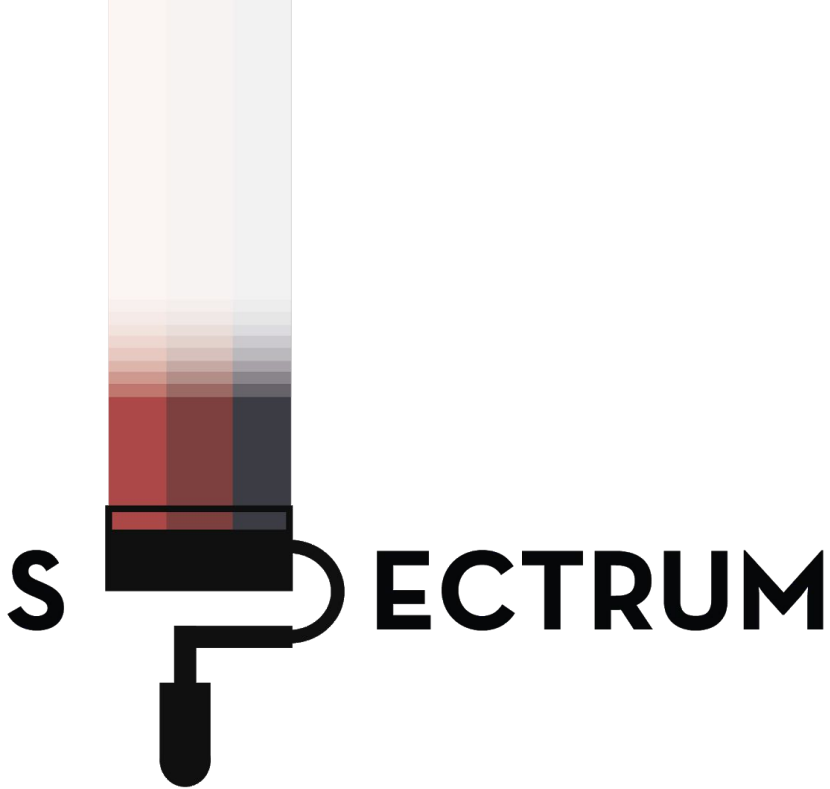

23

By 2050

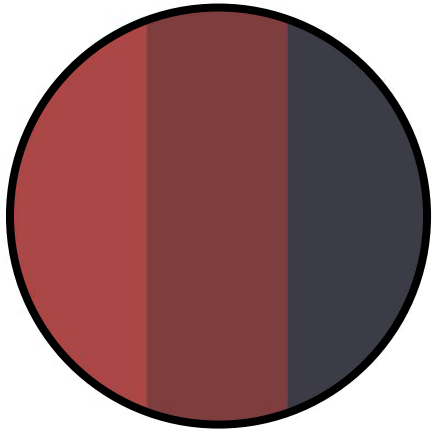
+ 5°C in Cities ⇢ **+ 30%** Energy Need

Warm Season

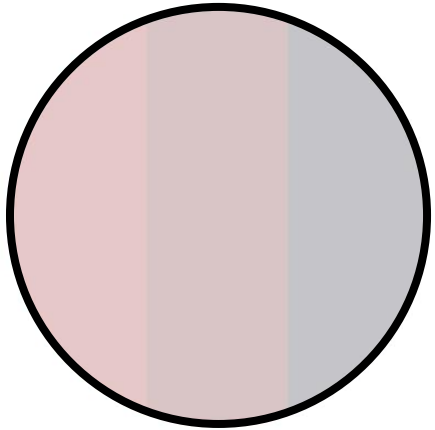

Warm Season
Cold Season


S ECTRUM

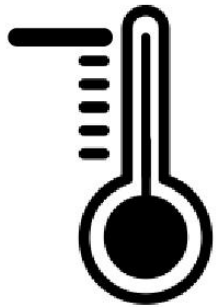
20 °C

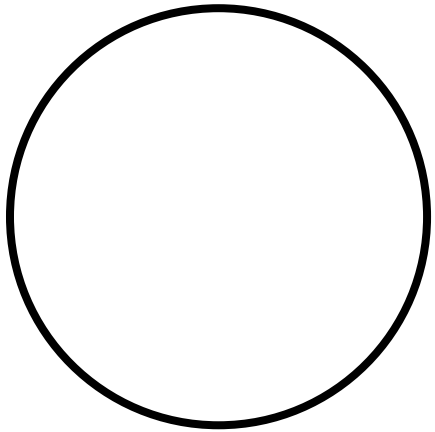


25 °C

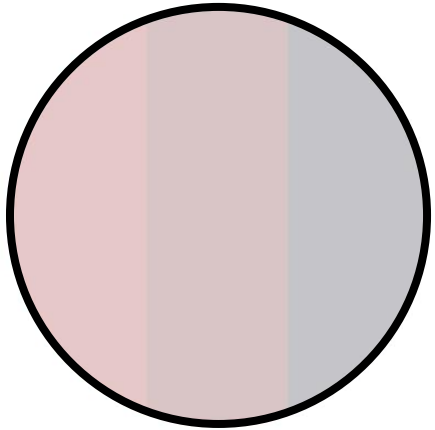


30 °C

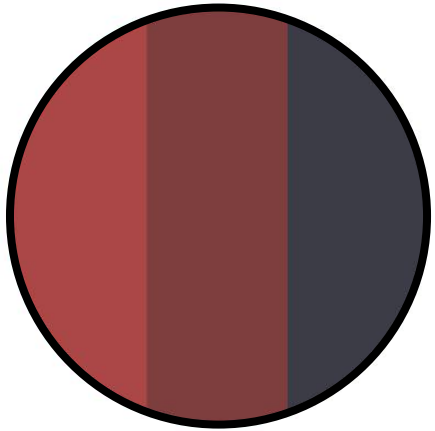




25 °C



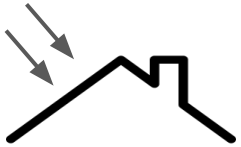
20 °C



Direct sun exposure

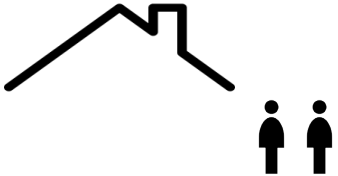
Direct sun exposure

Easy to paint

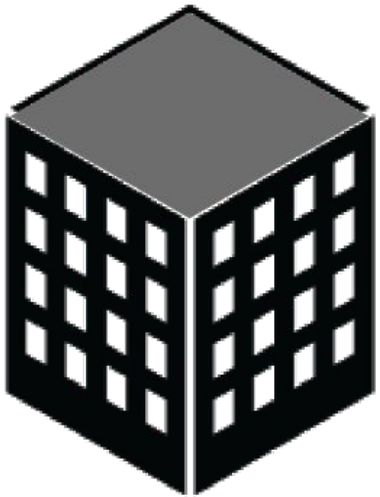


Direct sun exposure

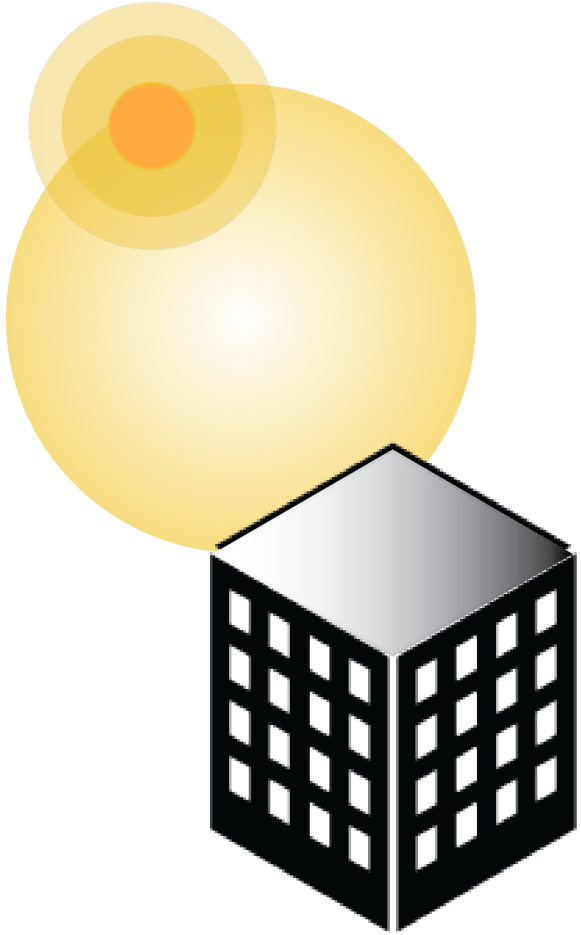
Easy to paint



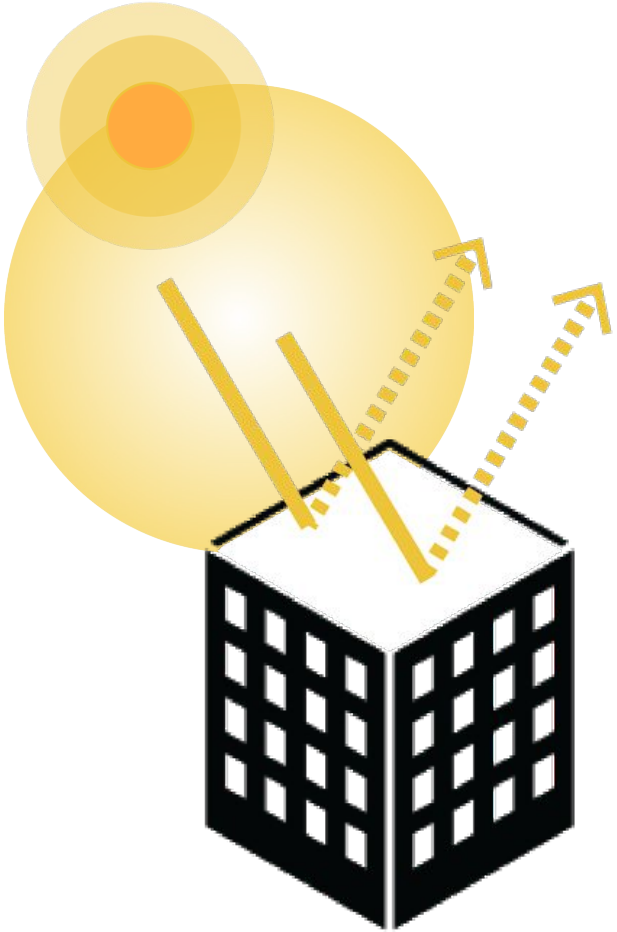
Do not affect everyday life



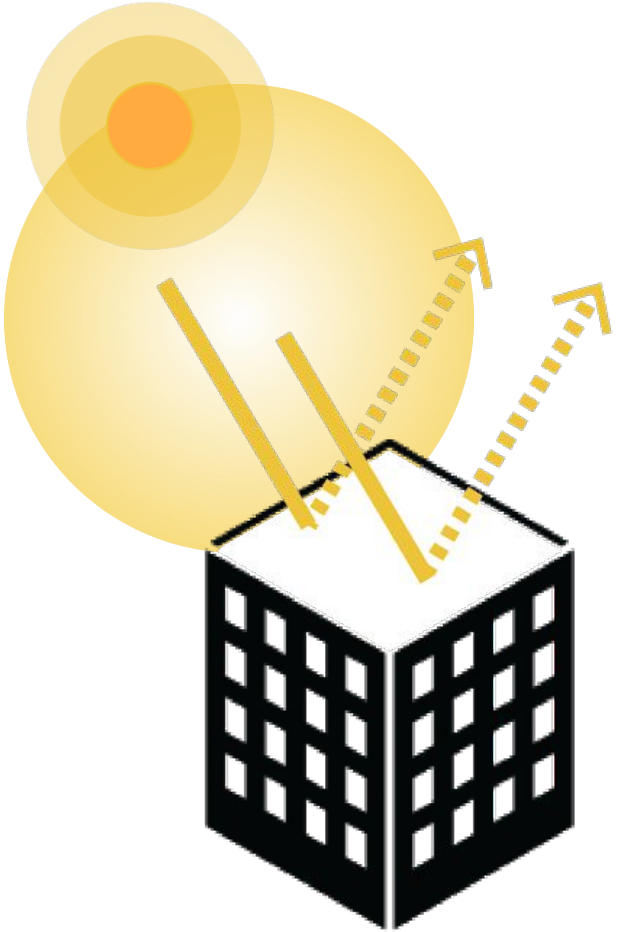
WARM SEASONS



WARM SEASONS



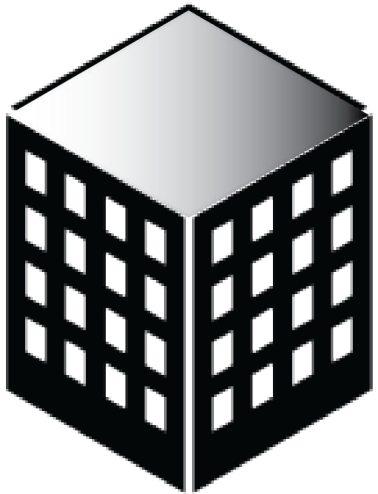
WARM SEASONS



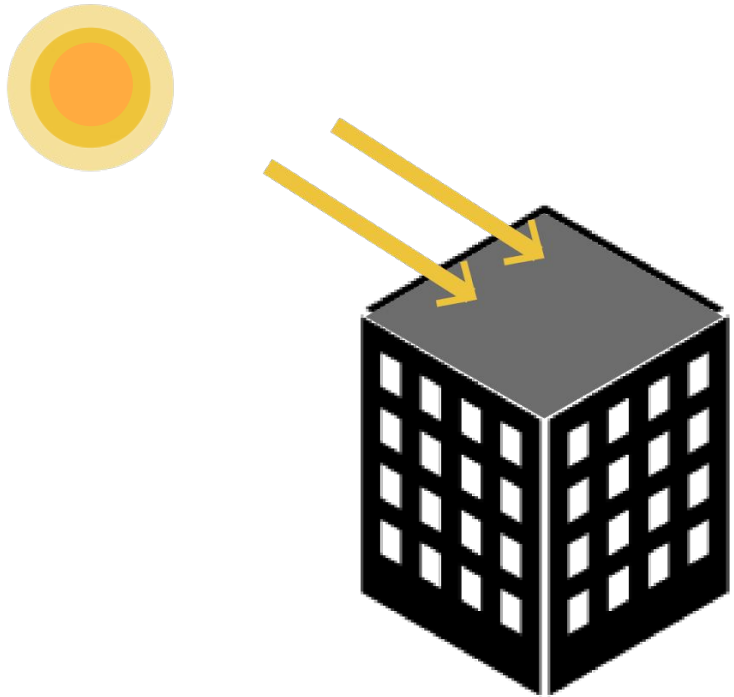
90 % REFLECTIVITY

15 % COOLING ENERGY SAVING

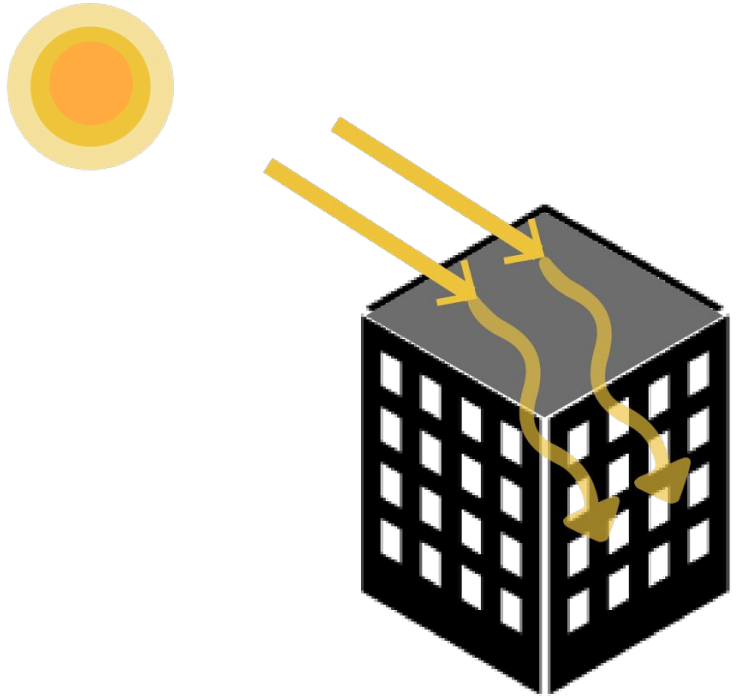
COLD SEASONS



COLD SEASONS



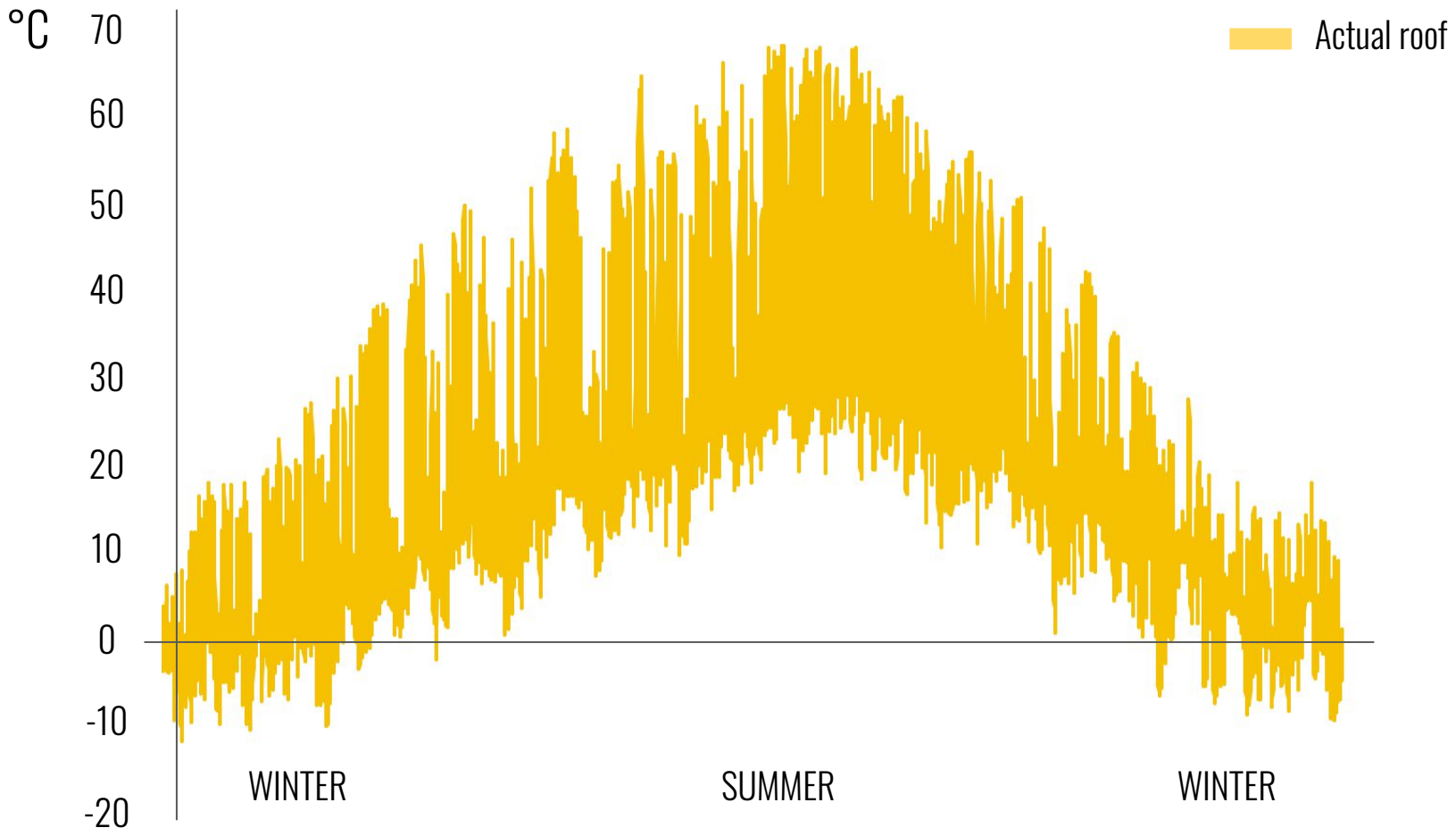
COLD SEASONS

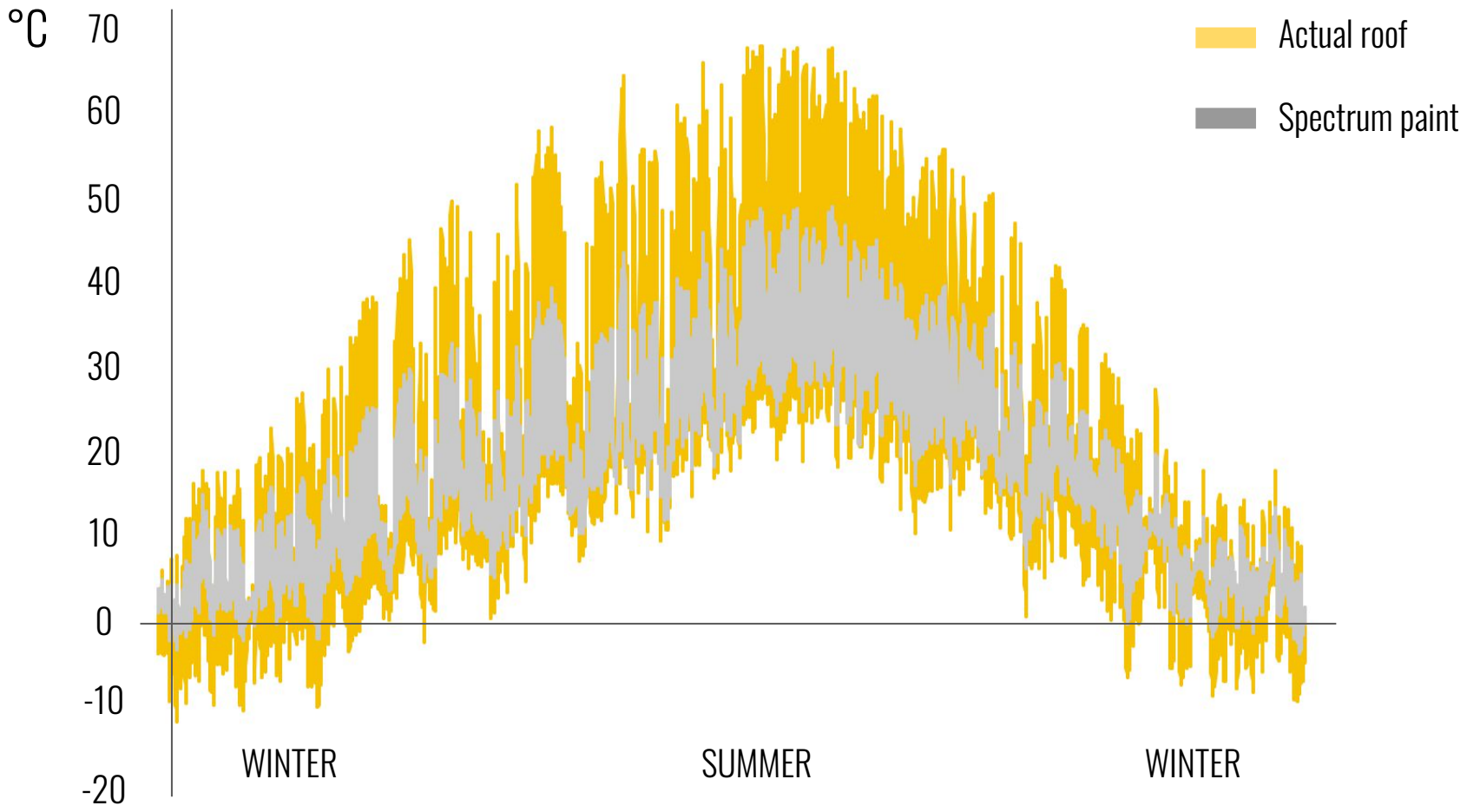


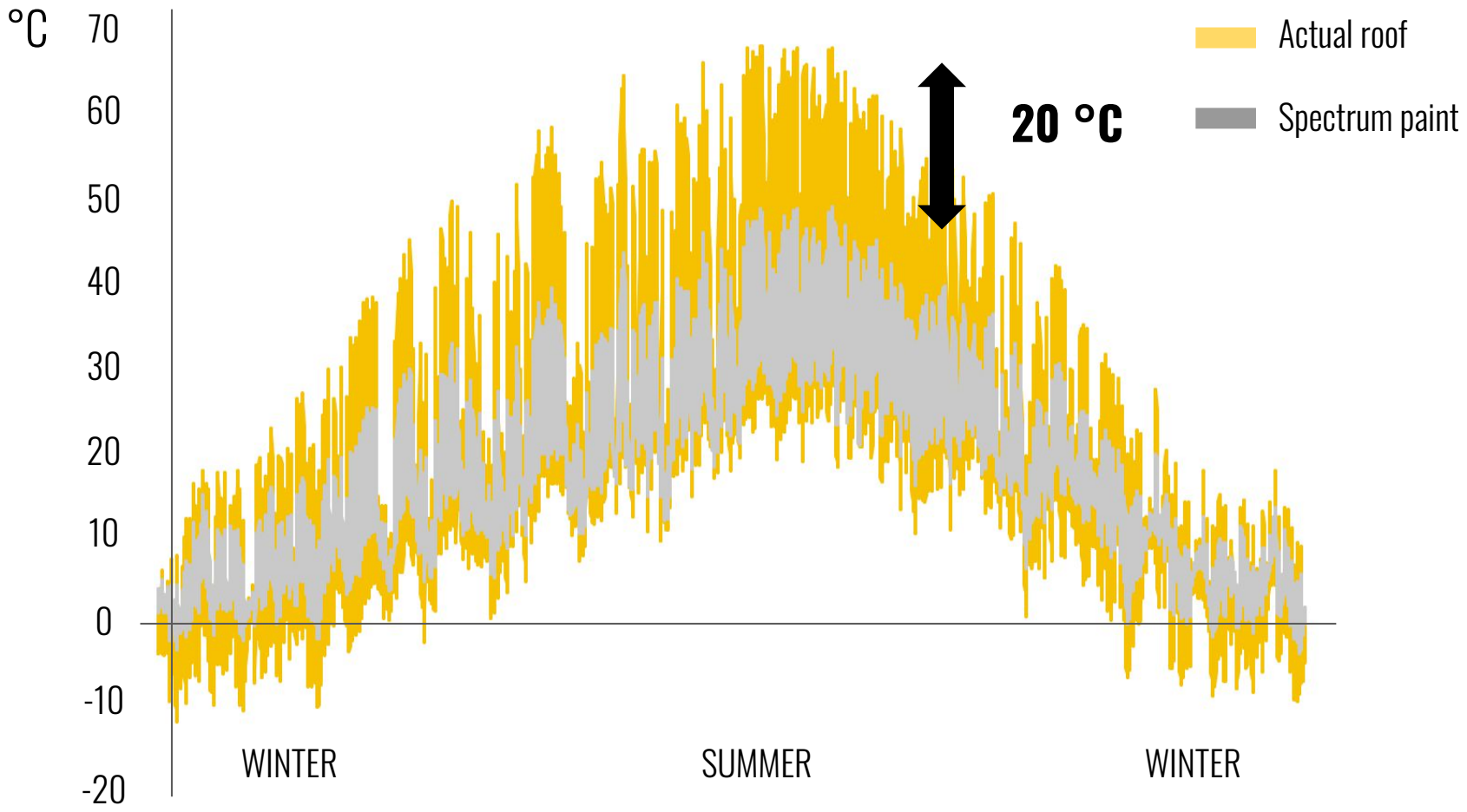
ORIGINAL ABSORPTANCE

NO COUNTER EFFECT

TALENT GARDEN
FONDAZIONE AGNELLI


°C
70
60
50
40
30
20
10
0
-10
-20
Actual roof
WINTER
SUMMER
WINTER


°C
70
60
50
40
30
20
10
0
-10
-20
Actual roof
Spectrum paint
WINTER
SUMMER
WINTER


°C
70
60
50
40
30
20
10
0
-10
-20
Actual roof
Spectrum paint
20 °C
WINTER
SUMMER
WINTER

ENERGY SAVING

14% per year

ENERGY SAVING **14%** per year

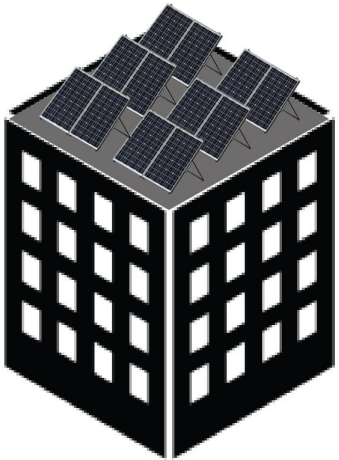
MONETARY SAVING **7k** per year

ENERGY SAVING **14%** per year

MONETARY SAVING **7k** per year

PAYBACK TIME **1.5** years

SOLAR PANELS

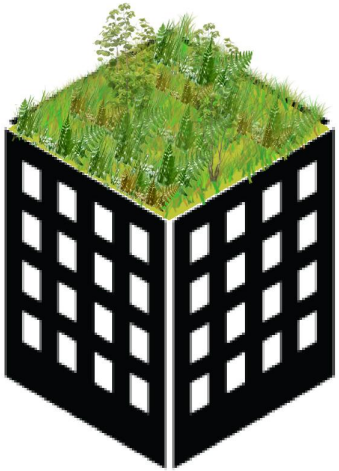


Price **300 €/m²**

Payback **8 years**

Energy savings **from 50%**

GREEN ROOF

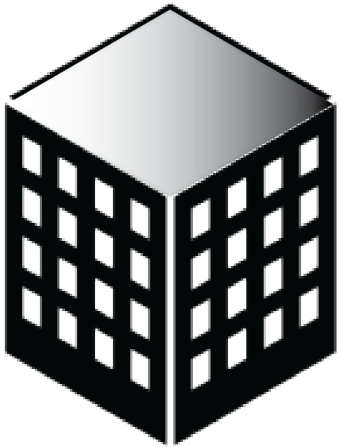


Price **150 €/m ^{2}**

Payback **5 years**

Energy savings **15 %**

SPECTRUM

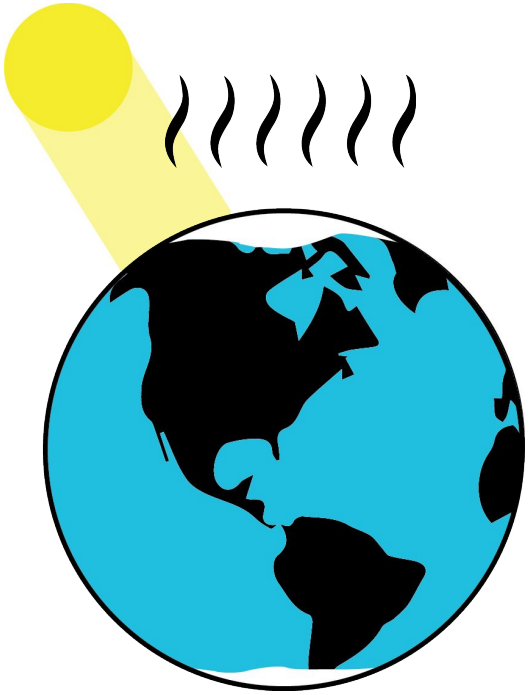


Price **20 €/m²**

Payback **1.5 years**

Energy savings **15 %**


80%
3°C



NOW

+ REFLECTIVE SURFACE

− GLOBAL WARMING

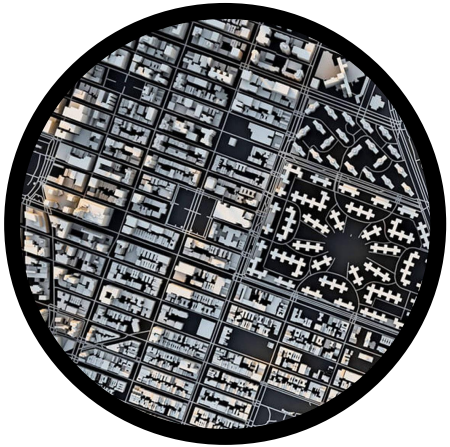
BUILDING

Save **15%** energy

BUILDING

Save **15%** energy

CITY

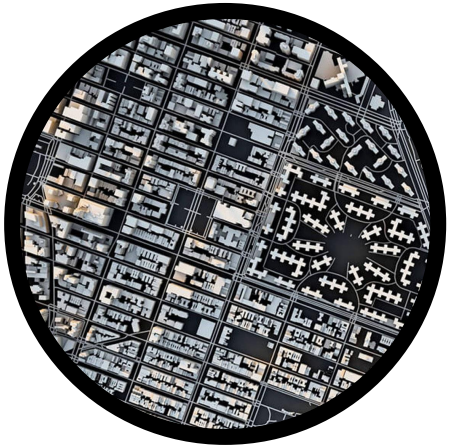


Decrease **3°C**
city temperature

BUILDING

Save **15%** energy

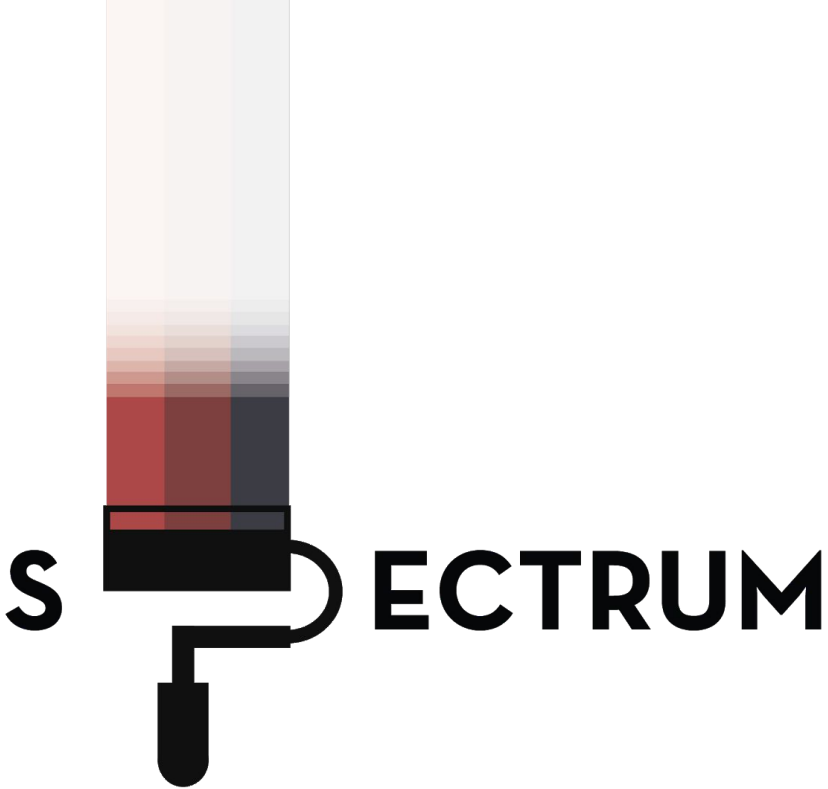
CITY



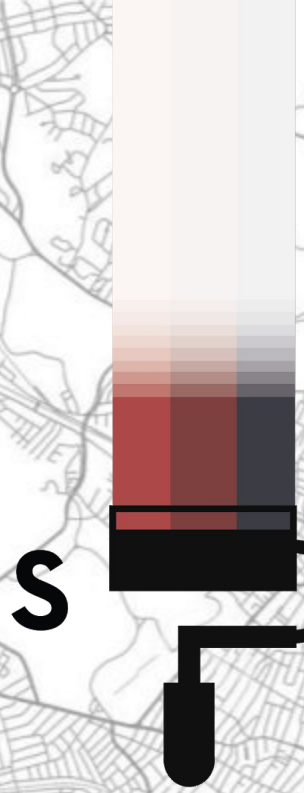
Decrease **3°C**
city temperature

WORLD

Reduce and delay
global warming



YOU SAVE ENERGY WE SAVE THE WORLD



SPECTRUM

JOIN US

SWITCH ON YOUR ROOF

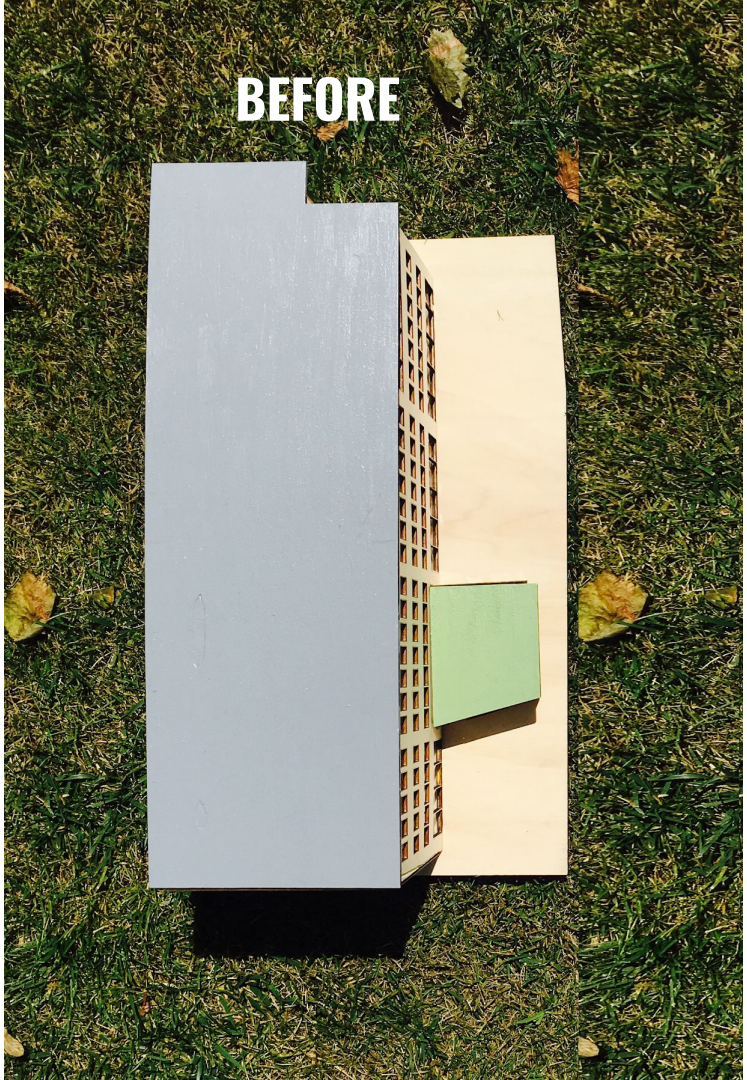
CERN Ideas

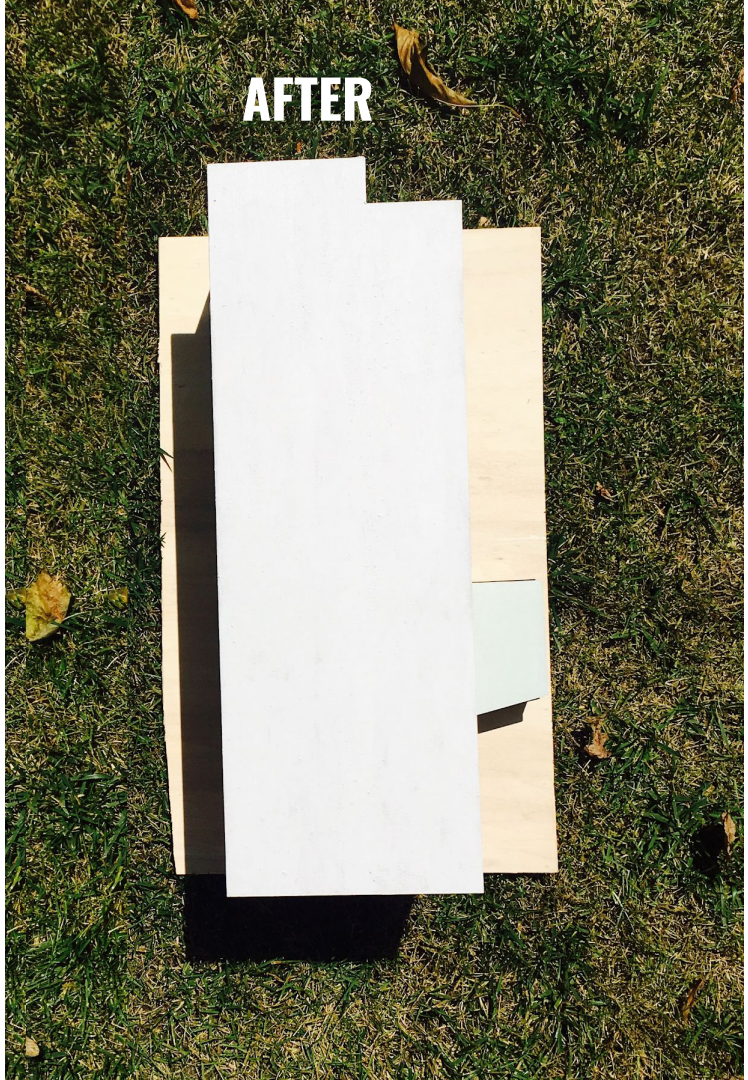
SCIENTIFIC COMMUNITY

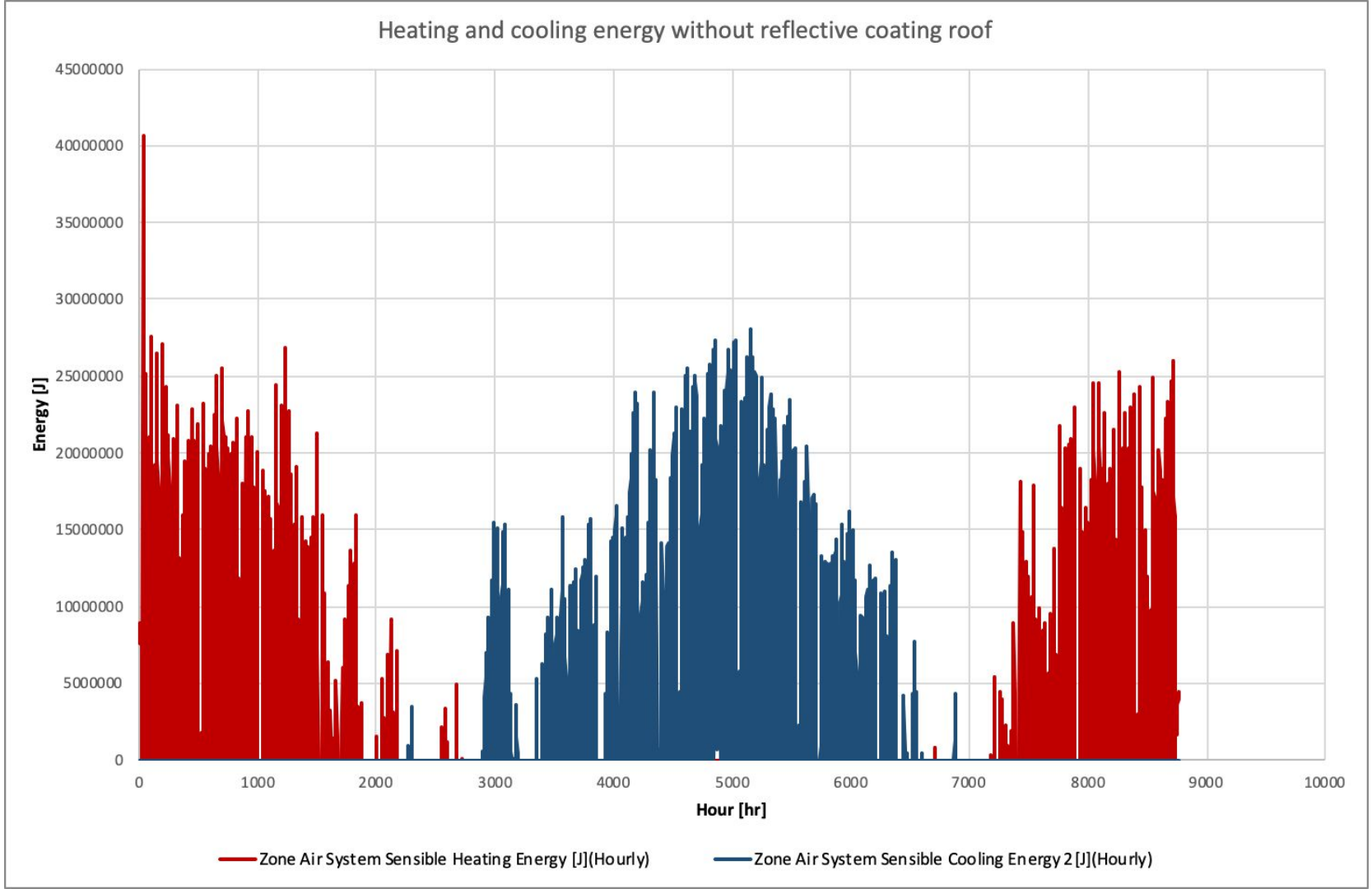
FERROVIE DELLO STATO ITALIANE

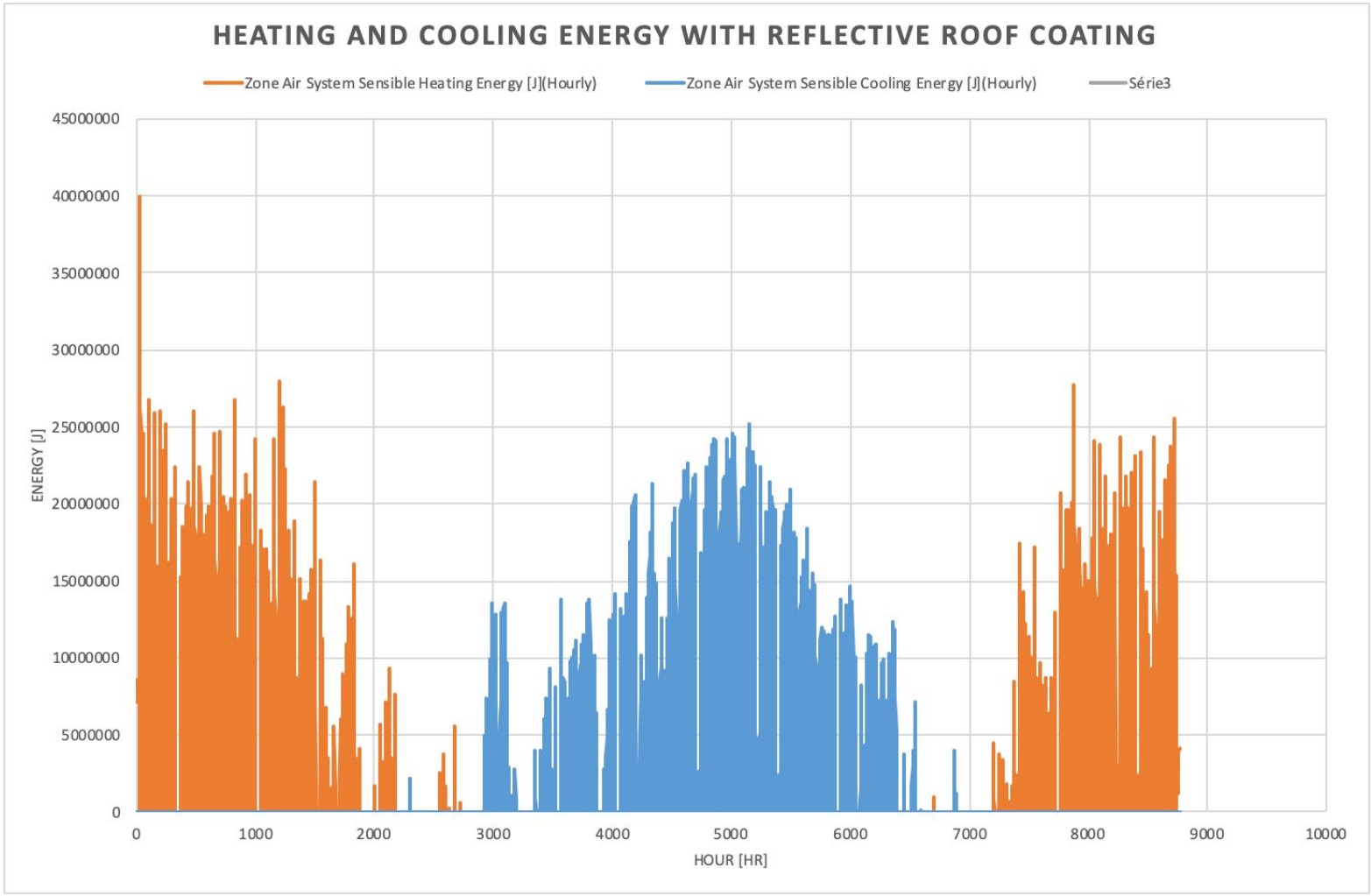
COLLEGE DES INGENIEURS

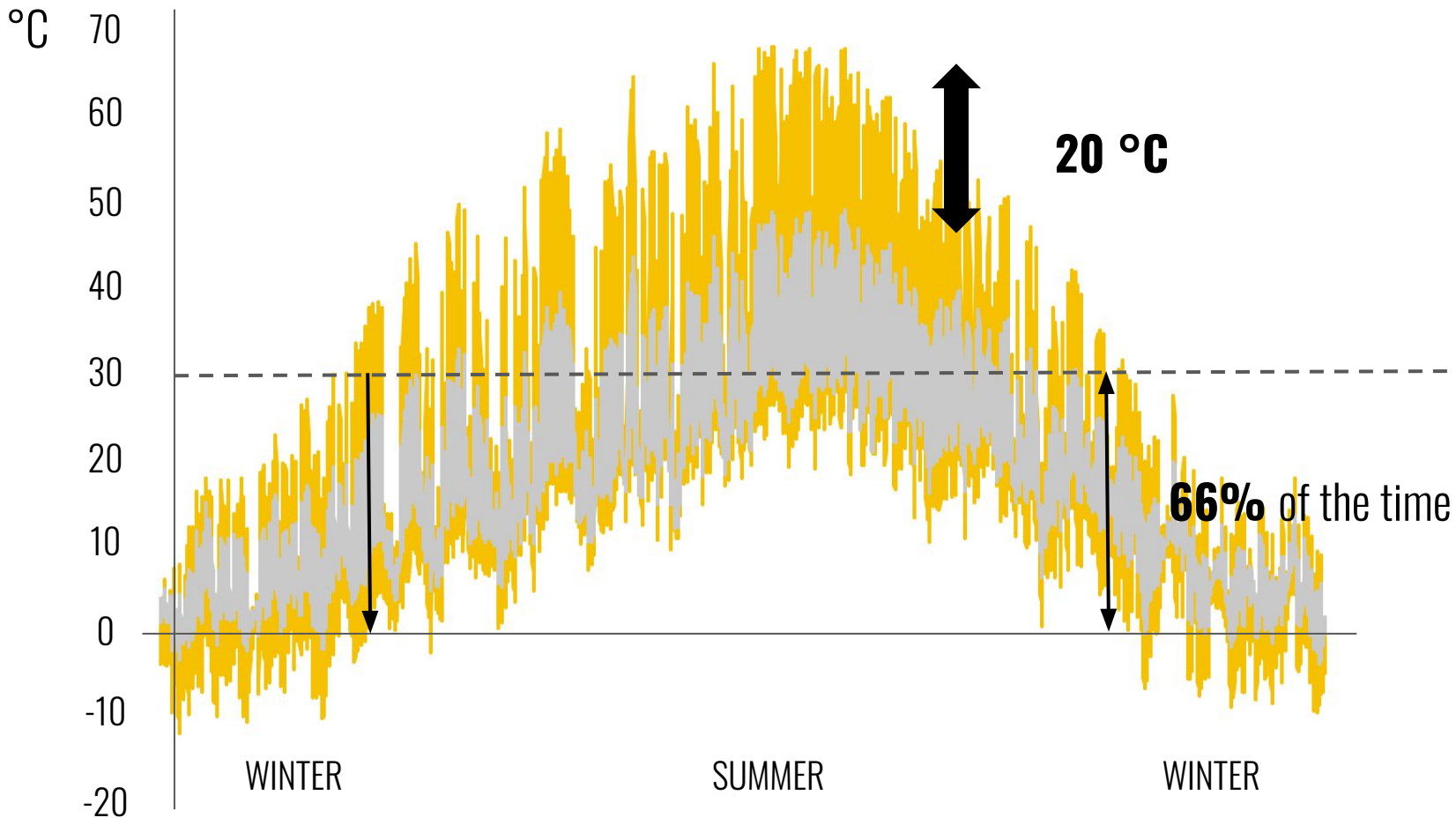
POLITECNICO DI TORINO

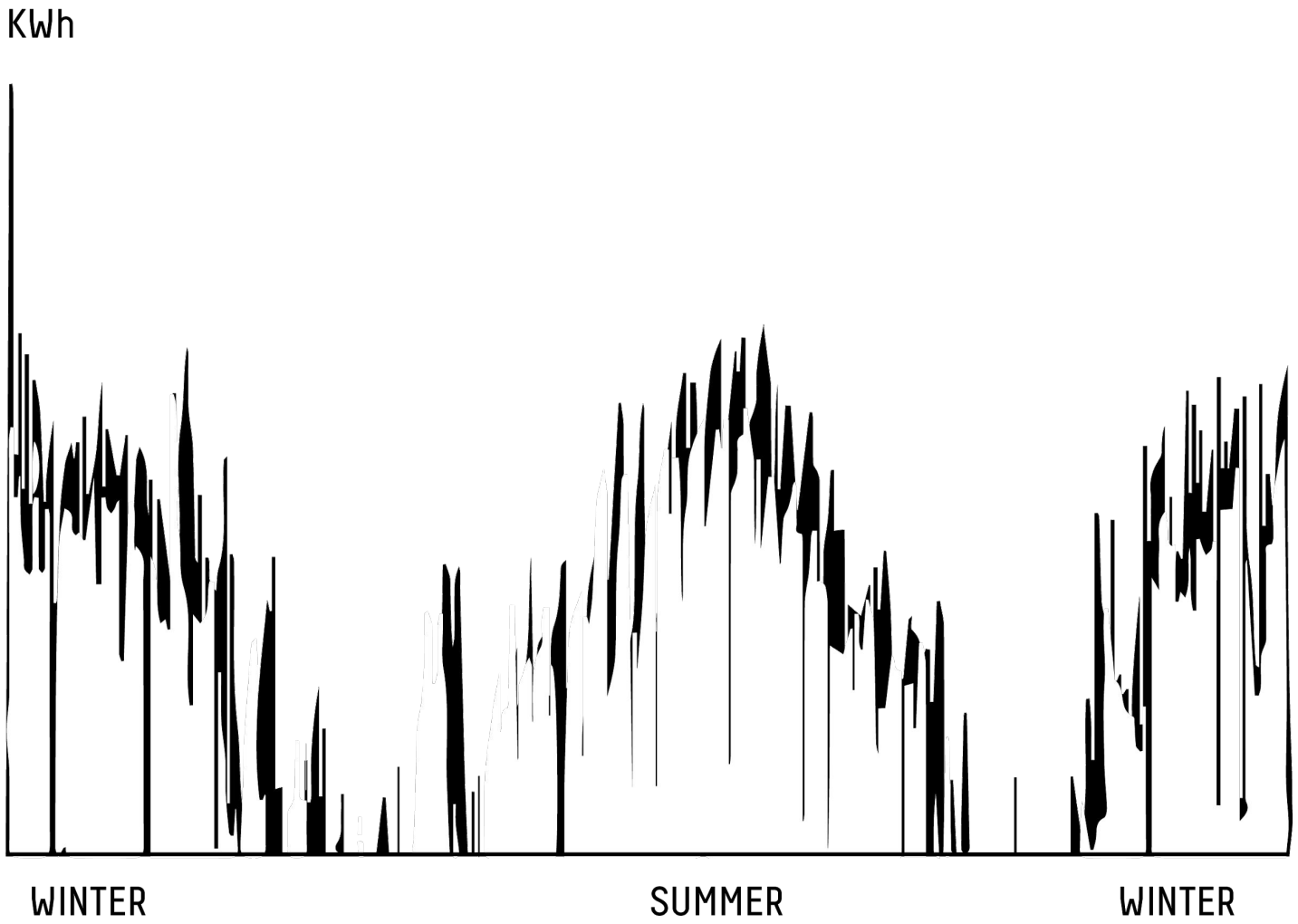

BEFORE


AFTER


Heating and cooling energy without reflective coating roof
45000000
40000000
35000000
30000000
25000000
20000000
15000000
10000000
5000000
0
Energy [J]
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
Hour [hr]
Zone Air System Sensible Heating Energy [J](Hourly)
Zone Air System Sensible Cooling Energy 2 [J](Hourly)


HEATING AND COOLING ENERGY WITH REFLECTIVE ROOF COATING
Zone Air System Sensible Heating Energy [J](Hourly)
Zone Air System Sensible Cooling Energy [J](Hourly)
Série3
45000000
40000000
35000000
30000000
25000000
20000000
15000000
10000000
5000000
0
ENERGY [J]
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
HOUR [HR]


°C
70
60
50
40
30
20
10
0
-10
-20
20 °C
66% of the time
WINTER
SUMMER
WINTER


KWh
WINTER
SUMMER
WINTER

White roof will increase or decrease global warming?

Lawrence Berkeley National Laboratory is the first to use a global model to study the question

If all eligible urban flat roofs in the tropics and temperate regions were gradually converted to white (and sloped roofs to cool colors), they would offset the heating effect of the emission of roughly 24 Gt of CO_2, but one-time only," says Rosenfeld, who returned to Berkeley Lab this year. "However, if we assume that roofs have a service life of 20 years, we can think of an equivalent annual *rate* of 1.2 Gt per year. That offsets the emissions of roughly 300 million cars (about the cars in the world) for 20 years!"

UPDATED CITY REGULATION

75 % of the roof

Minimum solar reflectance = 0.7

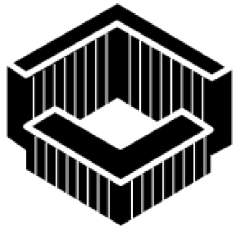
NEW YORK

CHICAGO

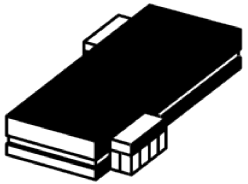
LOS ANGELES

MELBOURNE

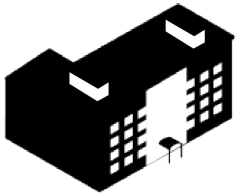
Real estate assets of Ferrovie dello Stato



Commercial buildings (AutoGrill, Carrefour, Coop, Conad)



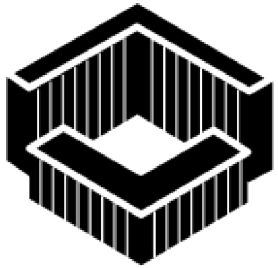
Production facilities

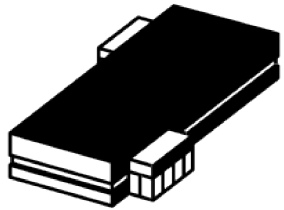


City Municipalities

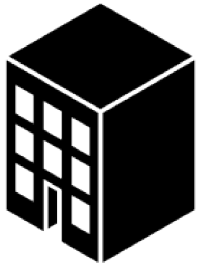
Institutional buildings (Hospitals, Universities, Military Barracks)

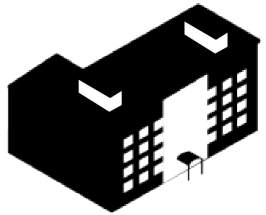
Italian Market





15 mln buildings





nefits too.
ions of Los Angeles
cing about
s and rooftops with
, as well as planting
cool the city by 2-3C.
e LA smog as much
ars and lorries, and
also save a fortune
On hot days in
o to 40% of all
consumed by
nd each degree a
rms is reckoned to
ned up enough to
MW - the output of a
ar power station.
hat widespread use
could slash $1bn
ls in the US a

Each 10 sq m of urban surface
increasing the reflectivity of road and
roof surfaces in urban areas with
populations over 1 million would
reduce carbon dioxide emissions 1.2
gigatons of carbon dioxide annually.
That's the equivalent of taking 300
million cars of the road.

Together, roads and roofs are reckoned to cover more than half the available surfaces in urban areas, which have spread over some 2.4% of the Earth's land area. A mass movement to change their colour, Akbari calculates, would increase the amount of sunlight bounced off our planet by 0.03%. And, he says, that would cool the Earth enough to cancel out the warming caused by 44bn tonnes of CO_2 pollution

of the Earth is urban areas

There are other benefits too.
Computer simulations of Los Angeles show that resurfacing about two-thirds of roads and rooftops with reflective surfaces, as well as planting more trees, could cool the city by 2-3C. That would reduce LA smog as much as a total ban on cars and lorries, and cooler roofs could also save a fortune in electricity bills. On hot days in North America, up to 40% of all electricity can be consumed by air-conditioners, and each degree a city such as LA warms is reckoned to see the air-con turned up need another 500MW - the decent sized nuclear pow Akbari estimates that wi of cooler rooftops could from electricity bills in t

Oleson found that even if every city building roof and stretch of urban pavement in the world were painted white, it would only delay global warming by 11 years. But its potential value in ameliorating the most severe consequences of excess heat in cities could be life-saving.