# Accessible and attractive thermally comfortable public outdoor spaces

*New guidelines and mapping of public outdoor spaces for cooling off*

Symposium - Hitte in de Stad: Hete Hangijzers
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# Agenda

- Context / intro (Stephanie)
- Thermally comfortable public outdoor spaces – existing & new guidelines (Stephanie)
  - Interactive moment
- Mapping locations and distances to cool spots (Koen)
  - Interactive moment
- Conclusions

# Cool spots context

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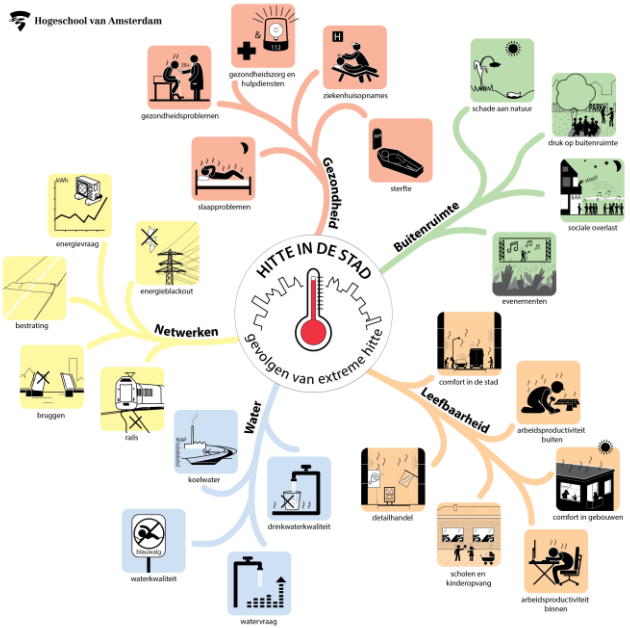
# The heat stress problem

- Cities face increasing heat stress risks with detrimental effects to the liveability of public spaces
- Heat stress impairs vital urban functions and poses risks to citizens' health




(Klok, L., & Kluck, J.; 2018)



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# Pressure on green public space

- Densification leads to pressure on the availability of thermally comfortable public outdoor spaces
- Green, outdoor public spaces are crucial cool spots!

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# What is a cool spot?

Public outdoor space that offers at least 200 m² of cooling capacity *(Kluck et al., 2020)*

# Cool spot guidelines

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# Cool spots - existing guidelines

- *Minimum of 200 m² within 300 m walking (Kluck, et al., 2020)*
- *3-30-300: 3 visible trees, 30% canopy and public green space within 300 m walking (Konijnendijk, 2022)*





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# Cool spots - new guidelines

## Scale: Block

- Minimum of 400 m² within 300 m walking
- Equal amounts of sun and shade (50/50 rule)

## Scale: Neighbourhood

- Large public green outdoor spaces (>0.5 ha) within a 500 m walking
- 9 m2 of public, accessible green per person

## Scale: City

- Public green outdoor spaces should vary in size and function




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# Cool spots – other suggestions

- Transform existing popular public areas into popular cool spots
- Extra shaded seating for neighbourhoods with vulnerable populations
- Ensure shaded play areas for children near their home
- Couple functions - biodiversity, health, water resilience, & social cohesion
- Offer temporary shading while trees mature
- Vegetation
  - balance between shade & airflow
  - Safety perception (low vs high plants)
  - Species (not all contribute to cooling)

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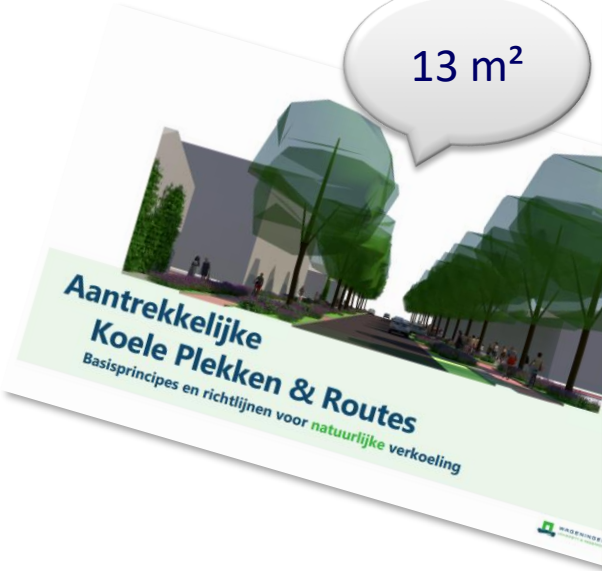
# 9m² per person – it's doable!

13 m²




9 m²

**Emerging trends**

**National and local guidelines on the adequate amount of public space differ significantly from place to place.** Adequate space for street networks is recommended, taking up some 30% of land with at least 18 km of street length per km2 of urban area (UN-HABITAT, 2015). Other **public spaces usually make up between 2 and 15% of land in city centres in Europe.** The WHO recommends a minimum amount of 9m2 of green open space per person (WHO, 2009). While there are contradictions in how a city may define green space, many cities struggle to reach this recommended minimum while others aim to incorporate substantially more (for example, the Italian planning law requires 18m2 of green area per person in new developments).

As mentioned above, the variety and quality of available space is important, as is where it is located and how accessible it is to users in different neighbourhoods. Ideally, public areas should be easily accessible on foot, by bike or by using public transport, and, in particular, should cater for the most vulnerable groups of city users, including people with different abilities, children and the elderly.

**On average, some 40% of the surface area of European cities is made up of urban green infrastructure, with around 18.2m2 of publicly accessible green space per inhabitant; 44% of Europe's urban population lives within 300m of a public park.** However, the presence of green areas (both public and private) in cities varies greatly – whereas some city centres, such as Vienna (AT) and Freiburg (DE), even have forested areas within their city centres, others lack green areas (Zulian et al., 2018; Corbane et al., 2018), especially in Mediterranean regions.

The greenness of European cities has increased by 38% over the last 25 years while globally it has grown by 12% over the same period (EC JRC, 2018).

18 m²

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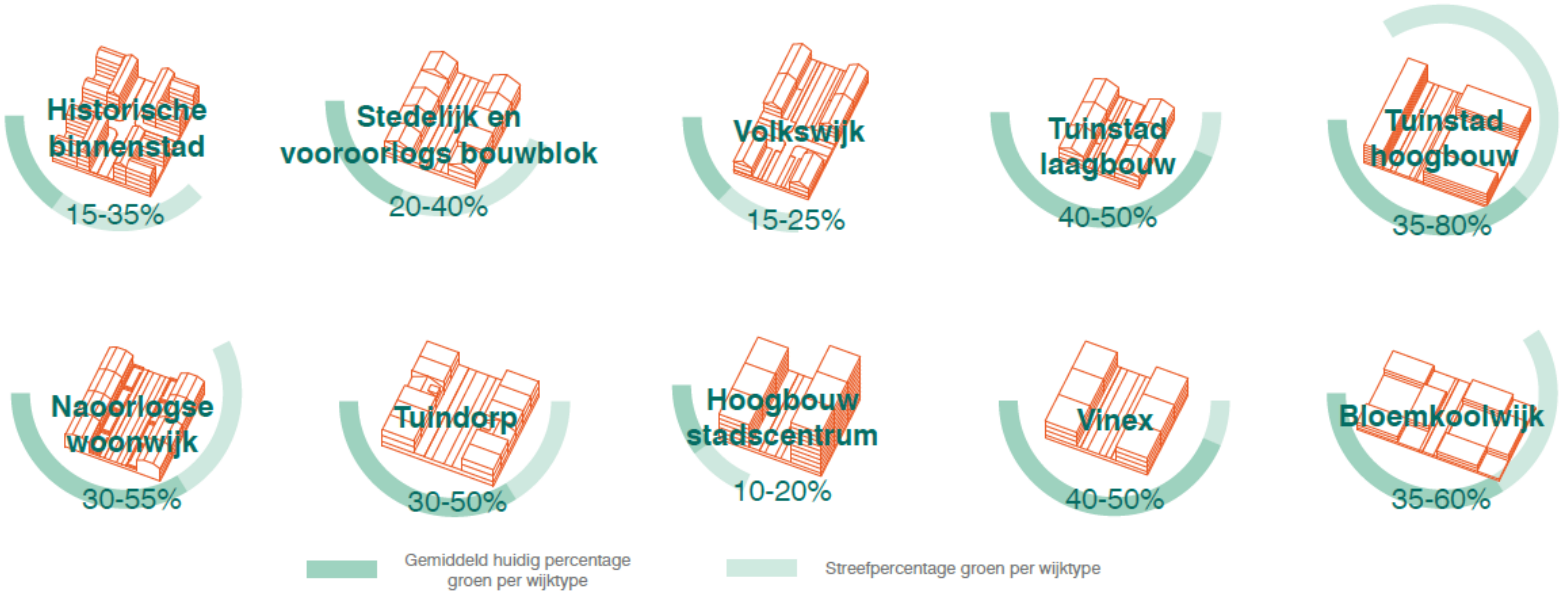
# and could vary per typology (Wijktypen)



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# Let's test it!

# Staatsliedenbuurt, Amsterdam

- 12,910 residents
- Urban building block (Stedelijke bouwblok)

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# Staatsliedenbuurt, Amsterdam

- Current PET map – hot everywhere!

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# Staatsliedenbuurt, Amsterdam

- Limited or no cool spots within the neighborhood
- Some cool spots outside the neighborhood

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# Staatsliedenbuurt, Amsterdam

Is 9 m² feasible? Let's test it out!

- Simple figure – ground of public space vs everything else

- White = public space
- Gray = parking
- Black = buildings, roads, bridges, etc.

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# Staatsliedenbuurt, Amsterdam

- 12,910 residents @ 9 m² per person
- 116,190 m² of green public space needed
- 58,095 m² of cool spots needed (50/50 rule)

- 43,313 m² of green public space
- 21,656 m² of cool spots possible

- Current situation - 3.35 m² per person
- With less parking and car lanes, vs. 9 m² pp public green space would be possible!

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# What are your thoughts on the new guidelines?

# Mapping cool spots

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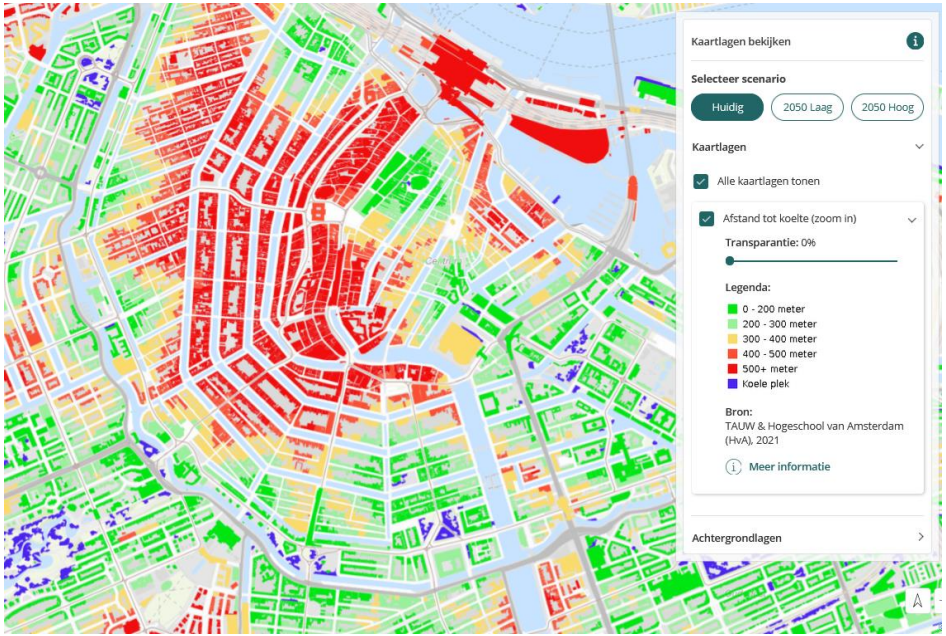
# Mapping cool spots

- In 2021, TAUW, AUAS and CAS produced the distance to coolness map (Aftstand tot Koelte kaart)
- Cool spots were identified using a high-resolution heat map (PET)
- Network analysis to determine walking distance to cool spots
- Visualize buildings by walking distance



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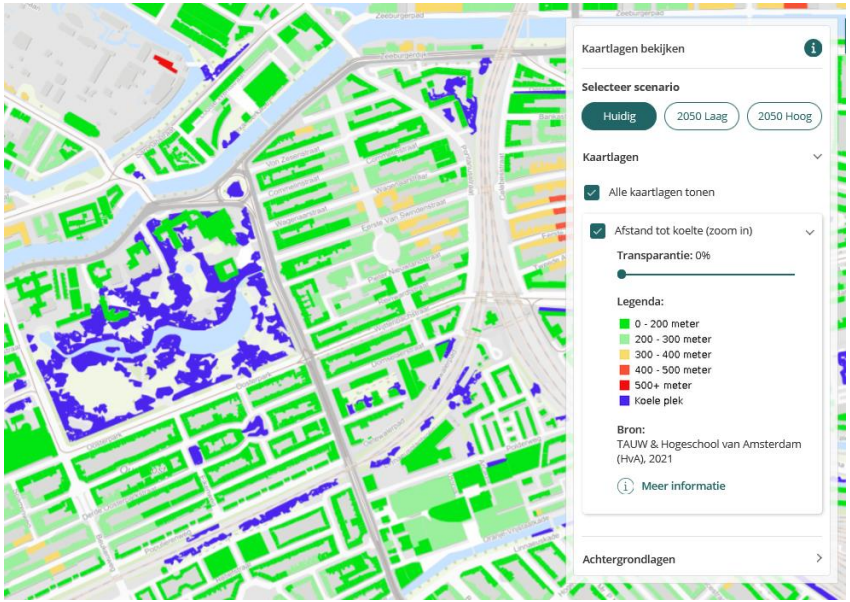
# Criteria for mapping cool spots

- Size: Public outdoor space of at least 200m².
- Temperature: Not above 35° C PET (shade)
- Location: Minimum distance from roads
- Width: No long and narrow cool spots



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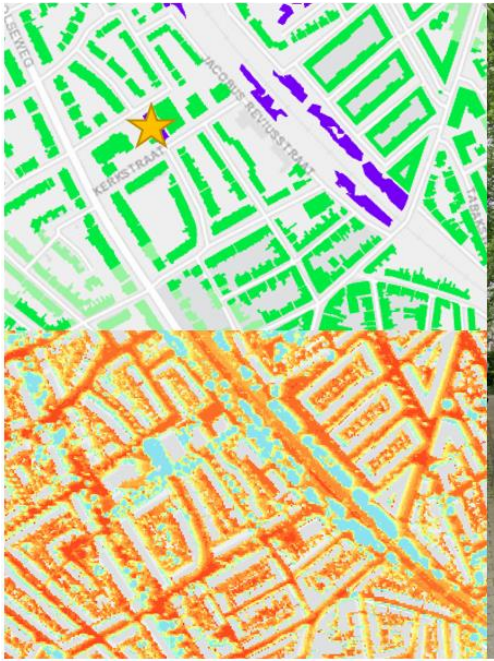
# What do these mapped cool spots look like in reality?



Positive:

- Lots of shade
- Playground for kids

Negative:

- One access through the fence
- Next to the school

Kerkstraat, Deventer

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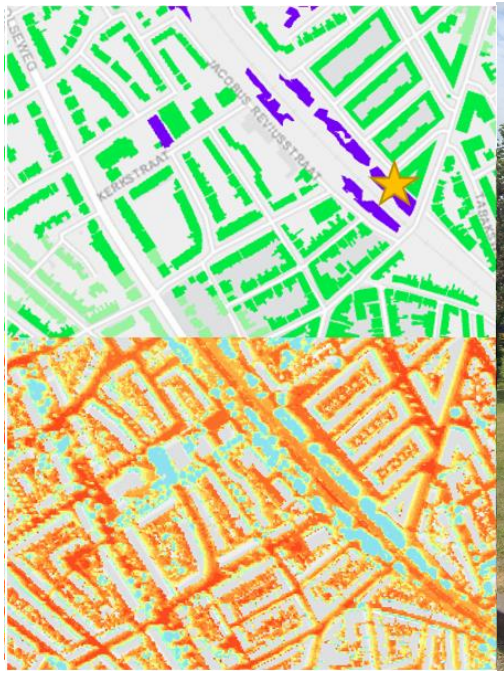
# What do these mapped cool spots look like in reality?



Positive:

- A bench to sit
- Large trees for shade

Negative:

- Next to the train track

Middelweg, Deventer

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# What do these mapped cool spots look like in reality?

Positive:

- A lot of green

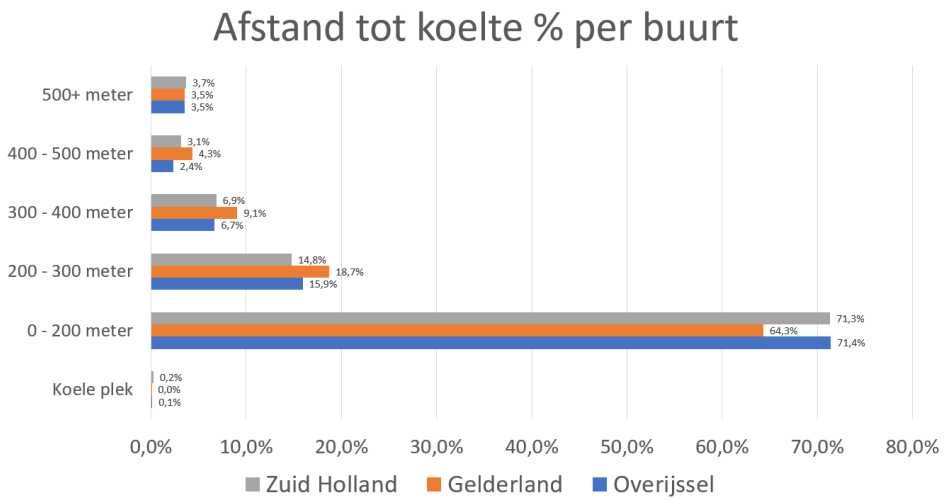
Negative:

- No place to sit
- Narrow piece of bushes
- Next to the train track

Jacobus Reviusstraat, Deventer

# Good start…but can be better

- Always meant to as a first step in assessing adaptive capacity
- 85% of addresses in the dataset were within walking distance of a cool spot
- We know in reality this is not the case



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# Should we update the distance to coolness map?

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# Conclusions

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**Thank you!**
**Questions or comments?**

**Please be in contact if you have any more questions or would like to connect!**

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