

Building information



- **Building Type/use**
Social Housing Building
- **Country**
Spain
- **Client**
VISESA
- **Architect**
Ramón Ruiz-Cuevas Peña
Adolfo Moro Quintana
Alfredo Bengoa
Iñigo Bilbao Ubillos
- **Occupation**
Social Housing Building

Design Process

55 social housing flats in Bermeo have been proved to achieve maximum energy saving using vernacular design principles such as adapting to the local climate along with modern technologies.

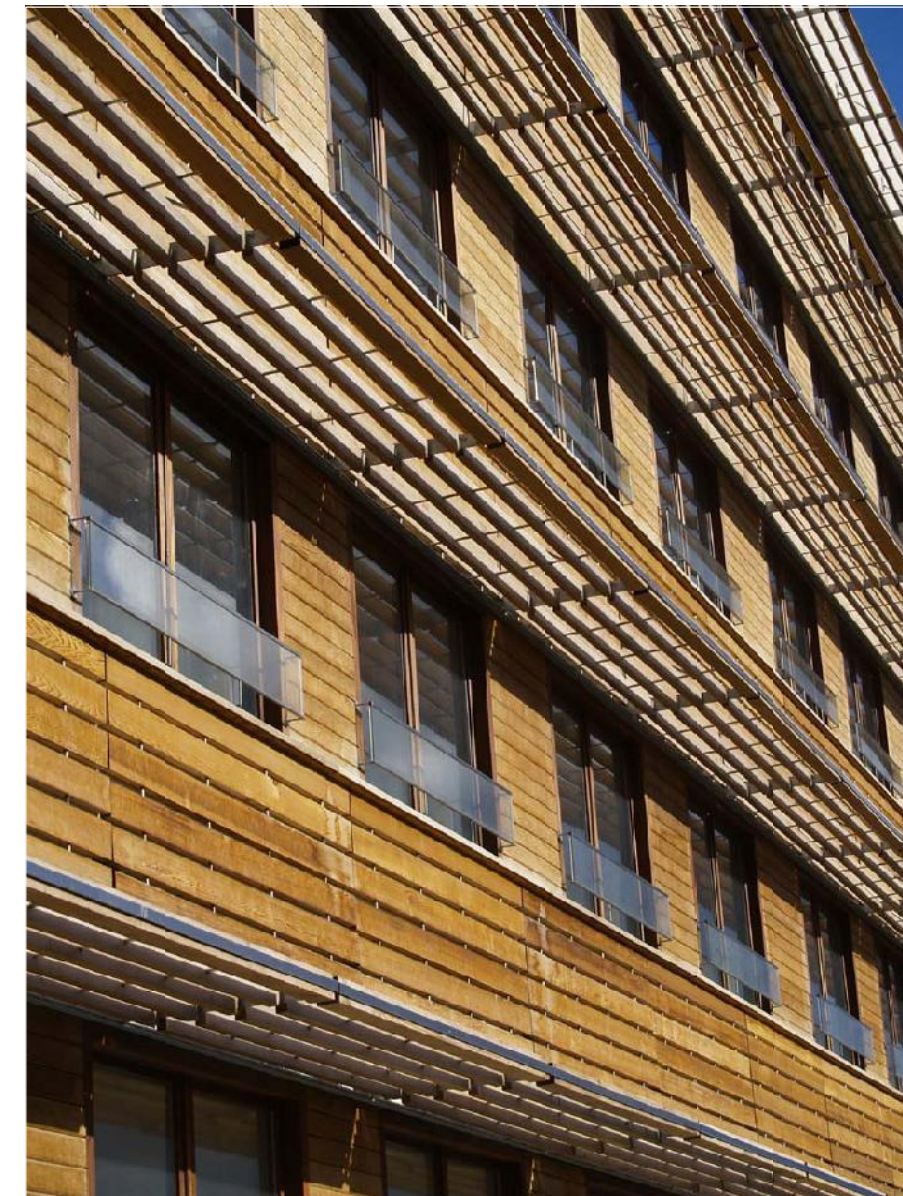
The aim of the project is to design a bioclimatic building.

It is designed in the same way as local vernacular architecture, although using modern technologies.

The orientation intends to improve solar gains and natural ventilation.

The climatic conditions are evaluated using the Givoni program to determine the amount of solar protection or solar gains needed in order to obtain optimum comfort conditions.

This building has achieved a grade A certificate according to the CEE/CADEM criteria.



Other relevant Building Features

Urban

Use of permeable paving, to save the existent trees and planting of new green spaces.

Materials

Most of the materials used in the building are recyclable, re-useable and have low environmental impact in their own manufacturing.

Water

Green roof with rainwater storage systems to re-use in toilets and irrigation.

Renewable

Installation of solar panels for domestic hot water consumption.

Building performance information



Energy efficiency

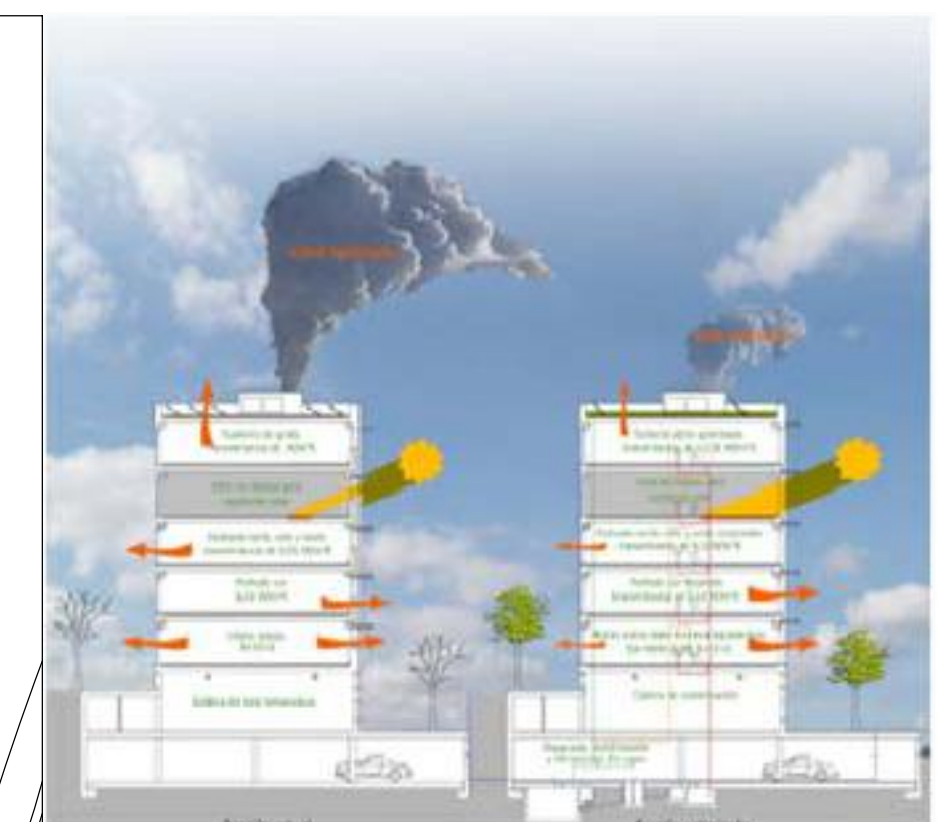
Windows are maximized in the north facade to maximize natural light gains. The south facade contains horizontal shadings to reduce solar gains during the summer, although allowing them in winter.

The dark internal floors use their own high thermal mass to increase passive solar gains.

All apartment typologies are designed to permit cross ventilation.

The insulation of the building has been improved by increasing the thickness of natural insulation materials.

Central heating is provided by two low temperature boilers.

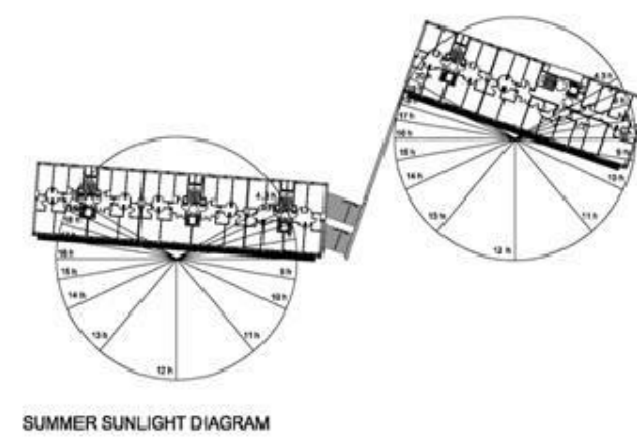


Building evaluation



The evaluation of the building has carried completion with the tool SBTool Verde, by means of the measurement of reduction of impacts in relation to a referential building, the obtained moral values demonstrate the following results:

Taking in account than only we analyze one building (left side), because both buildings, as shown in the graphic of the emplacement, they are very similar. There are not enough variations in orientation and size. We take the results from one been worth for the other building.



Results of relative evaluation. The relative impact avoid based on weight at criteria levels.

The data are based on the punctuations obtained in the auto-evaluation	Weights	Impact Avoided	Residual Impact
Climatic change	25%	2,26	2,74
Increase of UV radiation at ground level	3%	0,00	5,00
Loss of aquatic life	6%	1,65	3,35
Loss of fertility	10%	2,49	2,51
Depletion of non-renewable resources	20%	0,93	4,07
Land and water degradation	10%	1,12	3,88
Comfort	10%	1,70	3,30
Health and hygiene	8%	0,80	4,20
Economic and social imbalance	6%	1,51	3,49
Total impact avoided		1,57	3,43

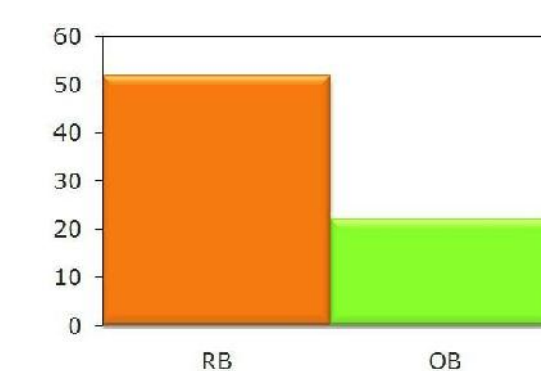


The data of evaluation of absolute impacts and your graphs

Where:
RB: Referential Building
OB: Object Building

1. Climate change.- Net annual GHG emissions in kg CO2 equivalent per m2 year. Values in KgCO2/m2y. Many materials are close to the place of the construction site, that bears a saving in transportation of materials

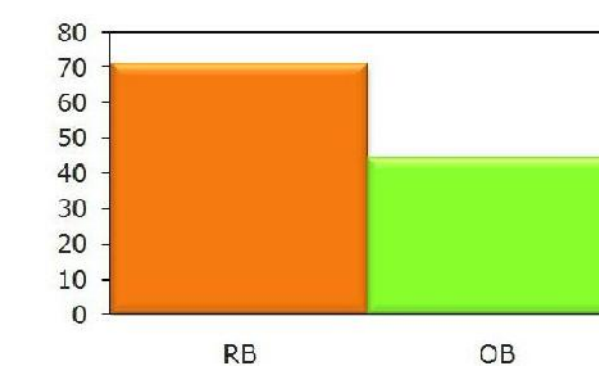
Criteria	RB	OB	Score
Energy used for transport of construction materials	0,17	0,01	4,9
Renewable energy systems	46,61	27,66	4,0



Most of the materials used in the building are recyclable, re-useable and have low environmental impact in their own manufacturing.

2. Loss of fertility.- Net annual acidifying components emissions from building operations, kg of SO2 equivalent per year

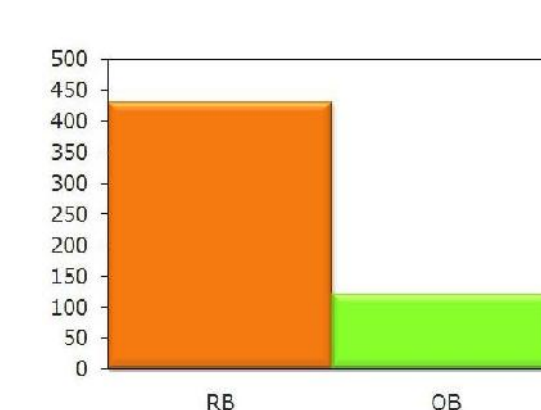
Criteria	RB	OB	Score
Energy used for transport of construction materials	0,066	0,002	4,8
Reduction of energy systems	0,067	0,050	5,0



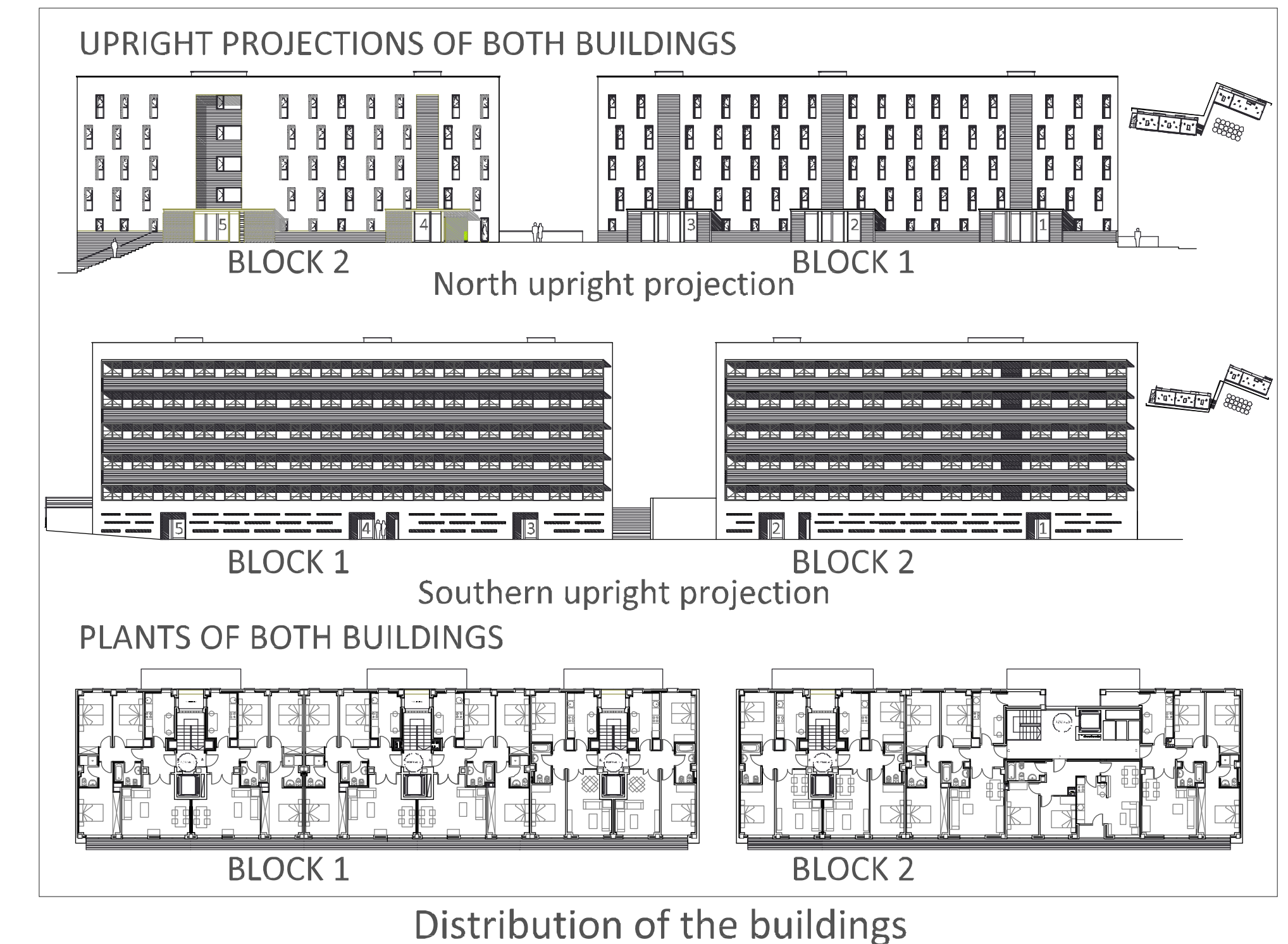
The aim of the project is to design a bioclimatic building.

3. Economic and social imbalance.- Total present value of life-cycle cost for total project, € per m2.

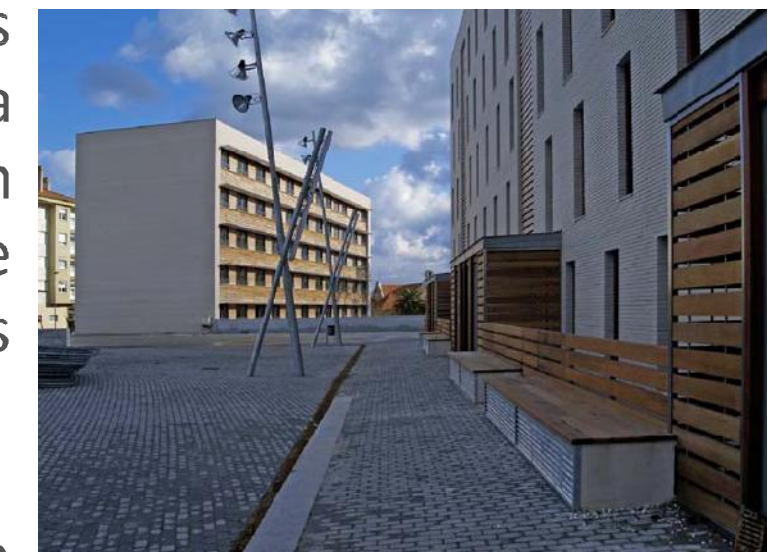
Criteria	RB	OB
Installation of control systems of consumption of water	0,94	0,63



The estimated cost of the construction is 647 EUR/m2y of constructed area



The final building assessment value is expressed as green leaves, from 0 to 5 as a maximum. The weight impact are based on Spanish sustainability indicators and the Sustainable National Observatory reports for 2007.



The result once the building analyzed, when the data introduced in the SBTool-Verde, was obtained:



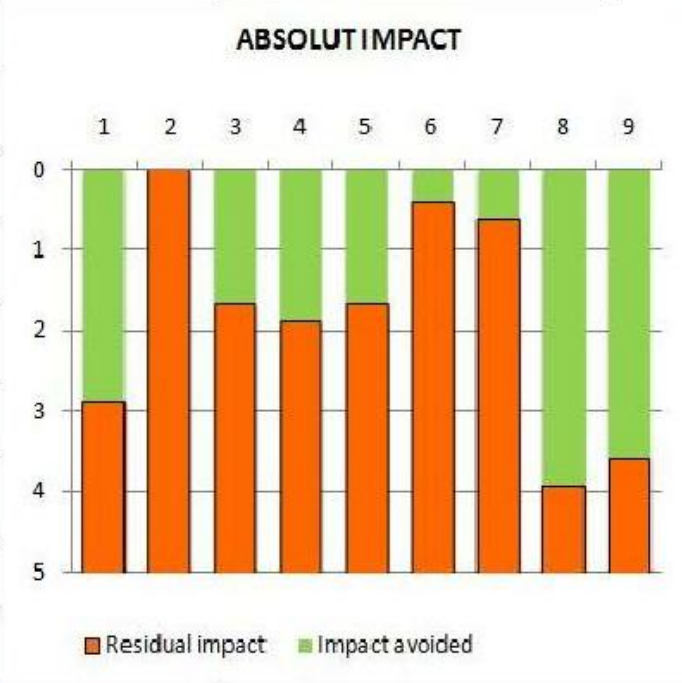
Two leaves, what is equivalent to a punctuation of 2. This means that the result once analysis was gotten from is not significant in reductions of impact.

According to the board of punctuation:



Results of absolute evaluation. This results show the global impact reduction from reference building

Absolute Performance Results				IMPACT AVOID	2.00
These data are based on the Self-Assessment values					
Reference Building	Object Building	% of Absolute Reduction			
1 Net annual GHG emissions from building operations, kg. CO2 equivalent per year	51.88	22.17	57%		
2 Net annual ozone depleting emissions from building operations, kg. CFC-11 equivalent per year	0.005	0.005	0%		
3 Load of chemical nutrient, kg. OFPO4 equivalent per year	1.91	1.27	33%		
4 Net annual acidifying components emissions from building operations, kg of SO2 equivalent per year	71.01	44.30	38%		
5 Depletion of non-renewable resources	2909.83	1952.23	33%		
6 Net annual hazardous and non hazardous waste to disposal, kg/m2	11.83	10.89	8%		
7 Comfort conditions, percentage of ameliorations			13%		
8 Health and hygiene			79%		
9 Total present value of 25-year life-cycle cost for total project, EUR per m2.	429.49	120.58	72%		



The results show as block diagram, the red block indicates the residual Impact and the green the Impact Avoided from the reference building

The system can provides annualized estimations of impacts absolute values, as CO2 amissions due to construction material and operation, NOx emissions, use of fresh water, cost, etc.