# Refurbishment of Apartments – how do you calculate?

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To calculate a refurbishment of an apartment sounds pretty simple – you have costs and the advantage of increase in rental income. To figure out, how difficult it might be in reality and which assumptions are crucial and which are less important, is the main issue of this report.

## Refurbishment costs and life expectancy

### Refurbishment Costs

The first important basic point of a calculation regarding refurbishments of apartments is the assumption about the costs. Thinking about a refurbishment of an apartment we shall divide our measurements into two categories. The first category consists of the essential measurements which have to be done to let this apartment once again and the second category consists of the additional refurbishment measures we want to do due to a higher rental income. In the case of an occupied apartment there are often no essential measurements but if we refurbish occupied apartments we have to take abatement of rent during the measurement into consideration. If the apartment is vacant we often have to consider a loss of rental income due to vacancy during the refurbishment measure. The costs shall be fixed or bounded before we start our refurbishment measure. If the costs are not fixed their might be some deviation in the costs which effects our investment risk. The costs shall be traceable regarding each measurement for example there shall be an amount of costs for painting, sanitary equipment, the floor and so on.

### Life expectancy

The second important basic point is the assumption about the life expectancy of the refurbishment measure. Standard life expectancy information is often given for each single installation or material by the fabricant. On the one hand assuming a too long life expectancy might turn a good looking investment into a bad one and on the other hand assuming a too

short expectancy we maybe forgo a good one. The life expectancy of housing components differs as the components differs. The effects concerning life expectancy can be compact described as following:

"The life expectancies of the components of a home depend on the quality of installation, the level of maintenance, weather and climate conditions, and the intensity of use. Some components may remain functional but become obsolete to changing styles and preferences or improvements in newer products while others may have a short life expectancy due to intensive use." (NAHB, Study of Life Expectancy of Home Components, February 2007, published on the web)

# Cash flow advantage

### New rent and rental development

The third important assumption is about the new rental level. If we think about an occupied apartment (in Germany) and we do some kind of modernization the annual rent may be increased by 11 per cent of the modernization cost by law. In this case we have to consider if the tenant is willing to pay this new rent or if he uses his special right to cancel his contract in this case. The other question is about how high the rent of a new letting of this apartment might be, unaffected if he cancels the contract now or in some years. For a vacant apartment we have to compare a possible letting of the apartment with minimal essential refurbishment measures to the letting of the apartment regarding our planned refurbishment. Planning a new rent for a vacant apartment is the most risky issue while calculating a refurbishment of an apartment.

### Running maintenance costs

Additional to a higher rental income there might be an advantage in lower running maintenance cost for a refurbished apartment. For example it might not be necessary to refurbish a bathroom, but it surely has to be refurbished earlier than a bathroom we modernize today.

### Vacancy rate, fluctuation and inflation

Refurbishing an apartment changes for sure vacancy and fluctuation rate of it in the future. Often it is good enough to use the experienced vacancy and fluctuation rate for it or in general for an object. Only if the change of the vacancy or fluctuation rate is immense it would be of relevance. The time the apartment may be vacant during the refurbishment measure should be considered as refurbishment cost. A possibly good estimation of the future inflation rate might be the average of the last 5 or 10 years.

# Calculation, Risks and Deviation

## Calculation

Before we start to calculate we need all the above mentioned information. Normally there is more than one measure included in a refurbishment of an apartment. Each measure has its own life expectancy, cost and delivers a part of the expected cash flow advantage. It would be cumbersome to think of each small measurement on its own and estimate a cash flow advantage for it. Further it is not even more exact in the result due to the fact that the new rent is assumed on base of experience and comparison to similar apartments in one building or in an area. Therefore we shall not ignore the differences in the measurements but we should bring them together into one complete measurement. The costs are simply added up and the life expectancy shall be the average of the life expectancies weighted regarding their costs.

| Measures | Gross refurbishment costs | | | Life expectancy | |
|---|---|---|---|---|---|
| | Total | Required refurbishment | Invest | Assumption | Standard |
| painter | 2 700 | 0 | 2 700 | 3 | 5 |
| sanitary | 4 300 | 2 300 | 2 000 | 20 | 20 |
| floor | 2 400 | 0 | 2 400 | 13 | 15 |
| kitchen | 1 200 | 0 | 1 200 | 15 | 15 |
| electricity | 1 300 | 1 300 | 0 | 35 | 35 |
| others | 0 | 0 | 0 | 20 | 20 |
| Total | 10 000 | 3 600 | 6 400 | 15 | 17 |

*Calculation Example; cost and life expectancy.*

The new rent shall be considered for the whole refurbished apartment. Again we shall estimate a new rent for the apartment with only essential refurbishment measures and a new rent for the apartment wit our planned refurbishment measures. In an occupied apartment the rent we are comparing with is the current rent paid by the tenant. It might be also of interest if we have a look on the old rent of a previous tenant. Further we shall have a closer look on the current market situation itself.

| | per month | per m² |
|---|---|---|
| old rent | 500,00 | 10,00 |
| new rent without modern. | 550,00 | 11,00 |
| new rent with modern. | 600,00 | 12,00 |
| rent increase due to modern. | 50,00 | 1,00 |

*Example for a 50 square meter apartment.*

Considering vacancy we have to reduce our cash flow advantage by the same rate and considering reduces of running maintenance costs we add up our assumed reduction. The result is our expected cash flow advantage.

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| | |
|---|---:|
| Initial Rental Income Adv. | 600 |
| assumed vacancy rate (2%) | -12 |
| Running Cost Reduction | 112 |
| **Initial Cash Flow Advantage** | **700** |

What shall we demand as risk premium for a refurbishment of an apartment? A question which shall be answered by the investor itself but assuming that it is an apartment in a growing area with a low vacancy rate it shall be somewhere between 4-7 percent. Another assumption is the rent development we expect for our apartment.

| Basic Investment Assumptions | |
|---|---:|
| **Initial Cash Flow Advantage** | 700 |
| **Discount Rate** | 7,5% |
| **Inflation** | 2,0% |
| **yearly growth rate (year 1 - 5)** | 0,0% |
| **yearly growth rate after 5 years** | 2,0% |

After gathering all required information we are able to calculate the present value of the expected cash flow and further all basic ratios of our investment.

| Year | 1 | 2 | 5 | 10 | 15 |
|---|---:|---:|---:|---:|---:|
| **Cash Flow Advantage** | 700 | 700 | 700 | 773 | 853 |
| Discounted Cash Flow | 651 | 606 | 488 | 375 | 288 |
| Present Value of total Cash Flow | 651 | 1 257 | 2 832 | 4 920 | 6 526 |

| Investment Key Facts | |
|---|---:|
| **Total Costs** | **10 000** |
| **Refurbishment Costs** | **3 600** |
| **Investment Costs** | **6 400** |
| **Life expectancy** | **15** |
| **Net Present Value** | **126** |
| **Annual growth rate** | **1,4%** |
| **Initial yield** | **10,9%** |
| **IRR** | **7,8%** |

## Risks and Deviation

The highest risk of a refurbishment of an apartment is the estimation of the achievable new rent for the apartment after it has been refurbished. A deviation in the initial new rent advantage compared to a minimalistic refurbishment creates an equal percentage deviation in the net present value of our investment. Obviously we have the same one on one effect regarding our costs. But what happens if we misjudged the life expectancy, the vacancy rate, running cost reduction or the yearly growth rate of our cash flow? Truly, our calculated net

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present value will deviate but the deviation is different if we compare each of our assumptions.

> Example. Our apartment is located in Berlin, Germany, with 70 square meter living space and currently vacant. We demand a risk premium of 5.5 percent; inflation rate is set to 2 percent. Our planned refurbishment cost are 10.000 €, none of our measures are essential and we estimate a life expectancy of 20 years. Annual running costs shall be reduced by 1 € per square meter. Further we assume the vacancy rate and growth rate with 2 percent each. The calculated present value of the estimated cash flow shall be 10.000 € Let us assume we made a big mistake and one of our assumptions deviates by 20 percent in the bad direction reducing our present value of the cash flow.

| Assumption ( 20 percent deviation) | Deviation of the PV |
|---|---|
| Rental income advantage | 20,0% |
| Life expectancy | 12,6% |
| Running cost reduction | 3,3% |
| Inflation | 3,2% |
| Annual growth rate | 3,0% |
| Vacancy rate | 0,4% |

***Effect of a bad assumption on the PV of the cash flow***

# Conclusions

The calculation itself is pretty simple. Unfortunately making good assumptions is difficult. Further there exists a wide variety of possibilities to refurbish an apartment. For example the floor, we have a great choice of materials, colours and designs. To calculate we need three essential things; the costs, the life expectancy and the cash flow advantage. We might be able to bound the range of the refurbishment costs or even fix them before we start the measurement but we can only try, by comparison, to predict our cash flow advantage and the life expectancy of our measurement. As similar apartments might be they are always unique and the tenants, too. Therefore to calculate a refurbishment of an apartment is always a challenge.

# Calculation examples for Germany

## Refurbishment of an occupied apartment

**Investment Application for Apartment Modernization**

| | | |
|---|---|---|
| Region | North | |
| Sub Region | Hamburg | |
| Object Number | | |
| Property | Apartment modernization | |
| Investment | | |

| | | City | Hamburg |
|---|---|---|---|
| | | Adress | |
| | | Floor | |
| | | Balcony / Terrace | |
| | | Letable area | 53,69 |

**gross investment costs** / **Life expectancy**

| Measures | Total | creditable costs | Invest | Assumption | Standard |
|---|---|---|---|---|---|
| painter | 1 000 | 0 | 1 000 | 5 | 5 |
| sanitary | 5 000 | 5 000 | 5 000 | 20 | 20 |
| floor | | 0 | 0 | 15 | 15 |
| kitchen | 3 000 | 3 000 | 3 000 | 15 | 15 |
| electricity | | 0 | 0 | 35 | 35 |
| others | | 0 | 0 | 20 | 20 |
| Total | 9 000 | 8 000 | 9 000 | 17 | 17 |

**Basic Investment Assumptions**

| | |
|---|---|
| Initial Cash Flow Advantage | 933 |
| Discount Rate | 7,5% |
| Inflation | 2,0% |
| yearly growth rate (year 1 - 5) | 0,0% |
| yearly growth rate after 5 years | 2,0% |

**Investment Key Facts**

| | |
|---|---|
| Total Costs | 9 000 |
| Creditable Cost | 8 000 |
| Investment Costs | 9 000 |
| Life expectancy | 17 |
| Net Present Value | 112 |
| Annual growth rate | 1,5% |
| Initial yield | 10,4% |
| IRR | 8,1% |

| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cash Flow Advantage | 933 | 933 | 933 | 933 | 933 | 952 | 971 | 990 | 1 010 | 1 030 | 1 051 | 1 072 | 1 093 | 1 115 | 1 137 | 1 160 | 1 183 |
| Additional Adjustment | -320 | | | | | | | | | | | | | | | | |
| Discounted Cash Flow | 570 | 807 | 751 | 699 | 650 | 617 | 585 | 555 | 527 | 500 | 474 | 450 | 427 | 405 | 384 | 365 | 346 |
| Present Value of Cash Flow | 570 | 1 378 | 2 129 | 2 827 | 3 477 | 4 094 | 4 679 | 5 234 | 5 761 | 6 260 | 6 735 | 7 185 | 7 612 | 8 017 | 8 401 | 8 766 | 9 112 |

**Standard Cash Flow Advantage Calculation**

| | per month | per m² |
|---|---|---|
| current rent | 500,00 | 9,31 |
| rent without modern. | 500,00 | 9,31 |
| rent after mod. (+11% credit. cost ) | 573,33 | 10,68 |
| rent increase due to modern. | 73,33 | 1,37 |

| | |
|---|---|
| Initial Rental Income Adv. | 880 |
| Adjustment | 53 |
| Initial Cash Flow Advantage | 933 |

**Additional Advantages / Disadvantages**

| Annually Cash Flow Adjustments | per m² | | Total |
|---|---|---|---|
| Annually Running Cost Reduction | 1,31 | | 71 |
| assumed vacancy rate | 2,0% | -0,33 | -18 |
| Total | 0,99 | | 53 |

| One Time Adjustments | | Total |
|---|---|---|
| Abatement of Rent (refurbishment) | | -100 |
| Timedelay of tenant apportion (3 months) | | -220 |

**Risks**

| | |
|---|---|
| high | |
| medium | |
| low | vacancy rate, rent development, life expectancy, investment costs |

# Refurbishment of a vacant apartment

## Investment Application for Apartment Modernization

| | | | |
|---|---|---|---|
| Region | North | City | Hamburg |
| Sub Region | Hamburg | Adress | Parkstraße 2 b |
| Object Number | 7068 | Floor | EG Mi. |
| Property | Parkstraße | Balcony / Terrace | yes |
| Investment | Apartment modernization | Letable area | 53,69 |

| Measures | gross investment costs | | | Life expectancy | |
|---|---|---|---|---|---|
| | Total | Required refurbishment | Invest | Assumption | Standard |
| painter | 500 | | 500 | 5 | 5 |
| sanitary | 124 | | 124 | 20 | 20 |
| floor | 3 100 | | 3 100 | 15 | 15 |
| kitchen | 0 | | 0 | 15 | 15 |
| electricity | 550 | | 550 | 35 | 35 |
| others | 1 600 | | 1 600 | 20 | 20 |
| Total | 5 874 | 0 | 5 874 | 17 | 17 |

| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cash Flow Advantage | 1 393 | 1 393 | 1 393 | 1 393 | 1 393 | 1 420 | 1 449 | 1 478 | 1 507 | 1 537 | 1 568 | 1 600 | 1 632 | 1 664 | 1 697 | 1 731 | 1 766 |
| Discounted Cash Flow | 1 295 | 1 205 | 1 121 | 1 043 | 970 | 920 | 873 | 829 | 786 | 746 | 708 | 672 | 637 | 605 | 574 | 544 | 516 |
| Present Value of Cash Flow | 1 295 | 2 500 | 3 621 | 4 664 | 5 634 | 6 554 | 7 428 | 8 256 | 9 042 | 9 788 | 10 496 | 11 168 | 11 805 | 12 410 | 12 983 | 13 528 | 14 044 |

### Standard Cash Flow Advantage Calculation

| | per month | per m² |
|---|---|---|
| old rent | 500,00 | 9,31 |
| new rent without modern. | 617,44 | 11,50 |
| new rent with modern. | 730,18 | 13,60 |
| rent increase due to modern. | 112,75 | 2,10 |
| Initial Rental Income Adv. | 1 353 | |
| Adjustment | 40 | |
| Initial Cash Flow Advantage | 1 393 | |

### Basic Investment Assumptions

| | |
|---|---|
| Initial Cash Flow Advantage | 1 393 |
| Discount Rate | 7,5% |
| Inflation | 2,0% |
| yearly growth rate (year 1 - 5) | 0,0% |
| yearly growth rate after 5 years | 2,0% |

### Additional Advantages / Disadvantages

| | | per m² | Total |
|---|---|---|---|
| Yearly Running Cost Reduction | | 1,24 | 67 |
| assumed vacancy rate | 2,0% | -0,50 | -27 |
| Other | | | |
| Total | | 0,74 | 40 |

### Investment Key Facts

| | |
|---|---|
| Total Costs | 5 874 |
| Refurbishment Costs | 0 |
| Investment Costs | 5 874 |
| Life expectancy | 17 |
| Net Present Value | 8 170 |
| Annual growth rate | 1,5% |
| Initial yield | 23,7% |
| IRR | 23,7% |

### Risks

| | |
|---|---|
| high | |
| medium | new rent |
| low | vacancy rate, rent development, life expectancy, investment costs |