



# SEMERGY Report

---

Your personal report contains recommendations for optimising the energy efficiency, the cost structure, and the sustainability of your planned construction.



# WHAT IS SEMERGY?

**The largest share of energy spent in buildings is used for heating and cooling. Implementing insulating measures is therefore essential for a long-term reduction of energy expenditure and the associated building costs.**

One central goal of Austrian and European climate policy is the reduction of building energy consumption. To this end, SEMERGY provides a comprehensive solution for identifying the most cost-efficient measures needed to make existing and newly constructed buildings more energy-efficient. Among other things, SEMERGY helps the user answer the following questions:

- **What measures can be implemented to achieve a particular building energy rating?**
- **How much do these measures cost compared against the expected long-term energy savings?**
- **Do the recommended measures comply with the legal requirements?**
- **Is there public funding for the implementation of these measures?**

SEMERGY is ideally suited for planning energy-efficient construction and renovation projects, if you are a private individual, building contractor, architect/planner, component manufacturer and vendor, real estate agent, facility management company, public shareholder in the energy sector and a building "end user" (i.e. owner, tenant, etc.). Apart from identifying appropriate packages of measures (e.g. insulated-glazing windows, suitable insulation materials, energy-efficient wall and floor constructions) SEMERGY considers your available budget, sustainability of the used products, the products' compatibility, legal requirements, and the long-term energy and cost saving potential. Based on the specific situation of your construction, the user can go through several renovation or construction scenarios and determine the option that is best suited for their needs.

## WHO WE ARE

Xylem Technologies was established in Vienna in 2009 with the aim of developing high-quality, research-driven software solutions in the areas of sustainability and energy efficiency. With SEMERGY, Xylem Technologies provides an innovative tool for planning energy-efficient renovation strategies for existing buildings.

## WHAT WE DO

Our goal is the reduction of CO2 emissions as a contribution to national and international climate targets. Our solutions help our customers directly realise cost advantages by optimising building energy efficiency and harmonising energy providers and consumers.

# YOUR ADVANTAGES

Based on your individual building configuration and your budgetary means, SEMERGY calculates a customized renovation package for your building's facade, doors/windows, roof, basement slab and top floor.

The latest construction materials data and costs as well as their structural and ecological properties are used for the calculation of your renovation project. From the calculated results, you can easily choose your ideal solution regarding energy efficiency, sustainability and cost efficiency.

## ENERGY EFFICIENCY



SEMERGY helps you identify efficient renovation and construction measures.

The calculations take compatibility and appropriate use of building materials into consideration, which rules out using the wrong construction materials (e.g. using moisture-sensitive insulation materials in areas with soil contact).

## SUSTAINABILITY



SEMERGY allows you to plan an ecologically sustainable renovation or construction project.

The use of sustainable materials may be mandatory, subsidized or desired by the customer for personal reasons. That is why SEMERGY offers a separate optimisation parameter for calculating solutions with the highest possible proportion of sustainable building materials.

## COST EFFICIENCY



SEMERGY helps you reduce your building's annual energy costs and the investment required to a minimum.

In addition, SEMERGY provides a cost-benefit calculation for each calculated solution and visualises the time needed for amortising the investment in a concise graph. Rising energy costs are taken into account as well in order to give you the most realistic estimate possible.



# OVERVIEW

**PROJECT TYPE:**

**Renovation**

**BUILDING TYPE: Single-family house**

Construction type:

**Solid masonry/concrete**

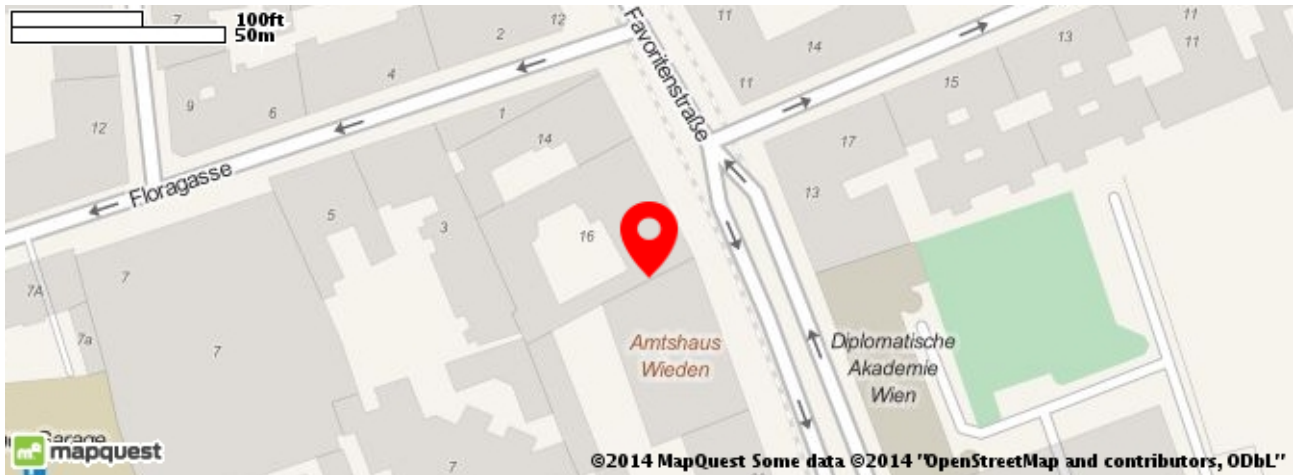
Year of construction: **1980 - 1989**

Address:

**FAVORITENSTRASSE 16, 1040,  
WIEN**

North-facing orientation:

**66°**

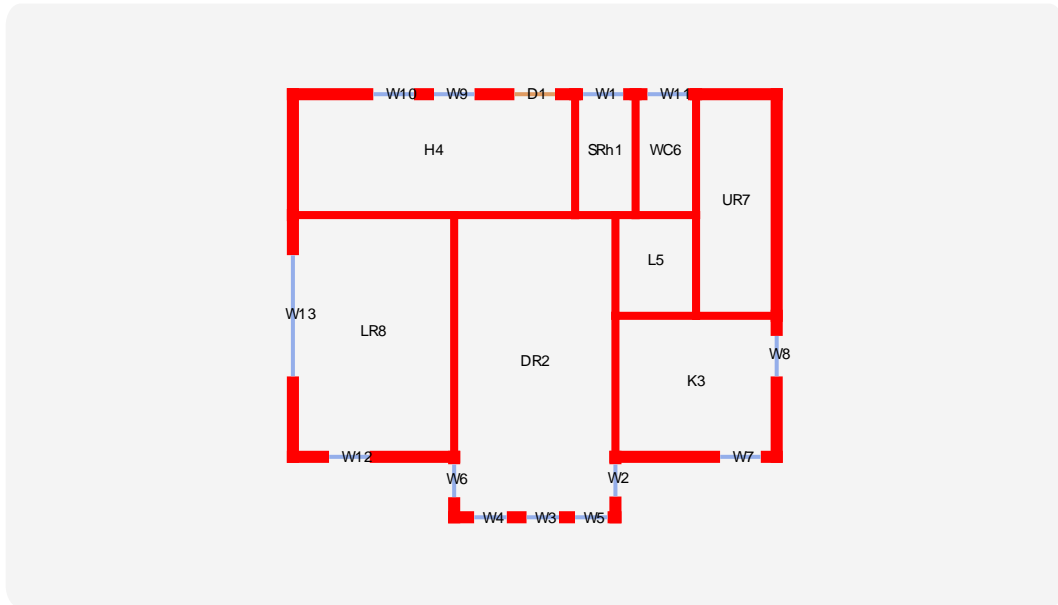


The renovation measures SEMERGY calculates and recommends are individually tailored to your construction and personal financial situation. However, the specific planning detail and implementation require the employment of a professional planner. With its clear presentation of your building's status quo, the SEMERGY report saves you additional survey work and therefore additional costs when planning the details of your construction.

On the following pages, the information you provided will be summed up in a clear and understandable form. This allows you to archive the provided information independently, and also allows you to consult any planner of your choice for the practical implementation of your project. Your building's key data is as follows:

|                  |                   |
|------------------|-------------------|
| Roof shape       | Double-pitch roof |
| Roof slope       | 30°               |
| Ridge height     | 2.9 m             |
| Jamb wall height | 0.70 m            |
| Roof base shape  | Rectangular       |
| Heating system   | Natural gas       |

# Ground floor



The floor plan shows a schematic of the rooms on each floor. Please note that the wall thickness is schematic and not to scale. The plan elements are designated as follows: RED: walls; BROWN: doors; BLUE: windows.

The room height given below designates the ceiling height, i.e. the vertical distance from the finished floor to the finished ceiling. The gross floor area (GFA) includes not only the floor area of the actual rooms but also the area taken up by external and internal walls and is therefore somewhat higher than the useable floor area (UFA).

|                        |                       |
|------------------------|-----------------------|
| Room height            | 2.60 m                |
| Gross floor area (GFA) | 134.12 m <sup>2</sup> |
| Rooms                  | 8                     |



## Rooms

The rooms below are listed with their respective functions. If there is more than one room per floor with a particular function, those rooms are numbered consecutively. Volume (room height multiplied by GFA) as well as GFA are given for each room. Please note that the GFA is larger than the UFA).

| No. | Description                  | Volume               | Gross floor area (GFA) |
|-----|------------------------------|----------------------|------------------------|
| 1   | Storage room (heated) (SRh1) | 14.62 m <sup>3</sup> | 5.29 m <sup>2</sup>    |
| 2   | Dining room (DR2)            | 97.50 m <sup>3</sup> | 35.29 m <sup>2</sup>   |
| 3   | Kitchen (K3)                 | 45.50 m <sup>3</sup> | 16.47 m <sup>2</sup>   |
| 4   | Hallway (H4)                 | 68.25 m <sup>3</sup> | 24.71 m <sup>2</sup>   |
| 5   | Larder (L5)                  | 16.25 m <sup>3</sup> | 5.88 m <sup>2</sup>    |
| 6   | WC (WC6)                     | 14.62 m <sup>3</sup> | 5.29 m <sup>2</sup>    |
| 7   | Utility room (UR7)           | 35.75 m <sup>3</sup> | 12.94 m <sup>2</sup>   |
| 8   | Living room (LR8)            | 78.00 m <sup>3</sup> | 28.24 m <sup>2</sup>   |

## Doors

For doors, height, width, and orientation are shown. Doors are also numbered consecutively.

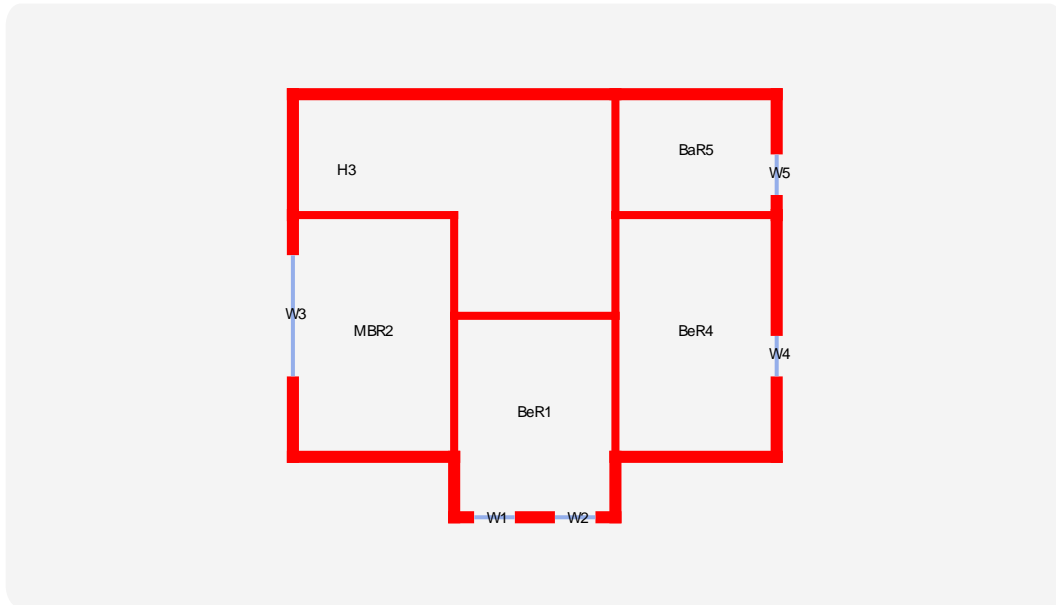
| No. | Description | Width | Height | Orient. |
|-----|-------------|-------|--------|---------|
| 1   | Door (D1)   | 1 m   | 2.1 m  | East    |

## Windows

For windows, parapet height, as well as the actual window height, width, and orientation, are shown. Windows are also numbered consecutively.

| No. | Description  | Parapet | Width  | Height | Orient. |
|-----|--------------|---------|--------|--------|---------|
| 1   | Window (W1)  | 0.9 m   | 0.99 m | 1.2 m  | East    |
| 2   | Window (W2)  | 0.9 m   | 0.79 m | 1.2 m  | South   |
| 3   | Window (W3)  | 0.9 m   | 0.8 m  | 1.2 m  | West    |
| 4   | Window (W4)  | 0.9 m   | 0.8 m  | 1.2 m  | West    |
| 5   | Window (W5)  | 0.9 m   | 0.8 m  | 1.2 m  | West    |
| 6   | Window (W6)  | 0.9 m   | 0.81 m | 1.2 m  | North   |
| 7   | Window (W7)  | 0.9 m   | 1 m    | 1.2 m  | West    |
| 8   | Window (W8)  | 0.9 m   | 1 m    | 1.2 m  | South   |
| 9   | Window (W9)  | 0.9 m   | 1 m    | 1.2 m  | East    |
| 10  | Window (W10) | 0.9 m   | 1 m    | 1.2 m  | East    |
| 11  | Window (W11) | 0.9 m   | 1 m    | 1.2 m  | East    |
| 12  | Window (W12) | 0.9 m   | 1 m    | 1.2 m  | West    |
| 13  | Window (W13) | 0.9 m   | 3 m    | 1.2 m  | North   |

# Attic



The floor plan shows a schematic of the rooms on each floor. Please note that the wall thickness is schematic and not to scale. The plan elements are designated as follows: RED: walls; BROWN: doors; BLUE: windows.

The room height given below designates the ceiling height, i.e. the vertical distance from the finished floor to the finished ceiling. The gross floor area (GFA) includes not only the floor area of the actual rooms but also the area taken up by external and internal walls and is therefore somewhat higher than the useable floor area (UFA).

Room height

3.60 m

Gross floor area (GFA)

134.12 m<sup>2</sup>

Rooms

5



## Rooms

The rooms below are listed with their respective functions. If there is more than one room per floor with a particular function, those rooms are numbered consecutively. Volume (room height multiplied by GFA) as well as GFA are given for each room. Please note that the GFA is larger than the UFA).

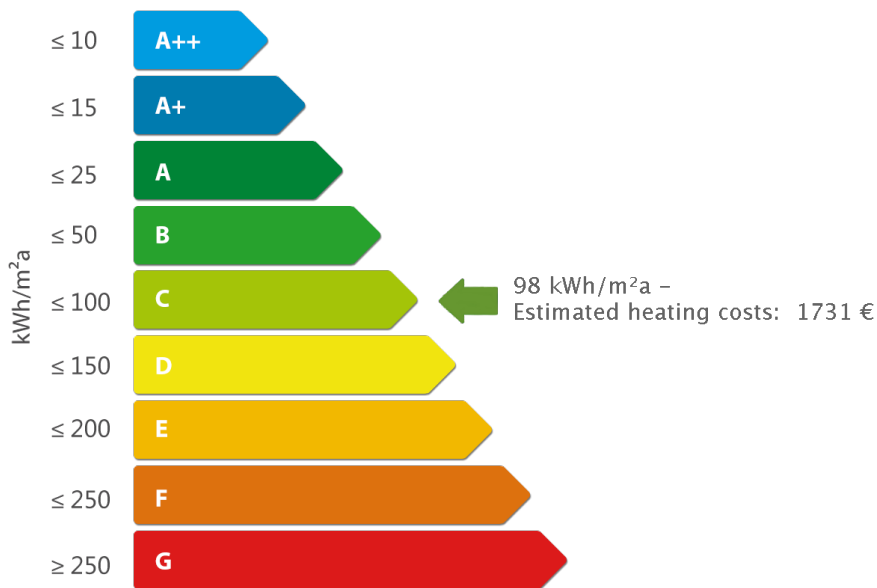
| No. | Description           | Volume               | Gross floor area (GFA) |
|-----|-----------------------|----------------------|------------------------|
| 1   | Bedroom (BeR1)        | 53.75 m <sup>3</sup> | 23.53 m <sup>2</sup>   |
| 2   | Master bedroom (MBR2) | 64.50 m <sup>3</sup> | 28.24 m <sup>2</sup>   |
| 3   | Hallway (H3)          | 91.38 m <sup>3</sup> | 40.00 m <sup>2</sup>   |
| 4   | Bedroom (BeR4)        | 64.50 m <sup>3</sup> | 28.24 m <sup>2</sup>   |
| 5   | Bathroom (BaR5)       | 32.25 m <sup>3</sup> | 14.12 m <sup>2</sup>   |

## Windows

For windows, parapet height, as well as the actual window height, width, and orientation, are shown. Windows are also numbered consecutively.

| No. | Description | Parapet | Width | Height | Orient. |
|-----|-------------|---------|-------|--------|---------|
| 1   | Window (W1) | 0.9 m   | 1 m   | 1.2 m  | West    |
| 2   | Window (W2) | 0.9 m   | 1 m   | 1.2 m  | West    |
| 3   | Window (W3) | 0.9 m   | 3 m   | 1.2 m  | North   |
| 4   | Window (W4) | 0.9 m   | 1 m   | 1.2 m  | South   |
| 5   | Window (W5) | 0.9 m   | 1 m   | 1.2 m  | South   |

# STATUS QUO ENERGY REQUIREMENTS



Based on the building configuration you entered, the current energy requirement and sustainability of currently used construction materials have been calculated. The building construction includes base areas, room heights, number of floors, room function, wall and floor construction as well as the geographical position of your planned construction or renovation.

The energy requirement has been calculated using an annual calculation method and cannot be equated to that used for the energy pass. However, it is a solid reference value sufficient for the rough plan of your project.

Estimated heating energy requirements per year

98 kWh/m²a

Estimated heating costs per year

ca. 1731 €

Below is a list of all current constructions. The reference in the construction name indicates whether the optimisation takes the respective construction into account (to be optimised) or whether it is ignored (remains unchanged).

# STATUS QUO - LOAD-BEARING EXTERNAL WALL (ISOLATED)

Single-shell masonry walls with exterior insulation finishing system (U-value:0.46) - To be optimised

Layers (innermost to outermost):

| No. | Layer name       | Thickness |
|-----|------------------|-----------|
| 1   | Interior plaster | 2.00 cm   |
| 2   | Masonry          | 25.00 cm  |
| 3   | Insulation       | 10.00 cm  |
| 4   | Exterior plaster | 1.00 cm   |

External walls are completely optimised, i.e. regardless of whether the areas are actually part of the thermal envelope (adjacent to a heated room).



# STATUS QUO - NON-LOAD-BEARING INTERNAL WALL

## Vertical coring block partition wall (U-value:4.80) - Remains unchanged

Layers (innermost to outermost):

| No. | Layer name | Thickness |
|-----|------------|-----------|
| 1   | Plaster    | 2.50 cm   |
| 2   | Masonry    | 10.00 cm  |
| 3   | Plaster    | 2.50 cm   |

# STATUS QUO - FLOOR WITH SOIL CONTACT (BASEMENT OR GROUND FLOOR)

**Cold basement floor slab, renovated (U-value:1.63) - Remains unchanged**

Layers (innermost to outermost):

| No. | Layer name    | Thickness |
|-----|---------------|-----------|
| 1   | Floor finish  | 2.00 cm   |
| 2   | Screed        | 5.00 cm   |
| 3   | Fill          | 6.00 cm   |
| 4   | Concrete slab | 20.00 cm  |



# STATUS QUO - FLOOR SLAB

## Timber beam ceiling, not insulated (U-value:0.74) - Remains unchanged

Layers (innermost to outermost):

| No. | Layer name               | Thickness |
|-----|--------------------------|-----------|
| 1   | Plaster                  | 3.00 cm   |
| 2   | Boarding                 | 2.00 cm   |
| 3   | Timber beam floor / fill | 17.00 cm  |
| 4   | Boarding                 | 2.00 cm   |
| 5   | Fill                     | 6.00 cm   |
| 6   | Floor finish             | 3.00 cm   |

# STATUS QUO - DOUBLE-PITCH ROOF

## Complete rafter insulation with wood substructure and gypsum slabs (U-value:0.35) - To be optimised

Layers (innermost to outermost):

| No. | Layer name   | Thickness |
|-----|--|-----------|
| 1   | Gypsum building slab                               | 2.50 cm   |
| 2   | Lathing  | 4.00 cm   |
| 3   | Vapour barrier                                     | 0.10 cm   |
| 4   | Rafters w/ intermediate complete rafter insulation | 20.00 cm  |
| 5   | Solid wood boarding                                | 4.00 cm   |
| 6   | Permeable roofing underlayment                     | 0.10 cm   |
| 7   | Lathing/ventilation                                | 8.00 cm   |
| 8   | Roof lathing                                       | 5.00 cm   |
| 9   | Roofing  | 5.00 cm   |

Roofs are completely optimised, i.e. regardless of whether the areas are actually part of the thermal envelope (adjacent to a heated room).



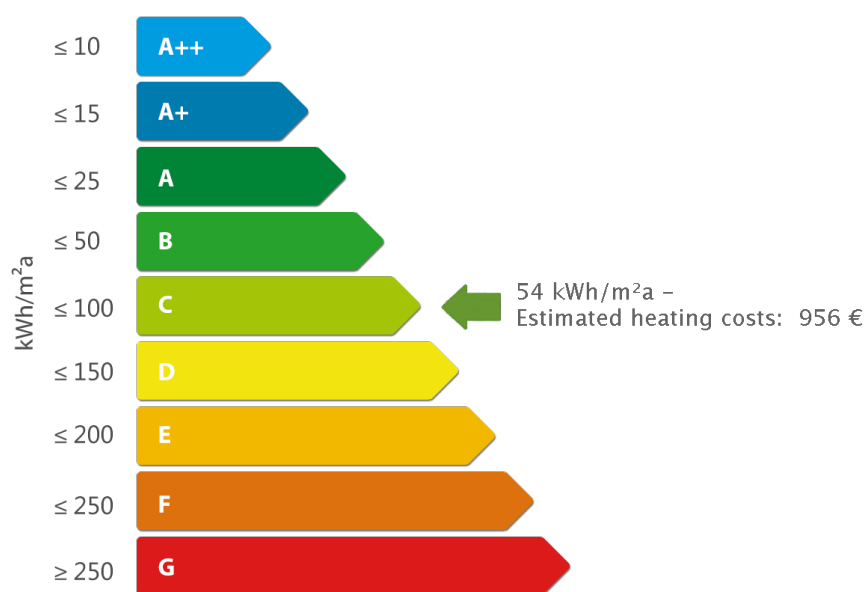
# STATUS QUO - DOORS AND WINDOWS

| No. | Type            | Current product                   | U-value | Opt. |
|-----|-----------------|-----------------------------------|---------|------|
| 1   | Exterior door   | Solid wooden / plastic door (4cm) | 2.20    | Yes  |
| 2   | Exterior window | Double glazing                    | 3.09    | Yes  |

Exterior doors and windows are completely optimised, i.e. regardless of whether the areas are actually part of the thermal envelope (adjacent to a heated room). Roof window groups are considered in the optimisation if the attic is occupied.



# OPTIMISED ENERGY REQUIREMENTS



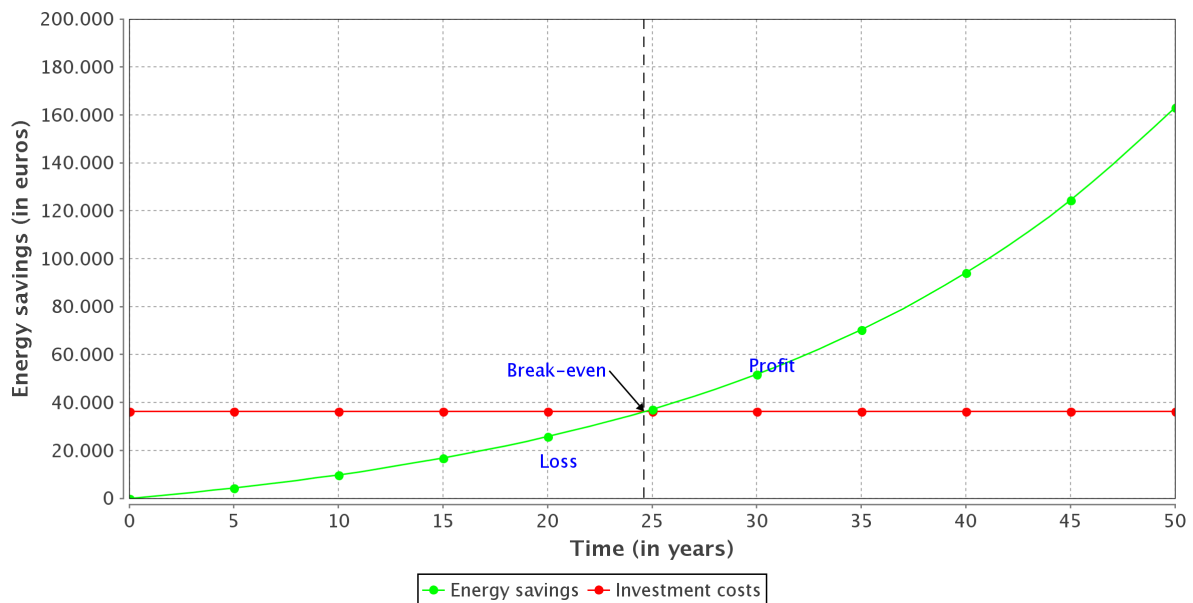
Based on your individual energy consumption, investment cost and sustainability preferences, an ideal renovation recommendation has been calculated. The changed heating energy demand as well as the estimated investment costs and sustainability data are concisely shown in the table below.

Renovated layers/constructions in the table are shown in green type.

|  |             |
|--|-------------|
| Estimated heating energy requirements per year | 54 kWh/m²a  |
| Estimated investment costs                     | ca. 36600 € |
| Estimated delta OI3 points (sustainability)    | 11565       |

# OPTIMISATION RECOMMENDATION

The diagramme below shows how long it will take for the recommended renovation plan to be amortised, i.e. when the annual energy savings exceed the investment costs (at the intersection of the red and green curve).



Depending on the chosen energy source, energy price increase estimates based on the increase rates of the past decade have been made. However, energy scarcity may accelerate these increases and so cause the savings to amortise the investment sooner than at the time shown.

Details about the used construction materials and implementation can be found on the following pages. Please note that the values shown are reference values calculated from limited data. Variances are possible depending on region.

# OPTIMISATION RECOMMENDATION - LOAD- BEARING EXTERNAL WALL (ISOLATED)

Single-shell masonry walls with exterior insulation finishing system, exterior renovated (U-value:0.14)

Layers (innermost to outermost):

| No.                              | Layer name             | Product class                    | Thickness             |
|----------------------------------|------------------------|----------------------------------|-----------------------|
| 1                                | Interior plaster       | Original material                | 2.00 cm               |
| 2                                | Masonry                | Original material                | 25.00 cm              |
| 3                                | EIFS insulation jacket | EPS EIFS base insulation panel   | 22.00 cm              |
| 4                                | EIFS plaster ratio     | Plasters with perlite aggregates | 4.00 cm               |
| Total gross floor area           |                        |                                  | 181.69 m <sup>2</sup> |
| Total estimated renovation costs |                        |                                  | ca. 19000 €           |



# OPTIMISATION RECOMMENDATION - DOUBLE- PITCH ROOF

**Complete rafter insulation with wood substructure and gypsum slabs, interior renovated (U-value:0.12)**

Layers (innermost to outermost):

| No. | Layer name   | Product class                         | Thickness |
|-----|--|---------------------------------------|-----------|
| 1   | Gypsum building slab                               | Gypsum building slabs                 | 0.95 cm   |
| 2   | Lathing  | Engineered wood boards                | 1.50 cm   |
| 3   | Vapour barrier                                     | Plastic vapour barriers and retarders | 0.02 cm   |
| 4   | Rafters w/ intermediate complete rafter insulation | Straw insulation material             | 40.00 cm  |
| 5   | Solid wood boarding                                | Original material                     | 4.00 cm   |
| 6   | Permeable roofing underlayment                     | Original material                     | 0.10 cm   |
| 7   | Lathing/ventilation                                | Original material                     | 8.00 cm   |
| 8   | Roof lathing                                       | Original material                     | 5.00 cm   |
| 9   | Roofing  | Original material                     | 5.00 cm   |

Total gross floor area

154.87 m<sup>2</sup>

Total estimated renovation costs

ca. 13000 €

# OPTIMISATION RECOMMENDATION - DOORS AND WINDOWS

| No. | Type            | Current product                           | U-value |
|-----|-----------------|---|---------|
| 1   | Exterior window | Plastic-aluminium windows, double glazing | 1.34    |

Plastic-aluminium windows, double glazing

|                                  |                      |
|----------------------------------|----------------------|
| Total area                       | 25.19 m <sup>2</sup> |
| Total estimated renovation costs | ca. 4600 €           |

# POLICIES

This section lists violated renovation policies and other legal requirements. The policies are divided into the following categories: Exceeded maximum U-values for relevant areas (e.g. walls or windows), minimum room heights and areas, and minimum window areas per room not reached.

## MAXIMUM U-VALUES EXCEEDED

| No. | Floor        | Room                  | Element              | max. U-value |
|-----|--------------|-----------------------|----------------------|--------------|
| 1   | Ground floor | Storage room (heated) | Floor (soil contact) | 0.4          |
| 2   | Ground floor | Dining room           | Floor (soil contact) | 0.4          |
| 3   | Ground floor | Kitchen               | Floor (soil contact) | 0.4          |
| 4   | Ground floor | Hallway               | Floor (soil contact) | 0.4          |
| 5   | Ground floor | Hallway               | Exterior door        | 1.7          |
| 6   | Ground floor | Larder                | Floor (soil contact) | 0.4          |
| 7   | Ground floor | WC                    | Floor (soil contact) | 0.4          |
| 8   | Ground floor | Utility room          | Floor (soil contact) | 0.4          |
| 9   | Ground floor | Living room           | Floor (soil contact) | 0.4          |

## MINIMUM ROOM AREAS NOT REACHED

No floor area violations.

## MINIMUM ROOM HEIGHTS NOT REACHED

No room height violations.

## MINIMUM WINDOW AREAS NOT REACHED

| No. | Floor | Room    | Mandatory minimum window area      |
|-----|-------|---------|------------------------------------|
| 1   | Attic | Bedroom | 10% of the total wall surface area |

# THE NEXT STEPS

Based on your existing building, your budgetary means, and your chosen renovation preferences, an individual renovation recommendation has been calculated. The calculated energy savings as well as the investment costs are reference values and can vary depending on region. The report created by SEMERGY can only be used as a base for further planning by your builder or planner. You can find Austrian builders and planners in your area at <http://firmen.wko.at>, among others.

The information you enter is stored for future use and to allow you to modify or recalculate your planned renovation (e.g. regarding investment costs or the use of certain building materials). Construction materials as well as construction costs are continuously updated by the SEMERGY team, ensuring that your results are always up to date.

For information about funding in your state, follow the links below:

Vienna

<http://www.wien.gv.at/amtshelfer/bauen-wohnen/wohnbauforderung/wohnungsverbesserung/thewosan.html>

Lower Austria

<http://www.noel.gv.at/Bauen-Wohnen/Sanieren-Renovieren.html>

Upper Austria

[http://www.land-oberoesterreich.gv.at/cps/rde/xchg/ooe/hs.xsl/109741\\_DEU\\_HTML.htm](http://www.land-oberoesterreich.gv.at/cps/rde/xchg/ooe/hs.xsl/109741_DEU_HTML.htm)

Salzburg

<http://www.salzburger-wohnbauforderung.at/foerderungen/sanierung.html>

Styria

<http://www.verwaltung.steiermark.at/cms/beitrag/11679862/74837517/>

Burgenland

<http://www.burgenland.at/wohnbauforderung/sanieren>

Carinthia

[http://www.ktn.gv.at/143193\\_DE-Organisation-Wohnhaussanierung](http://www.ktn.gv.at/143193_DE-Organisation-Wohnhaussanierung)

Tyrol

<https://www.tirol.gv.at/bauen-wohnen/wohnbauforderung/sanierung/>

Vorarlberg

[https://www.vorarlberg.at/vorarlberg/bauen\\_wohnen/wohnen/wohnbauforderung/weitereinformationen/wohnhaussanierung/wohnhaussanierung.htm](https://www.vorarlberg.at/vorarlberg/bauen_wohnen/wohnen/wohnbauforderung/weitereinformationen/wohnhaussanierung/wohnhaussanierung.htm)

