



The Why Factory
Graduation Studio

Y(our) Block

Veerasu Sae-Tae
Fall 2016 / Spring 2017

01. Introduction

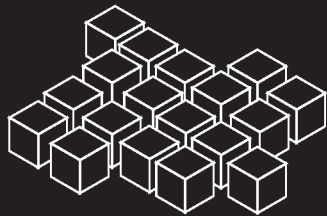
Collective Research

What if...?

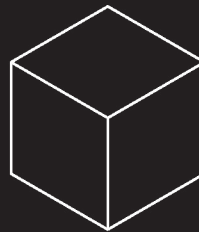
Scenarios that change (y)our block



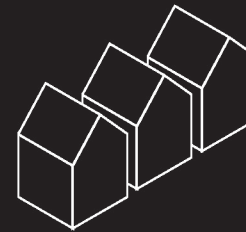
World



City



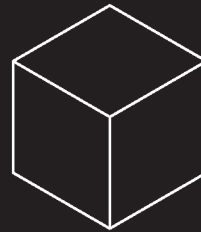
Block



Neighborhood



House

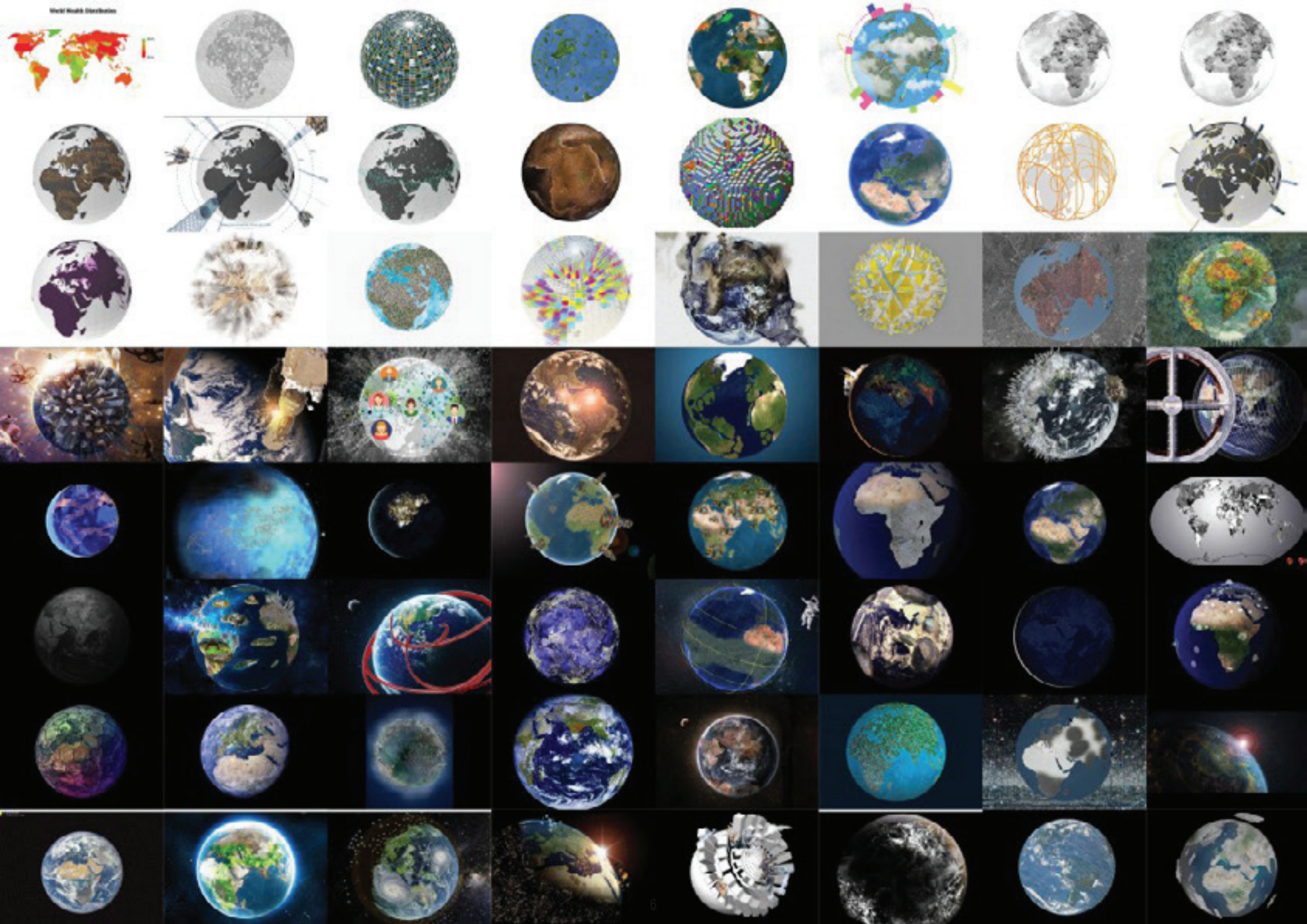


(Y)our World

(Y)our Block

(Y)our Home

explorative research



What if our block would only be made of access

What if we would re-distribute country borders based on an equal amount of land

What if we would live in a wildlife block?

What if the birth rate dropped to zero, faced with the aging problem.

What if we would be food self-sufficient?

What if our oceans get toxic and we need to protect our cities and oceans from toxins that come from oil?

What if we would live in a sport block?

What if we could produce energy with sound?

What if...everybody were working from their phone all time and there weren't any formal offices or computers.

What if I would live selfsufficiently in a solar panel block?

What if we would re-distribute country borders based on an equal amount of land

What if we give back the ground level to natural landscapes by making cities that are not impacted by gravity?

What if only wind energy is available?

What if we had an infrastructure to process any flow of objects?

What if we could produce energy with sound?

What if everybody abandoned the city, going to live on the countryside?

What if we would store renewable energy in our block by using water?

What if...all offices are centralized to a 'world office' that maximise the efficiency of physical space, resources and time?

What if the sun would no longer exist?

What if we give back the ground level to natural landscapes by making cities that are not impacted by gravity?

What if we would live in an extreme climate?

(Y)our Home

Exploring scenarios

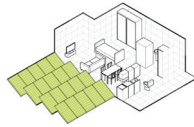
WHAT IF? #001

SOLAR PANELS WOULD BECOME A BUILDING MATERIAL?

Can building materials generate electricity? This fascination explores a series of scenarios where we can save up spaces used to produce electricity by integrating energy production with building components such as wall, floor, roof and furniture. Would we generate more energy!

0%

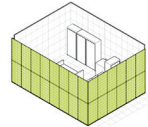
Typical situation which separated from the house?

**Calculation**

Footprint	78	m ²
House Area	47	m ²
Area for solar panels	31.3	m ²
Room Volume	171	m ³
Average energy consumption	30	kWh/day (US)
Total Electricity produced	30.1	kWh
Each solar panel produced	1.436	kWh
No. of solar panels (1.6 x 1 x 0.1 m)	21	panels

25%

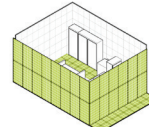
Wall ?

**Calculation**

Footprint	47	m ²
House Area	47	m ²
Area for solar panels	48.4	m ²
Room Volume	186	m ³
Average energy consumption	30	kWh/day (US)
Total Electricity produced	40.2	kWh
Each solar panel produced	1.436	kWh
No. of solar panels (1.6 x 1 x 0.1 m)	28	panels

50%

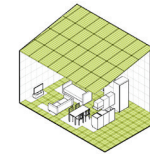
wall and floor ?

**Calculation**

Footprint	47	m ²
House Area	47	m ²
Area for solar panels	61.3	m ²
Room Volume	186	m ³
Average energy consumption	30	kWh/day (US)
Total Electricity produced	72	kWh
Each solar panel produced	1.436	kWh
No. of solar panels (1.6 x 1 x 0.1 m)	50	panels

75%

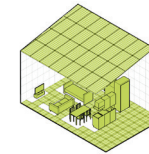
wall, floor, roof?

**Calculation**

Footprint	47	m ²
House Area	47	m ²
Area for solar panels	133	m ²
Room Volume	230	m ³
Average energy consumption	30	kWh/day (US)
Total Electricity produced	117.7	kWh
Each solar panel produced	1.436	kWh
No. of solar panels (1.6 x 1 x 0.1 m)	82	panels

100%

wall, floor, roof and furniture ?

**Calculation**

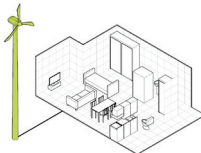
Footprint	47	m ²
House Area	47	m ²
Area for solar panels	150.6	m ²
Room Volume	230	m ³
Average energy consumption	30	kWh/day (US)
Total Electricity produced	133.5	kWh
Each solar panel produced	1.436	kWh
No. of solar panels (1.6 x 1 x 0.1 m)	93	panels

WHAT IF? #002

WIND TURBINE WOULD BECOME A BUILDING MATERIAL?

0%

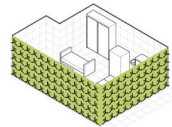
Typical situation which separated from the house?

**Calculation**

Footprint	78	m ²
House Area	47	m ²
Turbine Ø	6	m ²
Room Volume	140.4	m ³
Average energy consumption	30	kWh/day (US)
Total Electricity produced	30.1	kWh
Each Turbine produced	32.9	kWh
No. of turbines	1	Turbine

25%

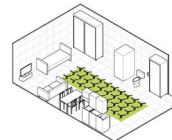
Wall ?

**Calculation**

Footprint	47	m ²
House Area	47	m ²
Turbine Ø	0.6	m ²
Room Volume	140.4	m ³
Average energy consumption	30	kWh/day (US)
Total Electricity produced	37.72	kWh
Each Turbine produced	0.328	kWh
No. of turbines	115	Turbine

50%

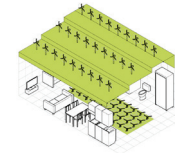
wall and floor ?

**Calculation**

Footprint	47	m ²
House Area	47	m ²
Turbine Ø	0.6	m ²
Room Volume	140.4	m ³
Average energy consumption	30	kWh/day (US)
Total Electricity produced	50.84	kWh
Each Turbine produced	0.328	kWh
No. of turbines	155	Turbine

75%

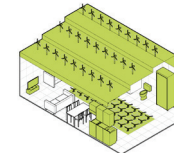
wall, floor, roof?

**Calculation**

Footprint	78	m ²
House Area	47	m ²
Turbine Ø	0.6	m ²
Room Volume	230	m ³
Average energy consumption	30	kWh/day (US)
Total Electricity produced	59.6	kWh
Each Turbine produced	0.328	kWh
No. of turbines	182	Turbine

100%

wall, floor, roof and furniture ?

**Calculation**

Footprint	47	m ²
House Area	47	m ²
Turbine Ø	0.6	m ²
Room Volume	230	m ³
Average energy consumption	30	kWh/day (US)
Total Electricity produced	61	kWh
Each Turbine produced	0.328	kWh
No. of turbines	186	Turbine

(Y)our Block

Exploring qualities

WHAT IF?

WE COULD SUSTAIN OURSELVES WITH SOLAR ENERGY PRODUCED BY BUILDING COMPONENTS?

(WALL+FLOOR+ROOF)

Can we be self-efficient in a block of 100m x 100m x 100m city with energy produced by solar panels? What is the best typology to maximised the surface area to receive sufficient average annual daylight? Can we be enough? How dense could the block be?

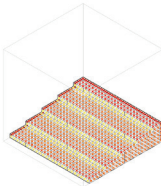
How to maximise the desires and qualities of the inhabitants? But at the same time, generates enough energy for the overall performance of the building.

Density - Stepping

#001

0%

Gross Floor Area: 24800 m²
Covered Area: 9200 m²
Coverage: 92%
FAR: 2.48

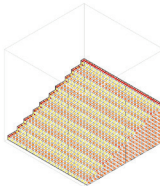


Calculation		
No. of Housing (47m2)	527	Unit/person
Total solar surface area	12240	m ²
average daylight	0.547	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	13708	kWh/day

#002

25%

Gross Floor Area: 50000 m²
Covered Area: 9600 m²
Coverage: 96%
FAR: 5

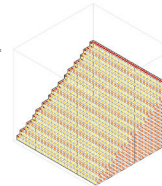


Calculation		
No. of Housing (47m2)	1063	Unit/person
Total solar surface area	15599	m ²
average daylight	0.392	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	17470	kWh/day

#003

50%

Gross Floor Area: 85200m²
Covered Area: 9600m²
Coverage: 96%
FAR: 8.5

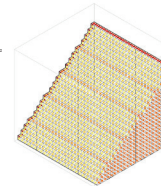


Calculation		
No. of Housing (47m2)	1812	Unit/person
Total solar surface area	18240	m ²
average daylight	0.324	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	20408	kWh/day

#004

75%

Gross Floor Area: 99690m²
Covered Area: 9600m²
Coverage: 96%
FAR: 9.9

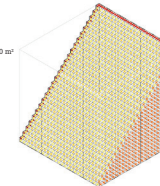


Calculation		
No. of Housing (47m2)	2119	Unit/person
Total solar surface area	21599	m ²
average daylight	0.296	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	24190	kWh/day

#005

100%

Gross Floor Area: 129600 m²
Covered Area: 10000 m²
Coverage: 100%
FAR: 12.9



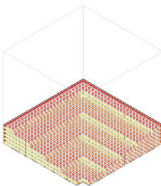
Calculation		
No. of Housing (47m2)	2757	Unit/person
Total solar surface area	25200	m ²
average daylight	0.27	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	28224	kWh/day

Density - Stepping 2 ways

#006

0%

Gross Floor Area: 34480 m²
Covered Area: 9936 m²
Coverage: 99%
FAR: 3.4

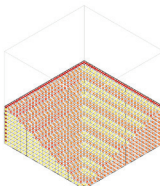


Calculation		
No. of Housing (47m2)	733	Unit/person
Total solar surface area	12936	m ²
average daylight	0.458	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	15608	kWh/day

#007

25%

Gross Floor Area: 76840 m²
Covered Area: 9936 m²
Coverage: 99%
FAR: 7.5

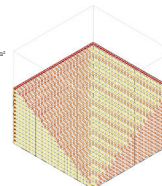


Calculation		
No. of Housing (47m2)	1613	Unit/person
Total solar surface area	17984	m ²
average daylight	0.322	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	20142	kWh/day

#008

50%

Gross Floor Area: 110320m²
Covered Area: 9936m²
Coverage: 99%
FAR: 11.0

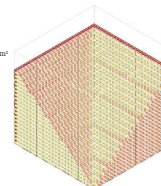


Calculation		
No. of Housing (47m2)	2347	Unit/person
Total solar surface area	21984	m ²
average daylight	0.547	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	24622	kWh/day

#009

75%

Gross Floor Area: 142800 m²
Covered Area: 9936m²
Coverage: 99%
FAR: 14.2

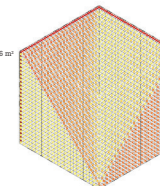


Calculation		
No. of Housing (47m2)	3038	Unit/person
Total solar surface area	25984	m ²
average daylight	0.243	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	29102	kWh/day

#010

100%

Gross Floor Area: 180816 m²
Covered Area: 10000 m²
Coverage: 100%
FAR: 18.0



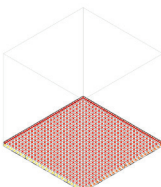
Calculation		
No. of Housing (47m2)	3847	Unit/person
Total solar surface area	30000	m ²
average daylight	0.222	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	33600	kWh/day

Density - Mountain

#011

0%

Gross Floor Area: 10000 m²
Covered Area: 10000 m²
Coverage: 100%
FAR: 1.0

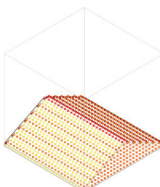


Calculation		
No. of Housing (47m2)	409	Unit/person
Total solar surface area	10800	m ²
average daylight	1.12	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	12096	kWh/day

#012

25%

Gross Floor Area: 38800 m²
Covered Area: 10000 m²
Coverage: 100%
FAR: 3.8

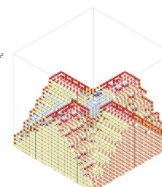


Calculation		
No. of Housing (47m2)	920	Unit/person
Total solar surface area	14352	m ²
average daylight	0.442	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	16074	kWh/day

#013

50%

Gross Floor Area: 96136 m²
Covered Area: 10000 m²
Coverage: 100%
FAR: 9.5

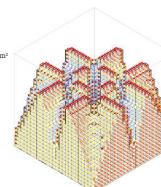


Calculation		
No. of Housing (47m2)	2024	Unit/person
Total solar surface area	20848	m ²
average daylight	0.612	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	23349	kWh/day

#014

75%

Gross Floor Area: 148868 m²
Covered Area: 10000 m²
Coverage: 100%
FAR: 14.8

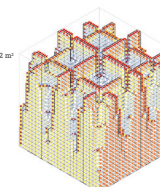


Calculation		
No. of Housing (47m2)	3163	Unit/person
Total solar surface area	33972	m ²
average daylight	0.417	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	37936	kWh/day

#015

100%

Gross Floor Area: 288212 m²
Covered Area: 10000 m²
Coverage: 100%
FAR: 28.9



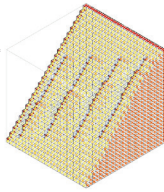
Calculation		
No. of Housing (47m2)	4453	Unit/person
Total solar surface area	53744	m ²
average daylight	0.292	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	60193	kWh/day

Diversity

#016

0%

Gross Floor Area: 144160 m²
Covered Area: 10000 m²
Coverage: 100%
FAR: 14.4

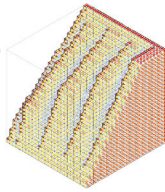


Calculation		
No. of Housing (47m2)	2067	Unit/person
Total solar surface area	26480	m ²
average daylight	0.237	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	29657	kWh/day

#017

25%

Gross Floor Area: 160112 m²
Covered Area: 10000 m²
Coverage: 100%
FAR: 16.0

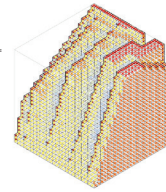


Calculation		
No. of Housing (47m2)	3408	Unit/person
Total solar surface area	29472	m ²
average daylight	0.193	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	16074	kWh/day

#018

50%

Gross Floor Area: 86300m²
Covered Area: 10000m²
Coverage: 100%
FAR: 16.3

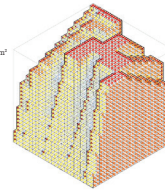


Calculation		
No. of Housing (47m2)	2024	Unit/person
Total solar surface area	31088	m ²
average daylight	0.612	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	34818	kWh/day

#019

75%

Gross Floor Area: 198368 m²
Covered Area: 10000m²
Coverage: 100%
FAR: 19.8

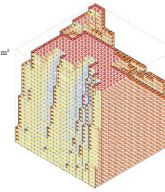


Calculation		
No. of Housing (47m2)	4220	Unit/person
Total solar surface area	32416	m ²
average daylight	0.417	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	36305	kWh/day

#020

100%

Gross Floor Area: 204887 m²
Covered Area: 10000 m²
Coverage: 100%
FAR: 20.4



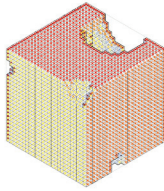
Calculation		
No. of Housing (47m2)	4358	Unit/person
Total solar surface area	32320	m ²
average daylight	0.292	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	36198.4	kWh/day

Porosity

#021

0%

Gross Floor Area: 119728 m²
Covered Area: 9600 m²
Coverage: 96%
FAR: 2.48

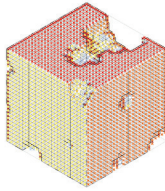


Calculation		
No. of Housing (47m2)	408	Unit/person
Total solar surface area	10800	m ²
average daylight	0.811	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	12096	kWh/day

#022

25%

Gross Floor Area: 60000 m²
Covered Area: 9600 m²
Coverage: 96%
FAR: 5

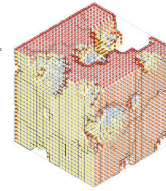


Calculation		
No. of Housing (47m2)	825	Unit/person
Total solar surface area	14352	m ²
average daylight	0.528	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	16074	kWh/day

#023

50%

Gross Floor Area: 86300m²
Covered Area: 9600m²
Coverage: 96%
FAR: 8.5

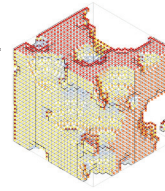


Calculation		
No. of Housing (47m2)	2024	Unit/person
Total solar surface area	20840	m ²
average daylight	0.433	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	23349	kWh/day

#024

75%

Gross Floor Area: 99599m²
Covered Area: 9600m²
Coverage: 96%
FAR: 8.9

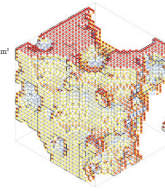


Calculation		
No. of Housing (47m2)	3163	Unit/person
Total solar surface area	33972	m ²
average daylight	0.401	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	37936	kWh/day

#025

100%

Gross Floor Area: 129600 m²
Covered Area: 10000 m²
Coverage: 100%
FAR: 12.9



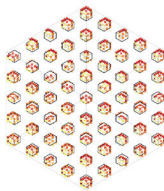
Calculation		
No. of Housing (47m2)	4453	Unit/person
Total solar surface area	53744	m ²
average daylight	0.328	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	60193	kWh/day

Collectiveness

#026

0%

Gross Floor Area: 10952 m²
Covered Area: 1369 m²
Coverage: 14%
FAR: 1.0

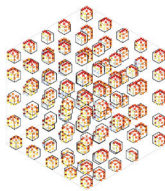


Calculation		
No. of Housing (47m2)	233	Unit/person
Total solar surface area	3300	m ²
average daylight	1.363	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	3696	kWh/day

#027

25%

Gross Floor Area: 13690 m²
Covered Area: 985 m²
Coverage: 10%
FAR: 1.3

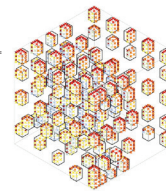


Calculation		
No. of Housing (47m2)	291	Unit/person
Total solar surface area	3135	m ²
average daylight	1.261	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	3511	kWh/day

#028

50%

Gross Floor Area: 17742m²
Covered Area: 875m²
Coverage: 9%
FAR: 1.7

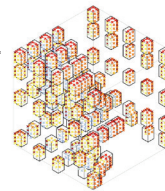


Calculation		
No. of Housing (47m2)	377	Unit/person
Total solar surface area	2970	m ²
average daylight	1.020	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	3326	kWh/day

#029

75%

Gross Floor Area: 21958m²
Covered Area: 766m²
Coverage: 8%
FAR: 2.19

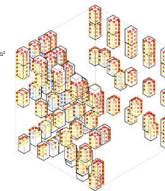


Calculation		
No. of Housing (47m2)	467	Unit/person
Total solar surface area	2850	m ²
average daylight	0.942	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	3192	kWh/day

#030

100%

Gross Floor Area: 22661 m²
Covered Area: 711 m²
Coverage: 7%
FAR: 2.2



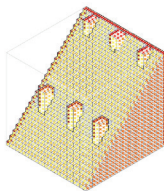
Calculation		
No. of Housing (47m2)	480	Unit/person
Total solar surface area	2640	m ²
average daylight	0.970	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	2956	kWh/day

Accessibility

#031

0%

Gross Floor Area: 137488 m²
Covered Area: 10000 m²
Coverage: 100%
FAR: 13.7

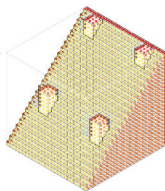


Calculation		
No. of Housing (47m2)	2925	Unit/person
Total solar surface area	m ²	
average daylight	0.250	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	-	kWh/day

#032

25%

Gross Floor Area: 137487 m²
Covered Area: 10000 m²
Coverage: 100%
FAR: 13.7

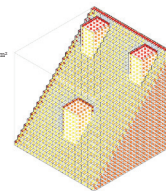


Calculation		
No. of Housing (47m2)	2925	Unit/person
Total solar surface area	m ²	
average daylight	0.256	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	-	kWh/day

#033

50%

Gross Floor Area: 140480 m²
Covered Area: 10000 m²
Coverage: 100%
FAR: 14.0

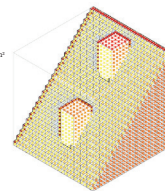


Calculation		
No. of Housing (47m2)	2988	Unit/person
Total solar surface area	m ²	
average daylight	0.242	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	-	kWh/day

#034

75%

Gross Floor Area: 136380m²
Covered Area: 10000 m²
Coverage: 100%
FAR: 13.6

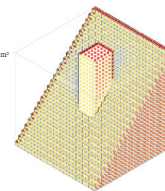


Calculation		
No. of Housing (47m2)	2878	Unit/person
Total solar surface area	m ²	
average daylight	0.235	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	-	kWh/day

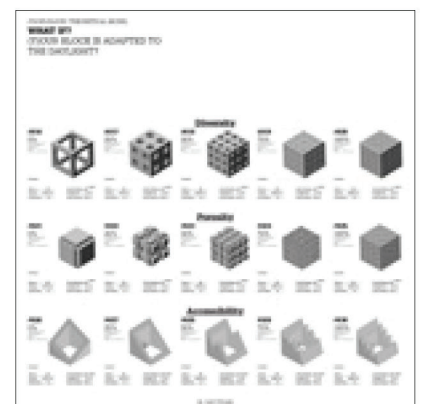
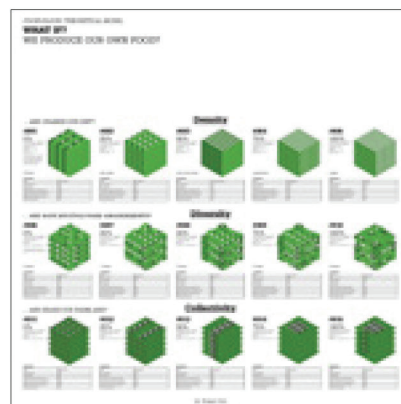
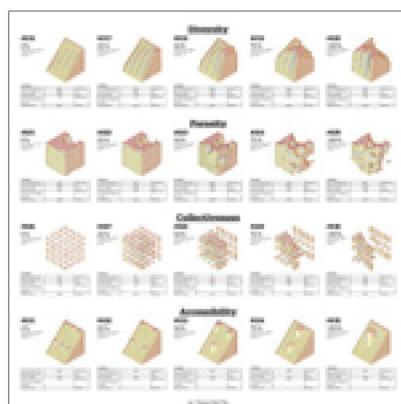
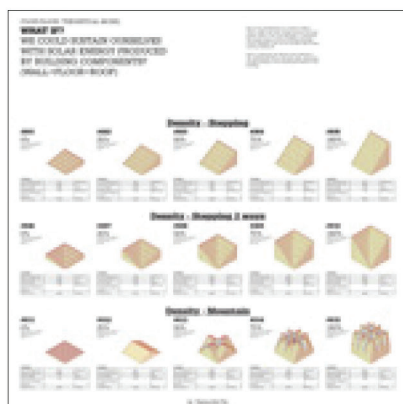
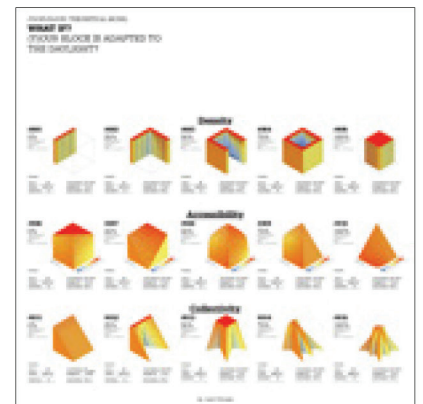
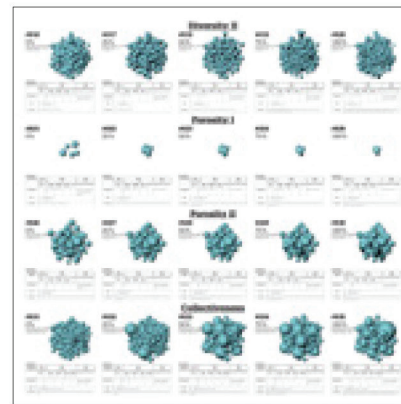
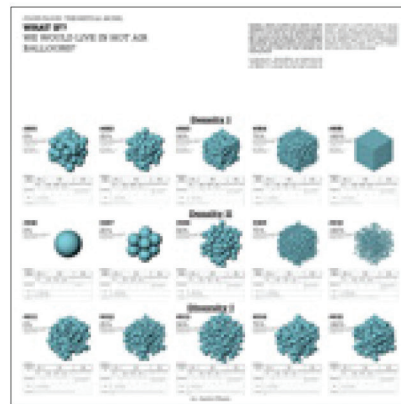
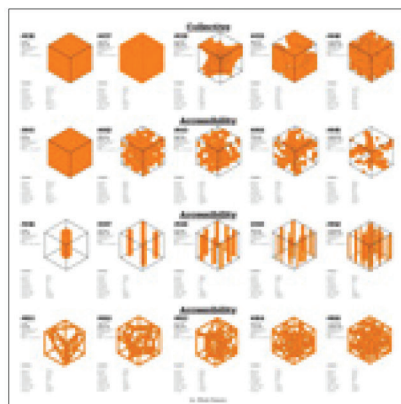
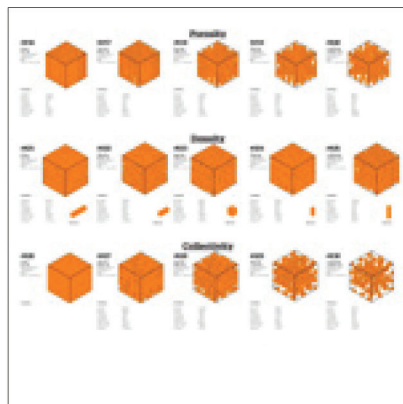
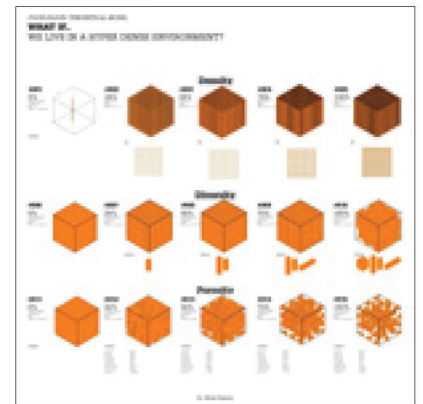
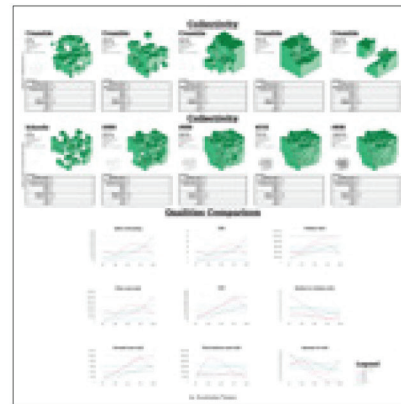
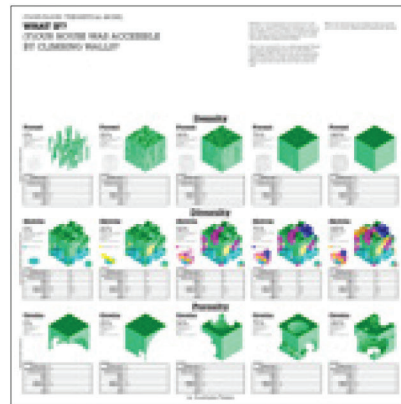
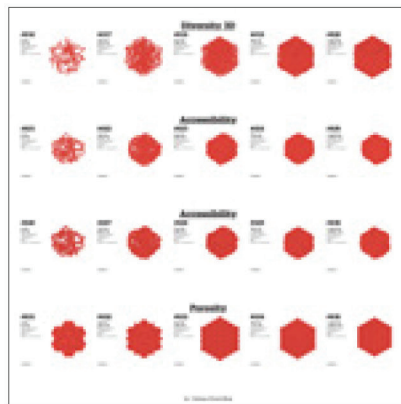
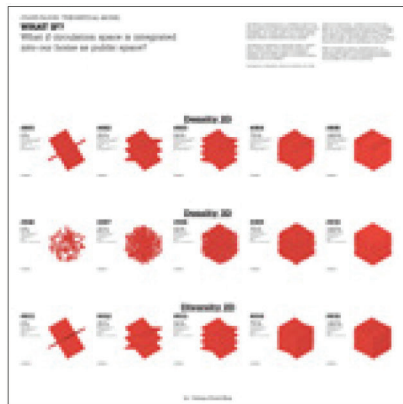
#035

100%

Gross Floor Area: 138224 m²
Covered Area: 10000 m²
Coverage: 100%
FAR: 13.8



Calculation		
No. of Housing (47m2)	2930	Unit/person
Total solar surface area	m ²	
average daylight	0.242	m ² /m ³
Each Solar panel produces (200W, 25% efficiency, 12 hours)	1.12	kWh/m ² /day
Total Electricity	-	kWh/day



What makes a block?

What makes a block?

Site

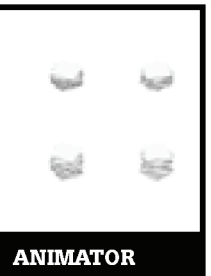
We look at the site not as a specific location but rather as a set of **parameters, variables and conditions**.

What makes a block?

Toolbox

we have developed a **set of tools** to be able **to generate** and **compare** in a systematical way.

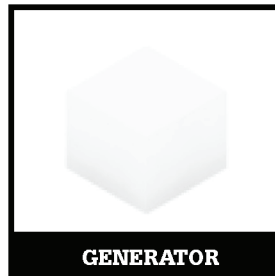
A collection of tools



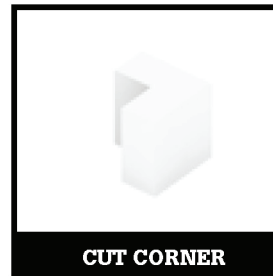
ANIMATOR



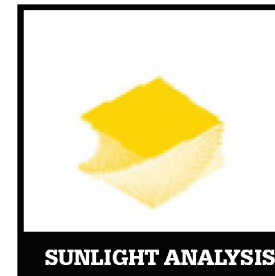
PROXIMITY ANALYSIS



GENERATOR



CUT CORNER



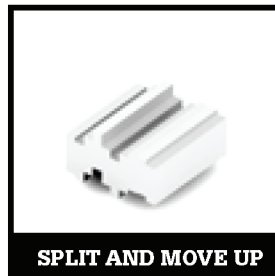
SUNLIGHT ANALYSIS



SPLIT & TURN UP



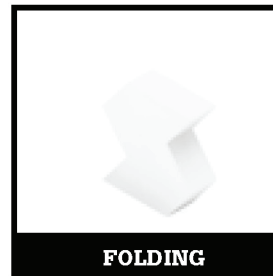
TWISTING



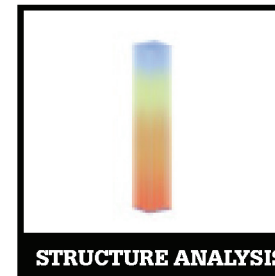
SPLIT AND MOVE UP



SPLIT & MOVE SIDE



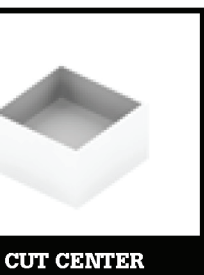
FOLDING



STRUCTURE ANALYSIS



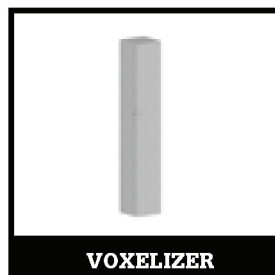
SPLIT & TURN SIDE



CUT CENTER



MASS&VOID



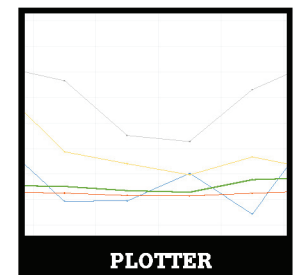
VOXELIZER



SPLIT & SHEAR



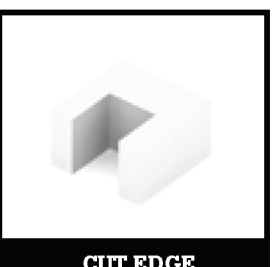
PROGRAMME



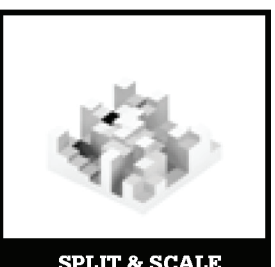
PLOTTER



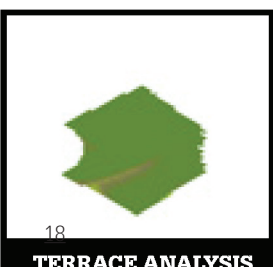
VIEW ANALYSIS



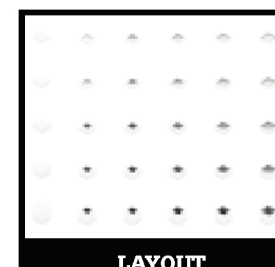
CUT EDGE



SPLIT & SCALE



TERRACE ANALYSIS

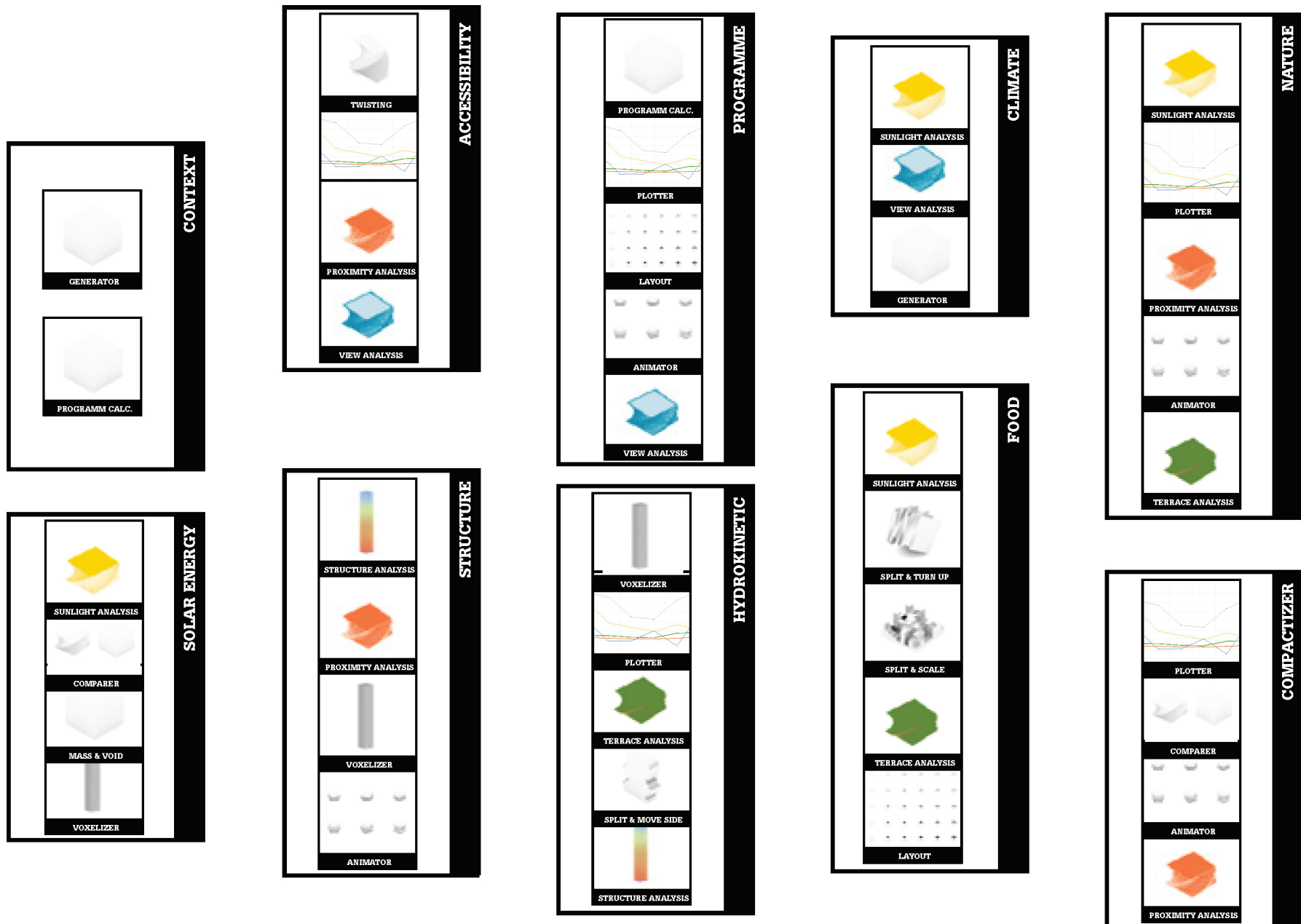


LAYOUT



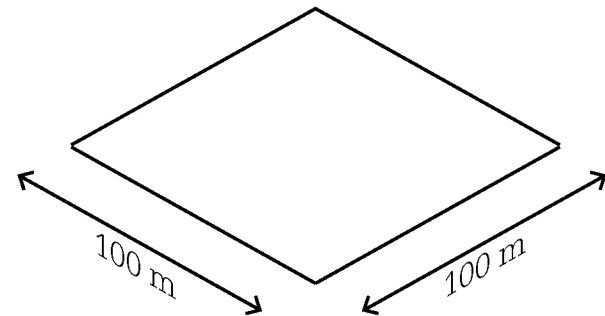
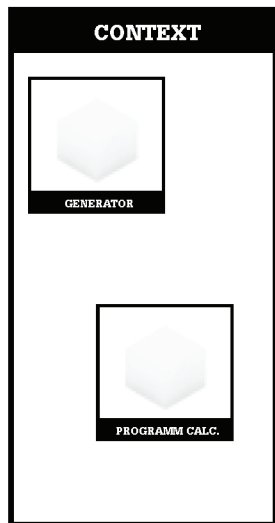
BENDING

A collection of makers



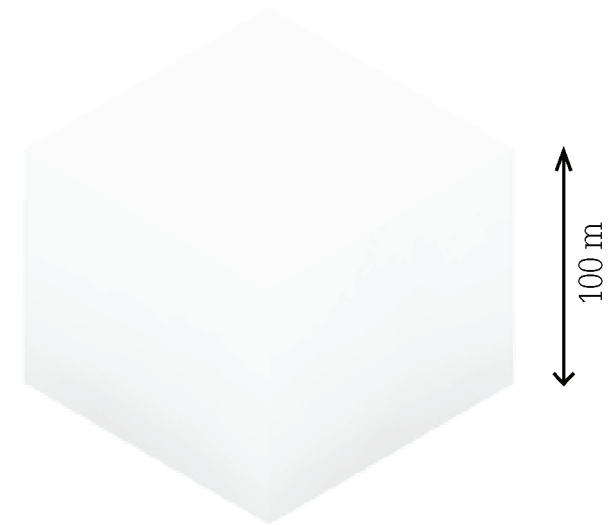
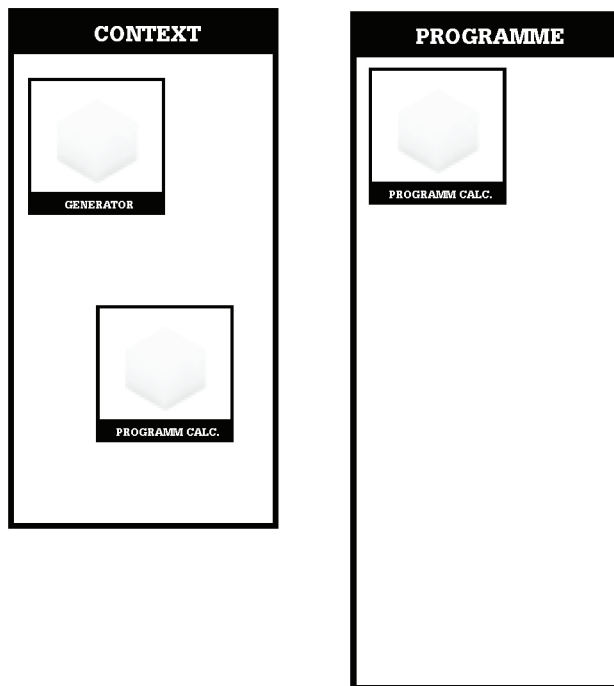
making the volume

We set a plot size



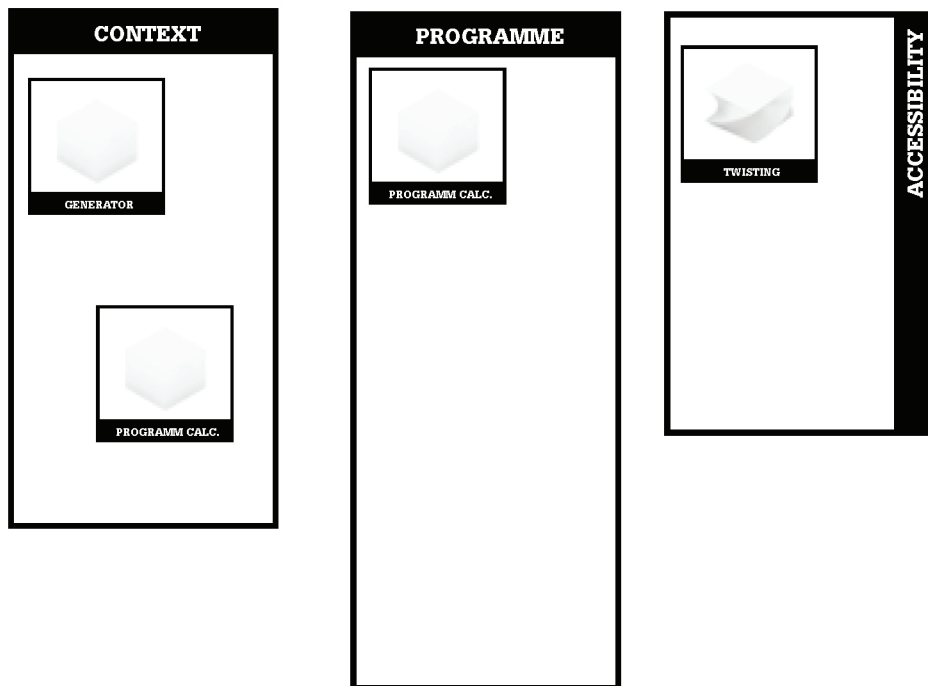
making the volume

We set a plot size
add programme



transform the volume

We set a plot size
add programme
transform



transform the volume **level**

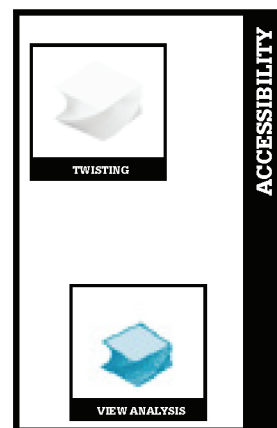
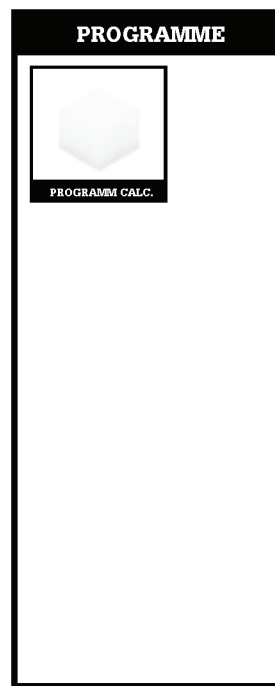
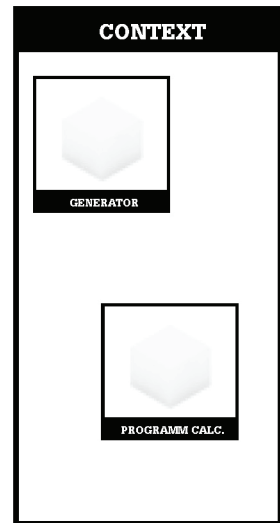


transform the volume **level density**



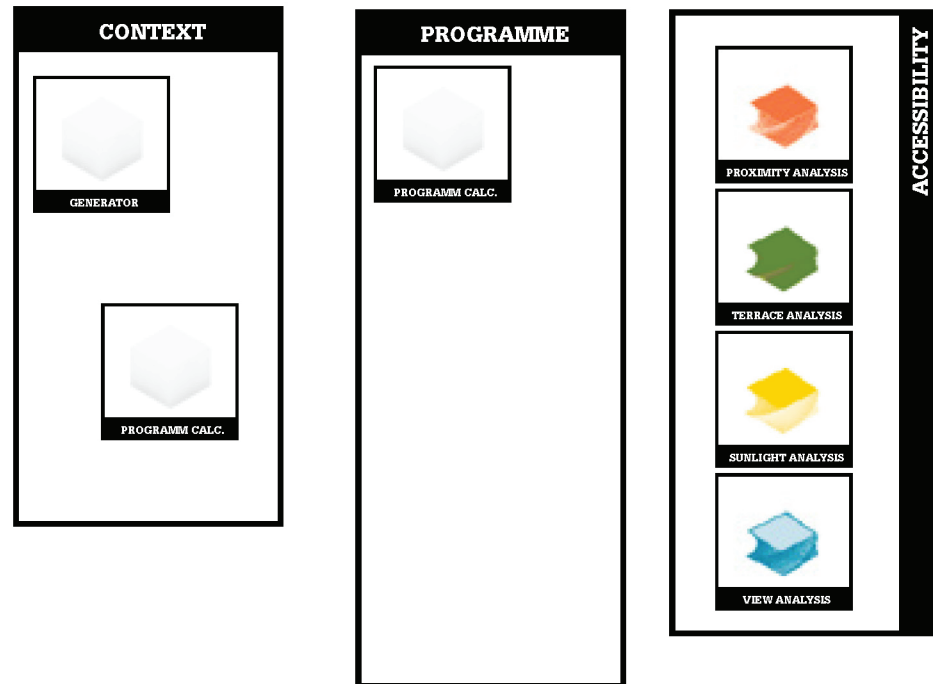
analyze the volume

We set a plot size
add programme
transform
analyze view
analyze terrace
analyze sun
analyze proximity
compare to block zero
analyze block zero
check values
compare values



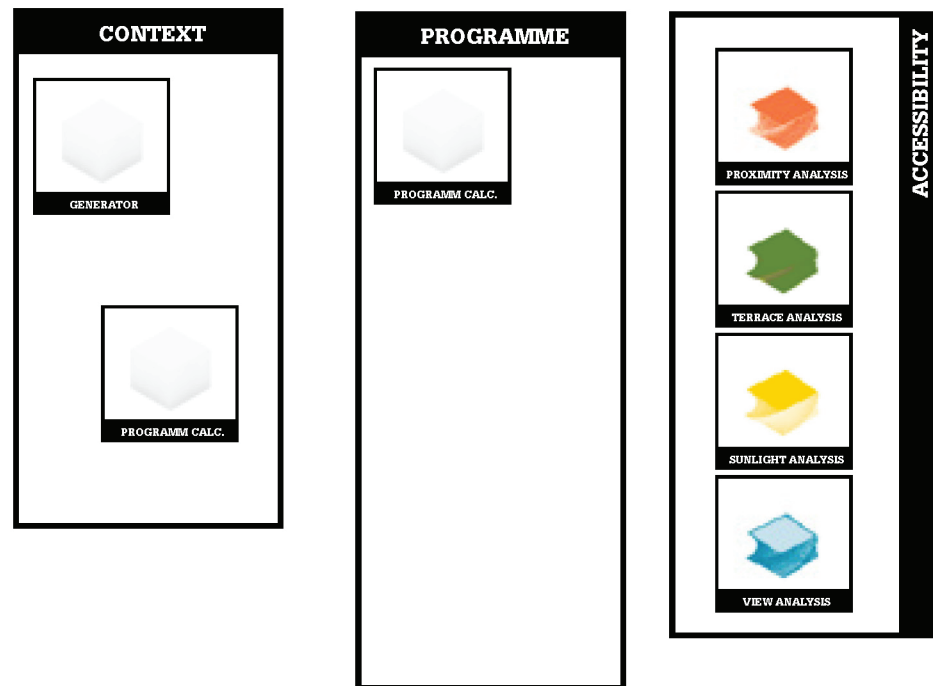
analyze the volume

We set a plot size
add programme
transform
analyze view
analyze terrace
analyze sun
analyze proximity



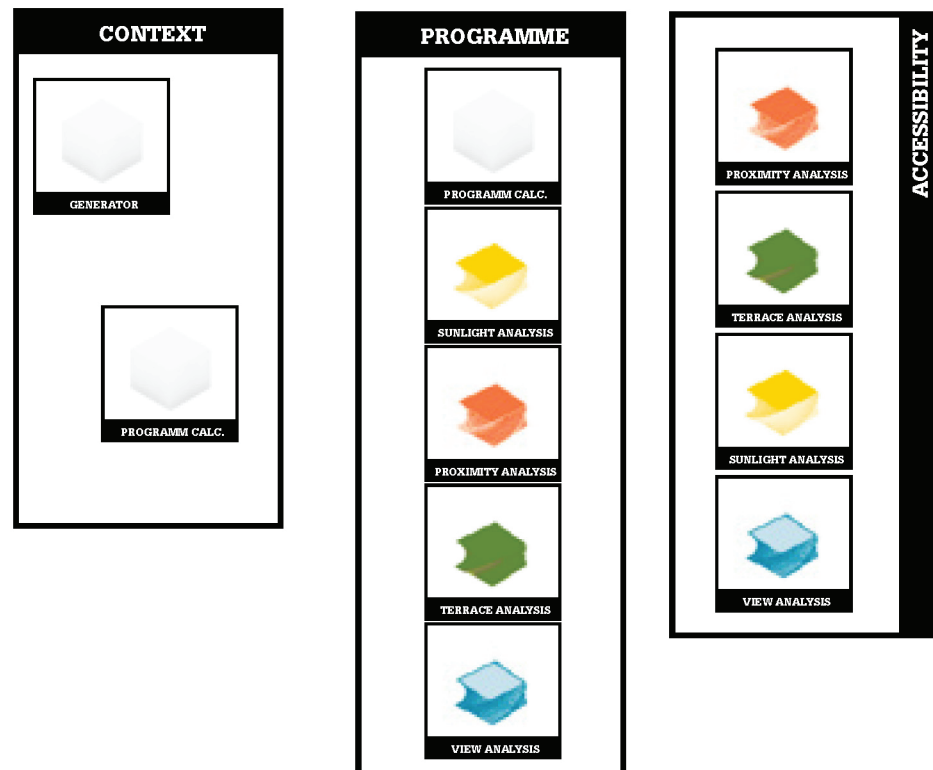
analyze the volume

We set a plot size
add programme
transform
analyze view
analyze terrace
analyze sun
analyze proximity
compare to block zero



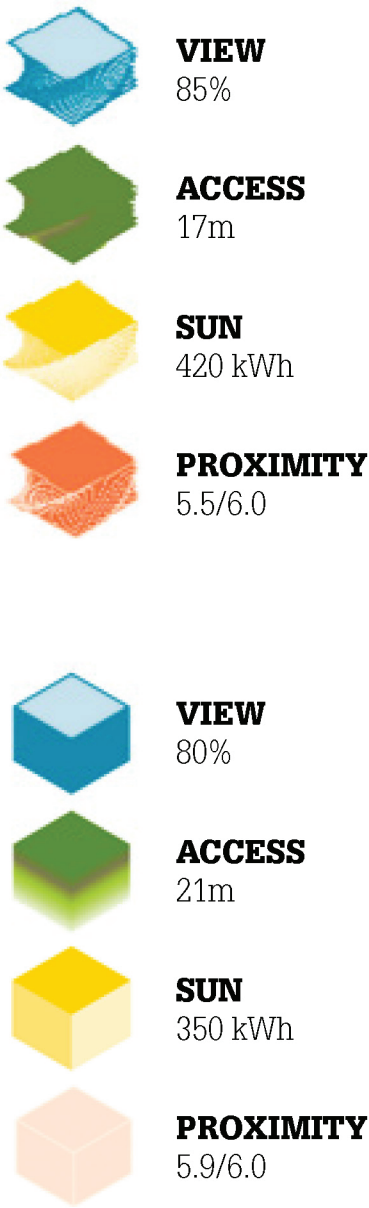
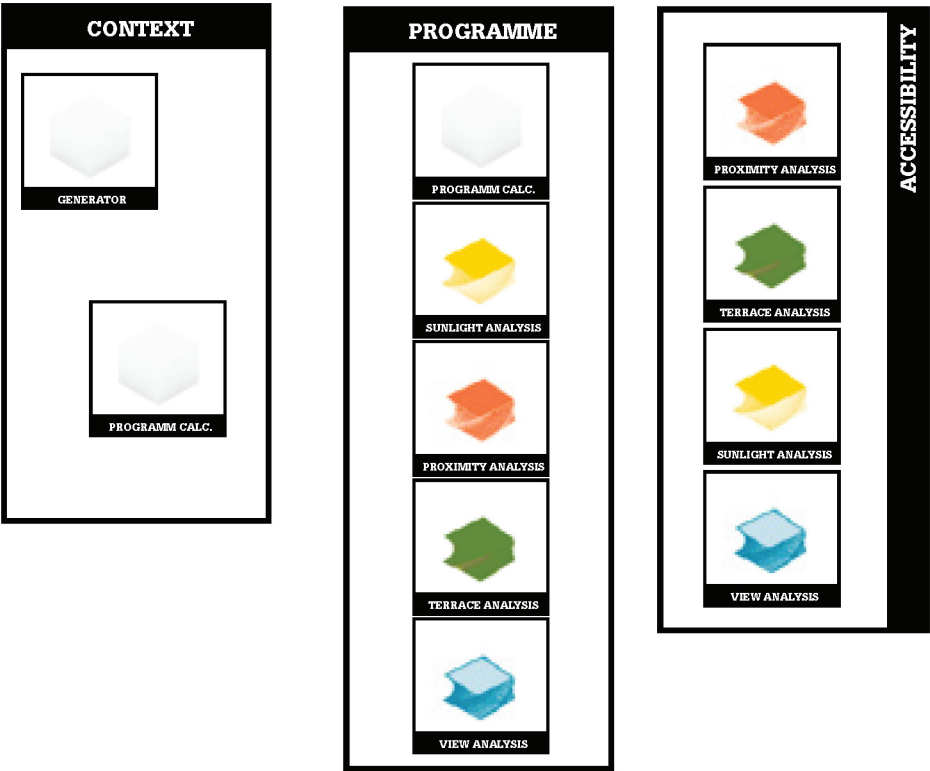
analyze the volume

We set a plot size
add programme
transform
analyze view
analyze terrace
analyze sun
analyze proximity
compare to block zero
analyze block zero



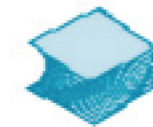
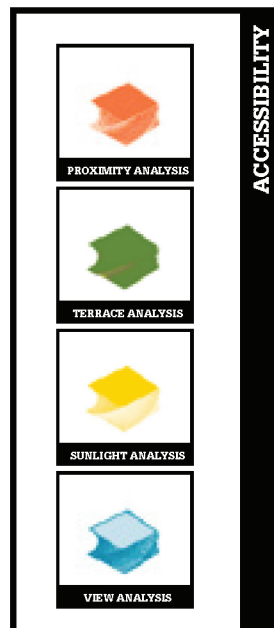
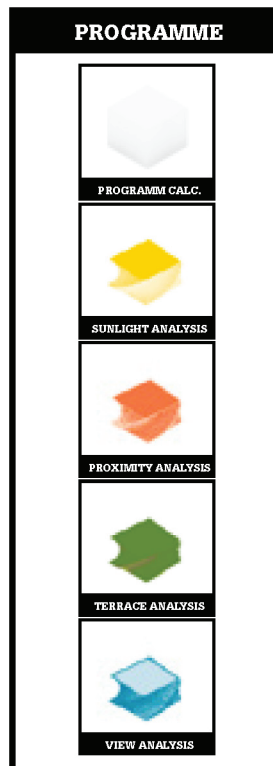
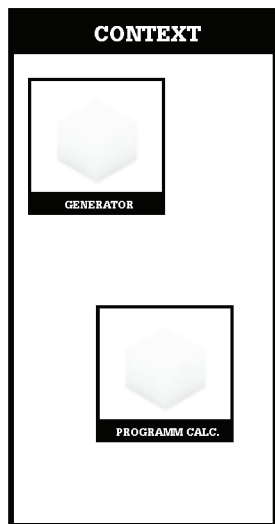
evaluate the volume

We set a plot size
add programme
transform
analyze view
analyze terrace
analyze sun
analyze proximity
compare to block zero
analyze block zero
check values



evaluate the volume

We set a plot size
add programme
transform
analyze view
analyze terrace
analyze sun
analyze proximity
compare to block zero
analyze block zero
check values
compare values



VIEW
85%
+5%



ACCESS
17 m
-4 m



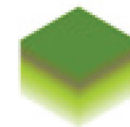
SUN
420 kWh/m²
+70 kWh/m²



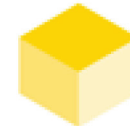
PROXIMITY
5.5/6.0
+0.4



VIEW
80%



ACCESS
21 m



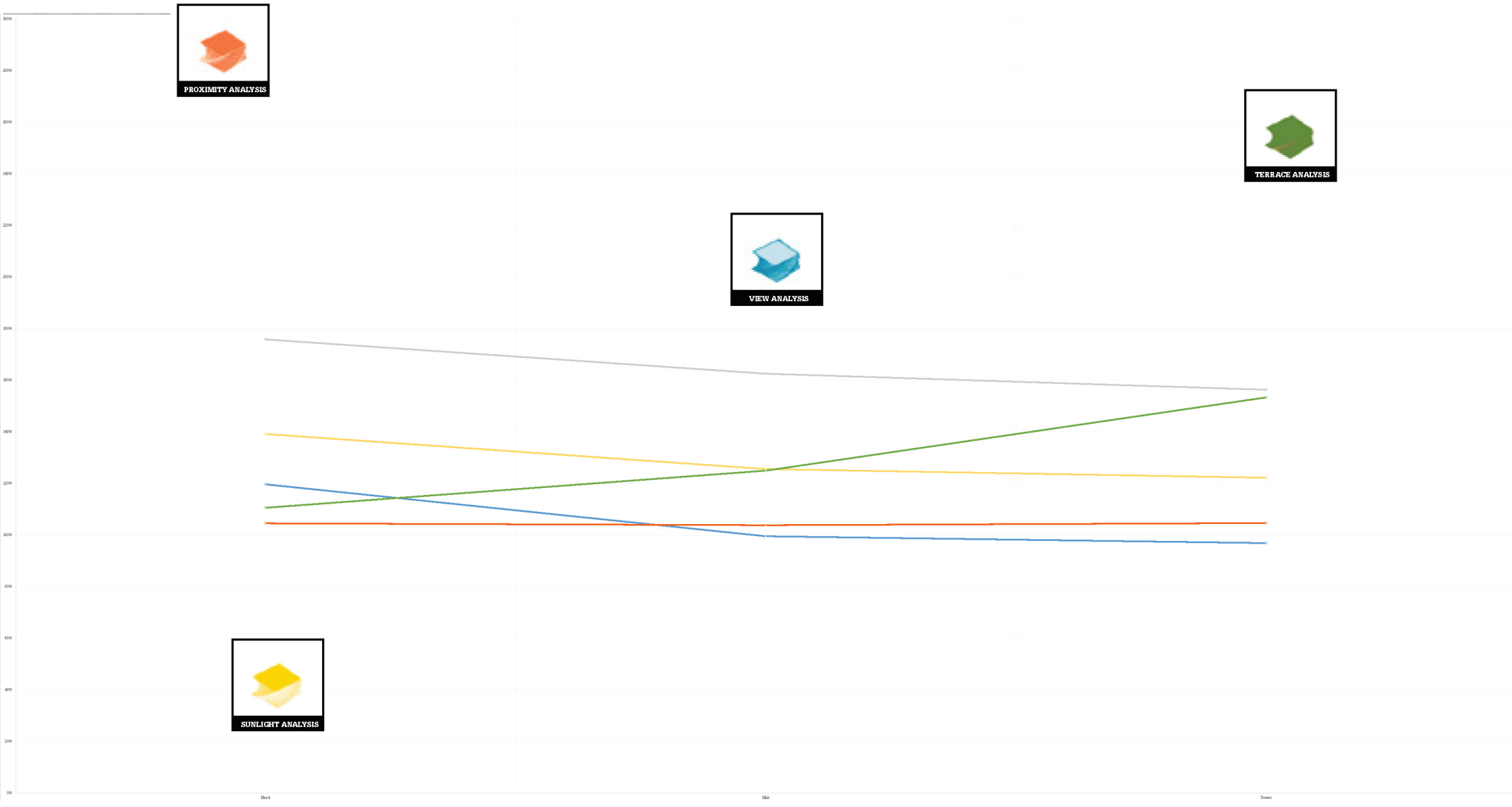
SUN
350 kWh



PROXIMITY
5.9/6.0

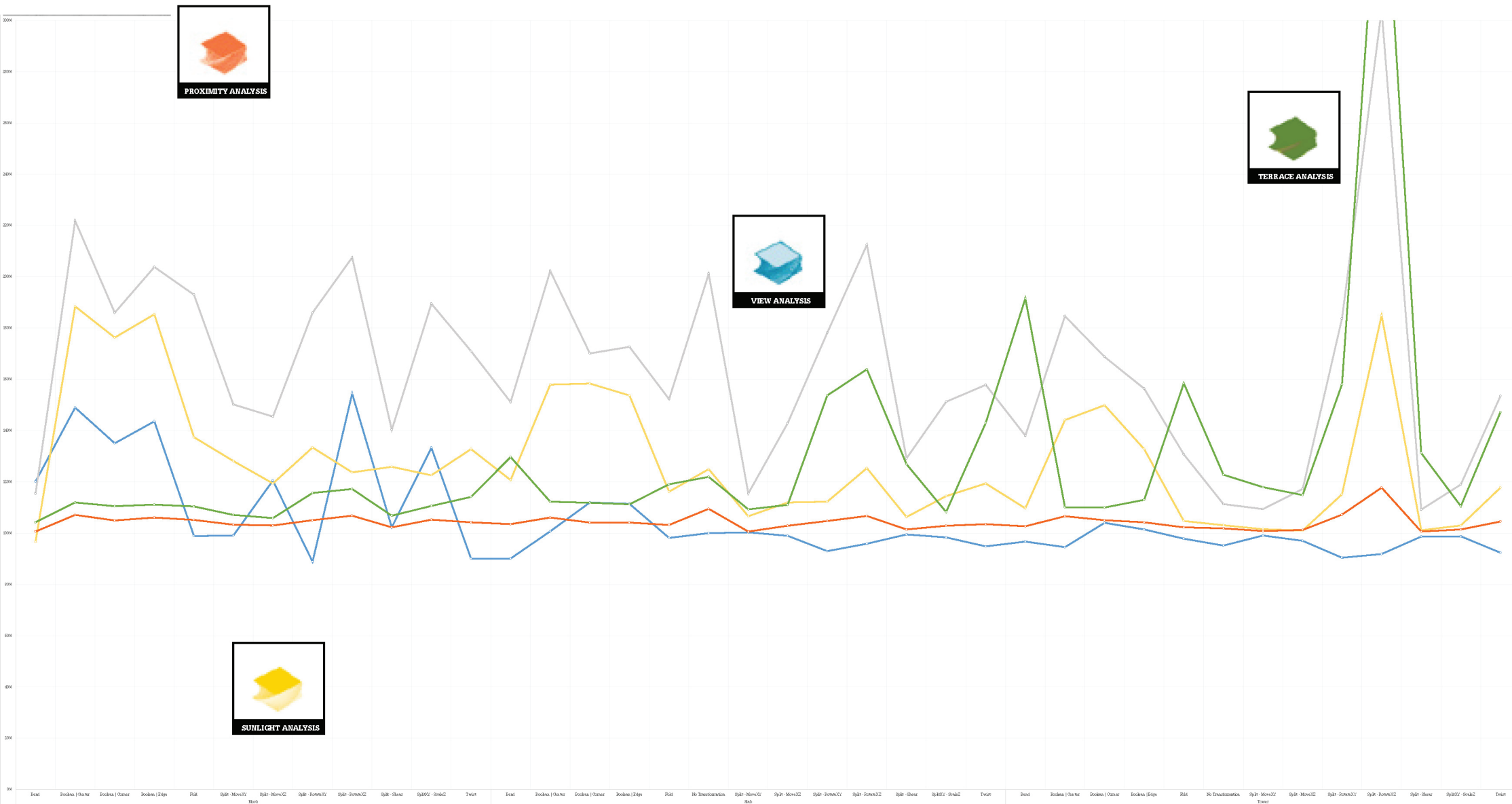
comparing trends

volume transformation level density



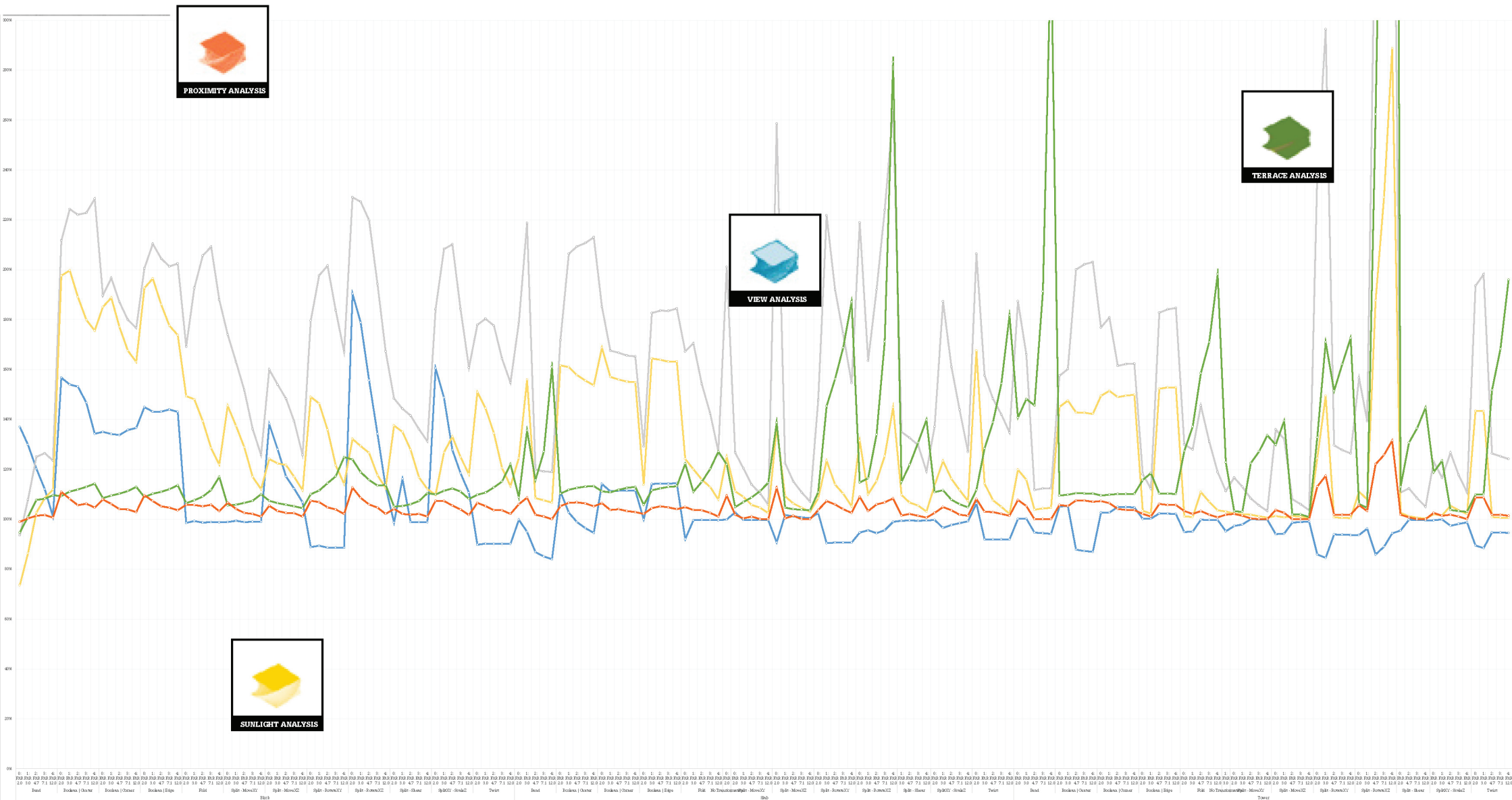
comparing trends

volume transformation level density



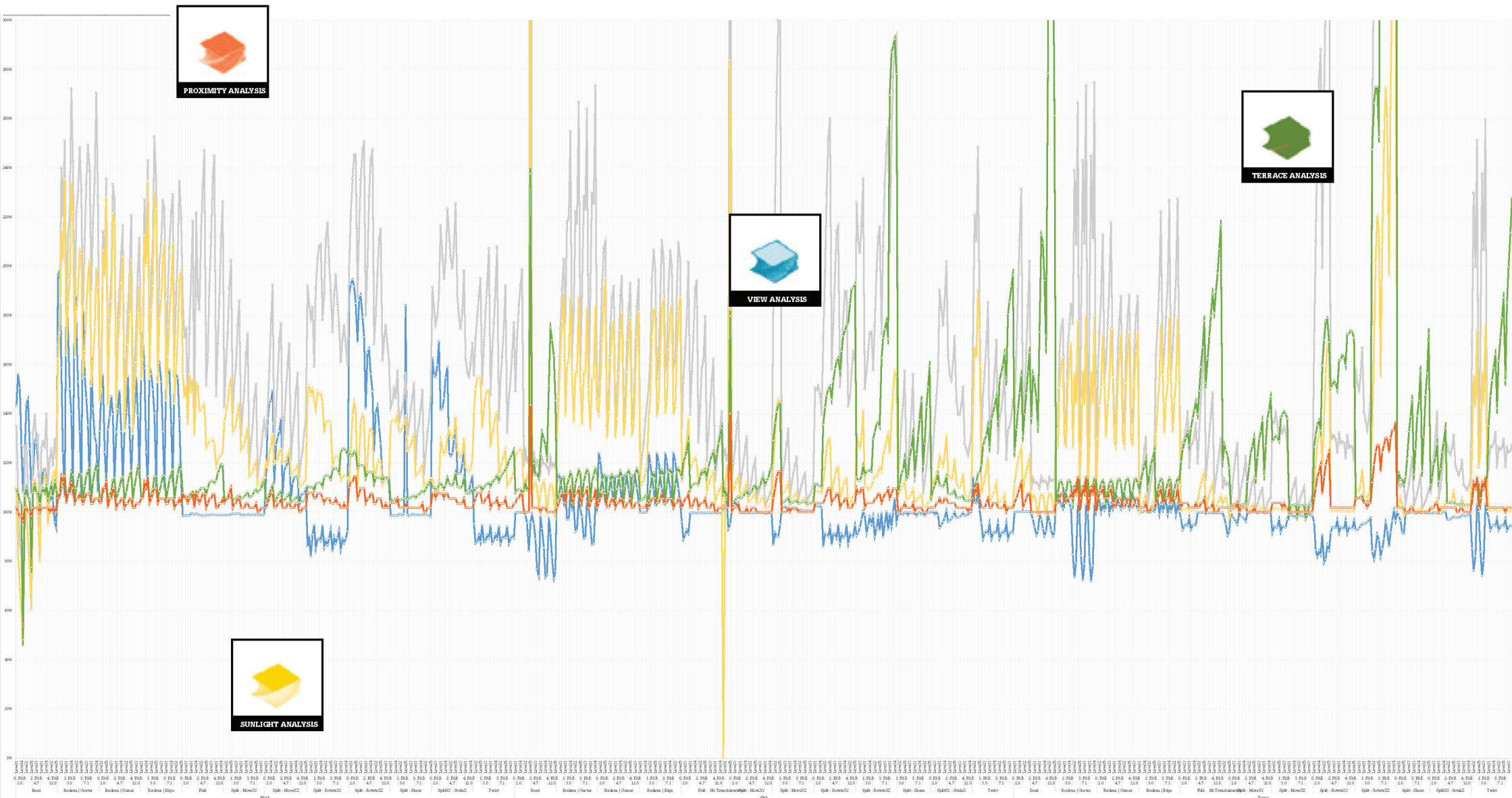
comparing trends

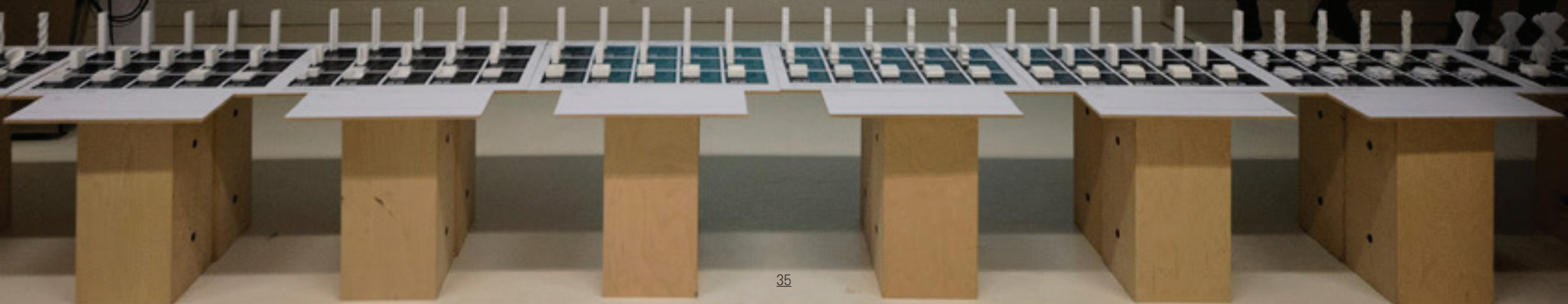
volume transformation level density



comparing trends

volume transformation level density





The Blockmaker VDO I & II

**What if we could live
self-sufficiently with
Solar Energy?**

02. Research

Solar Energy and Housing

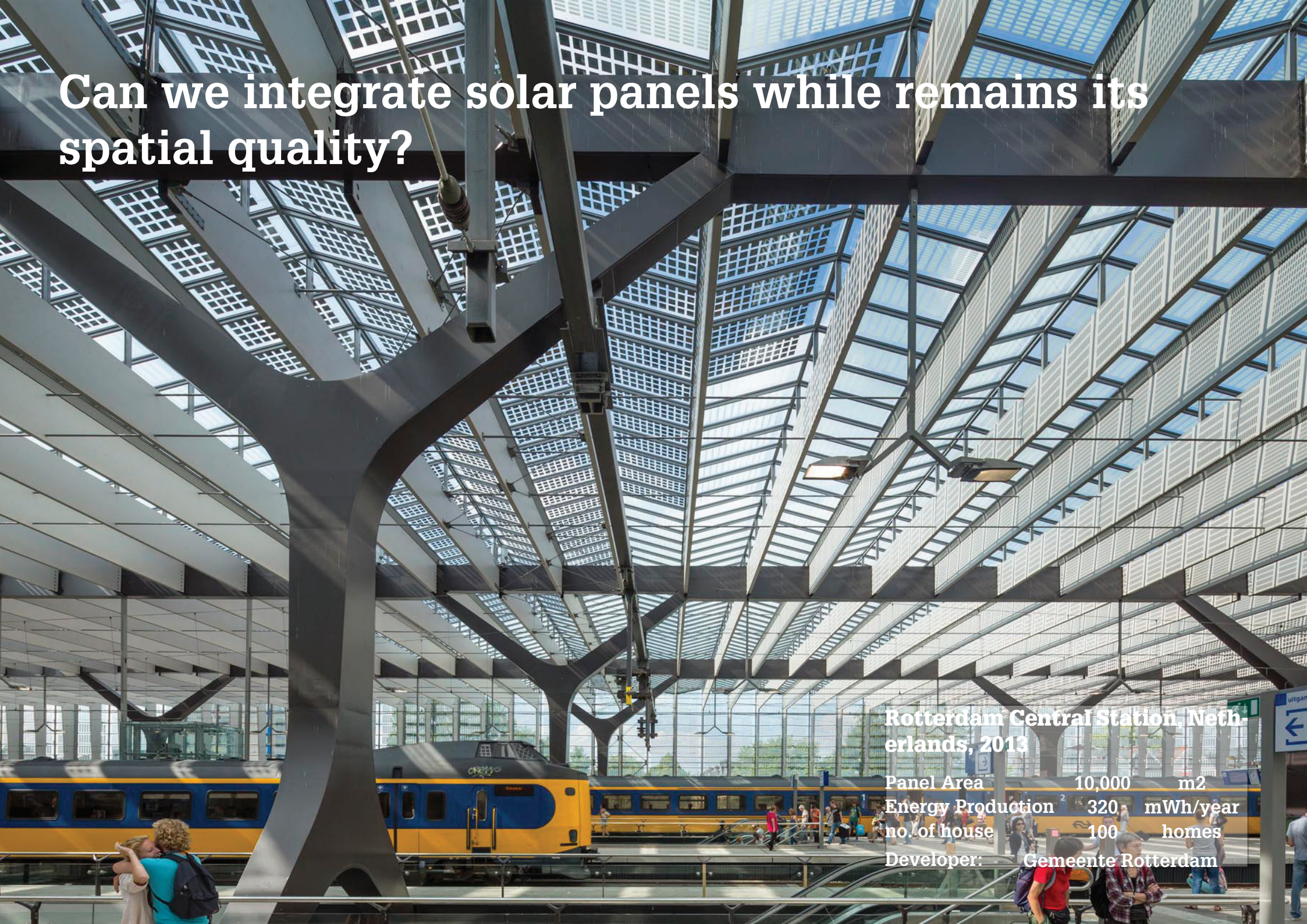
Is this the only solution?



Kyoto Abandoned golf course Solar Plant, Japan, 2015

Panel Area	0.3	km ²
Energy Production	26.3	Gwh/year
no. of house	7,514	homes
Developer:	Kyocera Corp.	

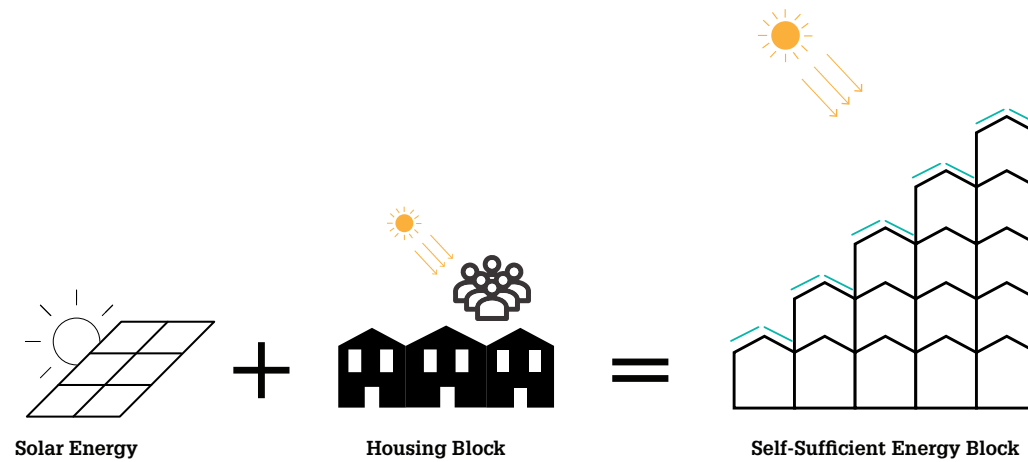
Can we integrate solar panels while remains its spatial quality?



Rotterdam Central Station, Netherlands, 2013

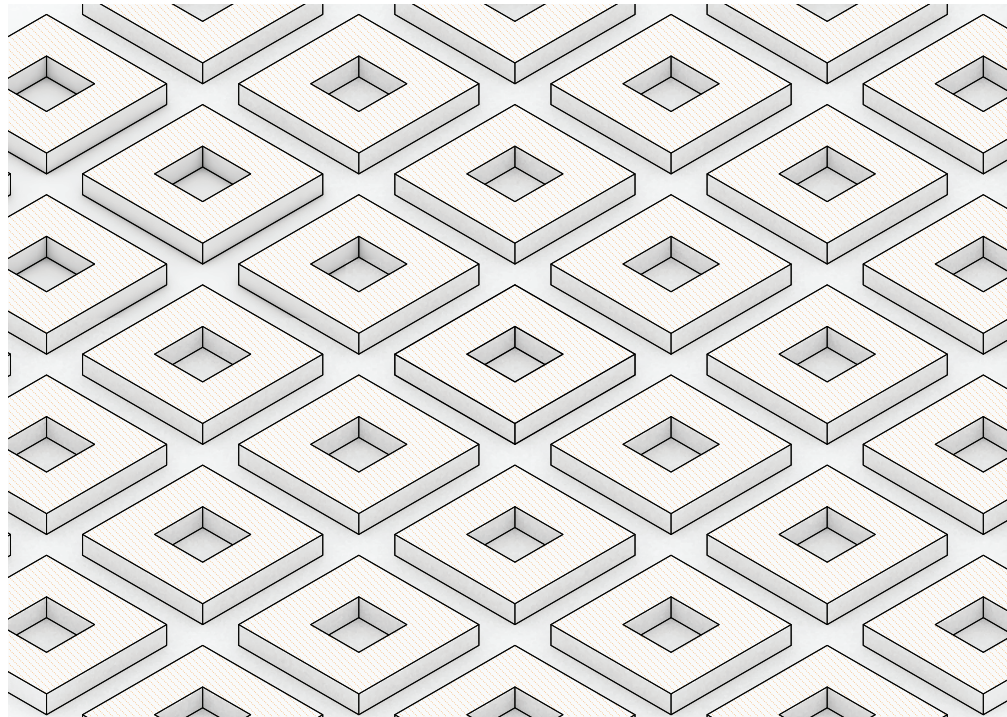
Panel Area	10,000	m ²
Energy Production	320	mWh/year
no. of house	100	homes
Developer:	Gemeente Rotterdam	

Objective



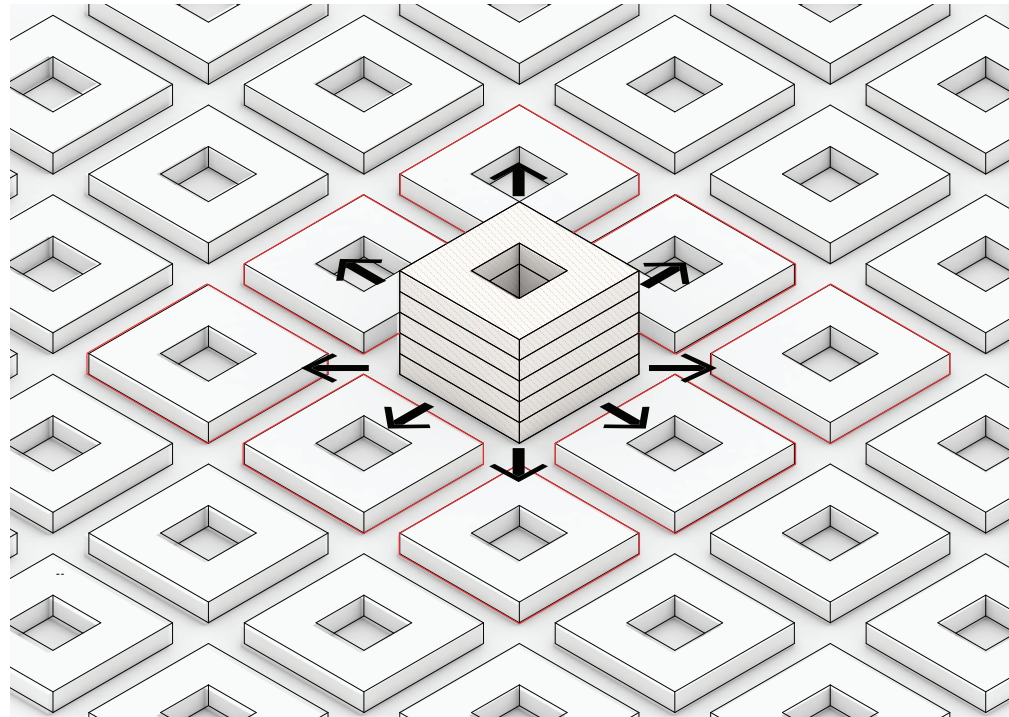
Imagine living in a city block where you can sustain your energy usage and not rely on the local electricity grid. And still, live comfortably with good daylight quality.

Objective

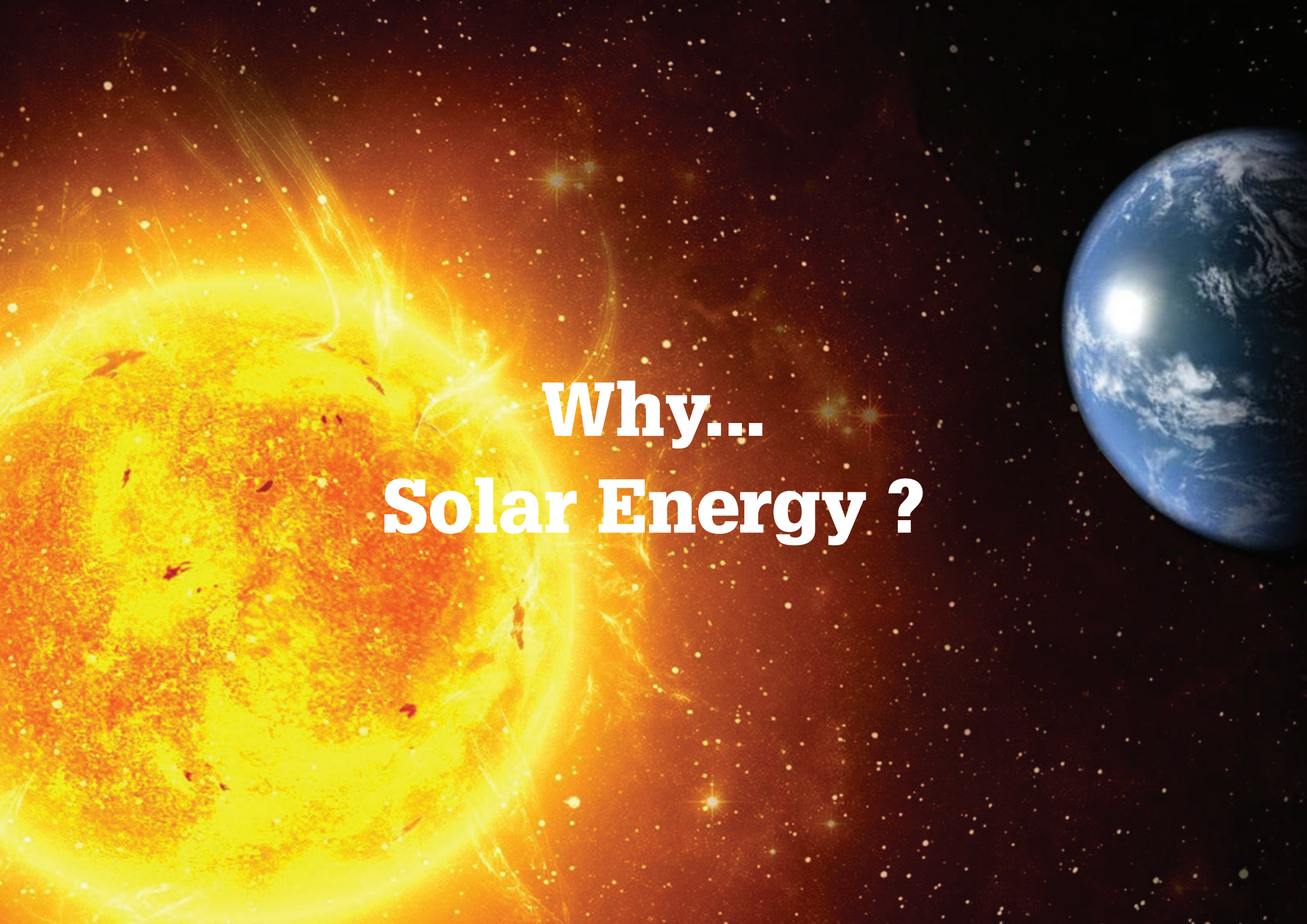


we can put solar panels on every roof the city block...

Objective



Or... we can design a housing that can power other surrounding blocks.

A composite image of the Sun and Earth in space. The Sun is on the left, a large, bright, fiery orange-yellow sphere with visible solar flares and a textured surface. The Earth is on the right, a blue and white sphere showing clouds and continents. The background is a dark, deep space filled with numerous small, distant stars of varying brightness.

**Why...
Solar Energy ?**

Solar Technology

Conversion Types of Sunlight

Solar Thermal collector



sunlight to heat
Odeillo solar furnace 1970

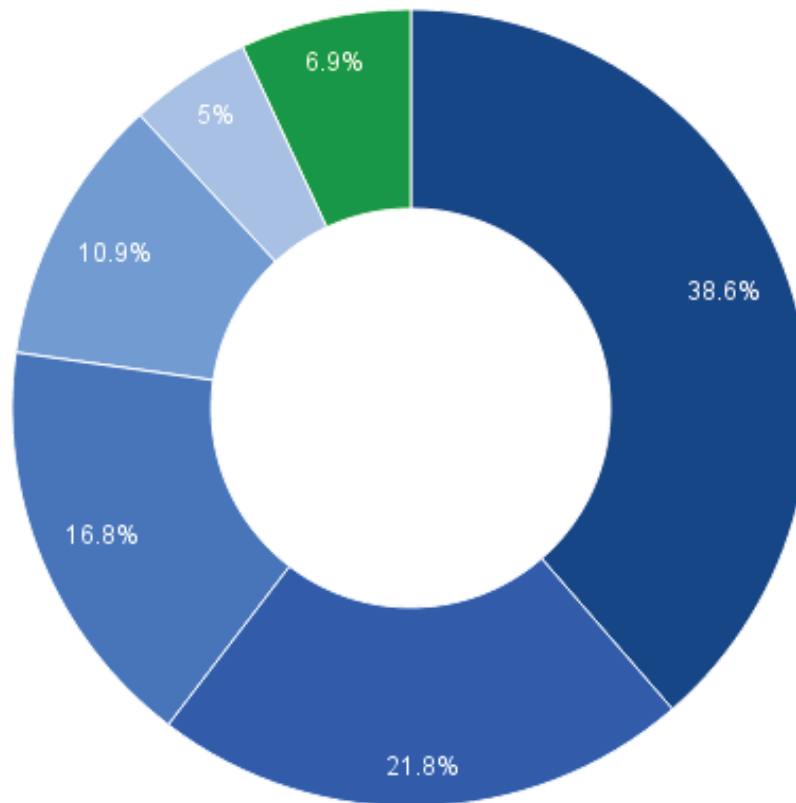
Solar photovoltaic panels



sunlight to electricity
ENDESA PAVILION , IAAC 2012

Solar Technology

World Electricity Production in 2014



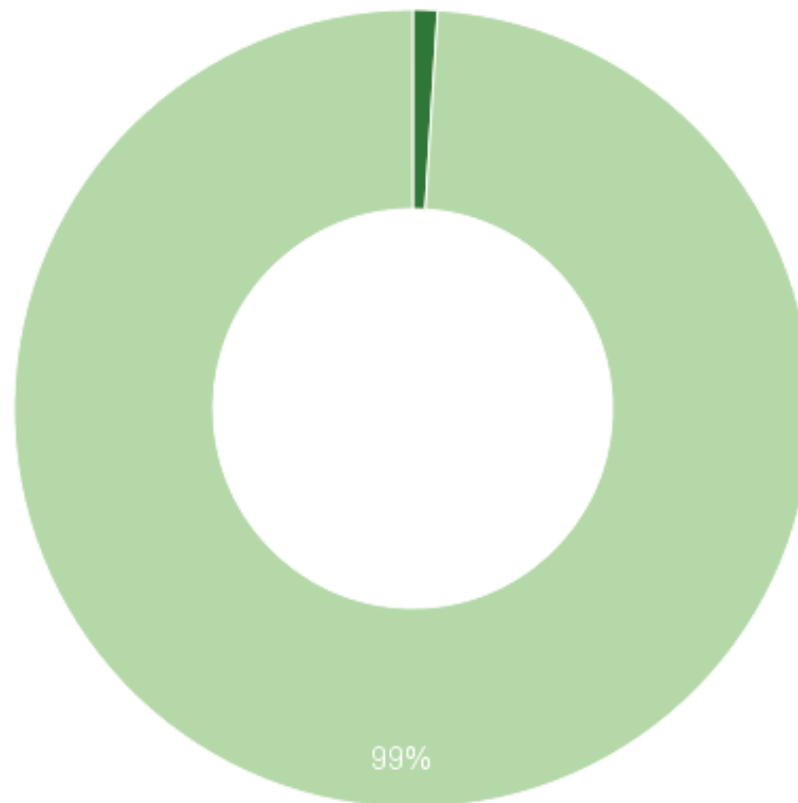
Total = 22,433 TWH

Renewable Energy	7%
Coal	39%
Gas	22%
Hydroelectric	17%
Nuclear	11%
Oil	5%

Source: The World Bank, Year: 2014

Solar Technology

World Electricity Production in 2014



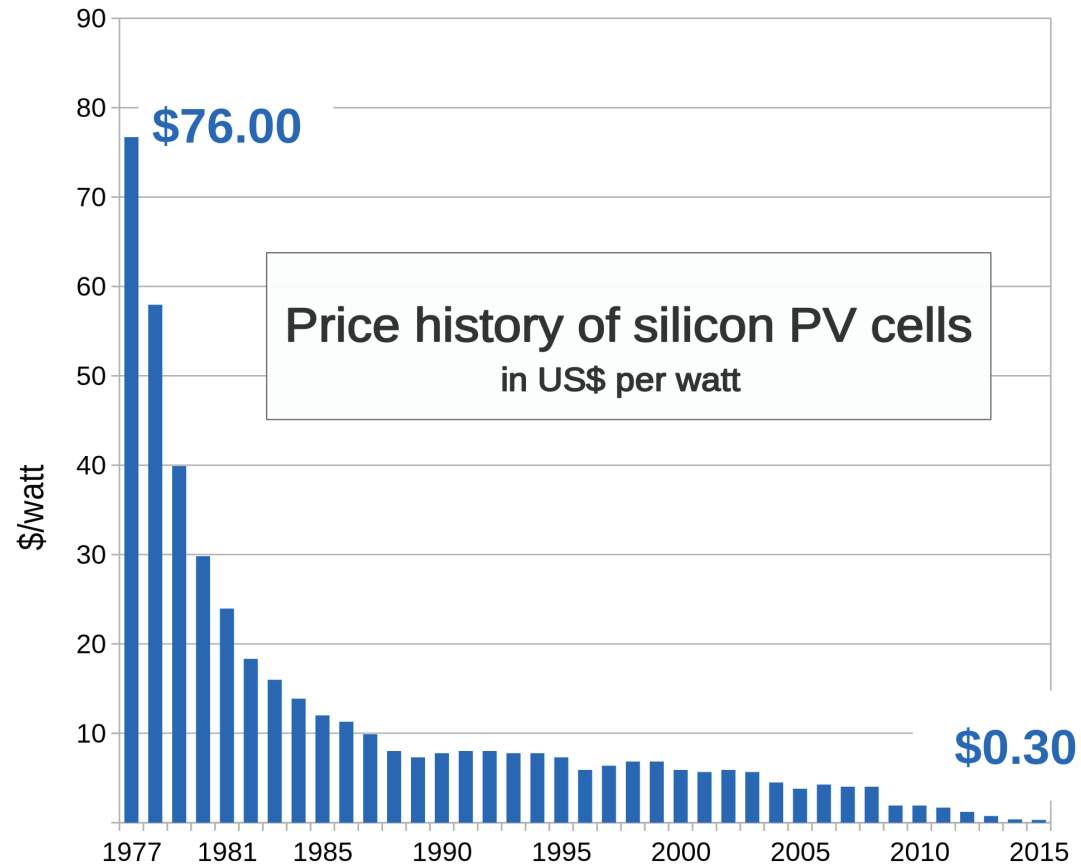
Total = 167 TWH

- **Solar Energy** 1%
- **Other renewable resources** 6%

Source: The World Bank, Year: 2014

Solar Technology

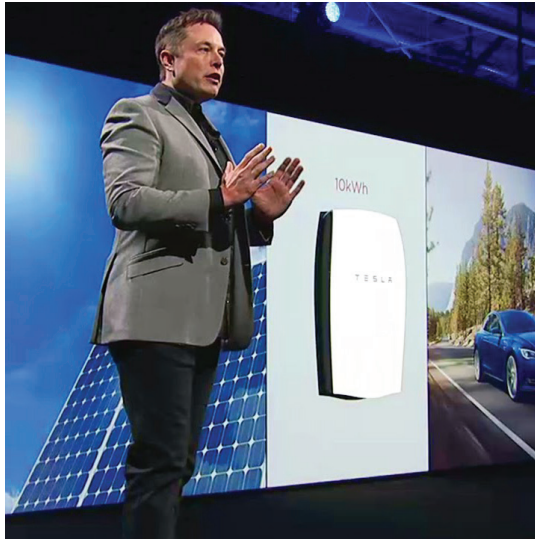
Solar panel price has dropped



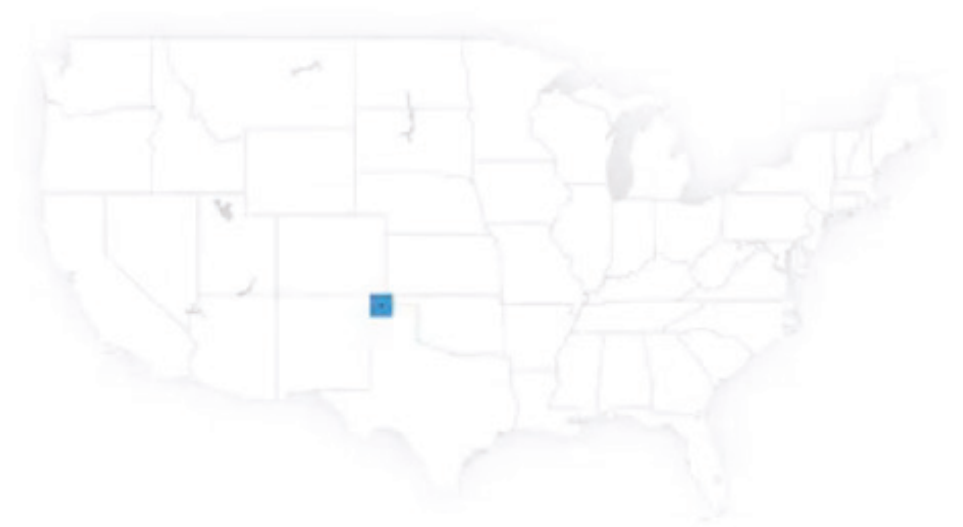
Source: Bloomberg New Energy Finance & pv.energytrend.com

Self-Sufficiency: Tesla Solar City

ELON MUSK, POWERWALL Battery Launched in 2015



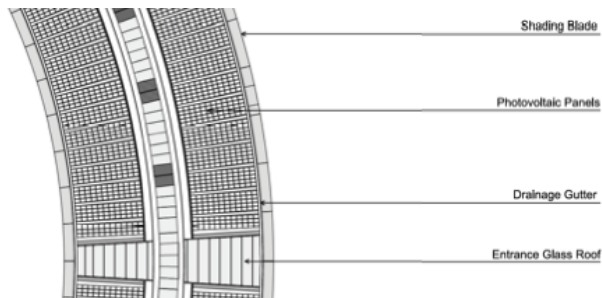
SURFACE AREA OF SOLAR PANELS
REQUIRED TO POWER ENTIRE U.S.



Tesla Gigafactory, Nevada 2014- 2018

Self-Sufficiency: Apple New Campus

Apple Campus in Cupertino, 2017



Plan of the building

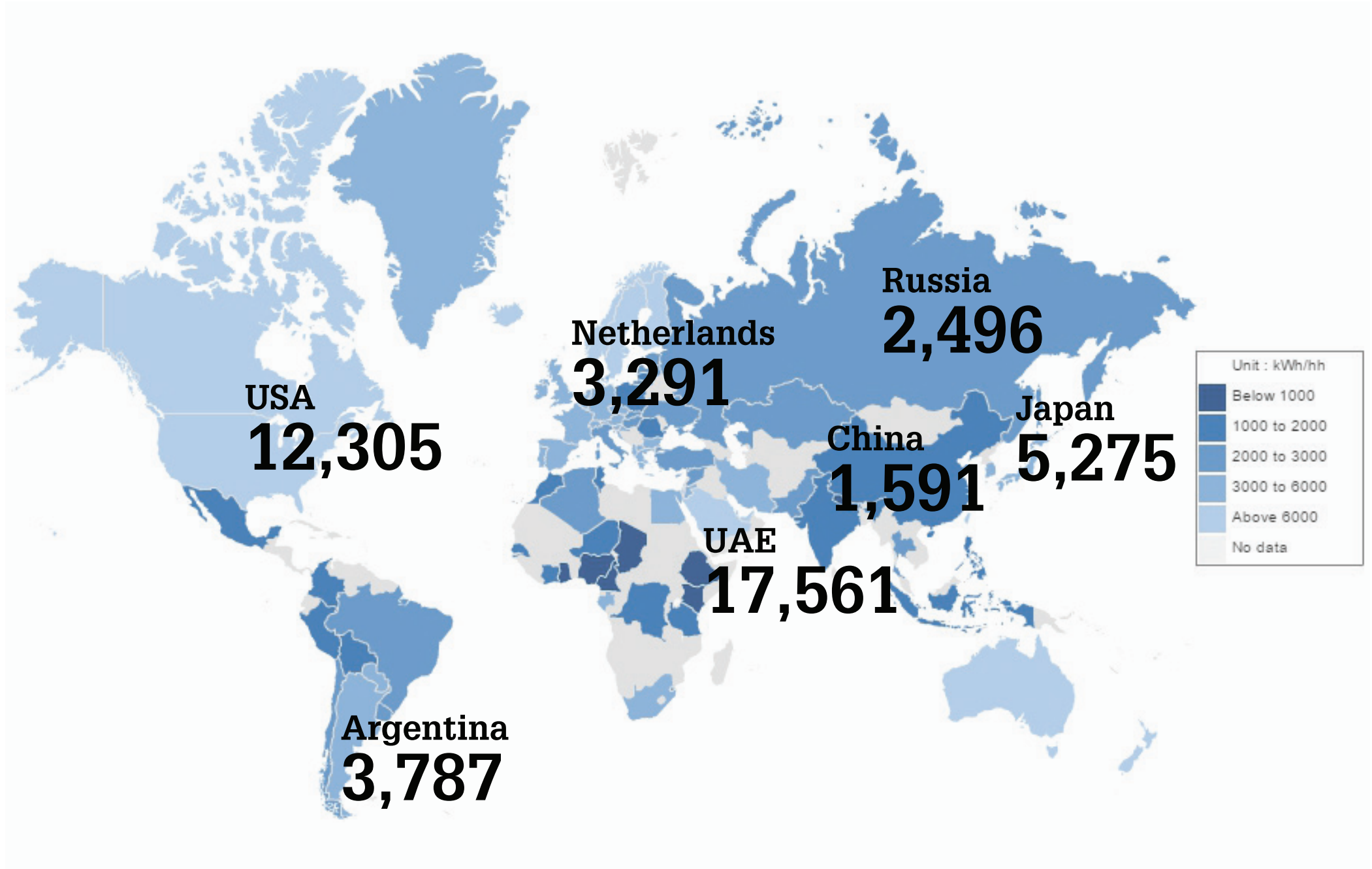
65,000 m² of solar panels

8 MW = 4,000 homes

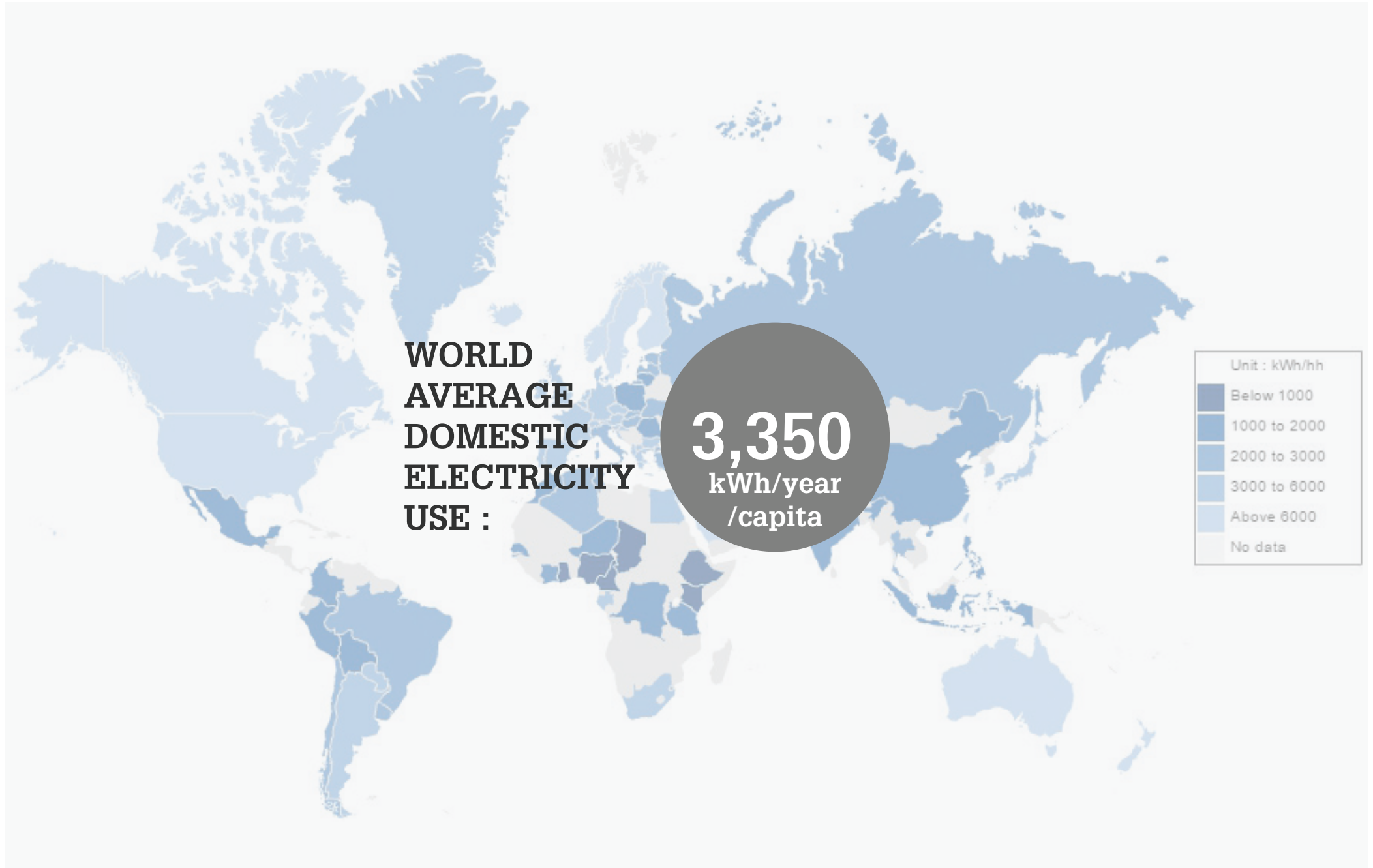


**How much electricity
one consume?**

Global domestic electricity use



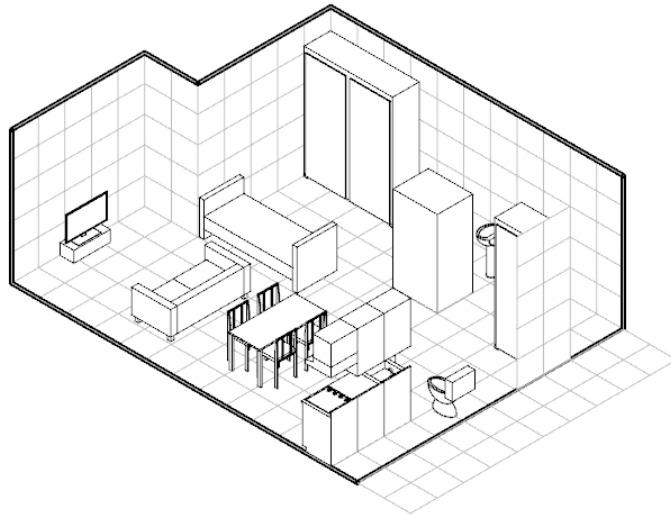
Average Global Domestic Electricity Use



**How much space would
require for a person to
live self-sufficiently?**

Self-Sufficiency: Average Household Electricity

A Standard House of 48 m²



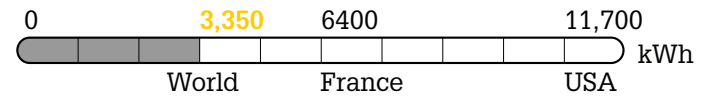
Footprint 48 m²

Volume 144 m³

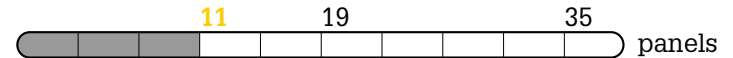
1



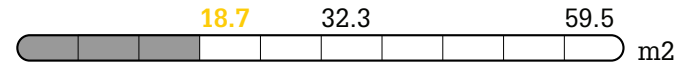
Electricity Consumption



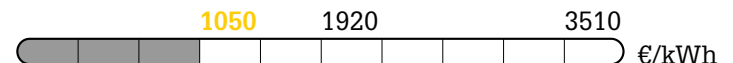
Solar Panels
330 kWh/ea



Space



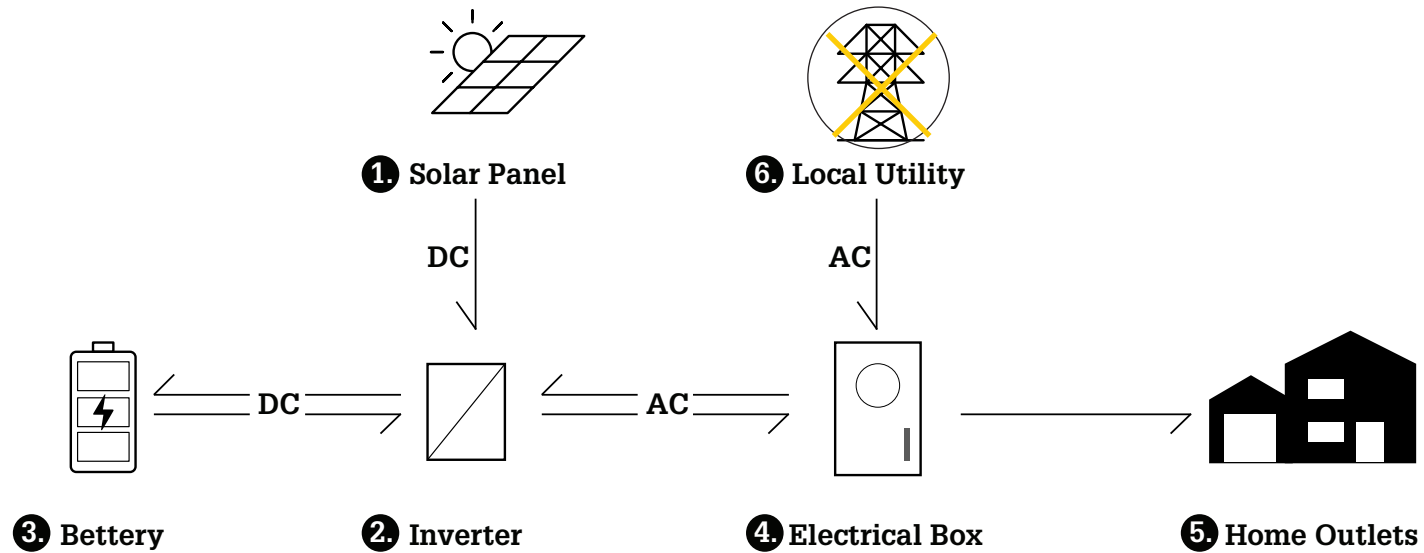
Cost
0.30 €/kWh



Source: World Energy Council, Year 2010

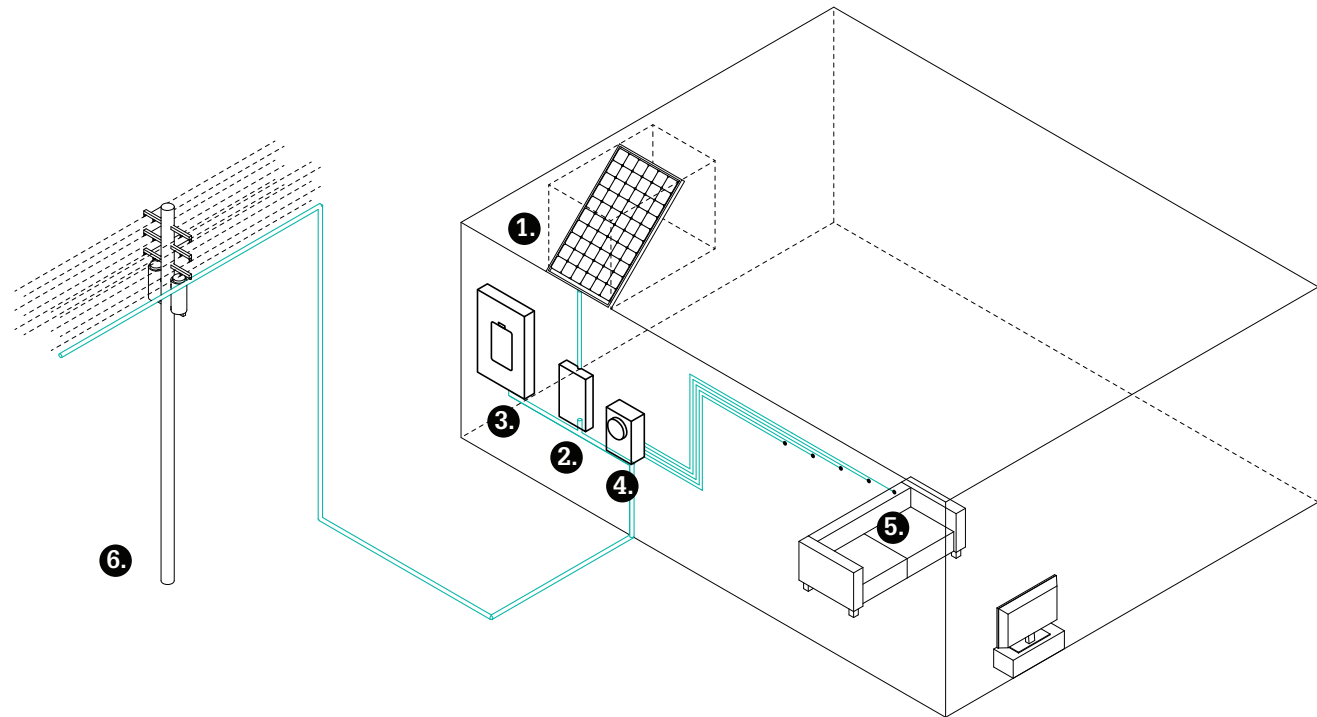
Photovoltaic system & Self-Sufficiency

Back power with battery



Solar Energy to Electricity

Domestic Electricity in a Home



	Total	electrical appliances and lighting	thermal uses including cooling	Unit
WORLD	3352			Kwh/year
THE NETHERLANDS	3291	3291	642	Kwh/year
SPAIN	3944	2265	1679	Kwh/year
THAILAND	2420	1285	1135	Kwh/year

PRODUCTION OF ELECTRICITY PER A SOLAR PANEL

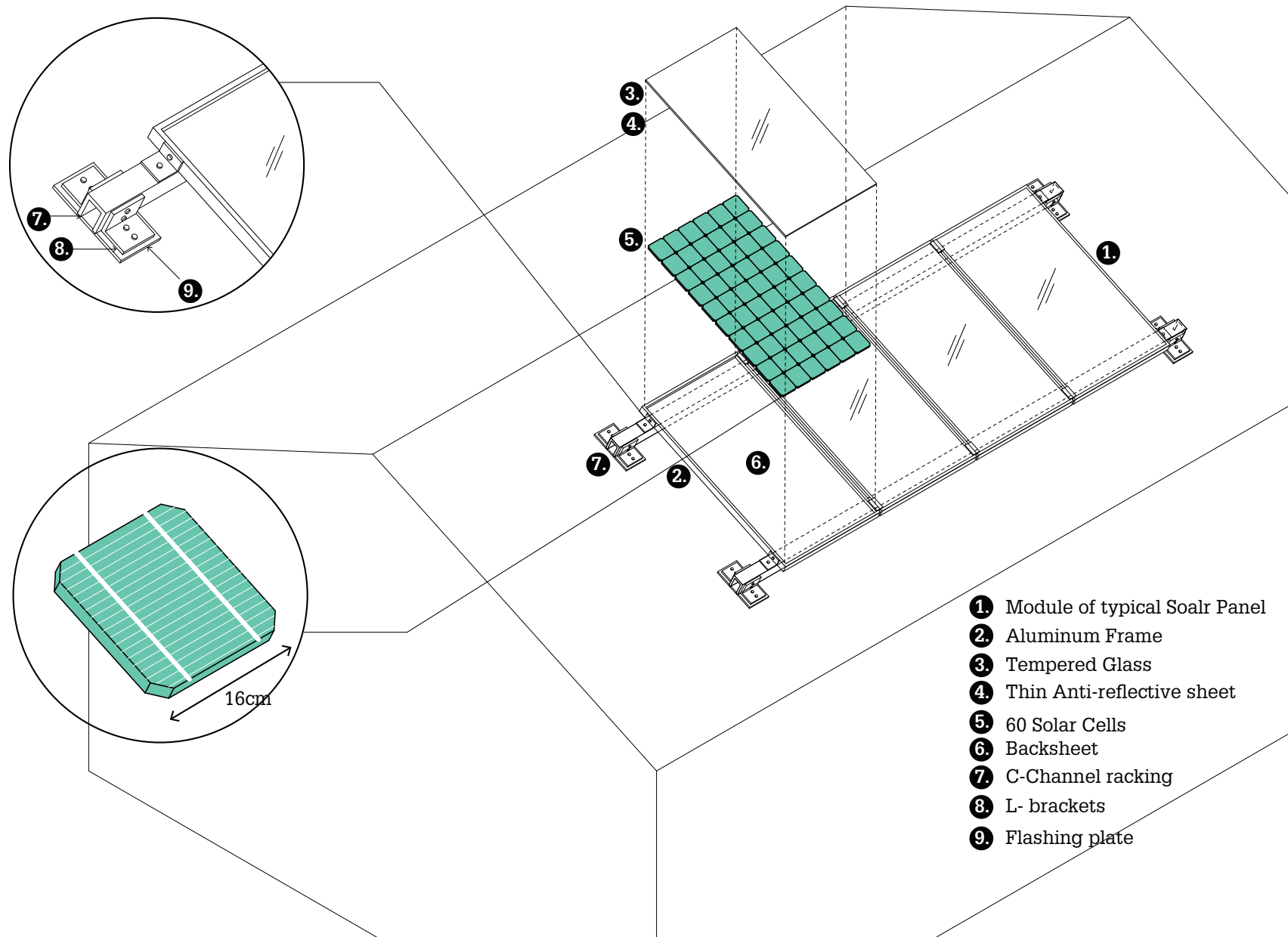
Calculate from the Ladybug(Grasshopper's plugin) Spec: 1.7m2

1 PANEL	330			Kwh/year
----------------	-----	--	--	----------

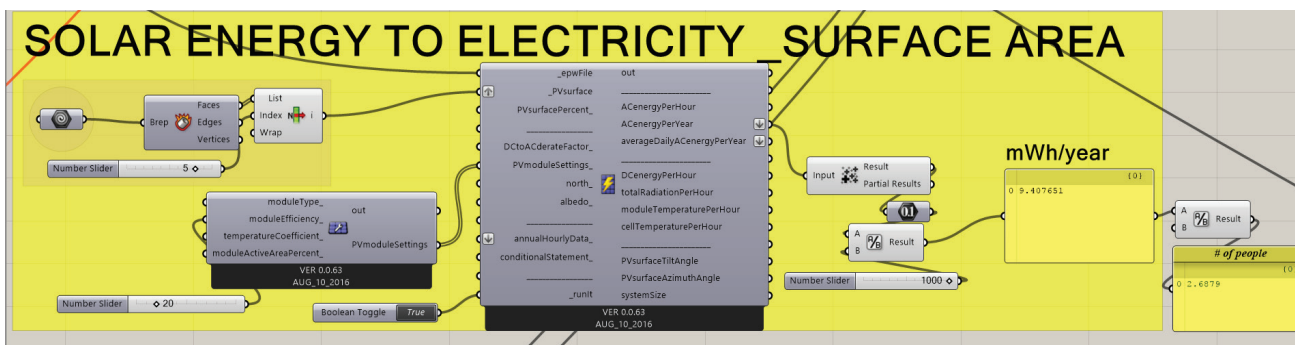
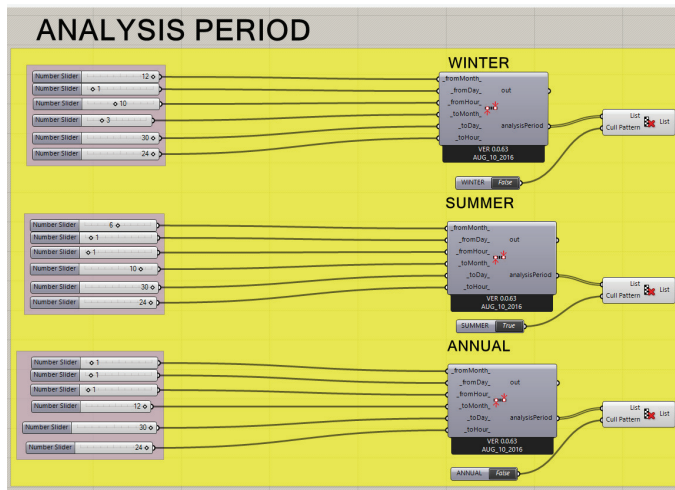
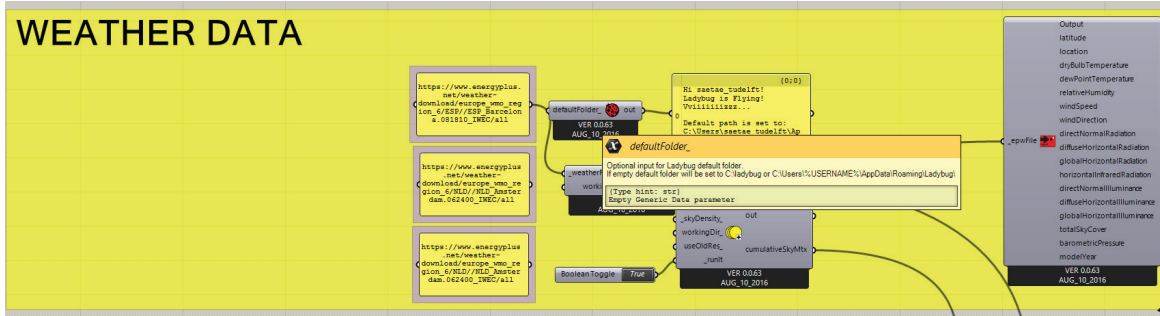
Source: <https://www.wec-indicators.enerdata.eu/co2-emissions-per-household.html>

Photovoltaic system

Typical Roof installation



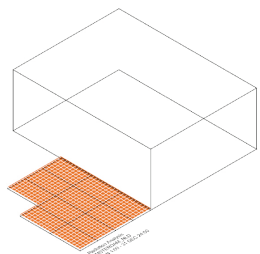
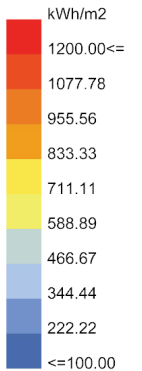
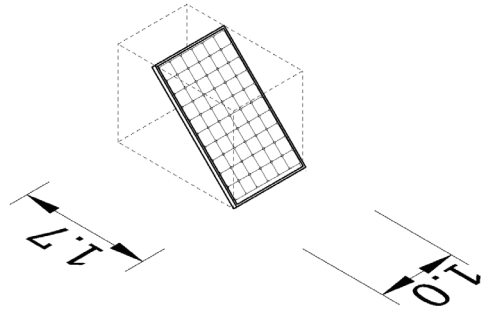
Calculation on Energy Production



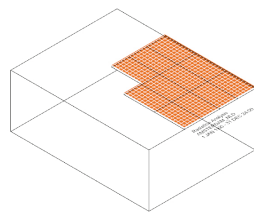
How much space require to be self-sufficient?

Testing on building roof and facade in different orientation

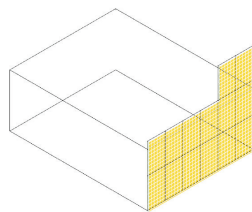
A Standard Solar Module



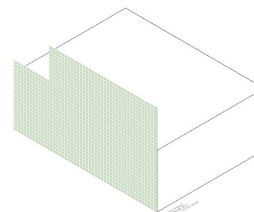
Ground()



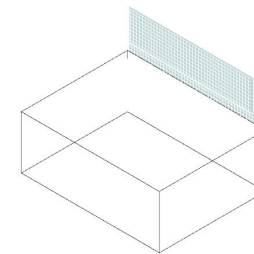
Roof()



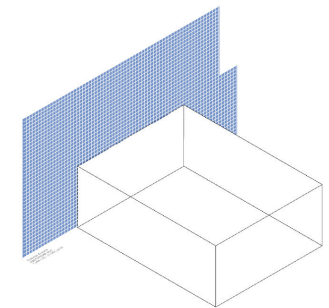
Wall_South()



Wall_West()



Wall_East()



Wall_North()

Area	19	m2
Volume	2	m3
Em3	3656	Kwh/year
#	1	people

Area	19	m2
Volume	2	m3
Em3	3656	Kwh/year
#	1	people

Area	24	m2
Volume	2	m3
Em3	3527	Kwh/year
#	1	people

Area	38	m2
Volume	4	m3
Em3	3685	Kwh/year
#	1	people

Area	39	m2
Volume	4	m3
Em3	3556	Kwh/year
#	1	people

Area	79	m2
Volume	8	m3
Em3	3569	Kwh/year
#	1	people

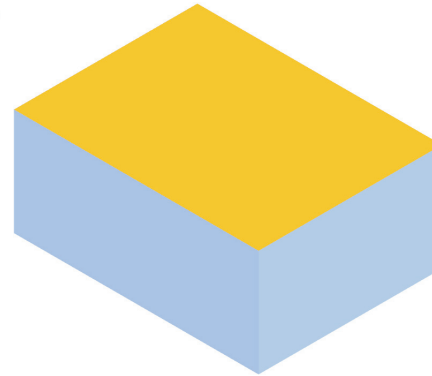
Can we be self-sufficient in winter?

All the surfaces are covered with solar panels



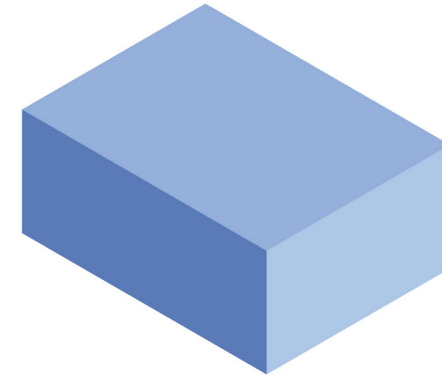
All Year

Area	146	m2
Volume	168	m3
Em3	26.6	MWh/year
#	6.8	people



**Summer
Jun to Oct**

Area	146	m2
Volume	168	m3
Em3	13.3	MWh/year
#	3.4	people



**Winter
Dec to Mar**

Area	146	m2
Volume	168	m3
Em3	6.1	MWh/year
#	1.6	people

Tesla Powerwall 2.0 Battery



Specifications

Energy Capacity	13.5	kWh
Dimension L x W x D	1150 x 755 x 155	mm
Wall Area	0.86	m ²
Volume	0.13	m ³

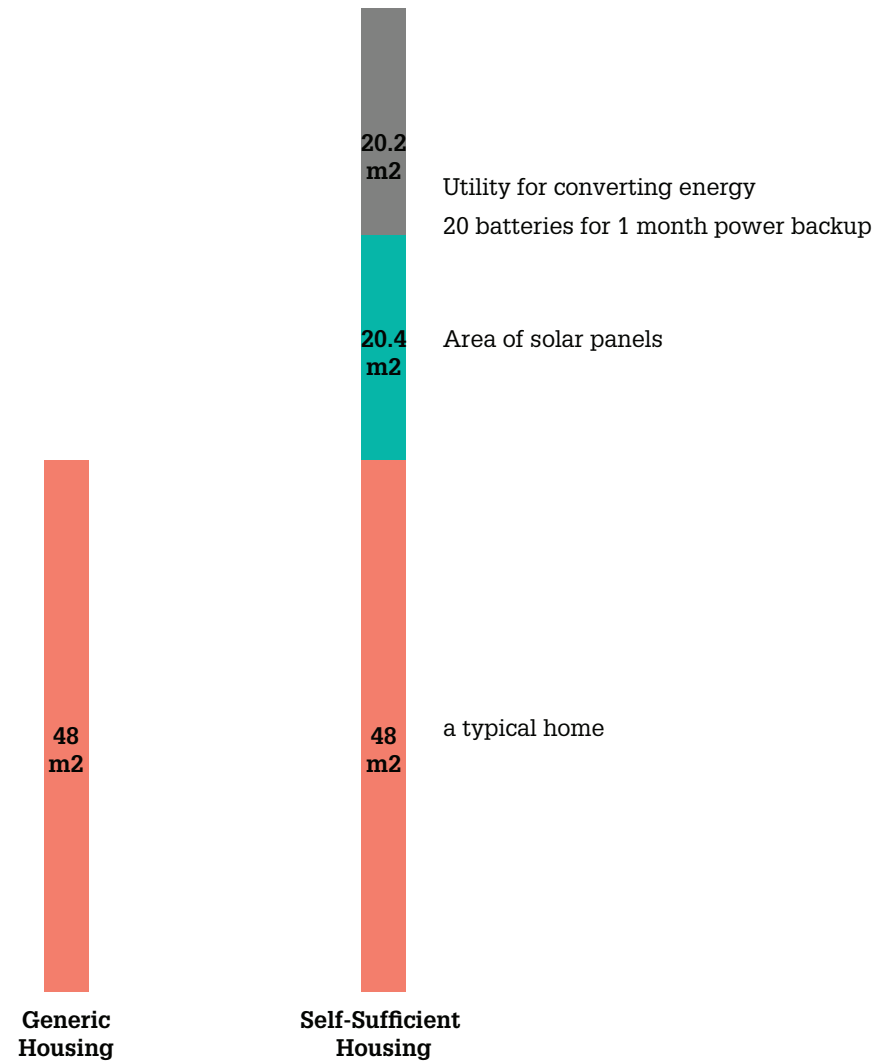
How much battery's space require for a day's back up ?

Average Electricity Use	3350	kWh
Average Daily Use	9.17	kWh

Therefore, One Powerwall2.0 would be able to back up electricity for 1 day

Self Sufficiency

Programme Division



Photovoltaic Technology

Photovoltaic Technology

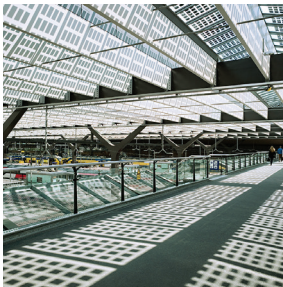
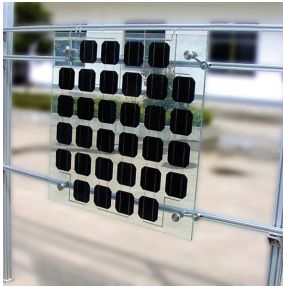
1.



**Standard
solar panel**

Efficiency: 20-40%

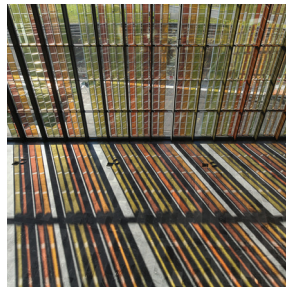
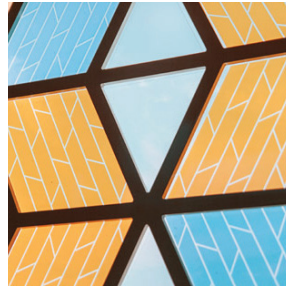
2.



**Semi-transparent
solar panel**

Efficiency: 10-15%

3.



**Dye sensitized
Solar panel**

Efficiency: 7-10%

4.



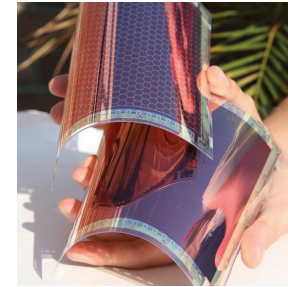
**Mirror-enhanced
Solar Generator**

5.



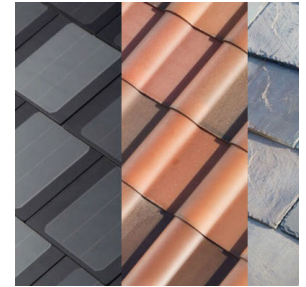
**Spherical Solar
Energy Generator**

6.



**Thin-film
Solar Cell**

7.



**Tesla roof-tile
Solar panel**

Materials give different spatial atmosphere

Efficiency	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	20%
Energy Production	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	3350 kWh
Space	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	17.25 m ²

Efficiency		15%
Energy Production		3350 kWh
Space		23.00 m ²

Efficiency	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	10%
Energy Production	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	3350 kWh
Space	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	34.50 m ²

03. The Solar Mountain

The Solar Sufficient Housing Block

SCENARIO

What if we could live self-sufficiently with Solar Energy ?

INPUT



BLOCKMAKER

Blockmaker is a research software that allows one to **generate multiple design solutions** by **transforming mass, reconfiguration** of programs, accessibilities, porosity and **generating options** for façade and structure responsively to a climate condition.



OUTPUT

The BlockMaker
(Y)our Block

- > Site
- > Users
- > Programme
- > Mass & void
- > Houses
- > Accessibility
- > Houses
- > Climate
- > Facade

Contextmaker
Site boundary

CONTEXT PLOT SIZE:

X AXIS: 100 m

Y AXIS: 100 m

Z AXIS: 0 m

STREET OFFSET:

WIDTH: 20 m

IMPORT DATA REFERENCE:

DENSITY:

FAR 2.0 (ville radieuse)

FAR 3.0 (Landtong, rotterdam)

FAR 4.7 (Barcelona block)

FAR 7.1 (Manhattan block)

FAR 12 (Hong kong block)

CLIMATE:

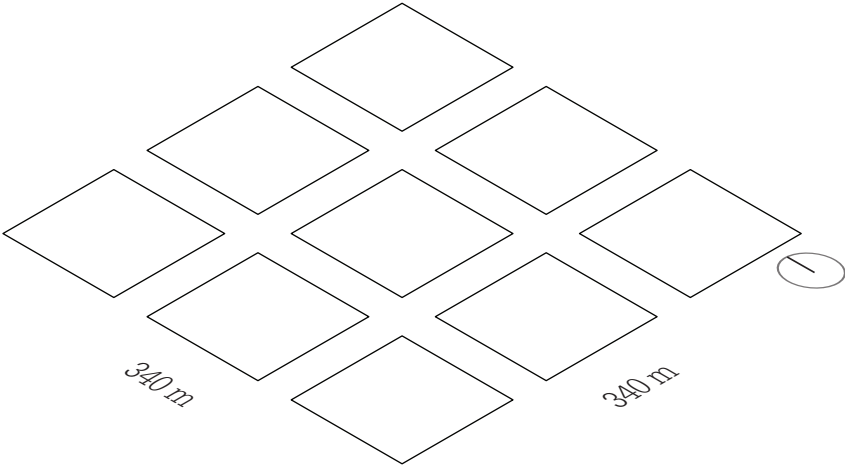
Paris (48.8566° N, 2.3522° E)

Amsterdam (52.3702° N, 4.8952° E)

Barcelona (41.3851° N, 2.1734° E)

NewYork (40.7128° N, 74.0059° W)

HongKong (22.3964° N, 114.1095° E)



The BlockMaker
(Y)our Block

- > Site
- > Users
- > Programme
- > Mass & void
- > Houses
- > Accessibility
- > Houses
- > Climate
- > Facade

Contextmaker
Surrounding Mass

CONTEXT PLOT SIZE:

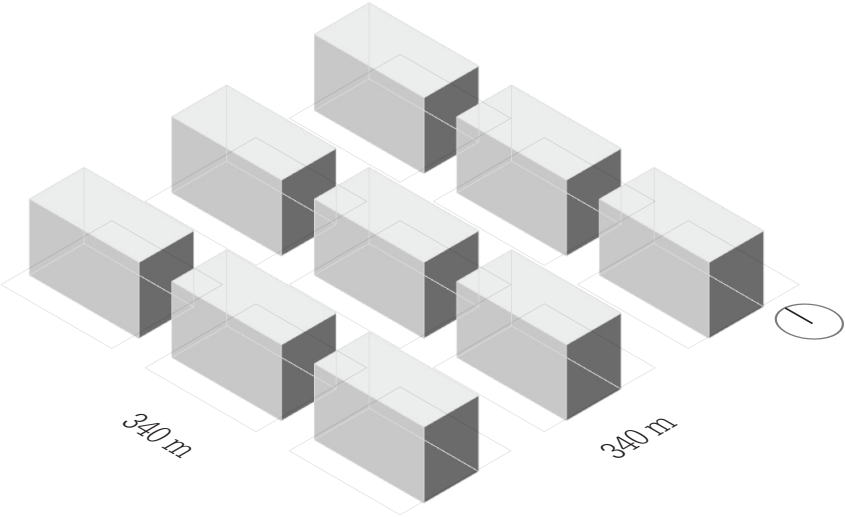
X AXIS: 50 m

Y AXIS: 100 m

Z AXIS: 60 m

STREET OFFSET:

WIDTH: 20 m



The BlockMaker
(Y)our Block

- > Site
- > Users
- > Programme
- > Mass & void
- > Houses
- > Accessibility
- > Houses
- > Climate
- > Facade

Contextmaker
Surrounding Mass

CONTEXT PLOT SIZE:

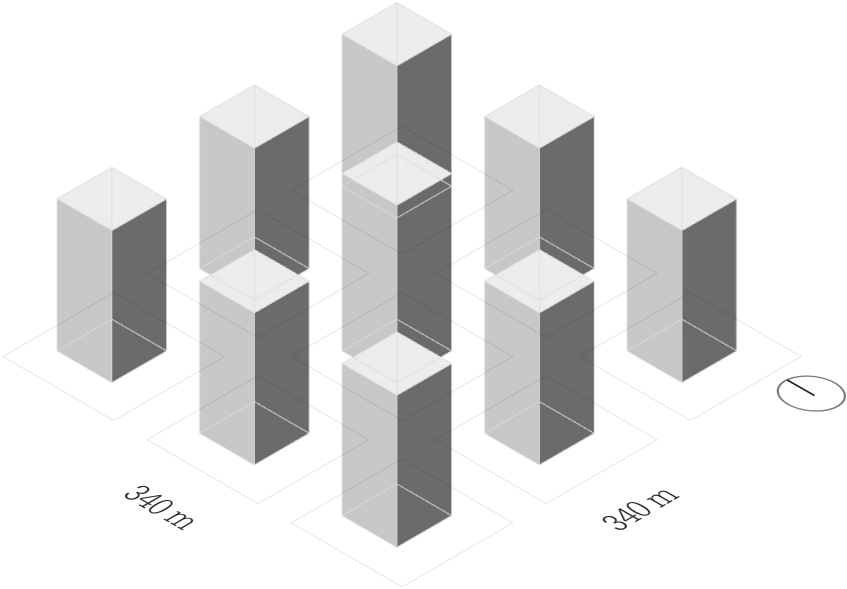
X AXIS: 50 m

Y AXIS: 50 m

Z AXIS: 120 m

STREET OFFSET:

WIDTH: 20 m



The BlockMaker
(Y)our Block

- > Site
- > Users
- > Programme
- > Mass & void
- > Houses
- > Accessibility
- > Houses
- > Climate
- > Facade

Contextmaker
Surrounding Mass

CONTEXT PLOT SIZE:

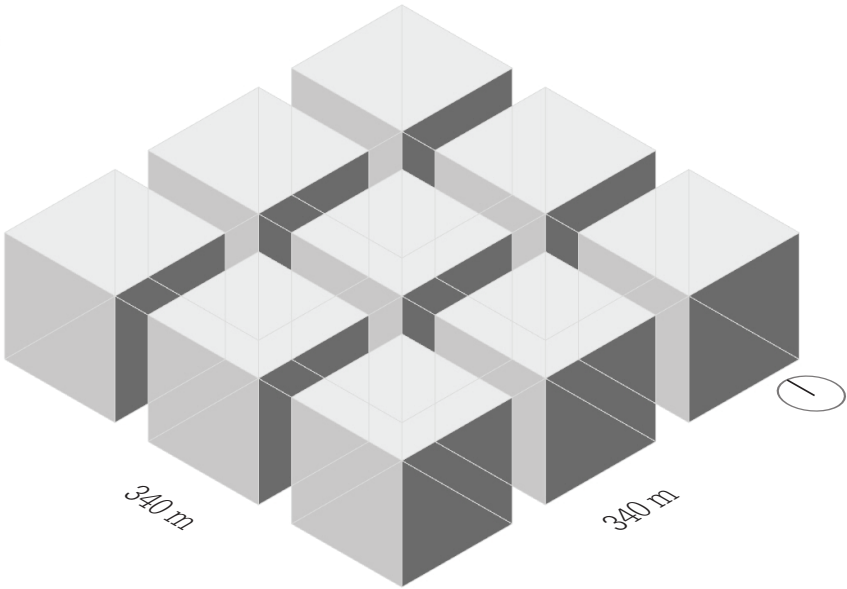
X AXIS: 100 m

Y AXIS: 100 m

Z AXIS: 100 m

STREET OFFSET:

WIDTH: 20 m



The BlockMaker
(Y)our Block

- > Site
- > Users
- > Programme
- > Mass & void
- > Houses
- > Accessibility
- > Houses
- > Climate
- > Facade

Contextmaker
Input Climate Data

CONTEXT PLOT SIZE:

X AXIS: 100 m

Y AXIS: 100 m

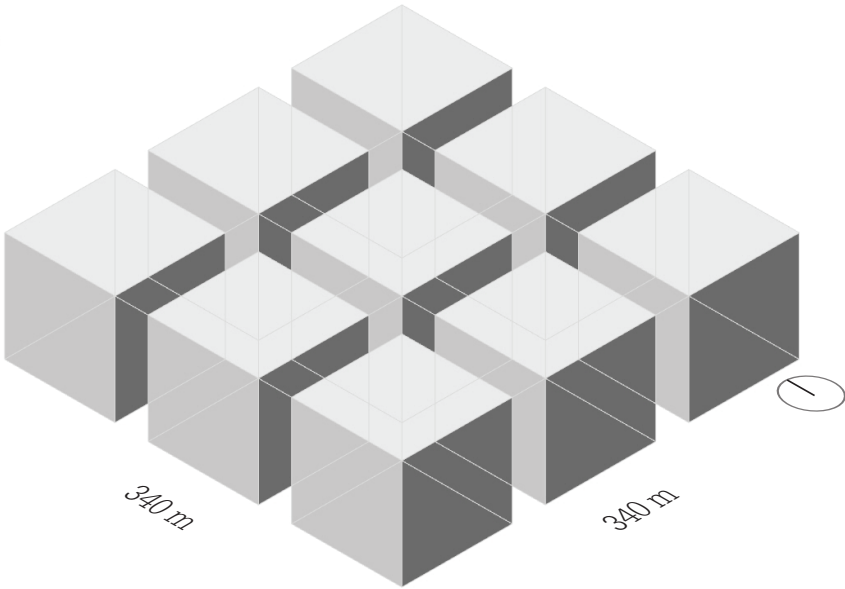
Z AXIS: 60 m

STREET OFFSET:

WIDTH: 20 m

IMPORT DATA REFERENCE:

CLIMATE:



The BlockMaker
(Y)our Block

- > Site
- > Users
- > Programme
- > Mass & void
- > Houses
- > Accessibility
- > Houses
- > Climate
- > Facade

Contextmaker
Input Climate Data

CONTEXT PLOT SIZE:

X AXIS: 100 m

Y AXIS: 100 m

Z AXIS: 60 m

STREET OFFSET:

WIDTH: 20 m

IMPORT DATA REFERENCE:

CLIMATE:

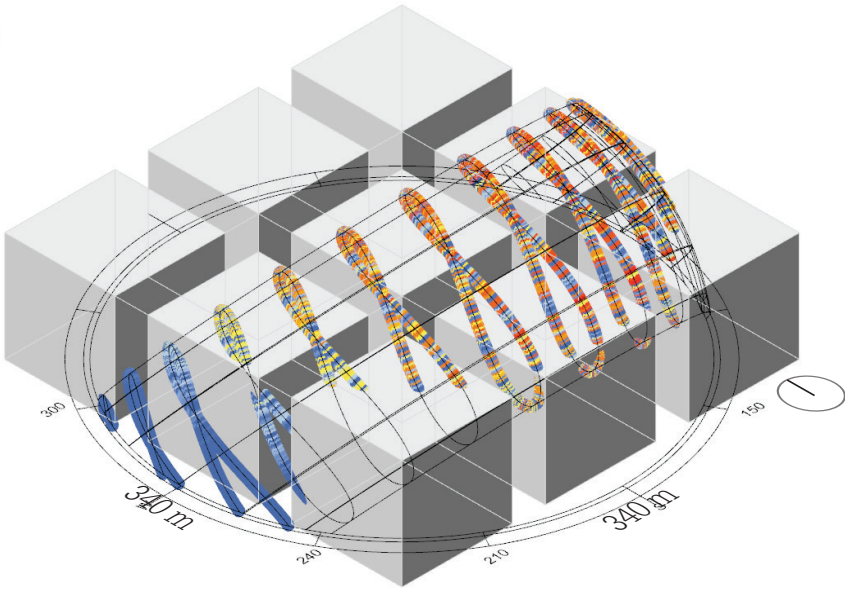
Paris (48.8566° N, 2.3522° E)

Amsterdam (52.3702° N, 4.8952° E)

Barcelona (41.3851° N, 2.1734° E)

NewYork (40.7128° N, 74.0059° W)

HongKong (22.3964° N, 114.1095° E)



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(Y)our Block

- > Site
- > Users
- > Programme
- > Mass & void
- > Houses
- > Accessibility
- > Houses
- > Climate
- > Facade

Contextmaker
Input Climate Data

CONTEXT PLOT SIZE:

X AXIS: 100 m

Y AXIS: 100 m

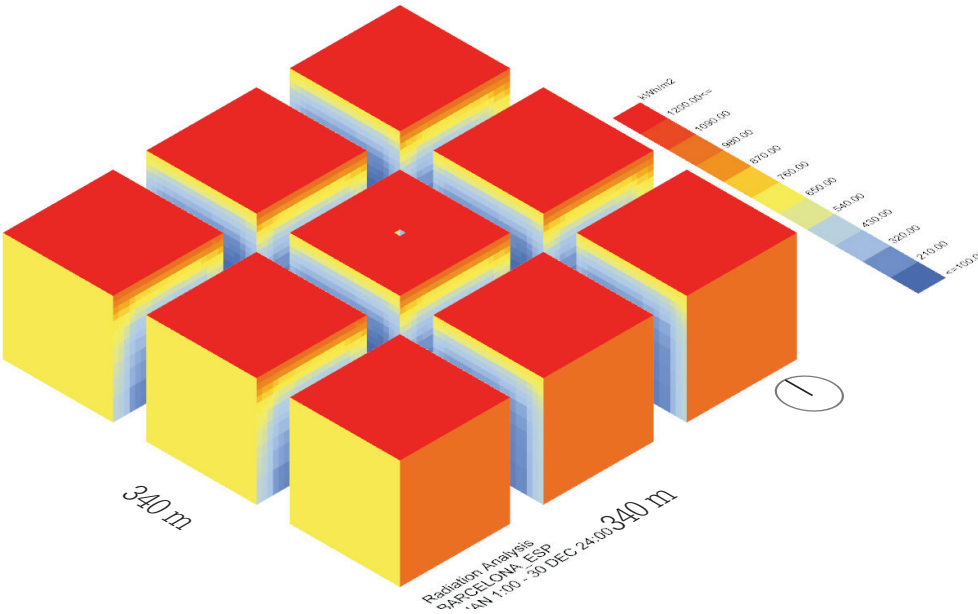
Z AXIS: 60 m

STREET OFFSET:

WIDTH: 20 m

IMPORT DATA REFERENCE:

CLIMATE:



The BlockMaker
(Y)our Block

- > Site
- > Users
- > Programme
- > Mass & void
- > Houses
- > Accessibility
- > Houses
- > Climate
- > Facade

Contextmaker
Input Density Data

CONTEXT PLOT SIZE:

X AXIS: 100 m

Y AXIS: 100 m

Z AXIS: 60 m

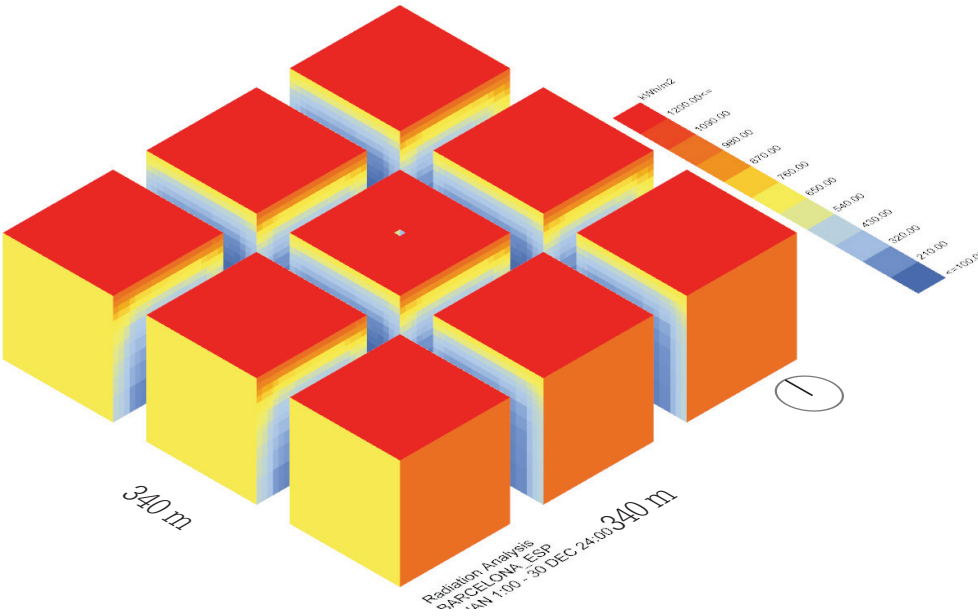
STREET OFFSET:

WIDTH: 20 m

IMPORT DATA REFERENCE:

CLIMATE:

DENSITY:



The BlockMaker

(Y)our Block

- > Site
- > Users
- > Programme
- > Mass & void
- > Houses
- > Accessibility
- > Houses
- > Climate
- > Facade

Contextmaker

Input Density Data

CONTEXT PLOT SIZE:

X AXIS: 100 m

Y AXIS: 100 m

Z AXIS: 60 m

STREET OFFSET:

WIDTH: 20 m

IMPORT DATA REFERENCE:

CLIMATE:

DENSITY:

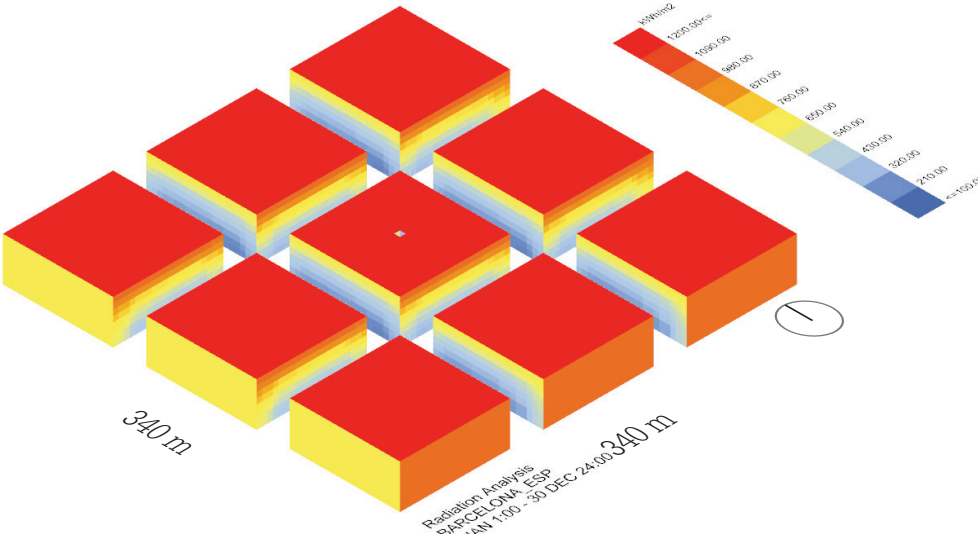
FAR 2.0 (ville radieuse)

FAR 3.0 (Landtong, rotterdam)

FAR 4.7 (Barcelona block)

FAR 7.1 (Manhattan block)

FAR 12 (Hong kong block)



The BlockMaker
(Y)our Block

- > Site
- > Users
- > Programme
- > Mass & void
- > Houses
- > Accessibility
- > Houses
- > Climate
- > Facade

Contextmaker
Input Density Data

CONTEXT PLOT SIZE:

X AXIS: 100 m

Y AXIS: 100 m

Z AXIS: 60 m

STREET OFFSET:

WIDTH: 20 m

IMPORT DATA REFERENCE:

CLIMATE:

DENSITY:

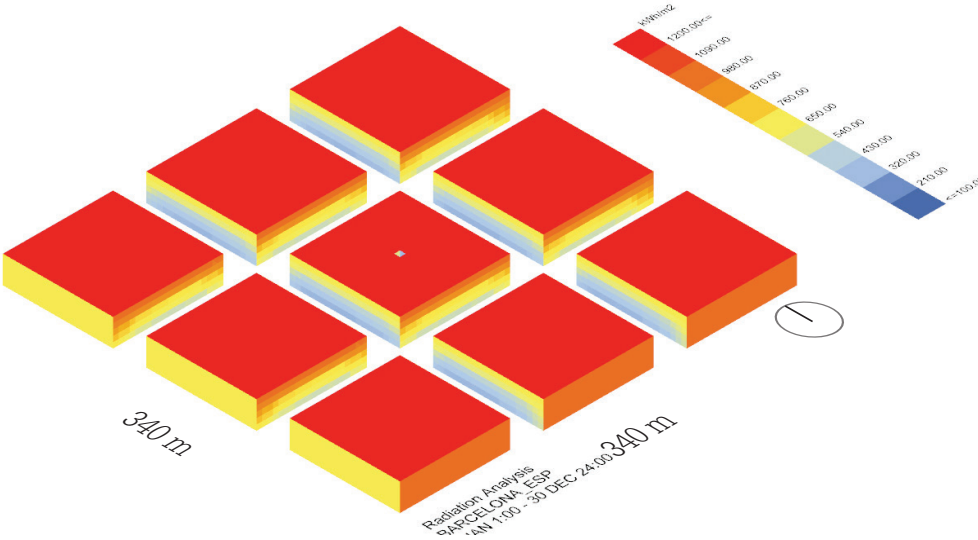
FAR 2.0 (ville radieuse)

FAR 3.0 (Landtong, rotterdam)

FAR 4.7 (Barcelona block)

FAR 7.1 (Manhattan block)

FAR 12 (Hong kong block)



The BlockMaker
(Y)our Block

- > Site
- > Users
- > Programme
- > Mass & void
- > Houses
- > Accessibility
- > Houses
- > Climate
- > Facade

Contextmaker
Input Density Data

CONTEXT PLOT SIZE:

X AXIS: 100 m

Y AXIS: 100 m

Z AXIS: 60 m

STREET OFFSET:

WIDTH: 20 m

IMPORT DATA REFERENCE:

CLIMATE:

DENSITY:

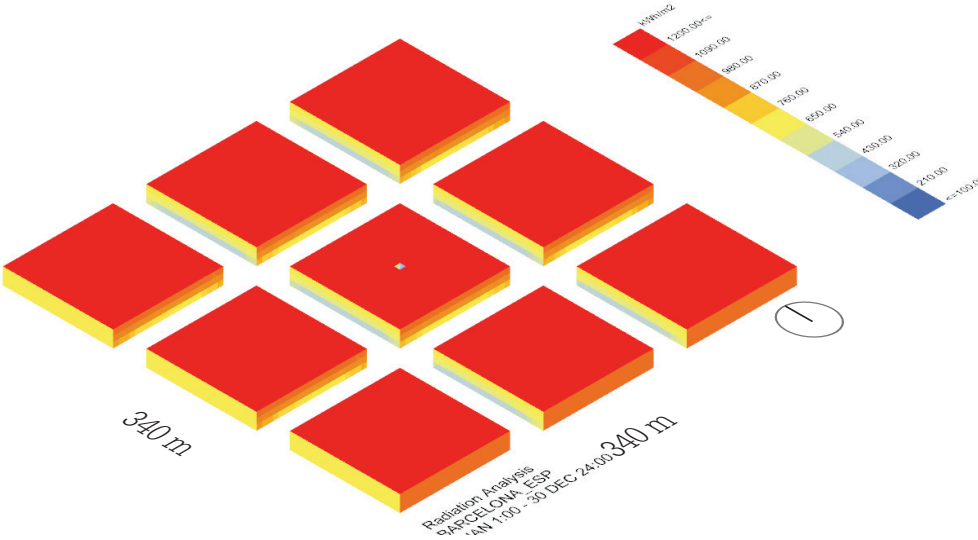
FAR 2.0 (ville radieuse)

FAR 3.0 (Landtong, rotterdam)

FAR 4.7 (Barcelona block)

FAR 7.1 (Manhattan block)

FAR 12 (Hong kong block)



The BlockMaker
(Y)our Block

- > Site
- > Users
- > Programme
- > Mass & void
- > Houses
- > Accessibility
- > Houses
- > Climate
- > Facade

Contextmaker
Input Density Data

CONTEXT PLOT SIZE:

X AXIS: 100 m

Y AXIS: 100 m

Z AXIS: 60 m

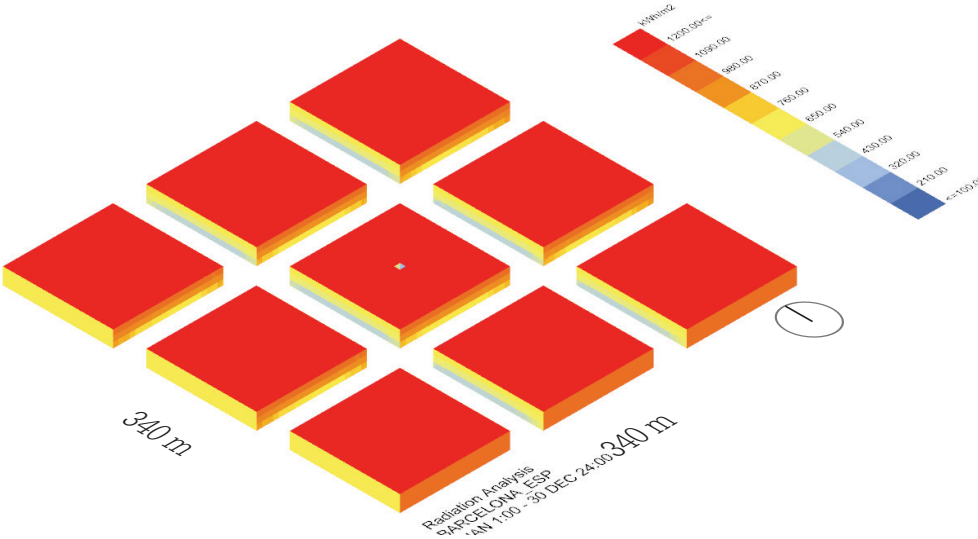
STREET OFFSET:

WIDTH: 20 m

IMPORT DATA REFERENCE:

CLIMATE: ▼

DENSITY: ▼



3.2 Demographic Inputs

**How many people will
live in this block?**

The BlockMaker
(Y)our Block

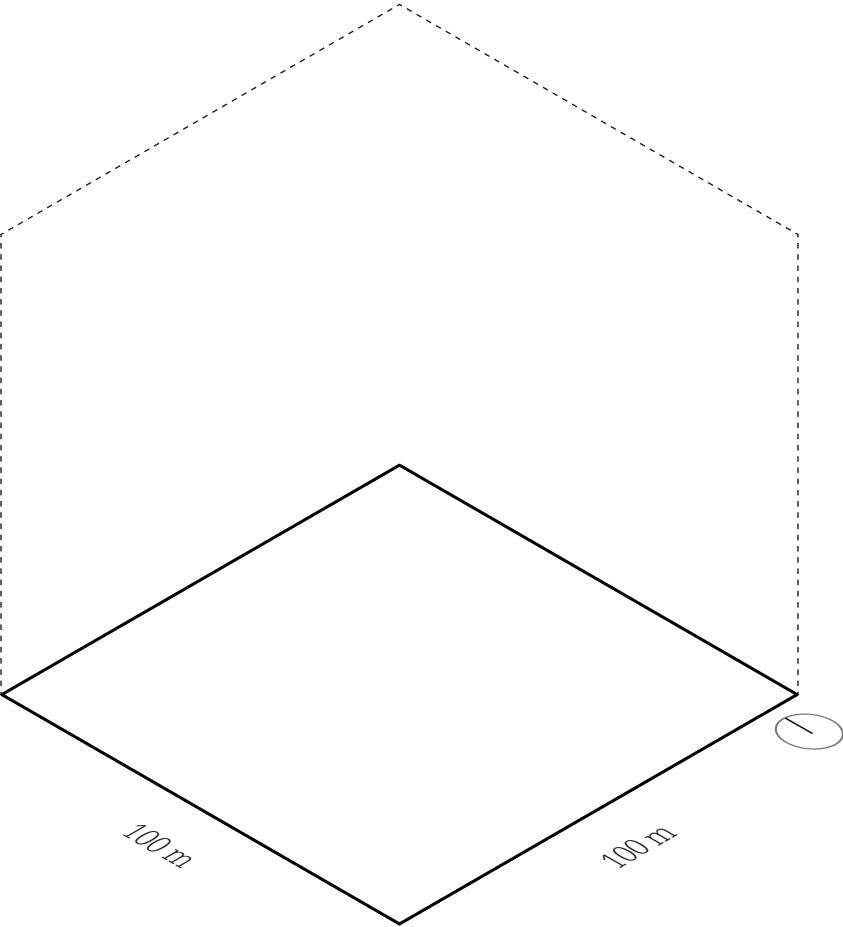
🔒 ▼ Site
100 x 100 m x 15m
(41.3851°N, 2.1734°E)
FAR 4.7

- 🔒 > Users
- 🔒 > Programme
- 🔒 > Mass & void
- 🔒 > Houses
- 🔒 > Accessibility
- 🔒 > Structure
- 🔒 > Climate
- 🔒 > Facade

Demographic Inputs
Input numbers of inhabitants

IMPORT USER DATA REFERENCE

POPULATION: ▼



The BlockMaker
(Y)our Block

👤 ▼ Site
100 x 100 m x 15m
(41.3851°N, 2.1734°E)
FAR 4.7

👤 > Users

👤 > Programme

👤 > Mass & void

👤 > Houses

👤 > Accessibility

👤 > Structure

👤 > Climate

👤 > Facade

Demographic Inputs
Input numbers of inhabitants

IMPORT USER DATA REFERENCE

POPULATION:

169 people (Ville Radieuse, Paris)

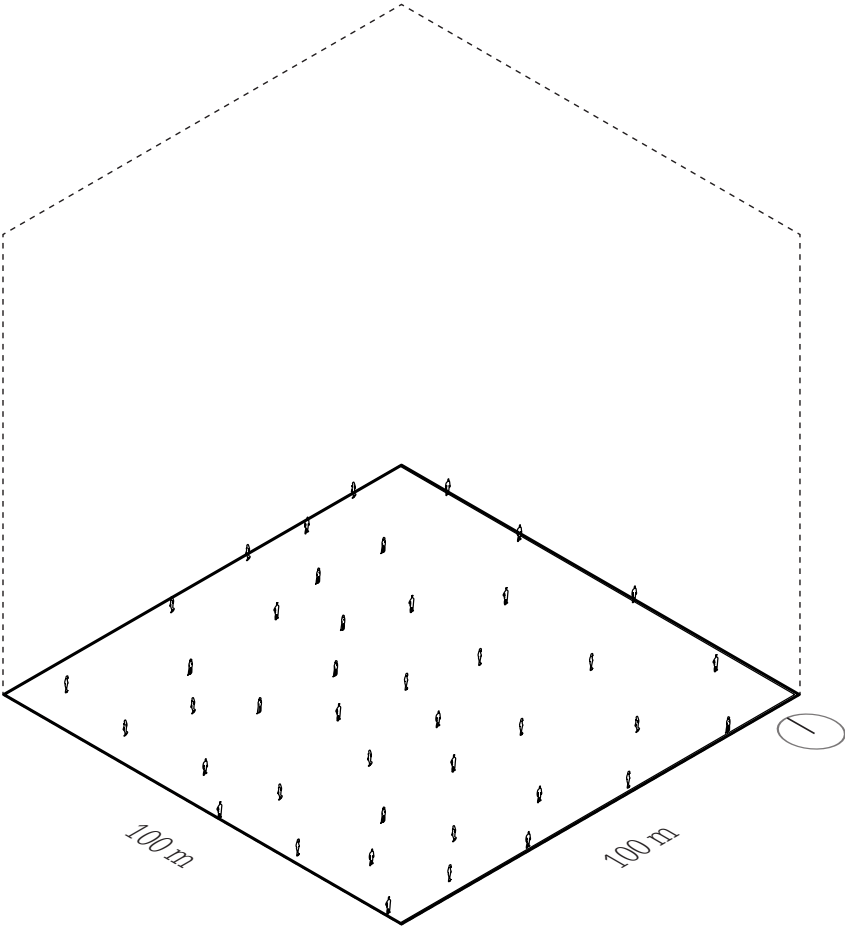
368 people (Landtong, Rotterdam)

483 people (L'Eixample, Barcelona)

1610 people (Manhattan, NewYork)

4188 people (Central, Hong Kong)

▼



The BlockMaker

(Y)our Block

👤 ▾ Site
100 x 100 m x 15m
(41.3851°N, 2.1734°E)
FAR 4.7

👤 > Users

👤 > Programme

👤 > Mass & void

👤 > Houses

👤 > Accessibility

👤 > Structure

👤 > Climate

👤 > Facade

Demographic Inputs

Input numbers of inhabitants

IMPORT USER DATA REFERENCE

POPULATION:

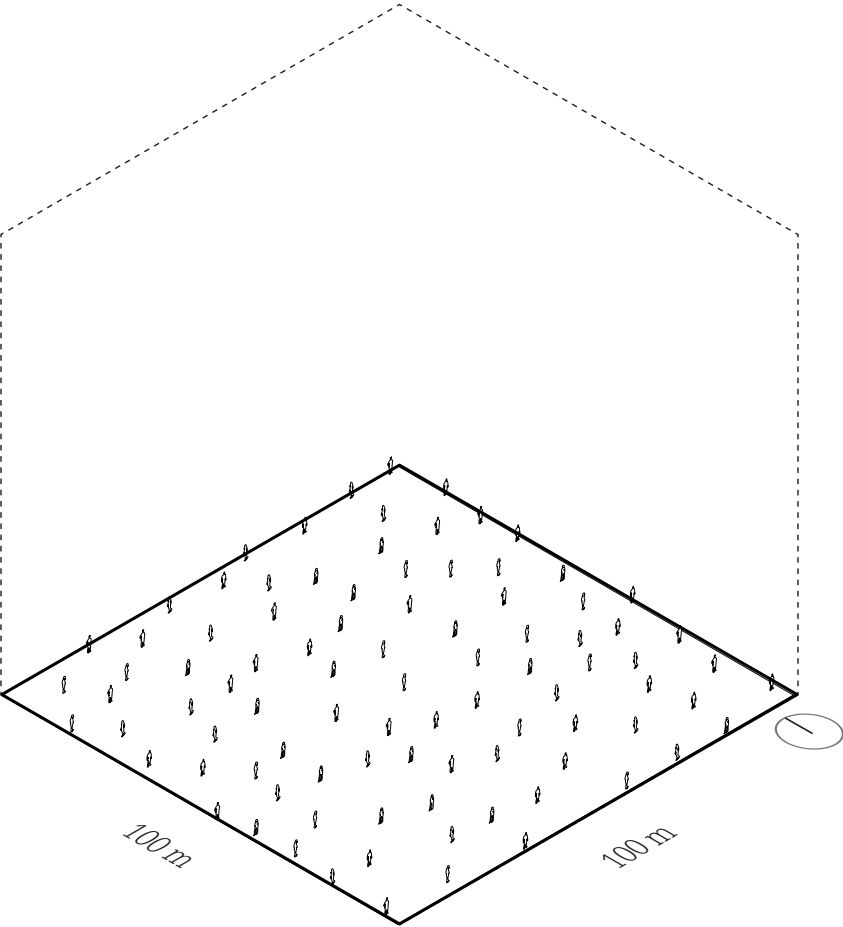
169 people (Ville Radieuse, Paris)

368 people (Landtong, Rotterdam)

483 people (L'Eixample, Barcelona)

1610 people (Manhattan, NewYork)

4188 people (Central, Hong Kong)



The BlockMaker

(Y)our Block

👤 ▼ Site
100 x 100 m x 15m
(41.3851°N, 2.1734°E)
FAR 4.7

👤 > Users

👤 > Programme

👤 > Mass & void

👤 > Houses

👤 > Accessibility

👤 > Structure

👤 > Climate

👤 > Facade

Demographic Inputs

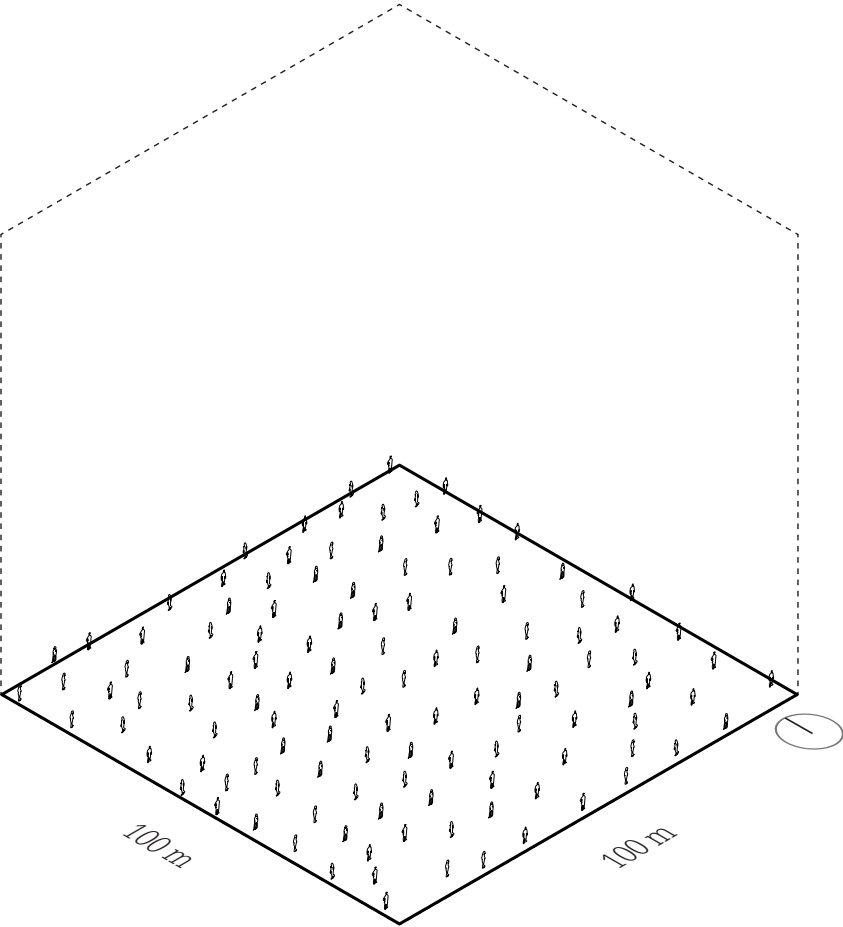
Input numbers of inhabitants

IMPORT USER DATA REFERENCE

POPULATION:

169 people (Ville Radieuse, Paris)
368 people (Landtong, Rotterdam)
483 people (L'Eixample, Barcelona)
1610 people (Manhattan, NewYork)
4188 people (Central, Hong Kong)

▼



The BlockMaker
(Y)our Block

👤 ▼ Site
100 x 100 m x 15m
(41.3851°N, 2.1734°E)
FAR 4.7

👤 > Users

👤 > Programme

👤 > Mass & void

👤 > Houses

👤 > Accessibility

👤 > Structure

👤 > Climate

👤 > Facade

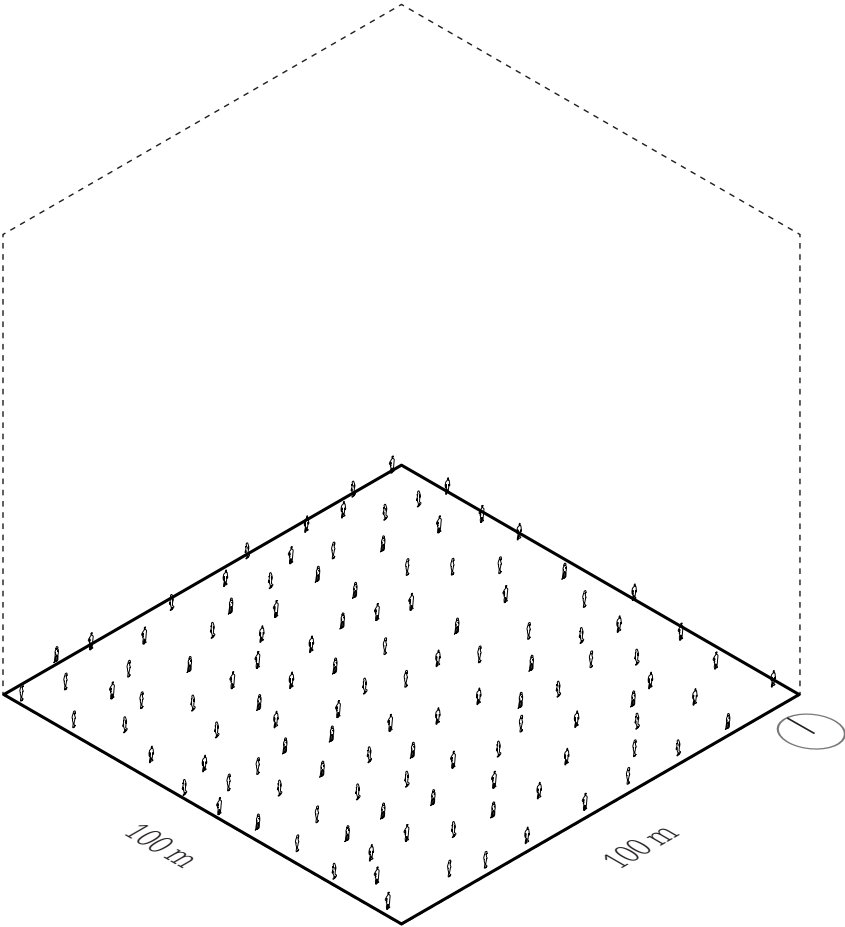
Demographic Inputs
Input energy demands

IMPORT USER DATA REFERENCE

POPULATION: 483 people (L'Eixample, Barcelona) ▼

IMPORT DOMESTIC ELECTRICITY CONSUMPTION:

DEMANDS: ----- ▼



The BlockMaker
(Y)our Block

🔒 ▼ Site
100 x 100 m x 15m
(41.3851°N, 2.1734°E)
FAR 4.7

🔗 > Users

🔗 > Programme

🔗 > Mass & void

🔗 > Houses

🔗 > Accessibility

🔗 > Structure

🔗 > Climate

🔗 > Facade

Demographic Inputs
Input energy demands

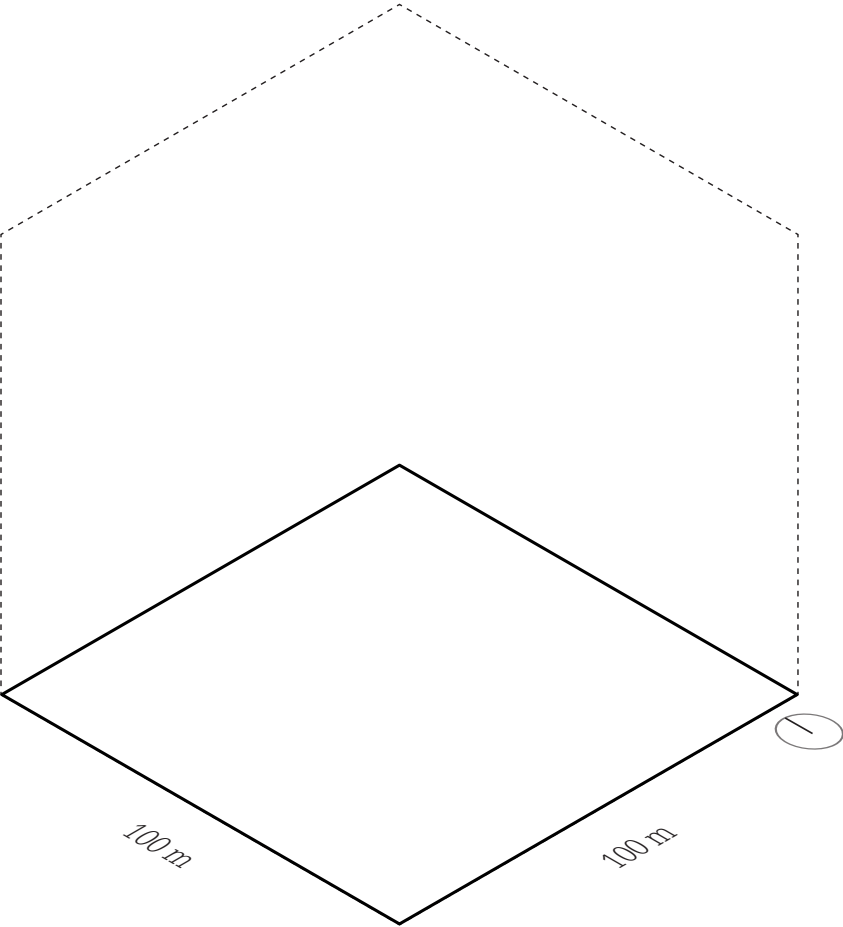
IMPORT USER DATA REFERENCE

POPULATION: 483 people (L'Eixample, Barcelona) ▼

IMPORT DOMESTIC ELECTRICITY CONSUMPTION:

DEMANDS: 5,036 kWh/household (France)
3,291 kWh/household (Netherlands)
3,944 kWh/household (Spain)
12,305 kWh/household (USA)
4,829 kWh/household (Hong Kong)
3,353 kWh/household (World Avg.) ▼

*Source:World Energy Council, Year 2014



The BlockMaker
(Y)our Block

🔒 ▼ Site
100 x 100 m x 15m
(41.3851°N, 2.1734°E)
FAR 4.7

🔓 > Users

🔓 > Programme

🔓 > Mass & void

🔓 > Houses

🔓 > Accessibility

🔓 > Structure

🔓 > Climate

🔓 > Facade

Demographic Inputs
Input energy demands

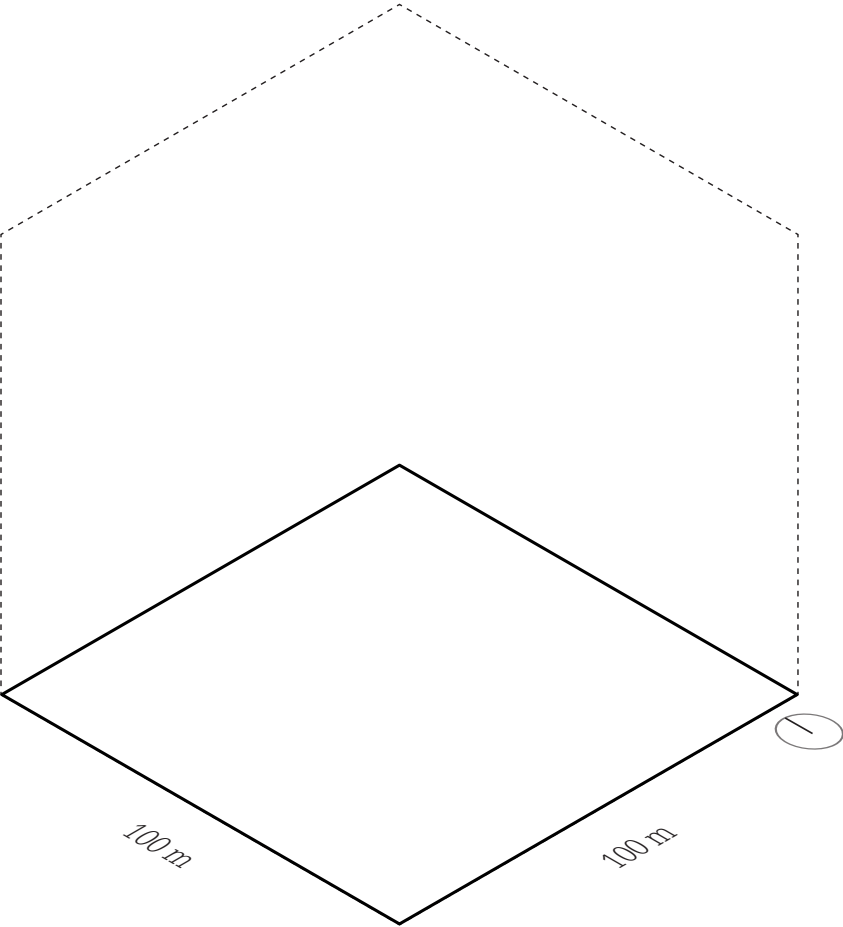
IMPORT USER DATA REFERENCE

POPULATION: 483 people (L'Eixample, Barcelona) ▼

IMPORT DOMESTIC ELECTRICITY CONSUMPTION:

DEMANDS: 3,944 kWh/household (Spain) ▼

*Source:World Energy Council, Year 2014



3.3 Program Distribution

**How much m2 requires
to be energy self-
sufficient for 483 people?**

The BlockMaker

(Y)our Block

🔒 ✓ Site

100 x 100 m

(41.3851°N, 2.1734°E)

FAR 4.7

🔒 ✓ Users

483 people

3,944 kWh/capita

🔓 > Programme

🔓 > Mass & void

🔓 > Houses

🔓 > Accessibility

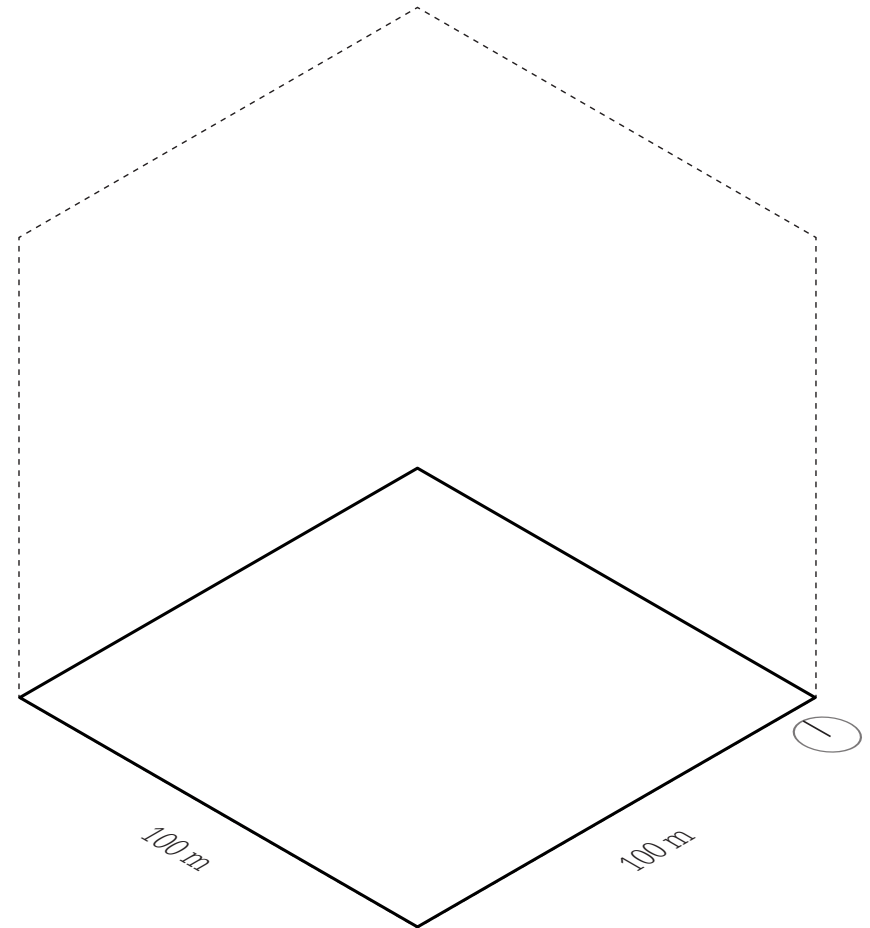
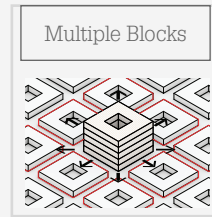
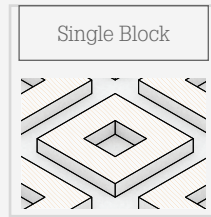
🔓 > Structure

🔓 > Climate

🔓 > Facade

Program Distribution

Select self-sufficient type

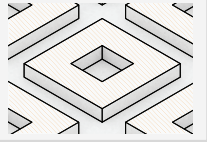


The BlockMaker
(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
- 🔓 > Programme
- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

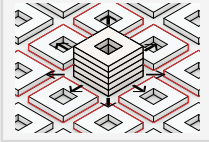
Program Distribution
Distribute program composition

Single Block



☒

Multiple Blocks



☐

PROGRAM COMPOSITION:

☒ HOUSING

0

%

☐

☐ Add...

SELF-SUFFICIENT RATE:

0%

FLOORAREA:

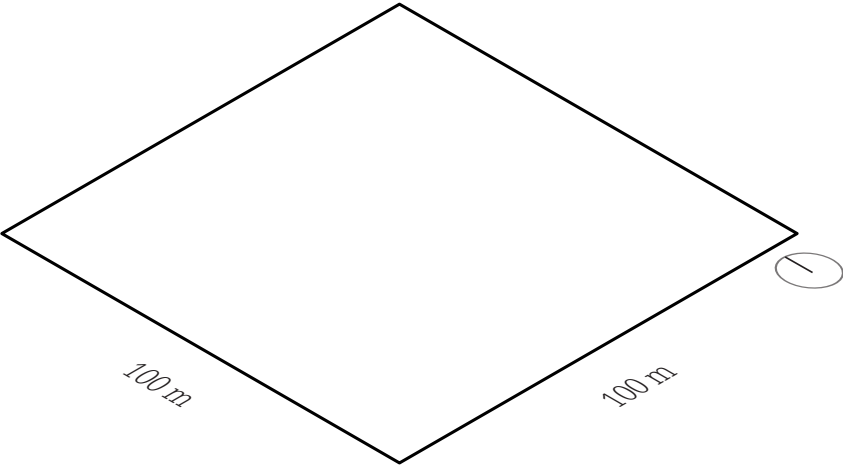
0

m2

VOLUME:

0

m3 (@ H =3.3m)



The BlockMaker

(Y)our Block

Site

100 x 100 m

(41.3851°N, 2.1734°E)

FAR 4.7

Users

483 people

3,944 kWh/capita

Programme

Mass & void

Houses

Accessibility

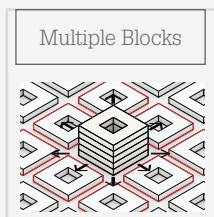
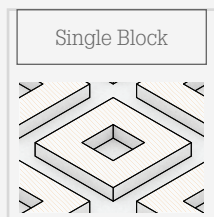
Structure

Climate

Facade

Program Distribution

Distribute program composition

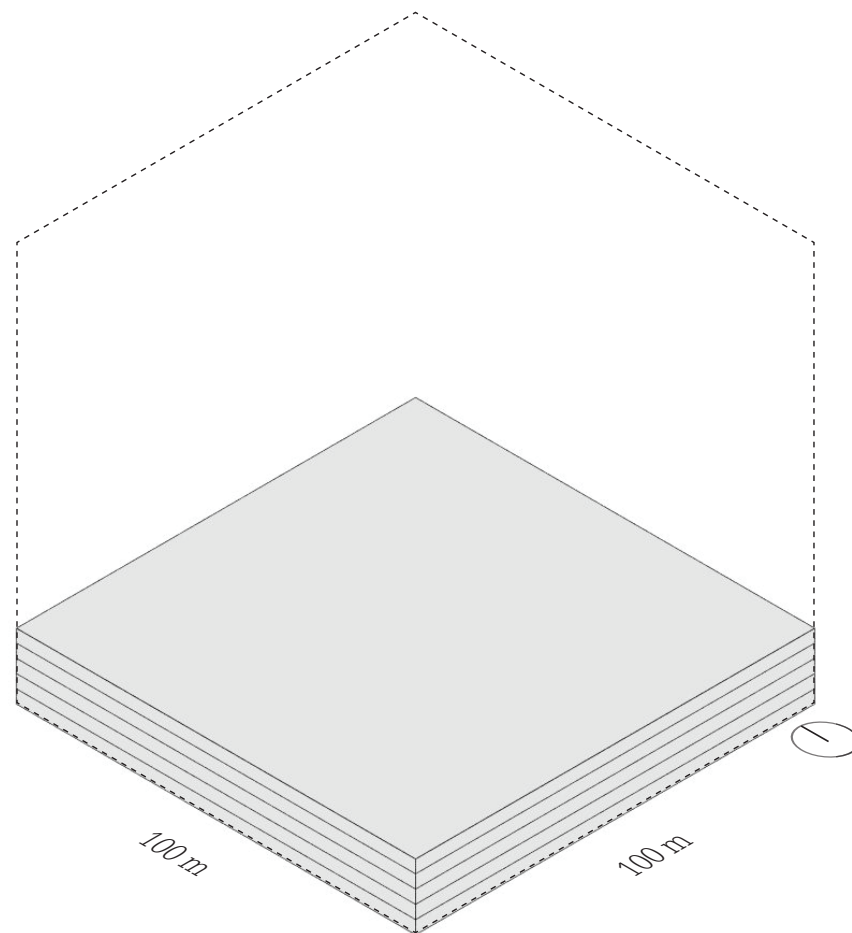


PROGRAM COMPOSITION:

☒ HOUSING 100 % ☐

☐ Add...

SELF-SUFFICIENT RATE:	0	%
SOLAR PANEL AREA:	0	m ²
FLOOR AREA:	47,000	m ²
VOLUME:	155,100	m ³ (@ H =3.3m)



The BlockMaker

(Y)our Block

Site

100 x 100 m

(41.3851°N, 2.1734°E)

FAR 4.7

Users

483 people

3,944 kWh/capita

Programme

Mass & void

Houses

Accessibility

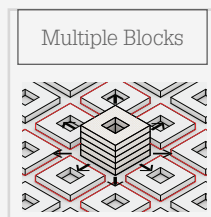
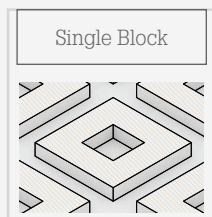
Structure

Climate

Facade

Program Distribution

Distribute program composition



PROGRAM COMPOSITION:

☒ HOUSING 62 % ☐

☐ SOLAR P. 17 % ☐

☐ BATTERY 21 % ☐

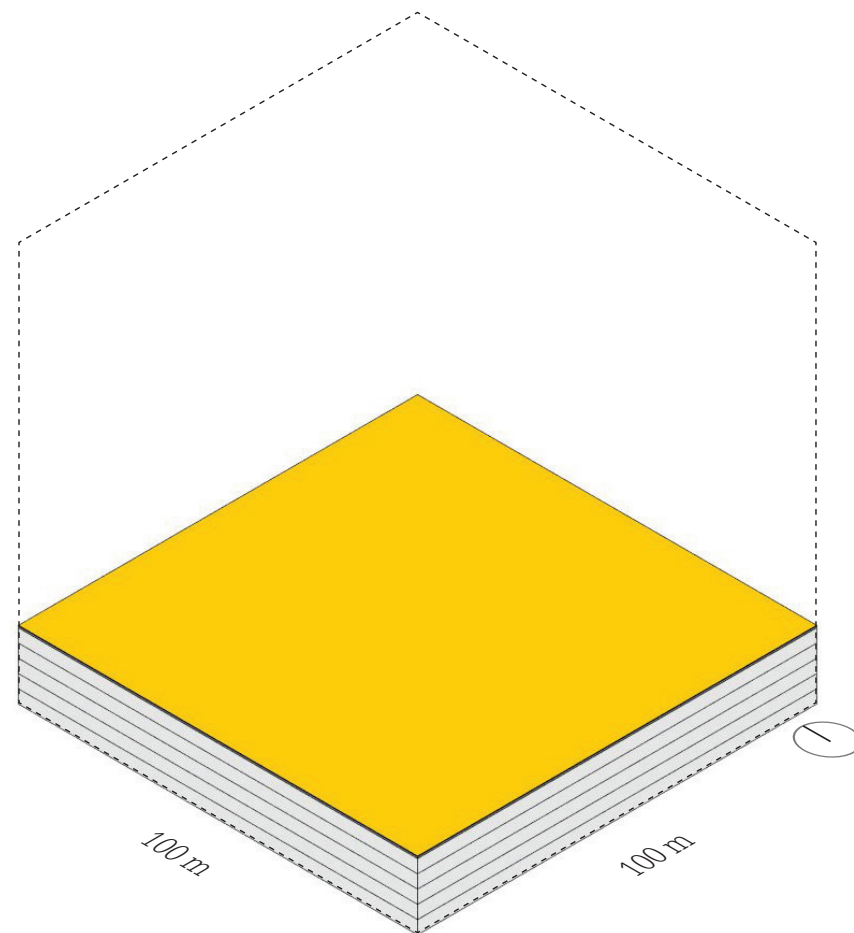
☐ Add...

SELF-SUFFICIENT RATE: 100 %

SOLAR PANEL AREA: 10,000 m²

FLOOR AREA: 47,000 m²

VOLUME: 161400 m³



The BlockMaker

(Y)our Block

Site

100 x 100 m

(41.3851°N, 2.1734°E)

FAR 4.7

Users

483 people

3,944 kWh/capita

Programme

Mass & void

Houses

Accessibility

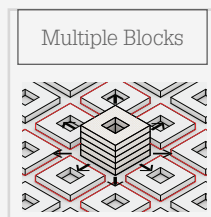
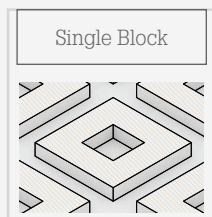
Structure

Climate

Facade

Program Distribution

Distribute program composition



PROGRAM COMPOSITION:

☒ HOUSING 62 % ☐

☐ SOLAR P. 28 % ☐

☐ BATTERY 21 % ☐

☐ Add...

SELF-SUFFICIENT RATE: 200 %

SOLAR PANEL AREA: 16,600 m²

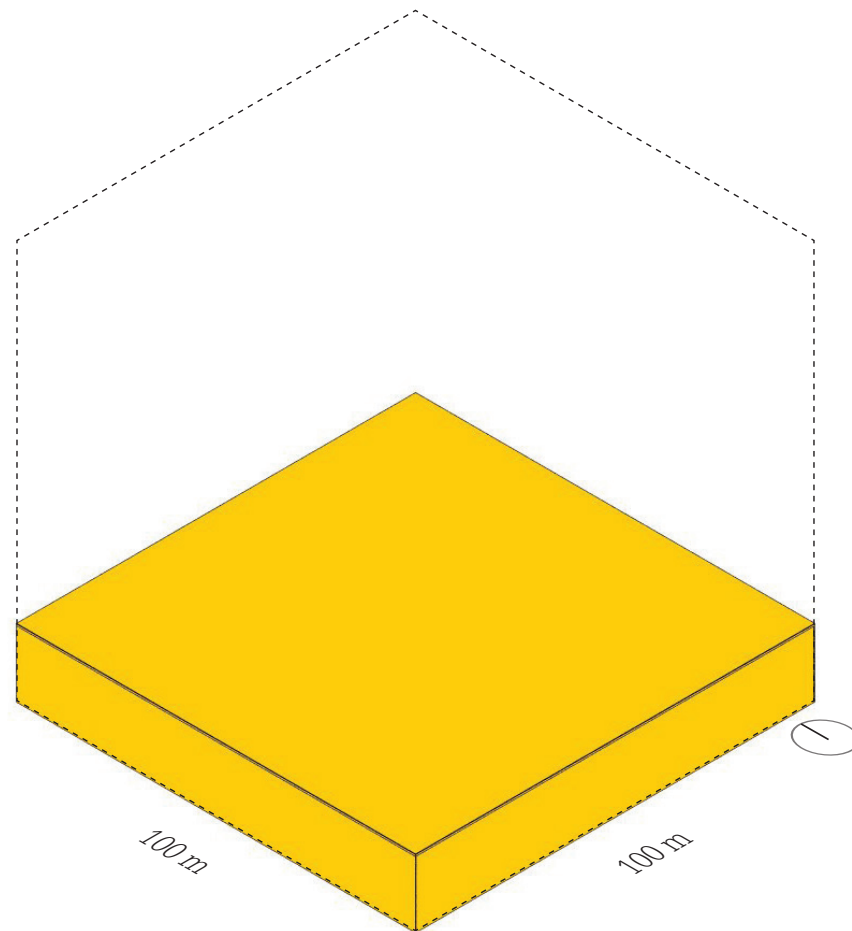
FLOOR AREA: 47,000 m²

VOLUME: 161400 m³

SPECIFIES SOLAR TECHNOLOGY:

TECHNOLOGY:

EFFICIENCY: 20 %



The BlockMaker

(Y)our Block

Site

100 x 100 m

(41.3851°N, 2.1734°E)

FAR 4.7

Users

483 people

3,944 kWh/capita

Programme

Mass & void

Houses

Accessibility

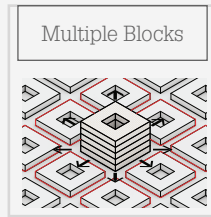
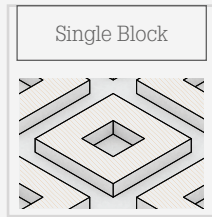
Structure

Climate

Facade

Program Distribution

Distribute program composition



PROGRAM COMPOSITION:

☒ HOUSING 62 % ☐

☐ SOLAR P. 28 % ☐

☐ BATTERY 21 % ☐

☐ Add...

SELF-SUFFICIENT RATE: 200 %

SOLAR PANEL AREA: 16,600 m²

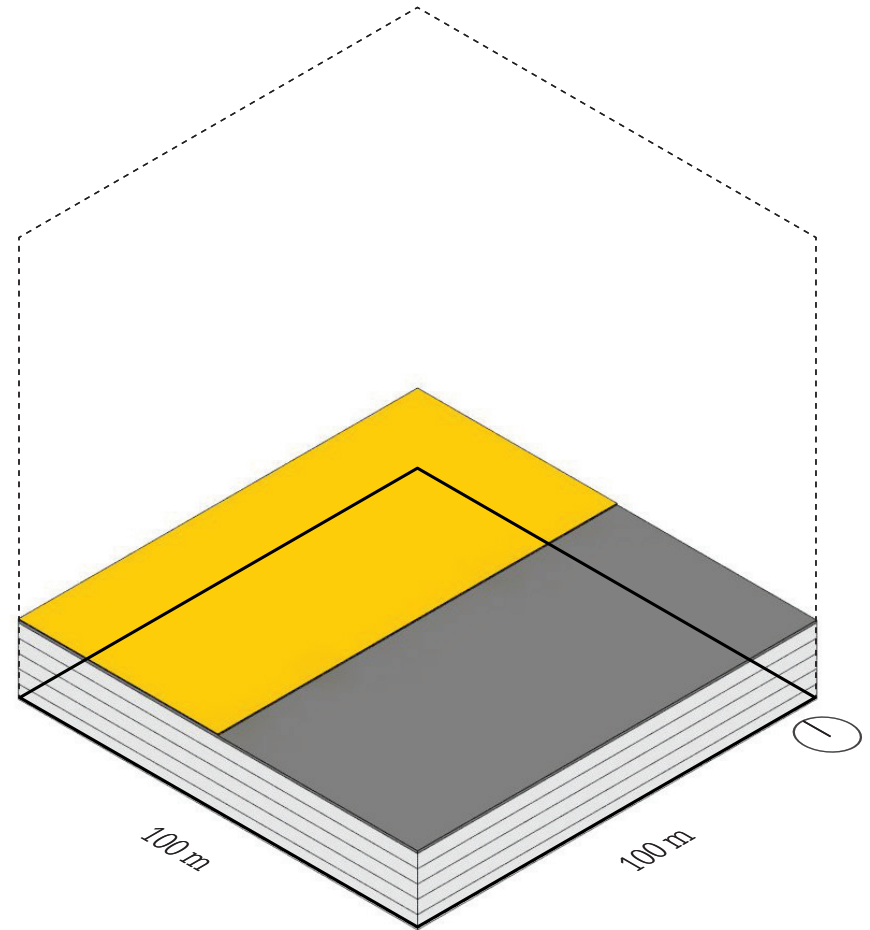
FLOOR AREA: 47,000 m²

VOLUME: 161400 m³

SPECIFIES SOLAR TECHNOLOGY:

TECHNOLOGY:

EFFICIENCY: 40 %



The BlockMaker

(Y)our Block

Site

100 x 100 m
(41.3851°N, 2.1734°E)
FAR 4.7

Users

483 people
3,944 kWh/capita

Programme

Mass & void

Houses

Accessibility

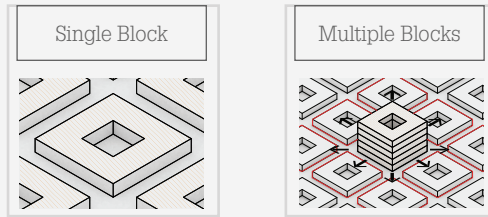
Structure

Climate

Facade

Program Distribution

Distribute program composition



PROGRAM COMPOSITION:

☒ HOUSING 62 % ☐

☐ SOLAR P. 28 % ☐

☐ BATTERY 21 % ☐

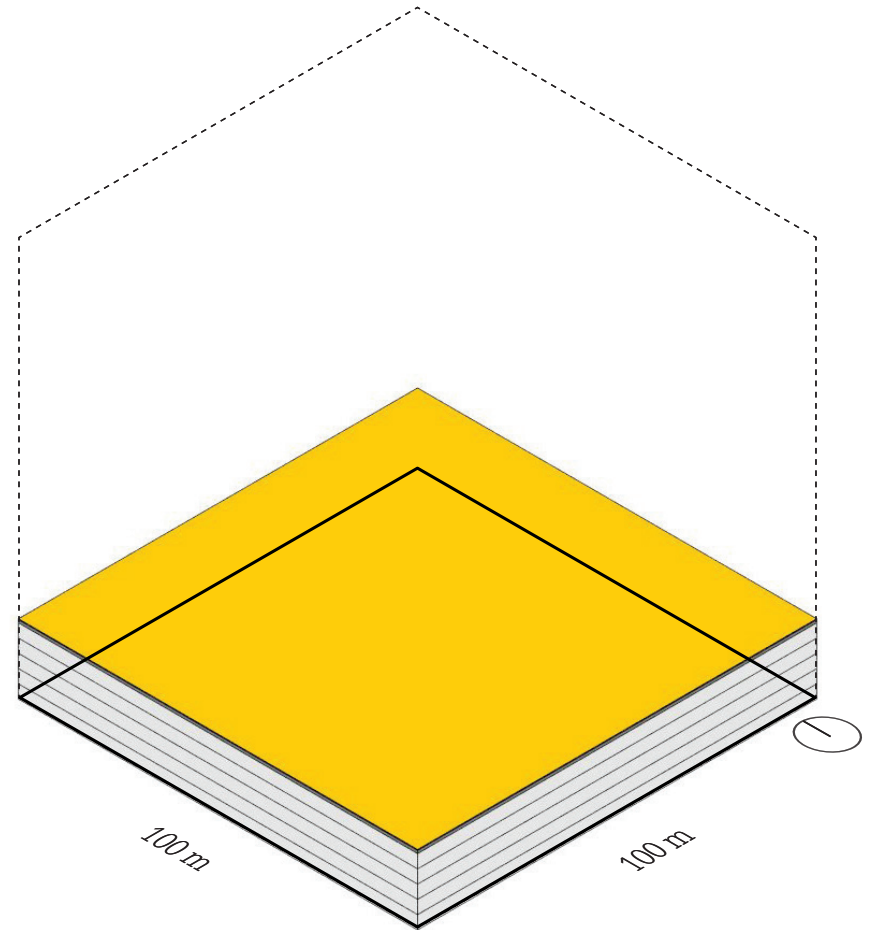
☐ Add...

SELF-SUFFICIENT RATE: 200 %
SOLAR PANEL AREA: 16,600 m²
FLOOR AREA: 47,000 m²
VOLUME: 161400 m³

SPECIFIES SOLAR TECHNOLOGY:

TECHNOLOGY:

EFFICIENCY: 20 %



The BlockMaker

(Y)our Block

🔒 ✓ Site

100 x 100 m

(41.3851°N, 2.1734°E)

FAR 4.7

🔒 ✓ Users

483 people

3,944 kWh/capita

🔒 > Programme

🔒 > Mass & void

🔒 > Houses

🔒 > Accessibility

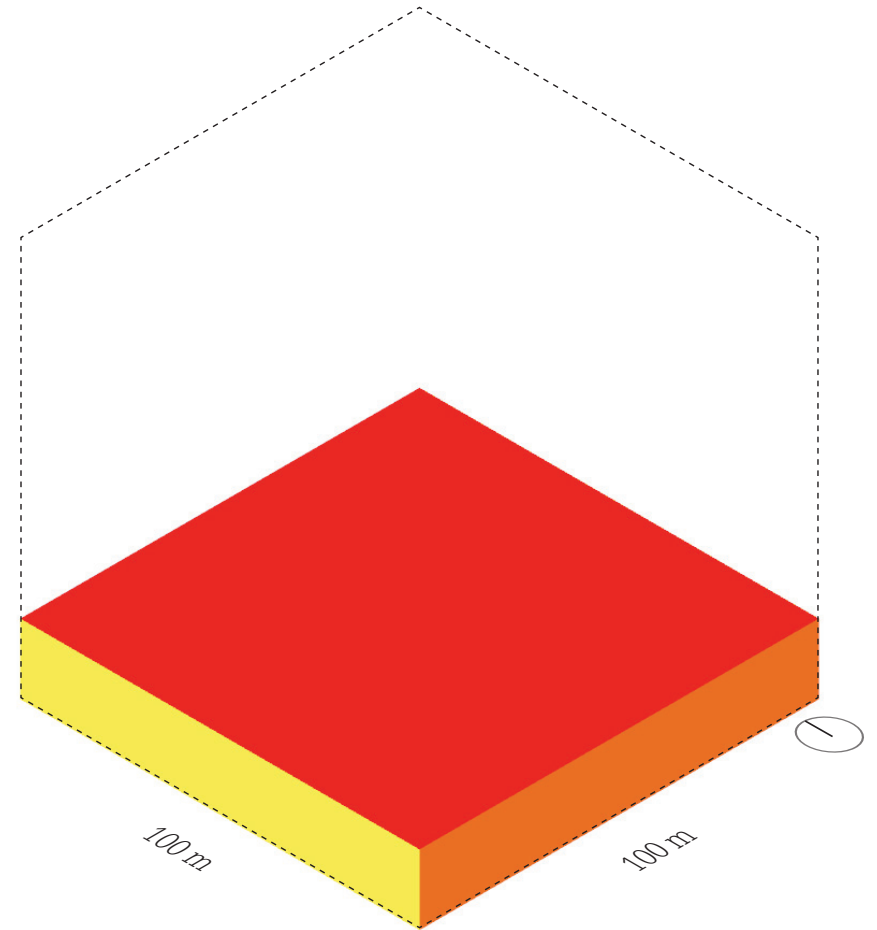
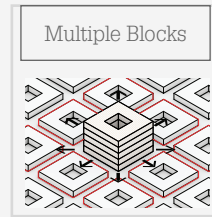
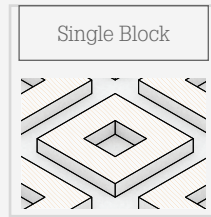
🔒 > Structure

🔒 > Climate

🔒 > Facade

Program Distribution

Select self-sufficient type



The BlockMaker
(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
- 🔓 > Programme
- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Program Distribution
Select self-sufficient type

Single Block

☐

Multiple Blocks

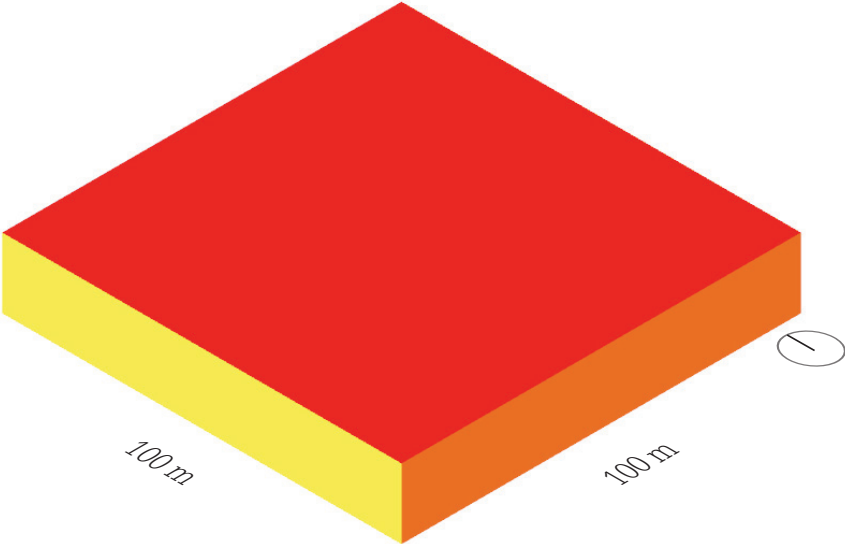
☒

SPECIFIES SOLAR TECHNOLOGY:

TECHNOLOGY:

Semi-transparent cell (silicon) 

EFFICIENCY: 20 %



(Y)our Block

100 x 100 m

(41.3851°N, 2.1734°E)

FAR 4.7

483 people

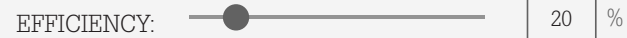
3,944 kWh/capita

⊙ > Facade

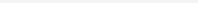
Select self-sufficient type

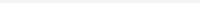


TECHNOLOGY: Semi-transparent cell (silicon)

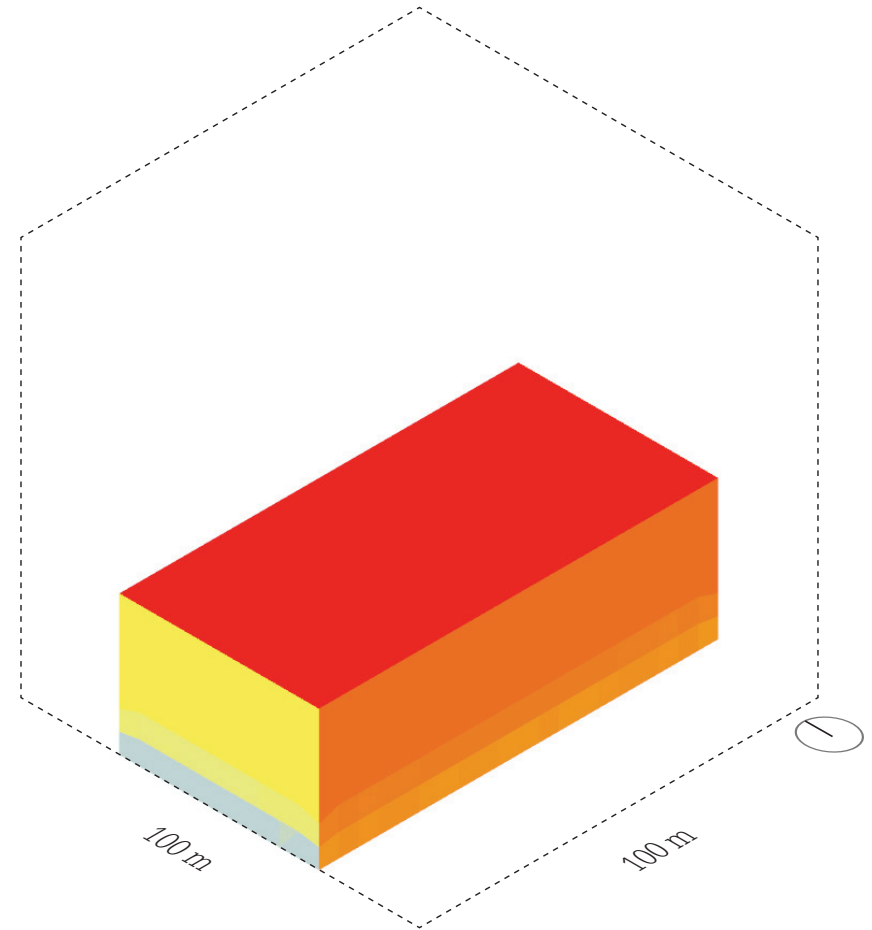


MODIFY PROGRAM MASS:

X-AXIS		100	m
--------	-----------------------------------------------------------------------------------	-----	---

Y-AXIS		50	m
--------	-----------------------------------------------------------------------------------	----	---

Z-AXIS		34	m
--------	-----------------------------------------------------------------------------------	----	---



Sufficiency rate	Energy Production	# of block to power	Solar Panel area	Volume
149 %	2,721 MWh	1.6 blocks	10.200 m ²	170,000 m ³

(Y)our Block

🔒 Site

100 x 100 m

(41.3851°N, 2.1734°E)

FAR 4.7

🔒 ▼ Users

483 people

3,944 kWh/capita

⌕ > Programme

○ > Mass & void

♂ > Houses

⊙ > Accessibility

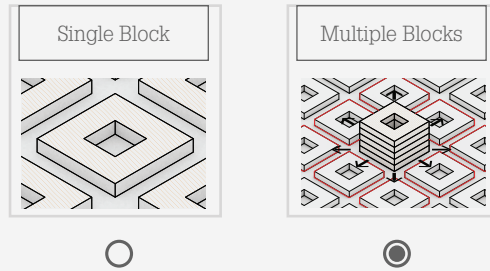
⊙ > Structure

♂ > Climate

⊙ > Facade

Program Distribution

Select self-sufficient type



SPECIFIES SOLAR TECHNOLOGY:

TECHNOLOGY: Semi-transparent cell (silicon)

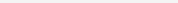


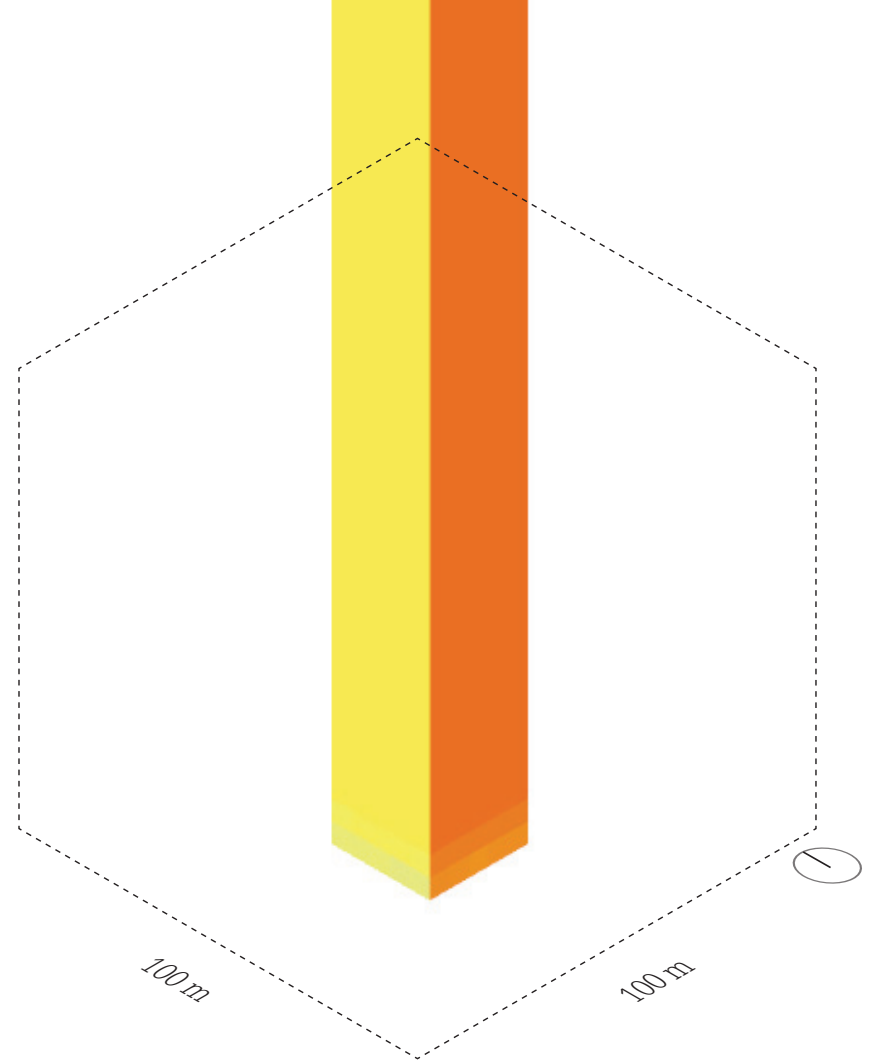
EFFICIENCY: 20 %

MODIFY PROGRAM MASS:

X-AXIS		25	m
--------	-----------------------------------------------------------------------------------	----	---

Y-AXIS		25	m
--------	-----------------------------------------------------------------------------------	----	---

Z-AXIS		272	m
--------	-----------------------------------------------------------------------------------	-----	---



Block Information

Sufficiency rate	Energy Production	# of block to power	Solar Panel area	Volume
201 %	3,672 MWh	2.1 blocks	18450 m ²	170,000 m ³

The BlockMaker
(Y)our Block

- 🔒 Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 Users
 - 483 people
 - 3,944 kWh/capita
- 🔓 Programme
- 🔓 Mass & void
- 🔓 Houses
- 🔓 Accessibility
- 🔓 Structure
- 🔓 Climate
- 🔓 Facade

Program Distribution
Select self-sufficient type


Single Block

Multiple Blocks

SPECIFIES SOLAR TECHNOLOGY:

TECHNOLOGY:

Semi-transparent cell (silicon)



EFFICIENCY:

20

%

MODIFY PROGRAM MASS:

X-AXIS

10

m

Y-AXIS

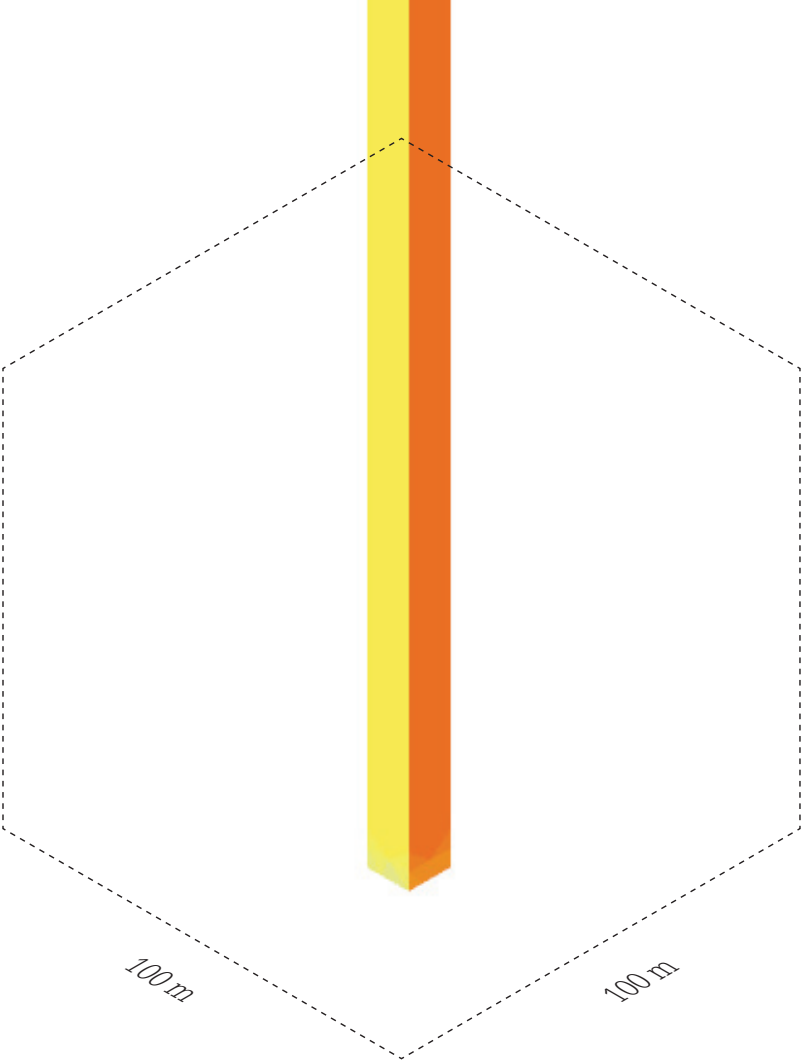
10

m

Z-AXIS

1088

m



Block Information

Sufficiency rate	Energy Production	# of block to power	Solar Panel area	Volume
400 %	7,048 MWh	4.1 blocks	44,712 m²	170,000 m³

The BlockMaker
(Y)our Block

- Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- Users
 - 483 people
 - 3,944 kWh/capita
- Programme
- Mass & void
- Houses
- Accessibility
- Structure
- Climate
- Facade

Program Distribution
Select self-sufficient type


Single Block

Multiple Blocks

SPECIFIES SOLAR TECHNOLOGY:

TECHNOLOGY:

Semi-transparent cell (silicon)



EFFICIENCY:

20

%

MODIFY PROGRAM MASS:

X-AXIS

100

m

Y-AXIS

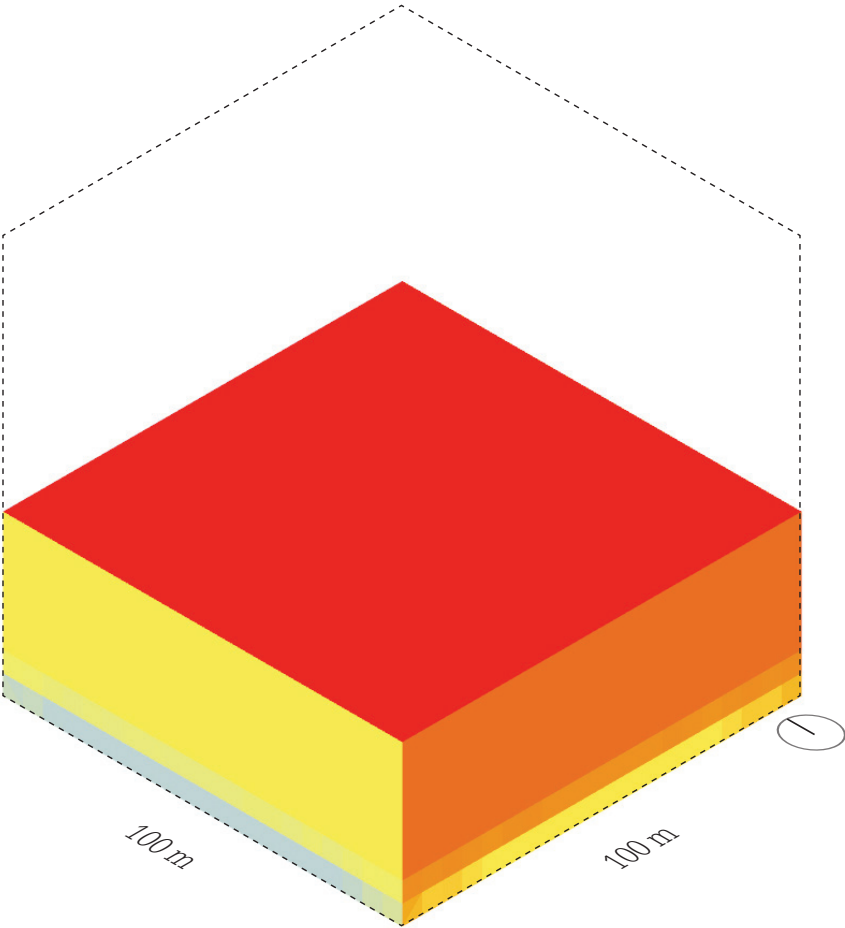
100

m

Z-AXIS

40

m



Block Information

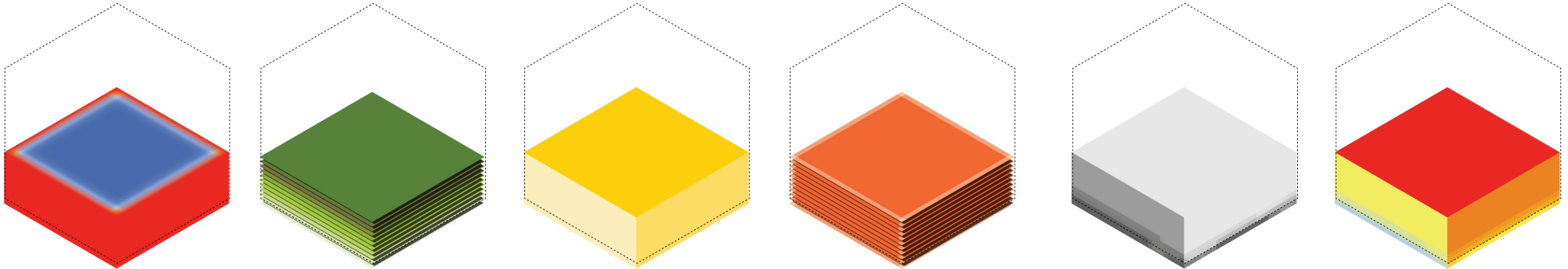
Sufficiency rate	Energy Production	# of block to power	Solar Panel area	Volume
265 %	4,846 MWh	2.8 blocks	26,000 m ²	400,000 m ³







3.4 Mass Transformation

**Will Transformations
help generate more
energy?**

Blockmaker as an Analyser tool

Evaluating Mass Performance to Energy Production and Housing quality



 % Unobstructed view	 Distant to terrace (m)	 % Daylight	 Average proximity	 % Sunlight hour	 Solar Energy (MWh)
100	15.62	64.5	5.7	53	4647

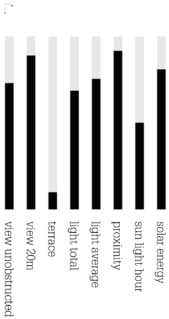
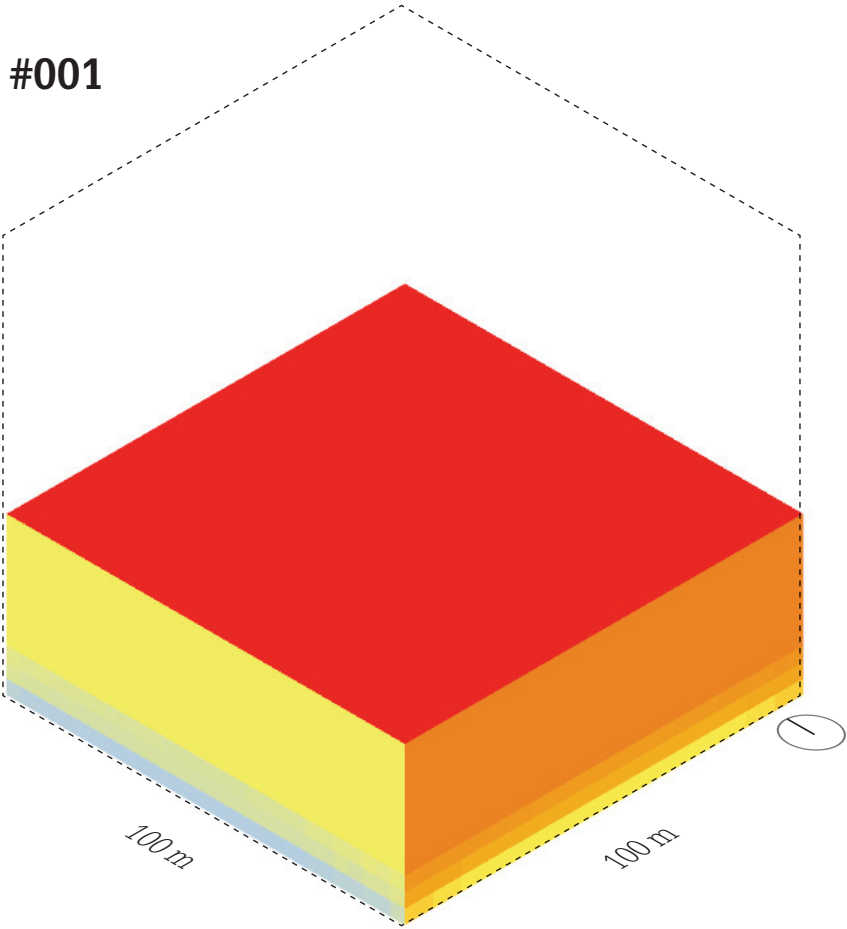
The BlockMaker

(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
- 🔒 ▼ Programme
 - 100 x 100 x 40 m
 - Housing 100%
 - Sufficiency 265%
 - Volume 400,000 m3
- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Mass Transformation I

#001

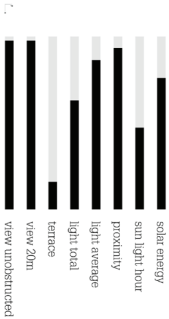
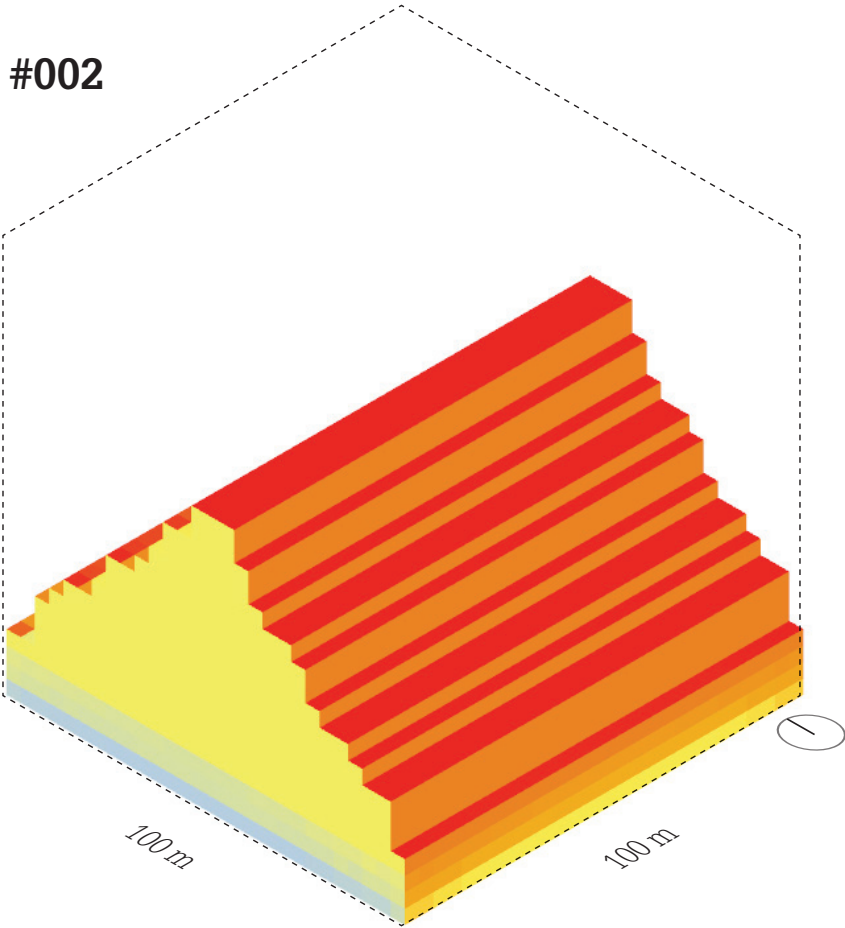


The BlockMaker
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Mass Transformation I

#002

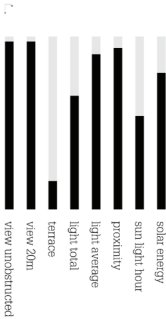
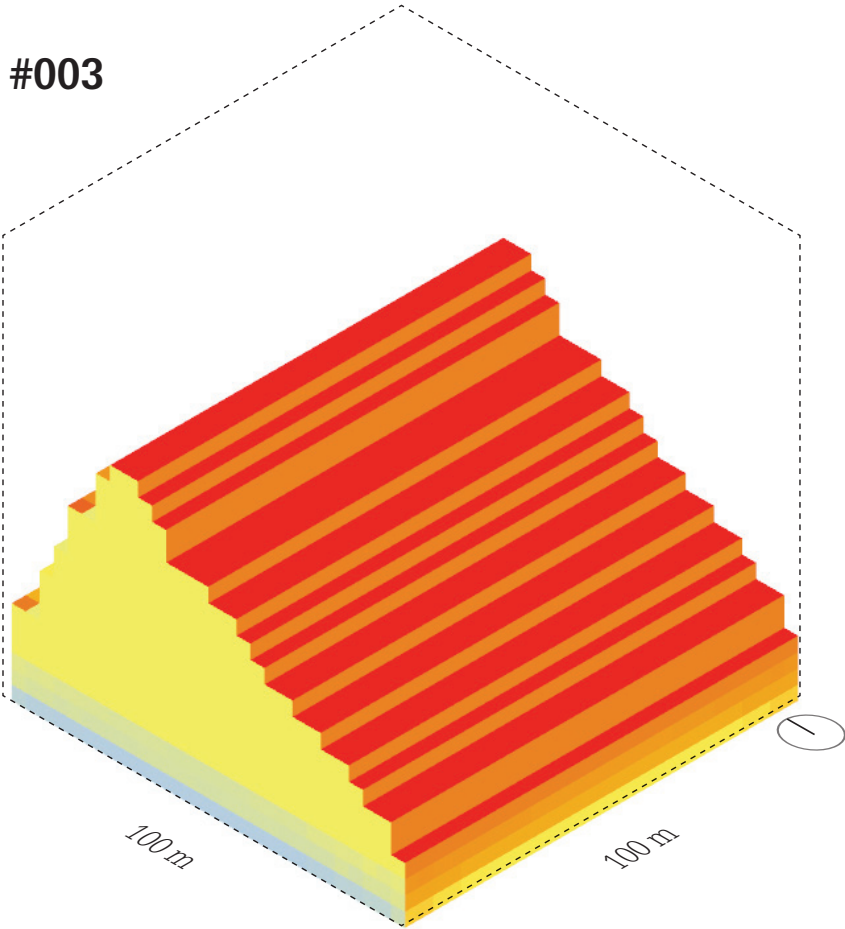


The BlockMaker
(Y)our Block

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 - FAR 4.7
- 🔒 ▼ Users
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- 🔒 ▼ Programme
 - 100 x 100 x 40 m
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 - Sufficiency 265%
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- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Mass Transformation I

#003

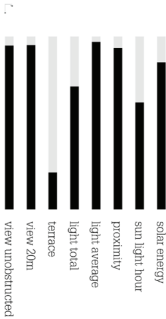
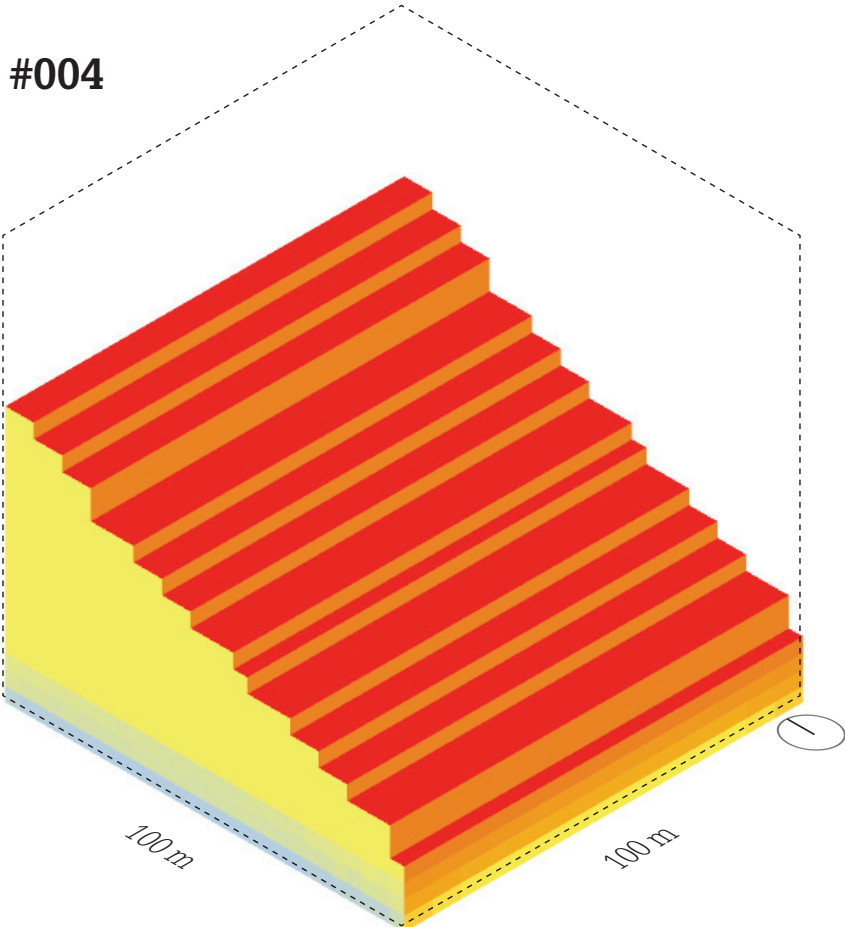


The BlockMaker
(Y)our Block

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 - 100 x 100 m
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- 🔒 ▼ Users
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- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Mass Transformation I

#004



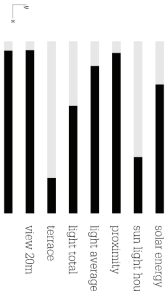
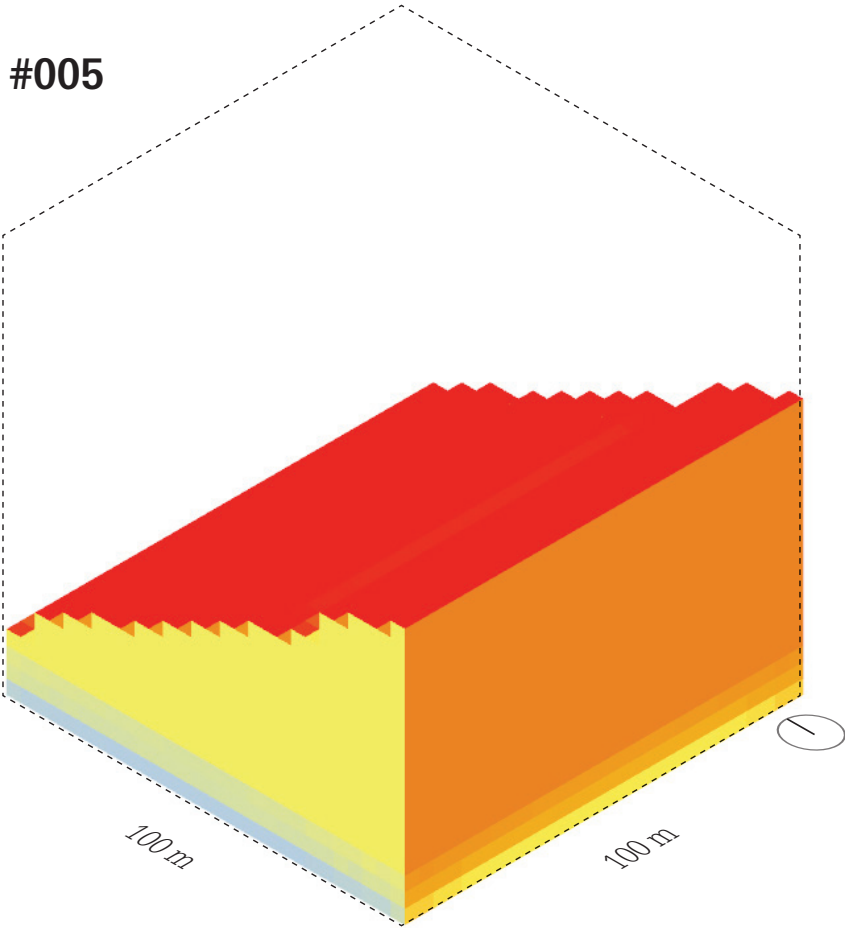
The BlockMaker

(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
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- 🔒 ▼ Programme
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 - Sufficiency 265%
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- 🔗 > Mass & void
- 🔗 > Houses
- 🔗 > Accessibility
- 🔗 > Structure
- 🔗 > Climate
- 🔗 > Facade

Mass Transformation I

#005



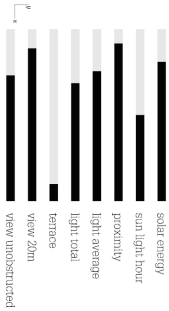
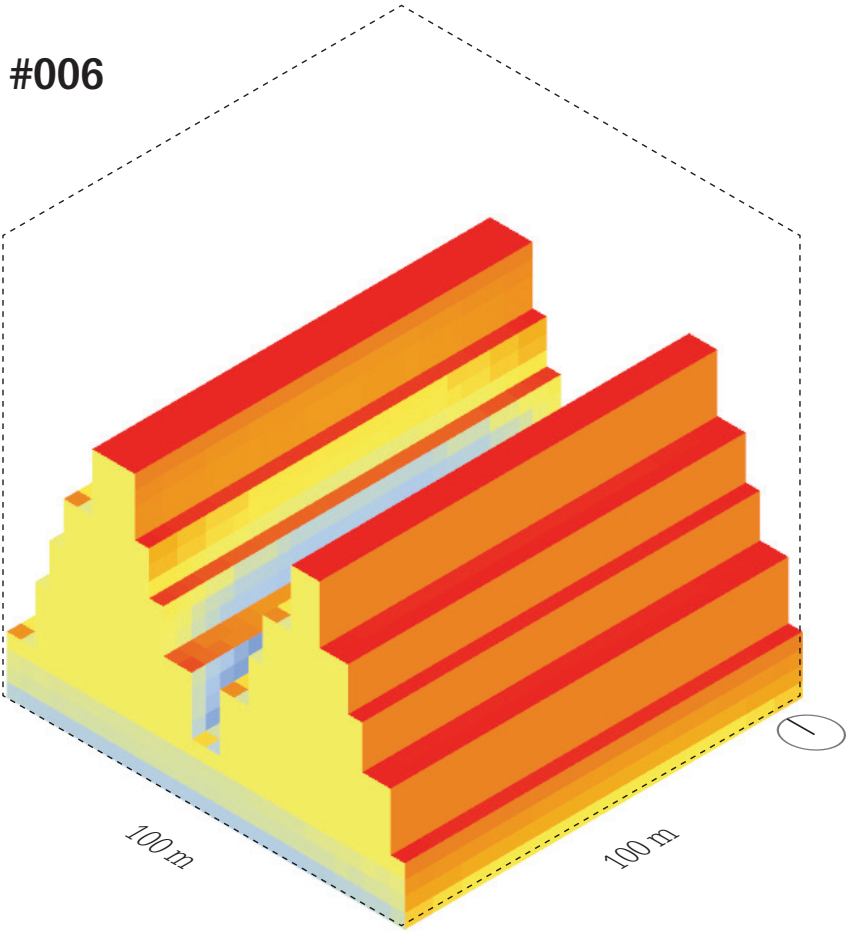
The BlockMaker

(Y)our Block

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 - 100 x 100 m
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- 🔒 ▼ Users
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 - Sufficiency 265%
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- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Mass Transformation I

#006

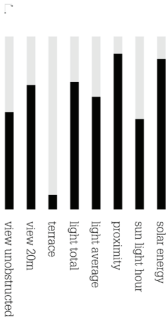
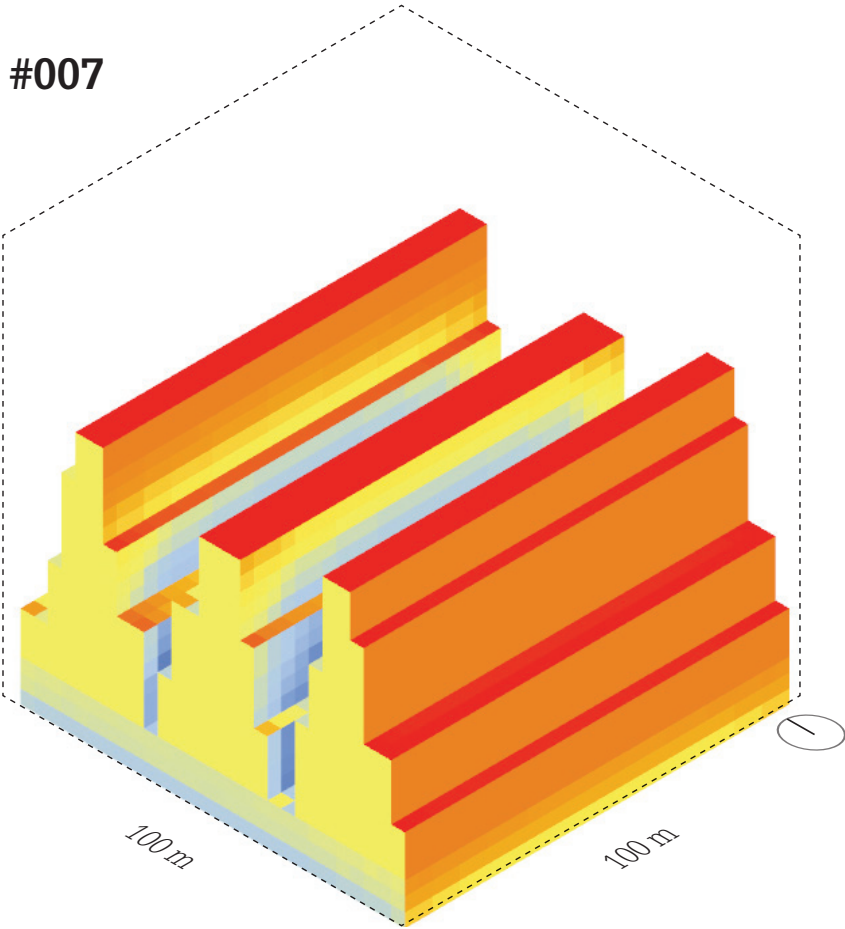


The BlockMaker
(Y)our Block

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 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
- 🔒 ▼ Programme
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 - Housing 100%
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- 🔗 > Mass & void
- 🔗 > Houses
- 🔗 > Accessibility
- 🔗 > Structure
- 🔗 > Climate
- 🔗 > Facade

Mass Transformation I

#007

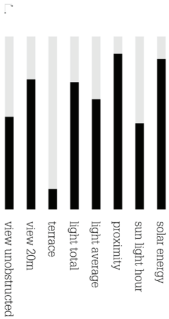
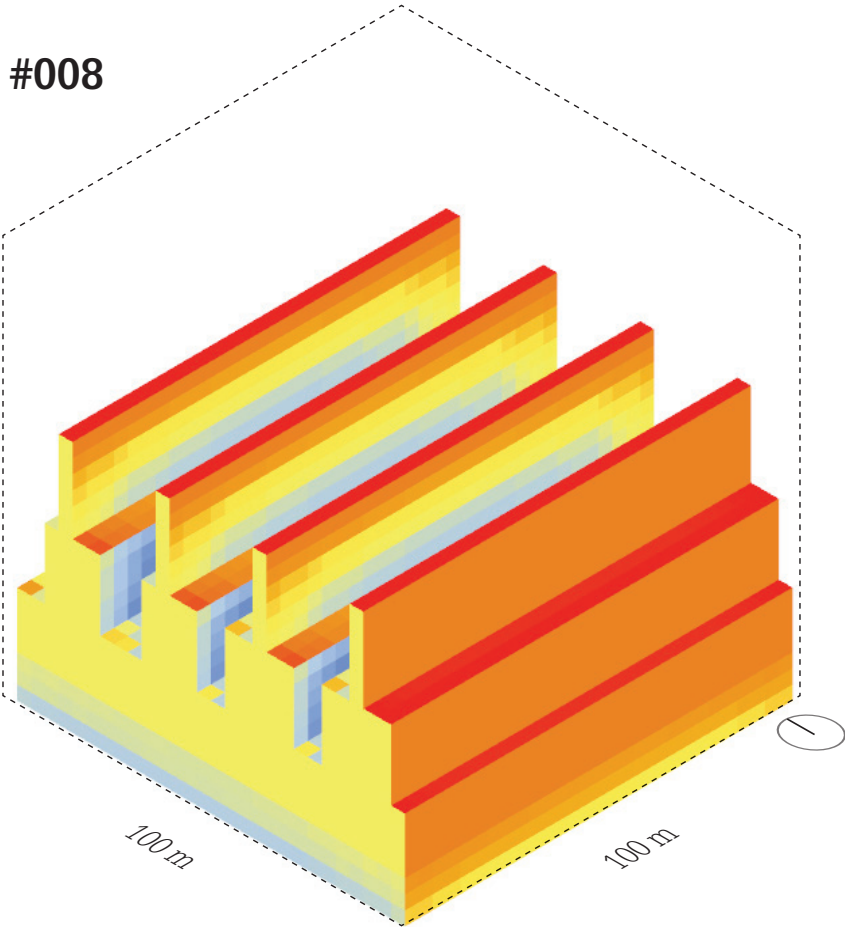


The BlockMaker
(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
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- 🔒 ▼ Programme
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- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Mass Transformation I

#008

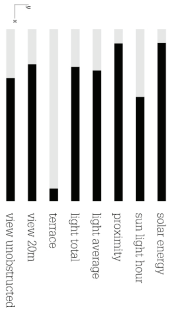
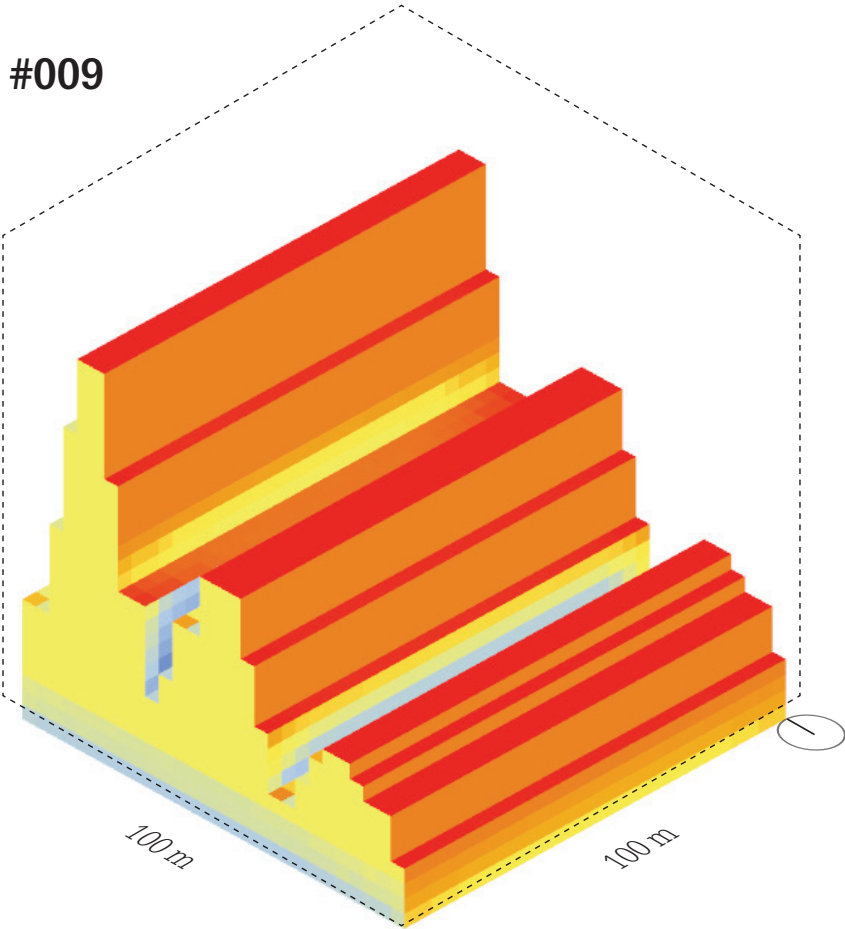


The BlockMaker
(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
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- 🔗 > Mass & void
- 🔗 > Houses
- 🔗 > Accessibility
- 🔗 > Structure
- 🔗 > Climate
- 🔗 > Facade

Mass Transformation I

#009

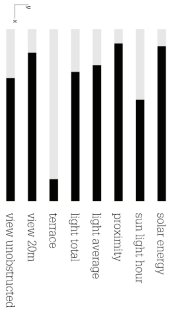
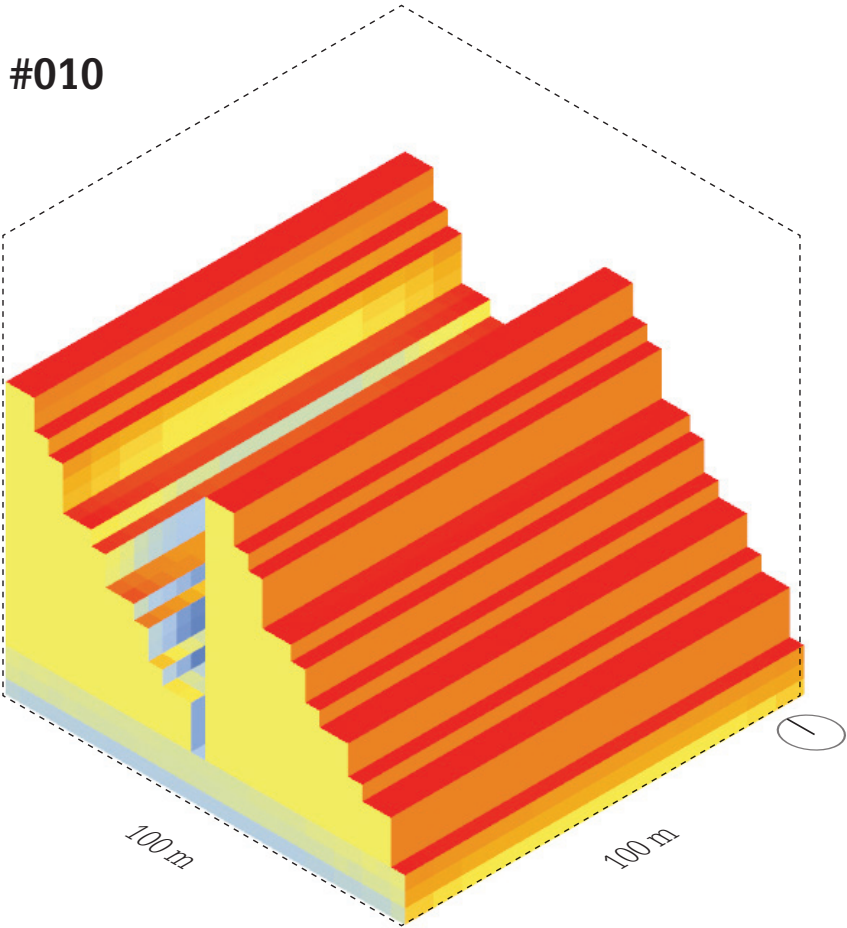


The BlockMaker
(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
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 - FAR 4.7
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- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Mass Transformation I

#010

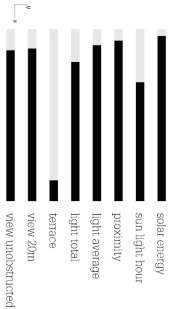
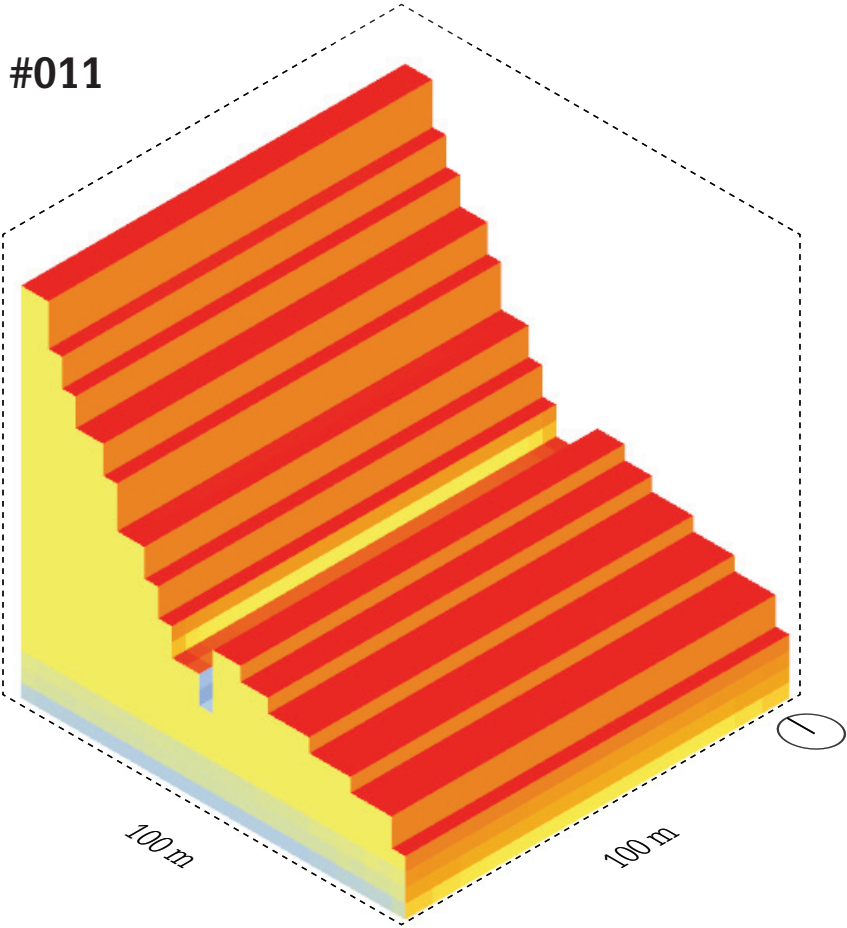


The BlockMaker
(Y)our Block

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- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Mass Transformation I

#011

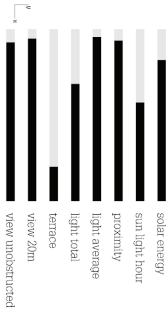
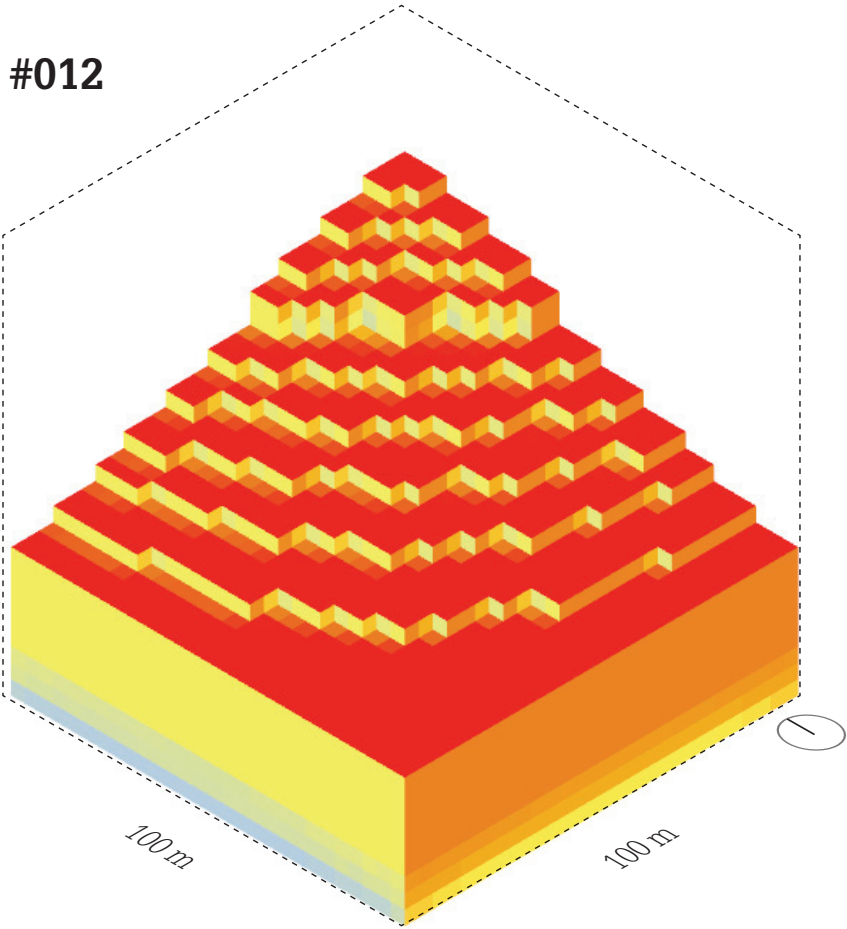


The BlockMaker
(Y)our Block

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- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Mass Transformation I

#012



The BlockMaker

(Y)our Block

🔒 ▼ Site

100 x 100 m

(41.3851°N, 2.1734°E)

FAR 4.7

🔒 ▼ Users

483 people

3,944 kWh/capita

🔒 ▼ Programme

100 x 100 x 40 m

Housing 100%

Sufficiency 265%

Volume 400,000 m³

🔒 > Mass & void

🔒 > Houses

🔒 > Accessibility

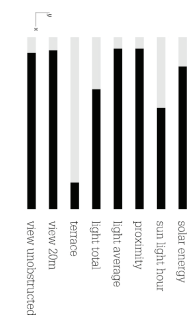
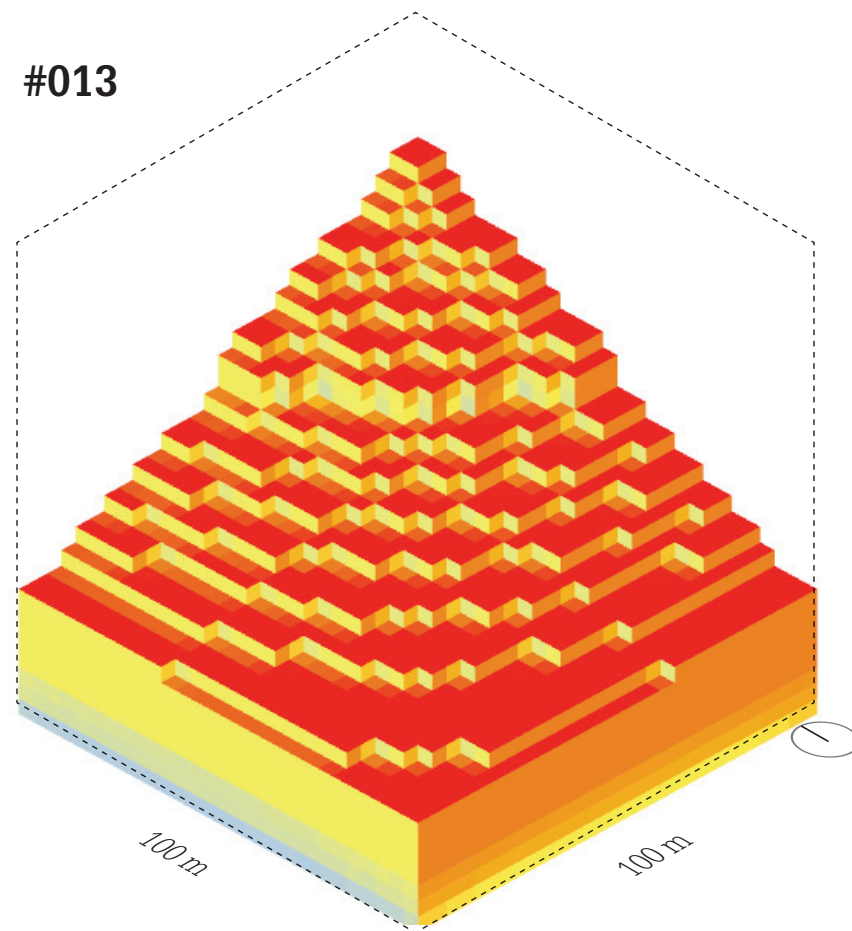
🔒 > Structure

🔒 > Climate

🔒 > Facade

Mass Transformation I

#013

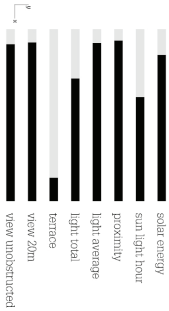
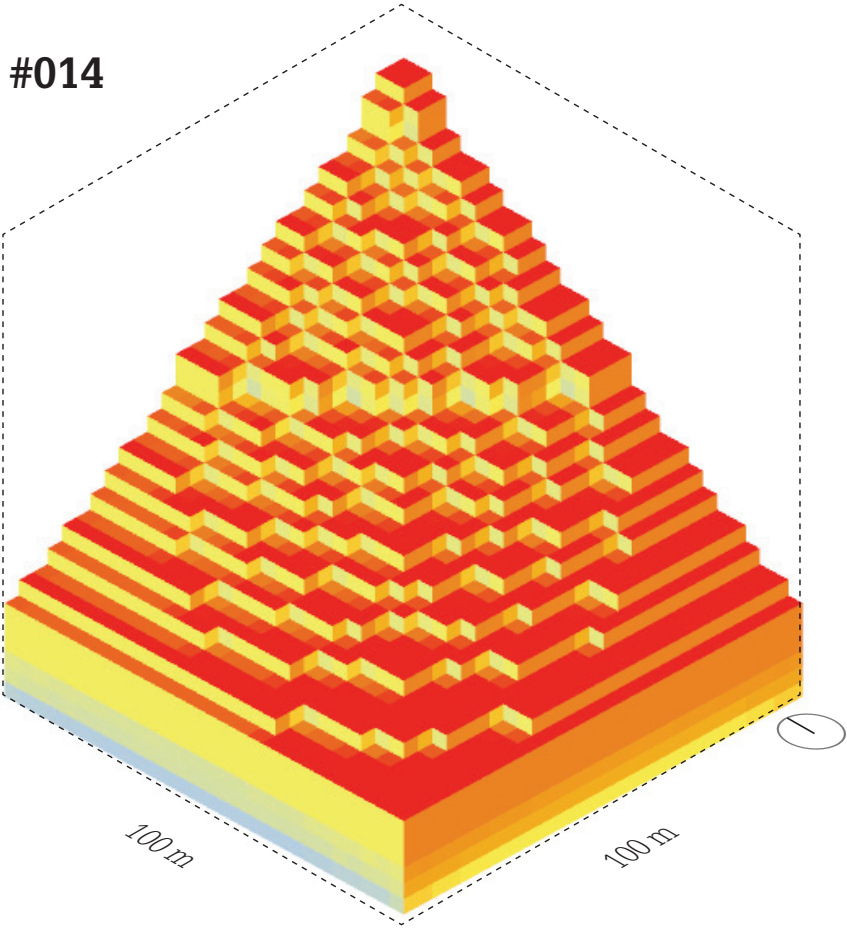


The BlockMaker
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Mass Transformation I

#014

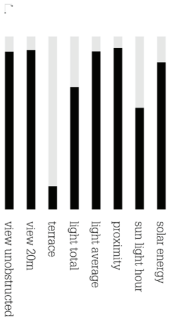
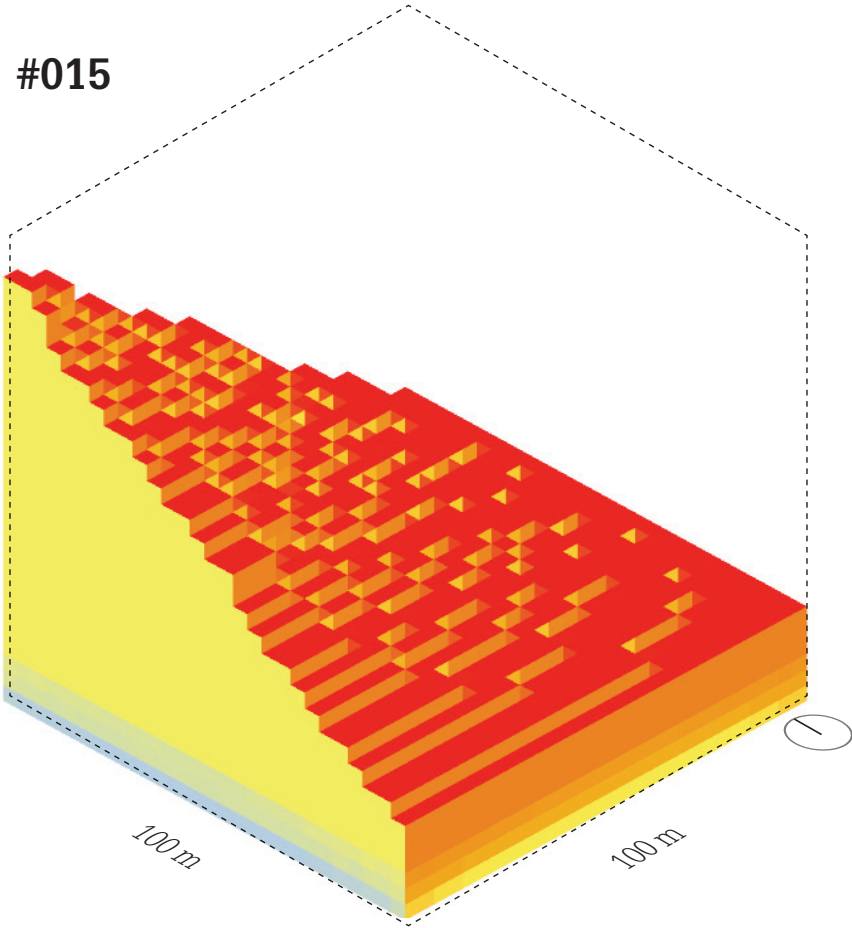


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- 🔓 > Facade

Mass Transformation I

#015

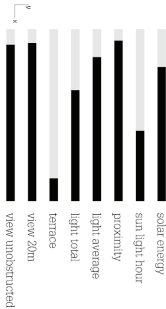
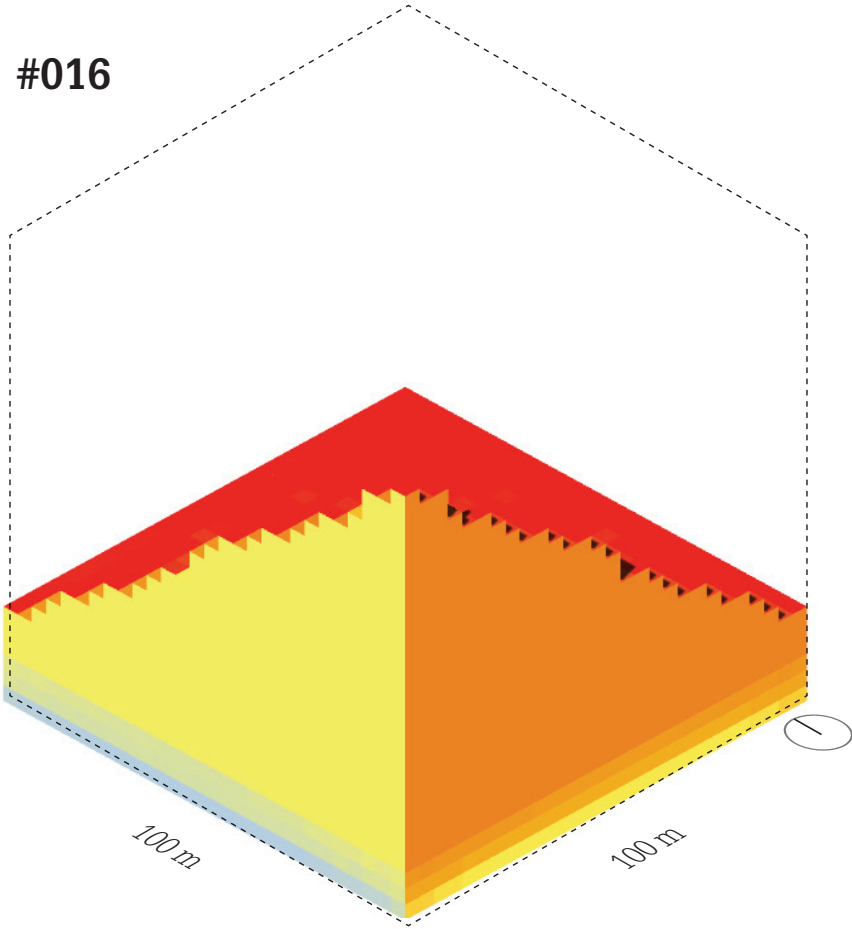


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Mass Transformation I

#016

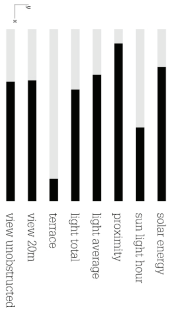
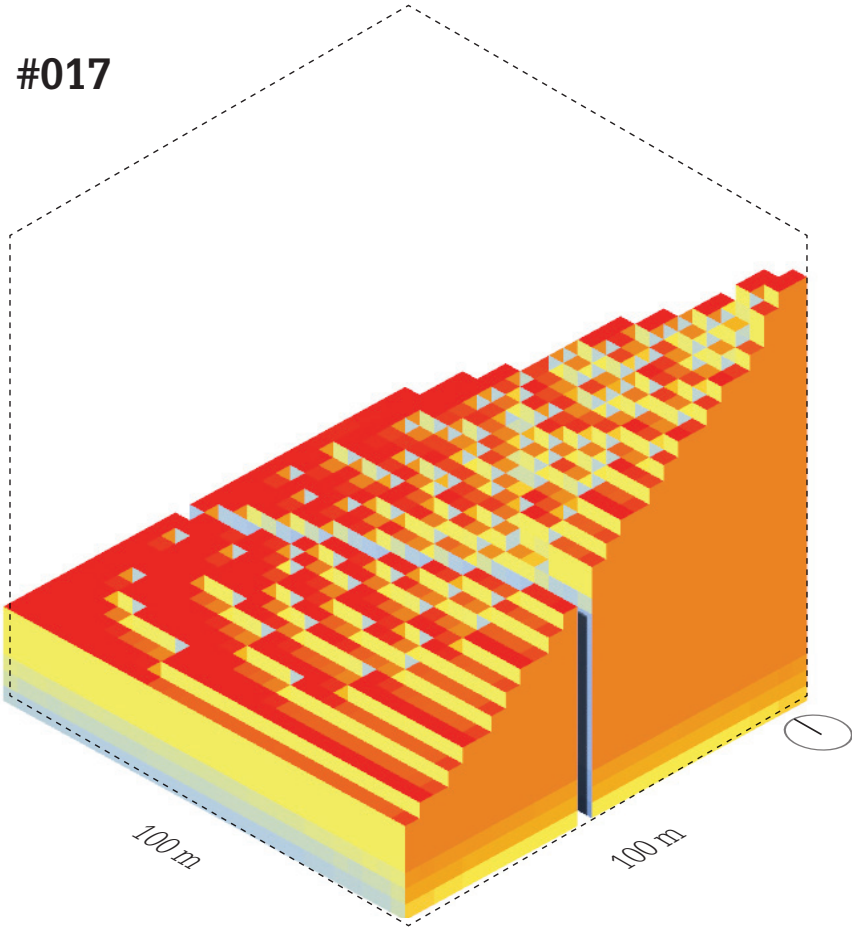


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- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Mass Transformation I

#017

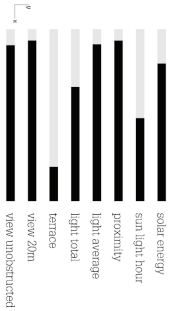
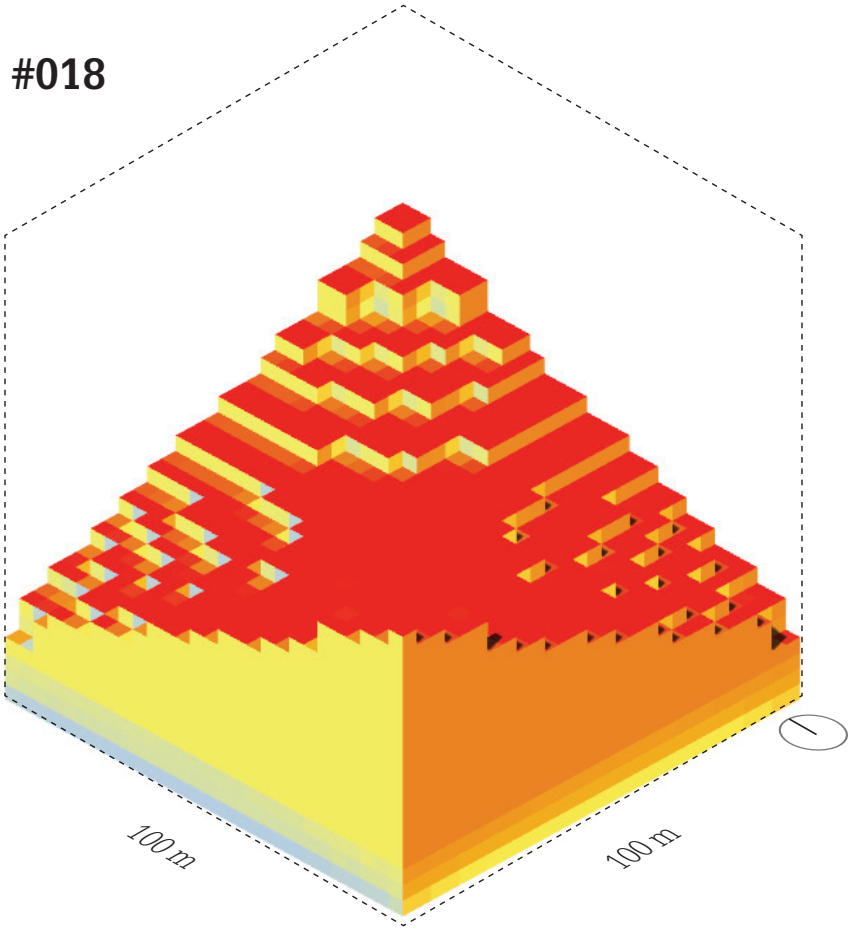


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Mass Transformation I

#018

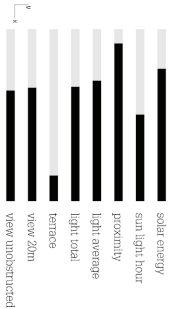
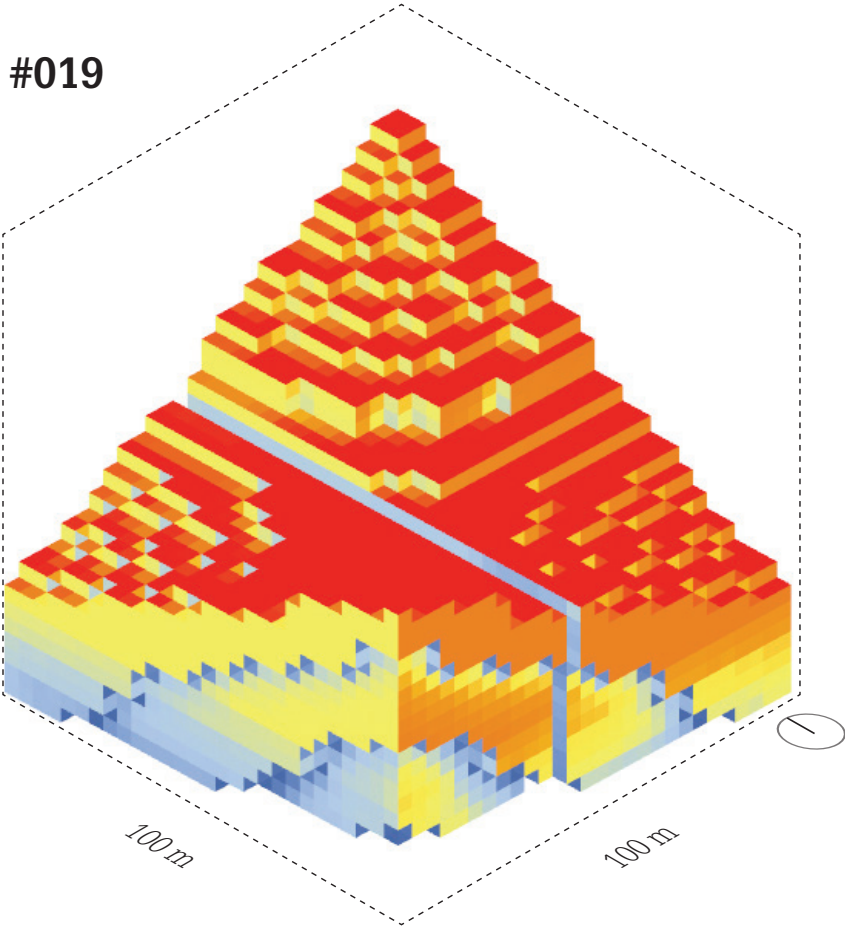


The BlockMaker
(Y)our Block

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- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Mass Transformation I

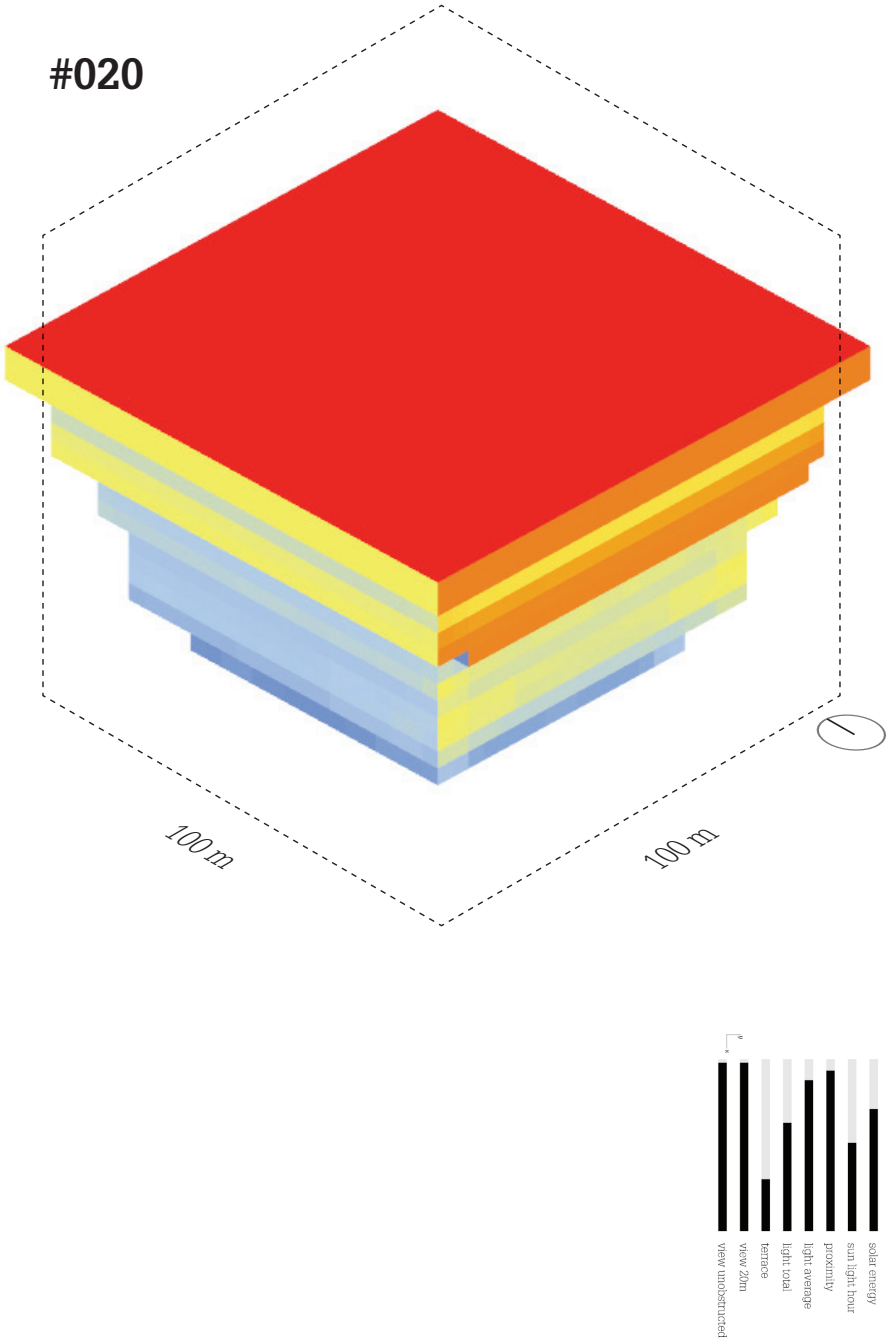
#019



The BlockMaker
(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
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- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

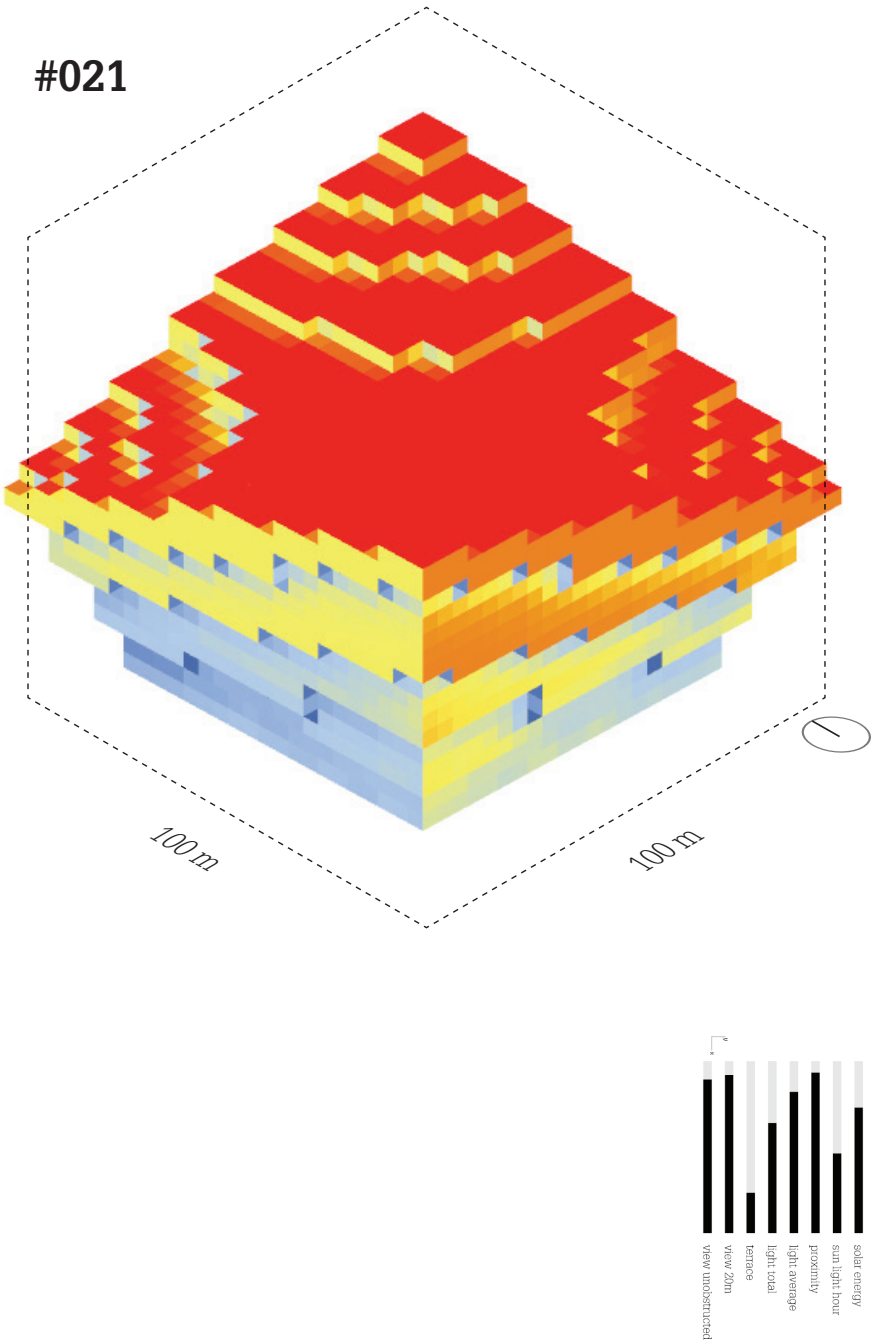
Mass Transformation I



The BlockMaker
(Y)our Block

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 - (41.3851°N, 2.1734°E)
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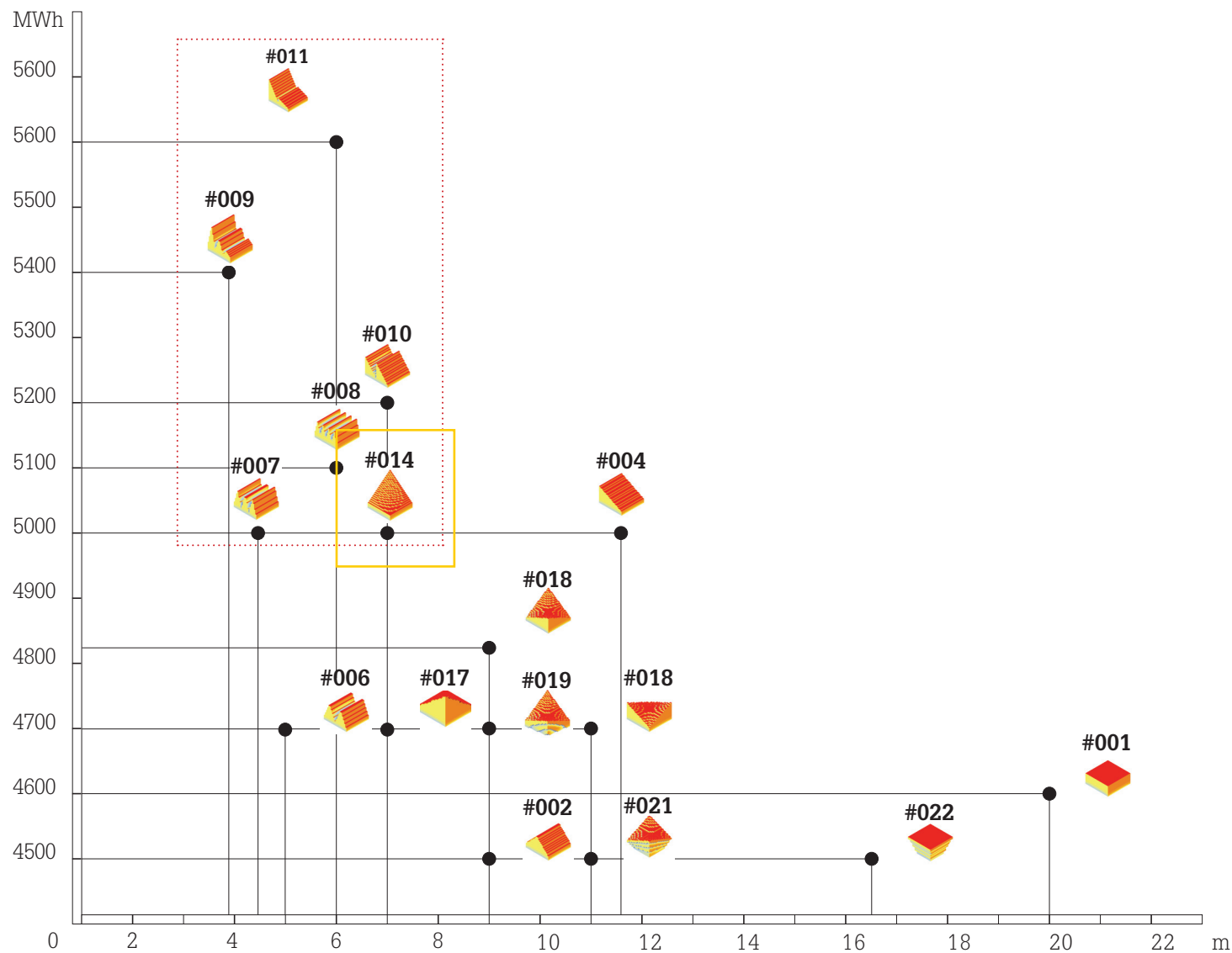
Mass Transformation I



Mass Transformation I

Research on housing typologies and its performance.

ENERGY PRODUCTION



Housing Quality
View Quality and Terraces

Potential Mass

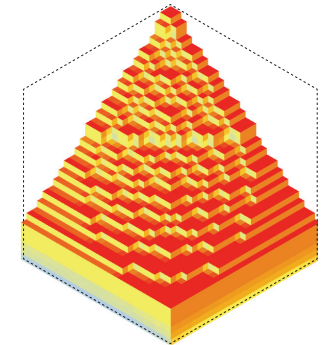
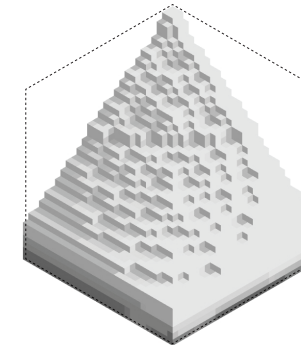
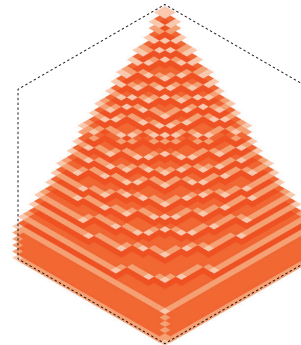
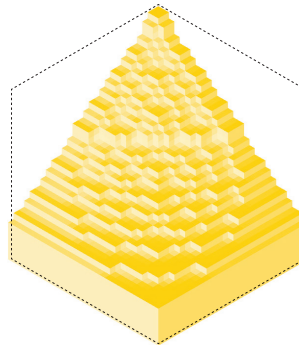
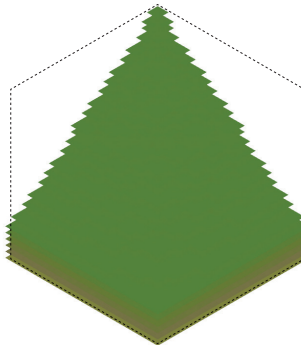
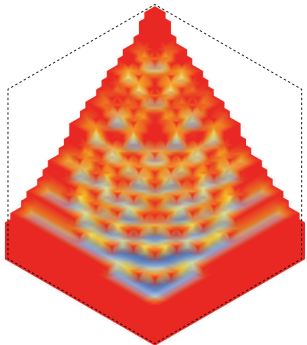
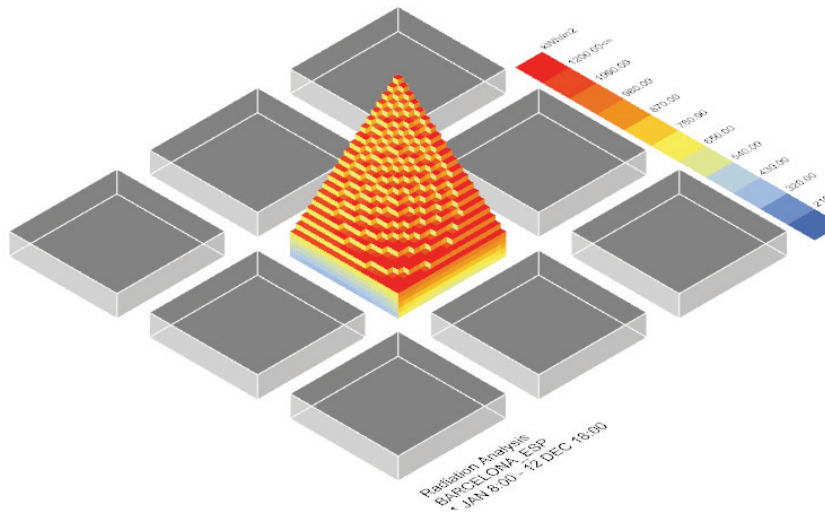
#014

Block Information:

Volume: 400,000 m³

Solar Energy Production: 5104 MWh

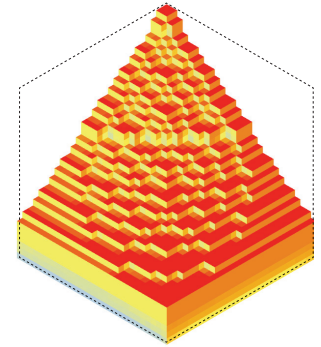
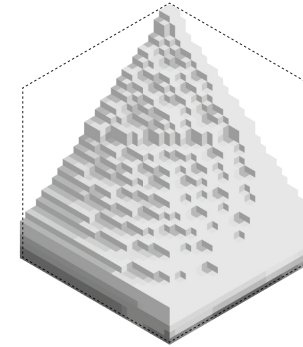
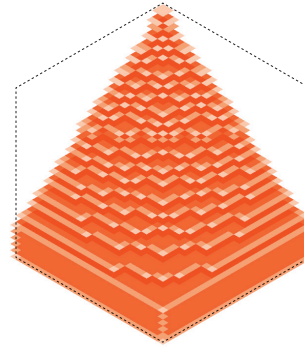
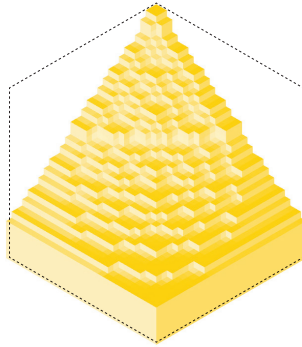
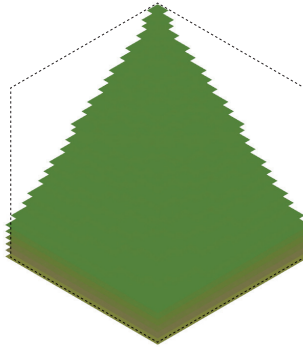
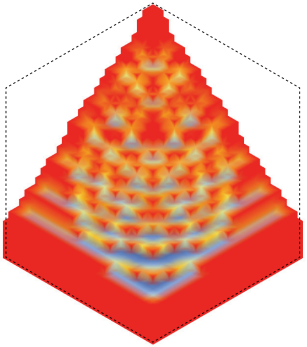
Sufficiency Rate: 300%



% Unobstructed view	Distant to terrace (m)	% Daylight	Average proximity	% Sunlight hour	Solar Energy (MWh)
91.2	13.6	71.3	5.6	85	5104

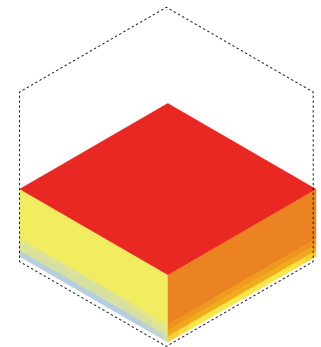
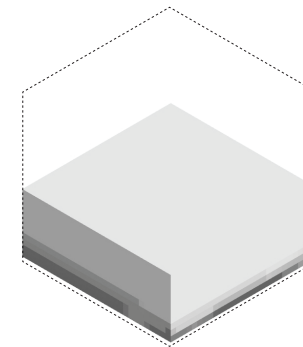
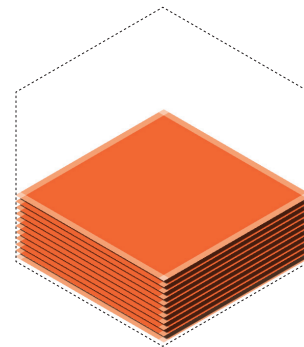
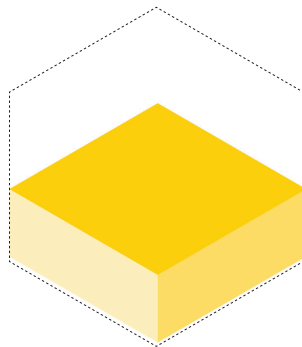
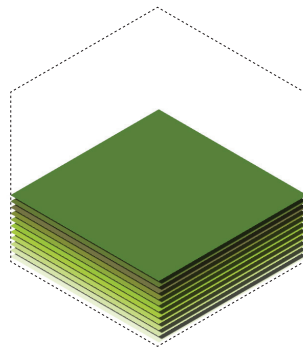
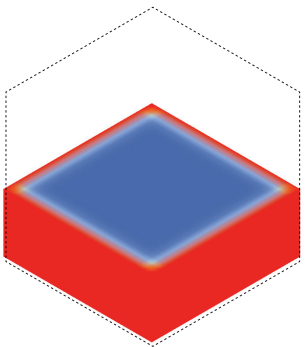
Evaluating Mass

#014



% Unobstructed view	Distant to terrace (m)	% Daylight	Average proximity	% Sunlight hour	Solar Energy (MWh)
91.2	13.6	71.3	5.6	85	5104

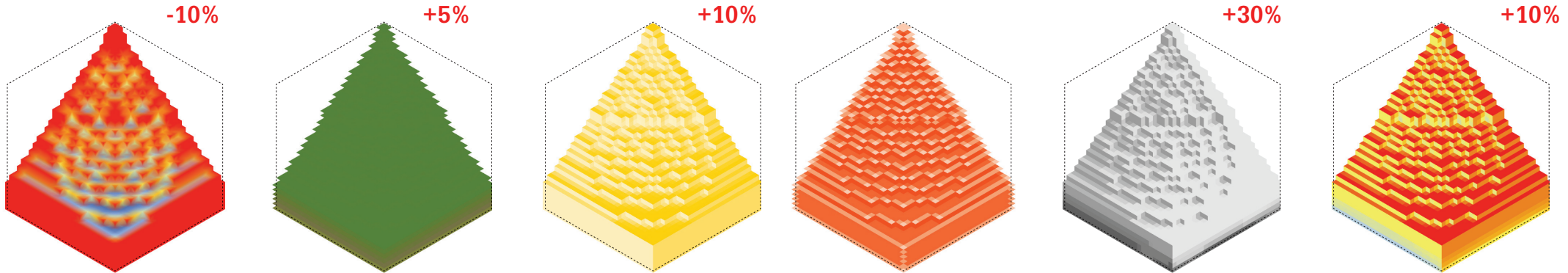
#001



% Unobstructed view	Distant to terrace (m)	% Daylight	Average proximity	% Sunlight hour	Solar Energy (MWh)
100	15.62	64.5	5.7	53	4647

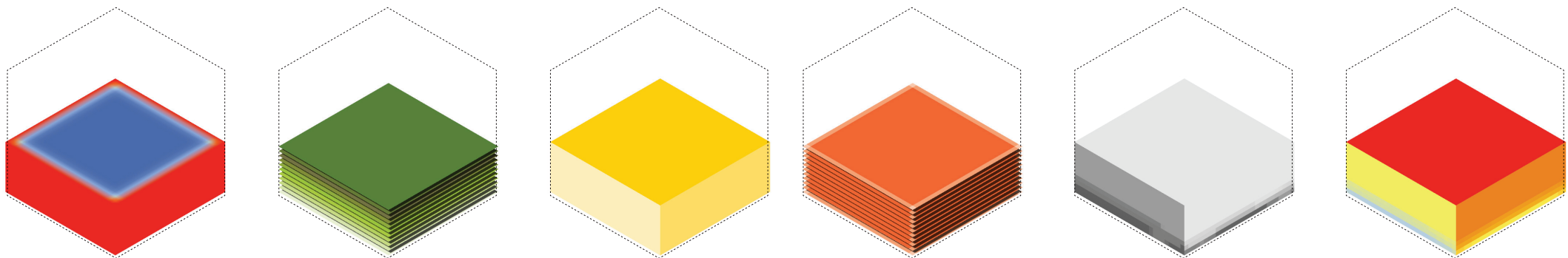
Evaluating Mass

#014



% Unobstructed view	Distant to terrace (m)	% Daylight	Average proximity	% Sunlight hour	Solar Energy (MWh)
91.2	13.6	71.3	5.6	85	5104

#001



% Unobstructed view	Distant to terrace (m)	% Daylight	Average proximity	% Sunlight hour	Solar Energy (MWh)
100	15.62	64.5	5.7	53	4647

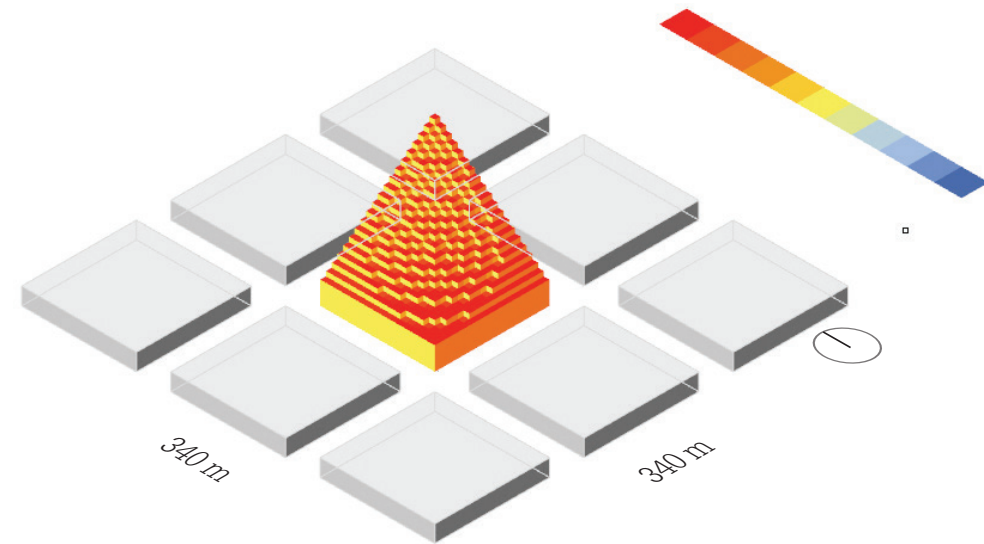
**What if... the context is
changing?**

The BlockMaker

(Y)our Block

- ⌕ > Site
- ⌕ > Users
- ⌕ > Programme
- ⌕ > Mass & void
- ⌕ > Houses
- ⌕ > Accessibility
- ⌕ > Houses
- ⌕ > Climate
- ⌕ > Facade

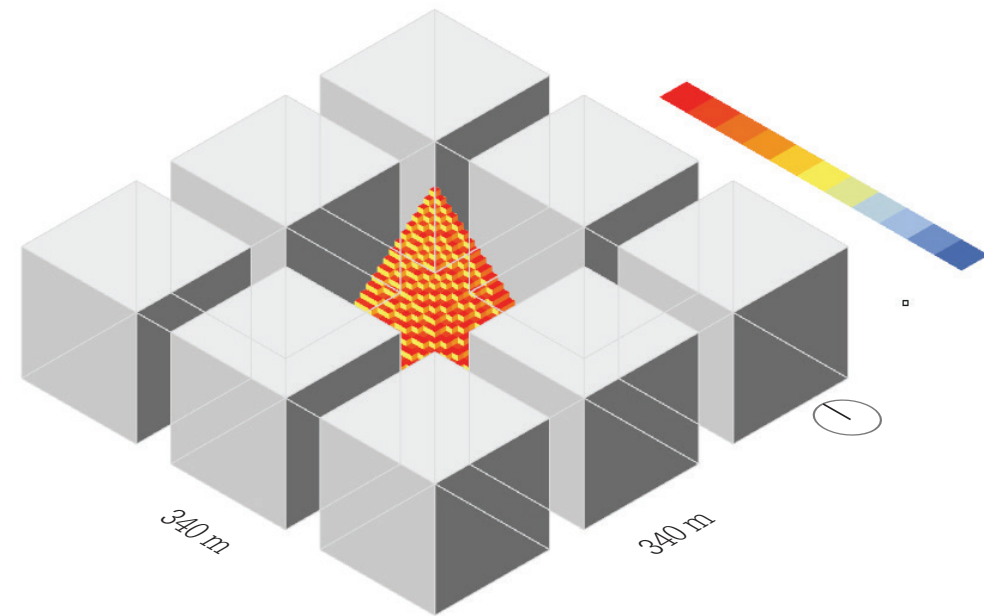
Contextmaker



The BlockMaker (Y)our Block

- ⌕ > Site
- ⌕ > Users
- ⌕ > Programme
- ⌕ > Mass & void
- ⌕ > Houses
- ⌕ > Accessibility
- ⌕ > Houses
- ⌕ > Climate
- ⌕ > Facade

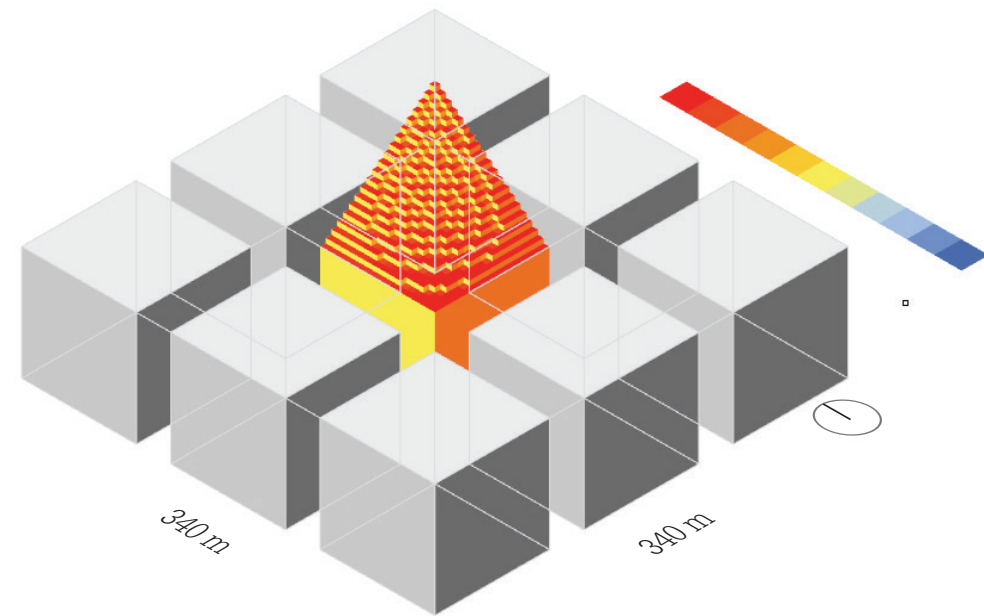
Contextmaker



The BlockMaker (Y)our Block

- ⌕ > Site
- ⌕ > Users
- ⌕ > Programme
- ⌕ > Mass & void
- ⌕ > Houses
- ⌕ > Accessibility
- ⌕ > Houses
- ⌕ > Climate
- ⌕ > Facade

Contextmaker

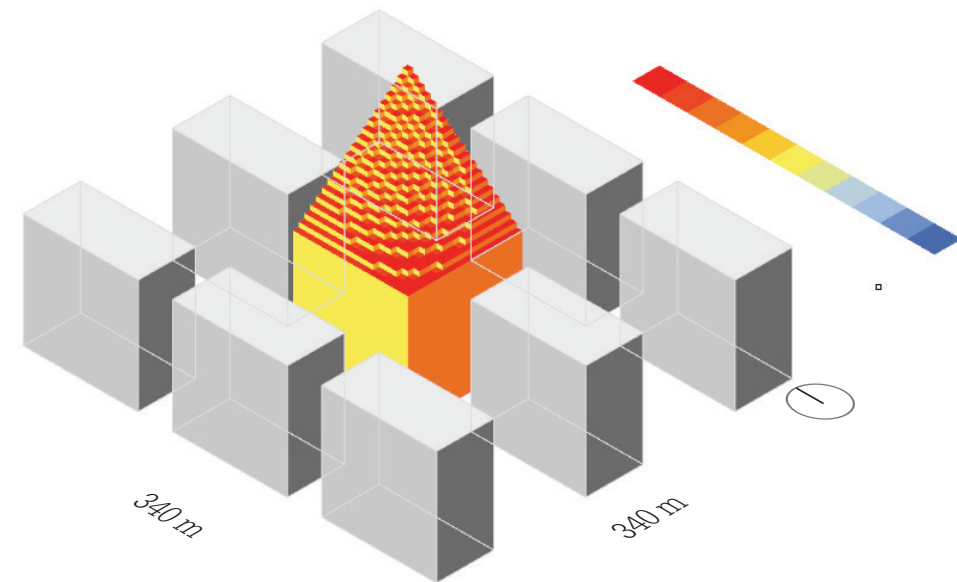


The BlockMaker

(Y)our Block

- ⌕ > Site
- ⌕ > Users
- ⌕ > Programme
- ⌕ > Mass & void
- ⌕ > Houses
- ⌕ > Accessibility
- ⌕ > Houses
- ⌕ > Climate
- ⌕ > Facade

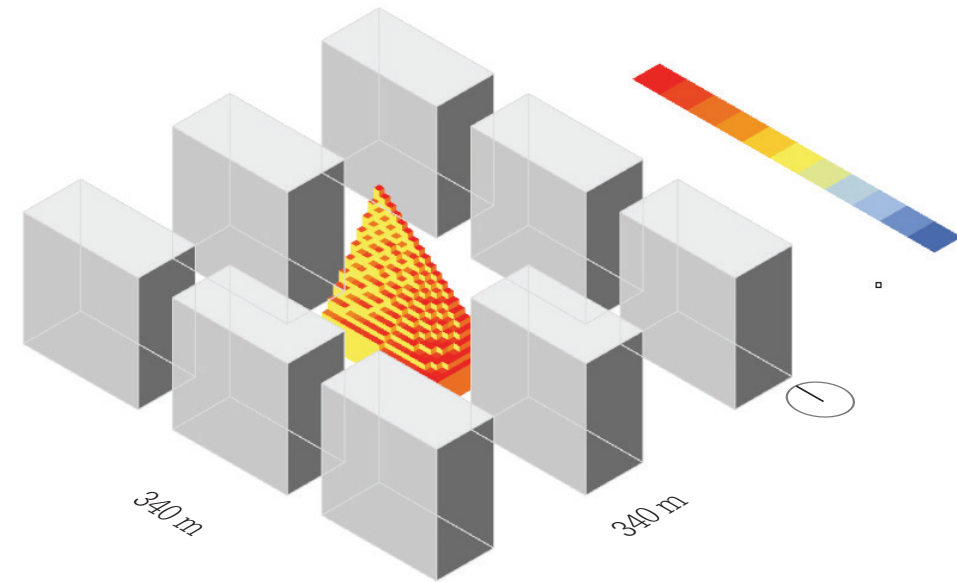
Contextmaker



The BlockMaker (Y)our Block

- ⌕ > Site
- ⌕ > Users
- ⌕ > Programme
- ⌕ > Mass & void
- ⌕ > Houses
- ⌕ > Accessibility
- ⌕ > Houses
- ⌕ > Climate
- ⌕ > Facade

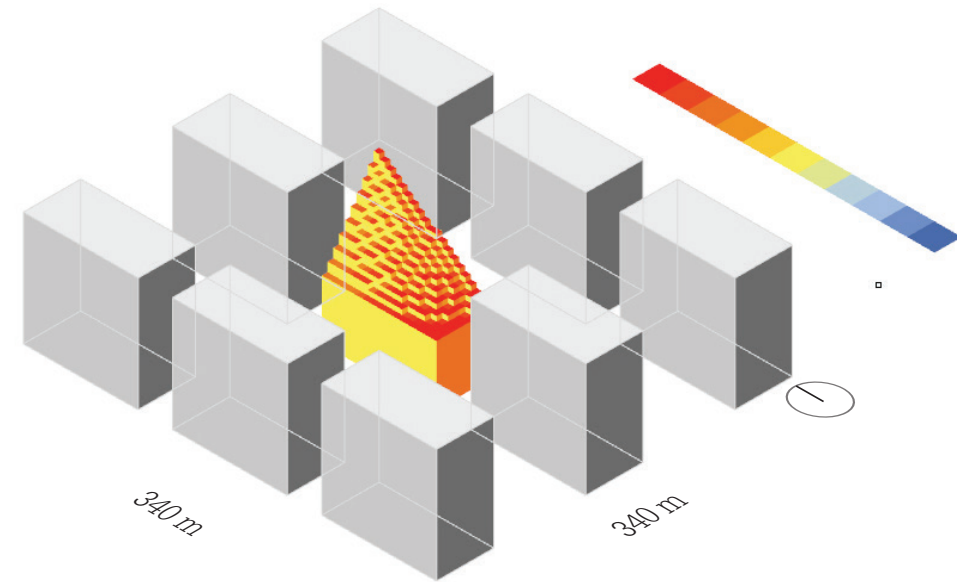
Contextmaker



The BlockMaker (Y)our Block

- ⌕ > Site
- ⌕ > Users
- ⌕ > Programme
- ⌕ > Mass & void
- ⌕ > Houses
- ⌕ > Accessibility
- ⌕ > Houses
- ⌕ > Climate
- ⌕ > Facade

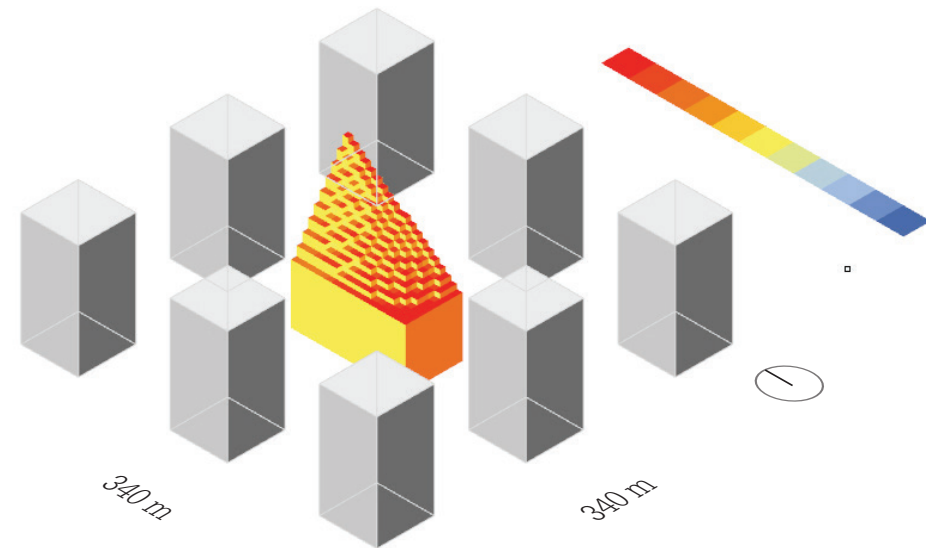
Contextmaker



The BlockMaker (Y)our Block

- ⌕ > Site
- ⌕ > Users
- ⌕ > Programme
- ⌕ > Mass & void
- ⌕ > Houses
- ⌕ > Accessibility
- ⌕ > Houses
- ⌕ > Climate
- ⌕ > Facade

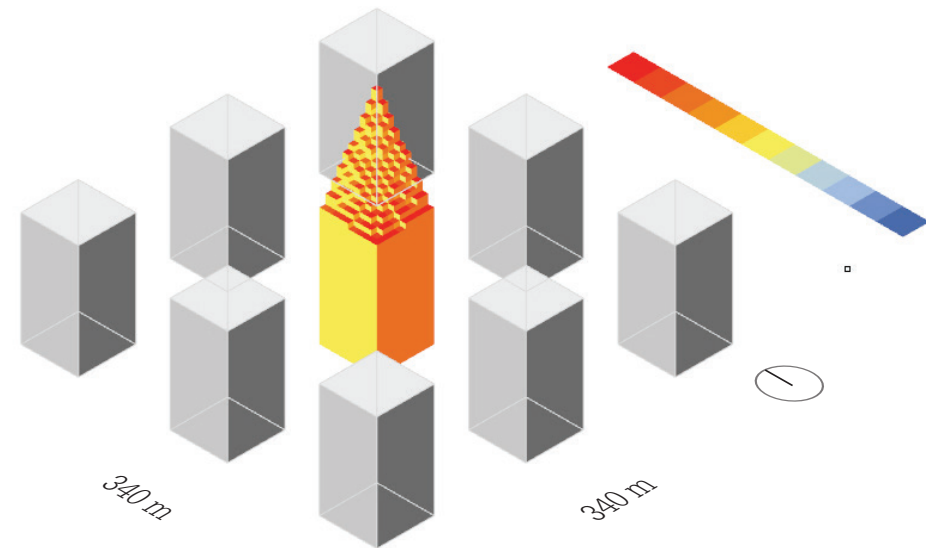
Contextmaker



The BlockMaker (Y)our Block

- ⌕ > Site
- ⌕ > Users
- ⌕ > Programme
- ⌕ > Mass & void
- ⌕ > Houses
- ⌕ > Accessibility
- ⌕ > Houses
- ⌕ > Climate
- ⌕ > Facade

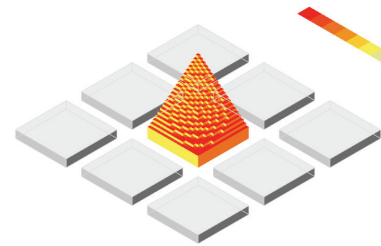
Contextmaker



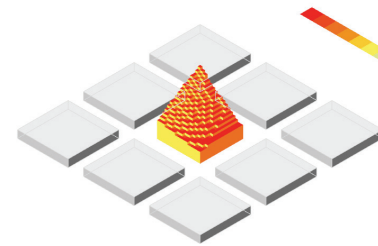
The Block will search for a form that meets the self-sufficient condition of the previous setting.

Or... it searches for an optimised orientation of the block for maximum energy production.

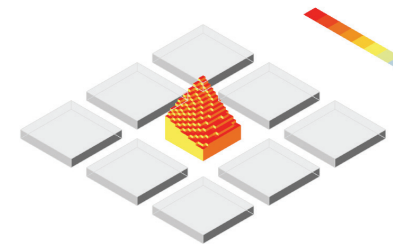
Block Orientation



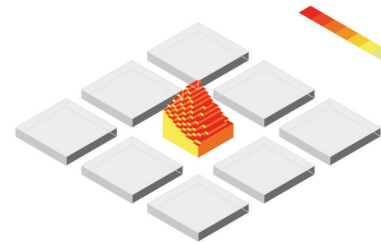
0°



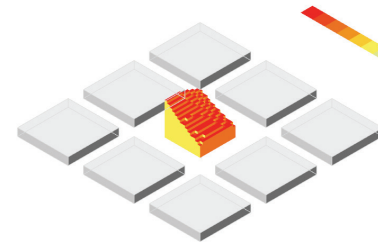
10°



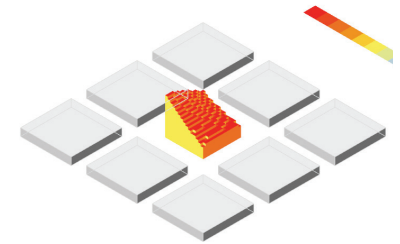
20°



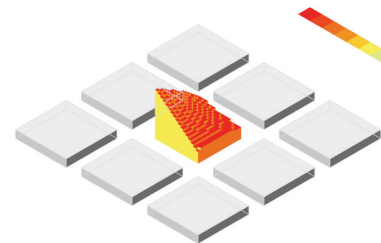
30°



60°



70°

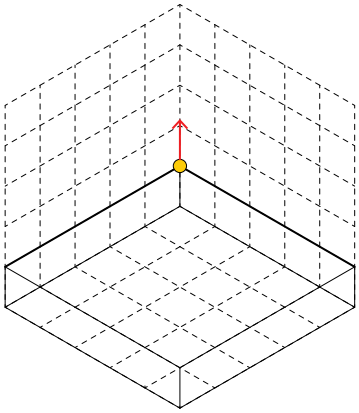


80°

3.5 Mass Transformation II

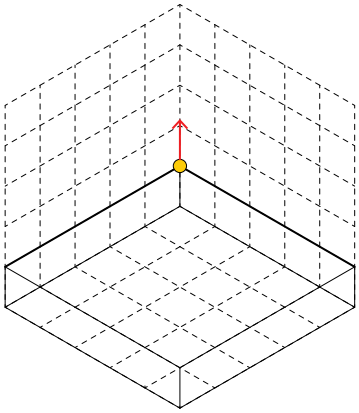
**Transformation to
improve housing quality**

Mass Transformation II

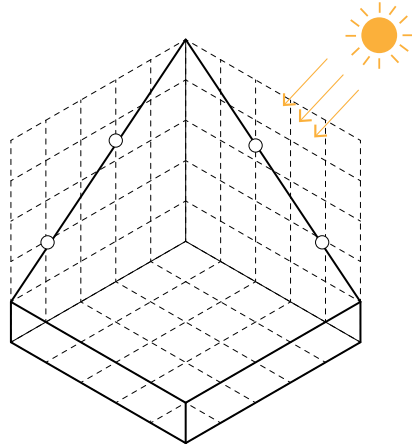


seeking for solar panel area and
higher solar radiation from South and
west direction

Mass Transformation II

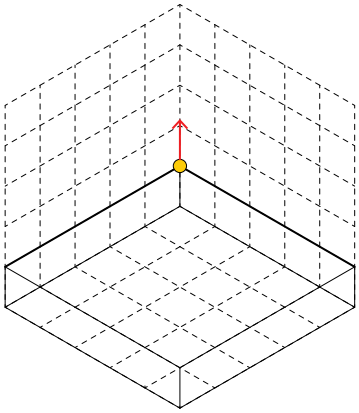


seeking for solar panel area and
higher solar radiation from South and
west direction

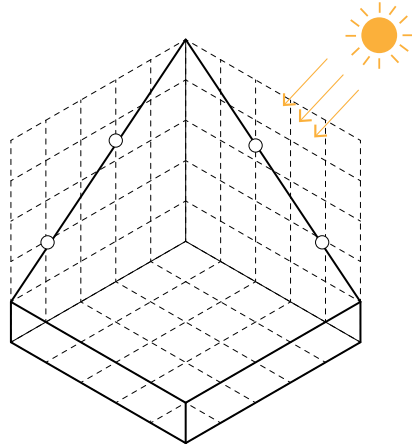


Efficiency Energy production but
what about housing quality?

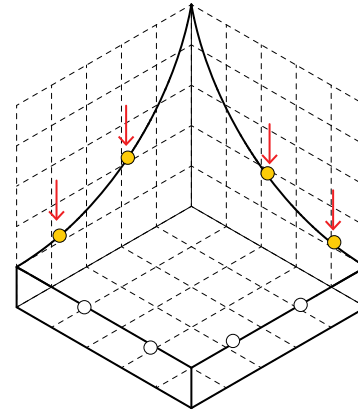
Mass Transformation II



seeking for solar panel area and
higher solar radiation form South and
west direction



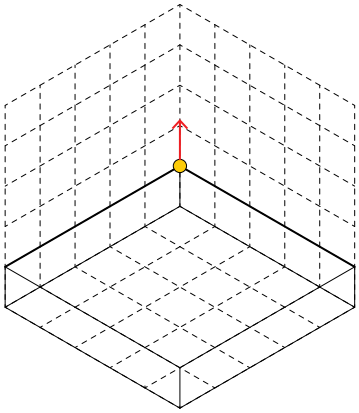
efficiency Energy production but
what about housing quality?



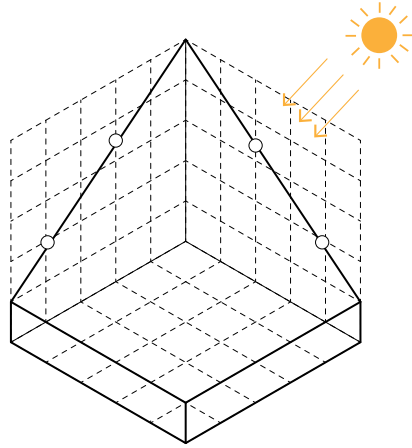
adjusting the control points of the
curve to improve view quality.

Mass Transformation II

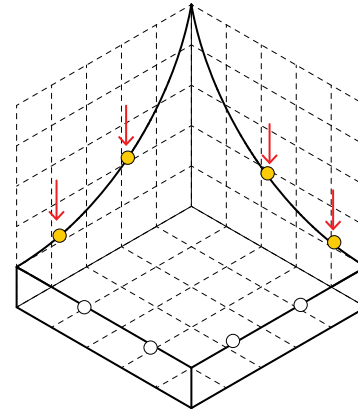
Forming Methodology



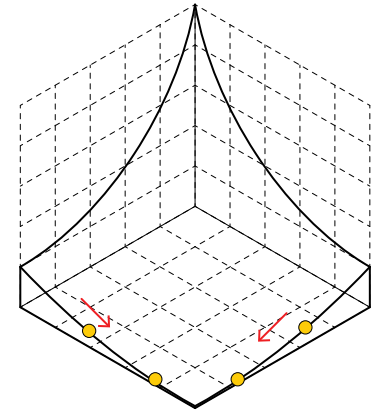
seeking for solar panel area and
higher solar radiation form South and
west direction



efficiency Energy production but
what about housing quality?



adjusting the control points of the
curve to improve view quality.



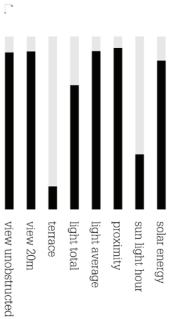
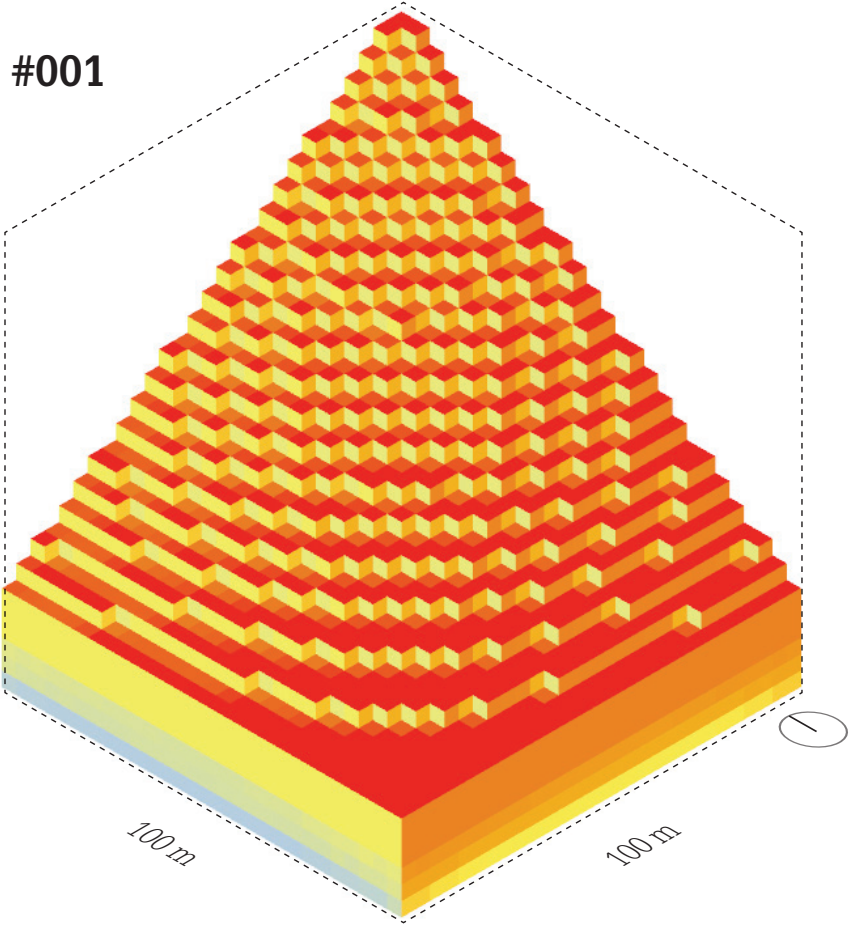
lower the edge to allow sunlight to
get into the inner part more as well
as relate the block to its surrounding.

The BlockMaker
(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
- 🔒 ▼ Programme
 - 100 x 100 x 40 m
 - Housing 100%
 - Sufficiency 265%
 - Volume 400,000 m3
- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Mass Transformation II

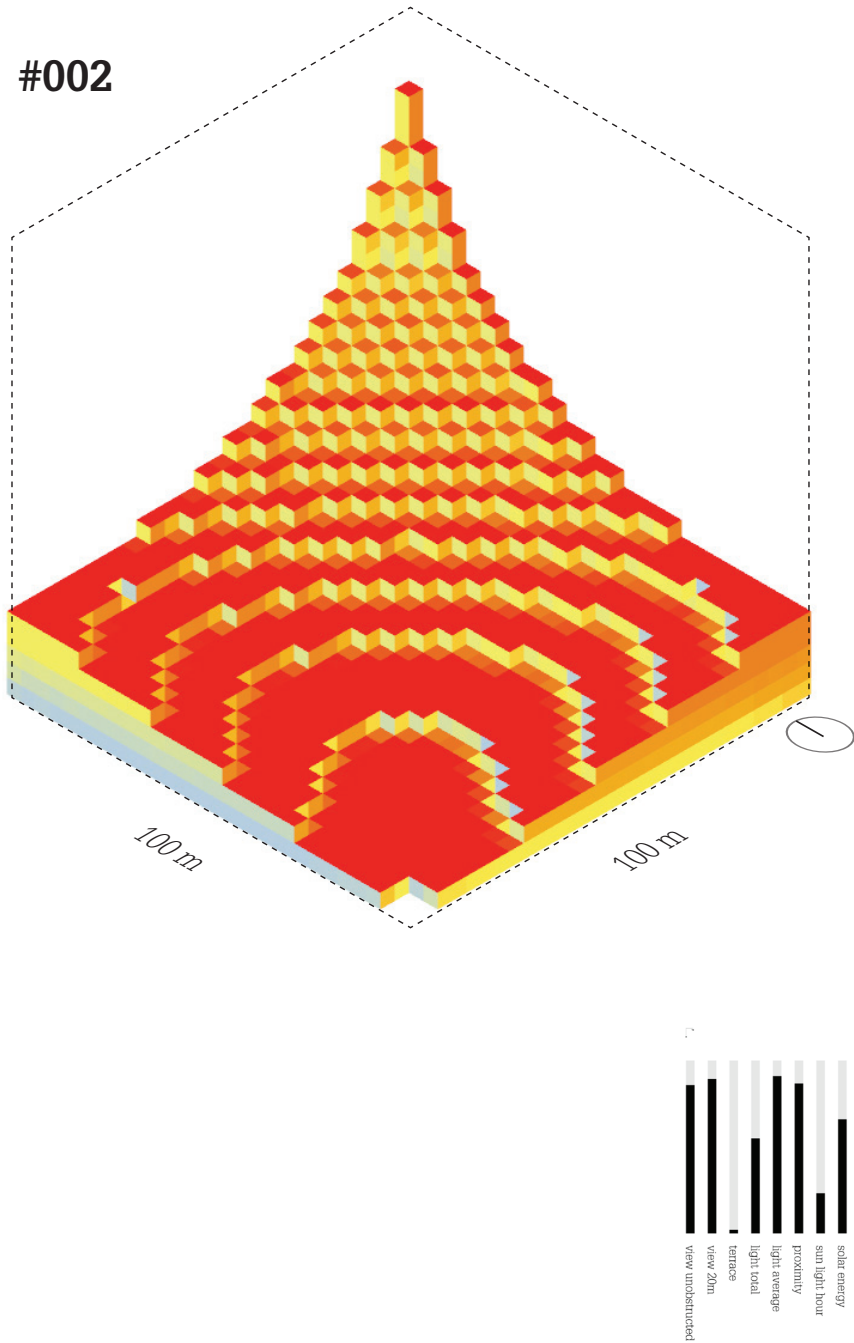
#001



The BlockMaker
(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
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- 🔓 > Facade

Mass Transformation II



The BlockMaker

(Y)our Block

🔒 ▼ Site
100 x 100 m
(41.3851°N, 2.1734°E)
FAR 4.7

🔒 ▼ Users
483 people
3,944 kWh/capita

🔒 ▼ Programme
100 x 100 x 40 m
Housing 100%
Sufficiency 265%
Volume 400,000 m3

🔗 > Mass & void

🔗 > Houses

🔗 > Accessibility

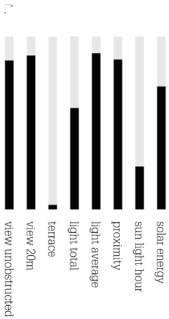
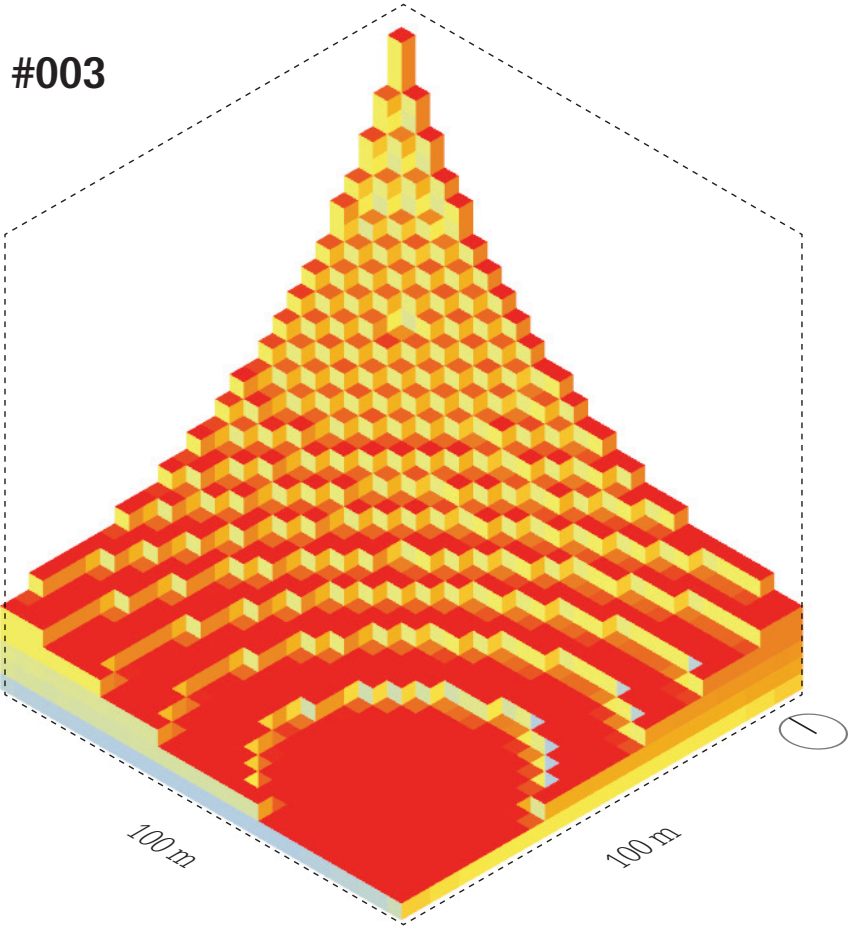
🔗 > Structure

🔗 > Climate

🔗 > Facade

Mass Transformation II

#003



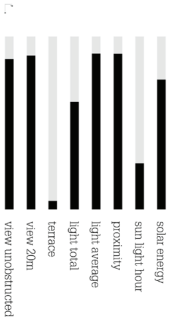
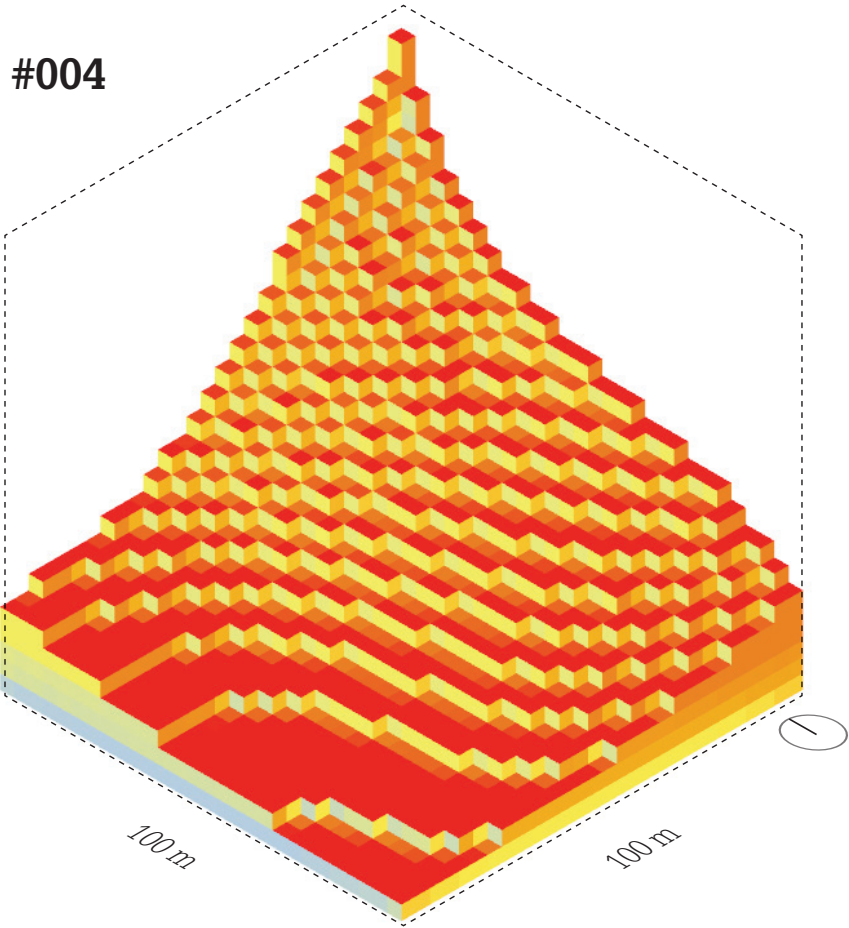
The BlockMaker

(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
- 🔒 ▼ Programme
 - 100 x 100 x 40 m
 - Housing 100%
 - Sufficiency 265%
 - Volume 400,000 m3
- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Mass Transformation II

#004



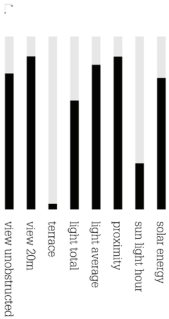
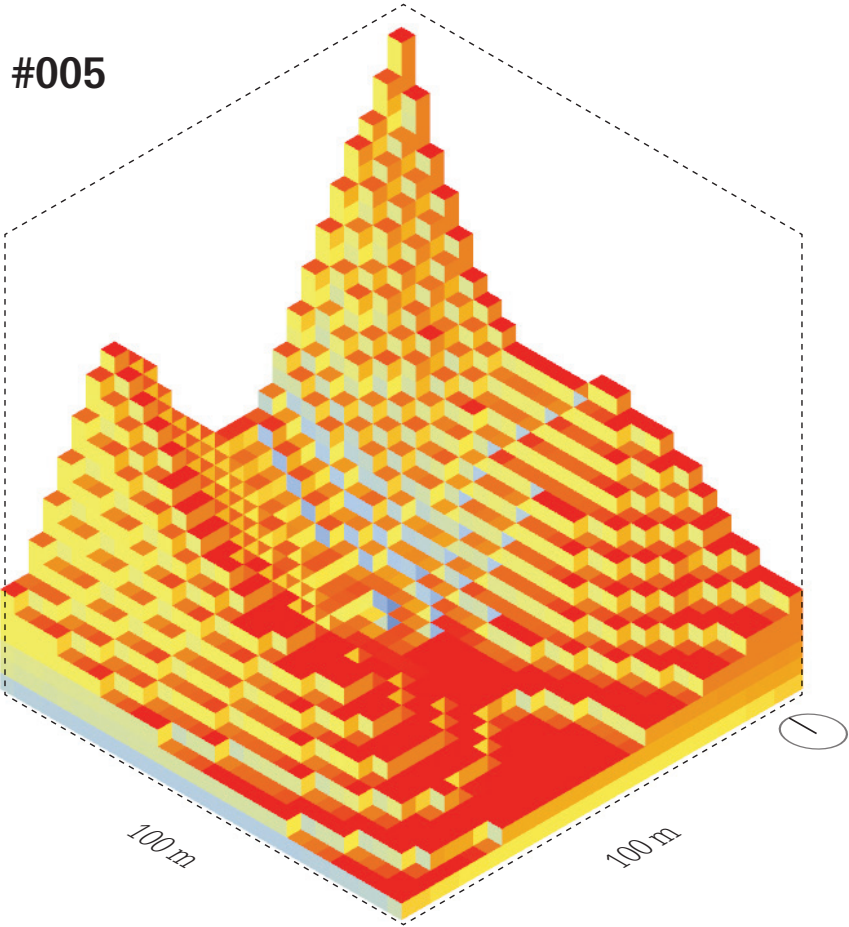
The BlockMaker

(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
- 🔒 ▼ Programme
 - 100 x 100 x 40 m
 - Housing 100%
 - Sufficiency 265%
 - Volume 400,000 m3
- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Mass Transformation II

#005



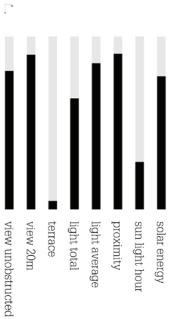
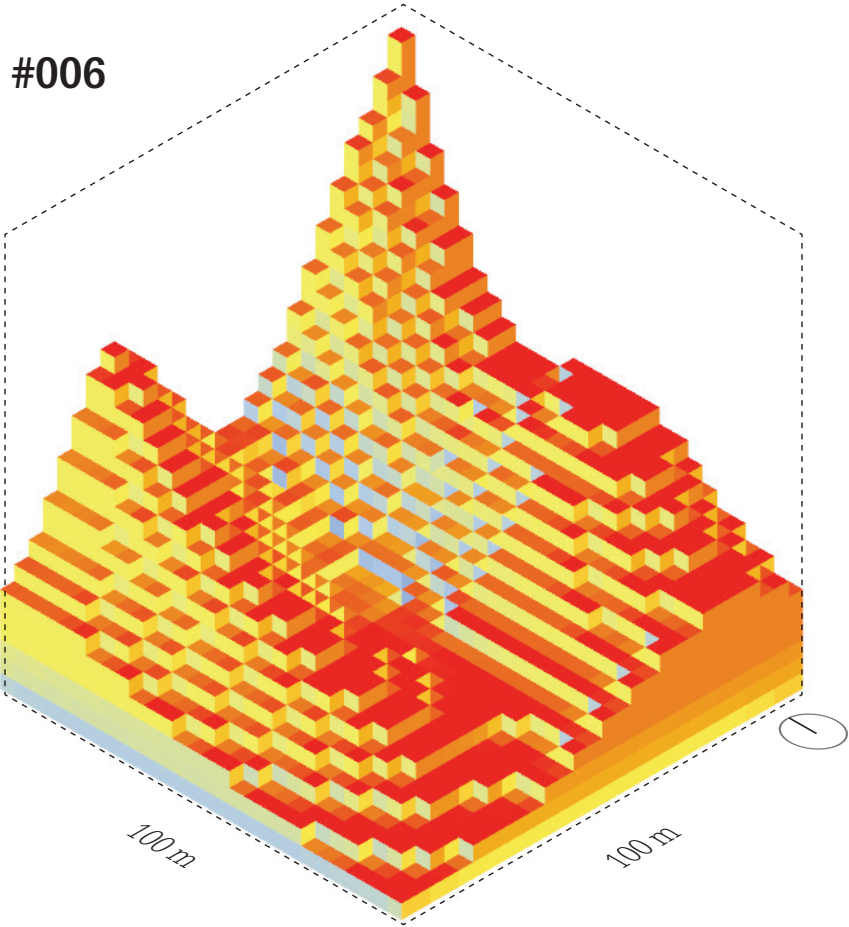
The BlockMaker

(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
- 🔒 ▼ Programme
 - 100 x 100 x 40 m
 - Housing 100%
 - Sufficiency 265%
 - Volume 400,000 m3
- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Mass Transformation II

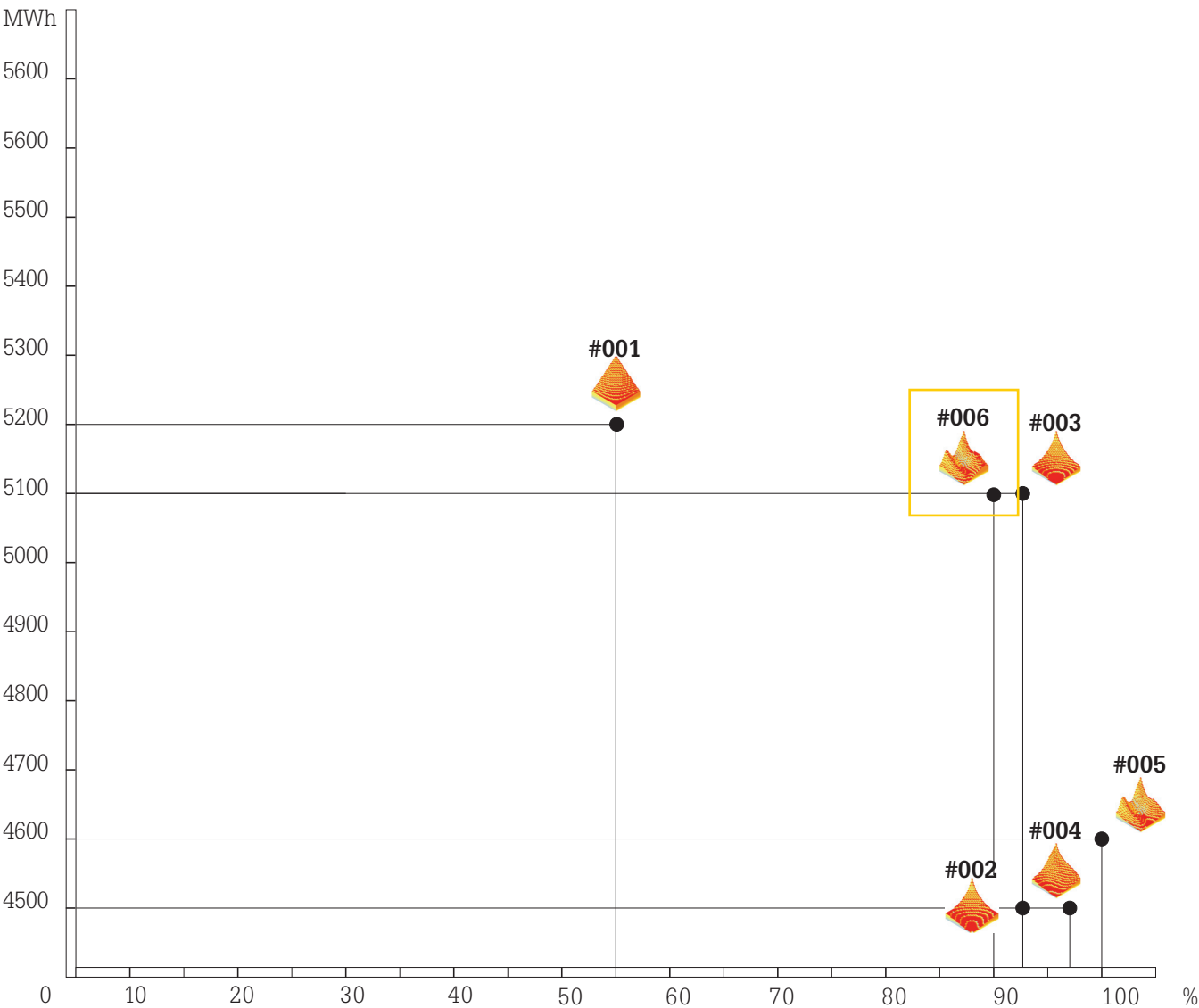
#006



Mass Transformation II

Research on housing typologies and its performance.

ENERGY PRODUCTION



Housing Quality
% of unobstructed Views

3.6 Adding Void

Block Porosity for housing quality

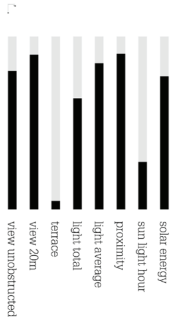
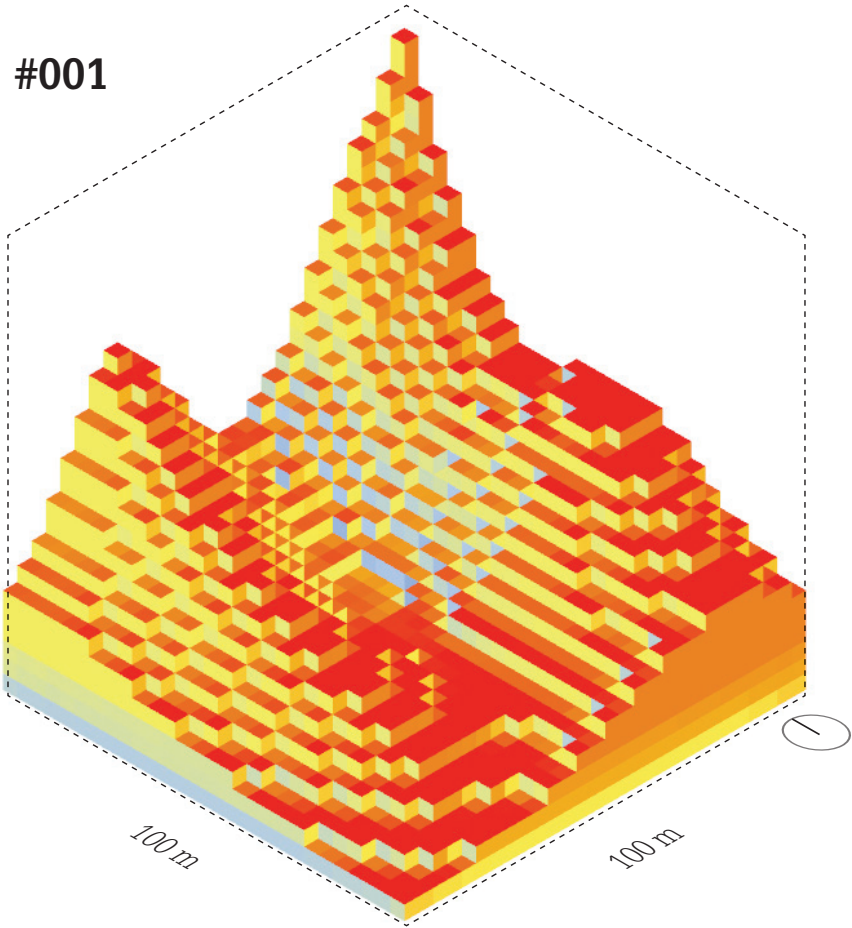
The BlockMaker
(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
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 - 3,944 kWh/capita
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- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Voids
Boolean Action



#001



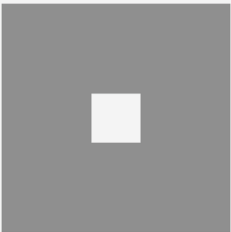
The BlockMaker

(Y)our Block

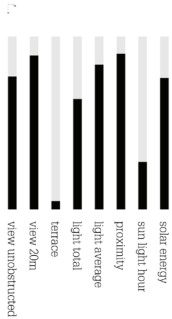
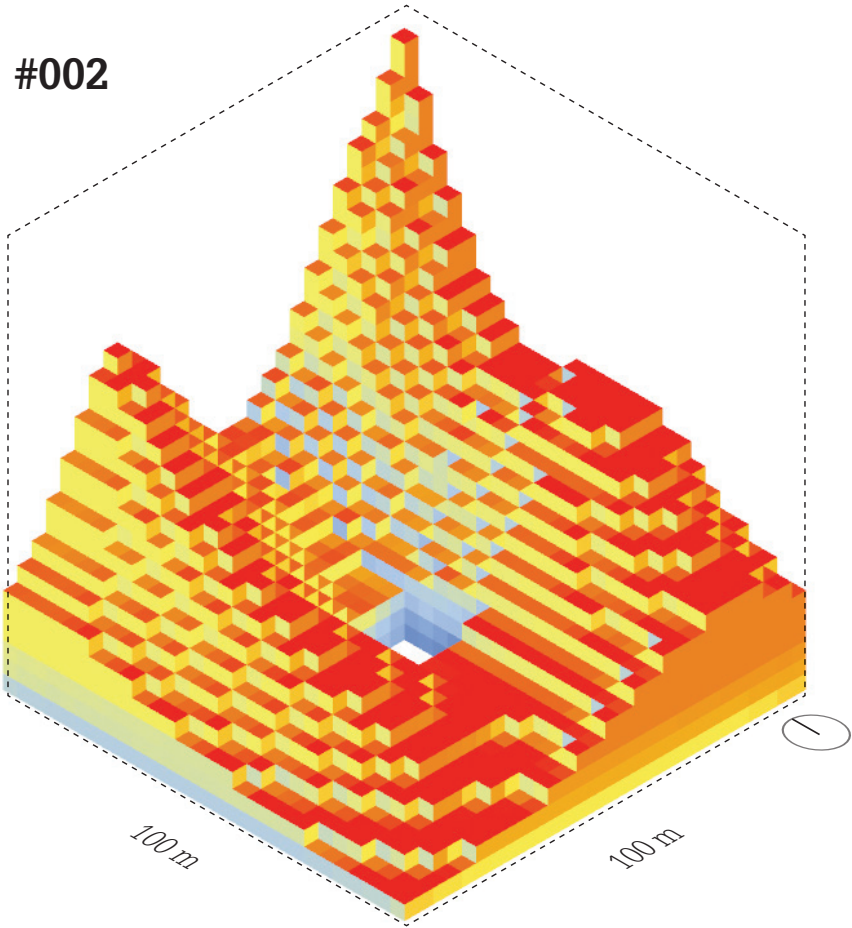
- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
- 🔒 ▼ Programme
 - 100 x 100 x 40 m
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 - Volume 400,000 m3
- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Voids

Boolean Action



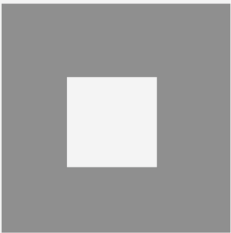
#002



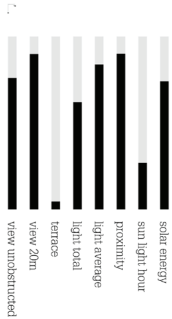
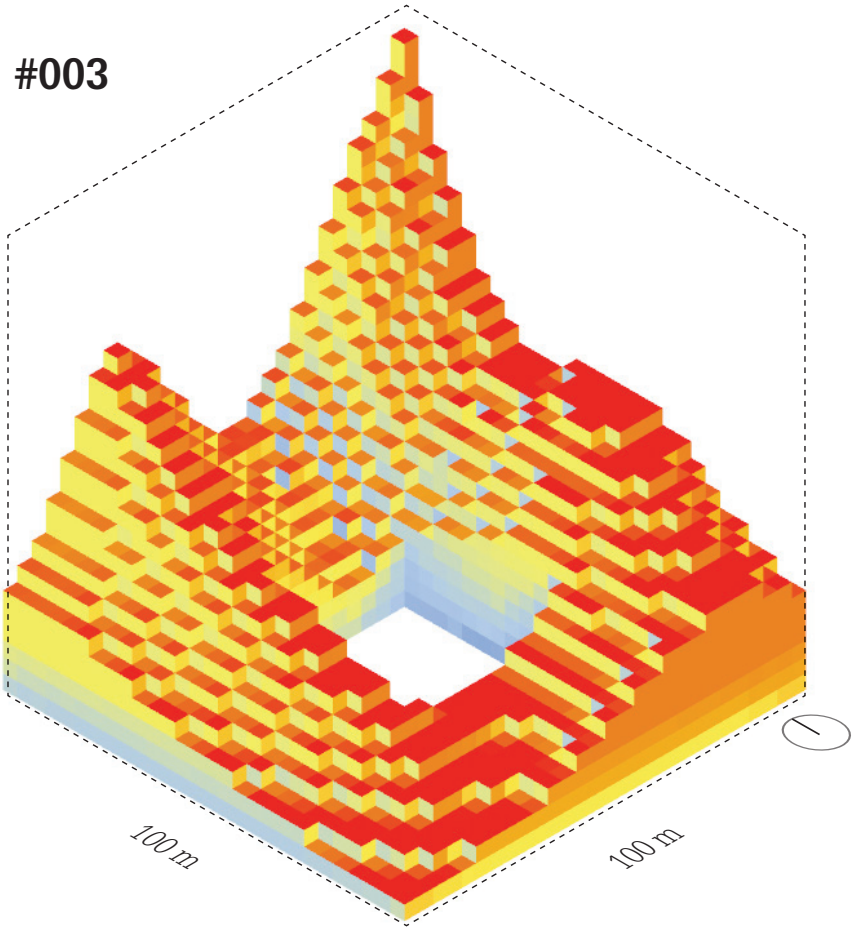
The BlockMaker
(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
- 🔒 ▼ Programme
 - 100 x 100 x 40 m
 - Housing 100%
 - Sufficiency 265%
 - Volume 400,000 m3
- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Voids
Boolean Action



#003



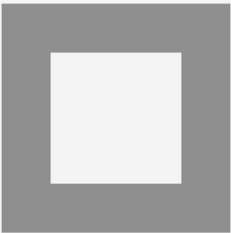
The BlockMaker

(Y)our Block

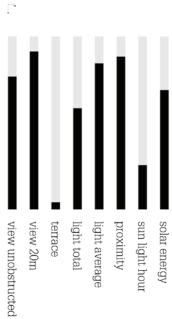
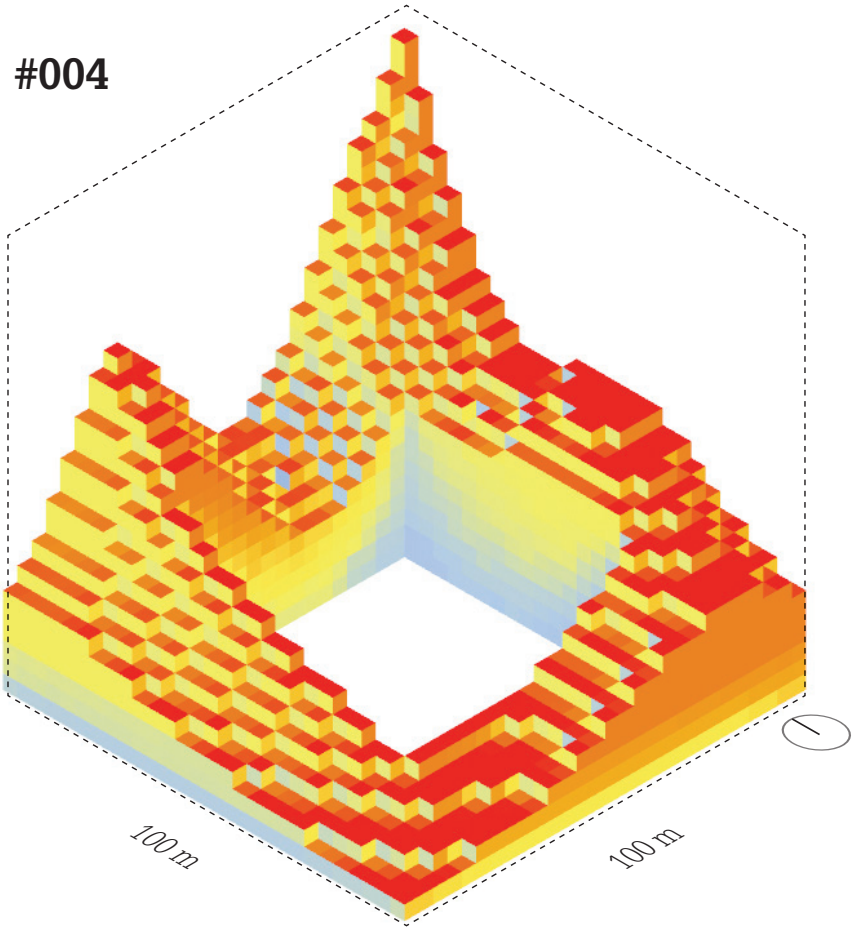
- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
- 🔒 ▼ Programme
 - 100 x 100 x 40 m
 - Housing 100%
 - Sufficiency 265%
 - Volume 400,000 m3
- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Voids

Boolean Action



#004



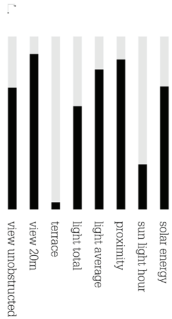
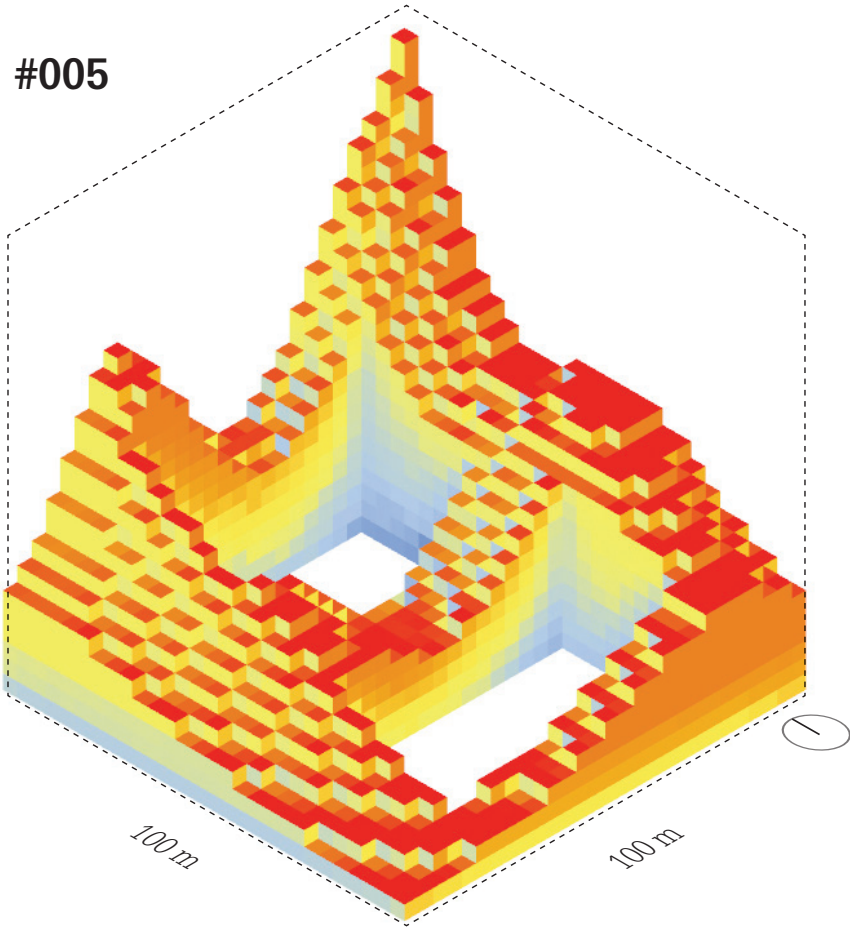
The BlockMaker
(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
- 🔒 ▼ Programme
 - 100 x 100 x 40 m
 - Housing 100%
 - Sufficiency 265%
 - Volume 400,000 m3
- 🔗 > Mass & void
- 🔗 > Houses
- 🔗 > Accessibility
- 🔗 > Structure
- 🔗 > Climate
- 🔗 > Facade

Voids
Boolean Action



#005



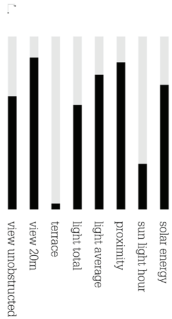
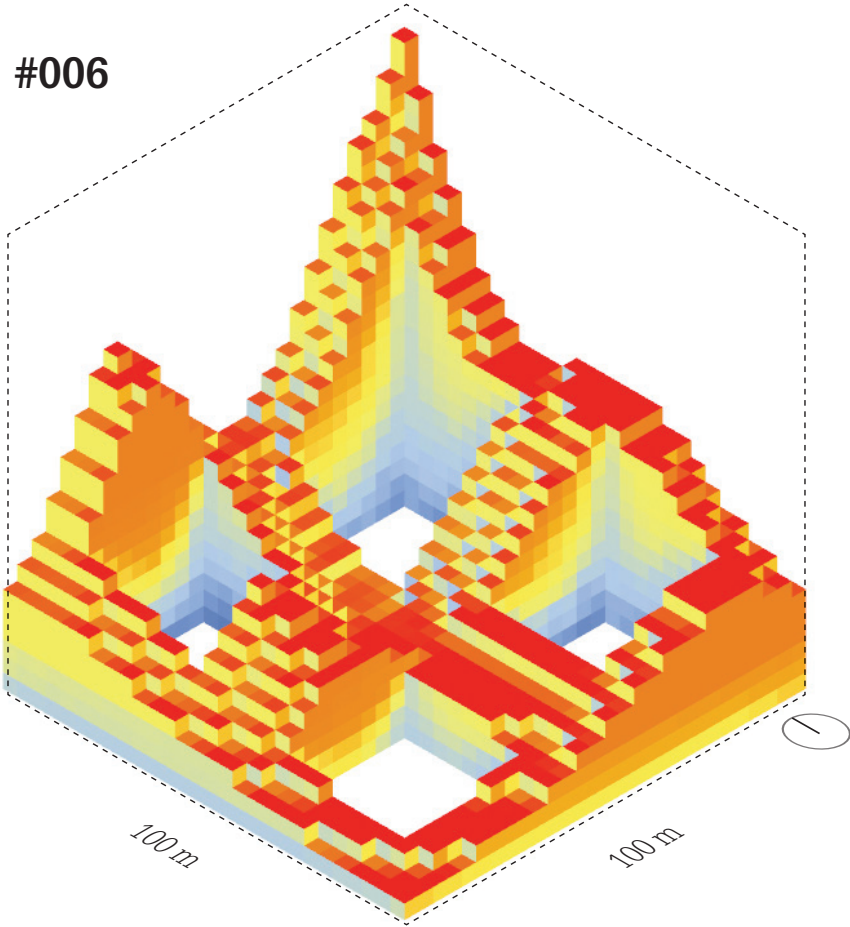
The BlockMaker
(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
- 🔒 ▼ Programme
 - 100 x 100 x 40 m
 - Housing 100%
 - Sufficiency 265%
 - Volume 400,000 m3
- 🔗 > Mass & void
- 🔗 > Houses
- 🔗 > Accessibility
- 🔗 > Structure
- 🔗 > Climate
- 🔗 > Facade

Voids
Boolean Action



#006



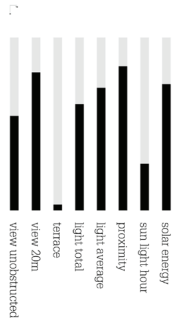
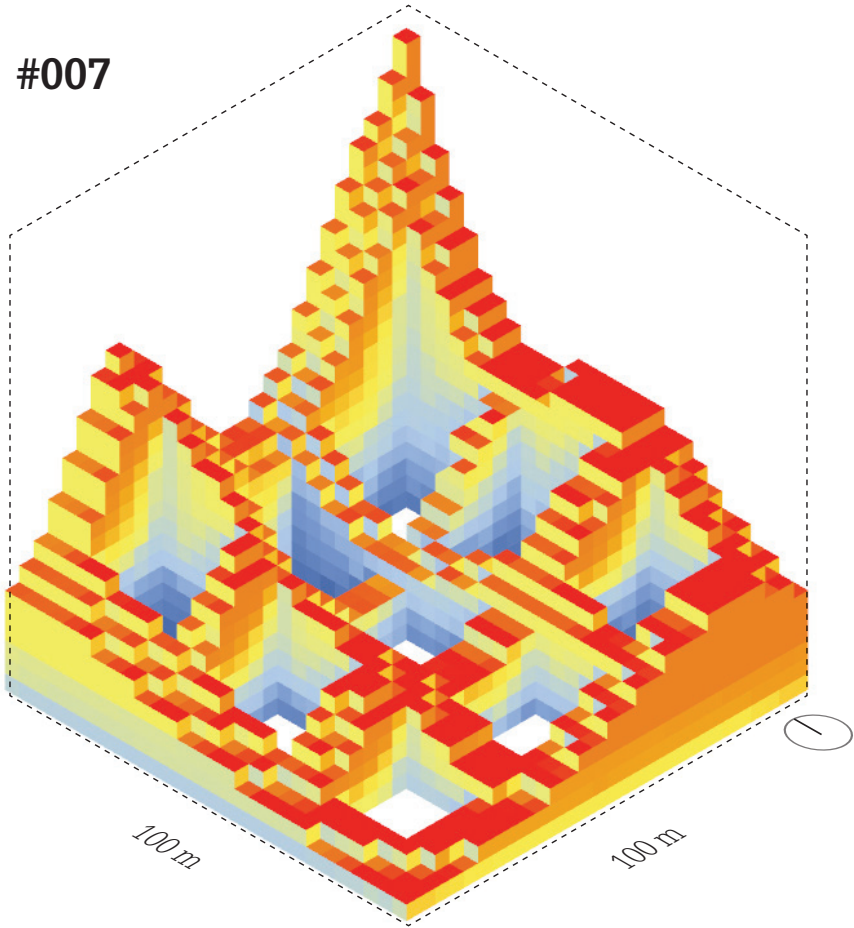
The BlockMaker
(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
- 🔒 ▼ Programme
 - 100 x 100 x 40 m
 - Housing 100%
 - Sufficiency 265%
 - Volume 400,000 m3
- 🔗 > Mass & void
- 🔗 > Houses
- 🔗 > Accessibility
- 🔗 > Structure
- 🔗 > Climate
- 🔗 > Facade

Voids
Boolean Action



#007



The BlockMaker

(Y)our Block

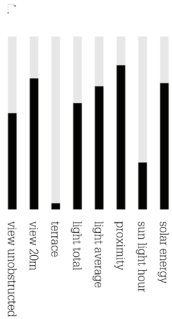
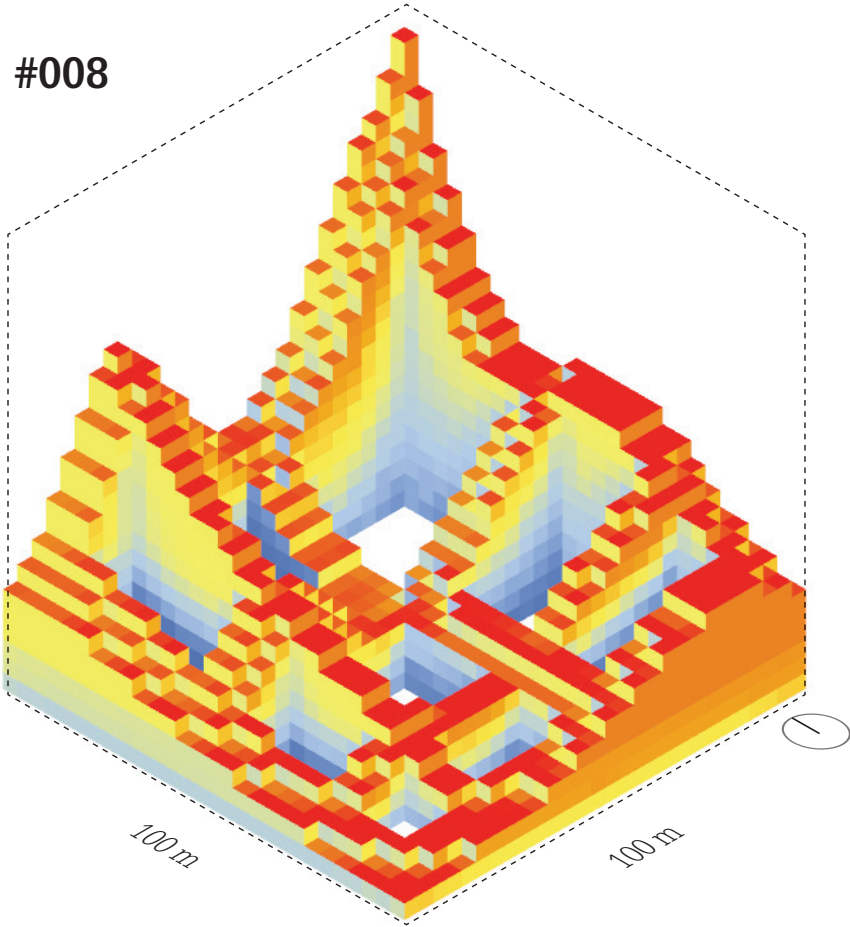
- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
- 🔒 ▼ Programme
 - 100 x 100 x 40 m
 - Housing 100%
 - Sufficiency 265%
 - Volume 400,000 m3
- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Voids

Boolean Action



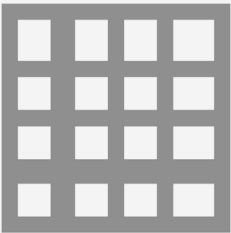
#008



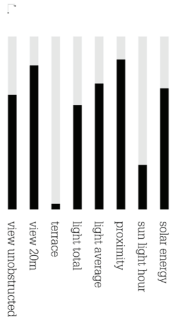
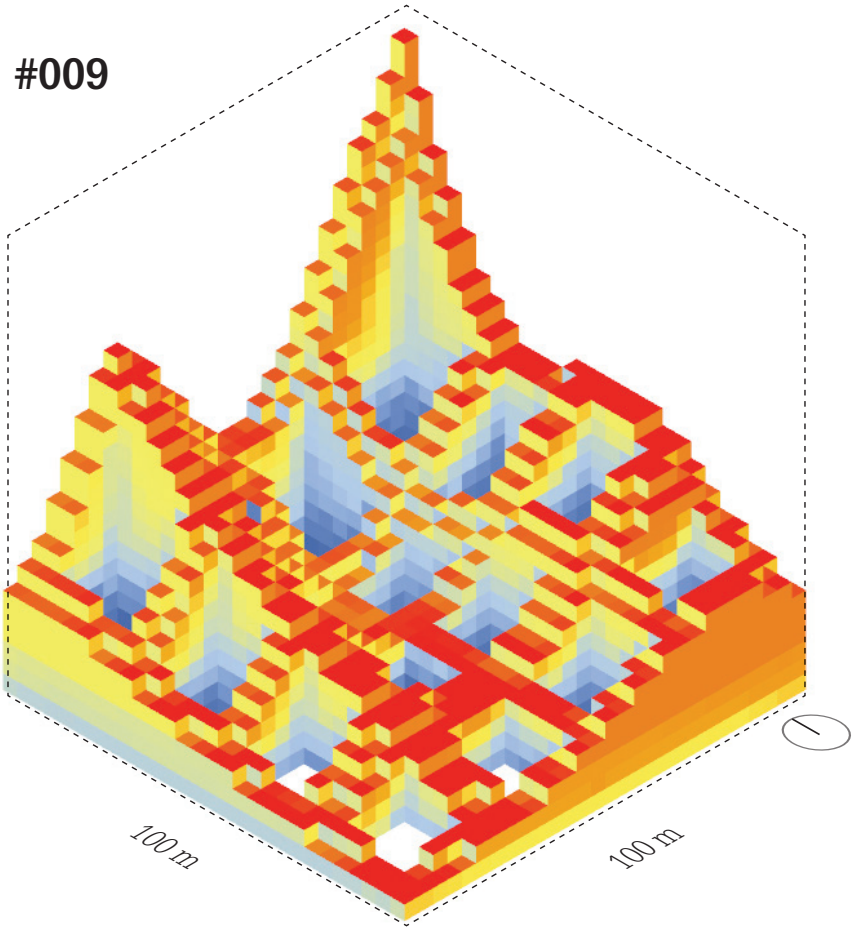
The BlockMaker
(Y)our Block

- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
- 🔒 ▼ Programme
 - 100 x 100 x 40 m
 - Housing 100%
 - Sufficiency 265%
 - Volume 400,000 m3
- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Voids
Boolean Action



#009



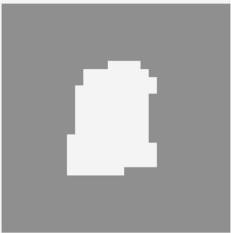
The BlockMaker

(Y)our Block

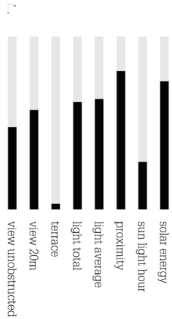
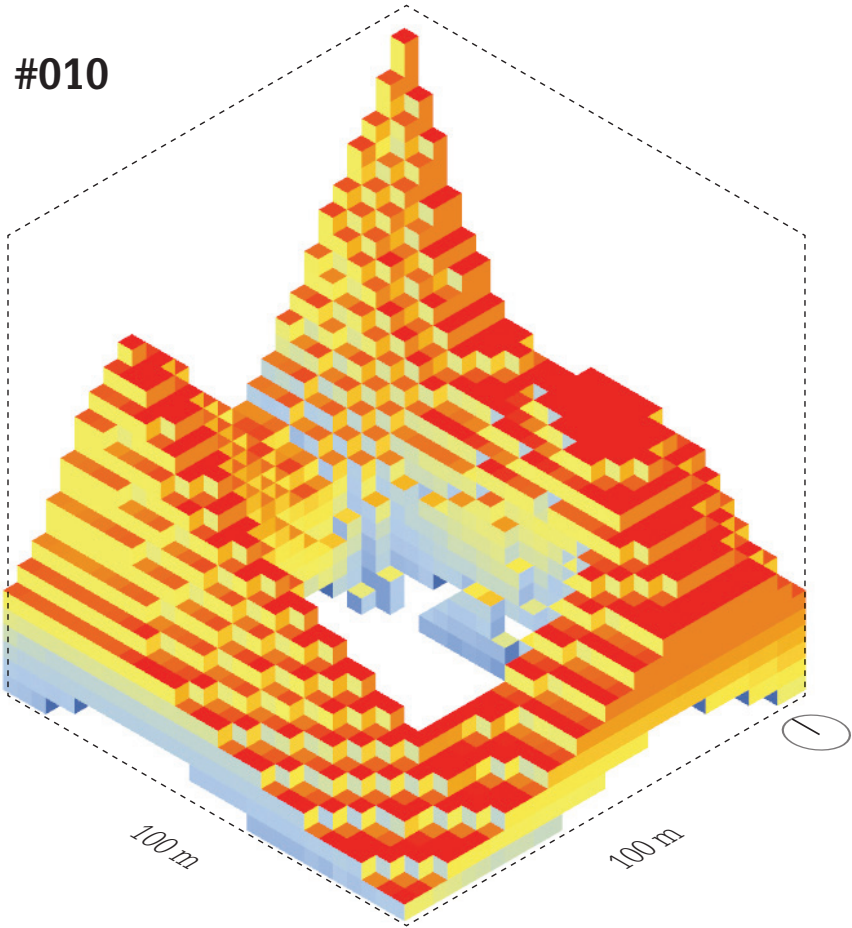
- 🔒 ▼ Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 ▼ Users
 - 483 people
 - 3,944 kWh/capita
- 🔒 ▼ Programme
 - 100 x 100 x 40 m
 - Housing 100%
 - Sufficiency 265%
 - Volume 400,000 m3
- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Voids

Pushing gradient options



#010



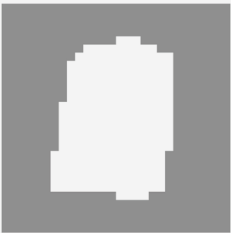
The BlockMaker

(Y)our Block

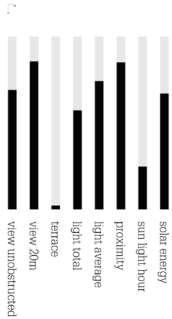
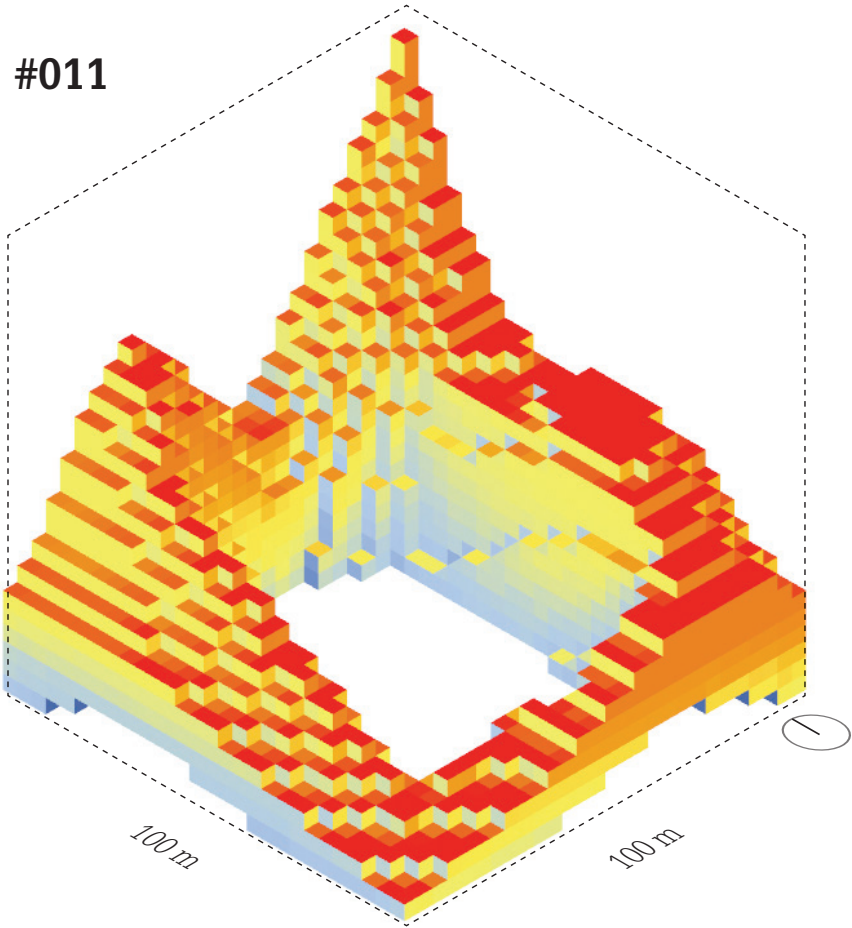
- 🔒 Site
 - 100 x 100 m
 - (41.3851°N, 2.1734°E)
 - FAR 4.7
- 🔒 Users
 - 483 people
 - 3,944 kWh/capita
- 🔒 Programme
 - 100 x 100 x 40 m
 - Housing 100%
 - Sufficiency 265%
 - Volume 400,000 m3
- 🔓 > Mass & void
- 🔓 > Houses
- 🔓 > Accessibility
- 🔓 > Structure
- 🔓 > Climate
- 🔓 > Facade

Voids

Pushing gradient options

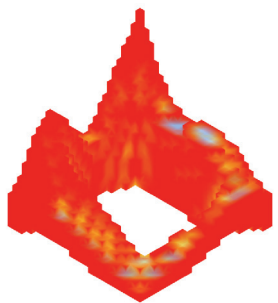
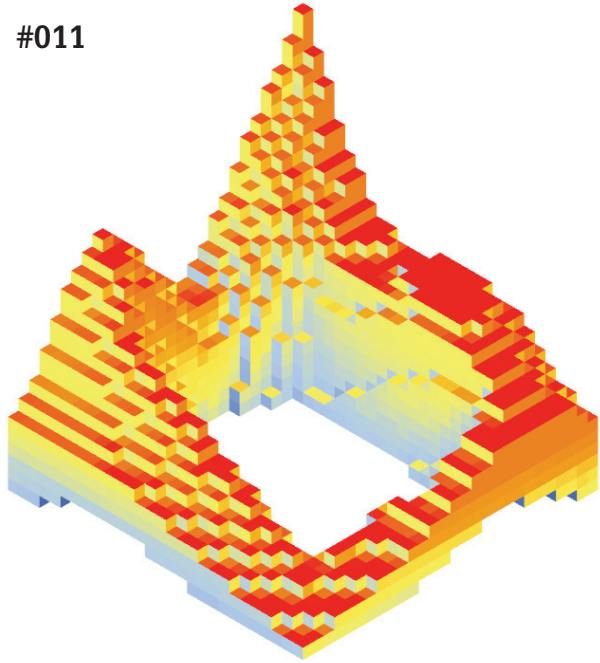


#011



Developping Mass

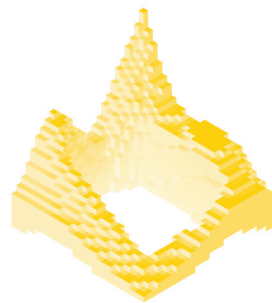
#011



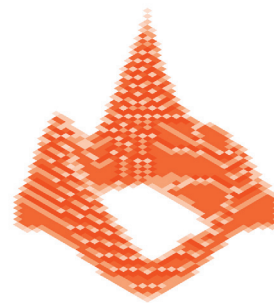
% Unobstructed view
77.5



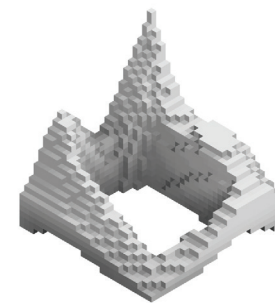
Distant to terrace (m)
1.14



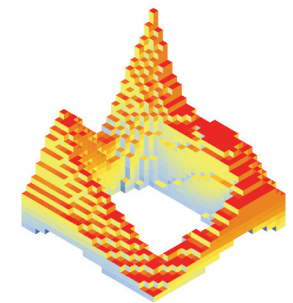
% Daylight
57



Average proximity
5.1



% Sunlight hour
25



Solar Energy (MWh)
4223

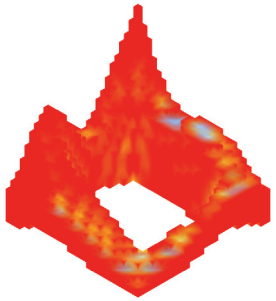
Mass I & Mass II Evaluation

#MASS II

-15%

+50%

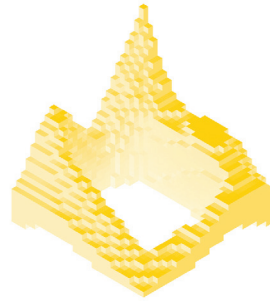
+20%



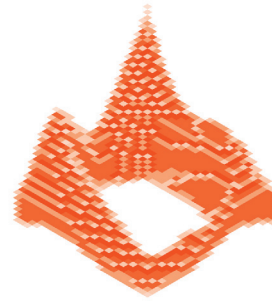
% Unobstructed view
77.5



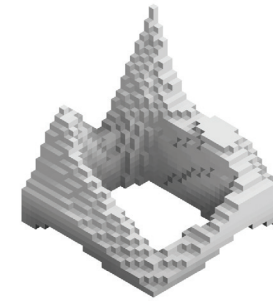
Distant to terrace (m)
1.14



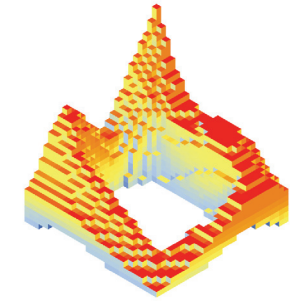
% Daylight
57



Average proximity
5.1

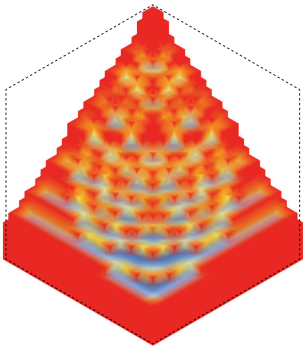


% Sunlight hour
55

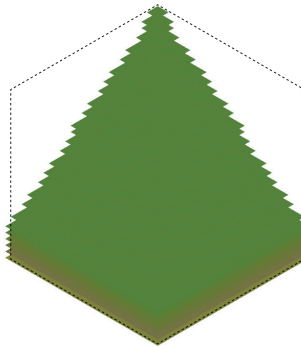


Solar Energy (MWh)
4223

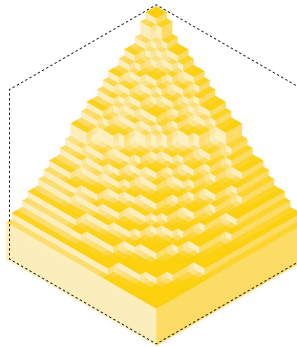
#MASS I



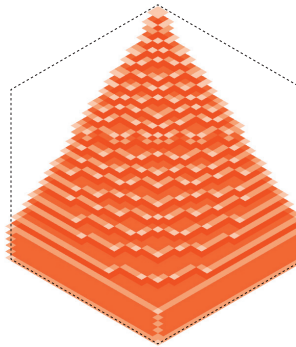
% Unobstructed view
91.2



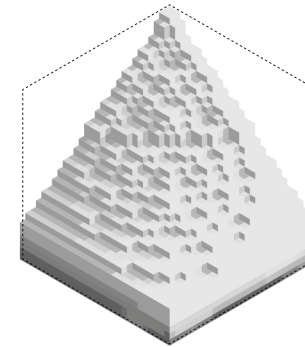
Distant to terrace (m)
13.6



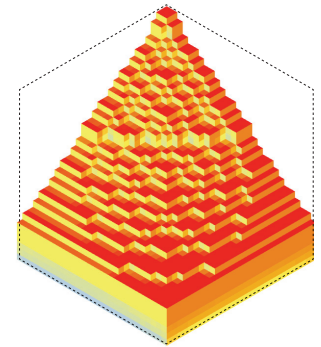
% Daylight
71.3



Average proximity
5.6

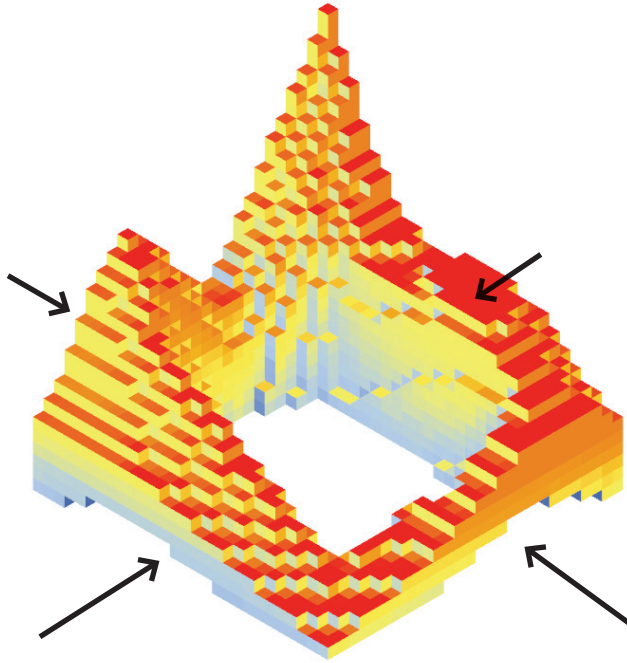


% Sunlight hour
85



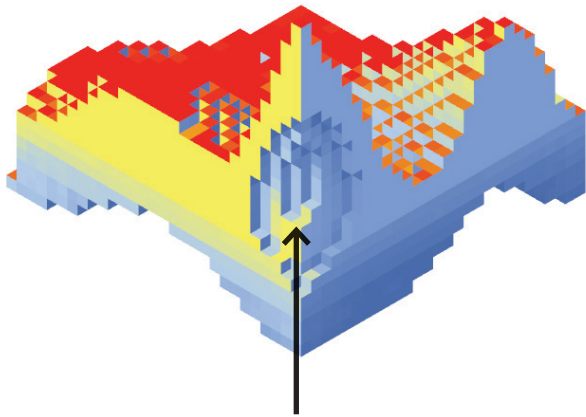
Solar Energy (MWh)
5104

Developing Mass for Entrances



The mass lifted up to create entrance

Developing Mass for improving urban surrounding in the North

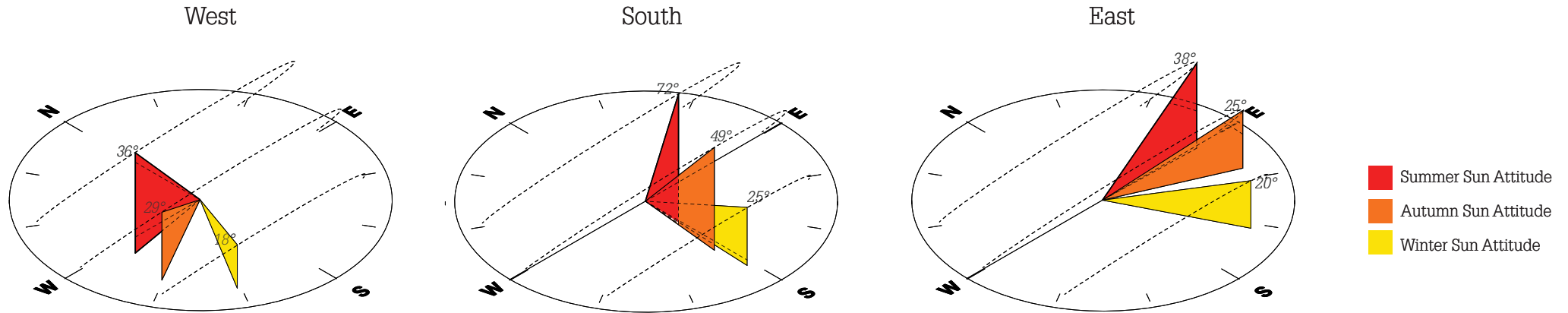


3.7 Housing Division

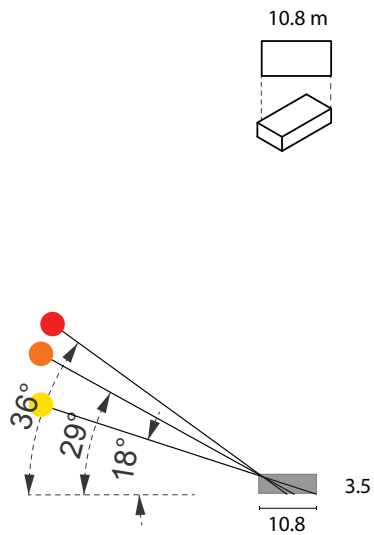
Daylight and Room Types

Sun direction and depth of rooms

Research on daylight quality for housing units



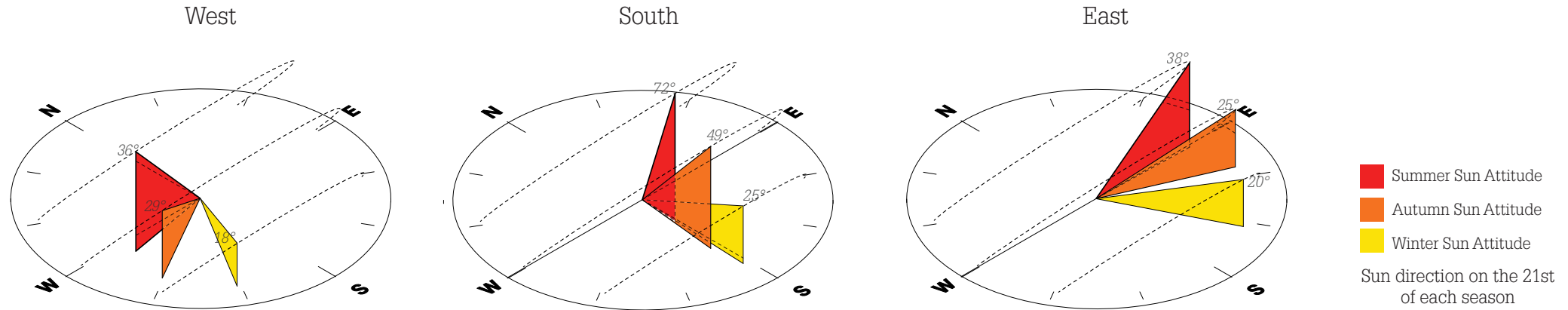
The diagram shows the sun attitude on the 21st of June, September and December at the different time of the day.



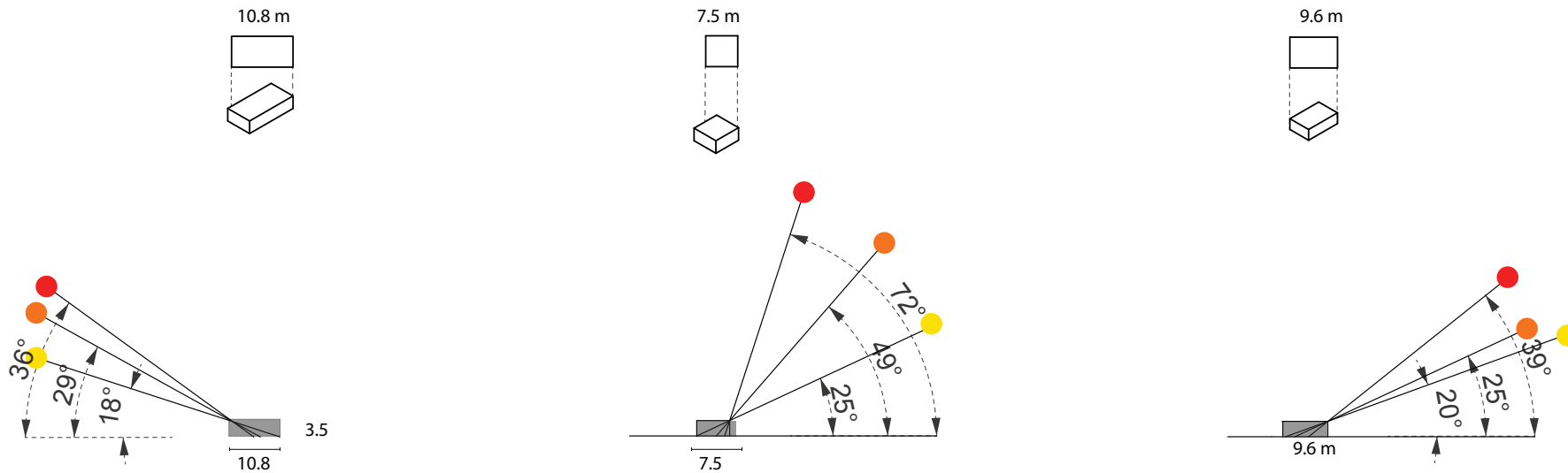
Room Depth is assigned according to sun angle of the three seasons to ensure that it has an effective amount of daylight annually.

Sun direction and depth of rooms

Research on daylight quality for housing units



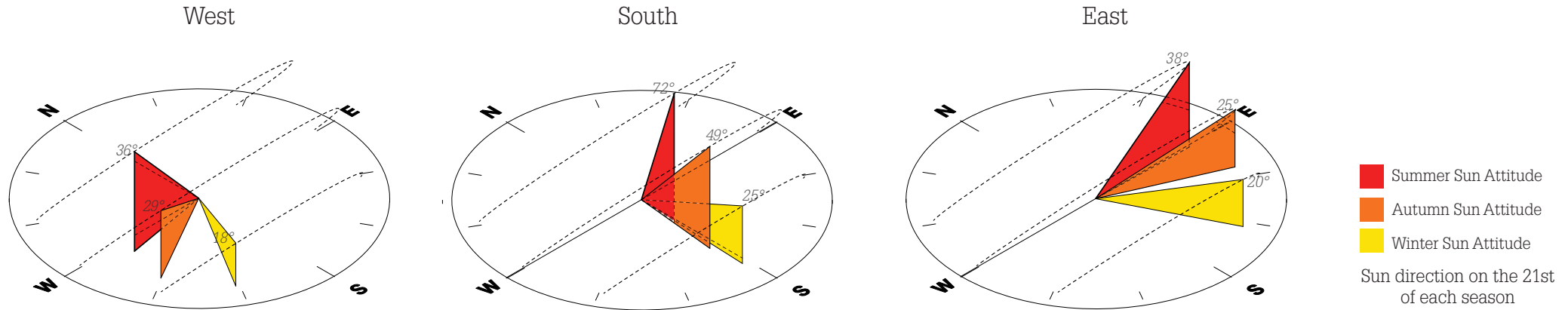
The diagram shows the sun attitude on the 21st of June, September and December at the different time of the day.



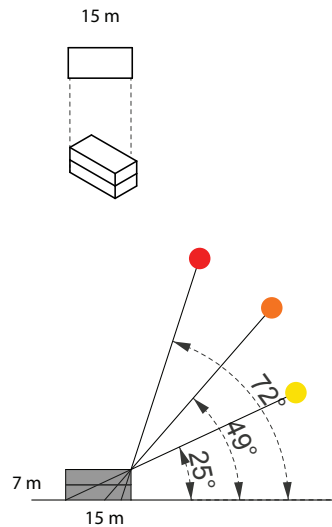
Room depth is diverse depending on the position of the room

Sun direction and depth of rooms

Research on daylight quality for housing units



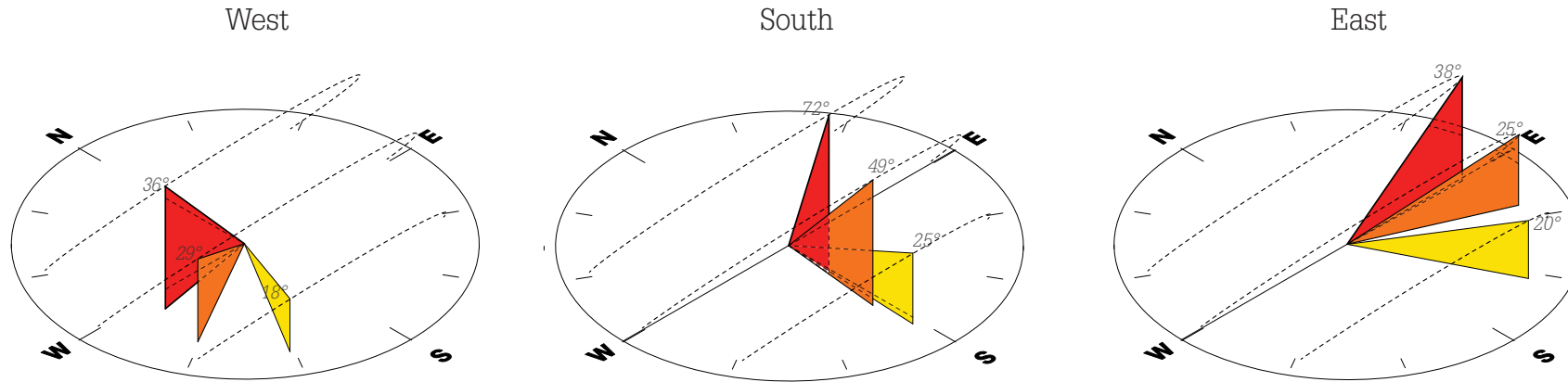
The diagram shows the sun attitude on the 21st of June, September and December at the different time of the day.



if the height of the room increase the room can be longer to maximise the daylight quality especially during Winter.

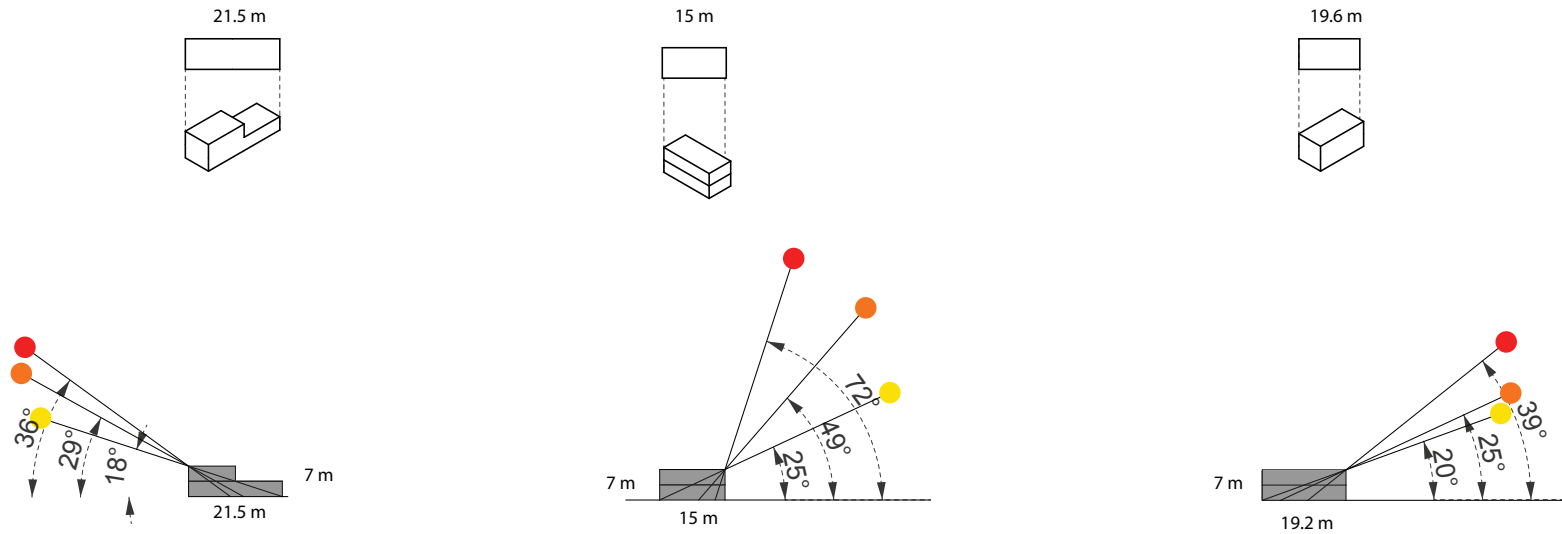
Sun direction and depth of rooms

Research on daylight quality for housing units



■ Summer Sun Attitude
■ Autumn Sun Attitude
■ Winter Sun Attitude
 Sun direction on the 21st of each season

The diagram shows the sun attitude on the 21st of June, September and December at the different time of the day.

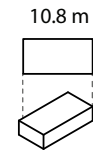


Therefore, more room types in the block.

Different Housing Types

Single storied
Room

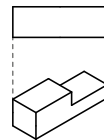
West



55.8 m²

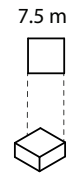
Double storied
Room

21.5 m



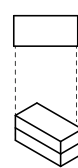
167.4 m²

South



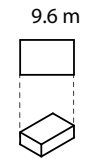
37.8 m²

15 m



75.6 m²

East



72.0 m²

19.6 m



144 m²

The BlockMaker
(Y)our Block

▼ Site

100 x 100 m
(41.3851°N, 2.1734°E)
FAR 4.7

▼ Users

483 people
3,944 kWh/capita

▼ Programme

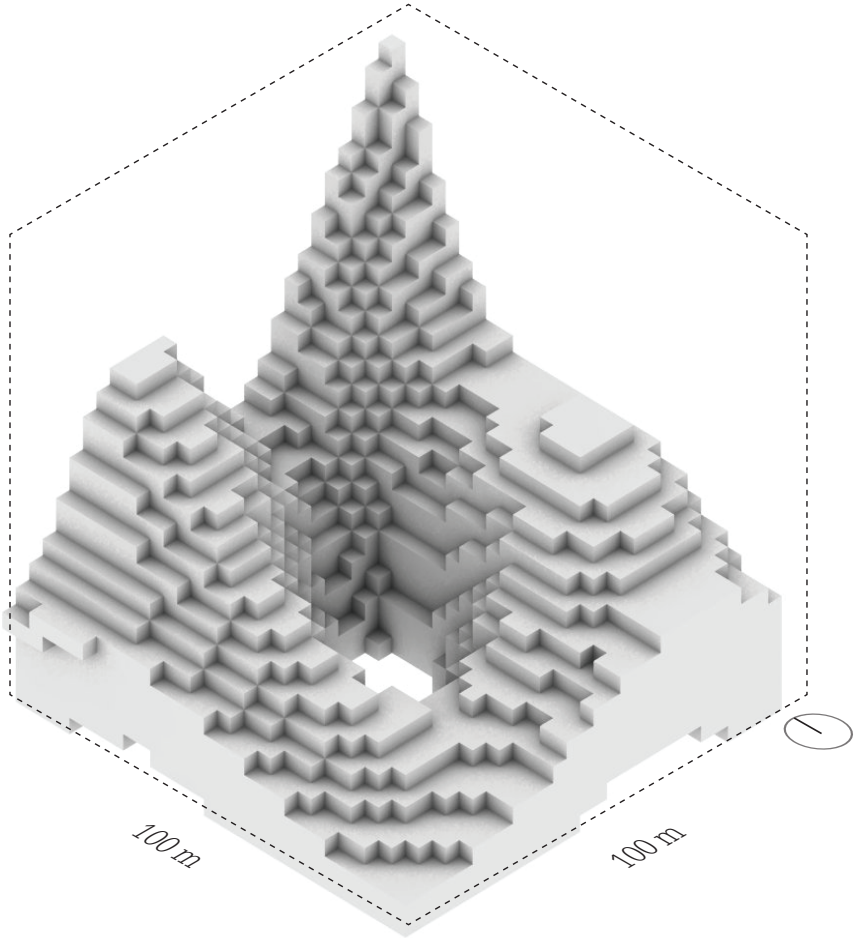
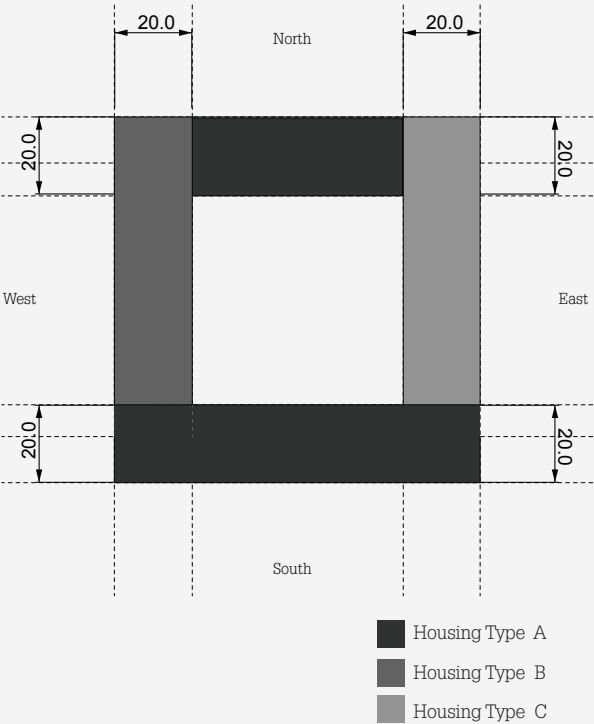
100 x 100 x 40 m
Housing 100%
Sufficiency 265%
Volume 400,000 m3

▼ Mass & void

MassIII
#010

- > Houses
- > Accessibility
- > Structure
- > Climate
- > Facade

Housing Division



(Y)our Block

100 x 100 m
(41.3851°N, 2.1734°E)
FAR 4.7

483 people
3,944 kWh/capita

100 x 100 x 40 m
Housing 100%
Sufficiency 265%
Volume 400,000 m³



MassIII
#010

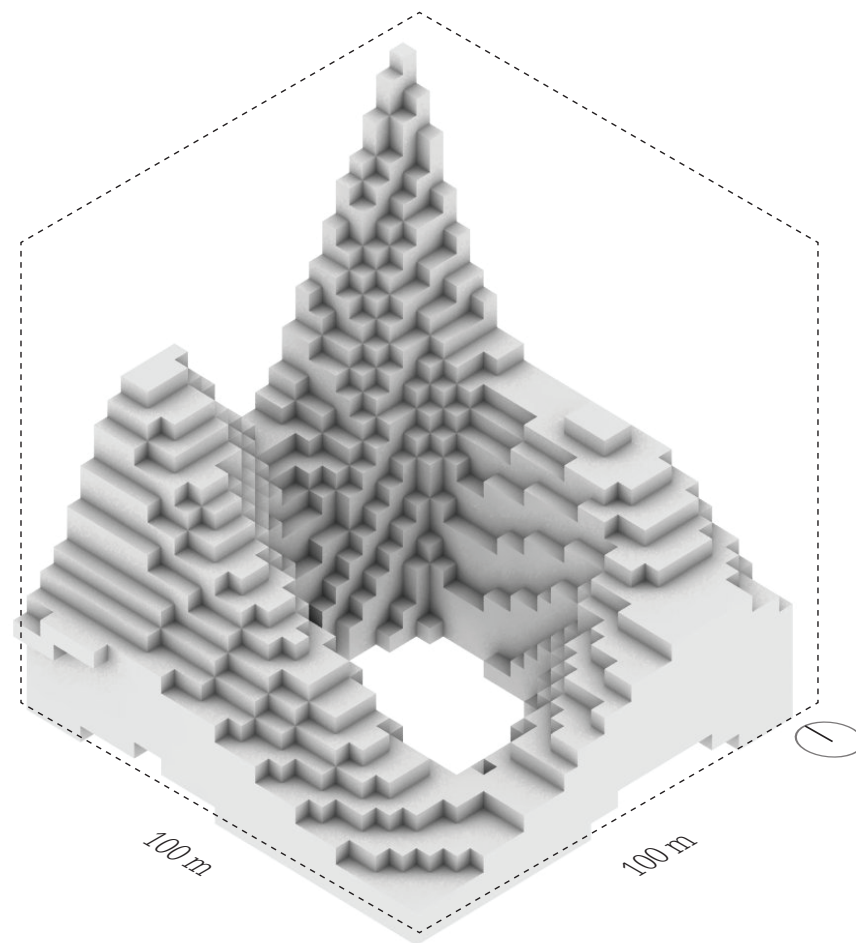
⦿ > Accessibility

Structure


♂ > Climate

○ > Facade


 Housing Type A
 Housing Type B
 Housing Type C




The BlockMaker
(Y)our Block

 Site


100 x 100 m
(41.3851°N, 2.1734°E)
FAR 4.7


 Users

483 people
3,944 kWh/capita

 Programme

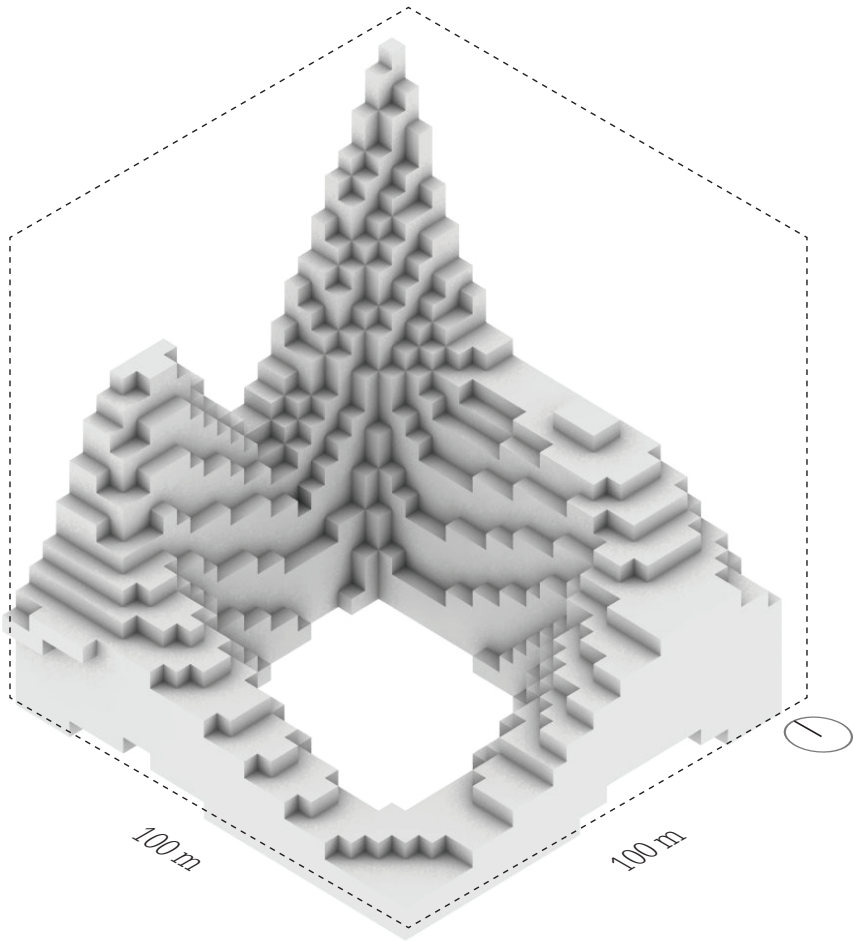
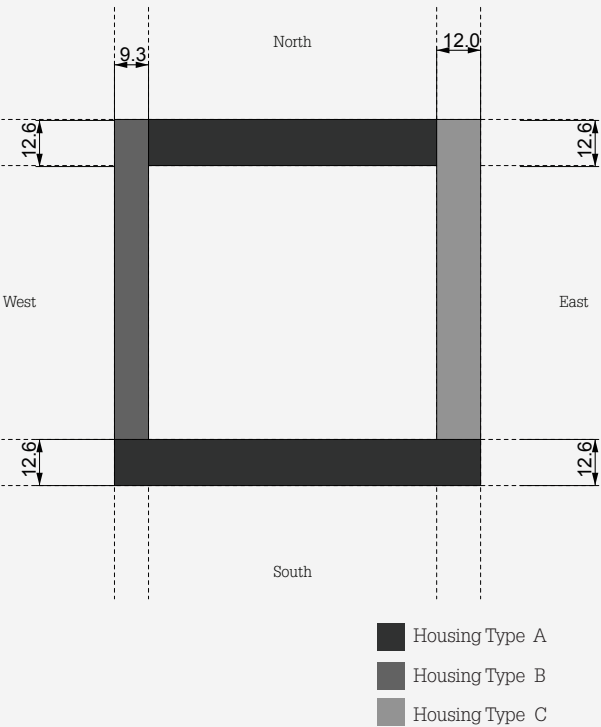
100 x 100 x 40 m
Housing 100%
Sufficiency 265%
Volume 400,000 m3

 Mass & void

 MassIII
#010

-  > Houses
-  > Accessibility
-  > Structure
-  > Climate
-  > Facade

Housing Division



3.8 Circulation Organization

Daylight and Access

The BlockMaker

(Y)our Block

Site

100 x 100 m
(41.3851°N, 2.1734°E)
FAR 4.7

Users

483 people
3,944 kWh/capita

Programme

100 x 100 x 40 m
Housing 100%
Sufficiency 265%
Volume 400,000 m³

Mass & void



MassIII
#010

Houses (Depth)

South = 7.5-15 m
West = 10.8 - 21.5 m
East = 9.6-19.2 m

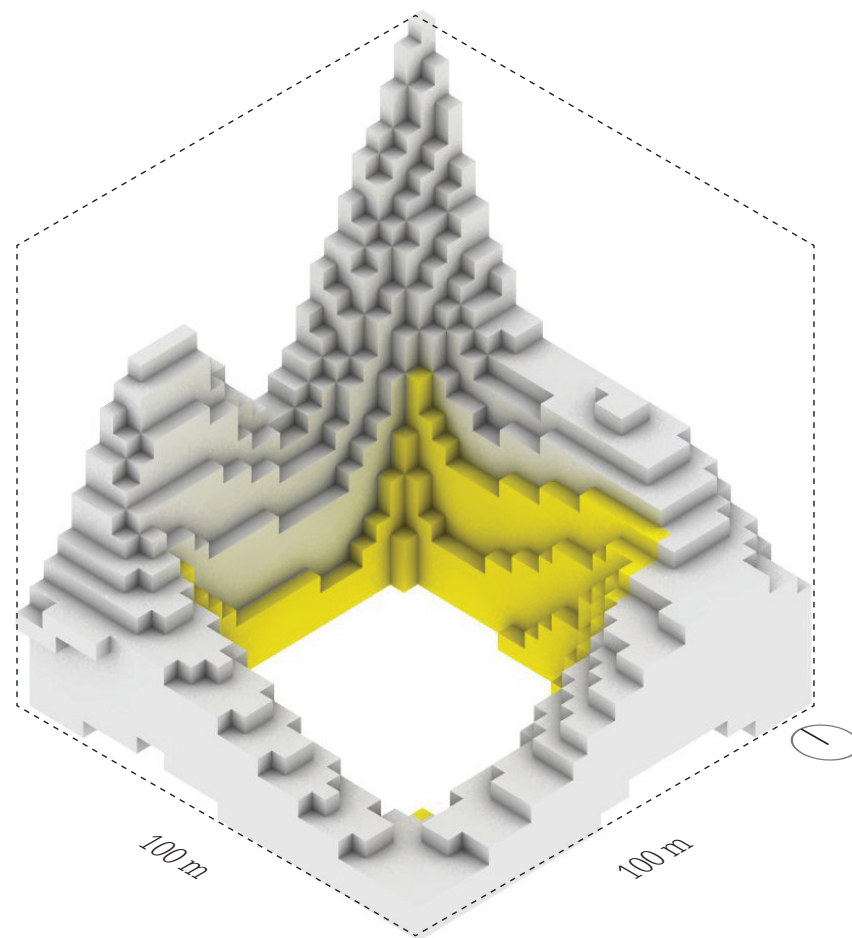
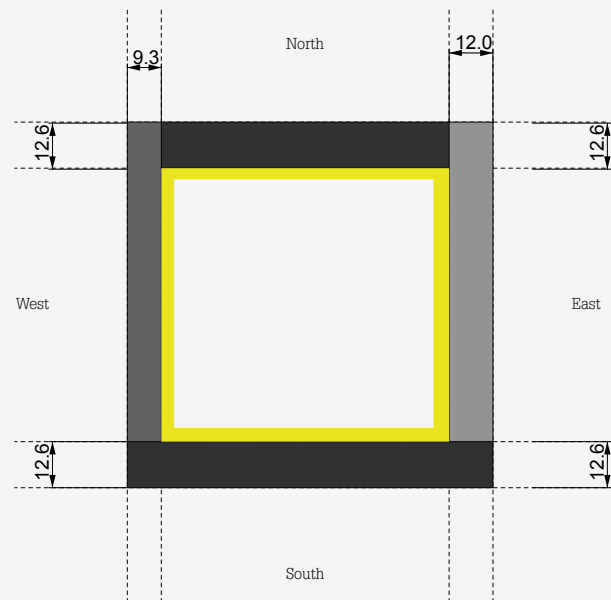
> Accessibility

> Structure

> Climate

> Facade

Circulation Organization



The BlockMaker

(Y)our Block

Site

100 x 100 m
(41.3851°N, 2.1734°E)
FAR 4.7

Users

483 people
3,944 kWh/capita

Programme

100 x 100 x 40 m
Housing 100%
Sufficiency 265%
Volume 400,000 m³

Mass & void



MassIII
#010

Houses (Depth)

South = 7.5-15 m
West = 10.8 - 21.5 m
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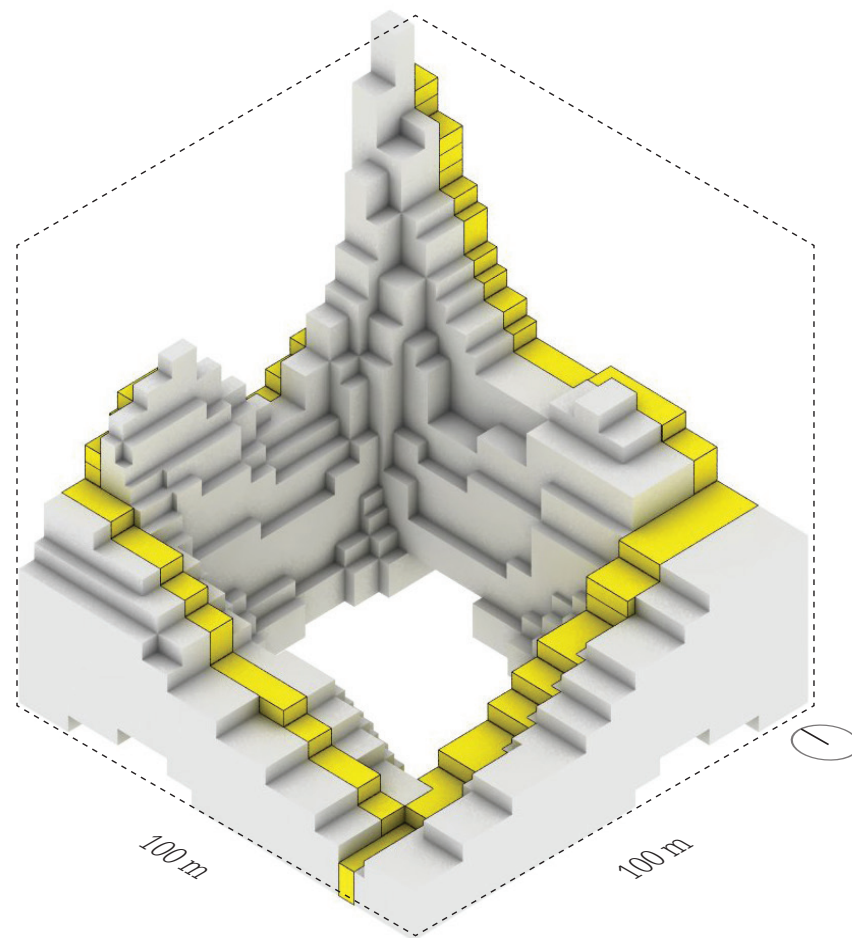
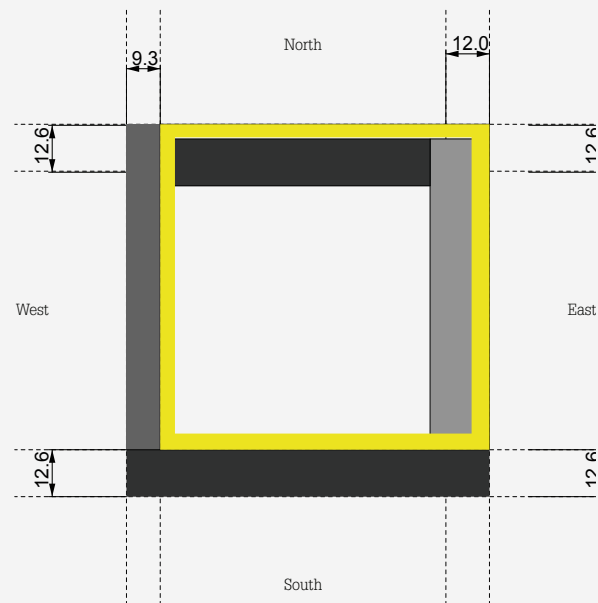
> Accessibility

> Structure

> Climate

> Facade

Circulation Organization



The BlockMaker

(Y)our Block

Site

100 x 100 m
(41.3851°N, 2.1734°E)
FAR 4.7

Users

483 people
3,944 kWh/capita

Programme

100 x 100 x 40 m
Housing 100%
Sufficiency 265%
Volume 400,000 m³

Mass & void



MassIII
#010

Houses (Depth)

South = 7.5-15 m
West = 10.8 - 21.5 m
East = 9.6-19.2 m

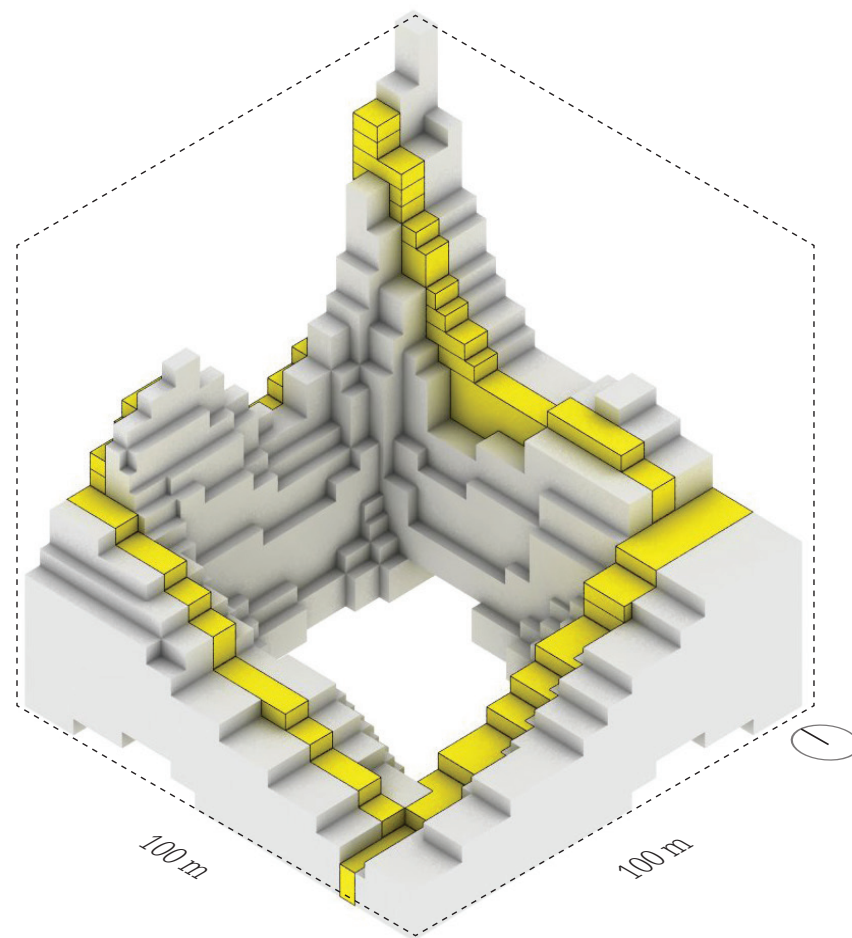
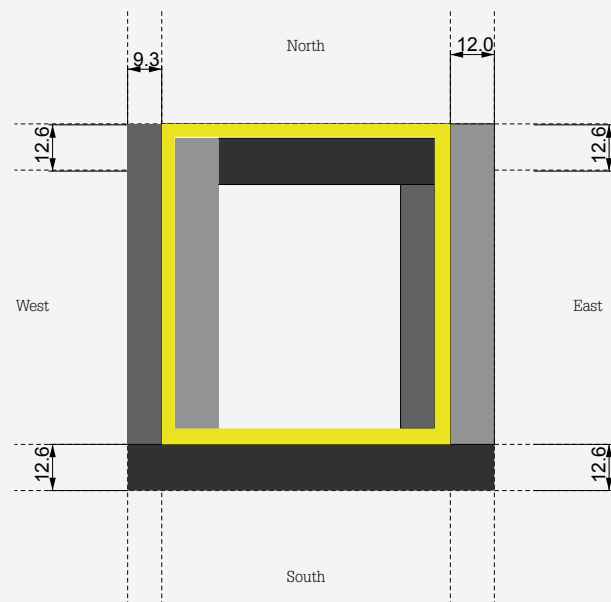
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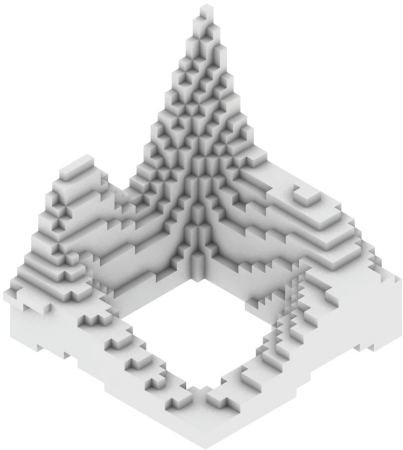
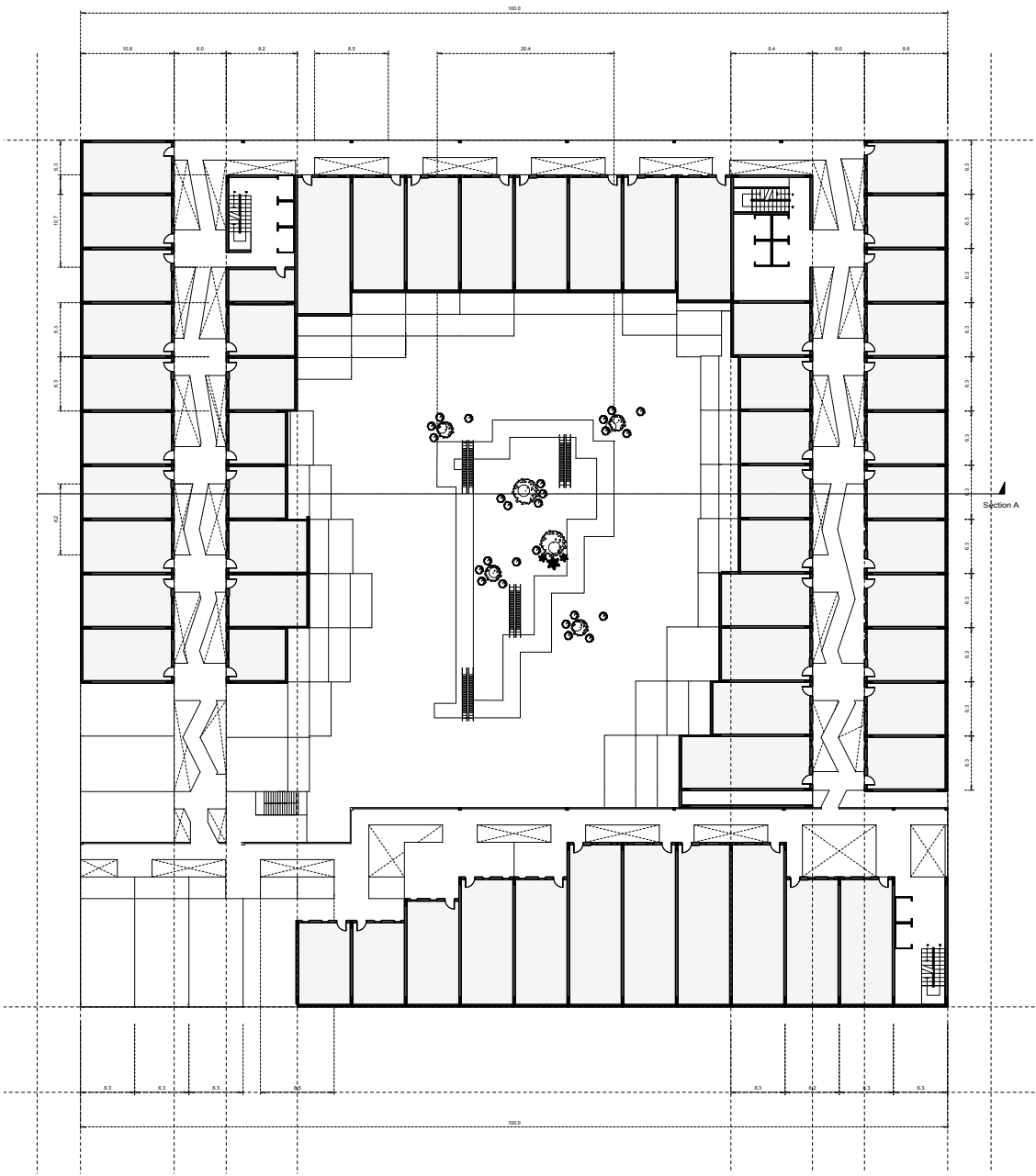
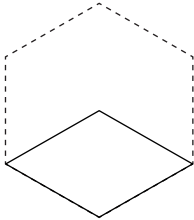
> Structure

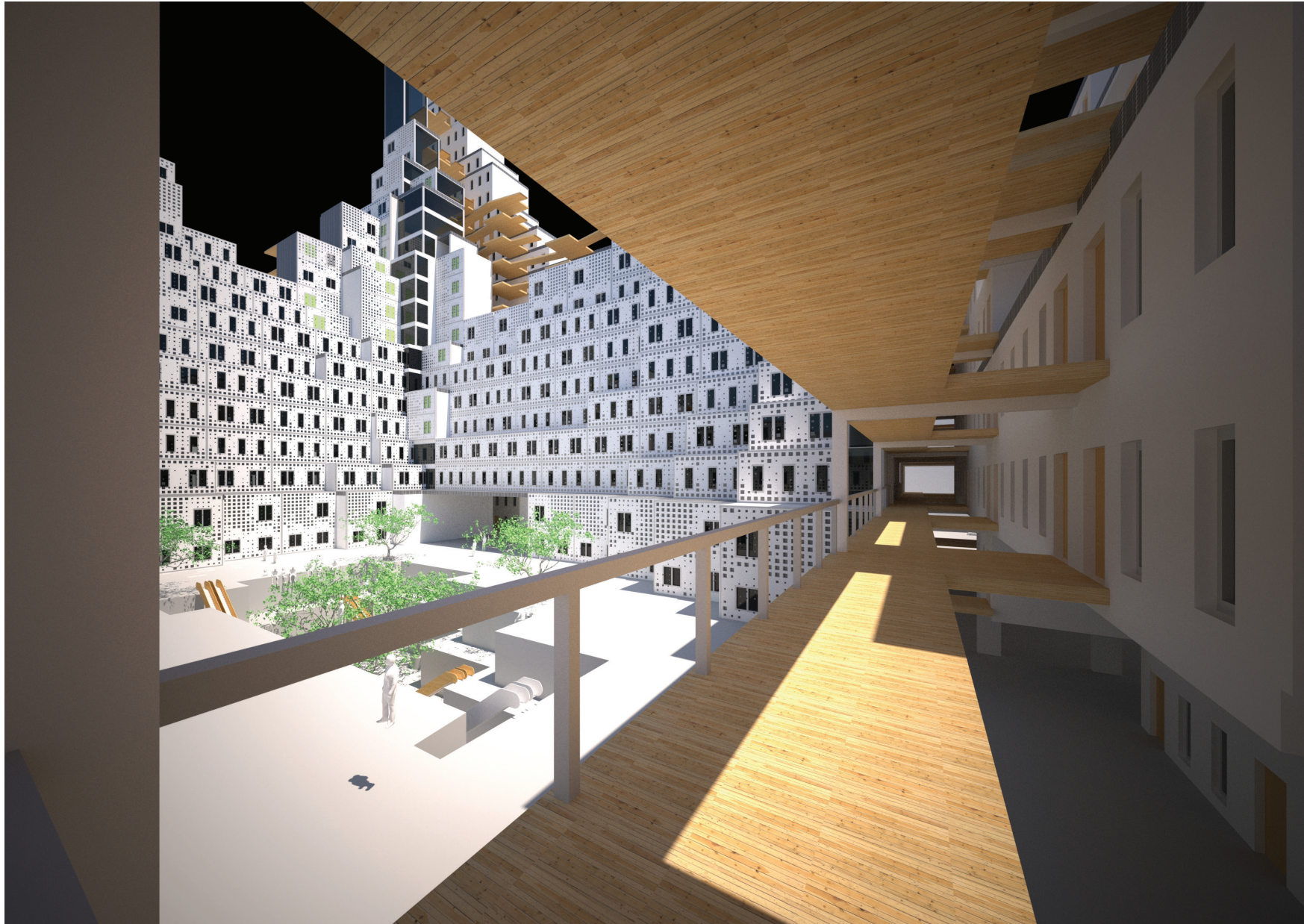
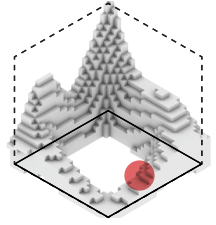
> Climate

> Facade

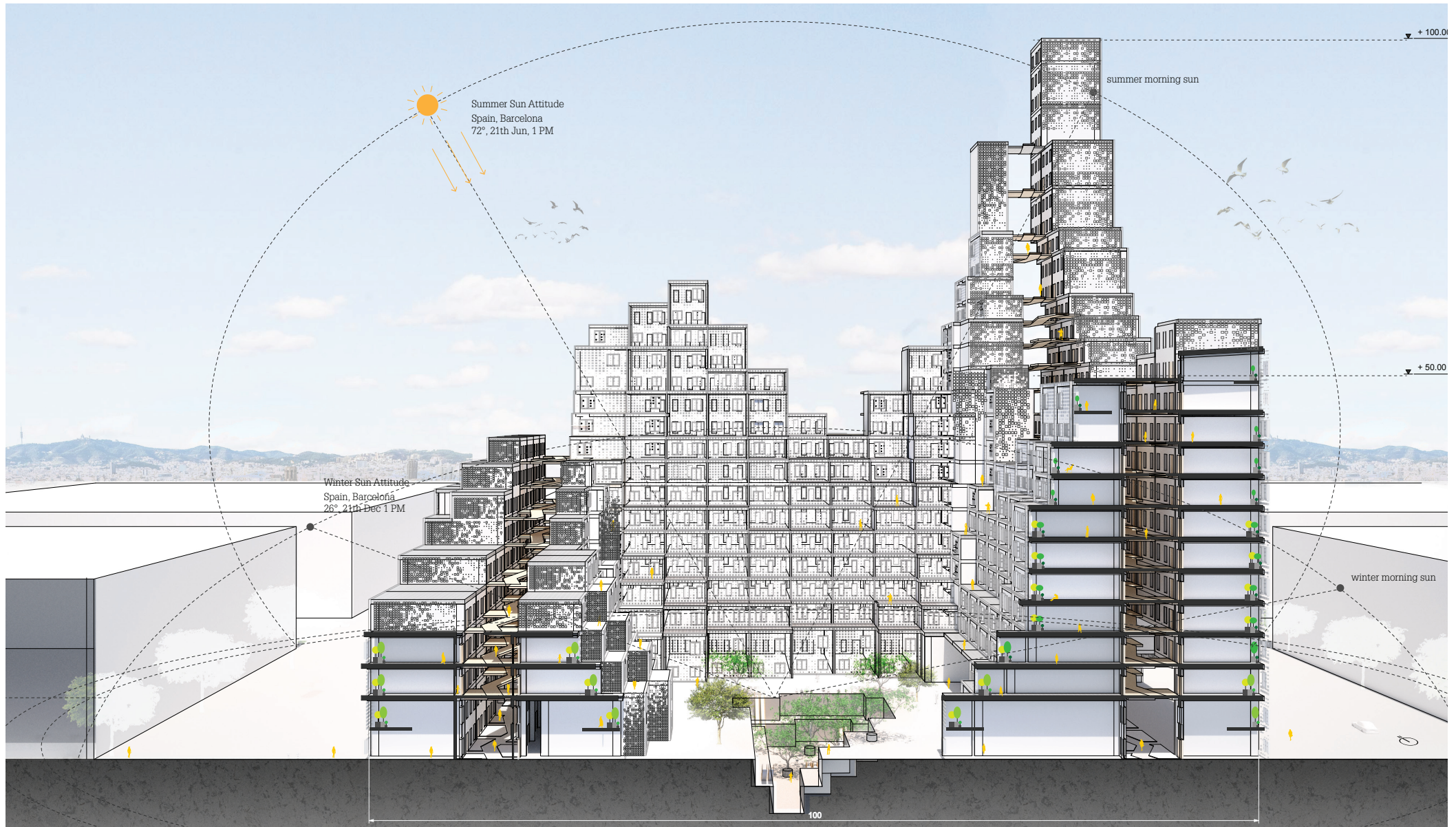
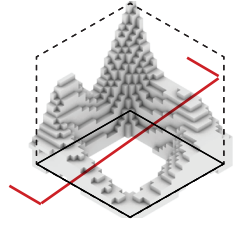
Circulation Organization

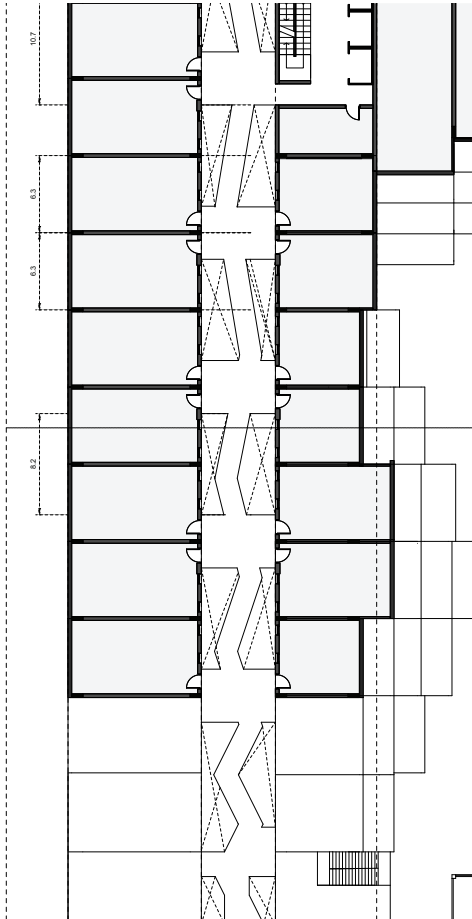
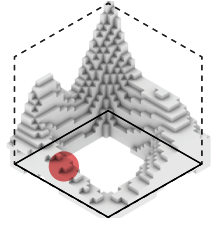




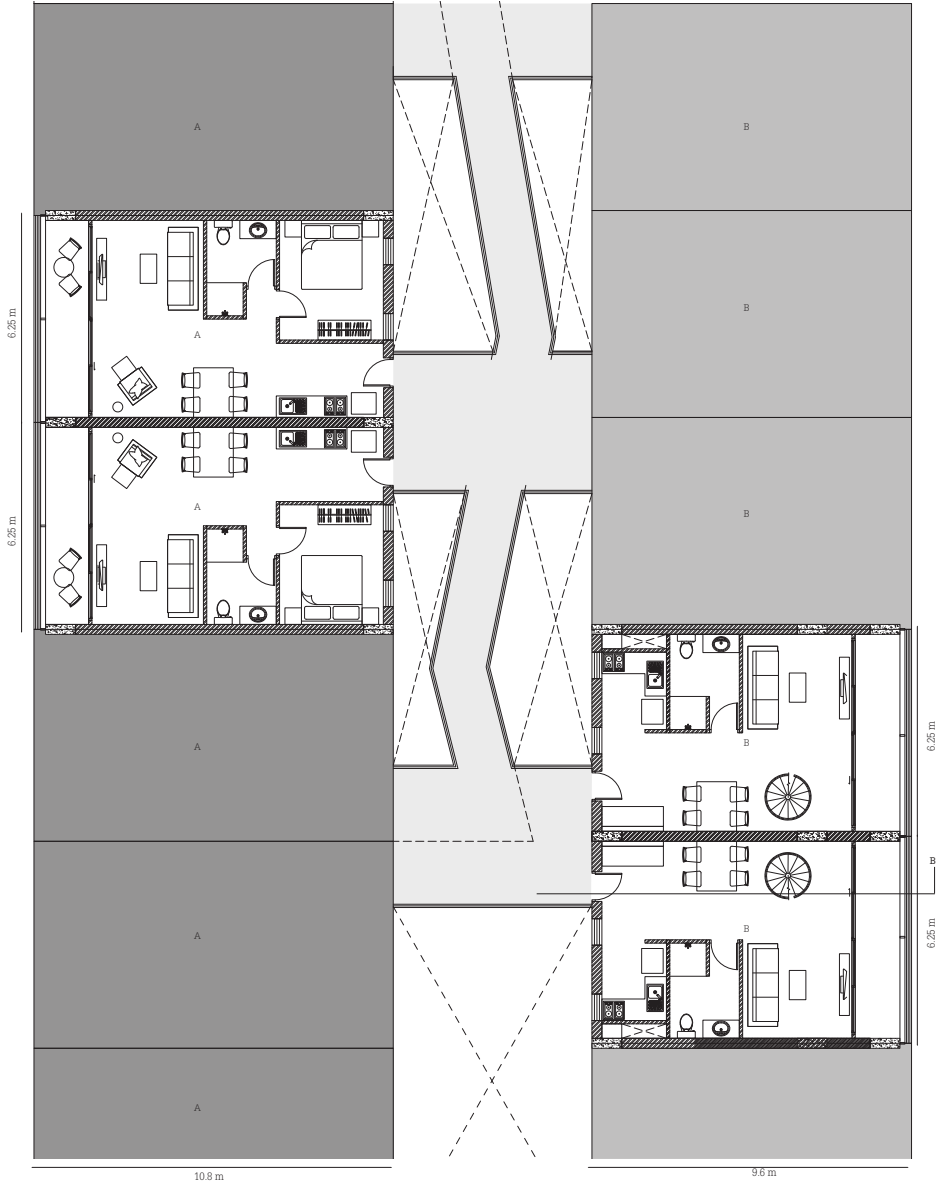
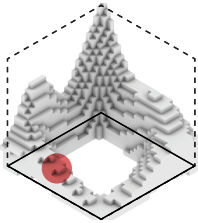


The Corridor is oriented to the area which receives less sunlight during a day.

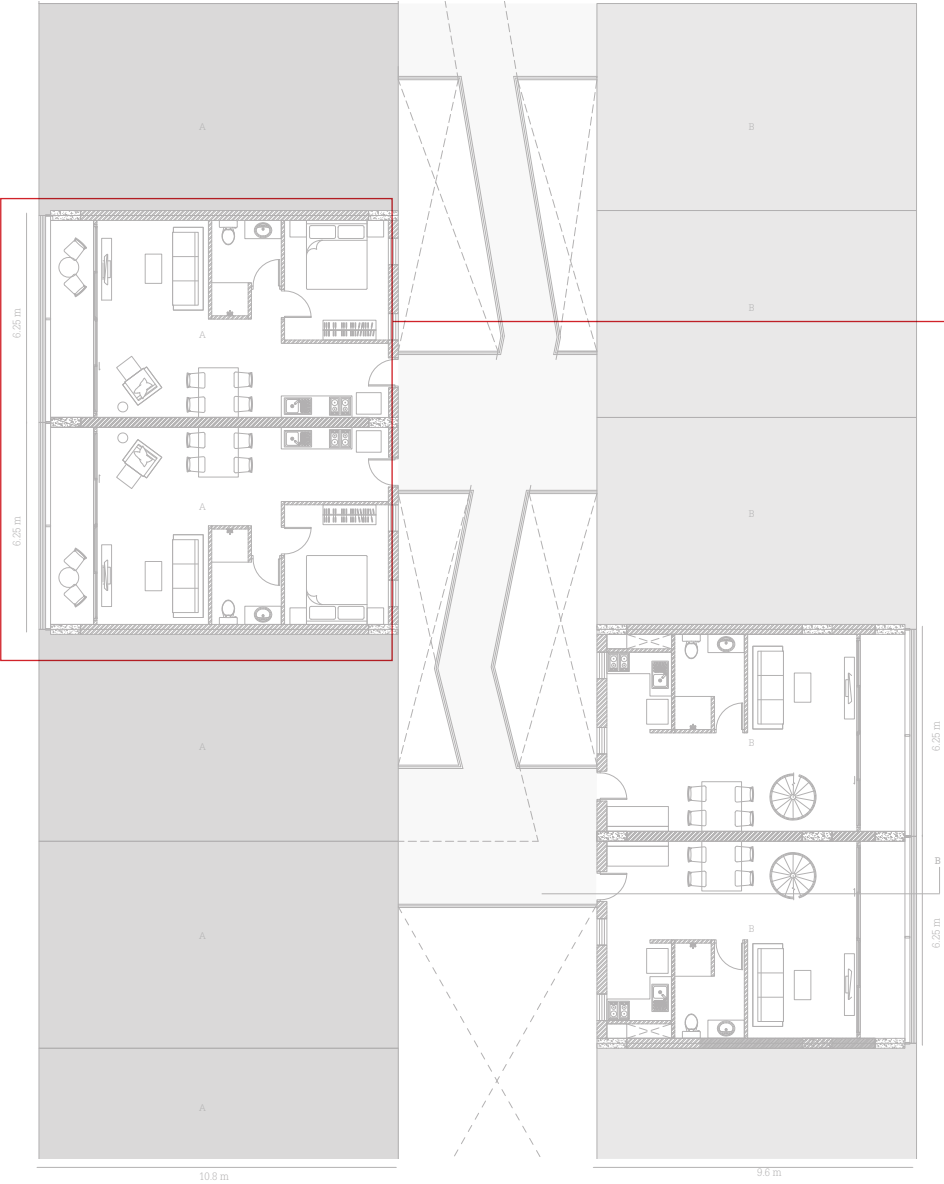
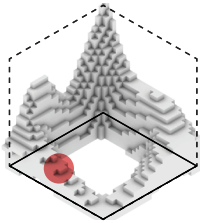




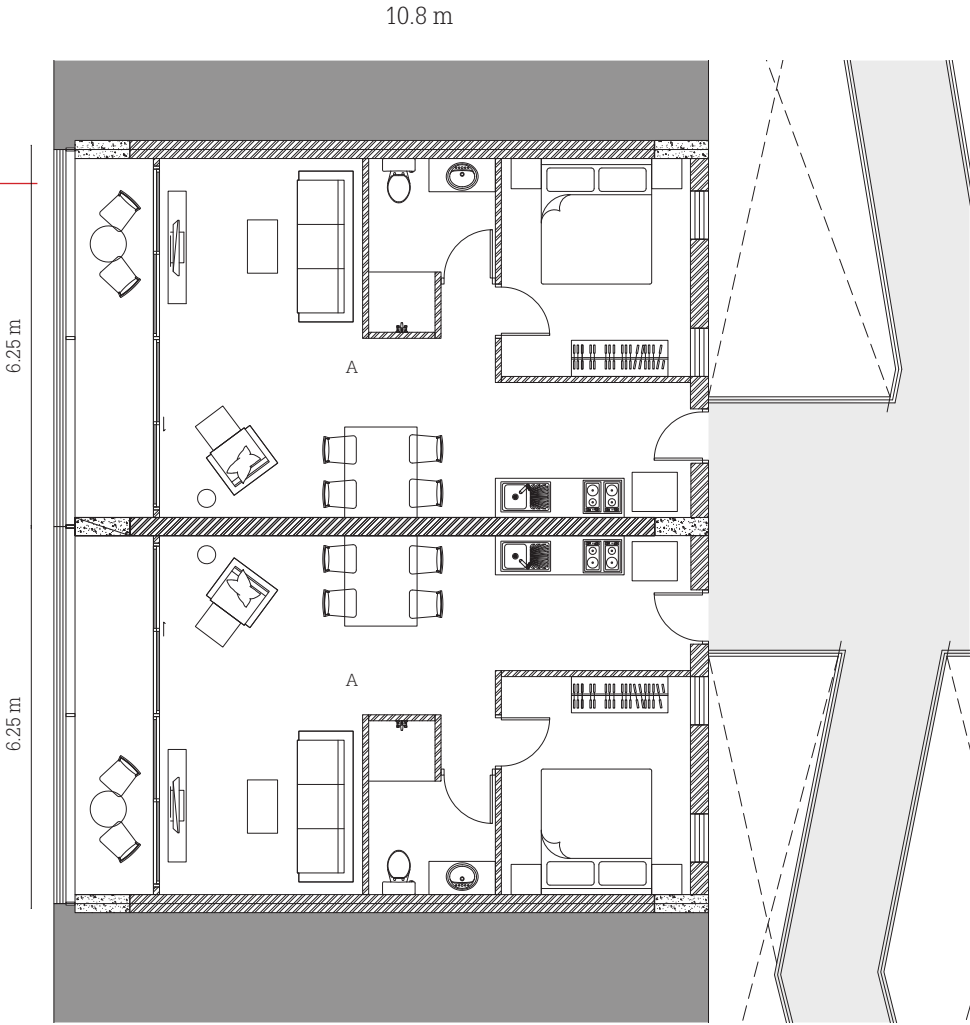
Lightwell corridor to create privacy for dwellers as well as light for small plants.



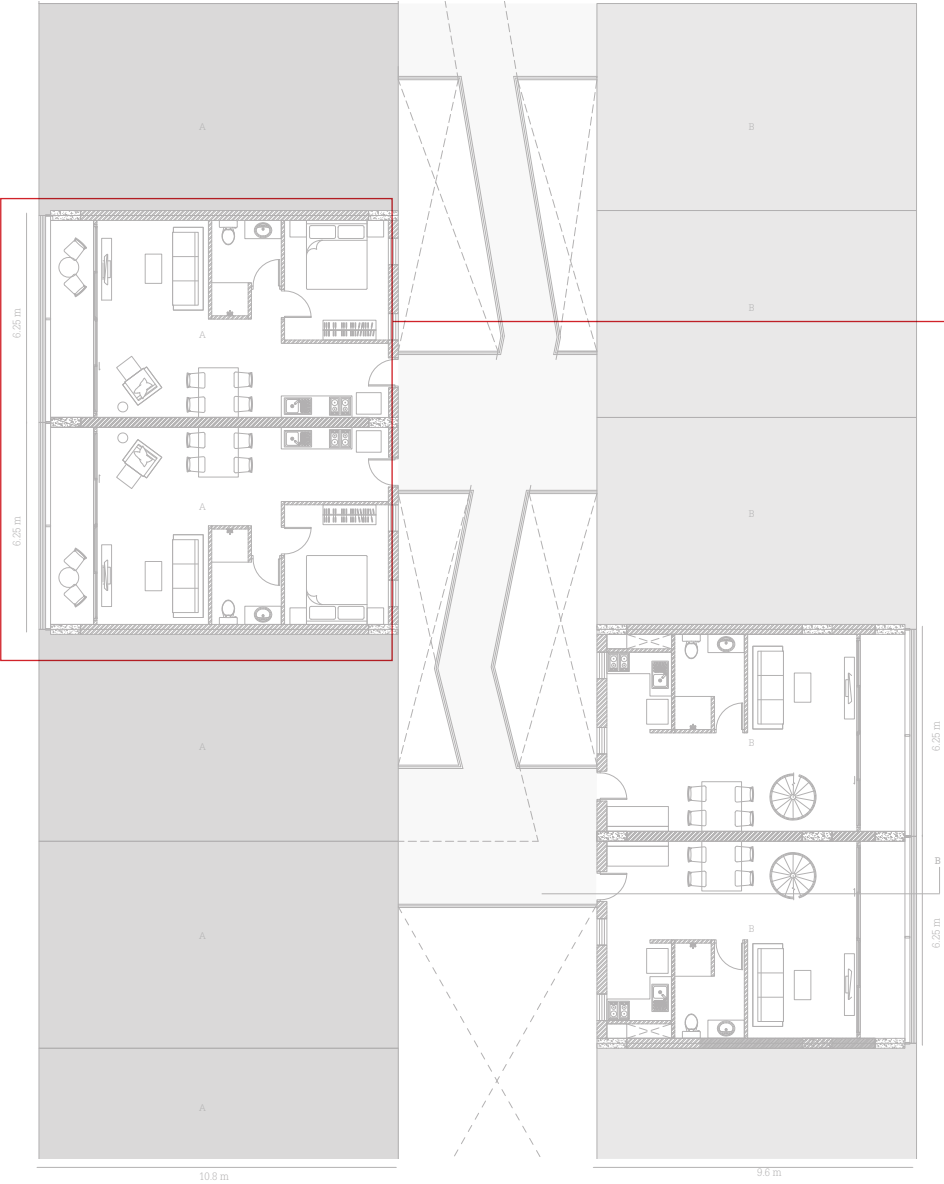
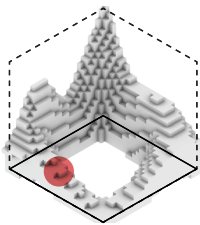
West Housing Plan 1:50
West -House Information
Type A(West): 55.8 m², Room Depth 10.8 m
TypeB (East): 72 m², Room Depth 9.6 m



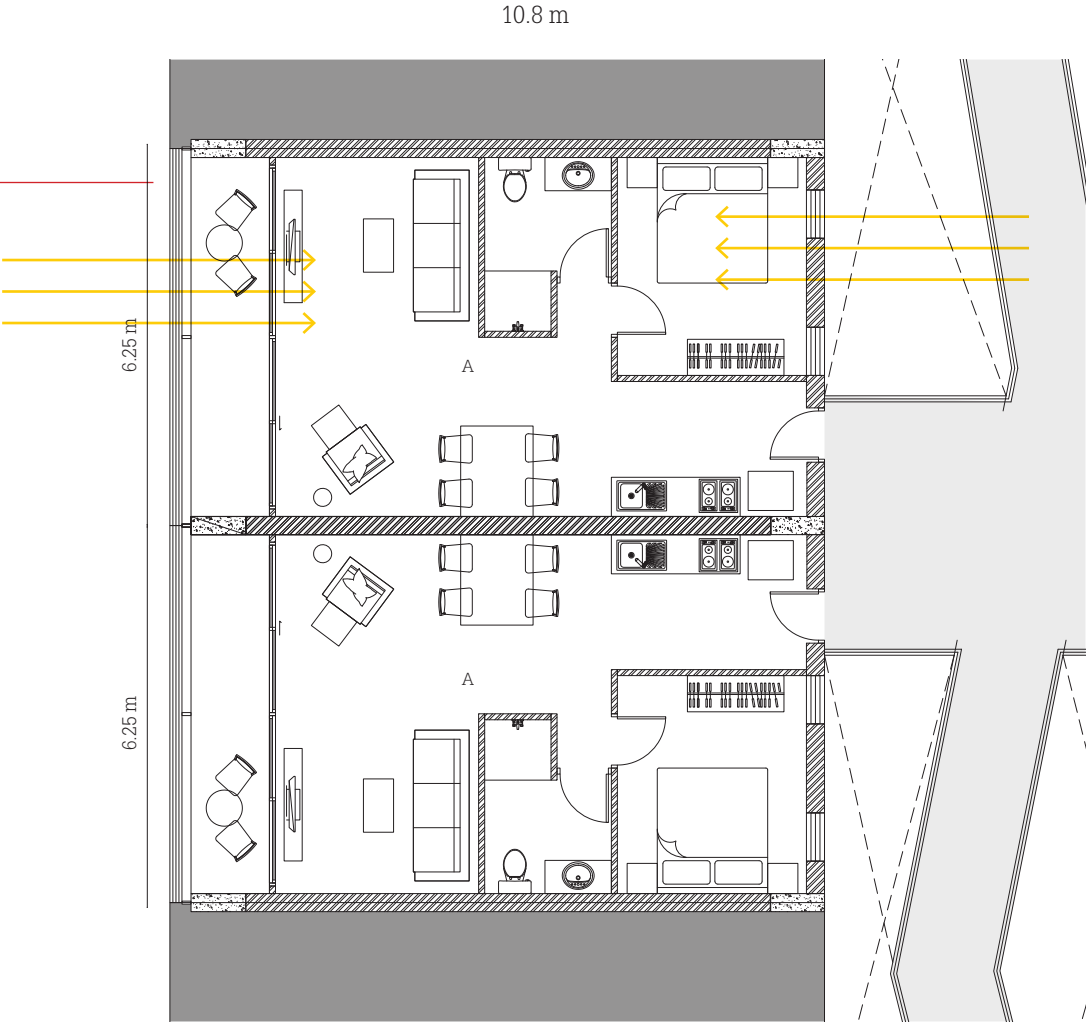
West Housing Plan 1:50
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Type B (East): 72 m², Room Depth 9.8 m



Living Area will receive excellent quality of daylight and bedroom would receive light from the lightwell.



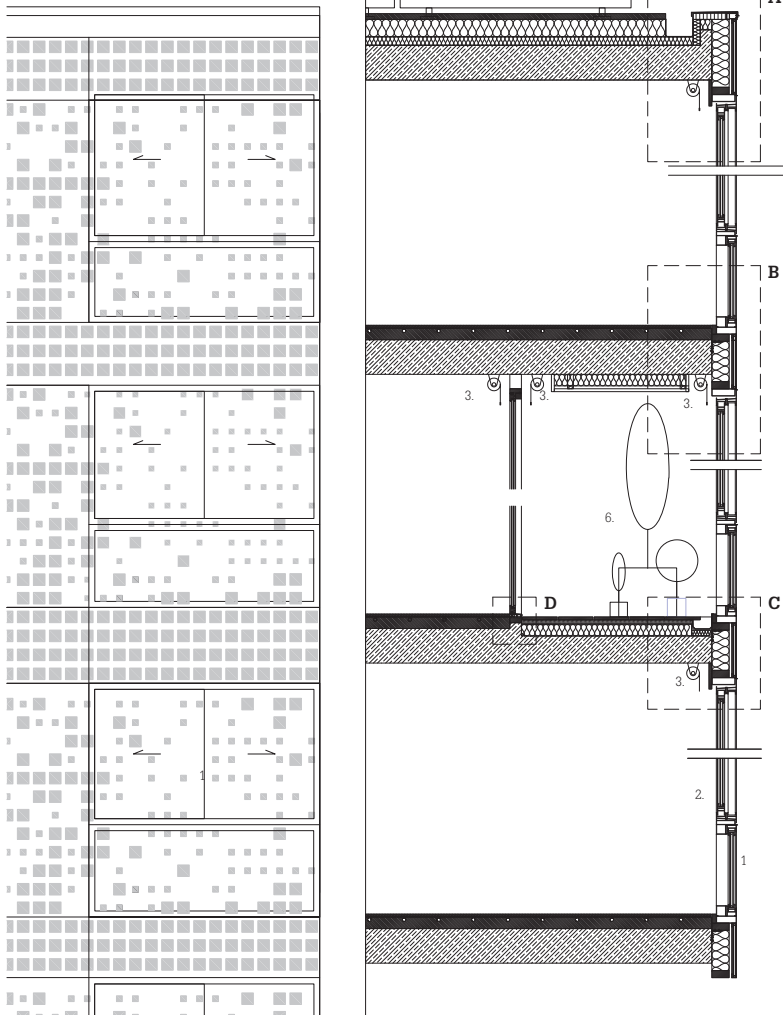
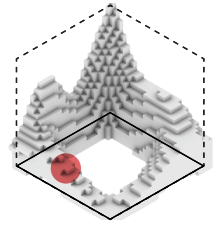
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The BlockMaker (Y)our Block

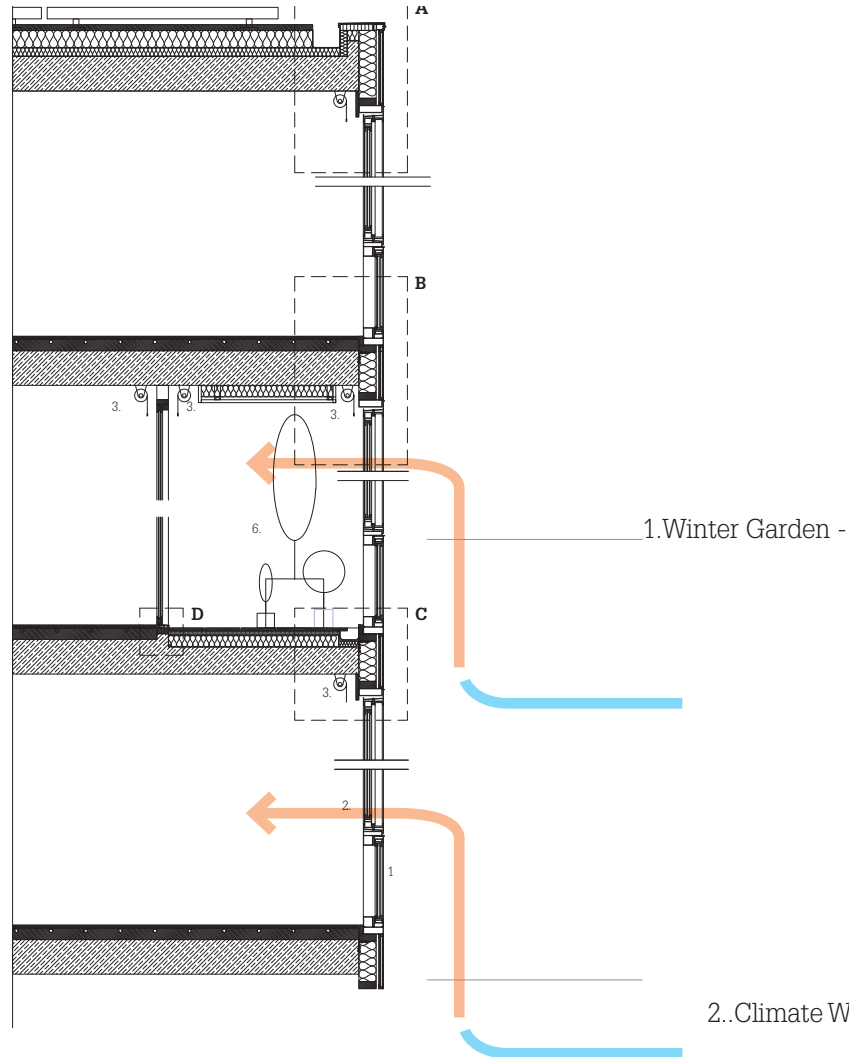
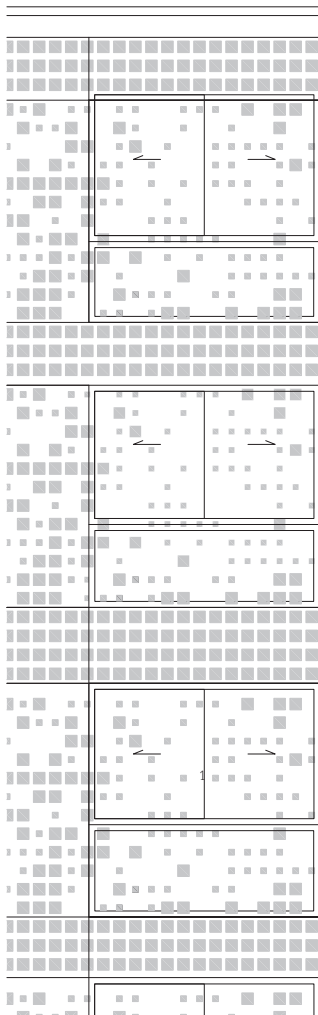
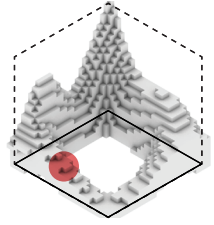
Technical drawing / Research information / Impression Facade to reduce heat and improve natural ventilation



Section B: Housing Facade 1:50

A: Roof Connection and Sun Shield
B: Winter Garden:
C: Housing Insulation separated with the winter garden.
D: Floor Connection between winter garden and living room

1. Laminated safety glass with integrated solar panels pattern
2. Sliding window act as climate window
3. Sun Screen
4. Reinforced Concrete Floor
5. Floor heating
6. Winter Garden
7. Roof Flashing
8. Water Drainage
9. Solar Panel Cladding



In Winter: Collect and store heat, prevent heat loss

In Summer: the garden preventing from overheating, and the plant will help reduce Temperature by 2 degrees. By opening the sliding window.

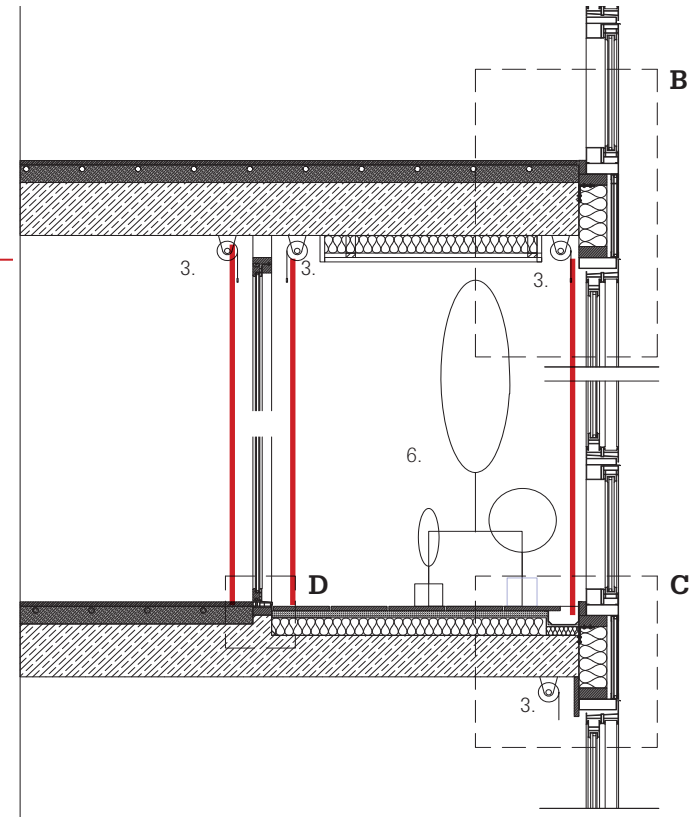
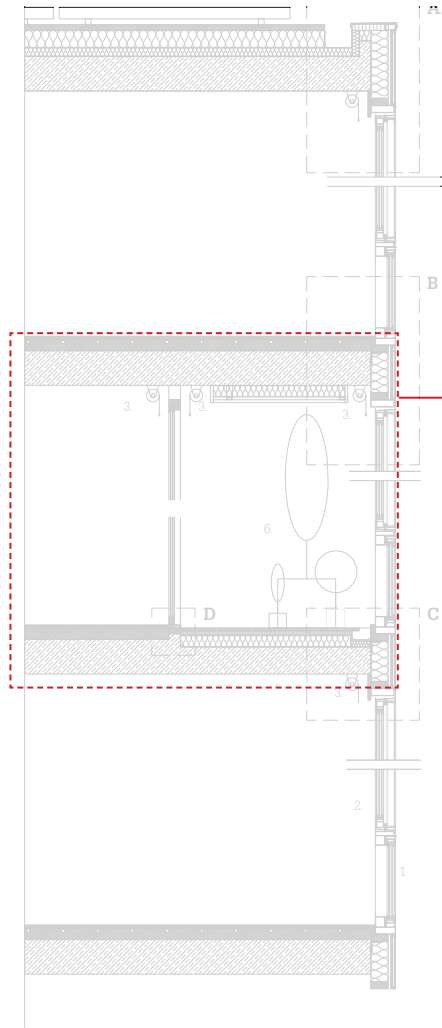
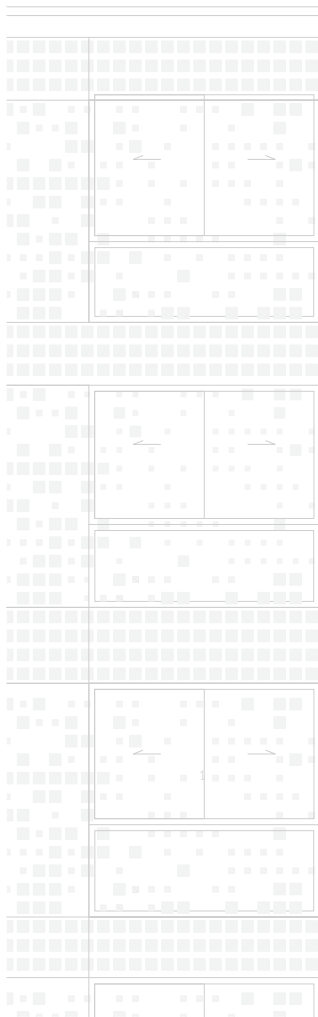
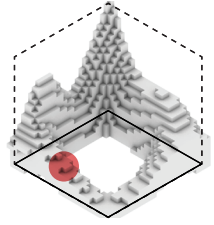
In Winter: pre-heat the air through climate window and store heat through the effect of air convection

Summer: open window for natural ventilation

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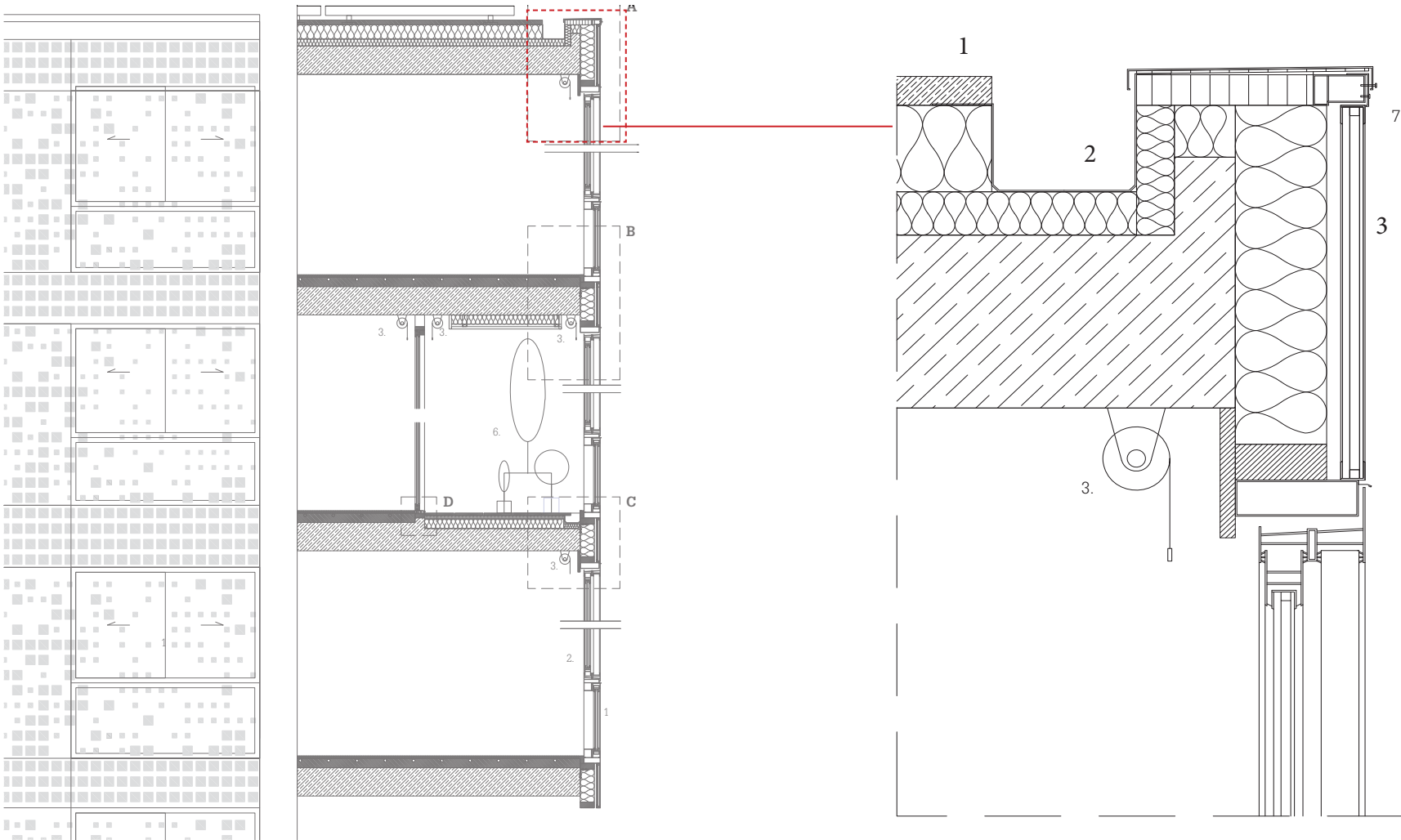
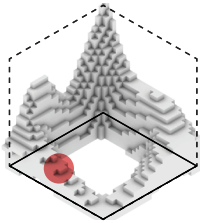
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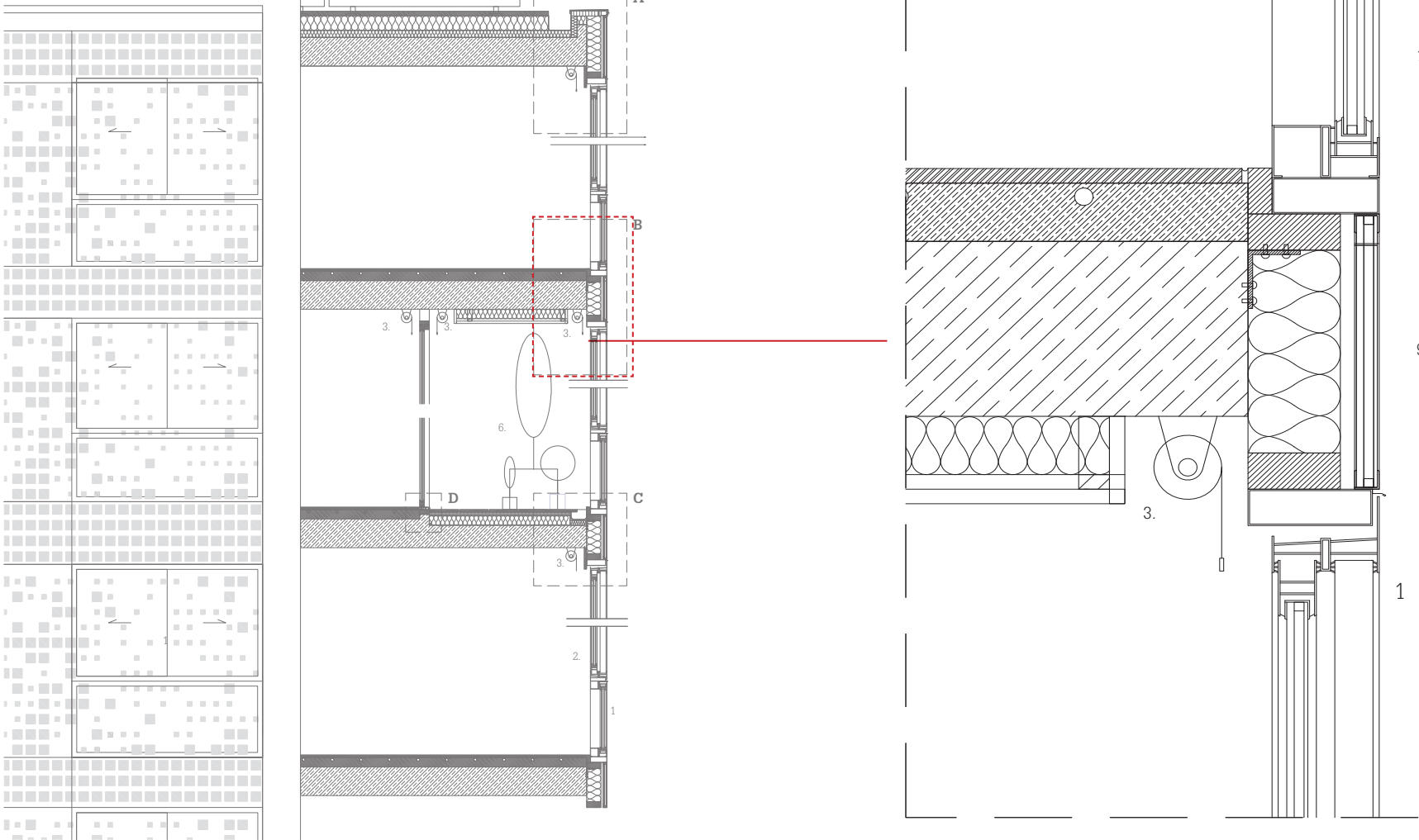
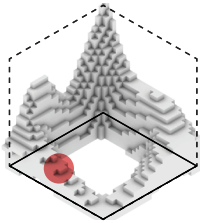


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- 1. Solar Panels mounted on the roof
- 2. Water Gutter and Flashing
- 3. Solar panel cladding

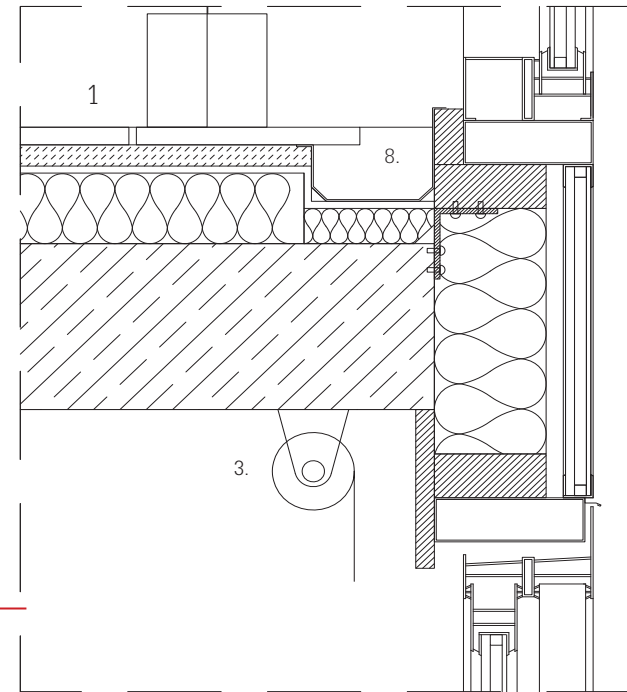
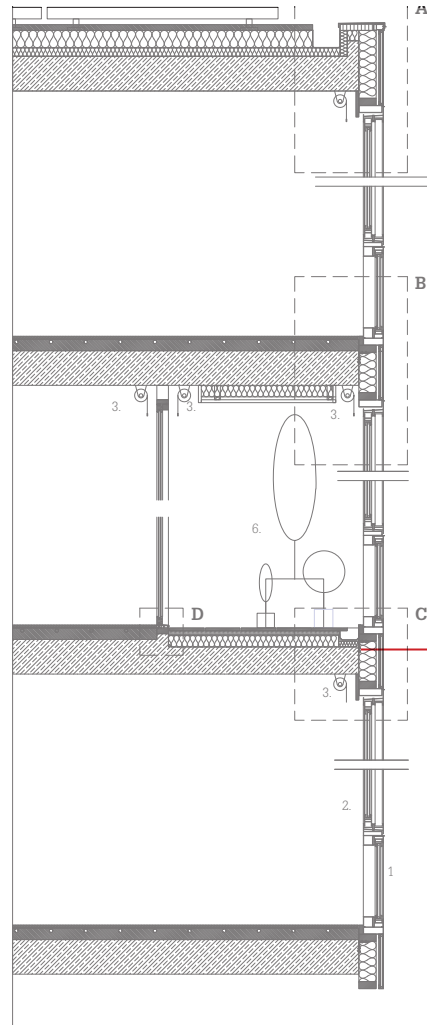
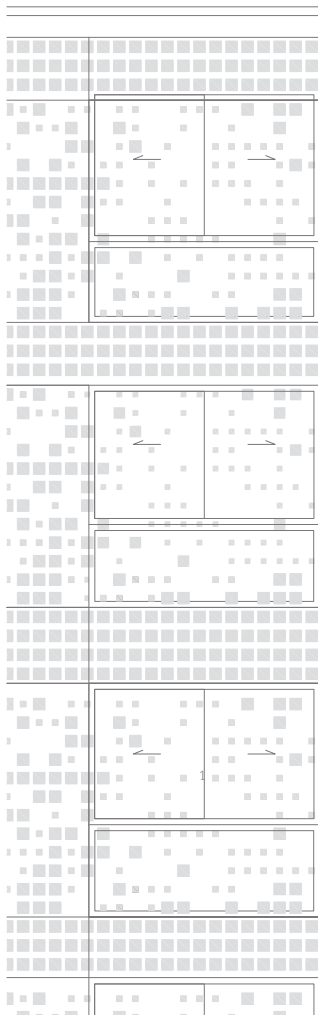
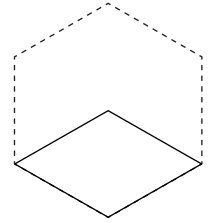


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1.Climate Window
-Triple glazing window with air grill and
solar panels facade- Thickness 350 mm

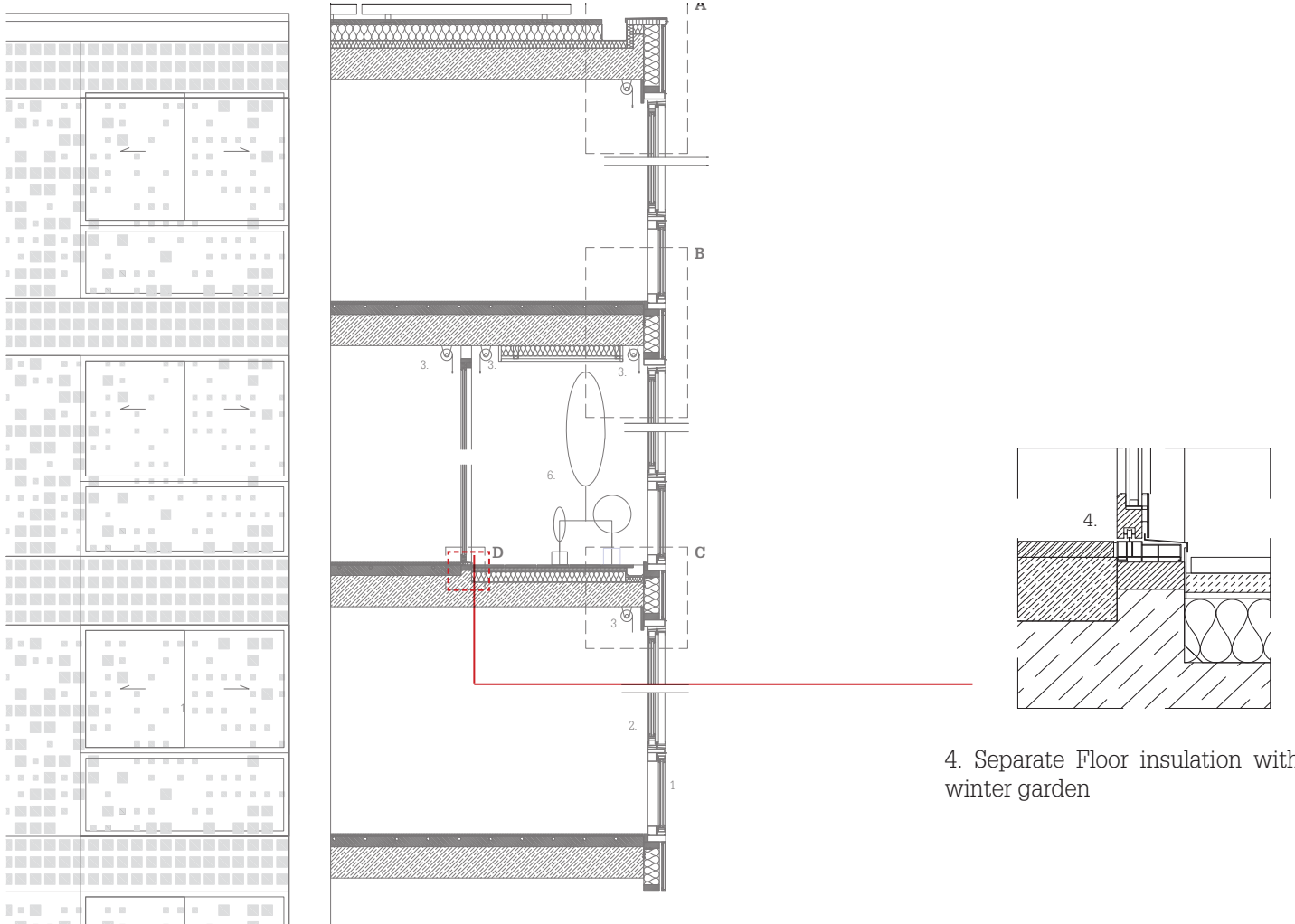


- 1. Thermal Floor for Winter Garden
- 8. Terrace water gutter
- 3. SunScreen curtains

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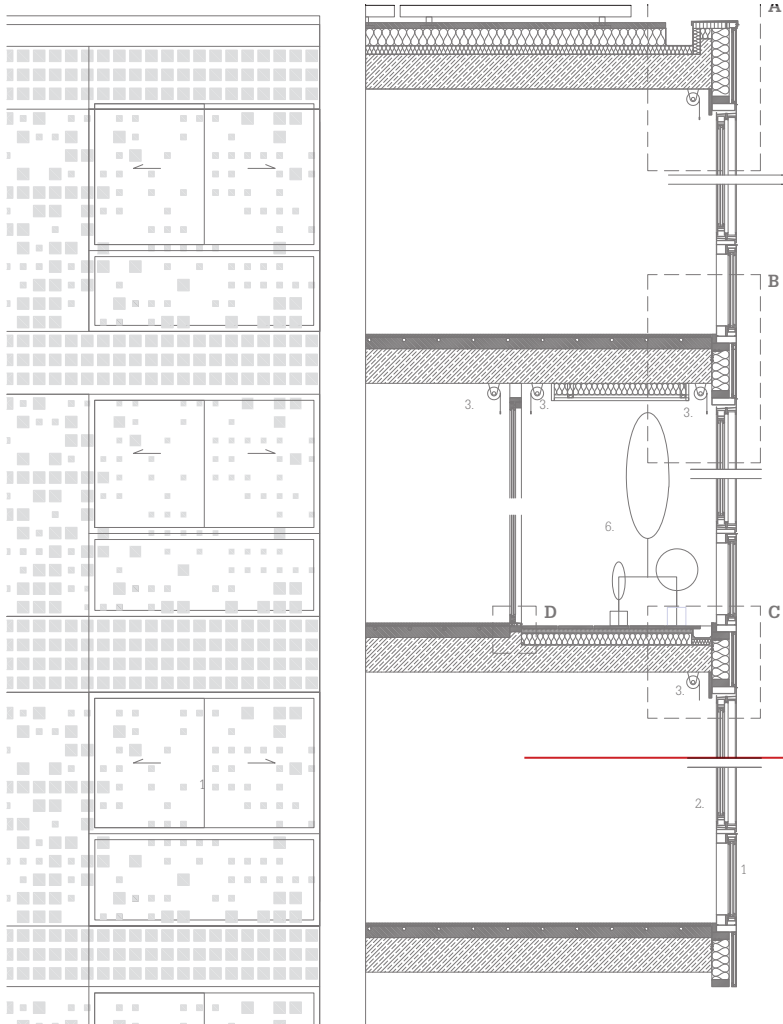
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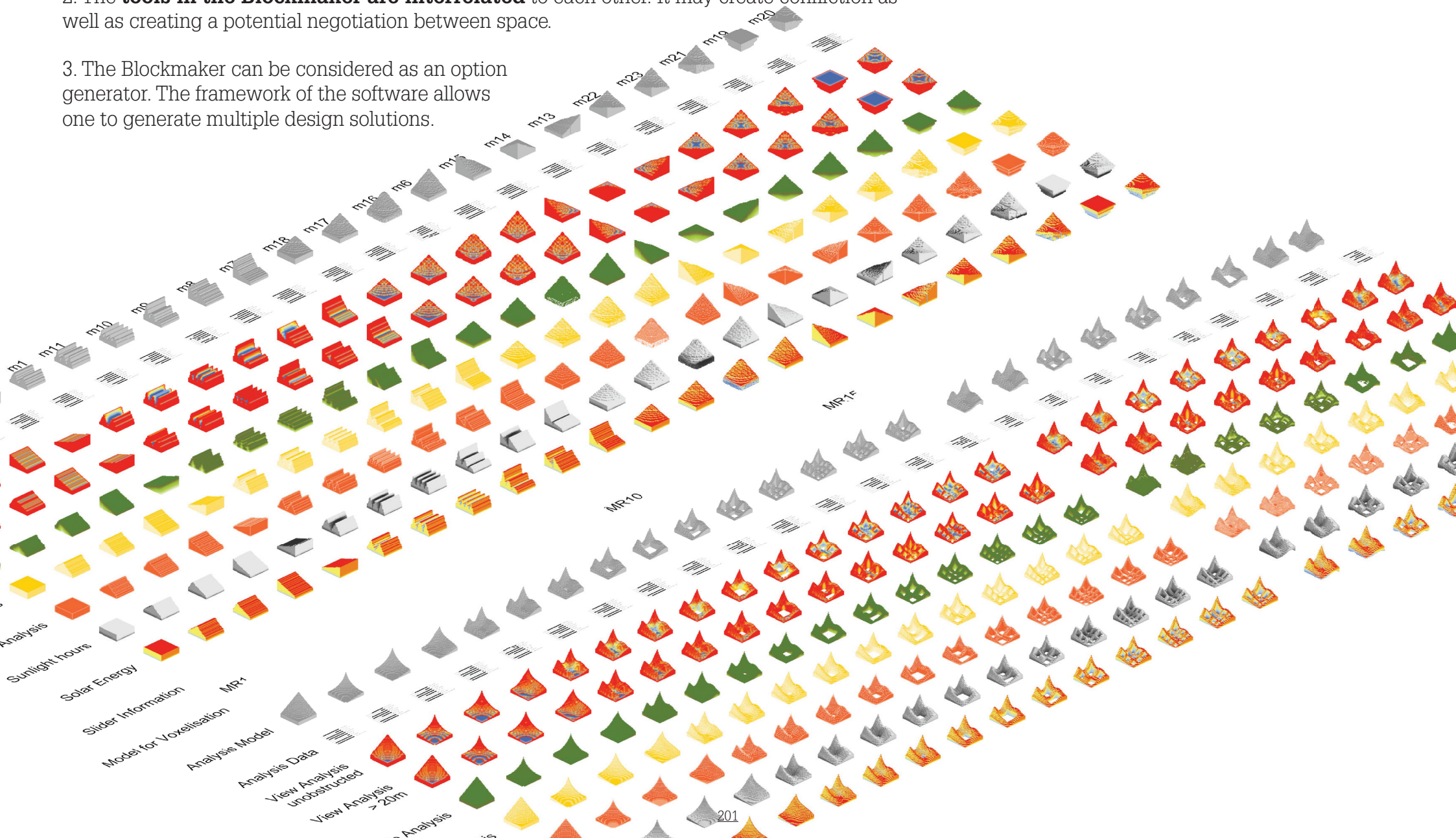
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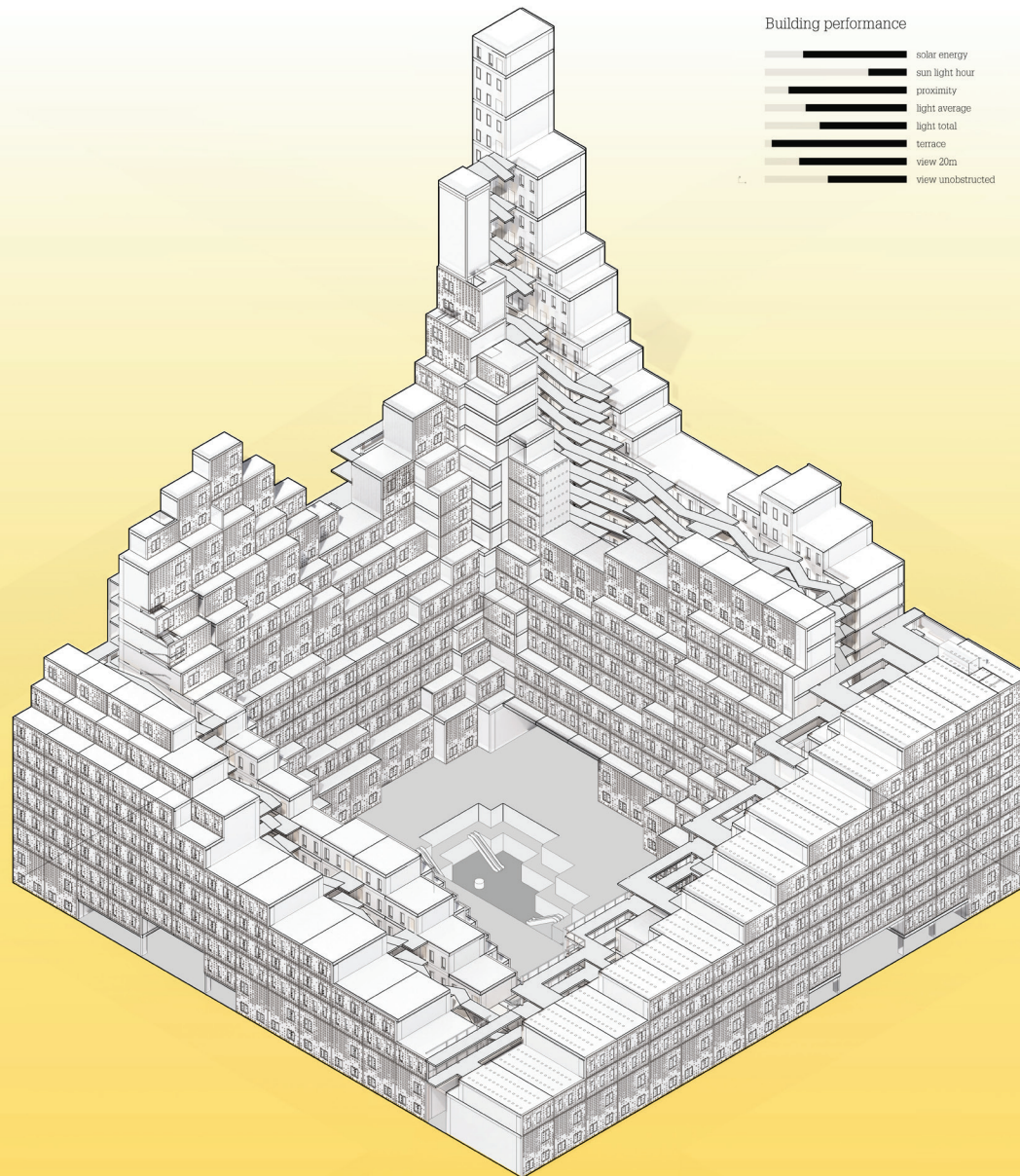
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What's Next ?

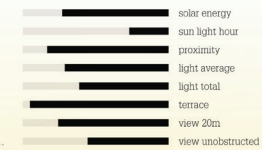
Reflection on The Blockmaker:

1. The Blockmaker has challenged the notion of **mass, desire and demands**.
2. The **tools in the Blockmaker are interrelated** to each other. It may create confliction as well as creating a potential negotiation between space.
3. The Blockmaker can be considered as an option generator. The framework of the software allows one to generate multiple design solutions.



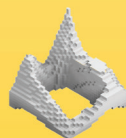
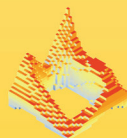


Building performance



THE SOLAR MOUNTAIN

SOLAR ENERGY SELF-SUFFICIENT HOUSING BLOCK



% Unobstru cted view	Distant to terrace (m)	% Daylight	Average proximity	% Sunlight hour	Solar Energy (MWh)
77.5	1.14	57	5.1	25	4223