

A photograph of an outdoor staircase surrounded by lush greenery. The scene is misty, with a large illuminated sign in the background that reads "BREATHE". The sign is made of white, block letters and is mounted on a dark structure. The staircase has a dark metal railing and leads up through the trees. The overall atmosphere is serene and natural.

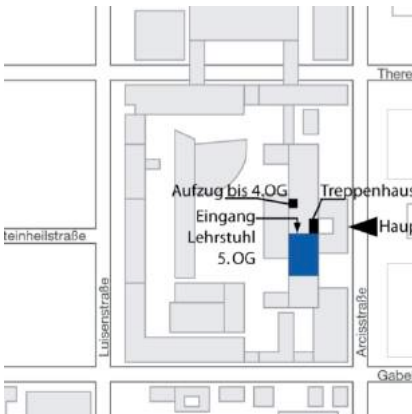
BREATHE

Urban Climate Transformation
Thomas Auer

Transsolar offices...

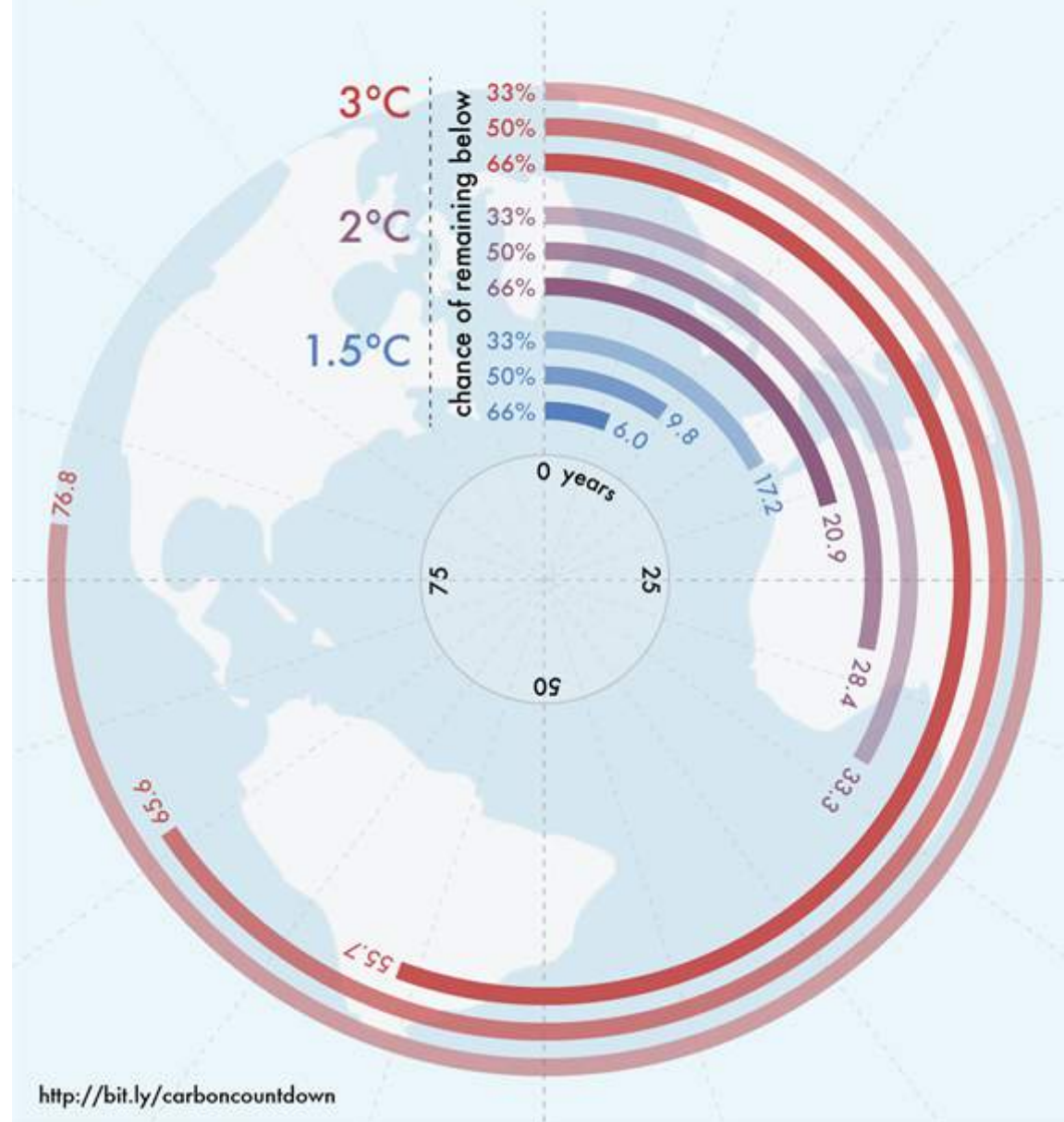


Staff



Carbon Countdown

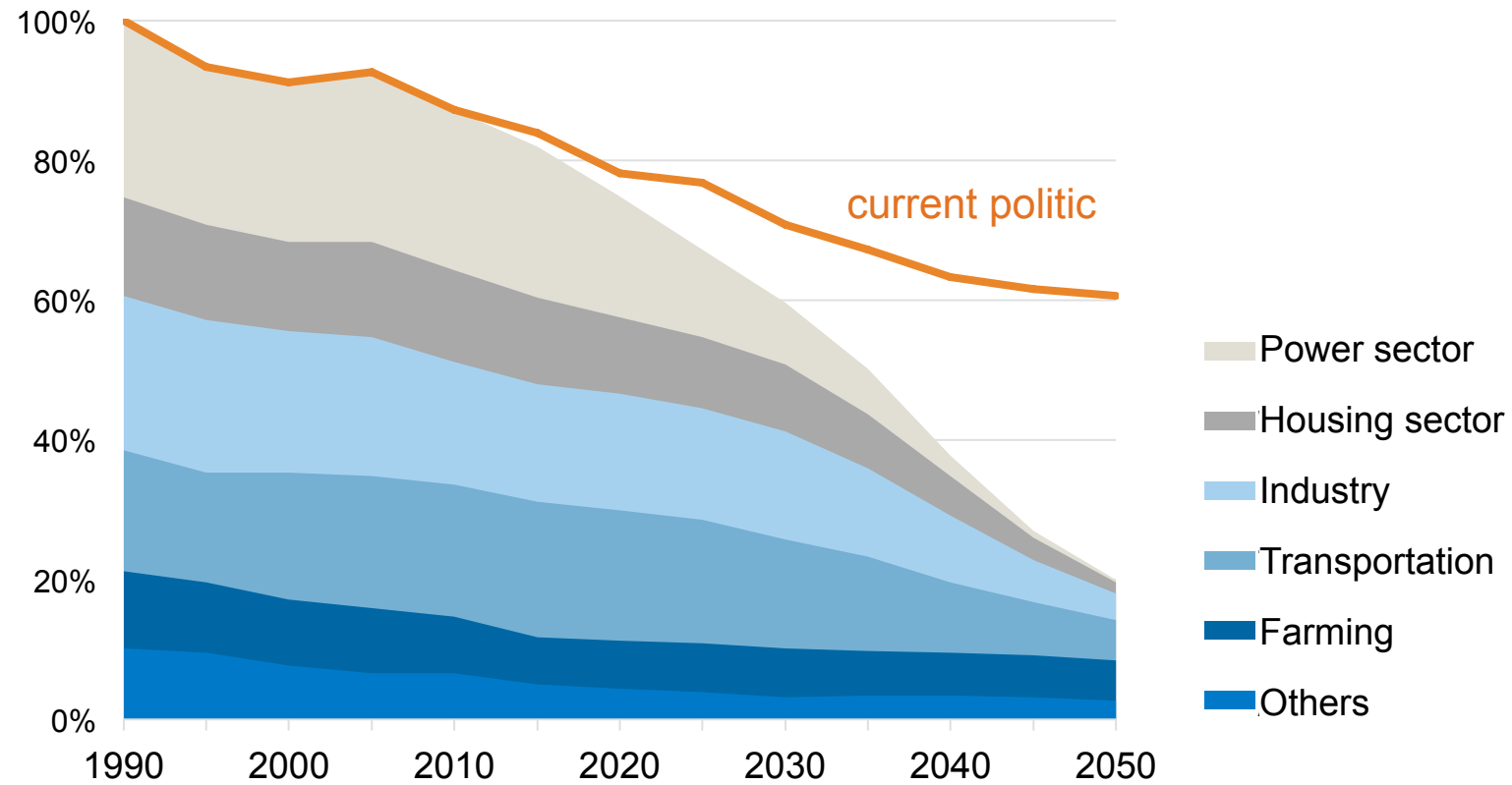
How many years of current emissions would use up the IPCC's carbon budgets for different levels of warming?



EU Carbon Roadmap

EU reduction of carbon emissions by 80% (100%=1990)

Source: European Commission



CO₂ TO ZERO

WE NEED TO REDUCE OUR EMISSIONS





Welcome to the breathtaking
Tokyo Water Park



37° C + / 60% RH

hot + dry air layer

25° - 35° C / 100% RH

warm + humid air layer

cool + dry air layer

18° C / 40% RH



Venice Biennale 2010 **cloudscapes**

photo: Tetsuo Kondo



Venice Biennale 2010 **cloudscapes**

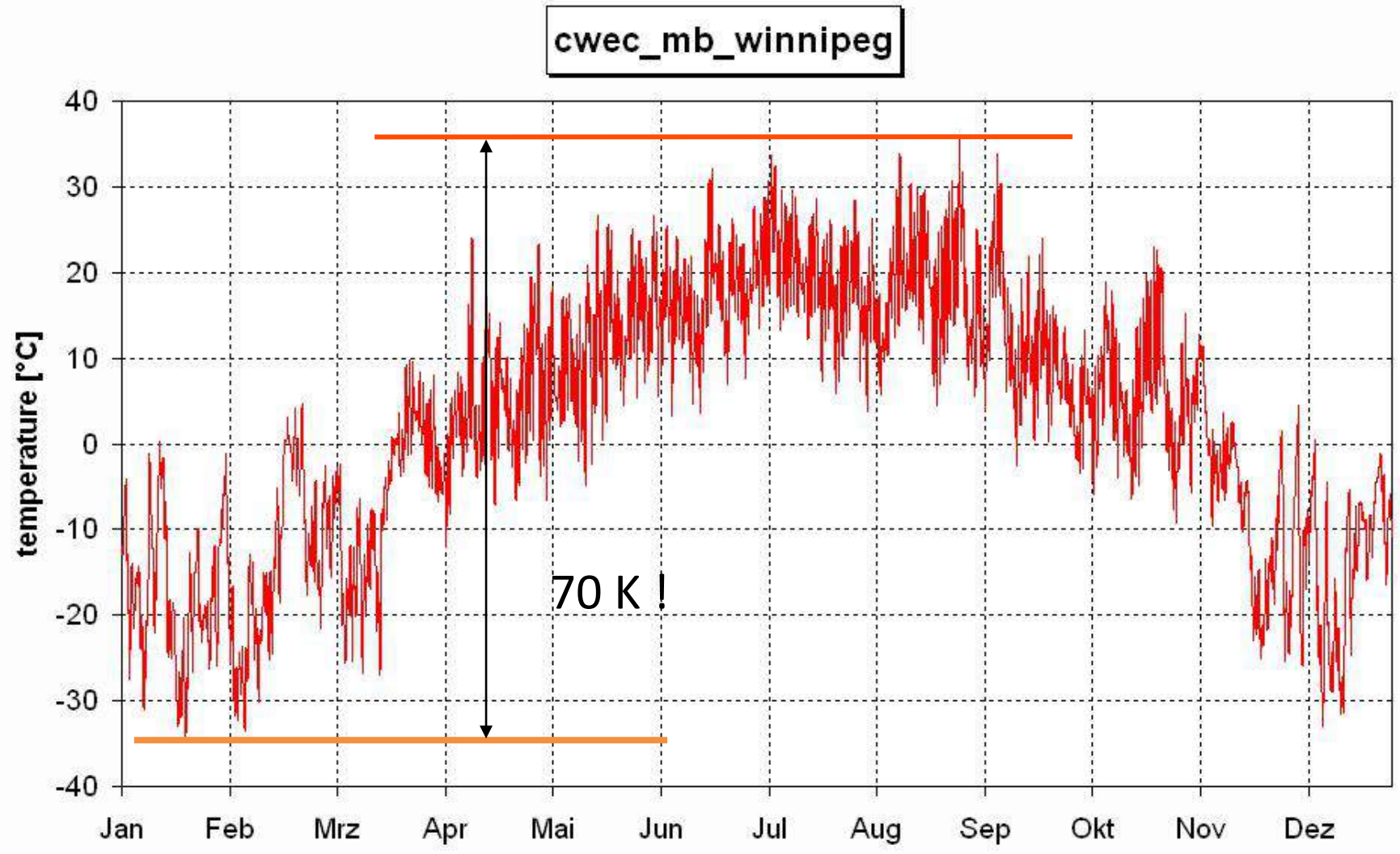
photo: Tetsuo Kondo



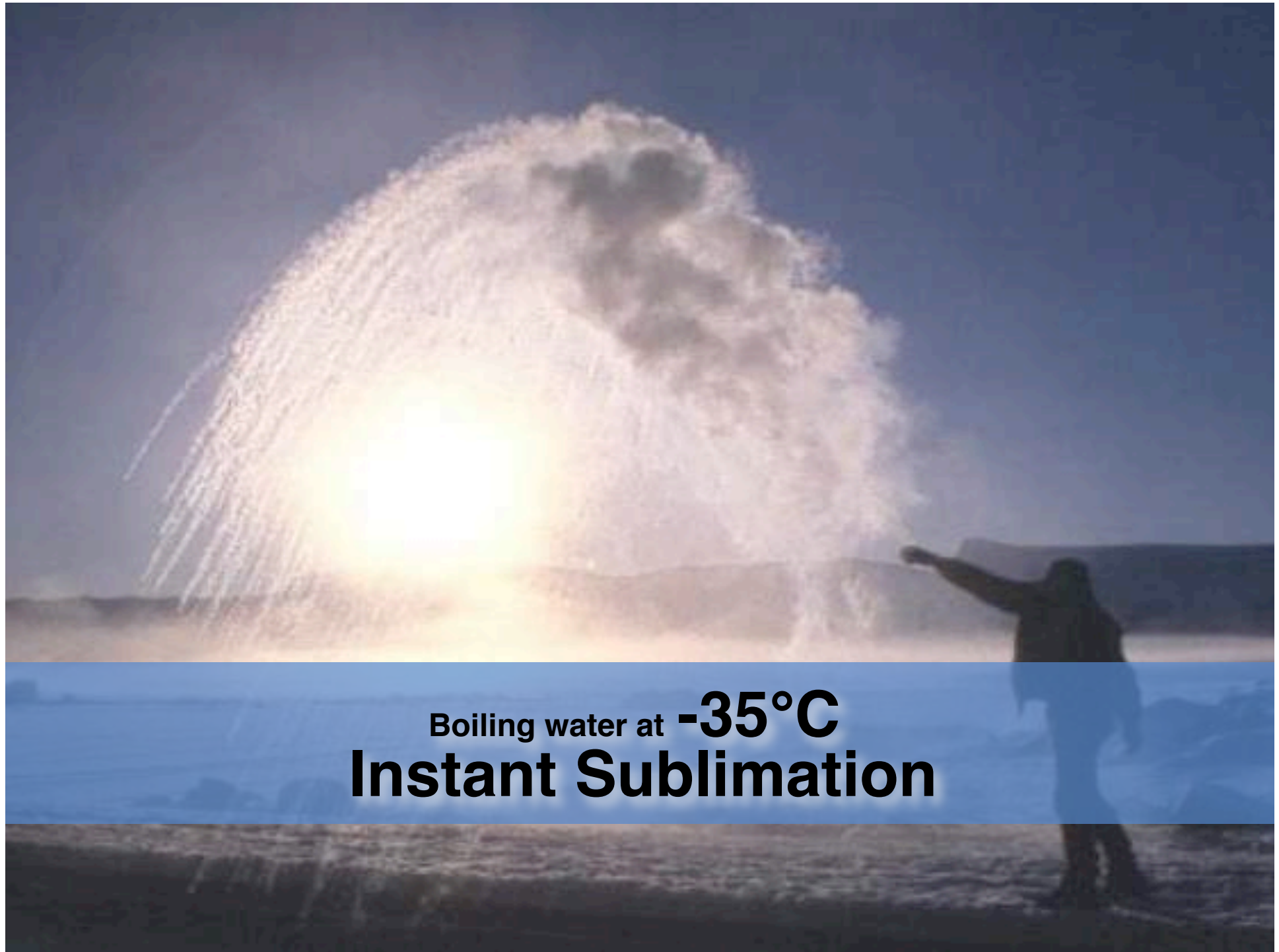
Manitoba Hydro - Winnipeg

architect: **KPMB**

photo: Ger



Climate - Winnipeg

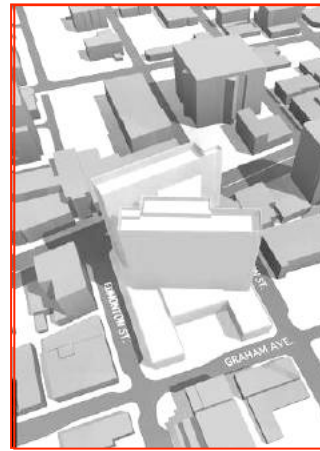
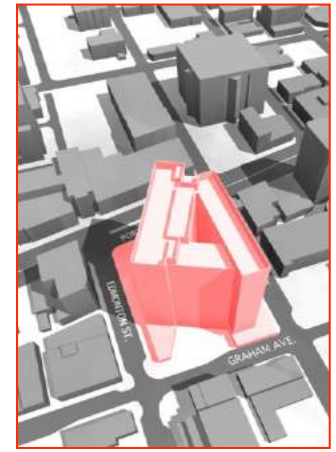
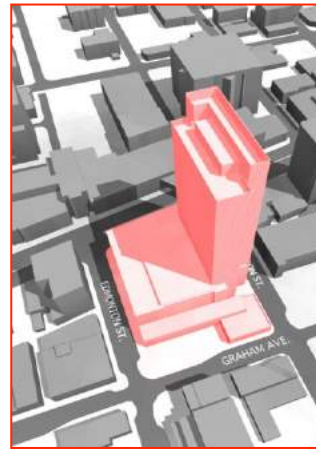


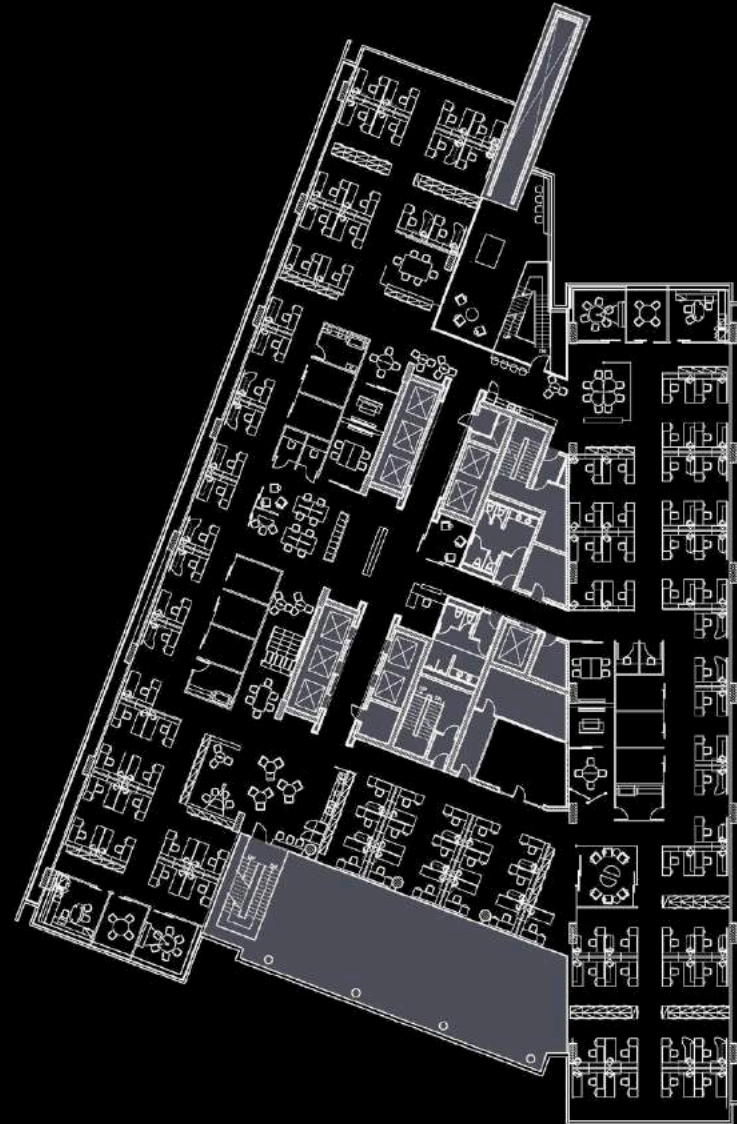
Boiling water at -35°C
Instant Sublimation

Iterative and integrative approach:

15 Options

3 for testing



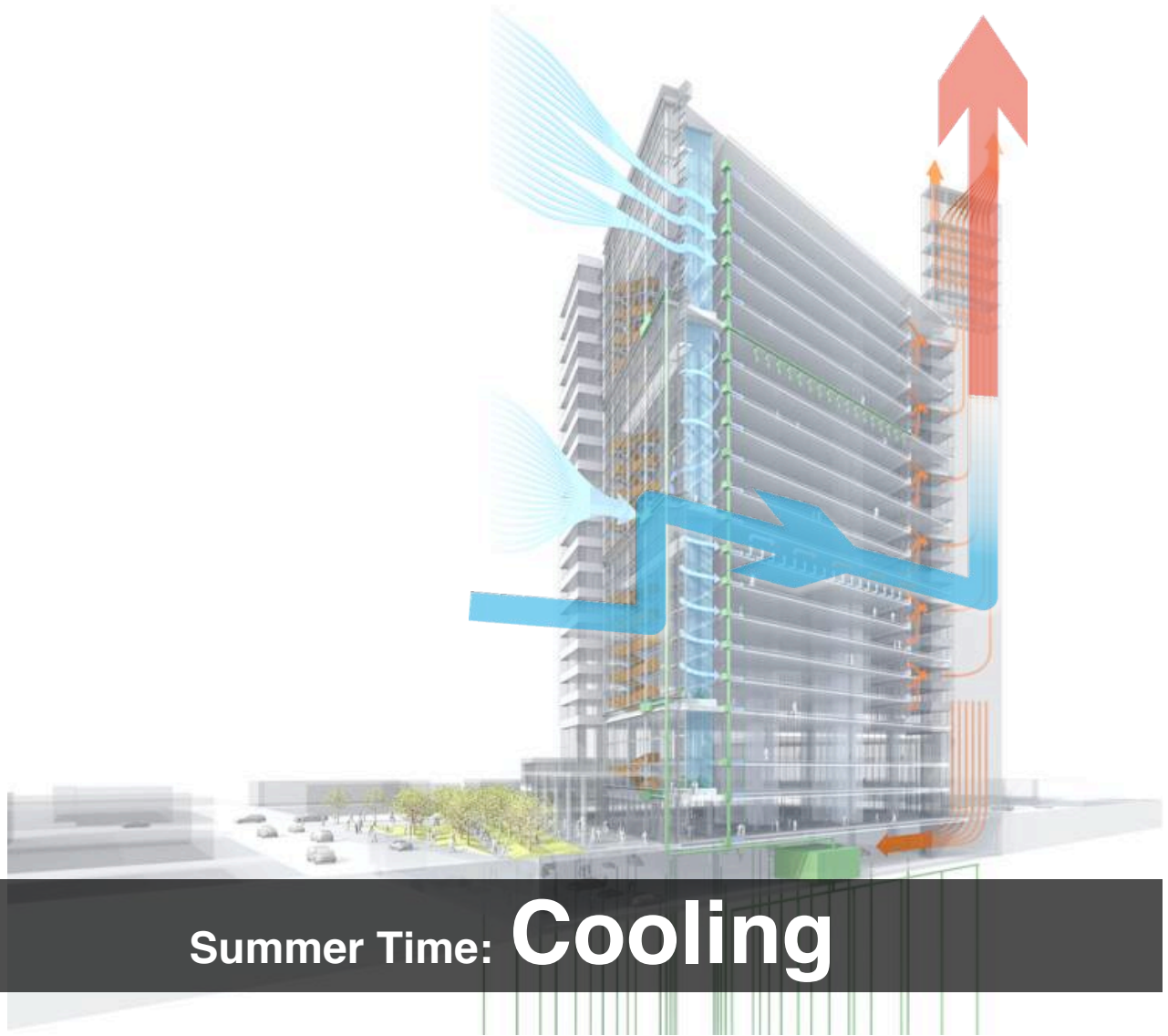


Typical Floor Plan





Winter Time: **Heating & Cooling**



Summer Time: **Cooling**



photo: Eduard Hueber

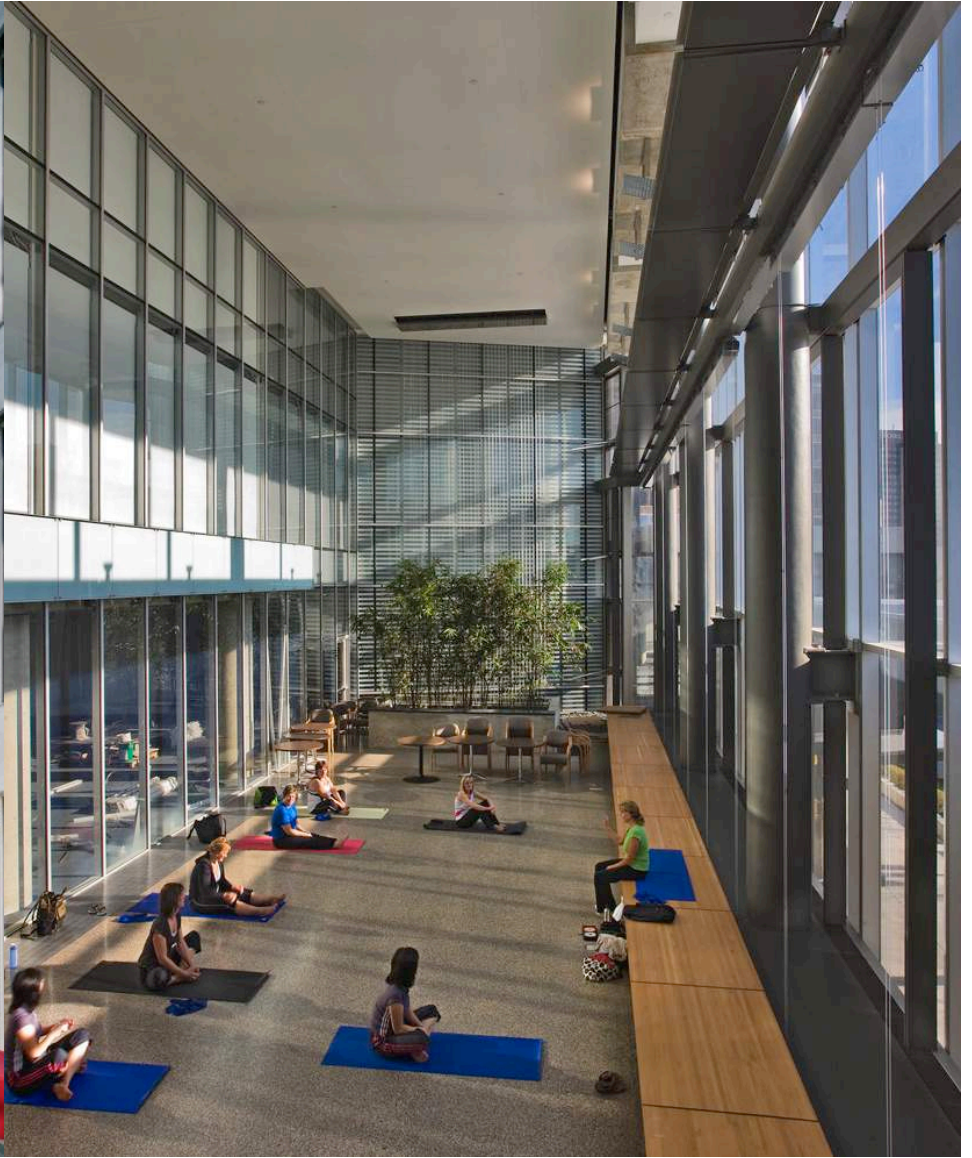
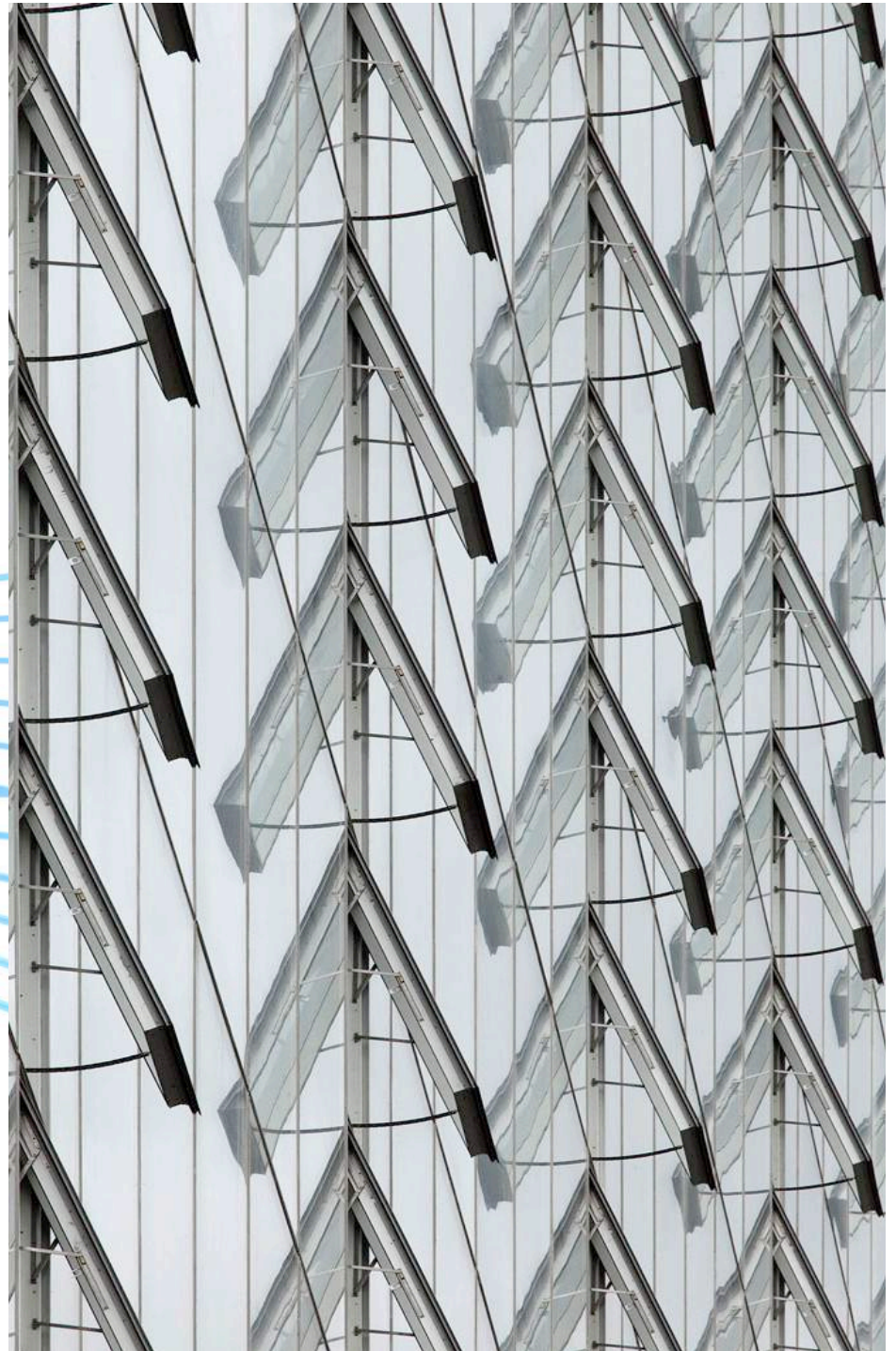
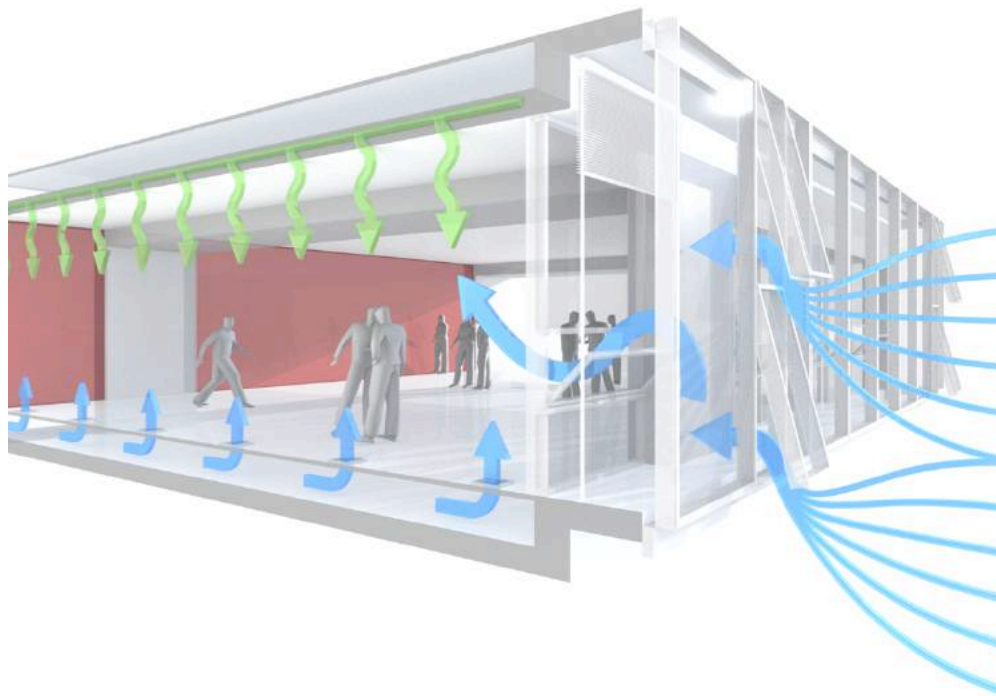
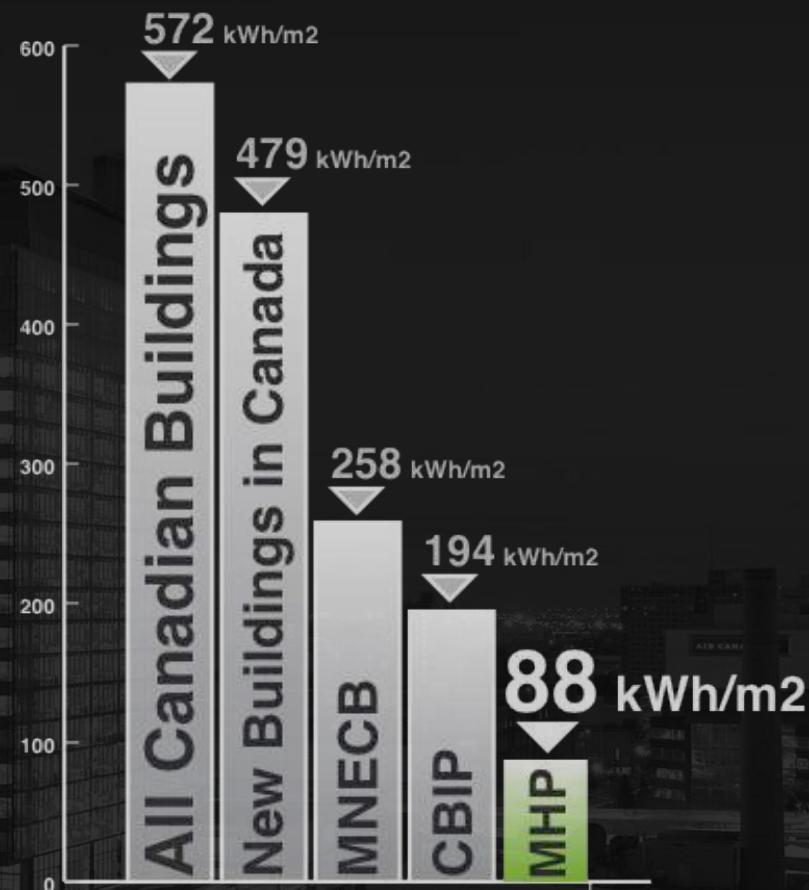


photo: Gerry Kopelow





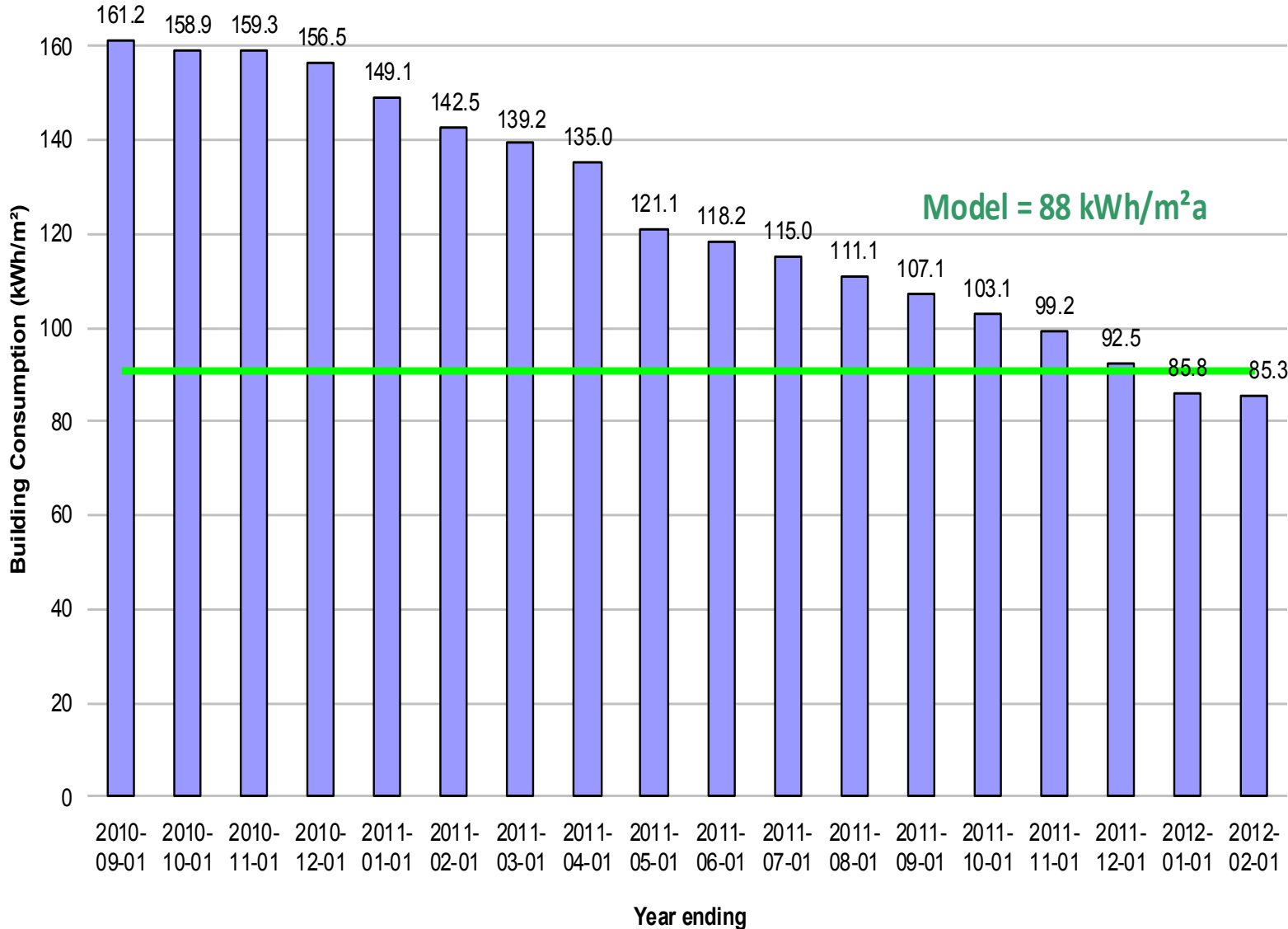


Manitoba Hydro Place

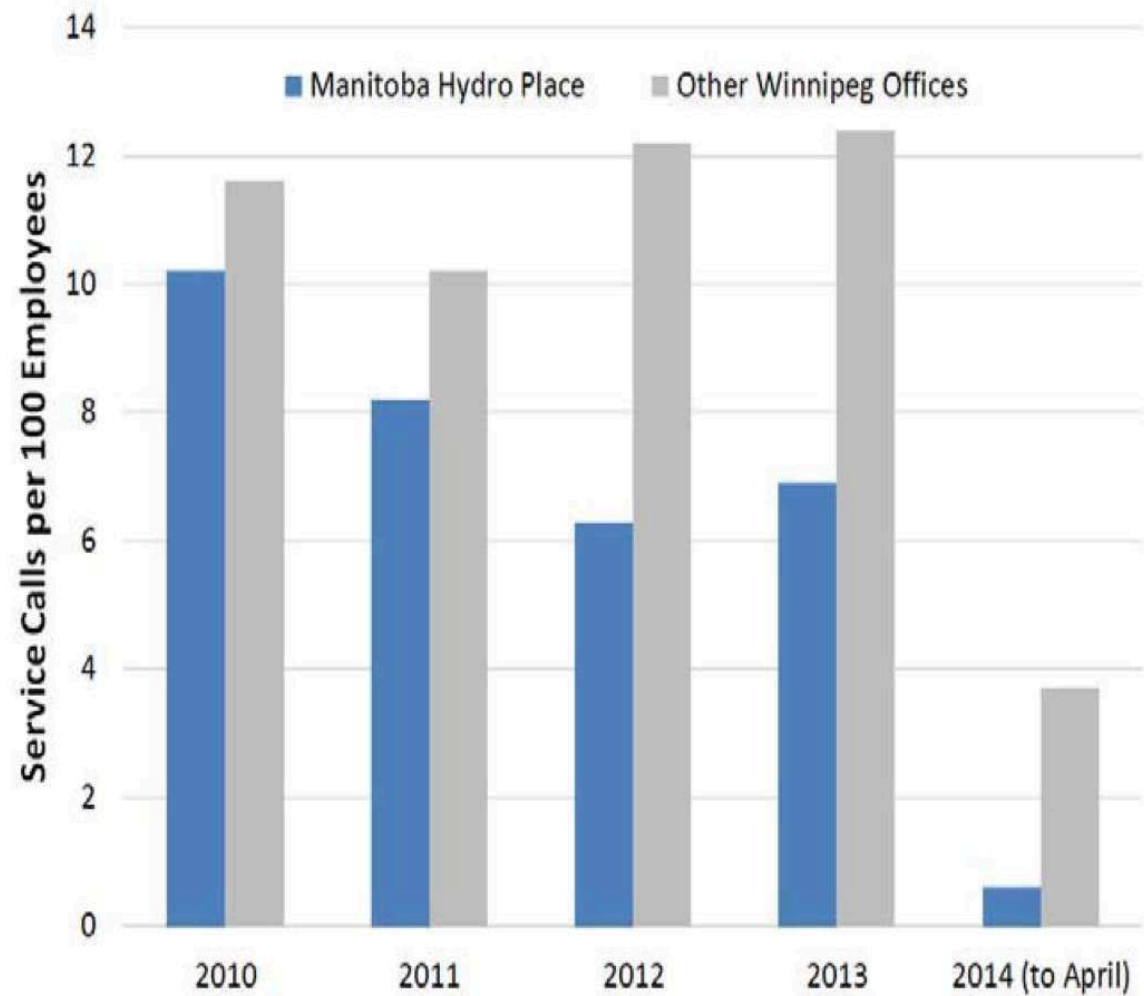
Energy use of Canadian buildings

* as of September 2010

Manitoba Hydro Place - Annual Rolling Energy Totals

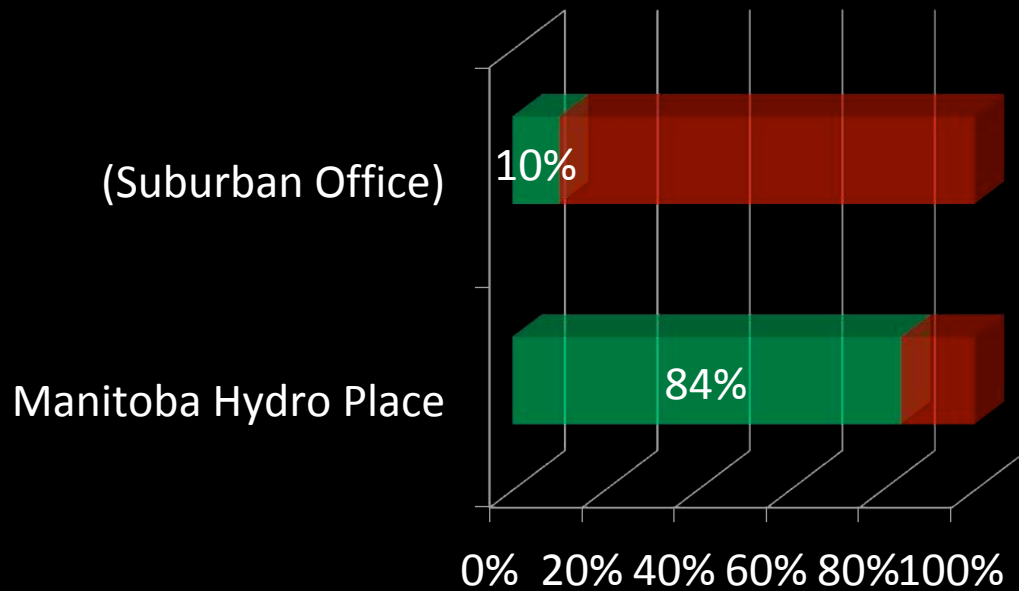


50% reduction in thermal comfort complaints

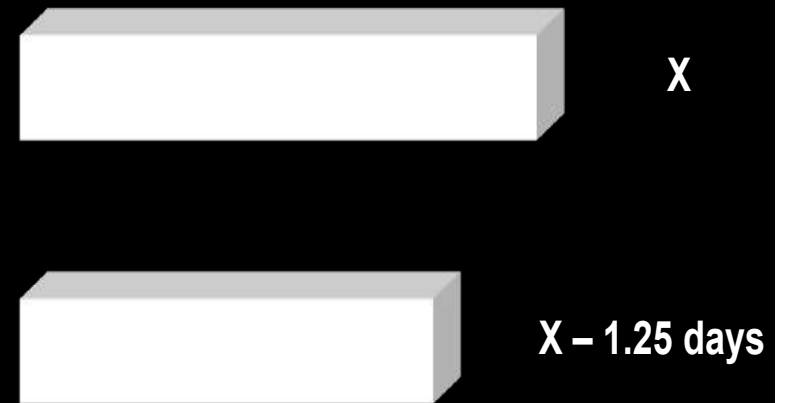


Hydro Service Calls

Green Commuting Options [%] (Public transportation, carpool or cycle)



Annual Sick Days per Employee



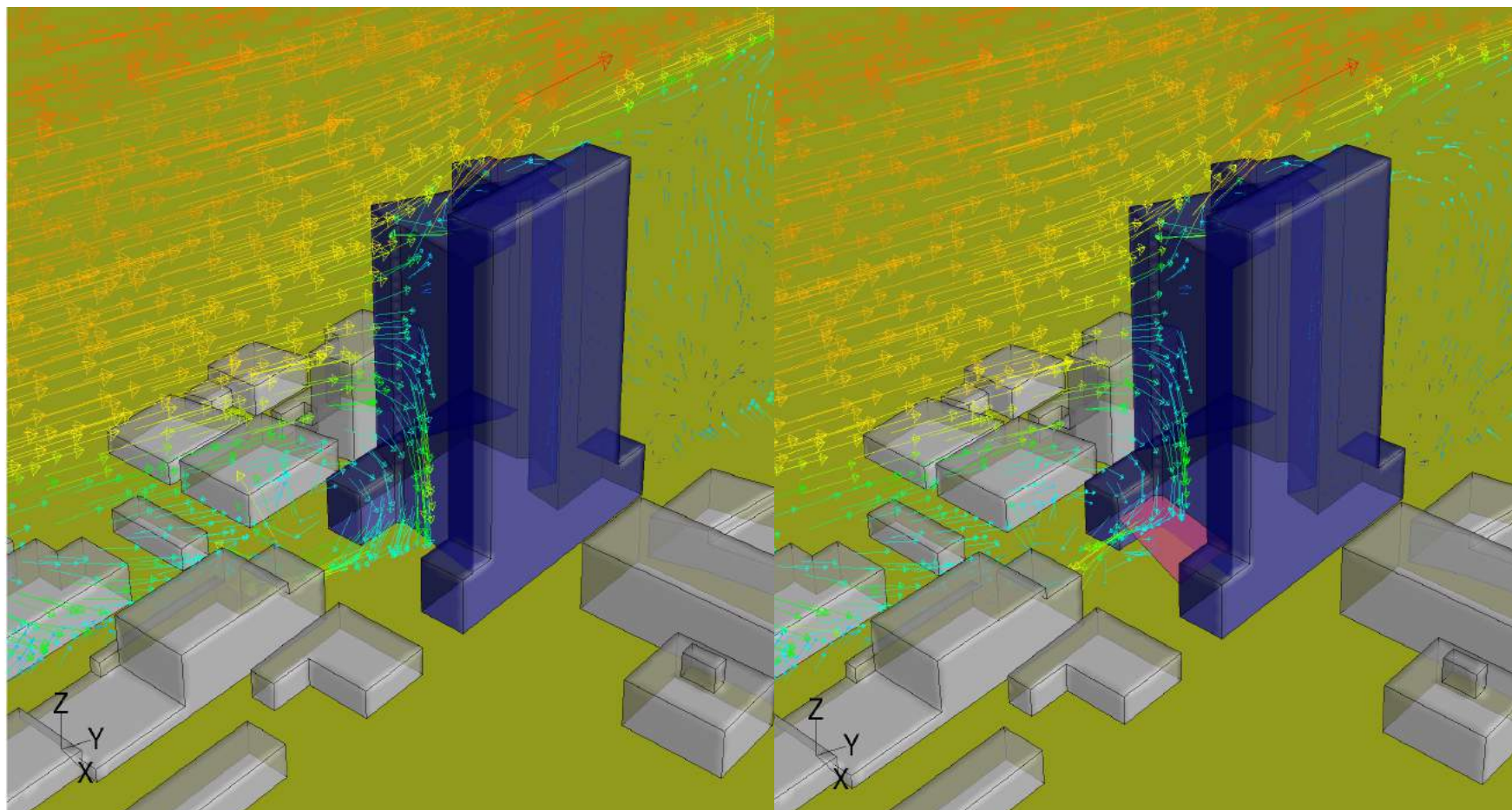
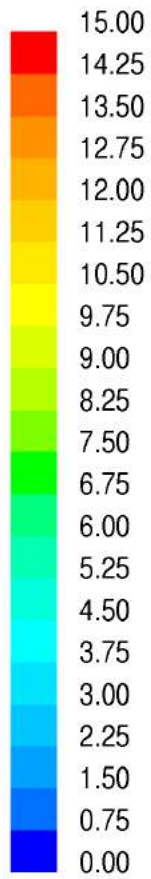
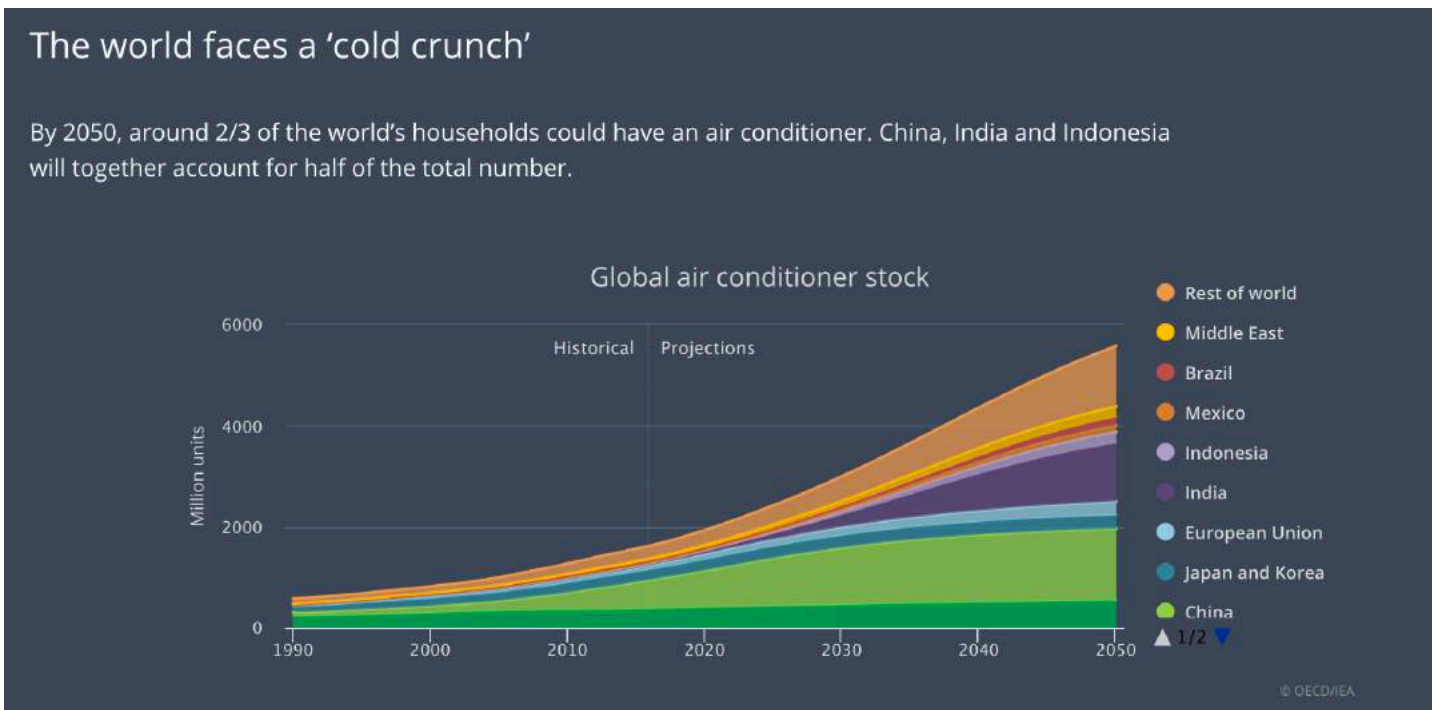




photo: Gerry Kopelow

Cooling is the fastest growing use of energy in buildings

Without action to address energy efficiency, energy demand for space cooling will more than triple by 2050 – consuming as much electricity as all of China and India today.



International Energy Agency: the Future of Cooling
www.iea.org/futureofcooling/



photo: Adria Goula

French School - Damascus

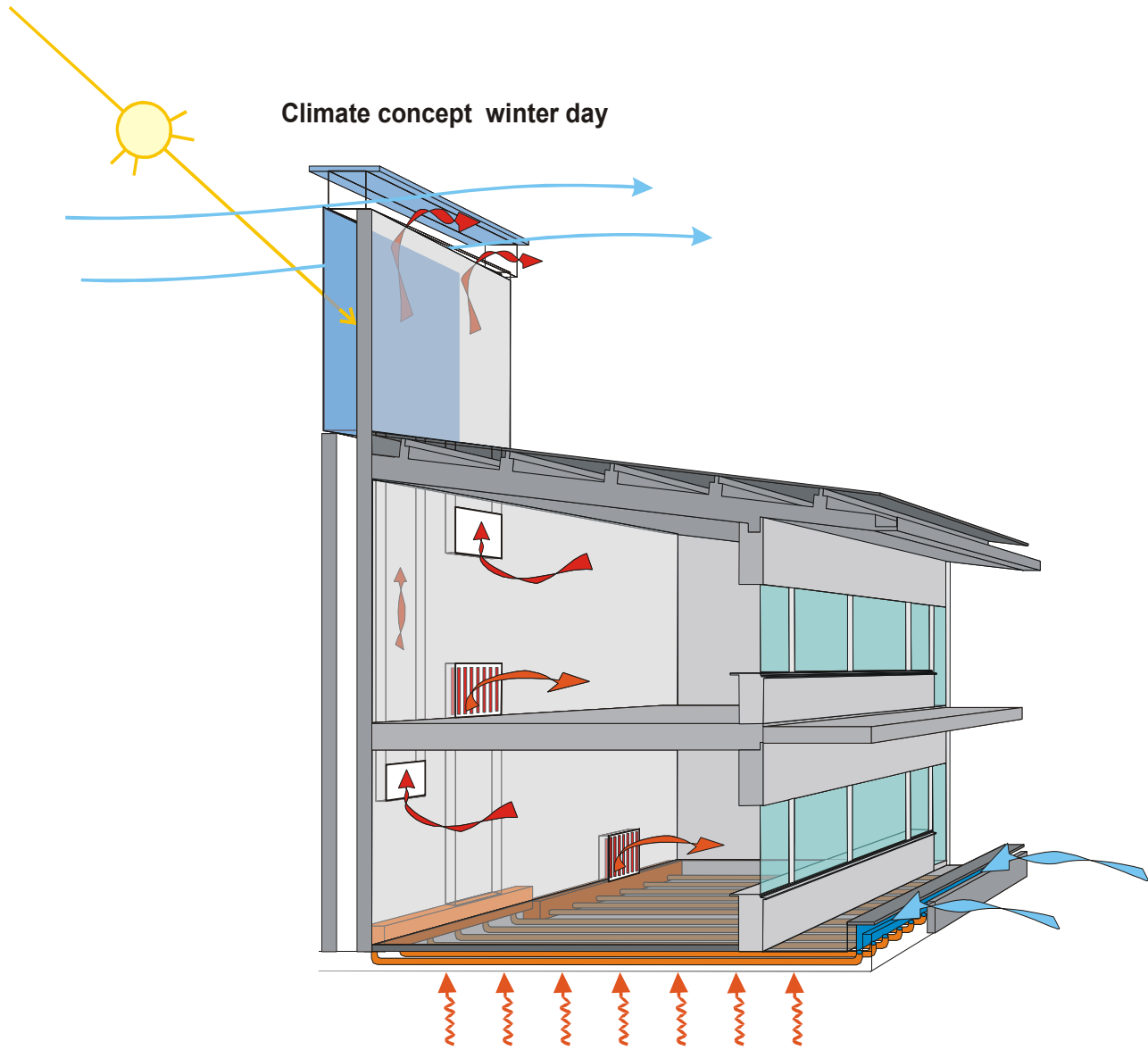
architect: **Atelier Lion, Paris**

Historic city of
Damascus

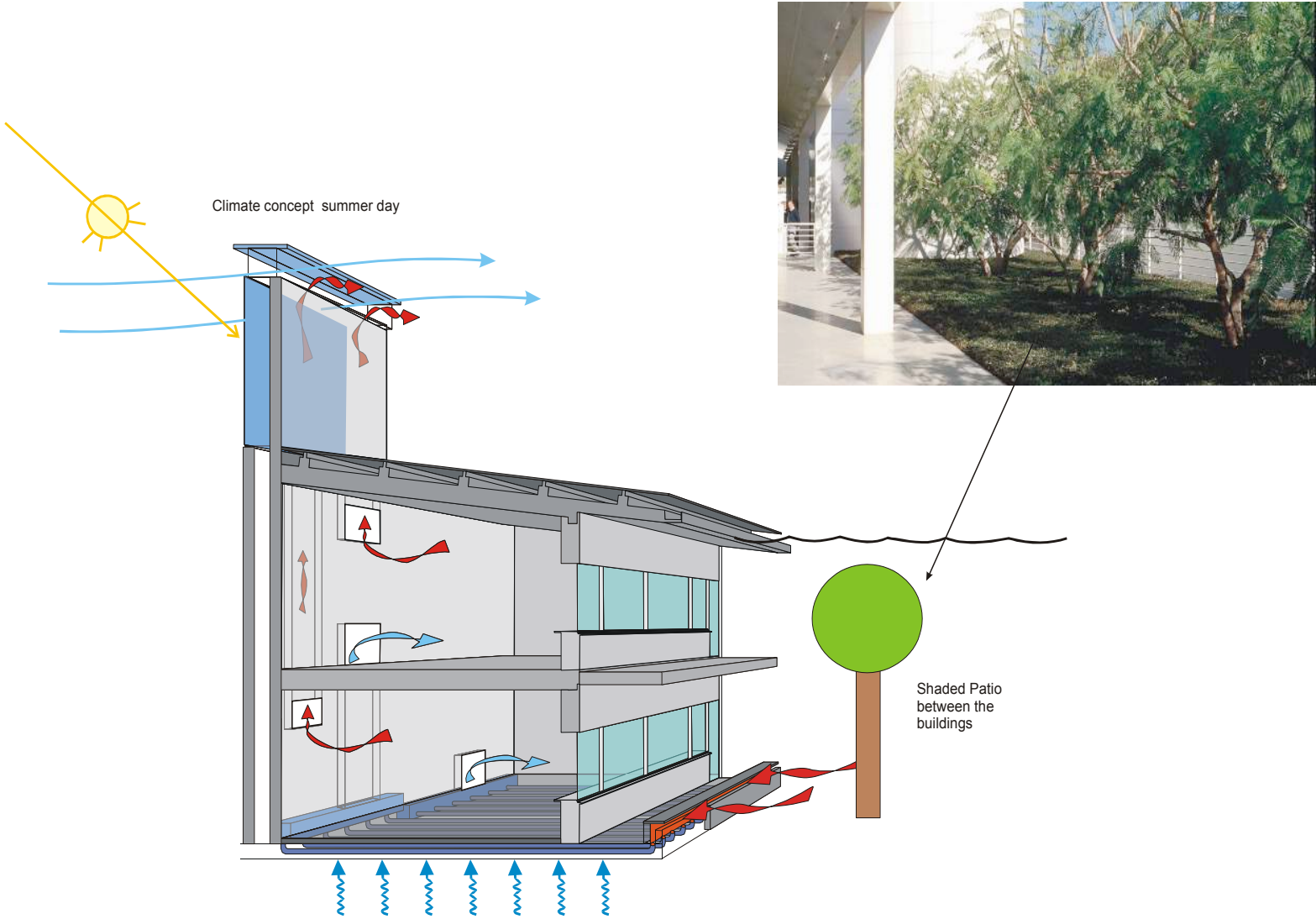


Winter day

Climate concept winter day



Summer day



Summer night

Climate concept summer night

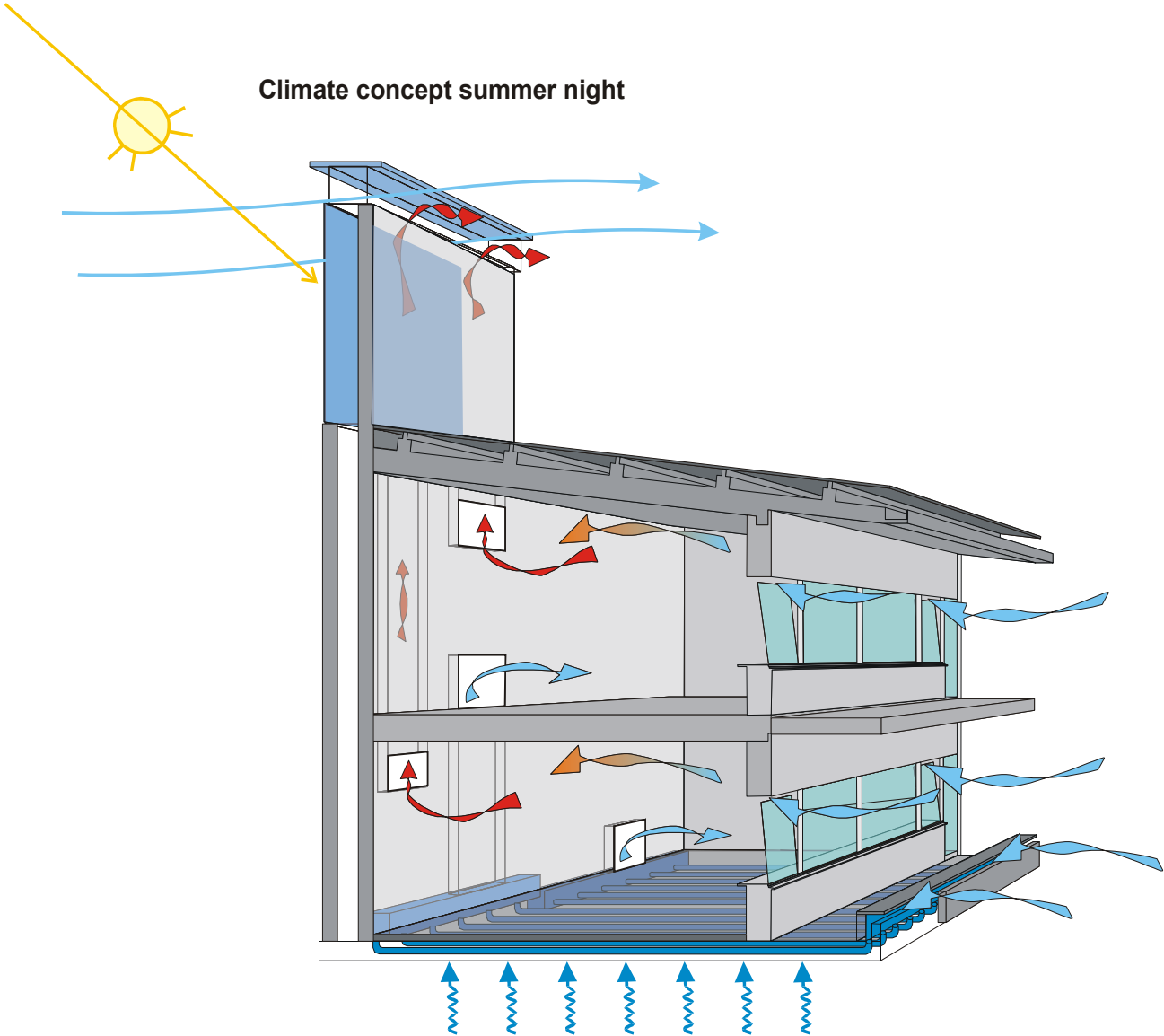




photo: Adria Goula

High- oder Low-Tech / Wohin geht die Reise?

12 Schulen im Vergleich



Prof. Thomas Auer, Lehrstuhl für Gebäudetechnologie und klimagerechtes Bauen
Prof. Florian Nagler, Lehrstuhl für Entwerfen und Konstruieren
Fotos: The PK Odessa Co



Grundschule an der Haimhauserstraße, München, 1898



Erste Openluchtschool, Amsterdam, 1931



Schulanlage Wandermatte, Wabern, 1956



Hohenstaufen-Gymnasium, Göppingen, 1959



Gymnasium Sonthofen, 1976



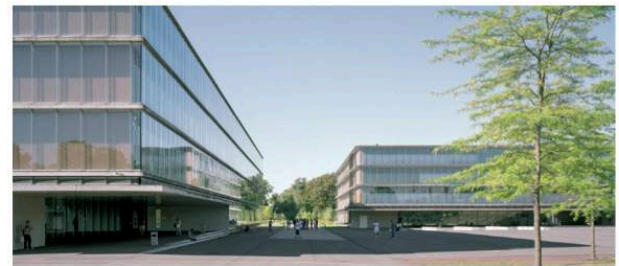
Mittelschule Buchloe, 1976



Gymnasium Baesweiler, 1978



Schule im Park, Ostfildern, 1999



Max-Born-Berufskolleg, Recklinghausen, 2008



Berufliche Oberschule Erding, 2011



Gymnasium Buchloe, 2013



Schmuttertal Gymnasium, Diedorf, 2015

Schulzimmer Fotografiert 2016



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Schulanlage Wandermatte Wabern, 1956



Hohenstaufen-Gymnasium Göppingen, 1959



Gymnasium Sonthofen, 1974



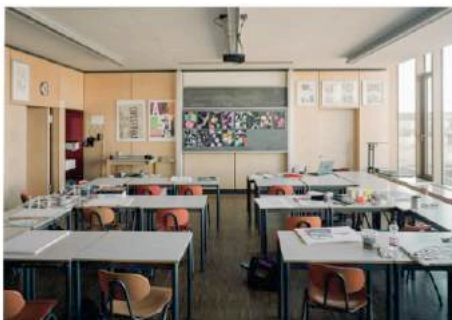
Mittelschule Buchloe, 1976



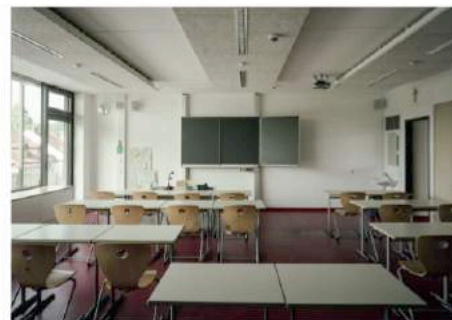
Gymnasium Baesweiler, 1978



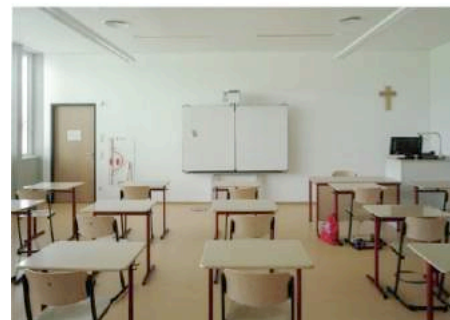
Schule im Schamhauser Park Ostfildern, 1999



Max-Born-Berufskolleg Recklinghausen, 2008



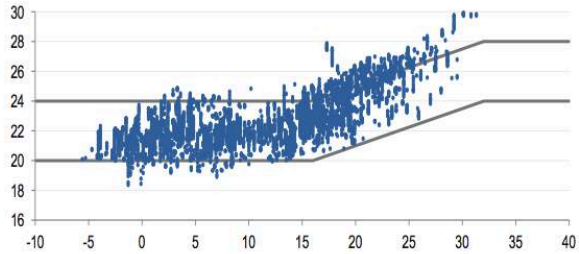
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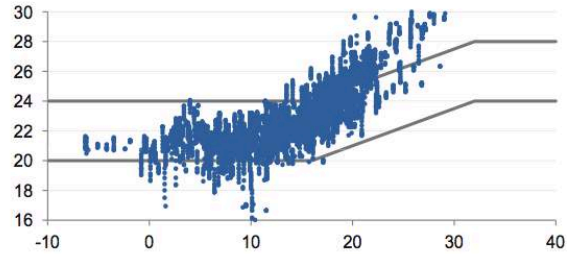
Gymnasium Buchloe, 2013



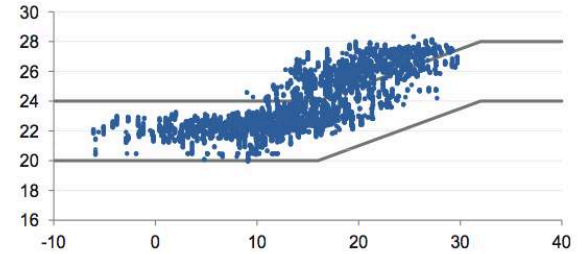
Schmuttertal Gymnasium Diedorf, 2015



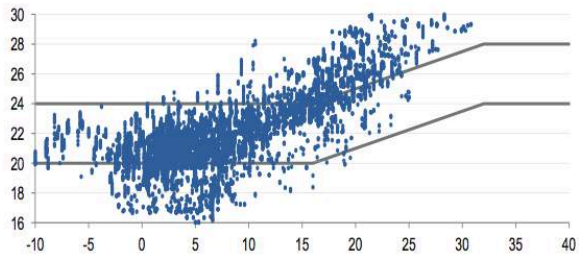
Grundschule an der Haimhauserstraße, München, 1898



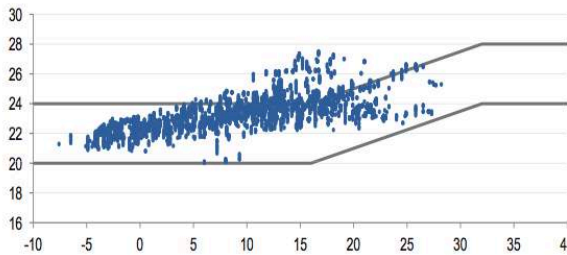
Erste Openlichtschool, Amsterdam, 1931



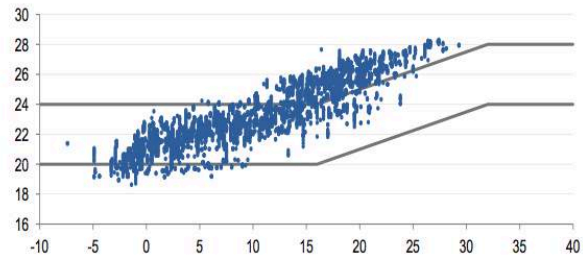
Schulanlage Wandermatte, Wabern, 1956



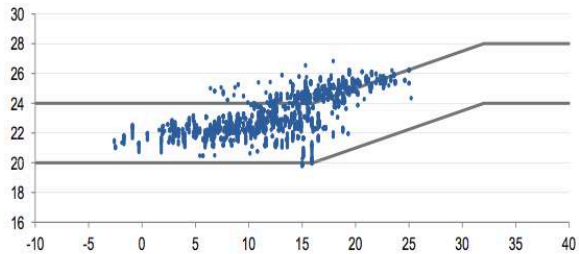
Hohenstaufen-Gymnasium, Göppingen, 1959



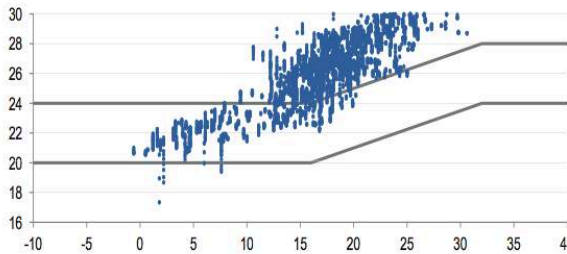
Gymnasium Sonthofen, 1976



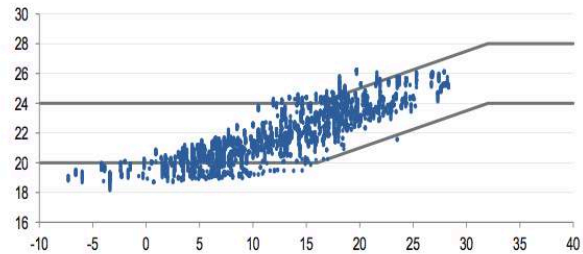
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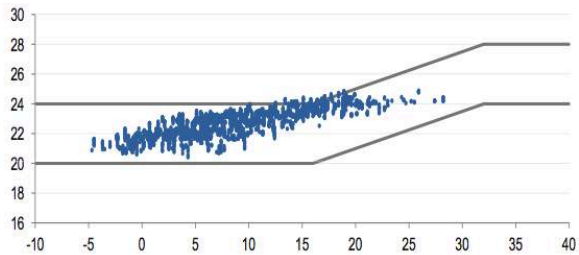
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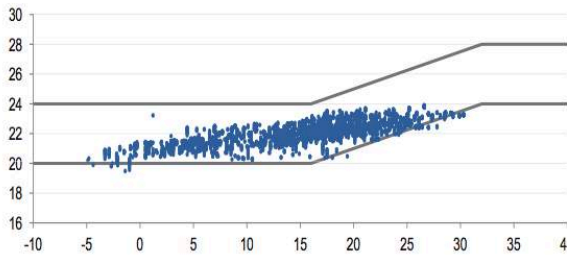
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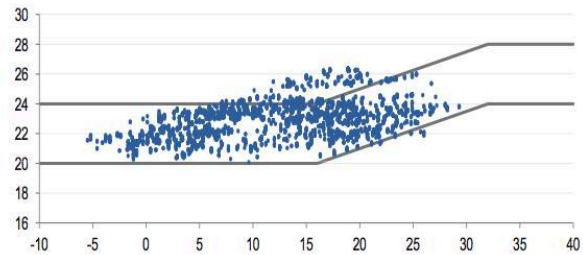
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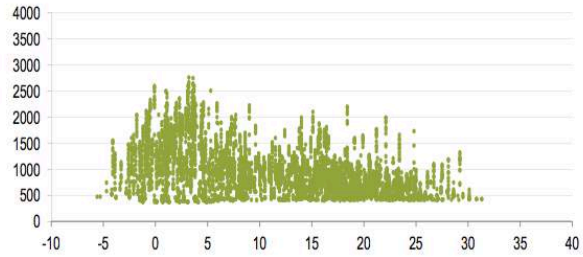
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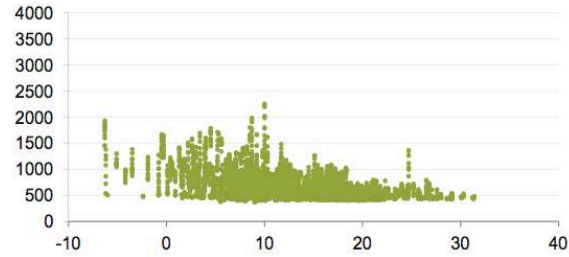
Gymnasium Buchloe, 2013



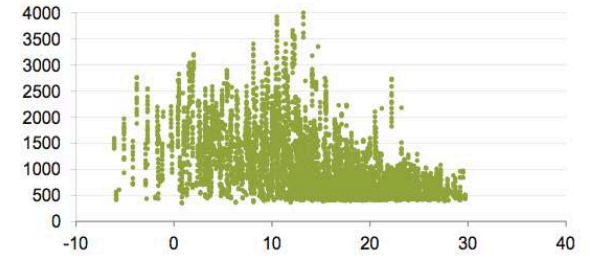
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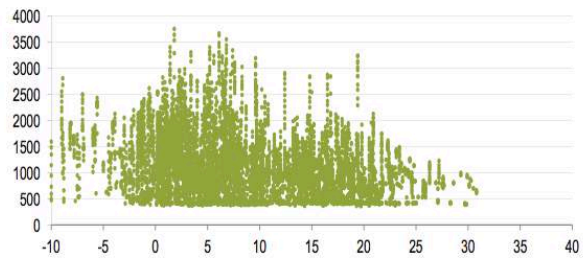
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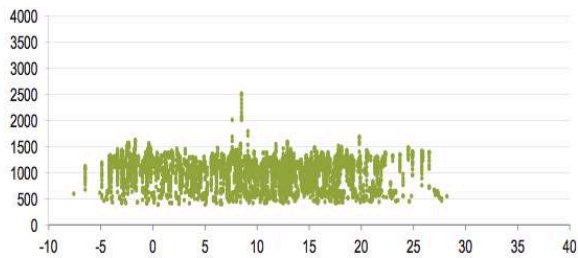
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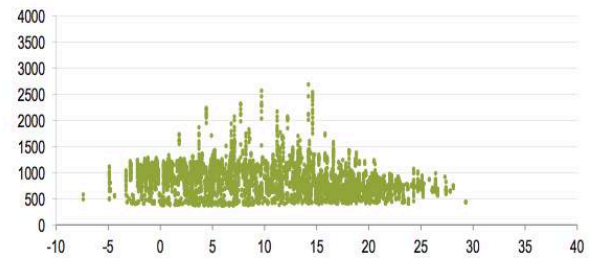
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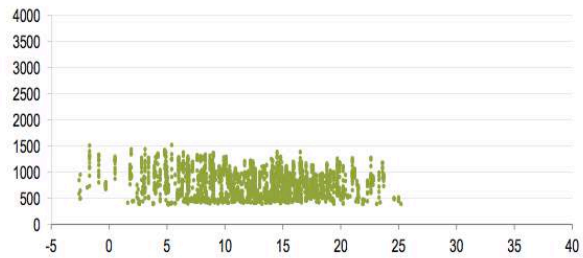
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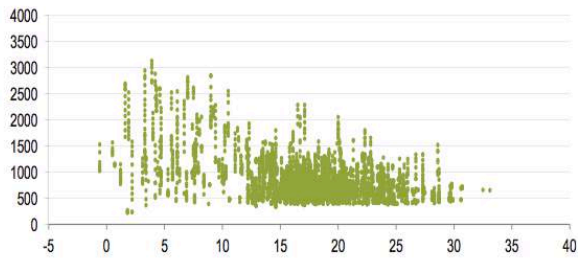
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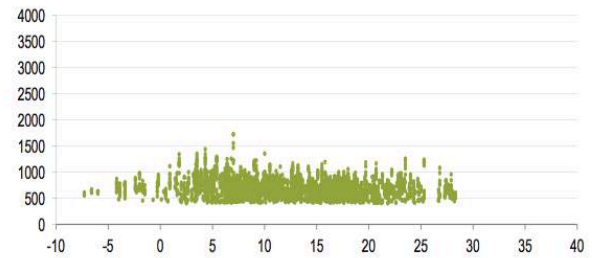
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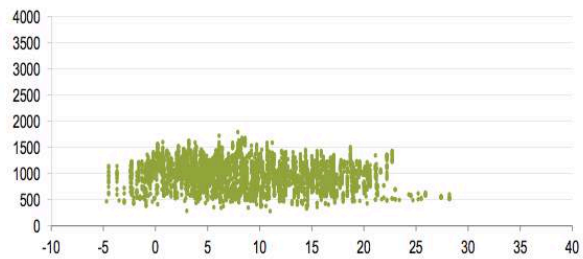
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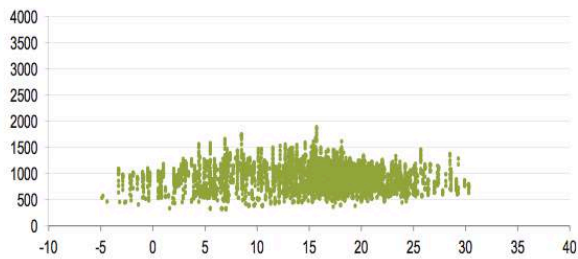
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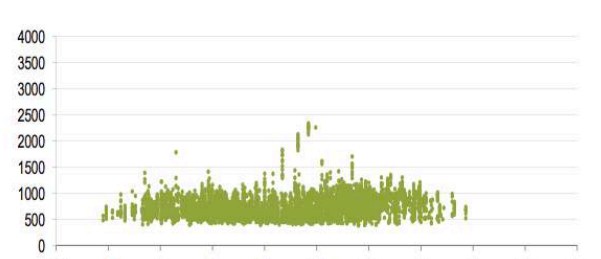
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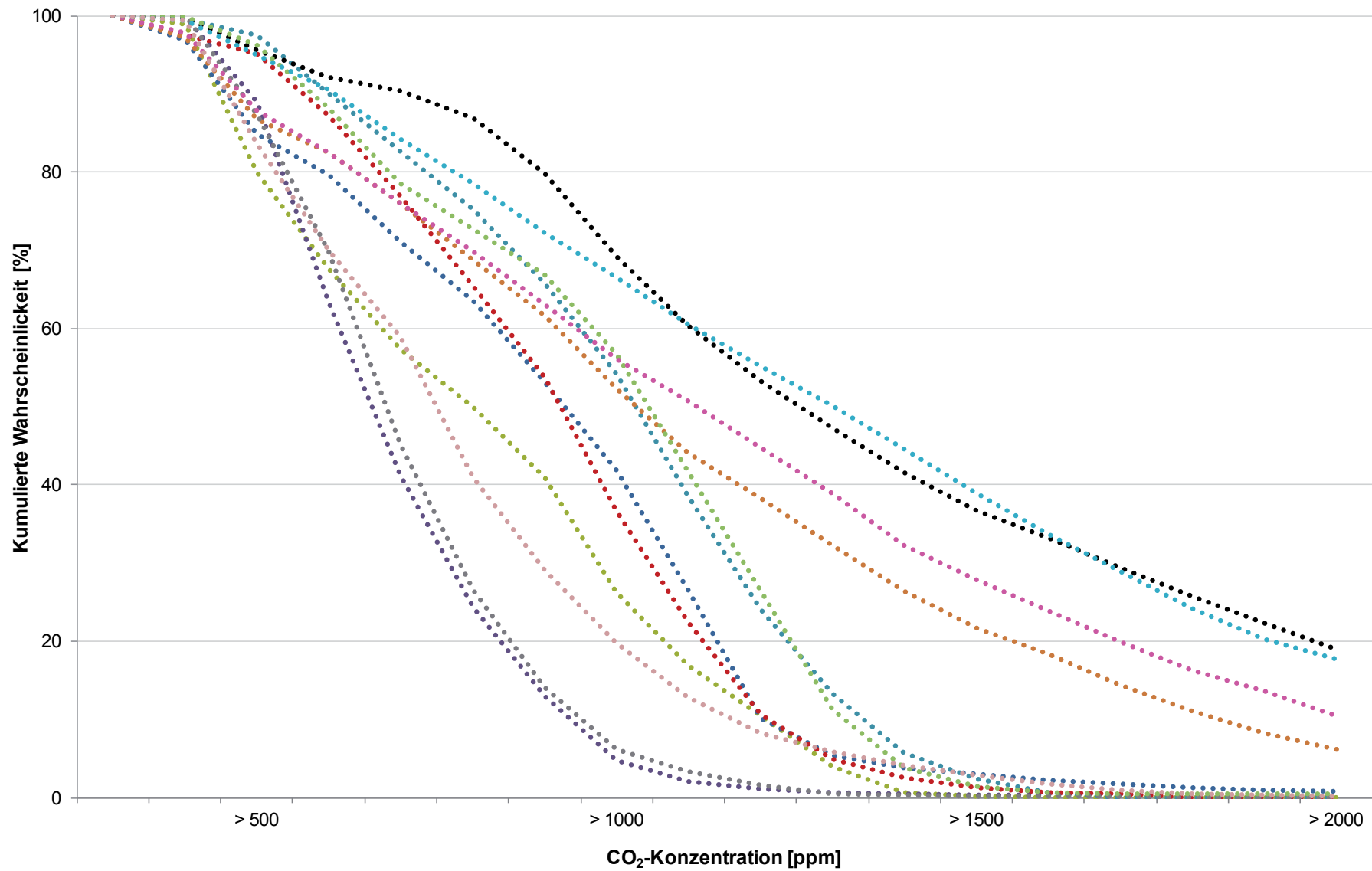


Gymnasium Buchloe, 2013

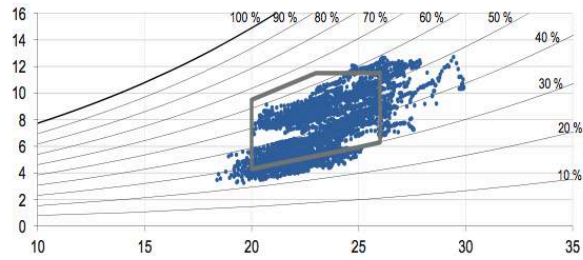


Schmuttertal Gymnasium, Diedorf, 2015

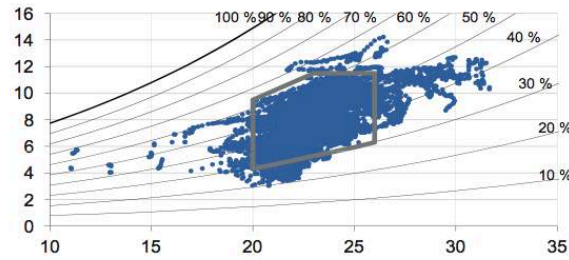
Häufigkeitsverteilung der CO₂ Konzentration während der Nutzungszeit mit einer Außentemperatur **unter** 12 °C



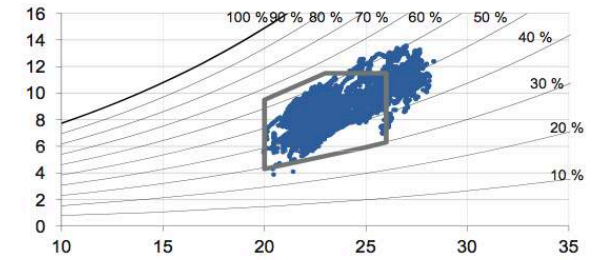
- Baesweiler 4207
- Buchloe MS 203
- Buchloe Gym 3
- Diedorf 1
- Erding 218
- München 304
- Ostfildern 358
- Recklinghausen 301
- Sonthofen 202
- Göppingen 304
- Wandermatte
- Amsterdam 2



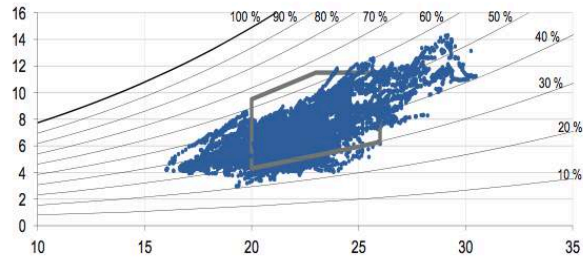
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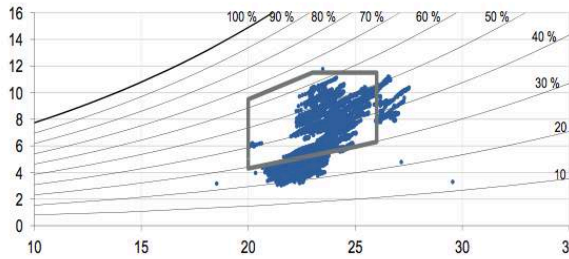
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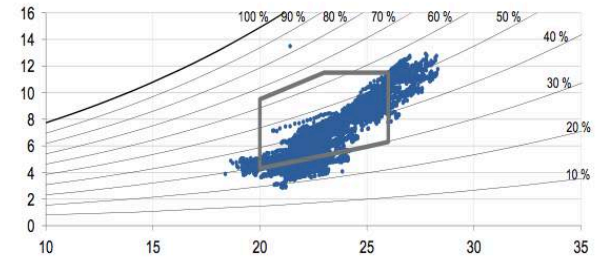
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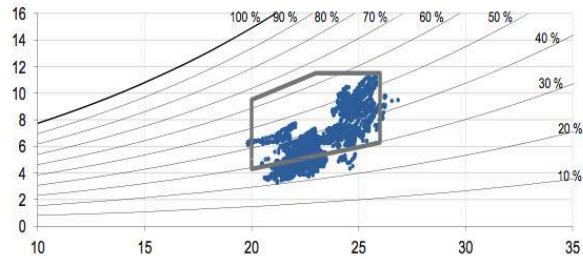
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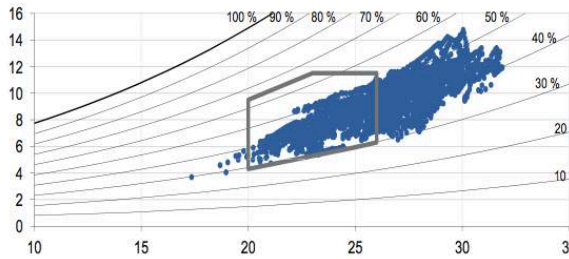
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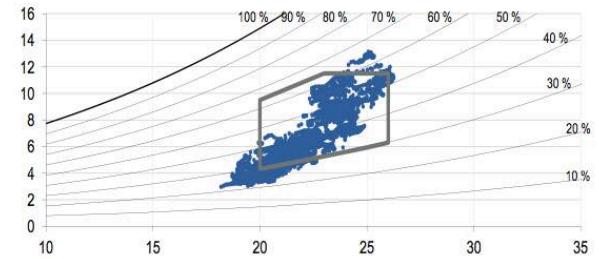
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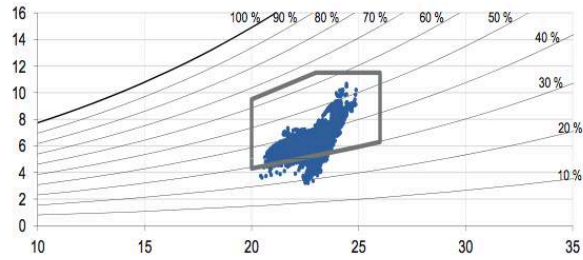
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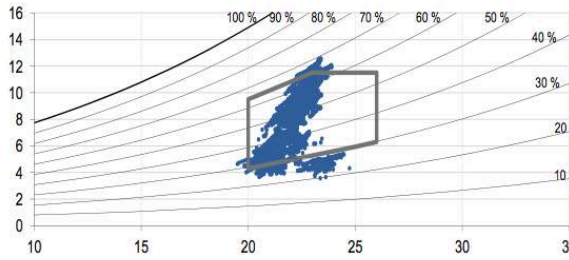
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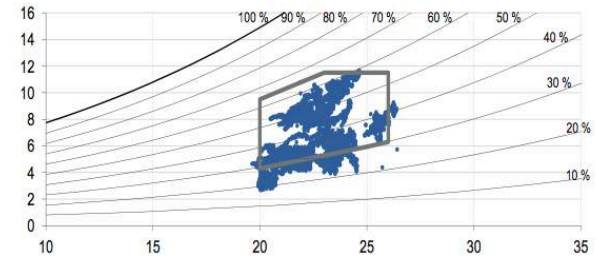
Max-Born-Berufskolleg, Recklinghausen, 2008



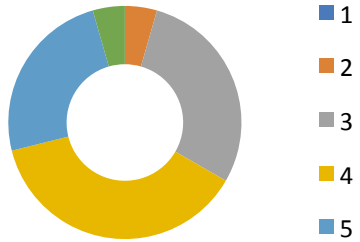
Berufliche Oberschule Erding, 2011



Gymnasium Buchloe, 2013

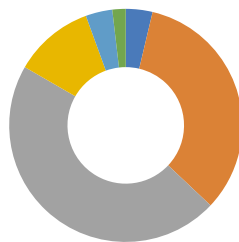


Schmuttertal Gymnasium, Diedorf, 2015



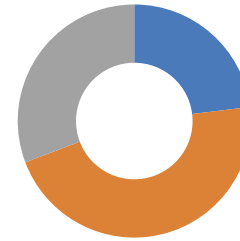
Hohenstaufen-Gymnasium, Göppingen, 1959

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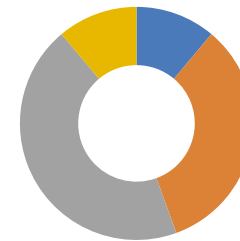
Gymnasium Sonthofen, 1976

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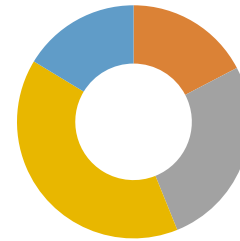
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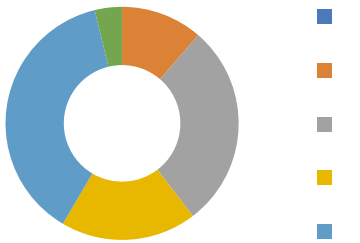
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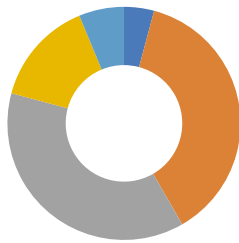
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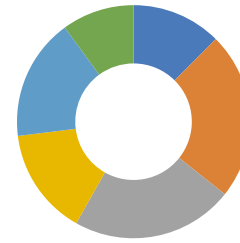
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Gymnasium Buchloe, 2013

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Schmuttertal Gymnasium, Diedorf, 2015

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- 2
- 3
- 4
- 5



Grundschule an der Haimhauserstraße München, 1898



Openluchtschool Amsterdam, 1931



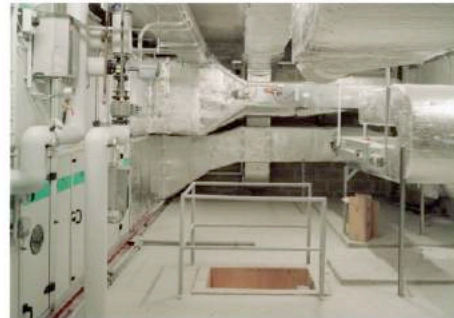
Schulanlage Wandermatte Wabern, 1956



Hohenstaufen-Gymnasium Göppingen, 1959



Gymnasium Sonthofen, 1974



Mittelschule Buchloe, 1976



Gymnasium Baesweiler, 1978



Schule im Scharnhäuser Park Ostfildern, 1999



Max-Born-Berufskolleg Rocklinghausen, 2008



Berufliche Oberschule Erding, 2011

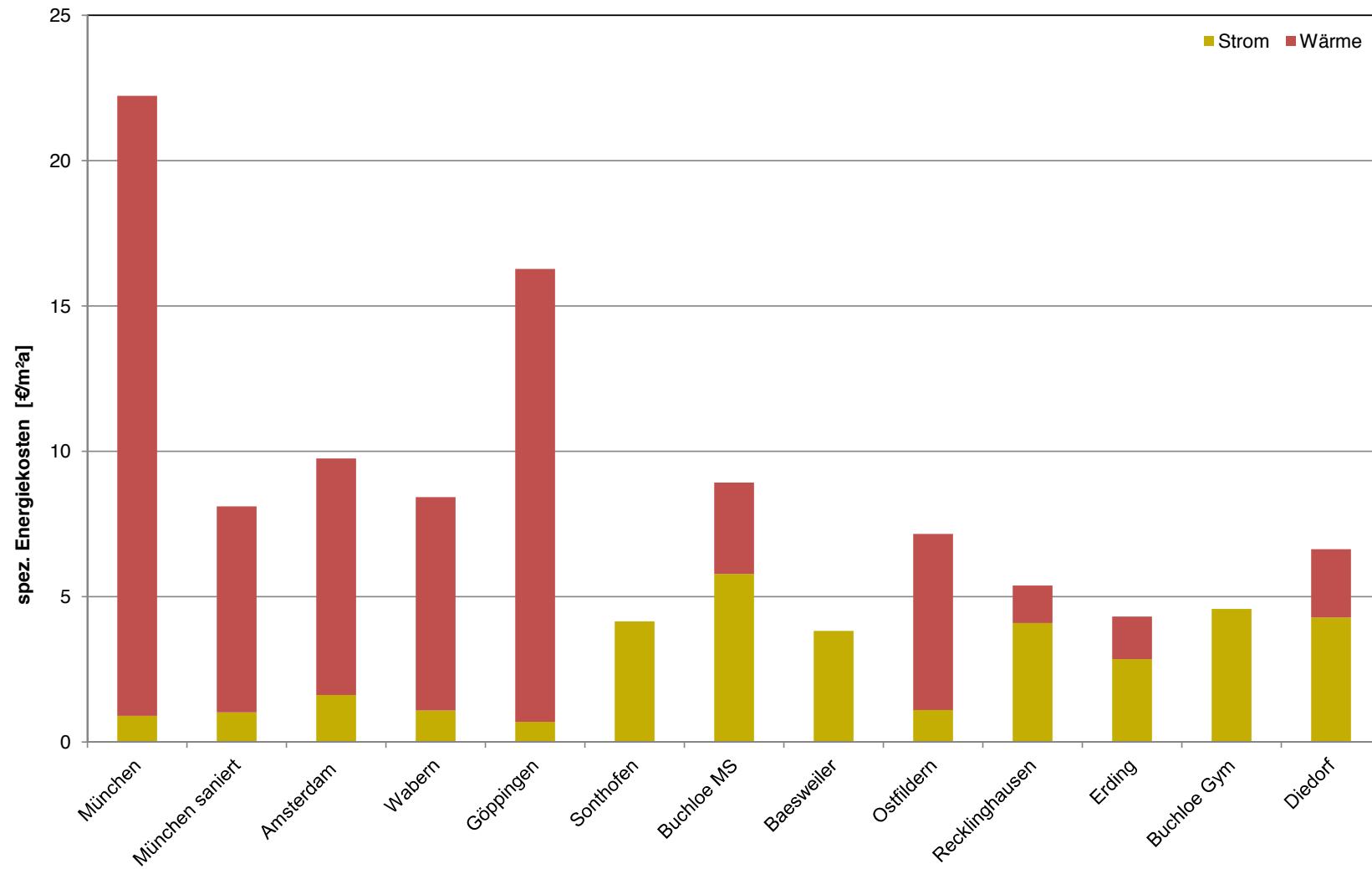


Gymnasium Buchloe, 2013

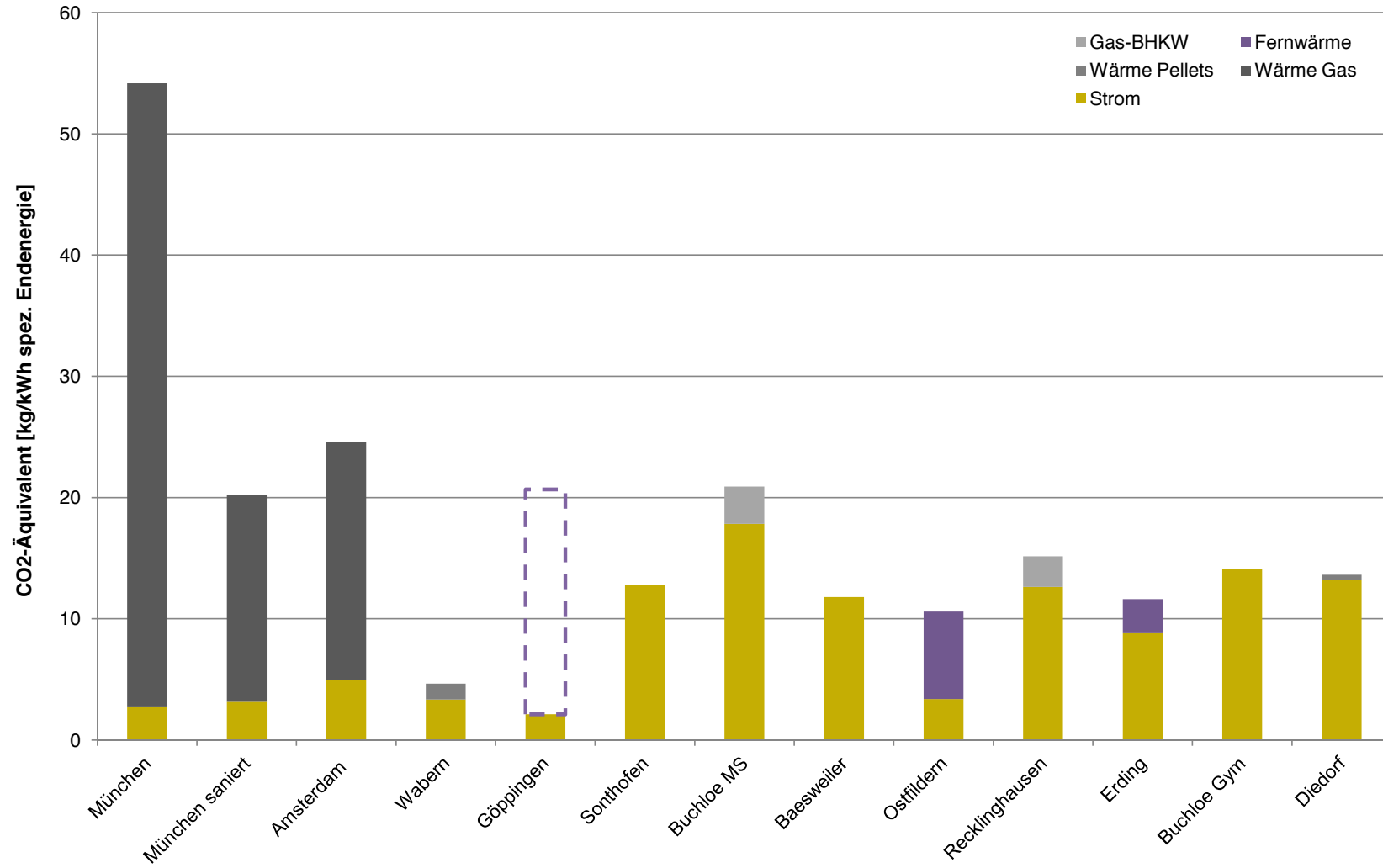


Schmuttertal Gymnasium Diedorf, 2015

Energiekosten für den Gebäudebetrieb

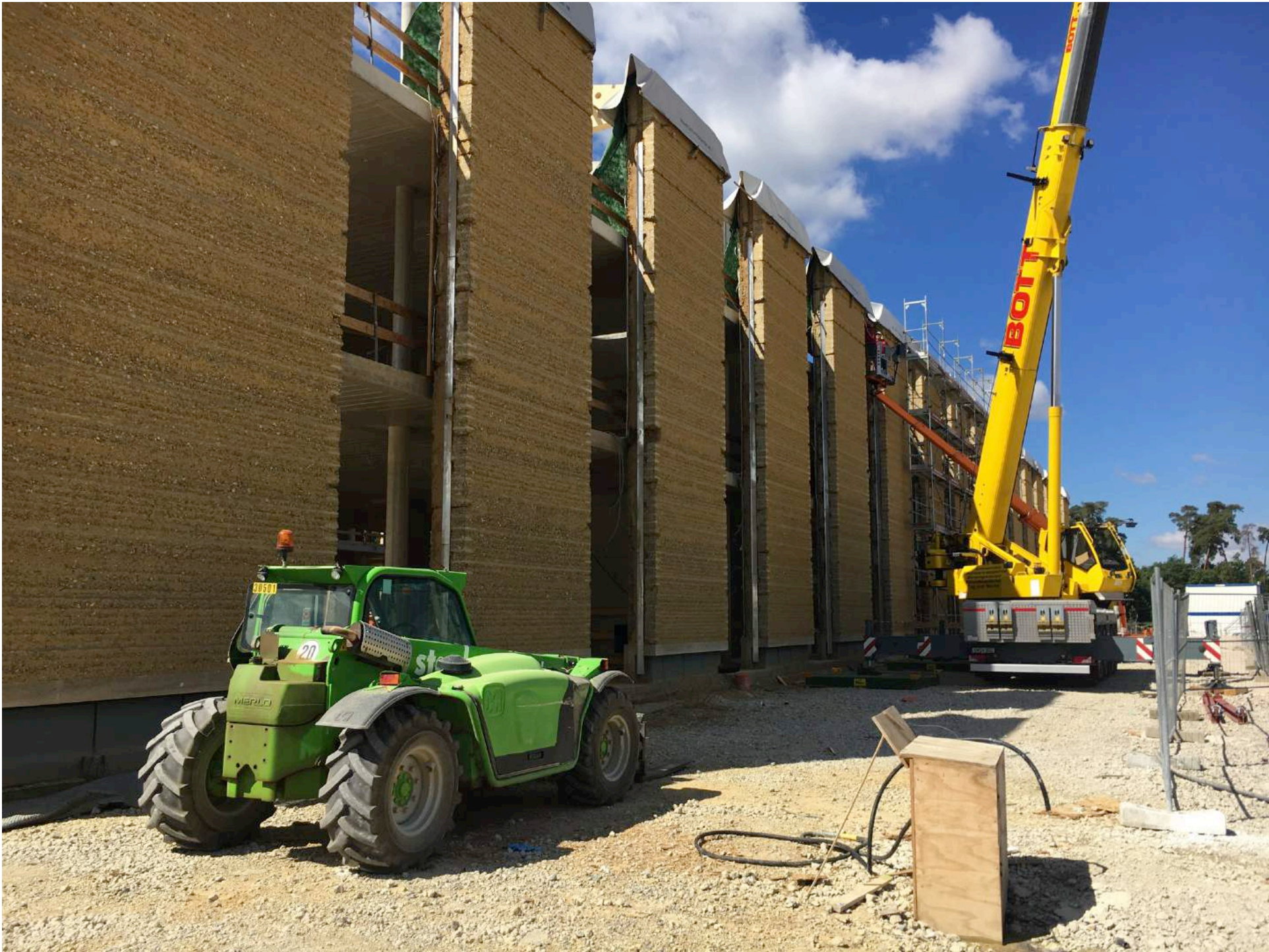


CO₂ Äquivalent für den Gebäudebetrieb

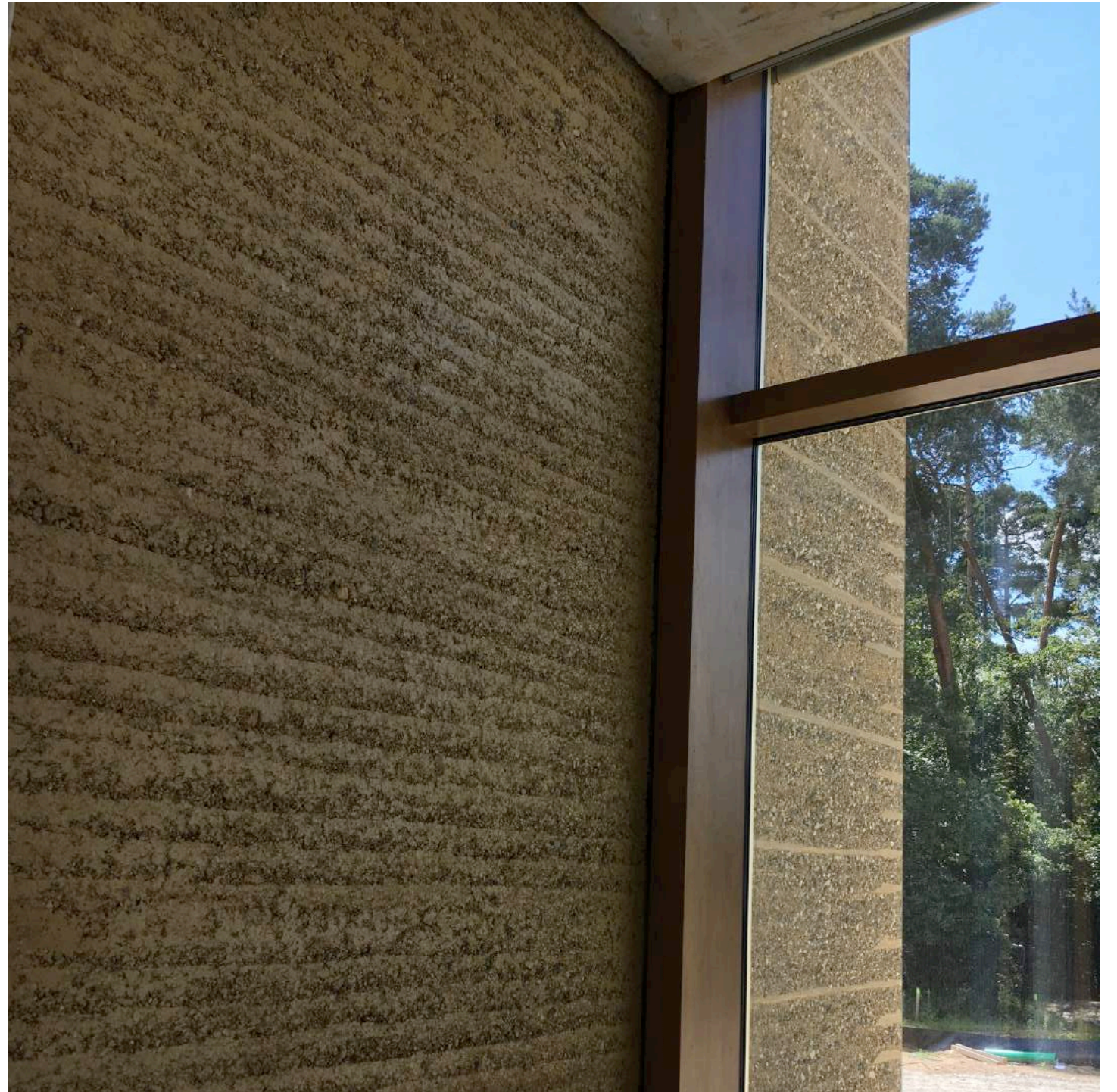


Alnatura Head Quarter, Haas Cook Zemmrich Architects



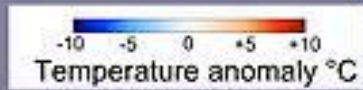




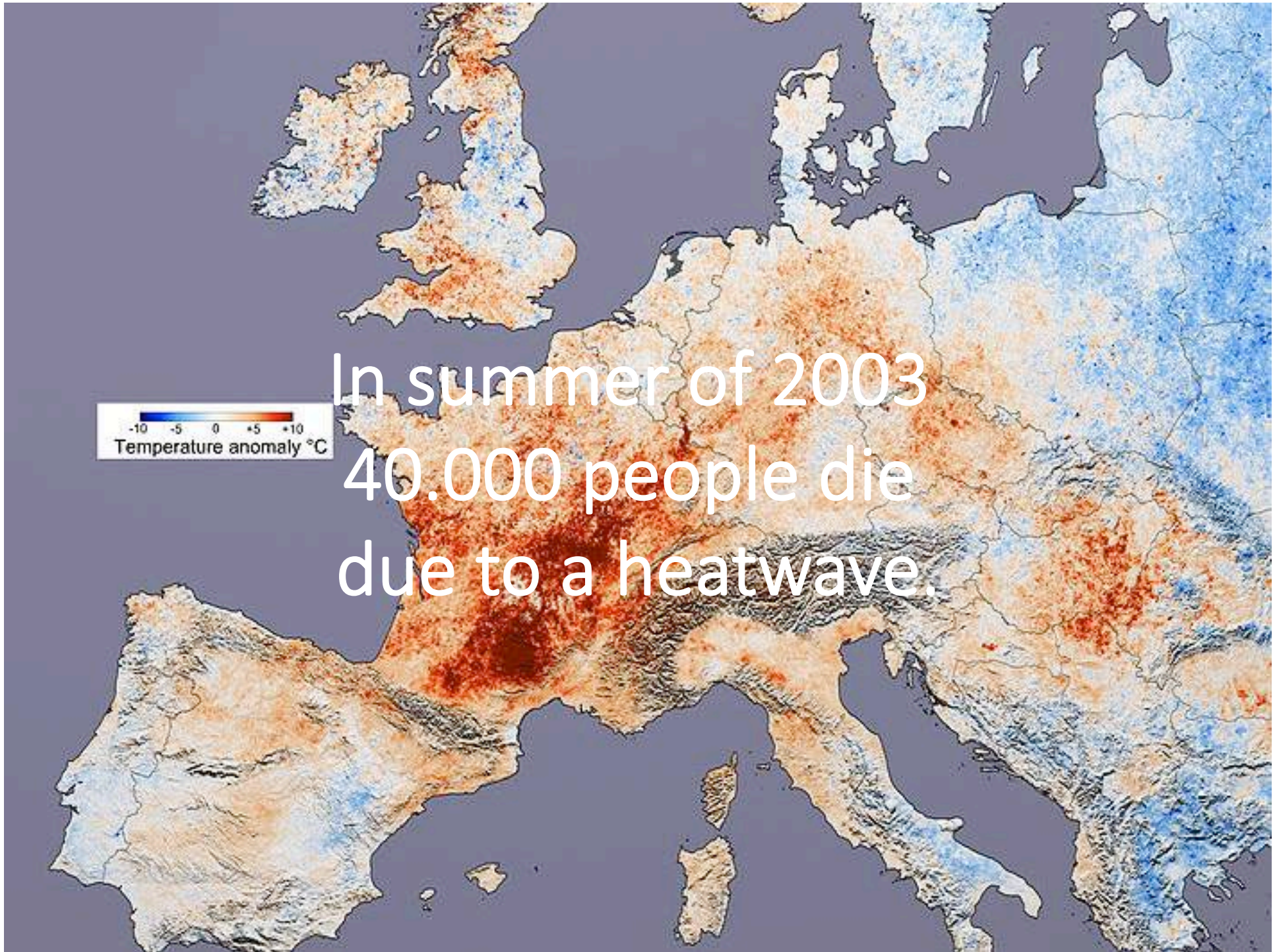


OUTDOOR COMFORT / URBAN MICROCLIMATE

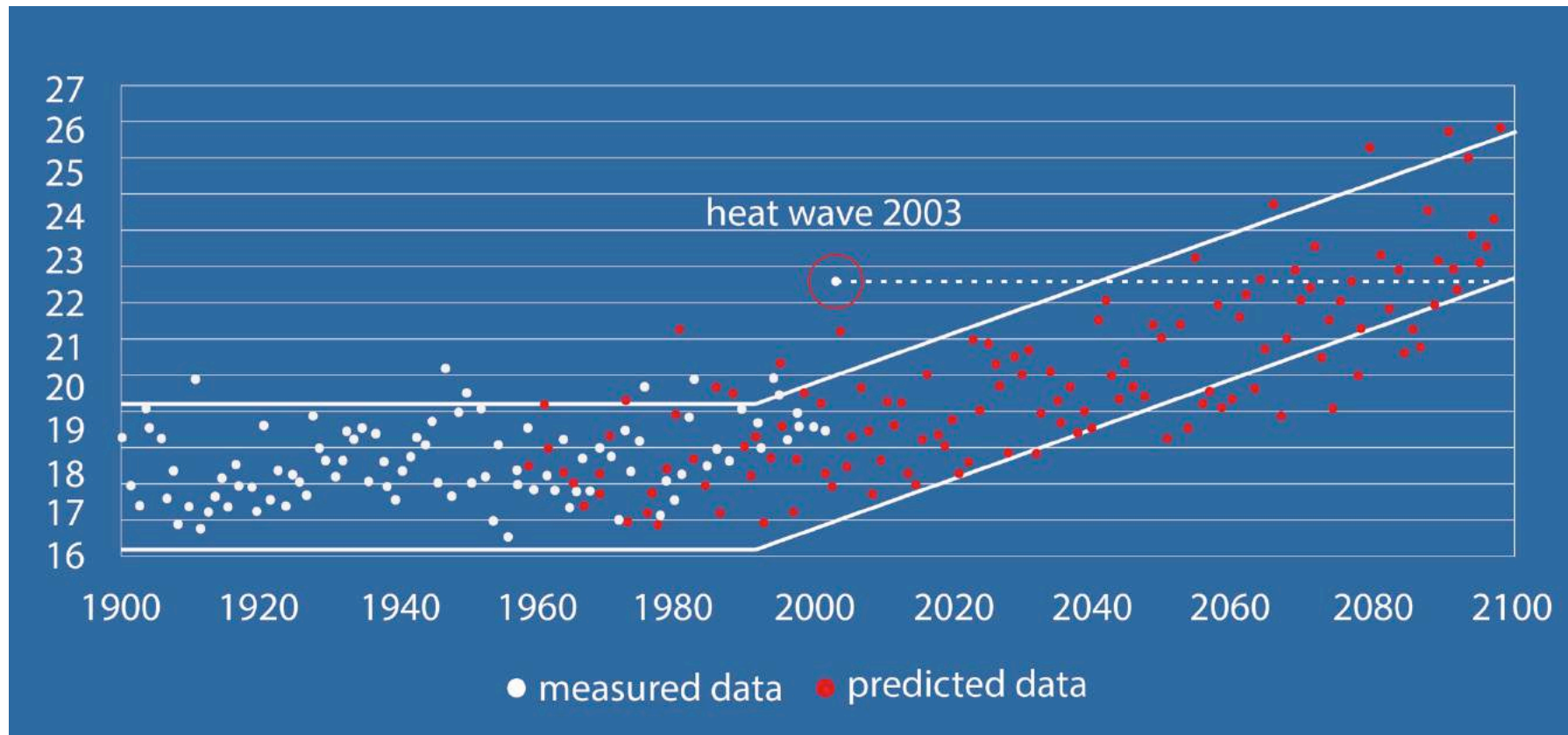




In summer of 2003
40.000 people die
due to a heatwave.



Paris mean summer temperature



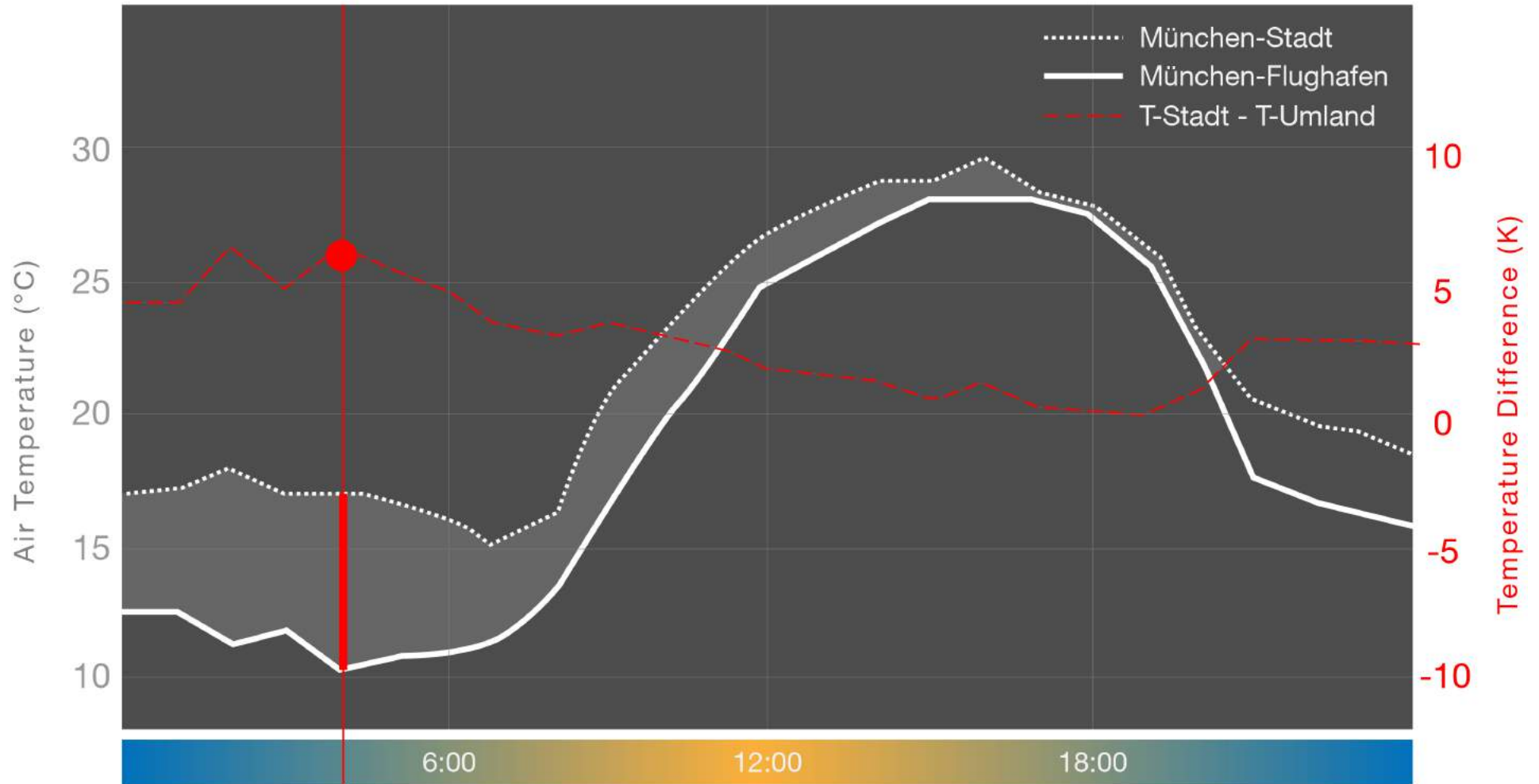
München-Stadt



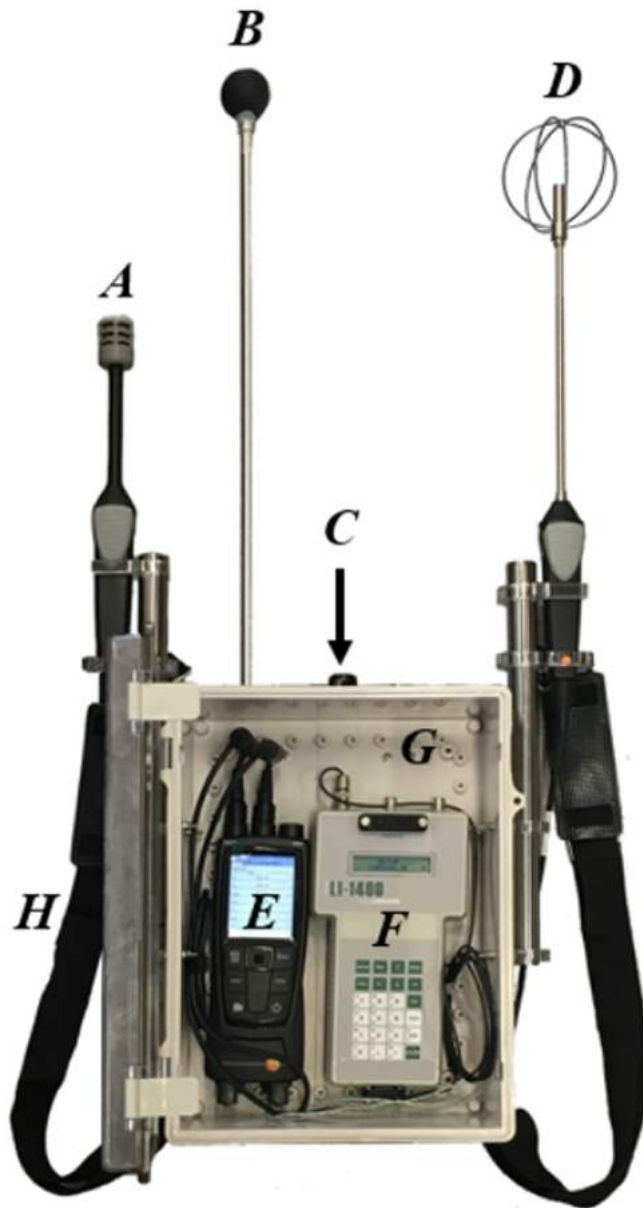
München-Flughafen



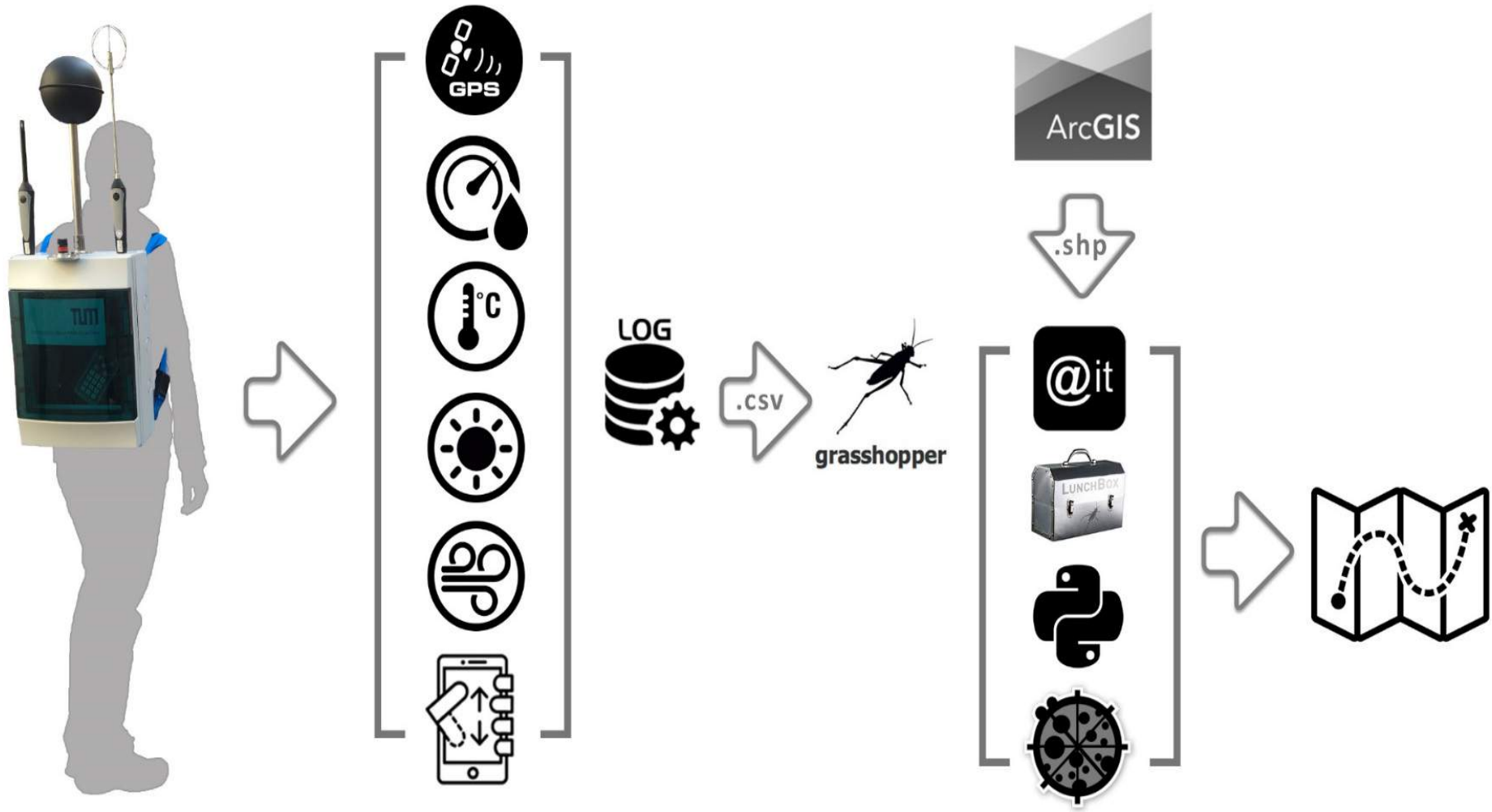
12.09.2018 (0:00) - 13.09.2018 (0:00)



Maximum ΔT
12.09.2018
04:00
 $\Delta T = 6,7 \text{ K}$



- A:** TESTO 480 Air Temperature and Relative Humidity Probe (being protected from direct sunlight and rain.)
- B:** Globe thermometer (connected to the TESTO 480 Data Logger)
- C:** LICOR LI-200SA Pyranometer
- D:** TESTO 480 Air Flow Probe
- E:** TESTO 480 Data Logger
- F:** LICOR LI-1400 Data Logger
- G:** Protection Case
- H:** Straps







Outdoor Thermal Comfort Survey App

The App is developed to record subjective votes of people in terms of thermal sensation and thermal satisfaction. It is enabled with GPS location tags to pin exact survey locations.

To install the 'Outdoor Comfort Survey' app, please click the link below on your mobile device and follow the instructions:

[Install the app](#)

(Make sure to install AppSheet from Appstore or Google Play)

You can also run the app in your web browser by clicking the link below:

[Run the app in a web browser](#)



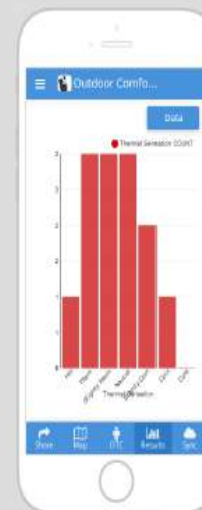
Start the Survey



Tag Location



Synchronize

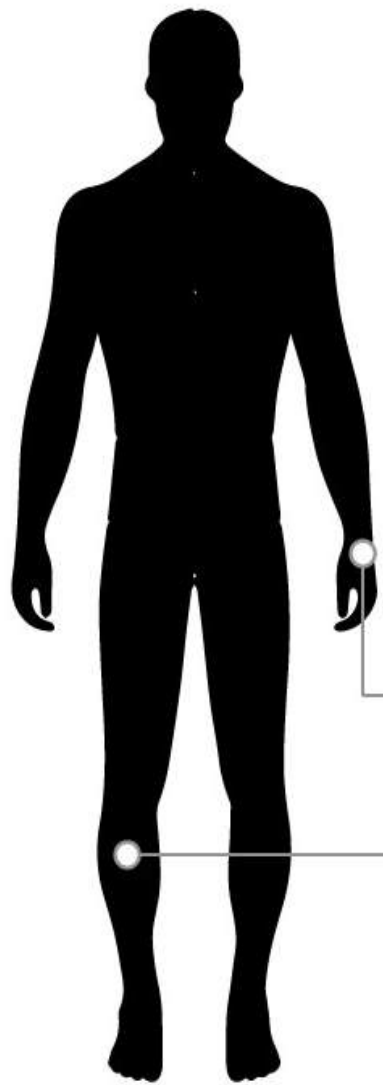


View Responses

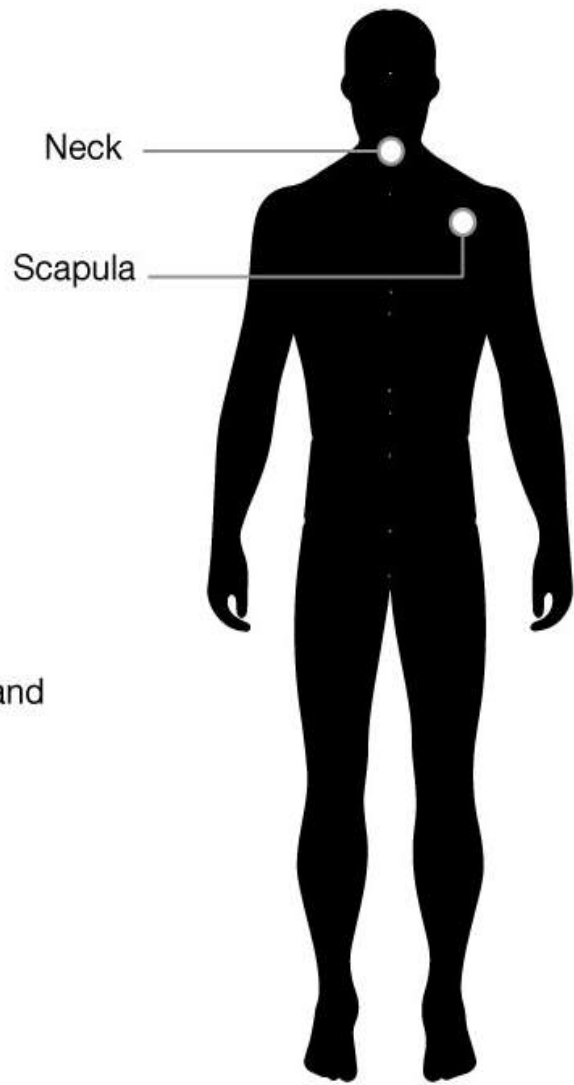


View Map





Front Body



Back Body

Left Hand

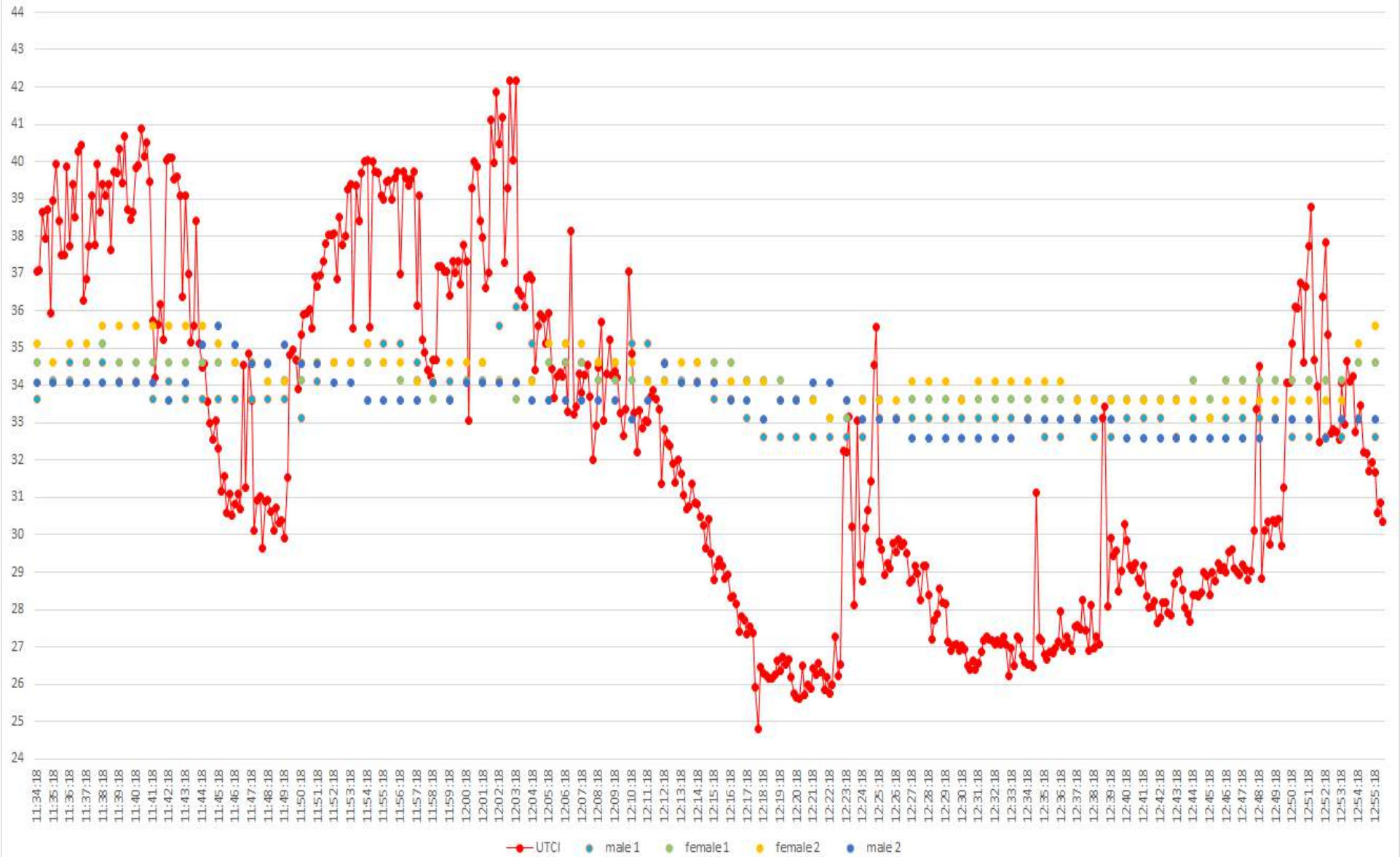
Shin

Neck

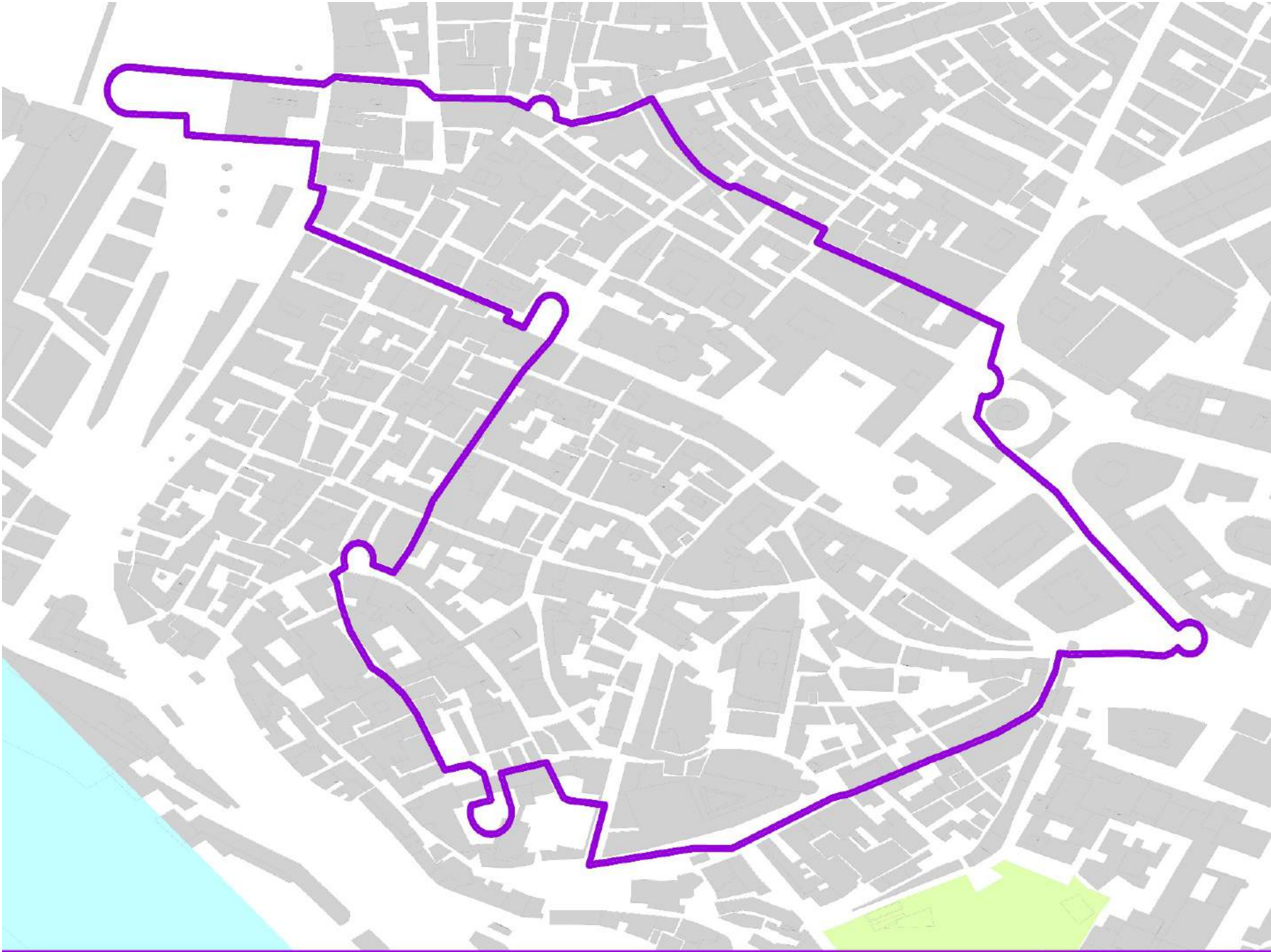
Scapula

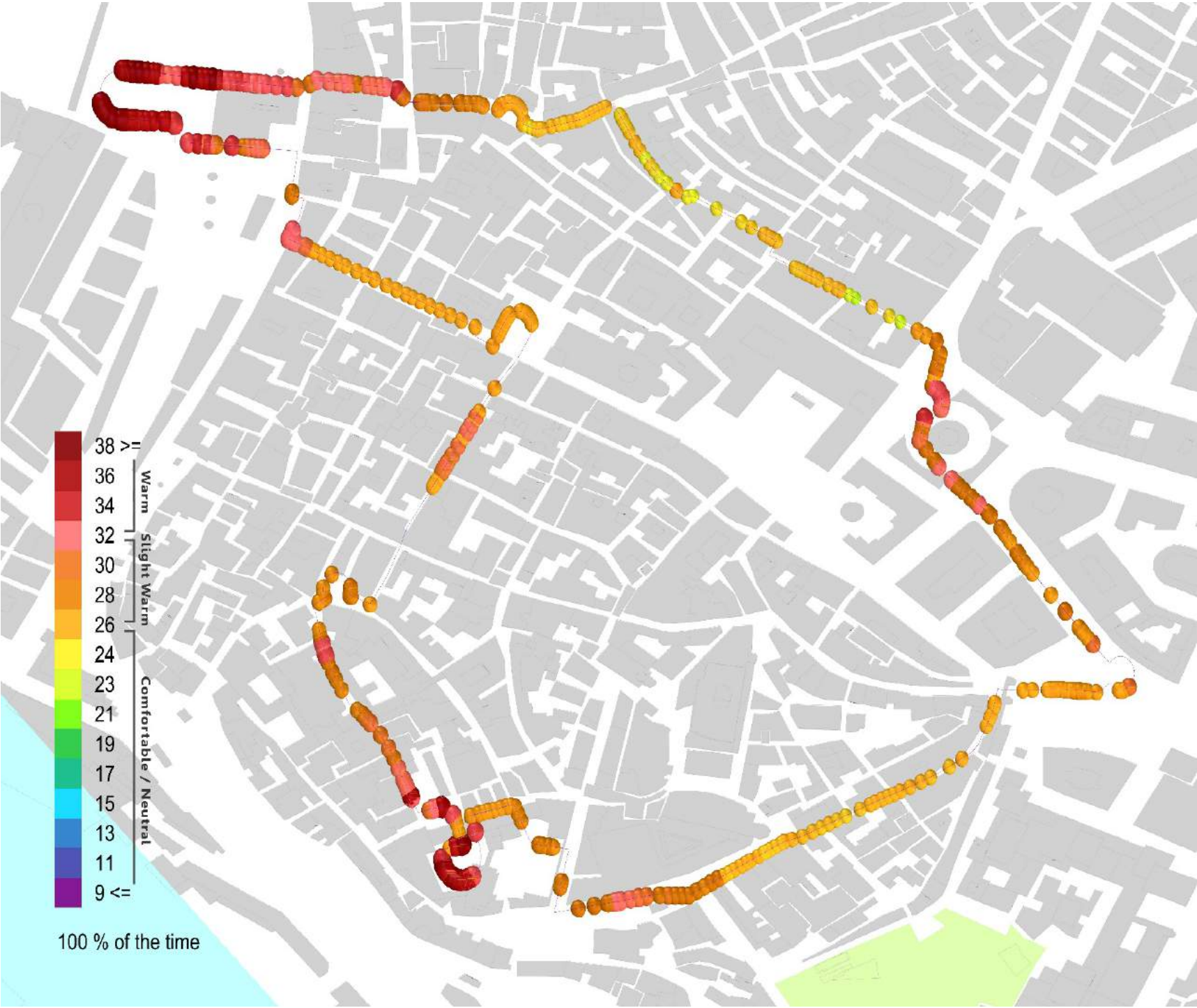


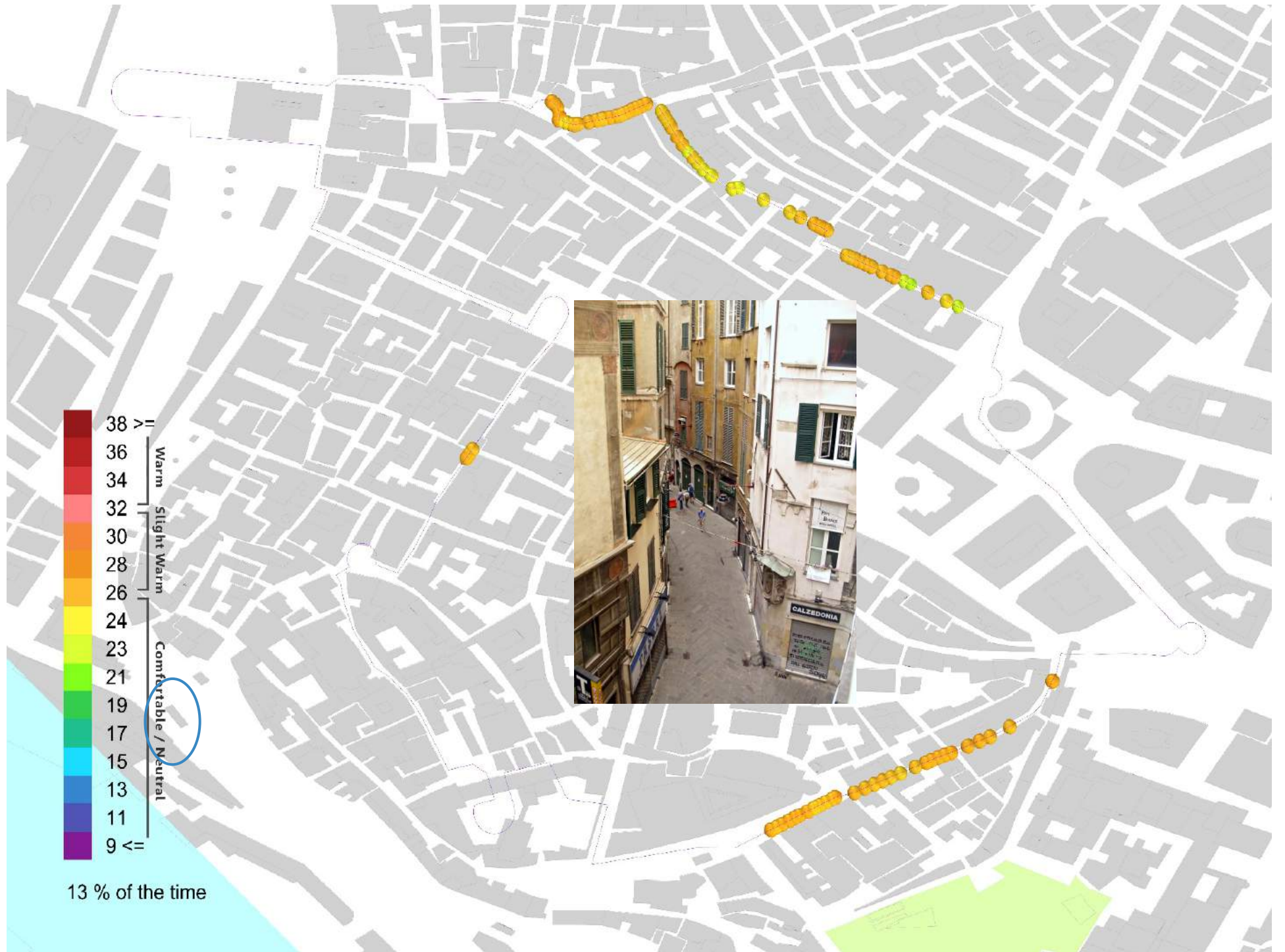
UTCI and Tskin comparison















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