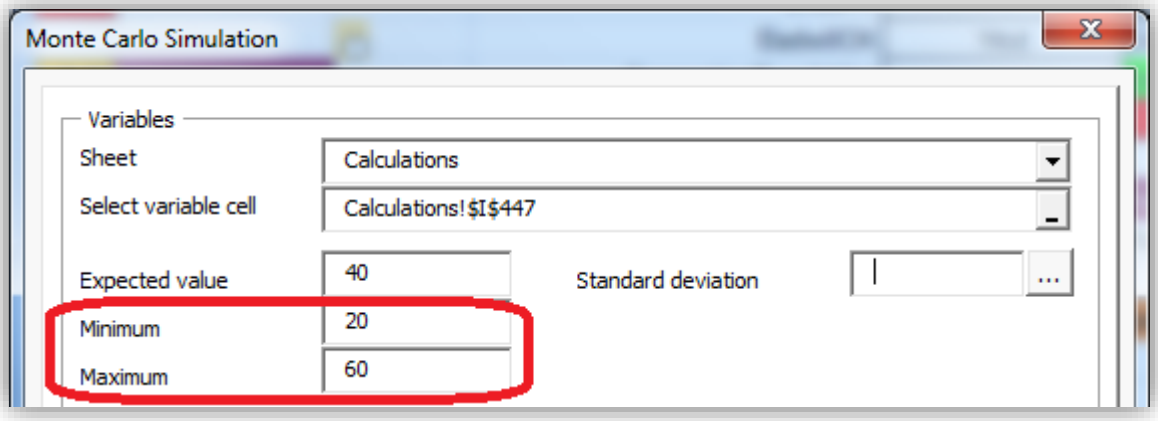
When we have the calculation made so that future selling price is dependent of first year's price, we can use Monte Carlo simulation to evaluate the risk. Press "Monte Carlo" in the "Analysis" section of the Invest for Excel ribbon menu to create a Monte Carlo simulation.



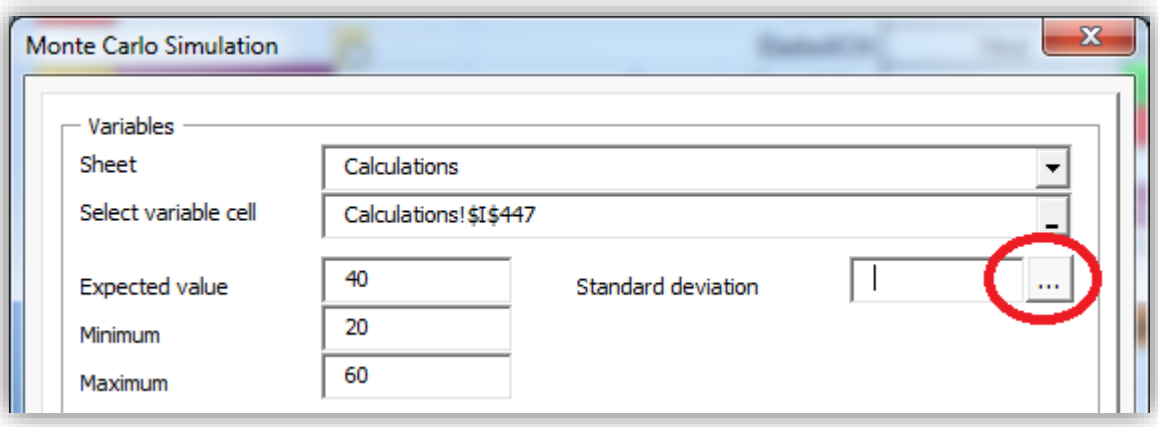
Select the first year's selling price cell from the "Calculations" sheet.



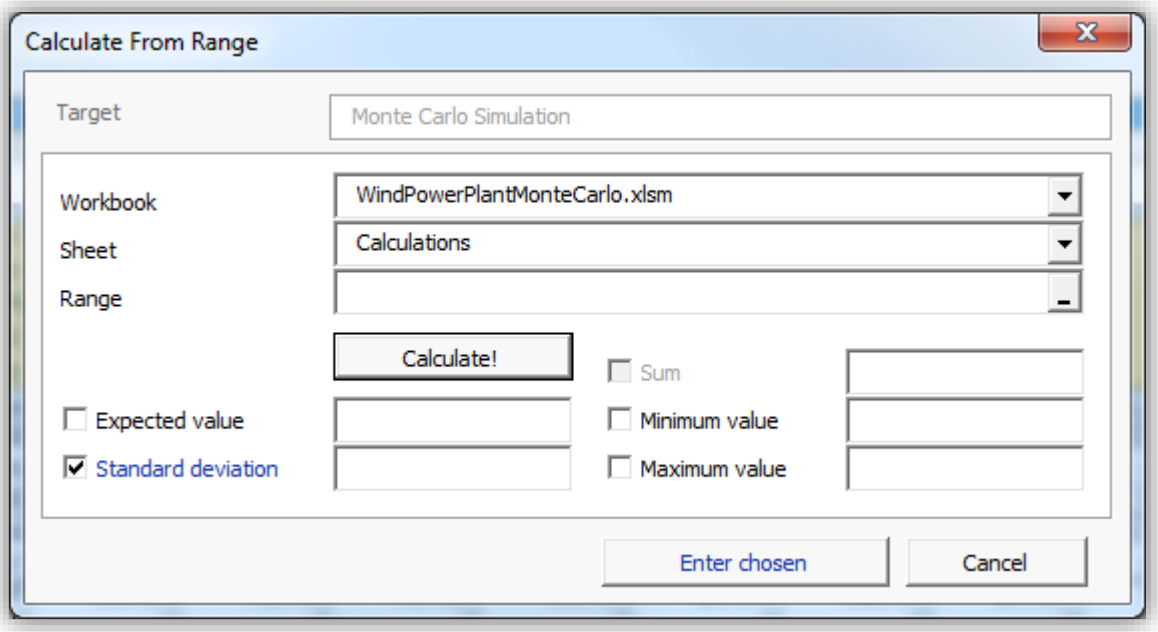
The cell value becomes the expected value. Enter minimum and maximum value for the selling price of electricity. We assume the price could go as down as 20 and as high as 60 in 2018.



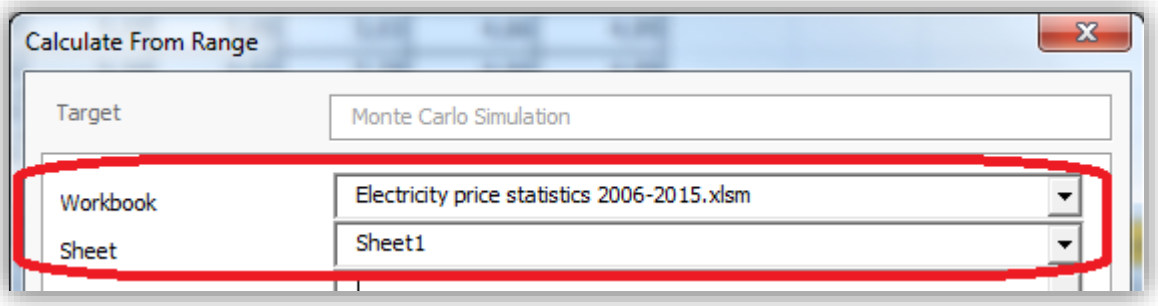
Let's assume that we don't know what the standard deviation of the selling price of electricity could be, but we have found statistical data of previous year's prices. We can easily calculate the standard deviation from this data. Press the "..." button by the standard deviation box.



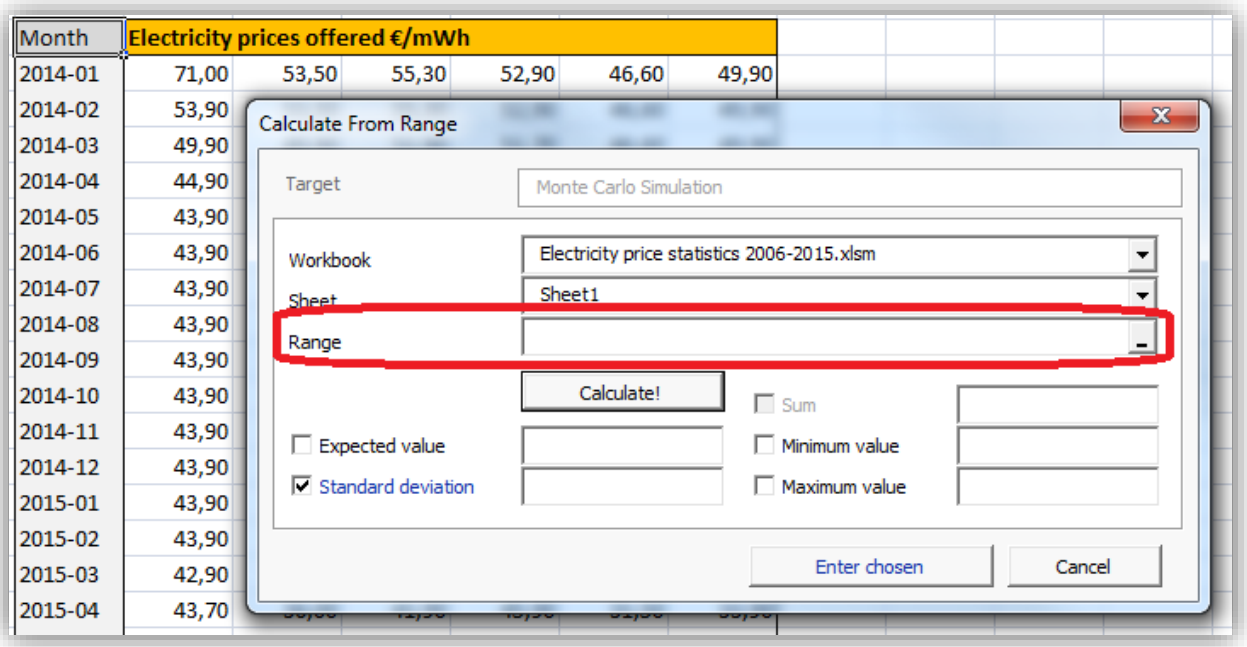
A dialog box for calculating standard deviation from a range of values is shown.

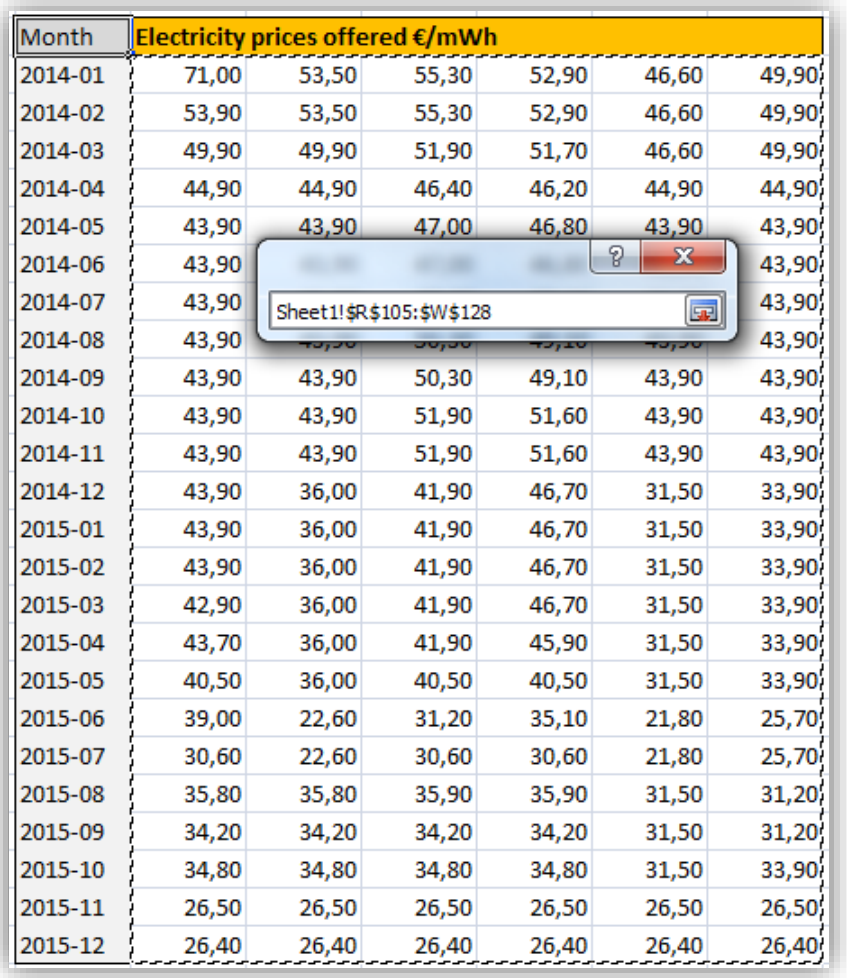


Choose the workbook and sheet with the price data.

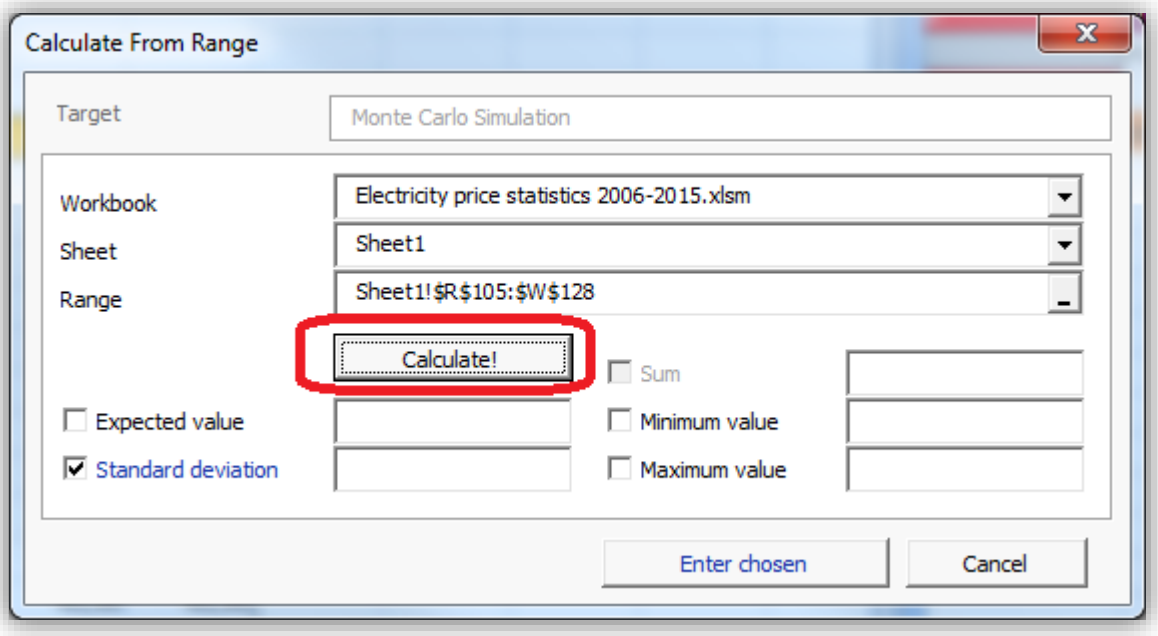


Put the cursor in the range field and select the range with the data from the sheet.

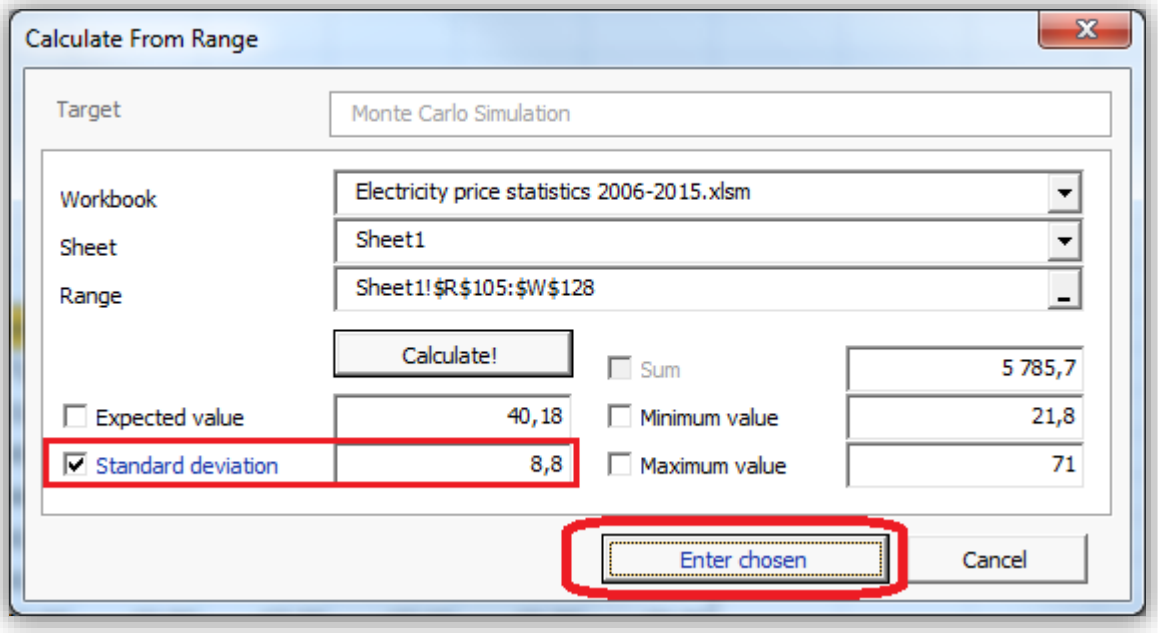




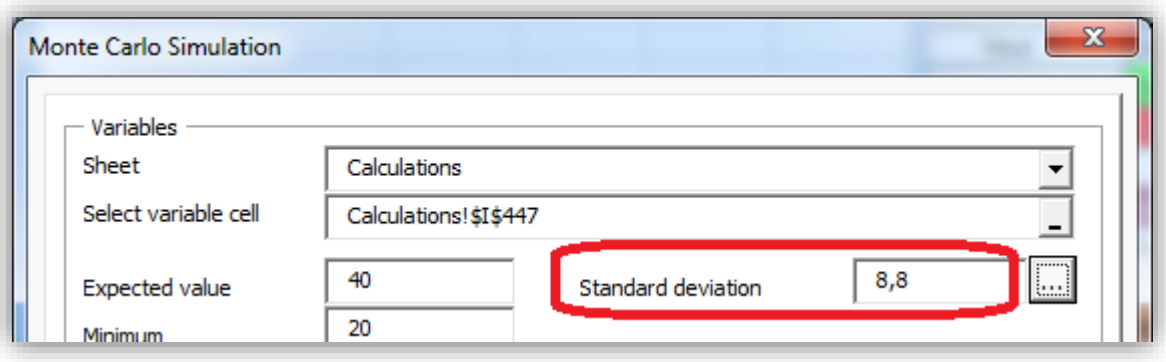
Press the “Calculate” button to calculate standard deviation.



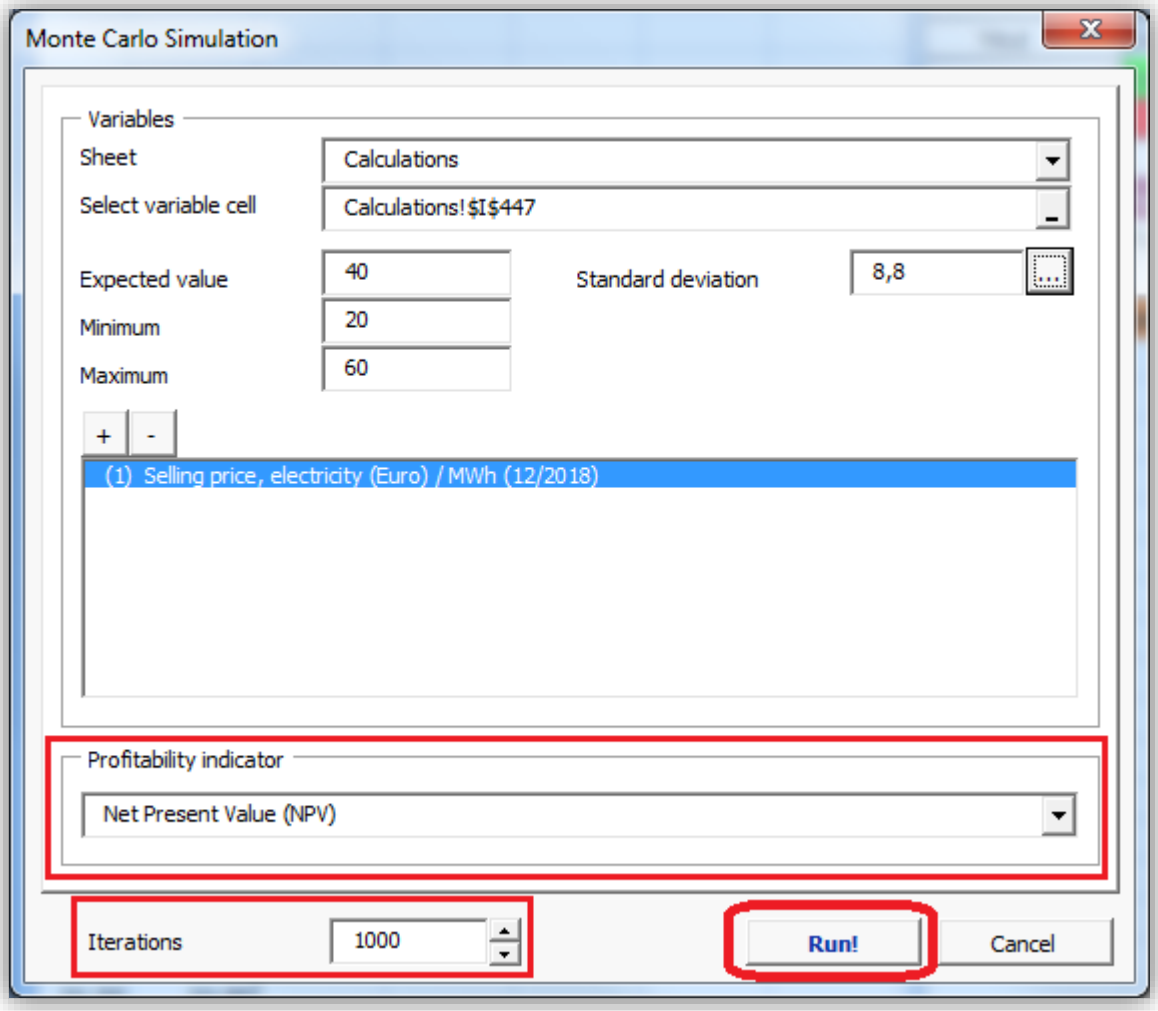
Standard deviation is calculated along with other supporting info.



We could choose to use other calculated values as well simply by checking the boxes in front of the text, but since the values are in line with what we already have specified, we will only include the Standard deviation. Press the “Enter chosen” button to enter the Standard deviation in the Monte Carlo Simulation form.

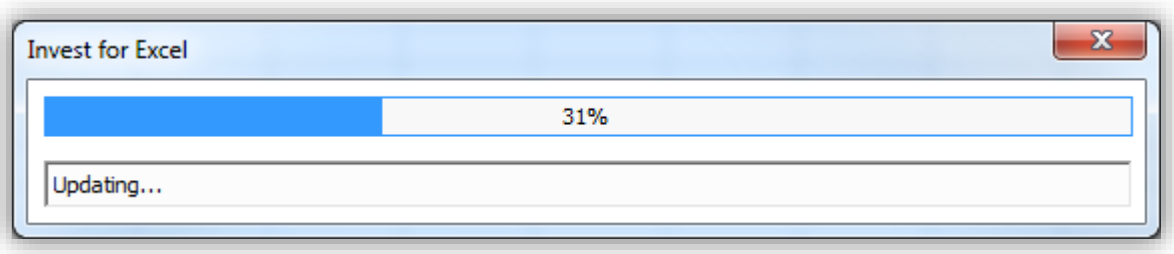


We could add more variables to the same simulation by pressing then "+" button, but we will keep this simulation simple and simulate selling price of electricity only.

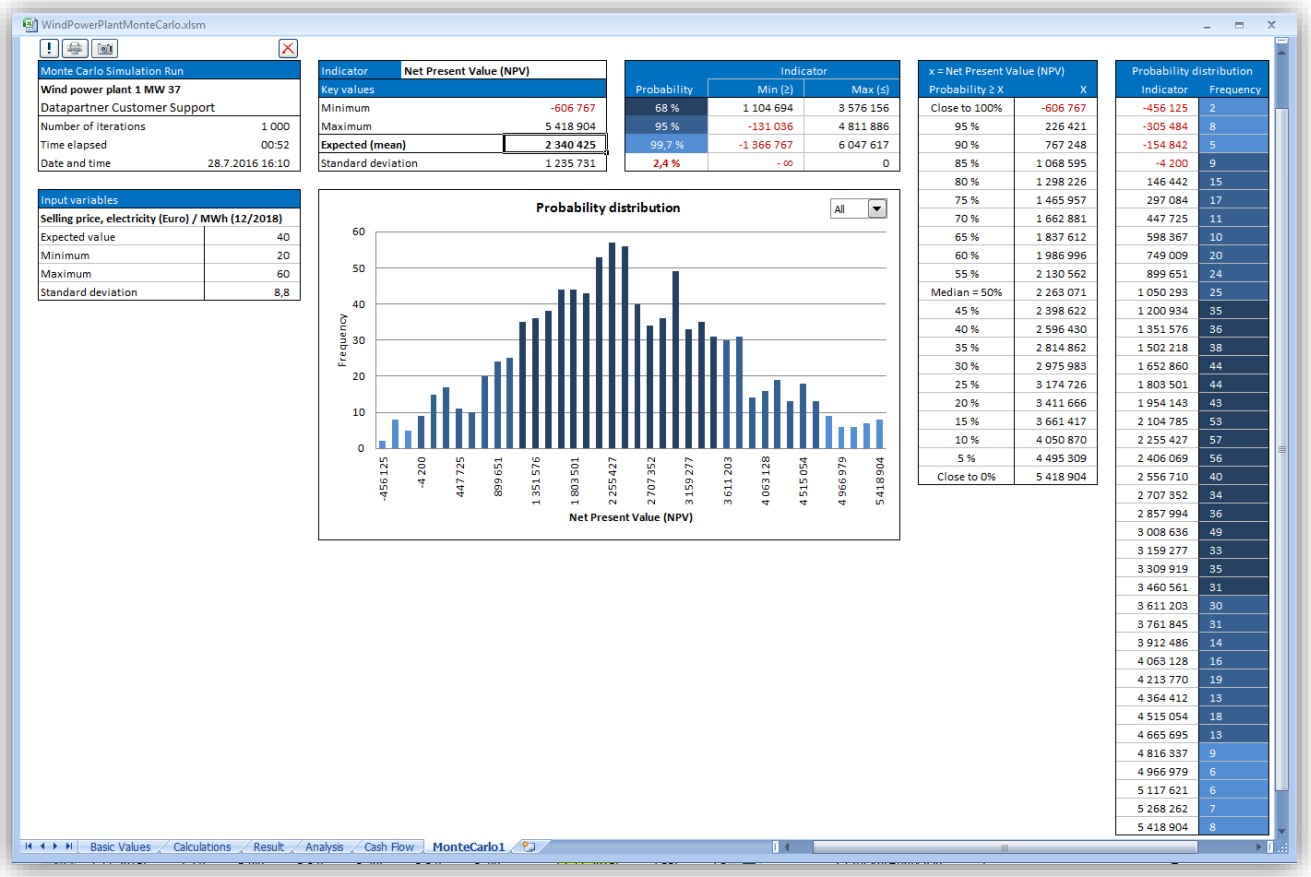


We will keep the default Profitability indicator Net Present Value (NPV) and keep Iteration at 1000. This means that 1000 random numbers between 20 and 60 are entered in variable cell and the resulting NPV is used in the Monte Carlo simulation distribution. Press the "Run" button to run the simulation.

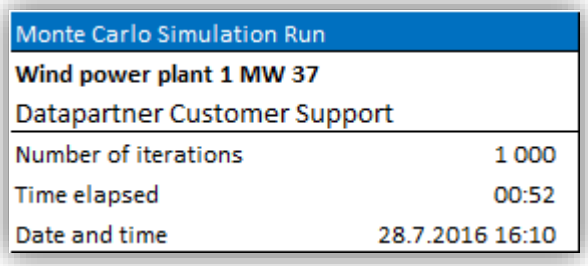
A progress bar is shown while the simulation is running. This could take several minutes.



When the simulation is ready, the result is shown in a new sheet.



At the upper left corner, general information is shown.



Below that, variable information is shown.

Input variables	
Selling price, electricity (Euro) / MWh (12/2018)	
Expected value	40
Minimum	20
Maximum	60
Standard deviation	8,8

The first box above the distribution chart shows the Net Present Value scenarios.

Indicator	Net Present Value (NPV)
Key values	
Minimum	-606 767
Maximum	5 418 904
Expected (mean)	**2 340 425**
Standard deviation	1 235 731

We can see that the minimum NPV found is -606 767 and the maximum NPV is 5 418 904.

The expected NPV is 2 340 425. When we compare to the Profitability analysis, we can see that this quite close to the calculated NPV.

PROFITABILITY ANALYSIS

Project description	**Wind power plant 1 MW 37**			€
Nominal value of all investments		3 610 000	Discounted investments	3 488 202
Required rate of return		9,00 %		
Calculation term		15,5	years	7/2017 - 12/2032
Calculation point		7/2017	(In the beginning of period)	

	Present value of business cash flows	Nominal	PV	Notes
±	PV of operative cash flow		5 884 314	
+	PV of residual value		29 605	
	Present value of business cash flows		**5 913 918**	
-	Present value of reinvestments	0	0	
	Total Present Value (PV)		**5 913 918**	
	Investment proposal	Nominal	PV	
-	Proposed investments in assets	-3 610 000	-3 488 202	
+	Investment subventions	0	0	
	Investment proposal	-3 610 000	-3 488 202	

Net Present Value (NPV)	**2 425 716**	>= 0	->	profitable
NPV as a monthly annuity	23 720			
Internal Rate of Return (IRR)	18,35 %	>= 9 %	->	profitable
Modified Internal Rate of Return (MIRR)	12,78 %	>= 9 %	->	profitable
Profitability Index (PI)	1,70	>= 1	->	profitable
Payback time, years	7,8	Based on discounted FCF		

The standard deviation is 1 235 731 and tells about the variation of the NPV values.

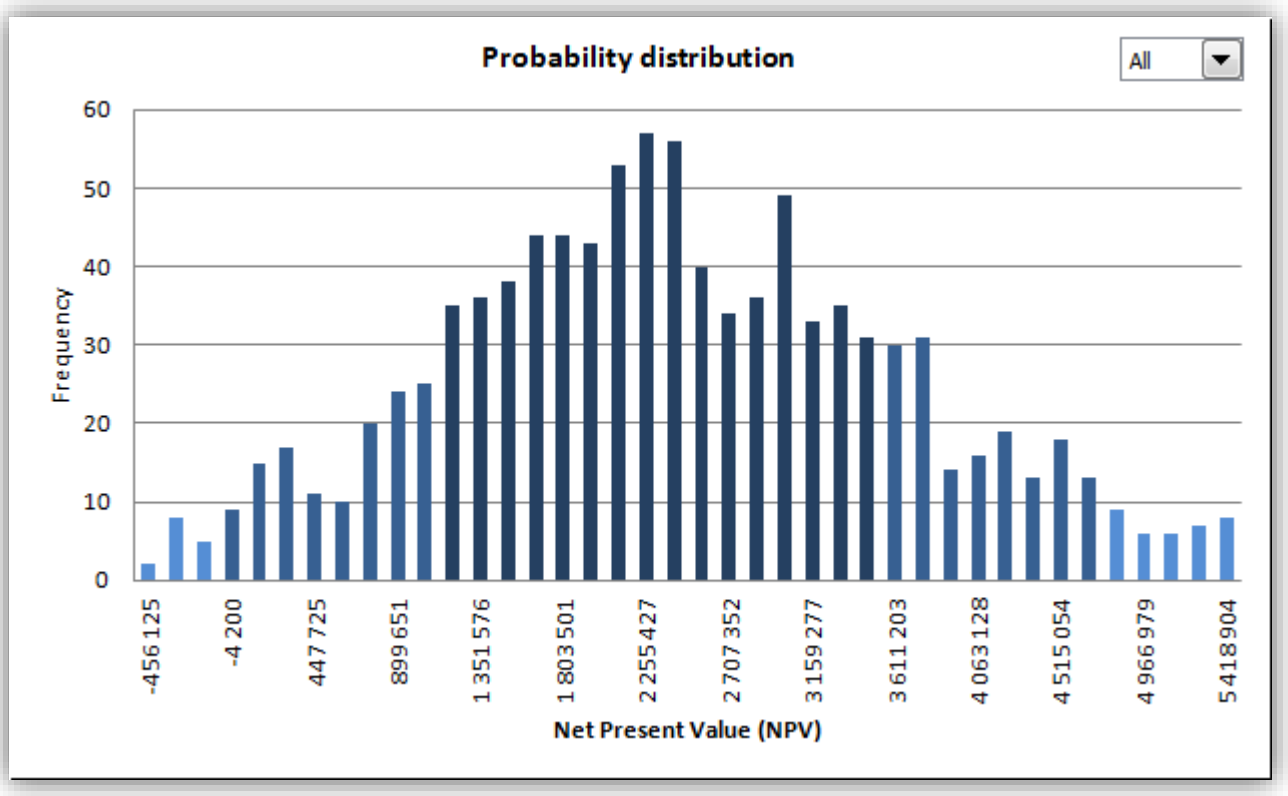
	Indicator	
Probability	Min (≥)	Max (≤)
68 %	1 104 694	3 576 156
95 %	-131 036	4 811 886
99,7 %	-1 366 767	6 047 617
2,4 %	- ∞	0

- There is a 68 % probability that the NPV will be between 1 104 694 and 3 576 156. This is equal to Expected NPV -+ Standard deviation.
- There is a 95 % probability that the NPV will be between -131 036 and 4 811 886. This is equal to Expected NPV -+ 2 * Standard deviation.
- There is a 99,7 % probability that the NPV will be between -1 366 76 and 6 047 617. This is equal to Expected NPV -+ 3 * Standard deviation.
- There is a 2,4 % probability that NPV will be negative.

The following table shows probabilities of NPV values exceeded. For example, there is a 95 % probability that NPV will exceed 226 421.

x = Net Present Value (NPV)	
Probability ≥ X	X
Close to 100%	-606 767
95 %	226 421
90 %	767 248
85 %	1 068 595
80 %	1 298 226
75 %	1 465 957
70 %	1 662 881
65 %	1 837 612
60 %	1 986 996
55 %	2 130 562
Median = 50%	2 263 071
45 %	2 398 622
40 %	2 596 430
35 %	2 814 862
30 %	2 975 983
25 %	3 174 726
20 %	3 411 666
15 %	3 661 417
10 %	4 050 870
5 %	4 495 309
Close to 0%	5 418 904

The chart shows distribution of the 1000 calculated NPV values.



The dropdown menu can be used to show different probabilities separately.

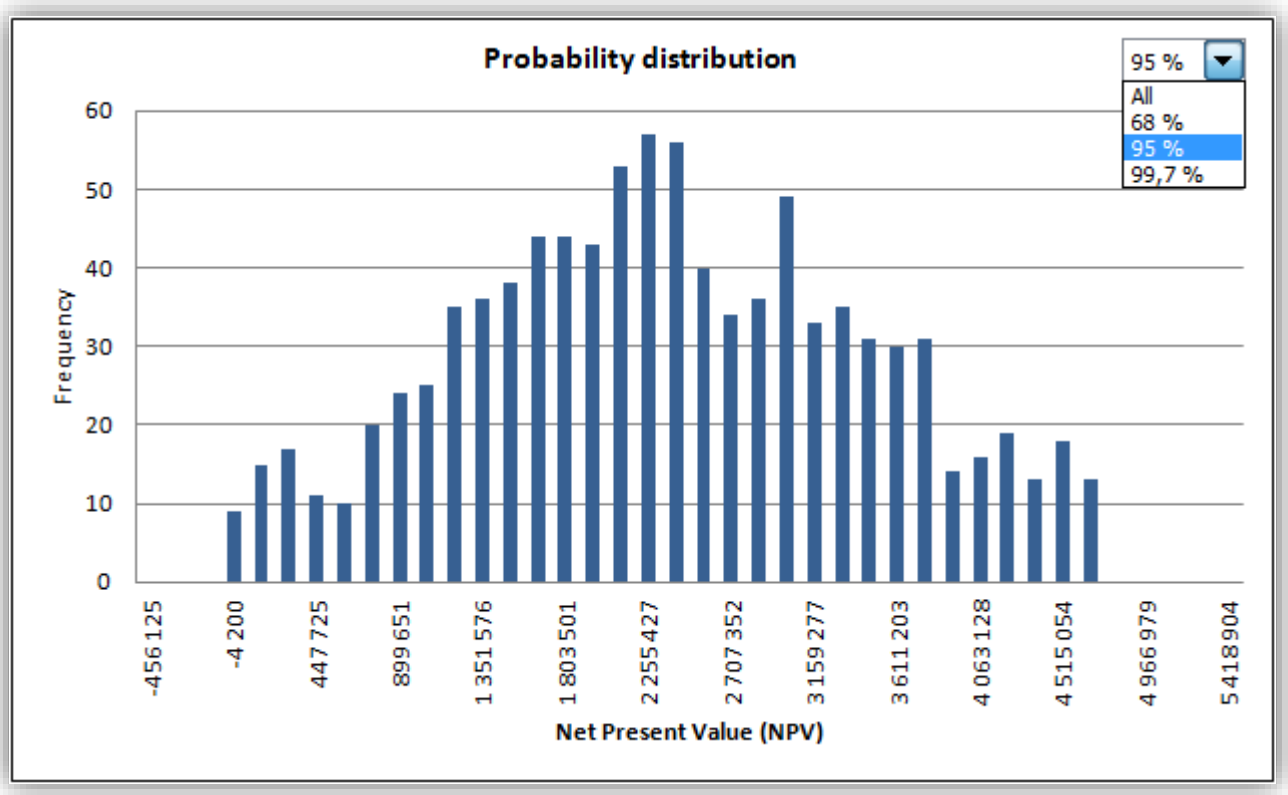
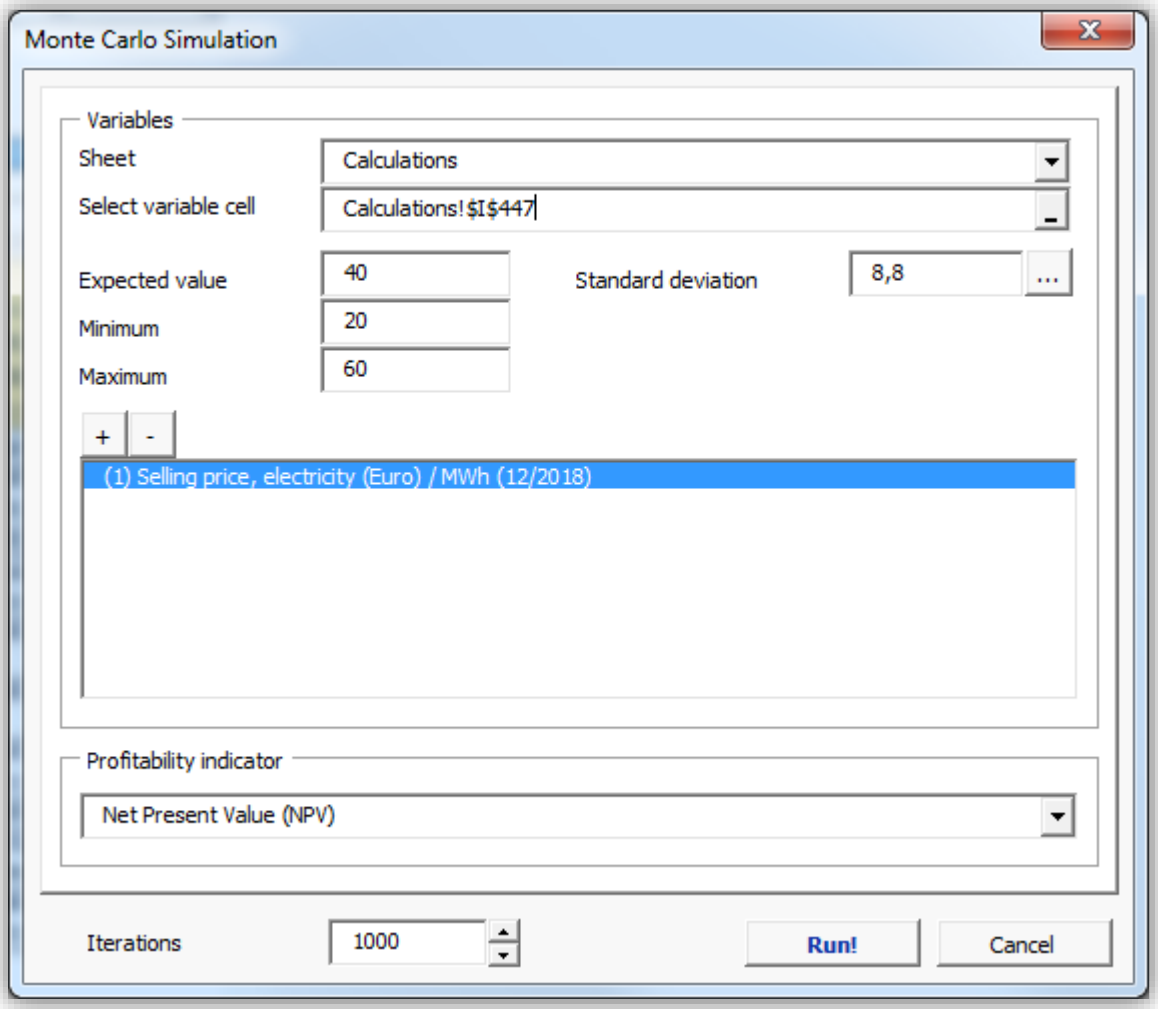


Chart values are also shown in table form.

Probability distribution	
Indicator	Frequency
-456 125	2
-305 484	8
-154 842	5
-4 200	9
146 442	15
297 084	17
447 725	11
598 367	10
749 009	20
899 651	24
1 050 293	25
1 200 934	35
1 351 576	36
1 502 218	38
1 652 860	44
1 803 501	44
1 954 143	43
2 104 785	53
2 255 427	57
2 406 069	56
2 556 710	40
2 707 352	34
2 857 994	36
3 008 636	49
3 159 277	33
3 309 919	35
3 460 561	31
3 611 203	30
3 761 845	31
3 912 486	14
4 063 128	16
4 213 770	19
4 364 412	13
4 515 054	18
4 665 695	13
4 816 337	9
4 966 979	6
5 117 621	6
5 268 262	7
5 418 904	8

The buttons in the upper left corner can be used to change, print , copy and delete the simulation.

Update the simulation. You can change, add and remove variable values if wanted. The Monte Carlo Simulation dialog box is shown.



Print the simulation sheet.

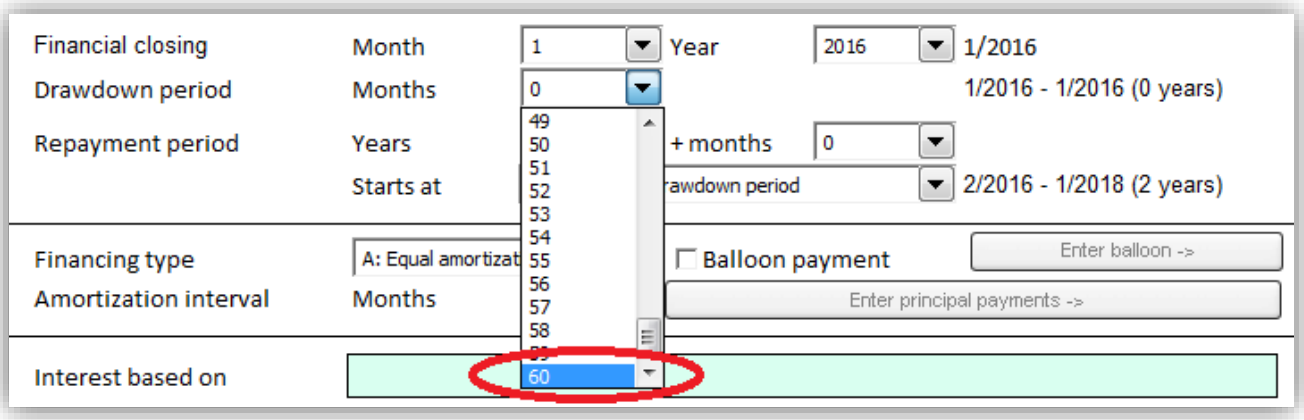
Copy a picture of the simulation. When only one cell is selected, the whole sheet is copied. When more than one cell is selected, the selection is copied. This way you can easily select and copy any part of the simulation result.

Delete the simulation.

Monte Carlo simulation is only available in English.

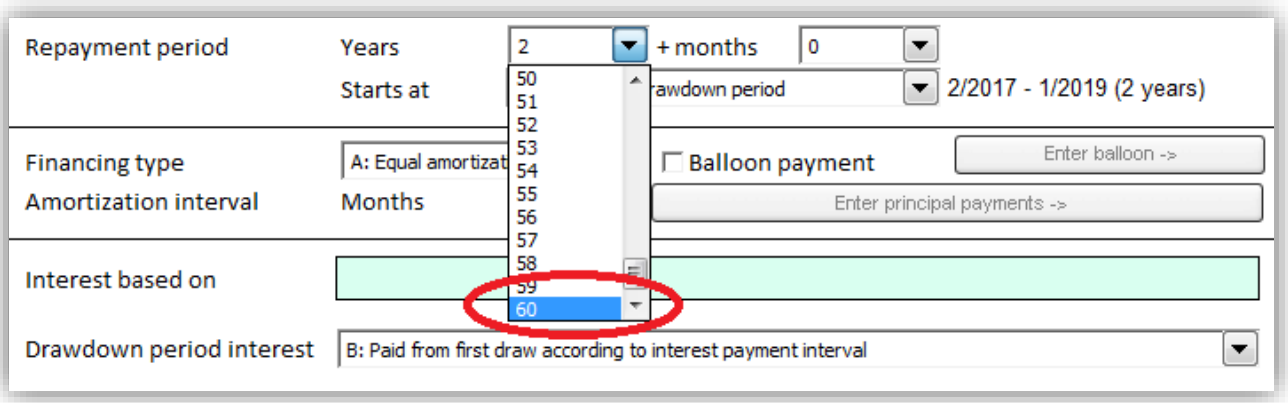
Drawdown period length in Financing file

The maximum drawdown period for a loan in Financing file is 60 months.



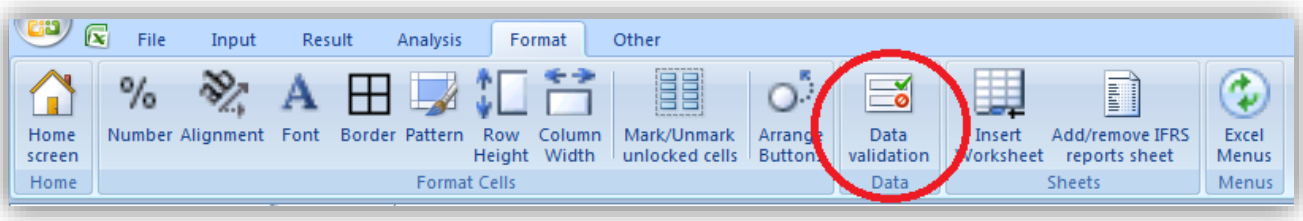
Maximum loan term in Financing file

The maximum loan term for a loan in Financing file is 60 years.

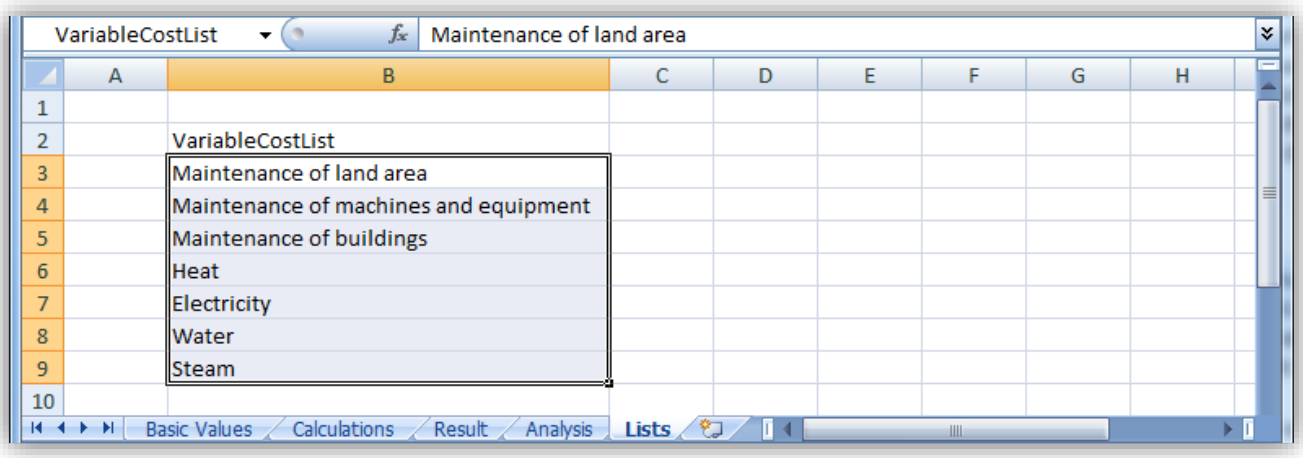


Data validation

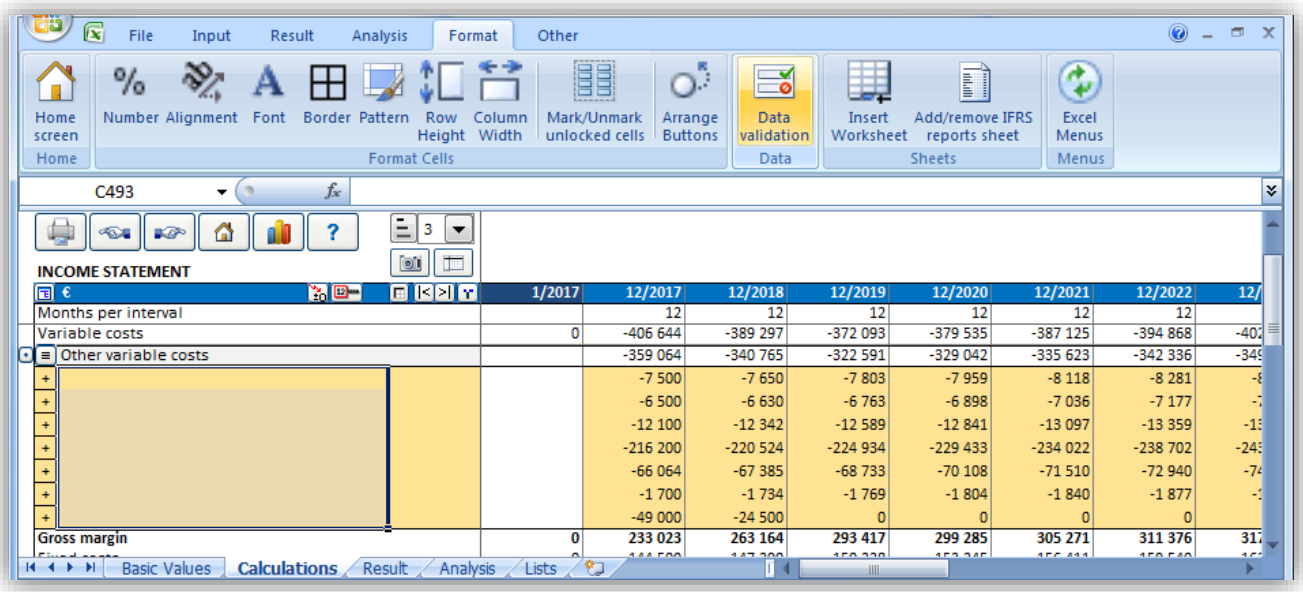
Data validation can be accessed from the Invest for Excel Format menu.



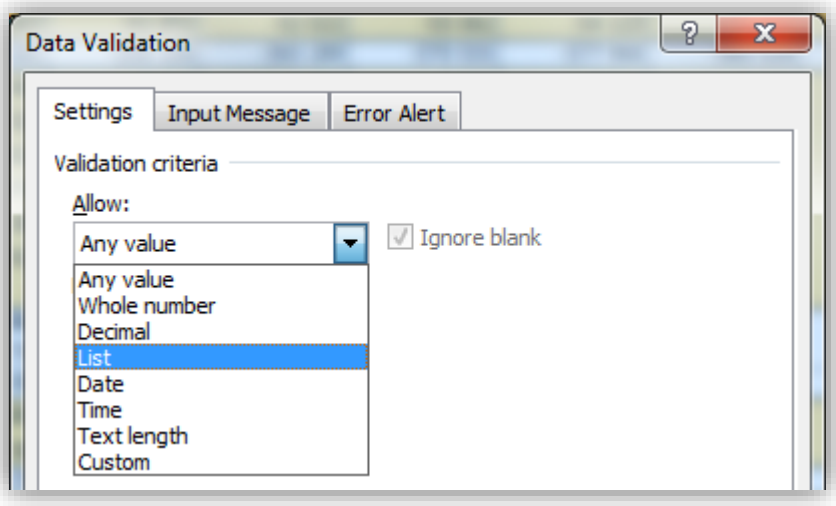
If you want to use Data validation to choose from lists, create the list on a new worksheet and name the list range. Example:



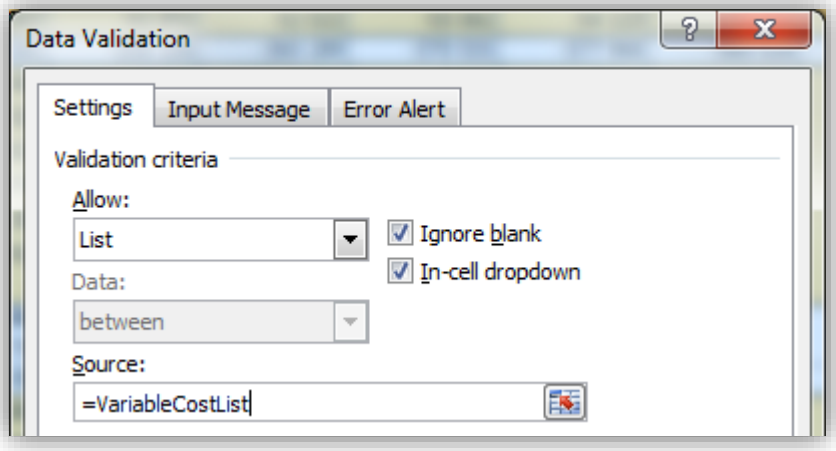
Select the cell or range where you want to use the list and press “Data validation” in the Invest for Excel Format menu.



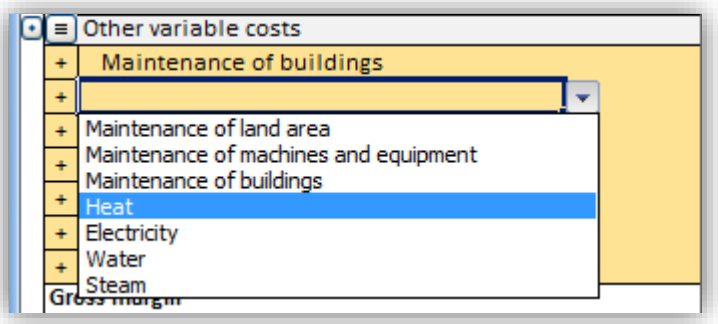
Choose list in the Data validation dialog box.



Enter created range.



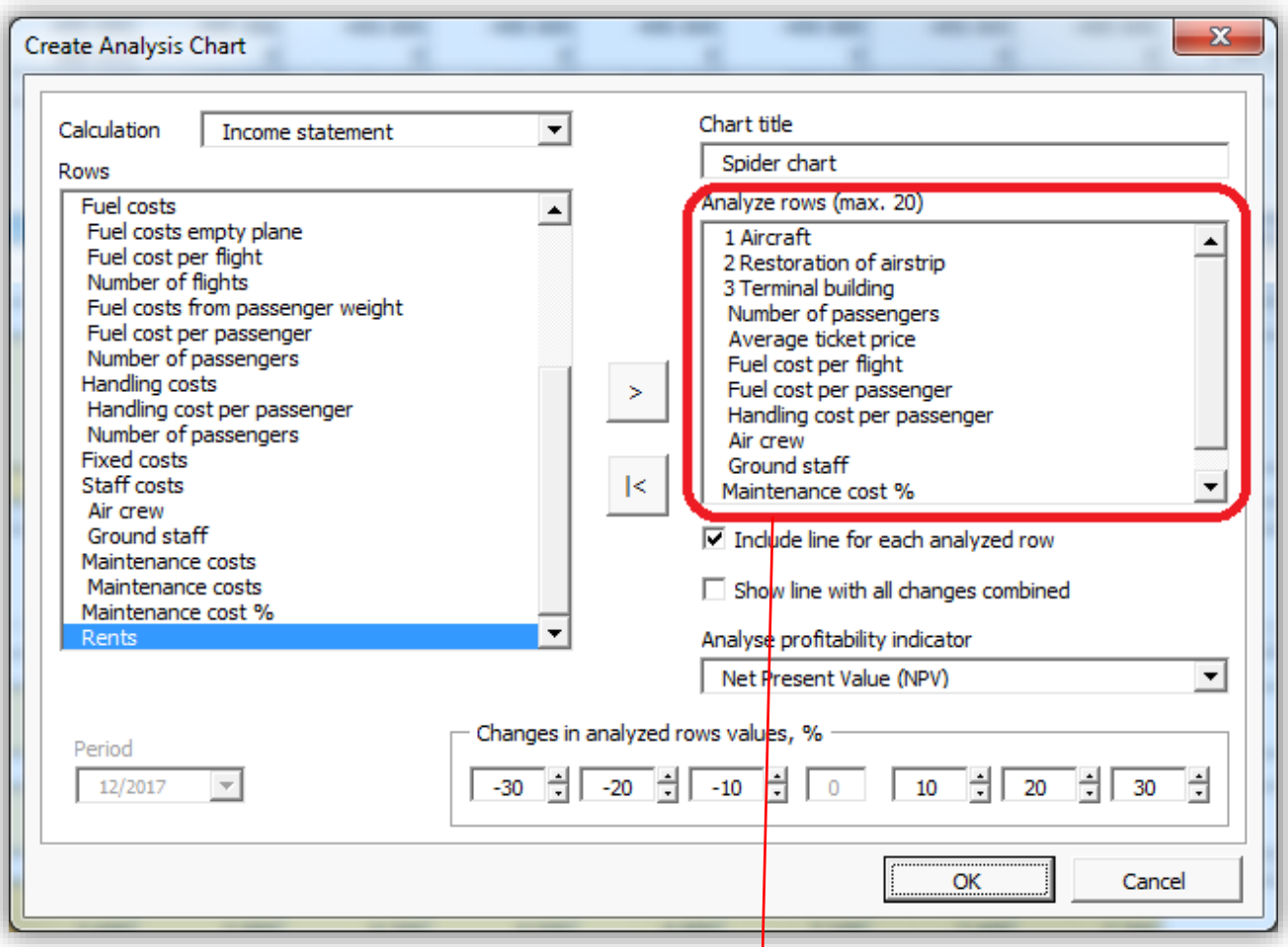
Your Data validation list is ready to be used.

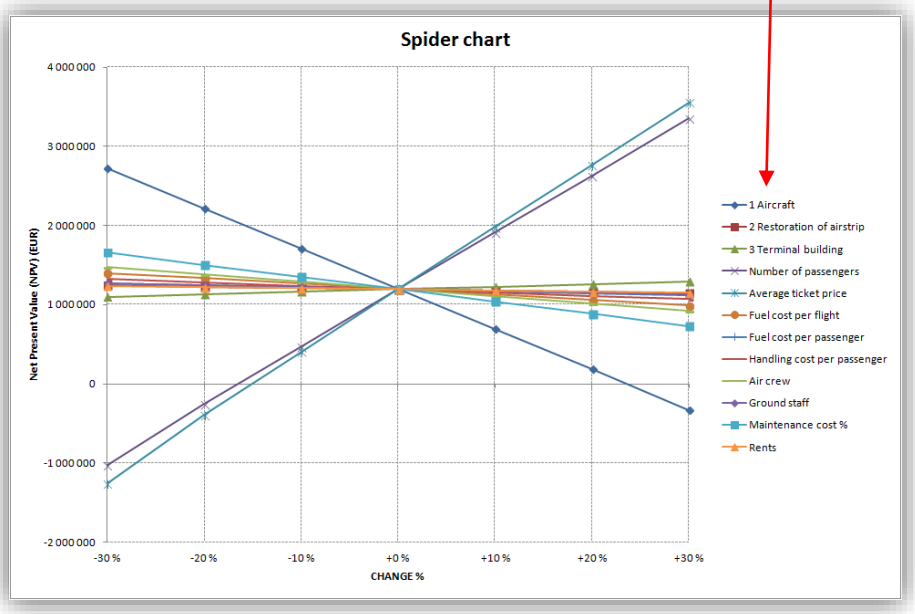


NOTE! Be careful when you use “Data validation” to restrict input cell entries, so that software functionality is not impaired.

Analysis chart can include 20 variables

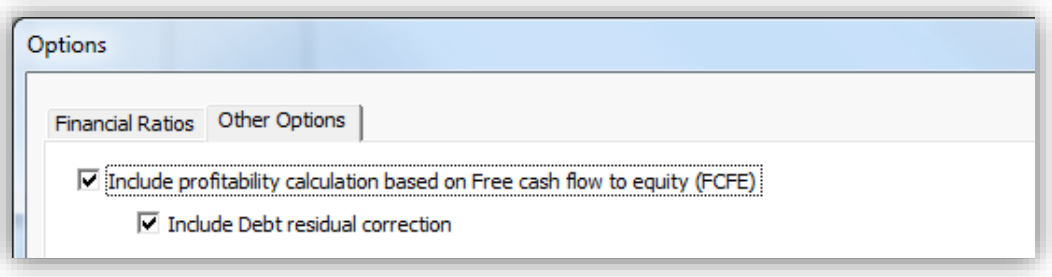
An analysis chart (Spider or Tornado) can include up to 20 variables.

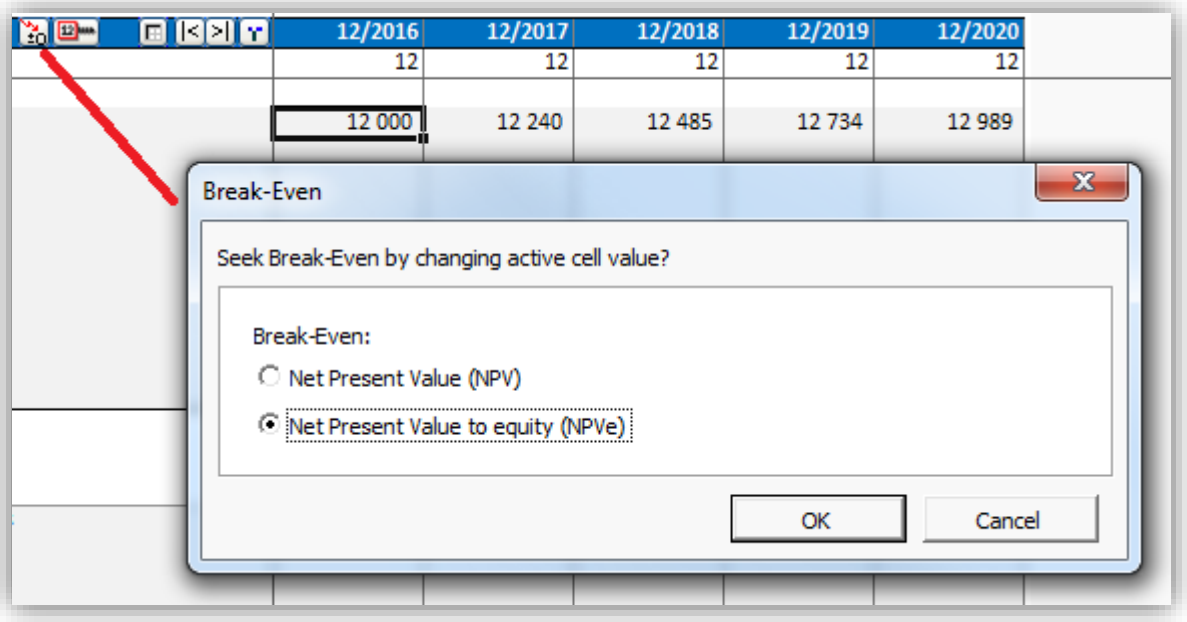




Break even to NPV/NPVe

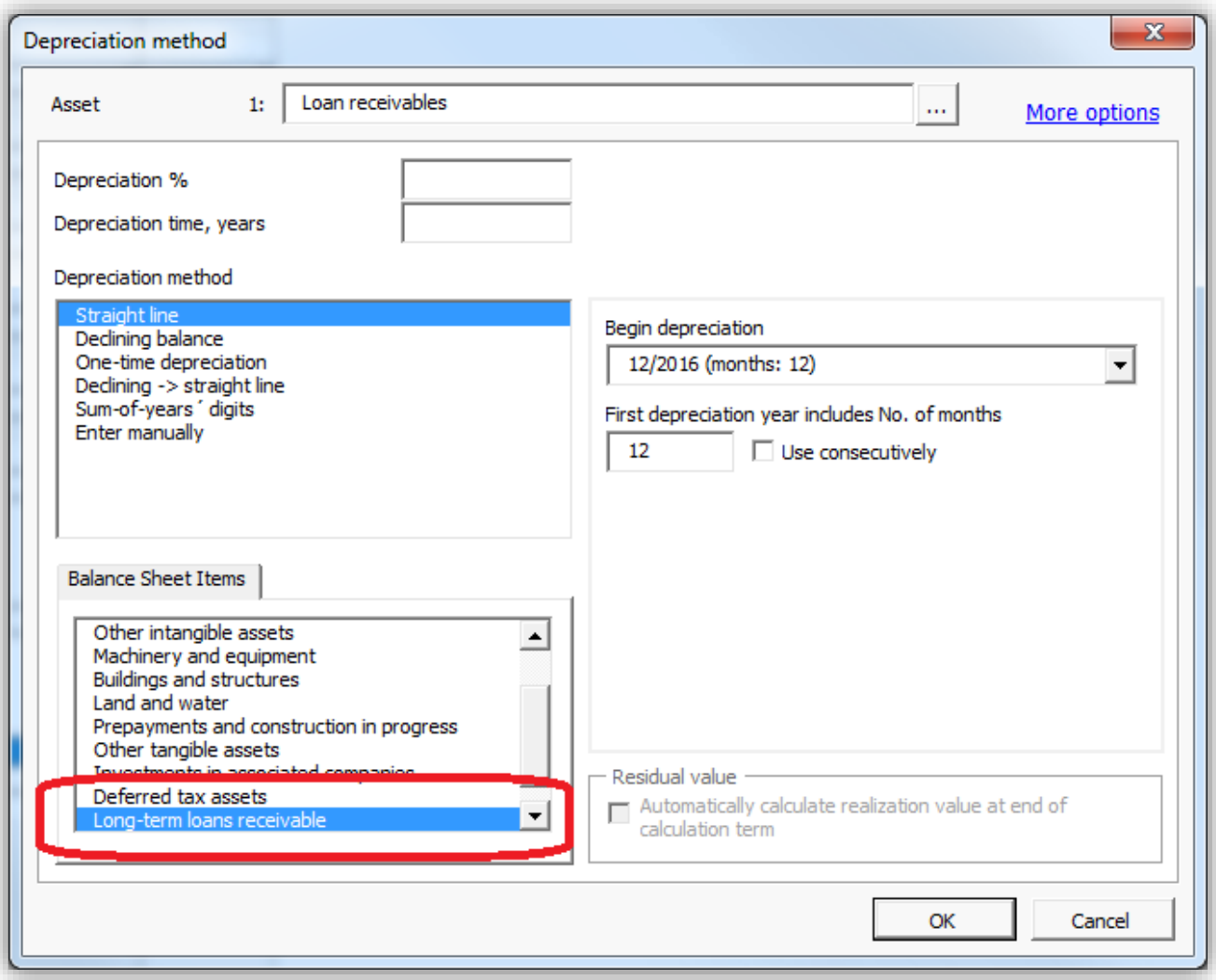
When profitability calculation based on Free cash flow to Equity is included in the calculation file in Invest for Excel program options you can choose to seek Break even for Net Present Value (NPV) or Net Present Value to equity (NPVe).





Long-term loans receivables

When you choose “Long-term loans receivables” from the “Balance Sheet Items” list in the “Depreciation method” dialog box, you can make capital changes to the asset without generating realisation profit or loss.



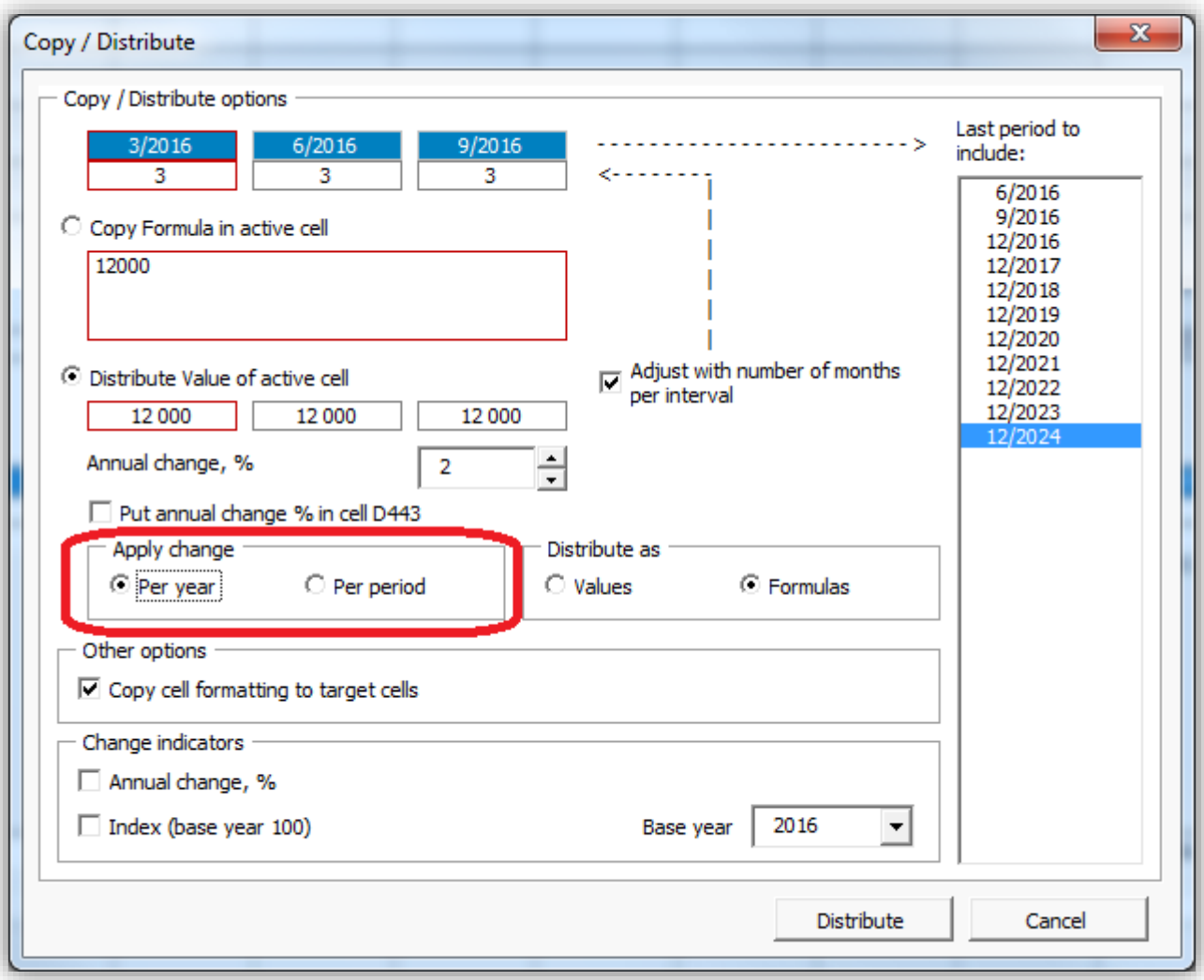
INVESTMENTS (-) / REALIZATIONS (+)

Imputed depreciation	Depr.-%	12/2016	12/2017	12/2018	12/2019	12/2020
Months per interval		12	12	12	12	12
1 **Loan receivables**		**-250 000**		**100 000**		**150 000**
Depreciation (straight line)						
Book value		250 000	250 000	150 000	150 000	0
Investments		**-250 000**	**0**	**100 000**	**0**	**150 000**
Realizations		0	0	0	0	0
Depreciation		0	0	0	0	0
Realization profit (+) / loss (-)		0	0	0	0	0
Book value		250 000	250 000	150 000	150 000	0

Copy/Distribute – change options

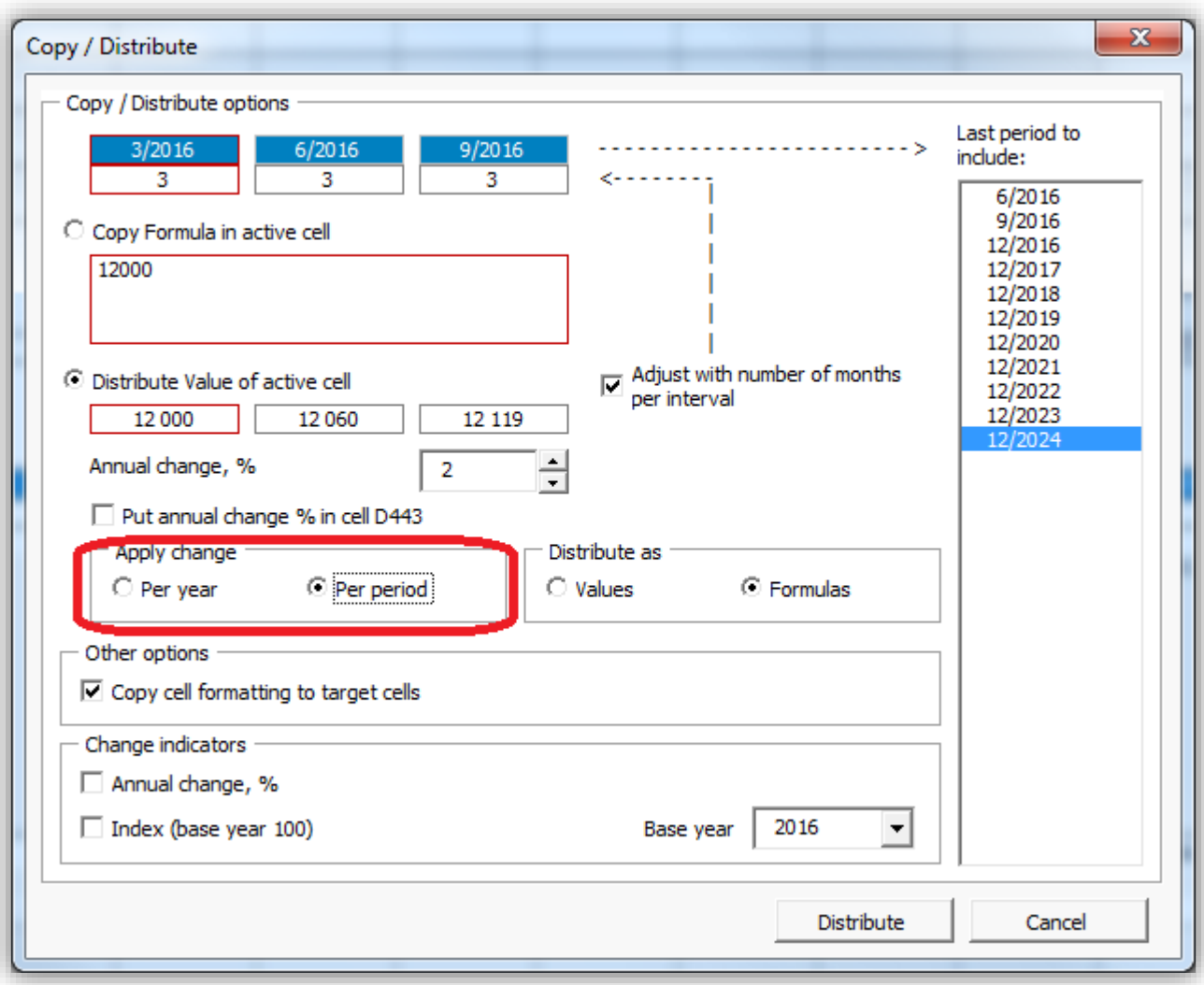
Distribution change percentage can be applied per year or per period.

When “Per year” is chosen, the change is applied when a new financial year starts.



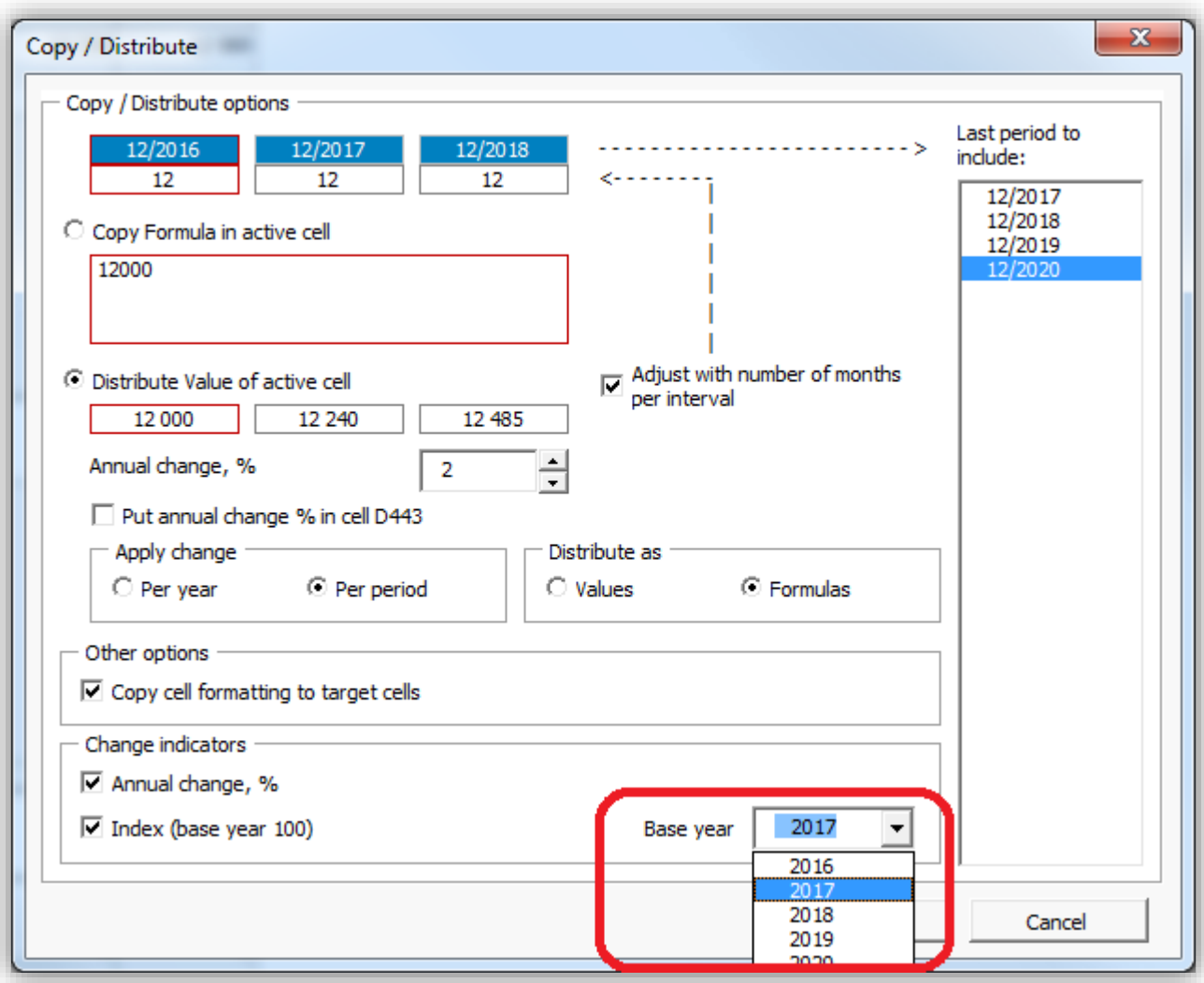
	3/2016	6/2016	9/2016	12/2016	12/2017	12/2018
Months per interval	3	3	3	3	12	12
Income specified:						
Sales	12 000	12 000	12 000	12 000	48 960	49 939

When “Per period” is chosen, the change is applied every period.



	3/2016	6/2016	9/2016	12/2016	12/2017	12/2018
Months per interval	3	3	3	3	12	12
Income specified:						
Sales	12 000	12 060	12 119	12 180	49 693	50 686

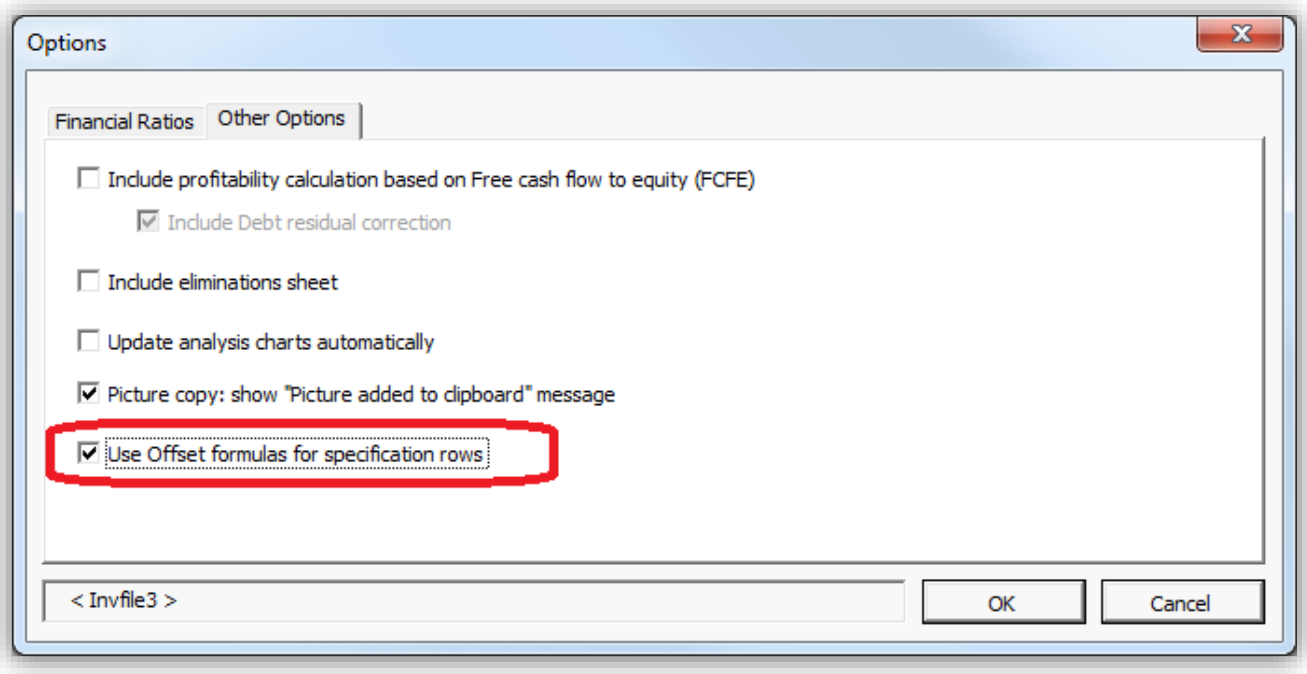
Base year can be selected for Index.



	12/2016	12/2017	12/2018	12/2019	12/2020
Months per interval	12	12	12	12	12
Income specified:					
Sales	12 000	12 240	12 485	12 734	12 989
Change, yearly %		2,0 %	2,0 %	2,0 %	2,0 %
Index (base year 100)		100	102	104	106

Use Offset formulas for specification rows

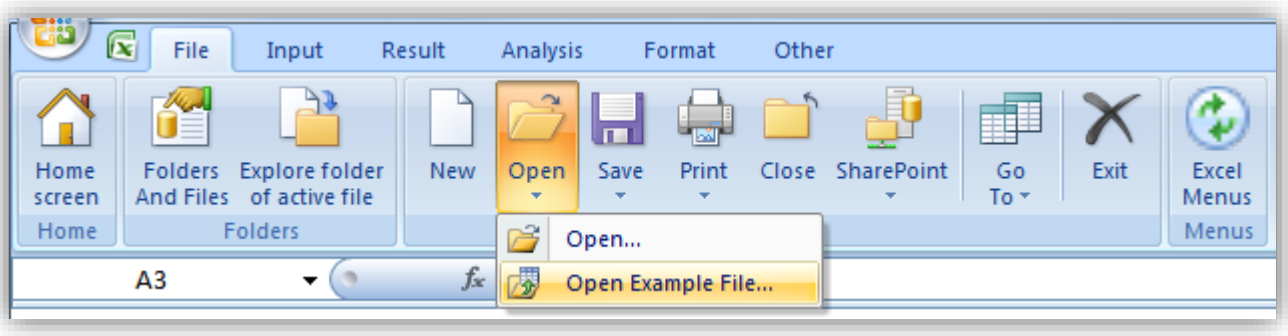
As an option you can use Offset formulas for specification rows.



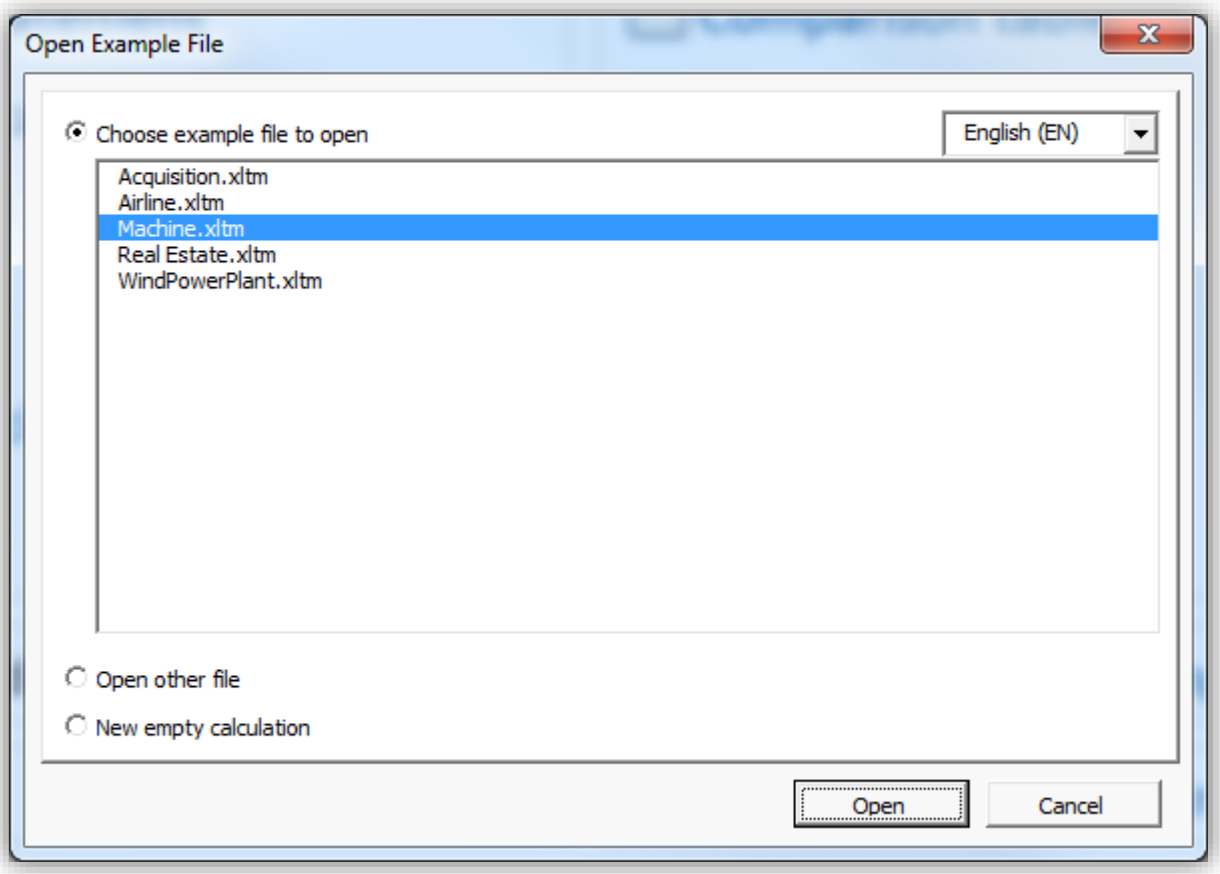
Offset formulas are safer and can handle cut and paste but are also much slower to calculate. Normal direct-reference formulas will break when cut and paste is used, but are much faster to calculate.

Open example file

Example files can easily be opened from the Invest for Excel menu.

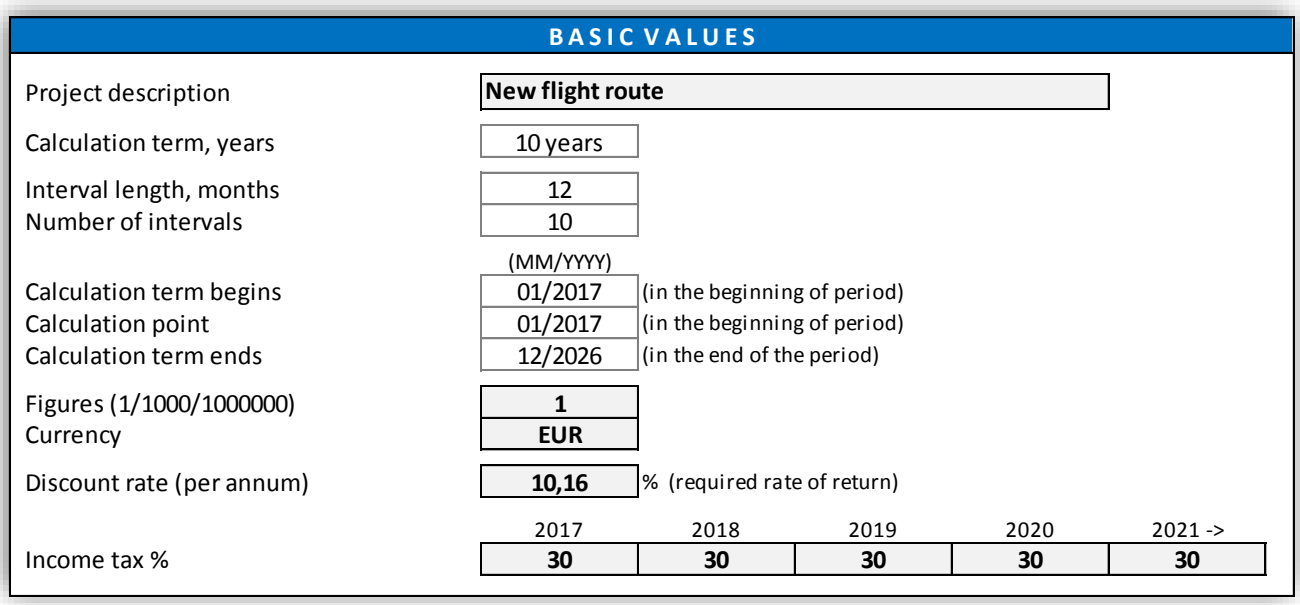


You can choose from available files per language.



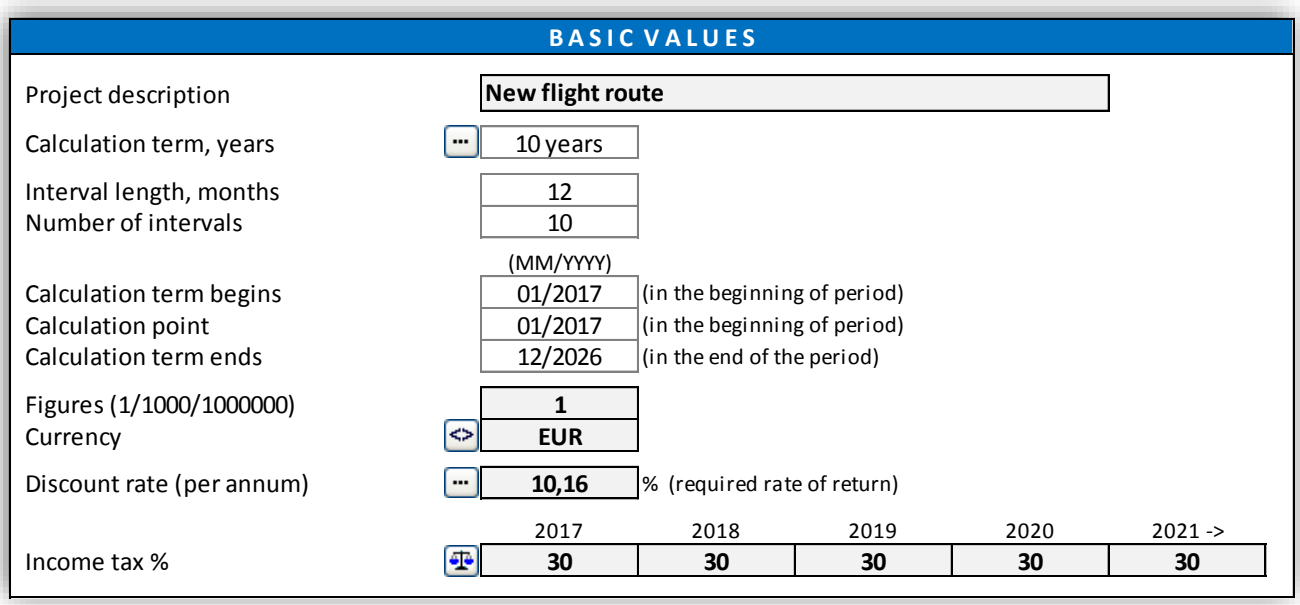
Camera shot with Shift key

By default, no program buttons etc. are included when you copy a table to clipboard using the Camera shot button.



BASIC VALUES						
Project description	**New flight route**					
Calculation term, years	10 years					
Interval length, months	12					
Number of intervals	10					
	(MM/YYYY)					
Calculation term begins	01/2017	(in the beginning of period)				
Calculation point	01/2017	(in the beginning of period)				
Calculation term ends	12/2026	(in the end of the period)				
Figures (1/1000/1000000)	**1**					
Currency	**EUR**					
Discount rate (per annum)	**10,16**	% (required rate of return)				
	2017	2018	2019	2020	2021 ->	
Income tax %	**30**	**30**	**30**	**30**	**30**	

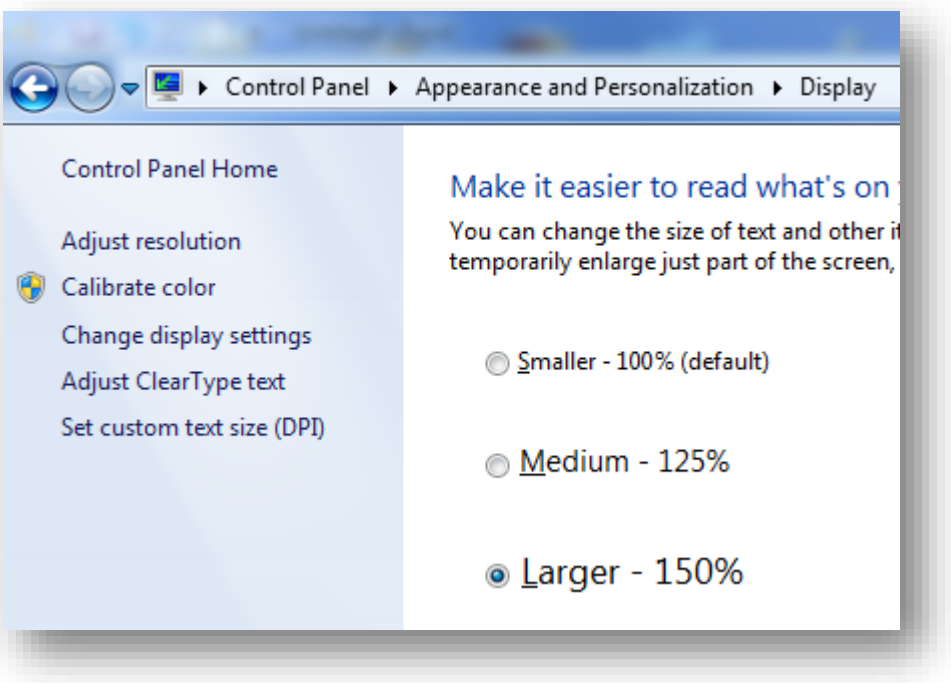
If you want to include program buttons, press Shift key when you click the Camera shot button.



BASIC VALUES						
Project description	**New flight route**					
Calculation term, years	10 years					
Interval length, months	12					
Number of intervals	10					
	(MM/YYYY)					
Calculation term begins	01/2017	(in the beginning of period)				
Calculation point	01/2017	(in the beginning of period)				
Calculation term ends	12/2026	(in the end of the period)				
Figures (1/1000/1000000)	**1**					
Currency	**EUR**					
Discount rate (per annum)	**10,16**	% (required rate of return)				
	2017	2018	2019	2020	2021 ->	
Income tax %	**30**	**30**	**30**	**30**	**30**	

Scaling

Scaling issues have been addressed when Windows display scaling is used.



On-sheet buttons and other objects keep their sizes and stay where they should be. This is especially important when a Windows 10 laptop with high-resolution (4k) screen is used combined with a large desktop monitor.

Note that when you copy pictures of tables or charts using the Camera shot button, the picture may still scale wrong when you paste it. This is caused by a bug in Office and needs to be fixed by Microsoft.