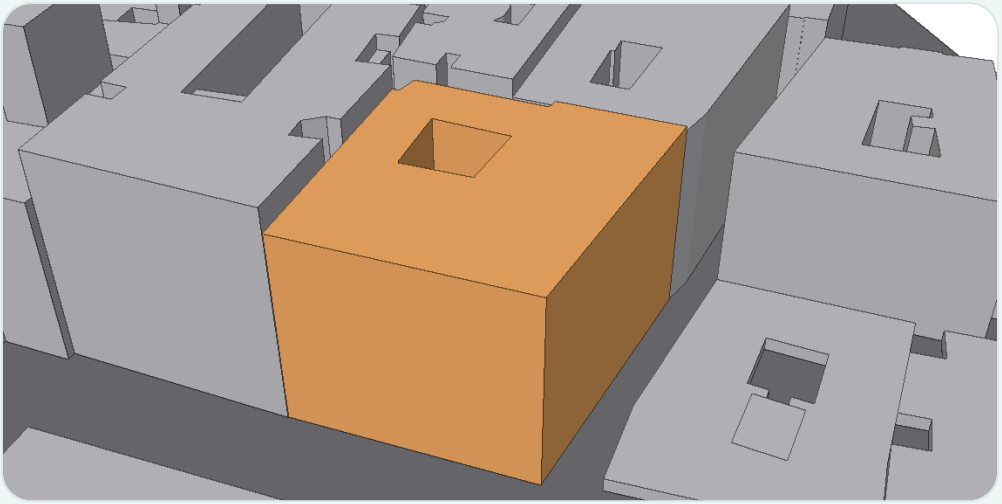
infrared.city

# How our energy model reacts to design changes

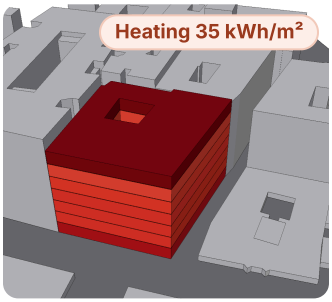
One real building in Vienna. 13 changes, one at a time.



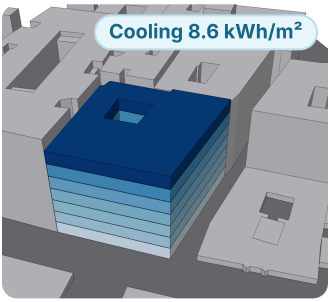
The model splits the building into one zone per storey. For every hour of a year it adds up sun, shade, reflected light, insulation and windows, in the real neighbourhood.

## 0 The building today

HEATING PER M²




COOLING PER M²




Per year, 7 storeys, 4,864 m² floor.

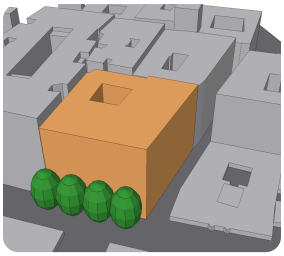
infrared.city

−30 −10 −3 −1 0 +1 +3 +10 +30

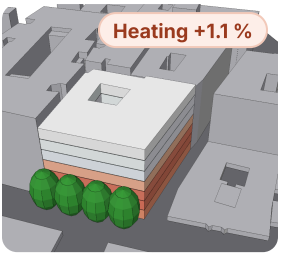
Change per storey in %: blue less, red more

## 1 Street trees

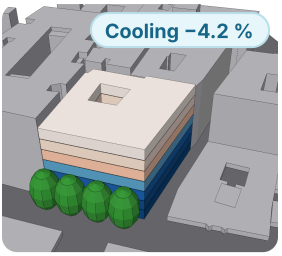
SCENE



HEATING



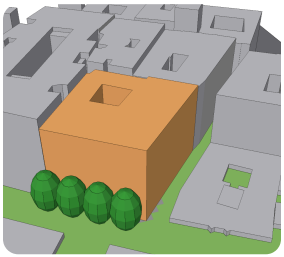

COOLING



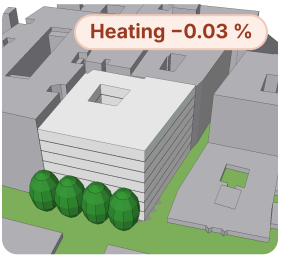

Shade on the south-west facade, strongest on the lower floors.

## 2 Grass instead of asphalt

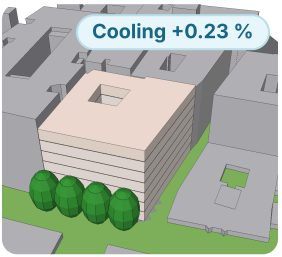
SCENE



HEATING



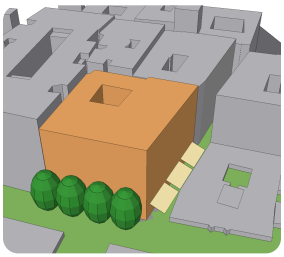

COOLING



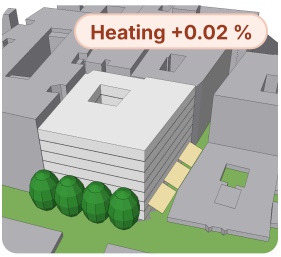

A brighter ground reflects a little more sun onto the facades.

## 3 Shade sails

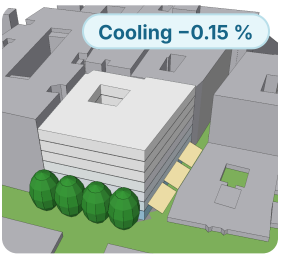
SCENE



HEATING




COOLING



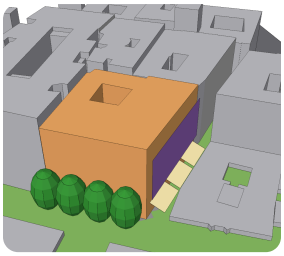

Shade on the ground floor of one facade.

Each row keeps the changes before it. The ground counts as reflected sunlight, not as cooler air.

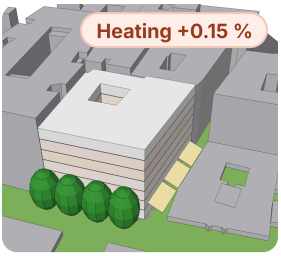
−30 −10 −3 −1 0 +1 +3 +10 +30
Change per storey in %: blue less, red more

## 4 Shade mesh

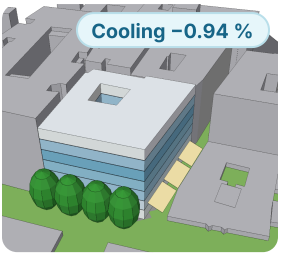
SCENE



HEATING



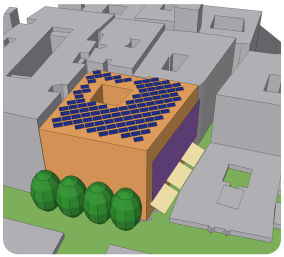

COOLING



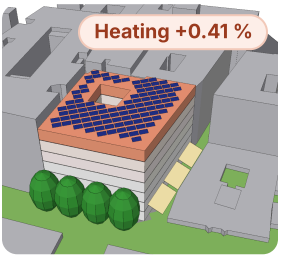

Halves the sun on the windows of four storeys.

## 5 PV panels on the roof

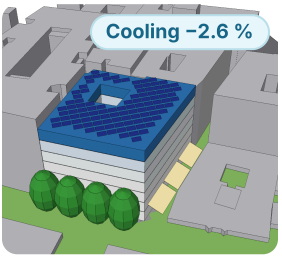
SCENE



HEATING



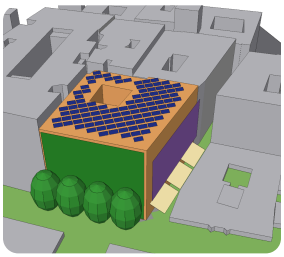

COOLING



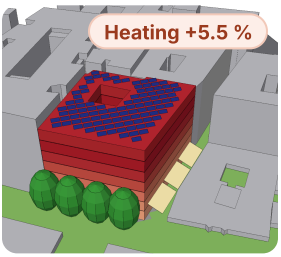

Shade on the roof keeps the top storey cooler.

## 6 Green living wall

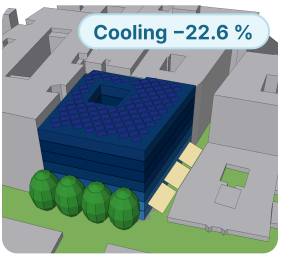
SCENE



HEATING

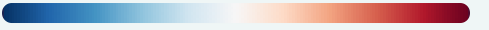



COOLING




Blocks the sun on the whole south-west facade.

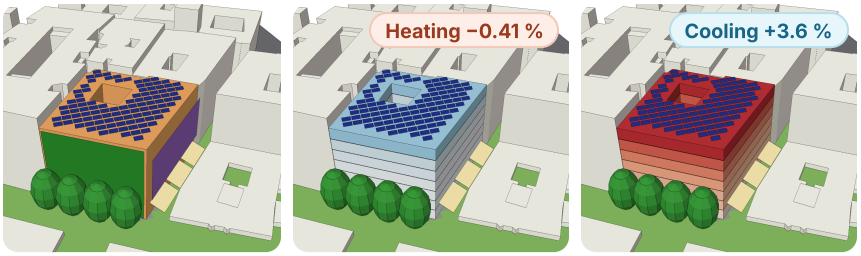
In row 6 the green panels also cover the windows.




Change per storey in %: blue less, red more

## 7 Brighter neighbours

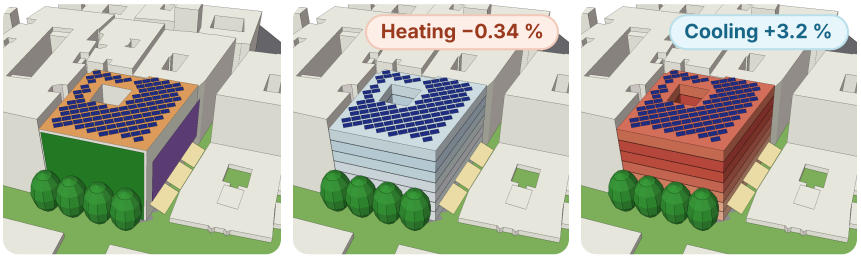
SCENE HEATING COOLING




Bright walls across the street reflect more daylight into the windows.

## 8 Brighter own walls

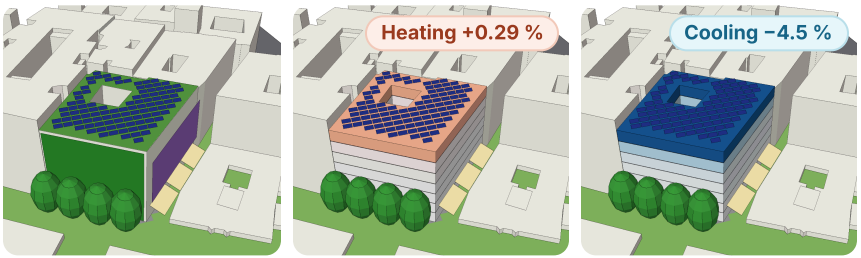
SCENE HEATING COOLING




Courtyard walls reflect more daylight into the building's own windows. On a well-insulated wall this outweighs the lower heat taken in.

## 9 Green roof

SCENE HEATING COOLING



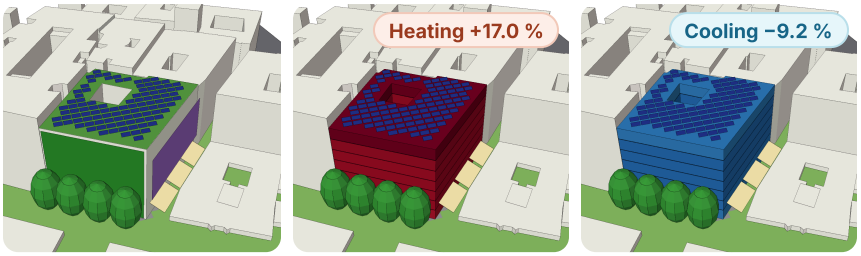

Less heat from the sun reaches the top storey.

Materials change the sun that walls and roofs take in and reflect, not their insulation.

−30 −10 −3 −1 0 +1 +3 +10 +30
Change per storey in %: blue less, red more

## 10 Insulation: older standard

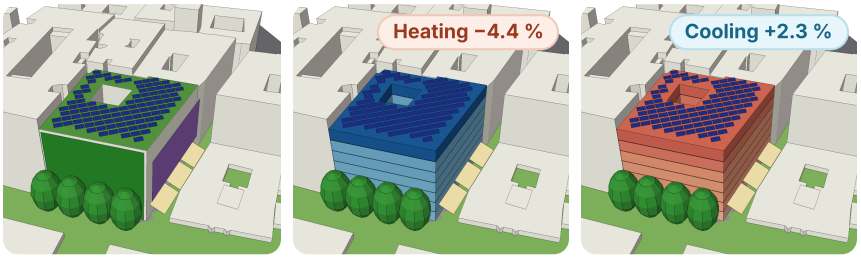
SCENE | HEATING | COOLING




Walls U 0.35, roof U 0.40 W/m²K. Compared with row 9.

## 11 Insulation: better

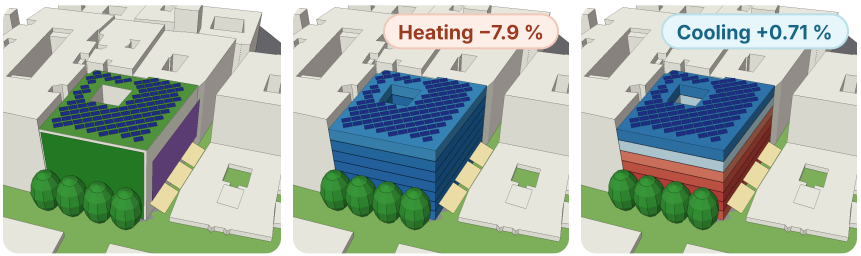
SCENE | HEATING | COOLING




Walls U 0.10, roof U 0.15 W/m²K. In summer more heat stays inside.

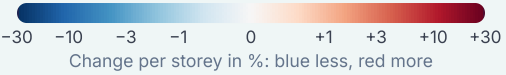
## 12 Triple glazing

SCENE | HEATING | COOLING



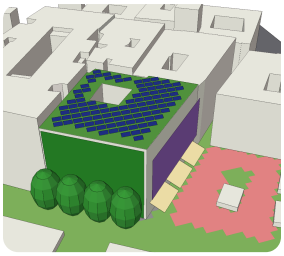

U 0.7 W/m²K, g 0.50. Less sun comes in, and less heat goes out.

Row 10 is a side comparison with row 9. Row 11 continues from row 9.

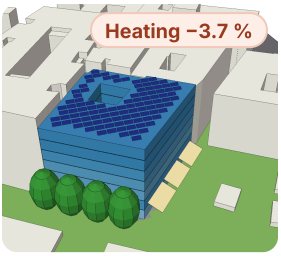



## 13 Remove a neighbour

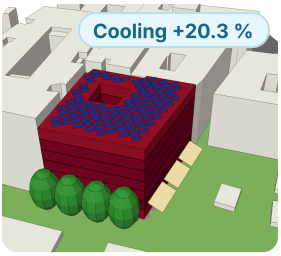
SCENE



HEATING




COOLING




The south-east facade gets more sun.

## What you can test

**Greenery**
trees, green walls, green roofs

**Ground**
asphalt, grass, paving, water

**Shading**
sails, screens, PV panels

**Materials**
facade and roof finishes

**Insulation**
U-values of walls and roof

**Glazing**
U-value and solar gain

**Neighbours**
new or removed buildings

Every storey gets its own heating and cooling, hour by hour, in its real surroundings. The model ranks building variants like EnergyPlus (rank correlation 0.98 to 0.99).