# who's leading?

## Urban climate adaptation in Germany and The Netherlands

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Germany

Netherlands

air pollution

wind

air temperature

stormwater

... who is leading???

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# Urban air pollution

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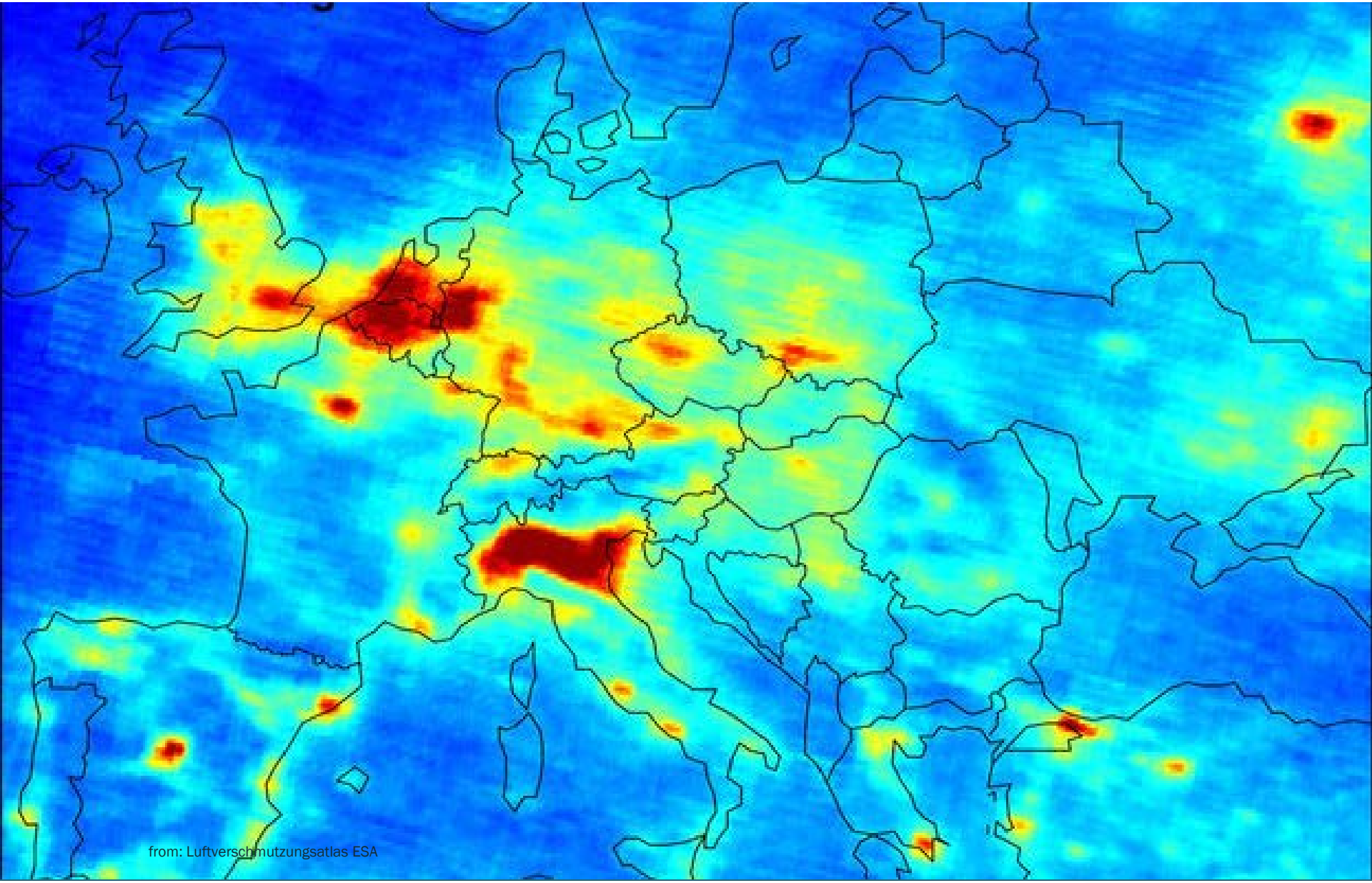
# Air pollution in Europe

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# Air pollution PM 10 & 2,5

**Figure 2.3 Attainment situation for $PM_{10}$ in 2011**

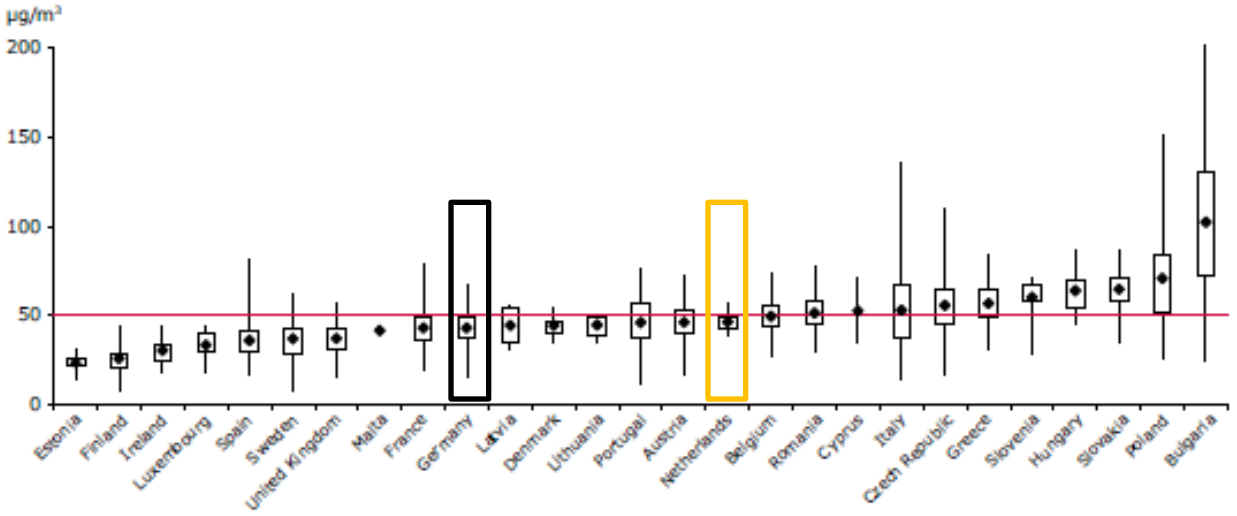
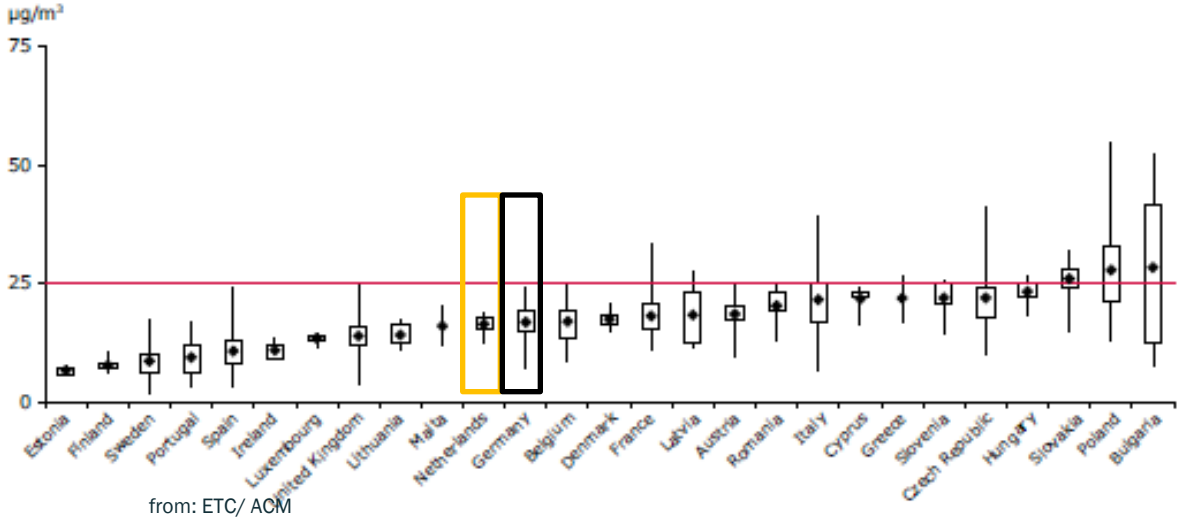



**Figure 2.4 Attainment situation for $PM_{2.5}$ in 2011**




from: ETC/ ACM

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# Air pollution SO2 and NO2

**Figure 5.2 Attainment situation for $SO_2$ in 2011**

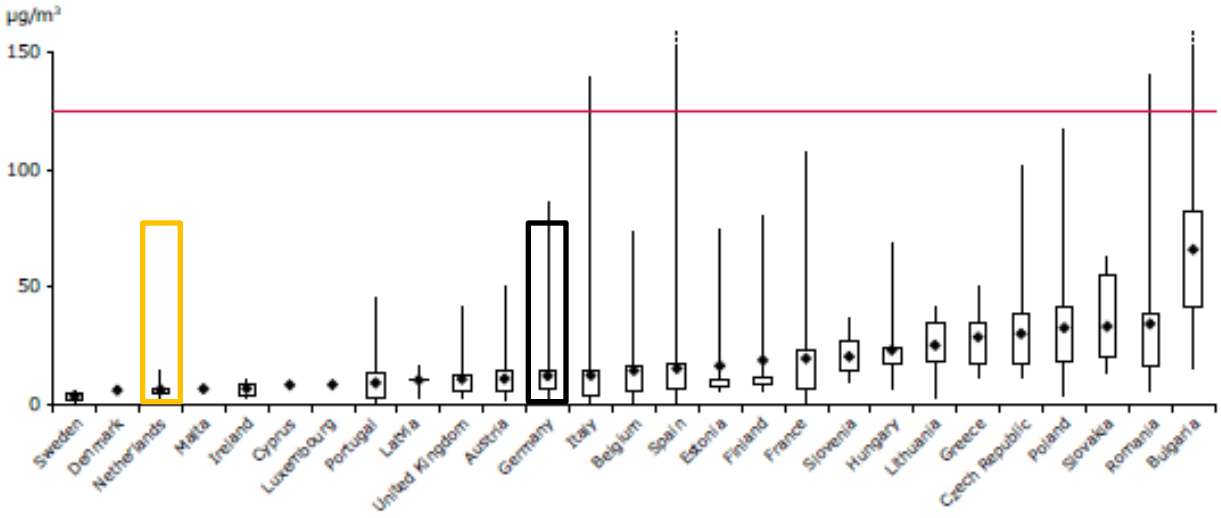
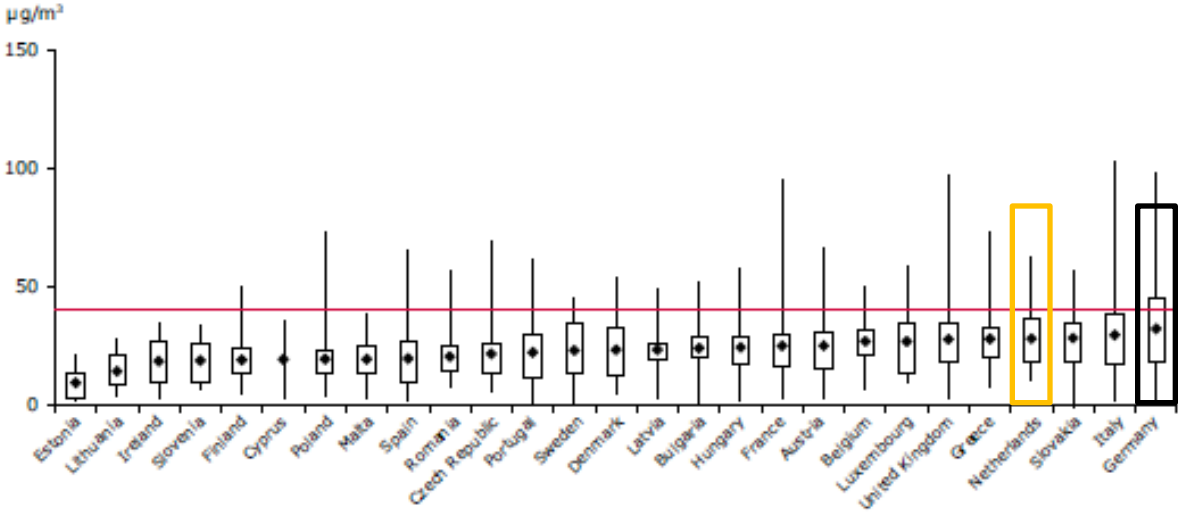



**Figure 4.2 Attainment situation for annual limit value of $NO_2$ in 2011**

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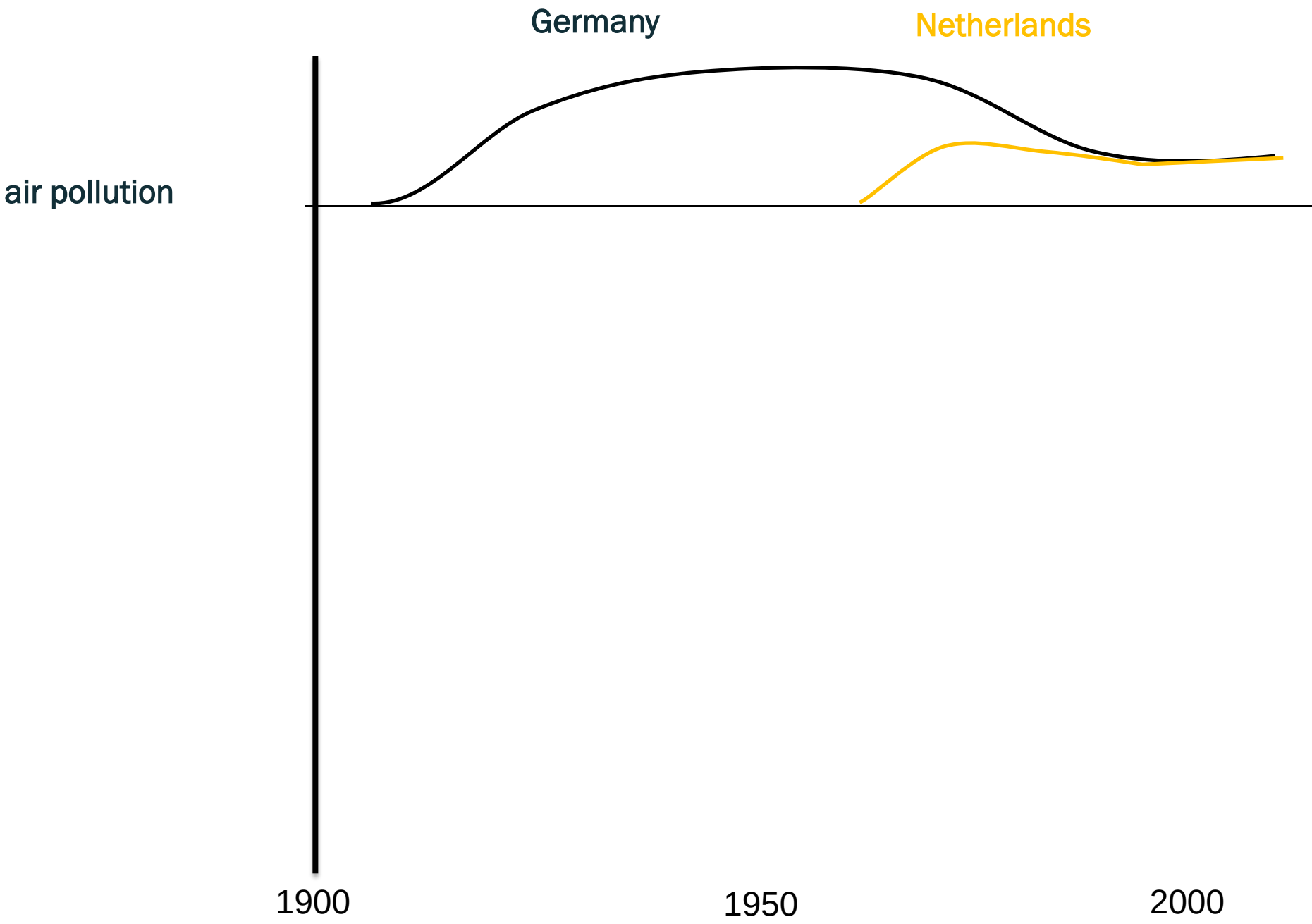


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# urban wind


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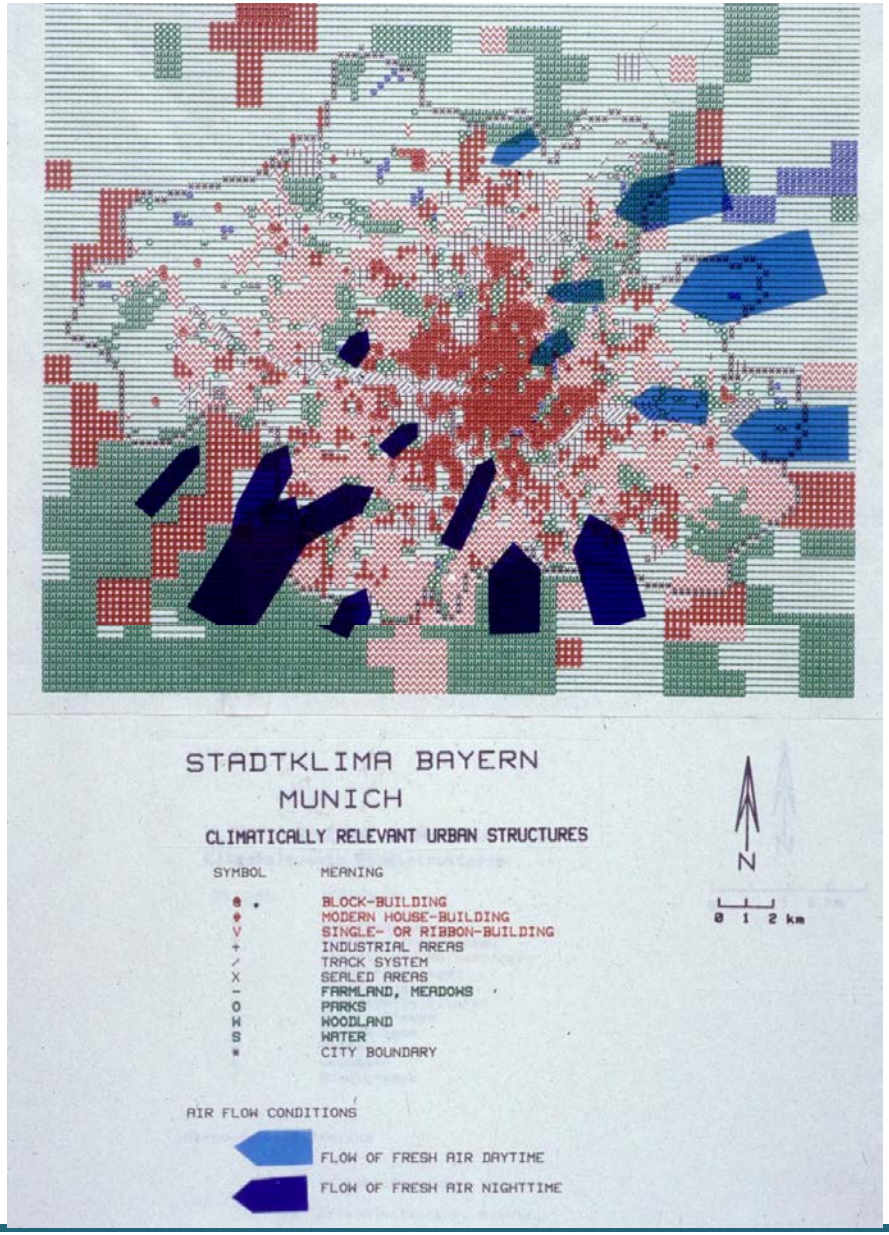
# Wind maps, München

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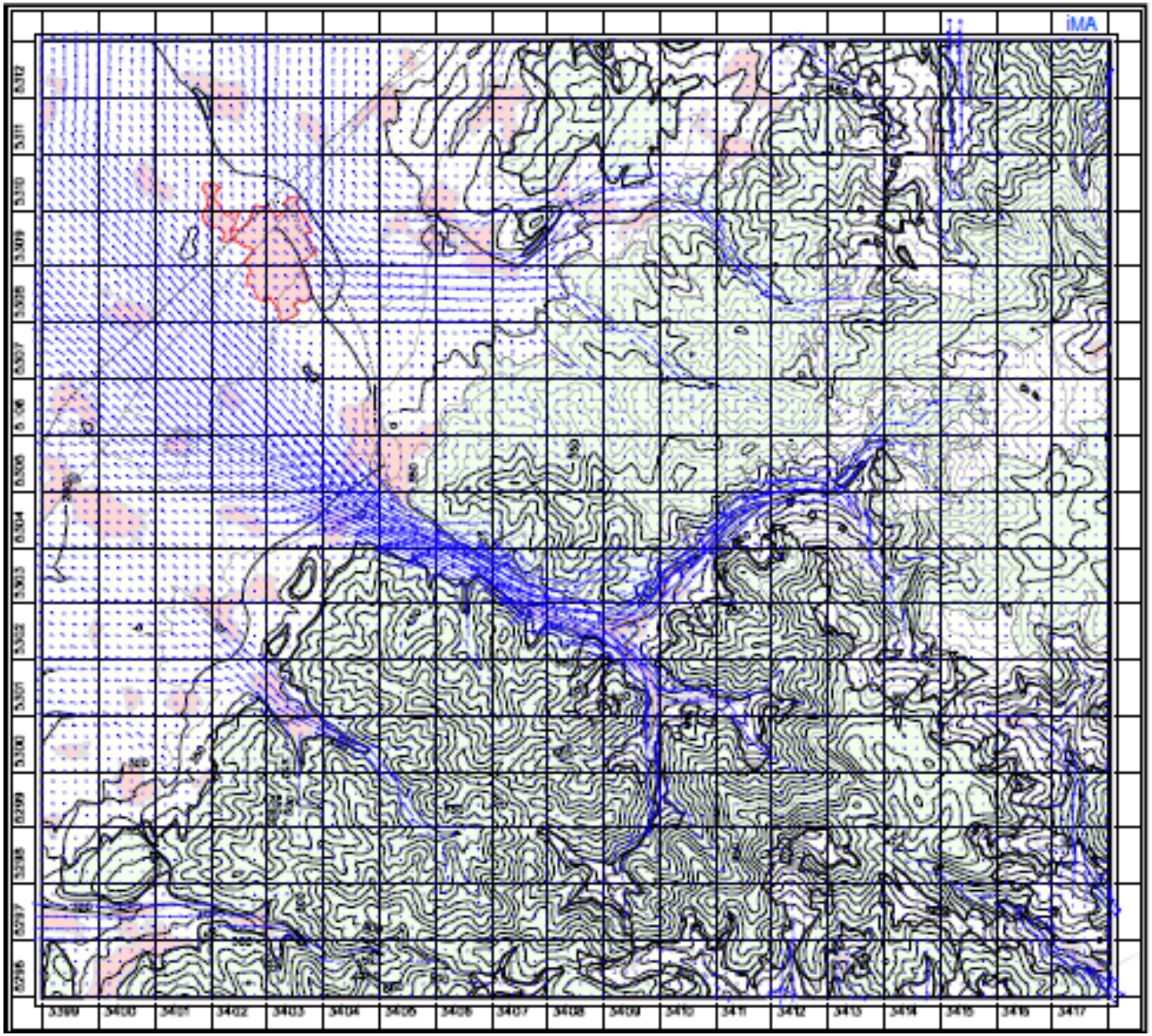
# Cold air stream map, Freiburg

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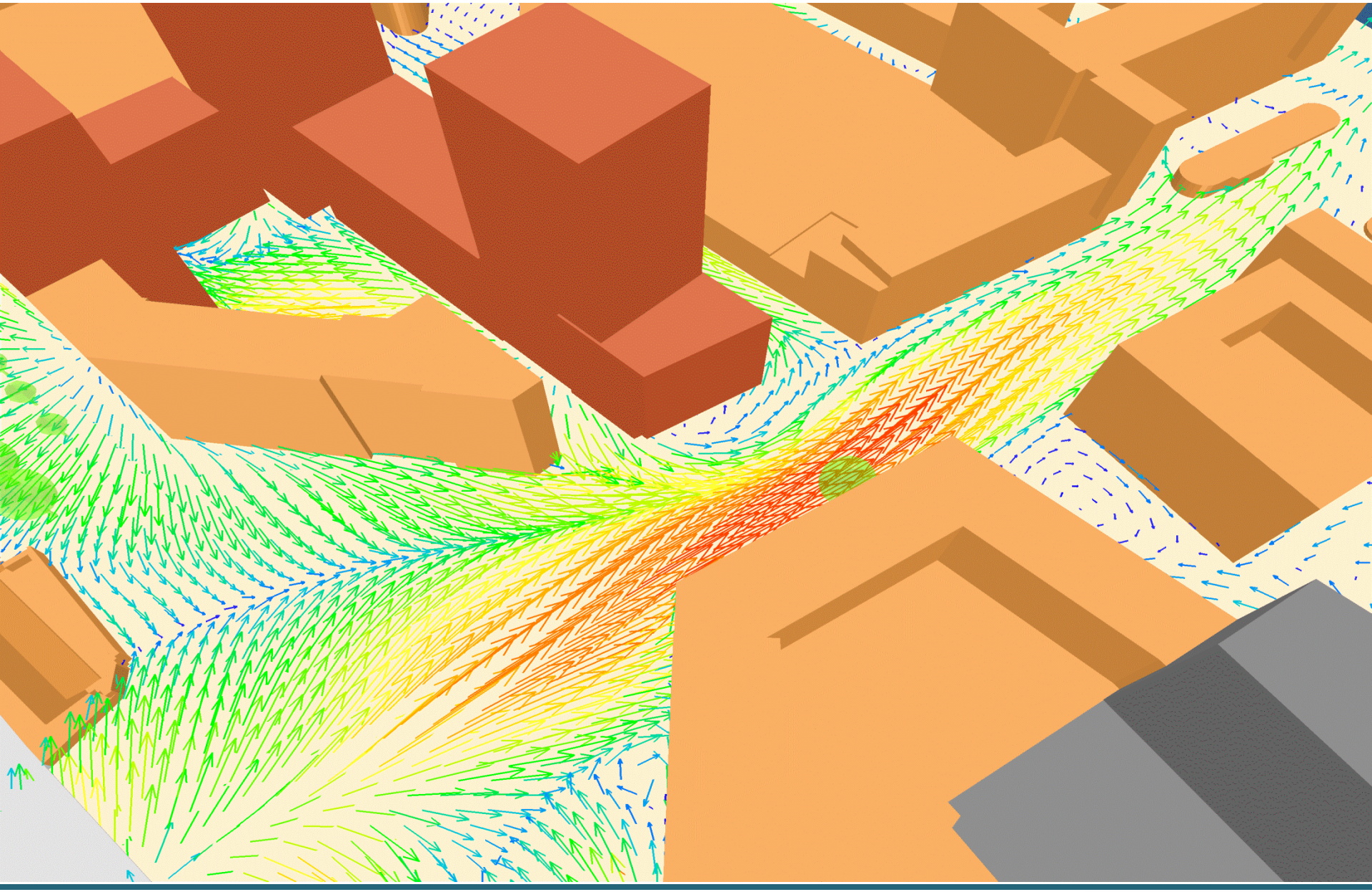
# NEN norm 8100, NL



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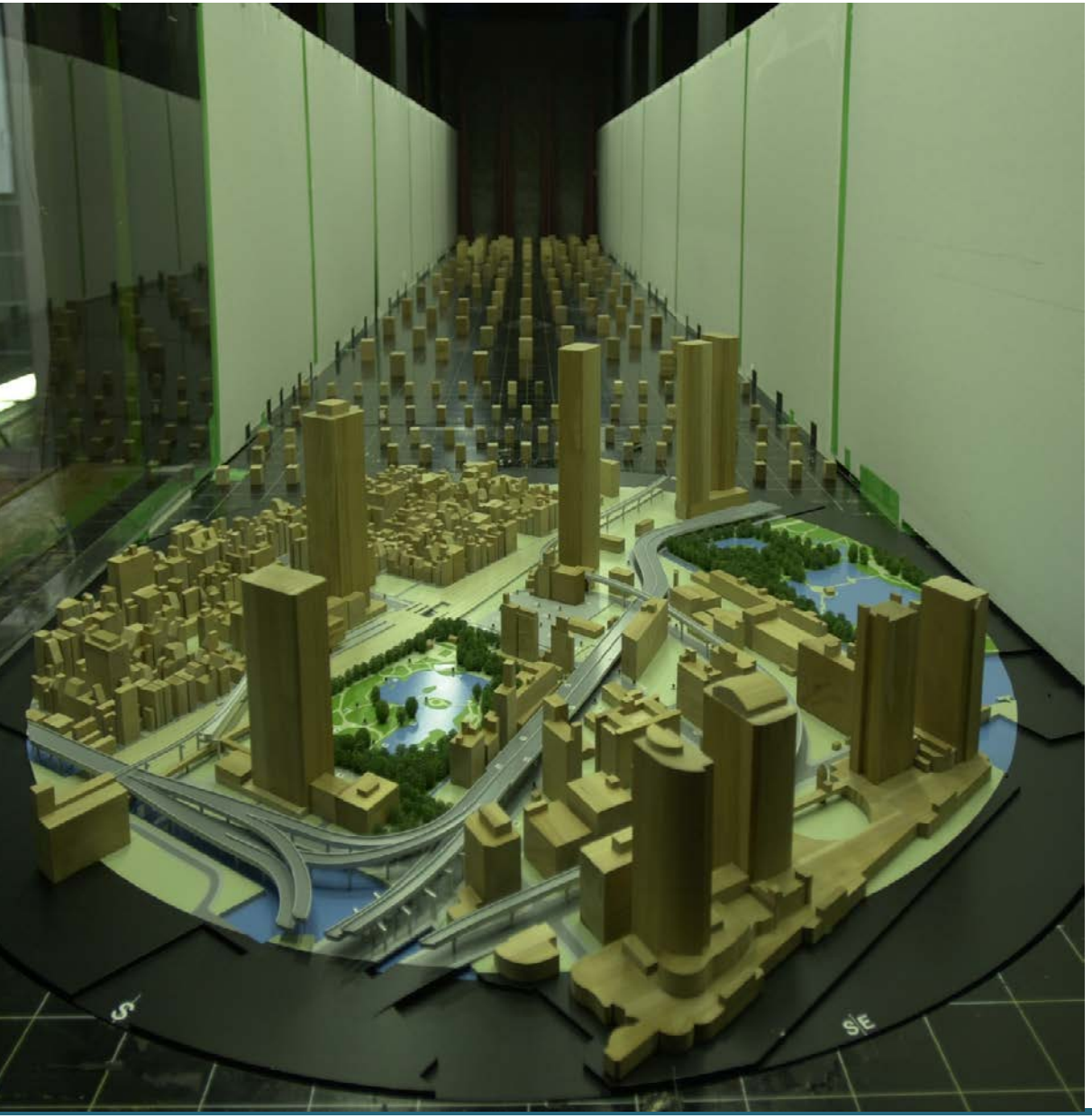


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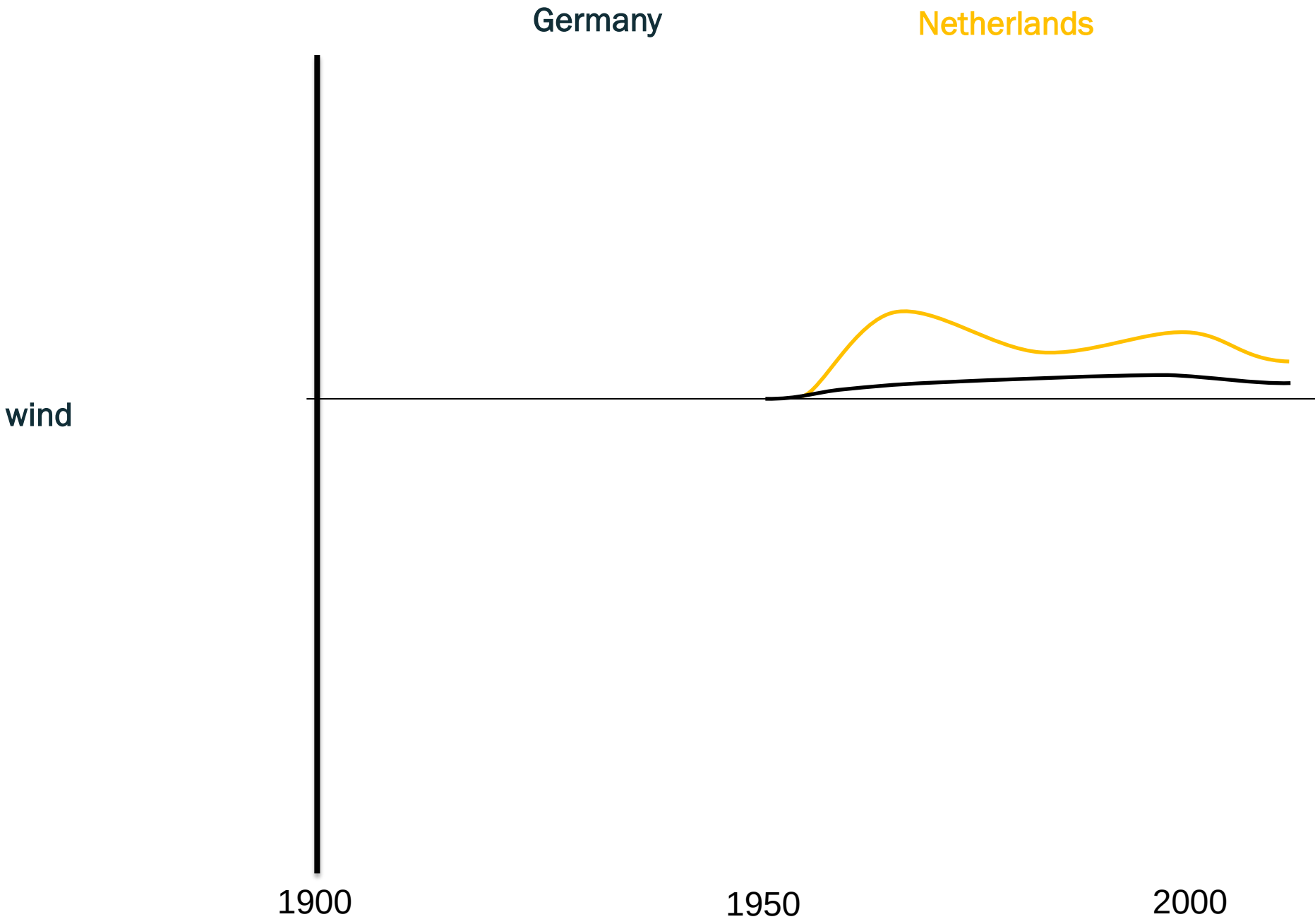


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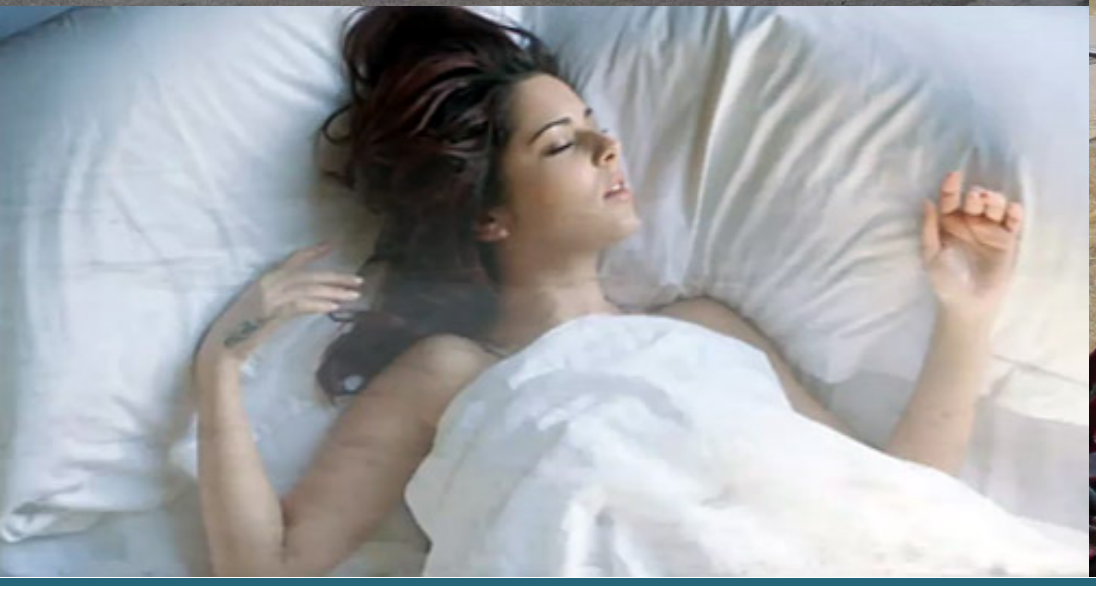
# Air temperature



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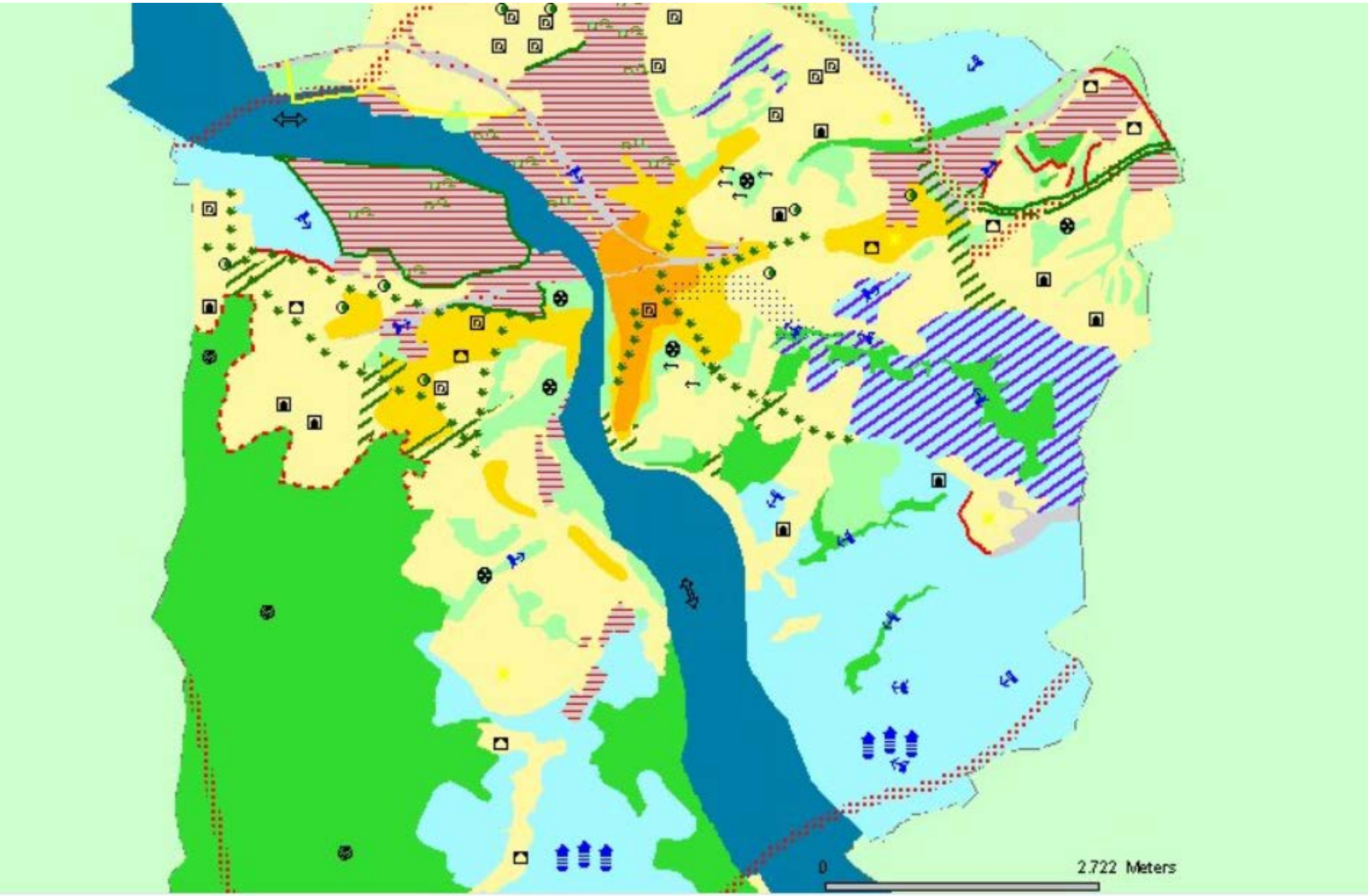
# Urban climate analysis Ruhr area

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# Urban climate analysis Stuttgart

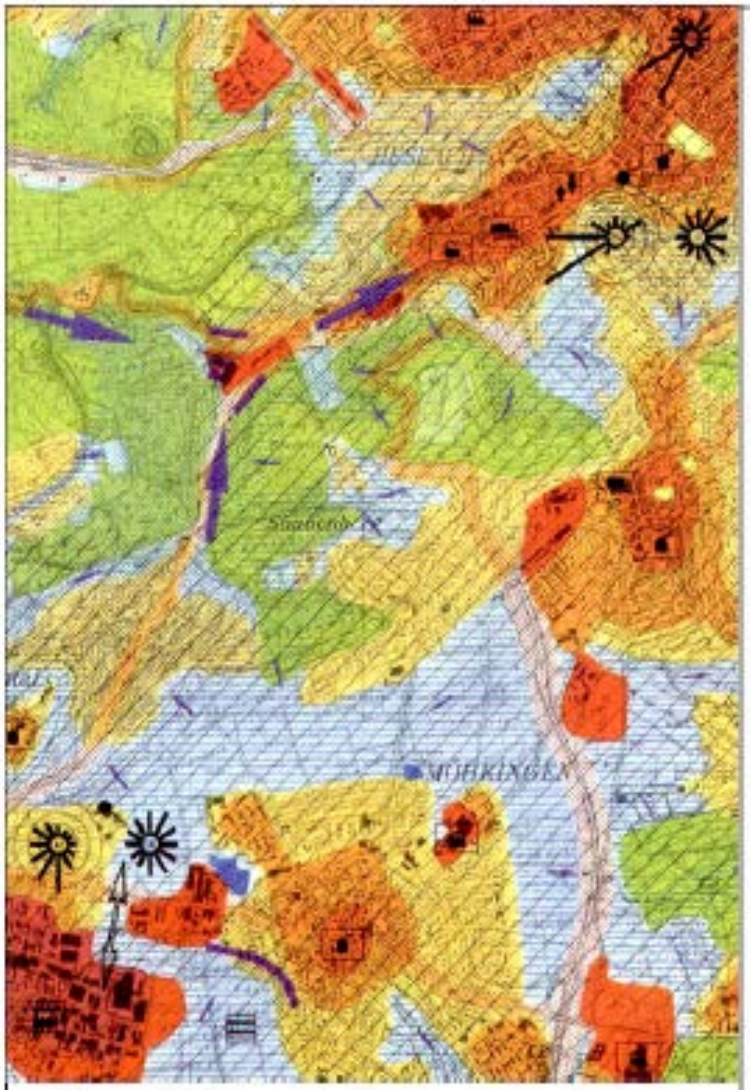

Figure 14: Example of a climate analysis map for Stuttgart city area (Source: Nachbarschaftsverband Stuttgart, 1992).

VDI 3787 Blatt 1 / Part 1

Symbols for climate and air pollution maps

**CLIMATOTOPES /AEROTOPES**

- Water bodies/lakes
- Open land
- Forest
- Open spaces in town centers
- Garden town/village
- Suburban area
- Agglomerated urban development
- Town center
- Business
- Industry

**COLD AND WARM AIR AREAS**

- Cold air drainage area
- Cold air catchment area
- Stagnant cold air/ cold air pools
- Climate of the warm slope zone

**TRAFFIC EMISSIONS**

- Traffic loading (> 50000 vehicles per day)
- Traffic loading (> 30000 vehicles per day)
- Traffic loading (> 10000 vehicles per day)

**AIR EXCHANGE**

- Downslope wind, slight cold air drainage
- Downslope wind, medium cold air drainage
- Downslope wind, strong cold air drainage
- Mountain breeze system/valley breeze system
- Air directing track (unpolluted)
- Air directing track (polluted)
- Air directing track (partially polluted/partially unpolluted)

**AIR POLLUTION**

- Strong pollution
- Medium pollution
- Slight pollution
- No measured values

**PICTOGRAMS**

- Domestic fire emissions
- Traffic emissions
- Business emissions
- Industry emissions
- Loading from pollution
- Ground fog/valley fog
- Raised inversion
- Wind field change
- Wind rose
- Air pollution wind rose

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# Adaptation in urban planning, Stuttgart


from: Stuttgart Municipality, Flächennutzungsplan

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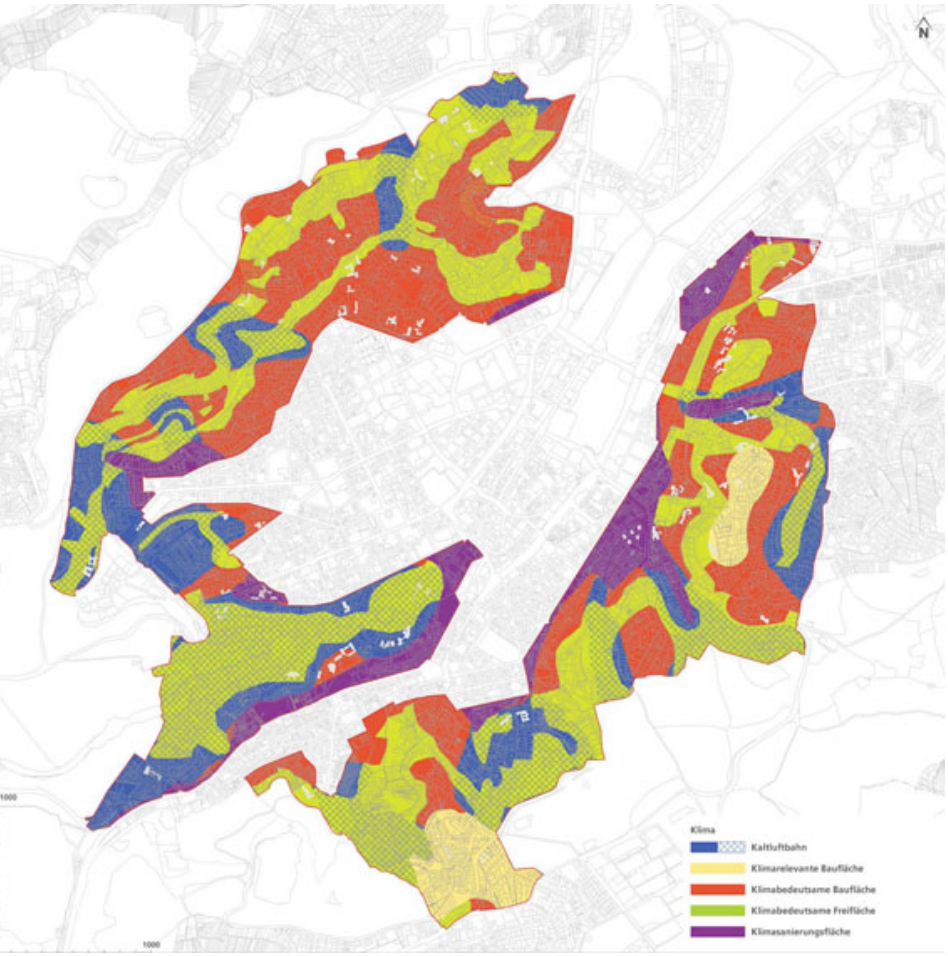
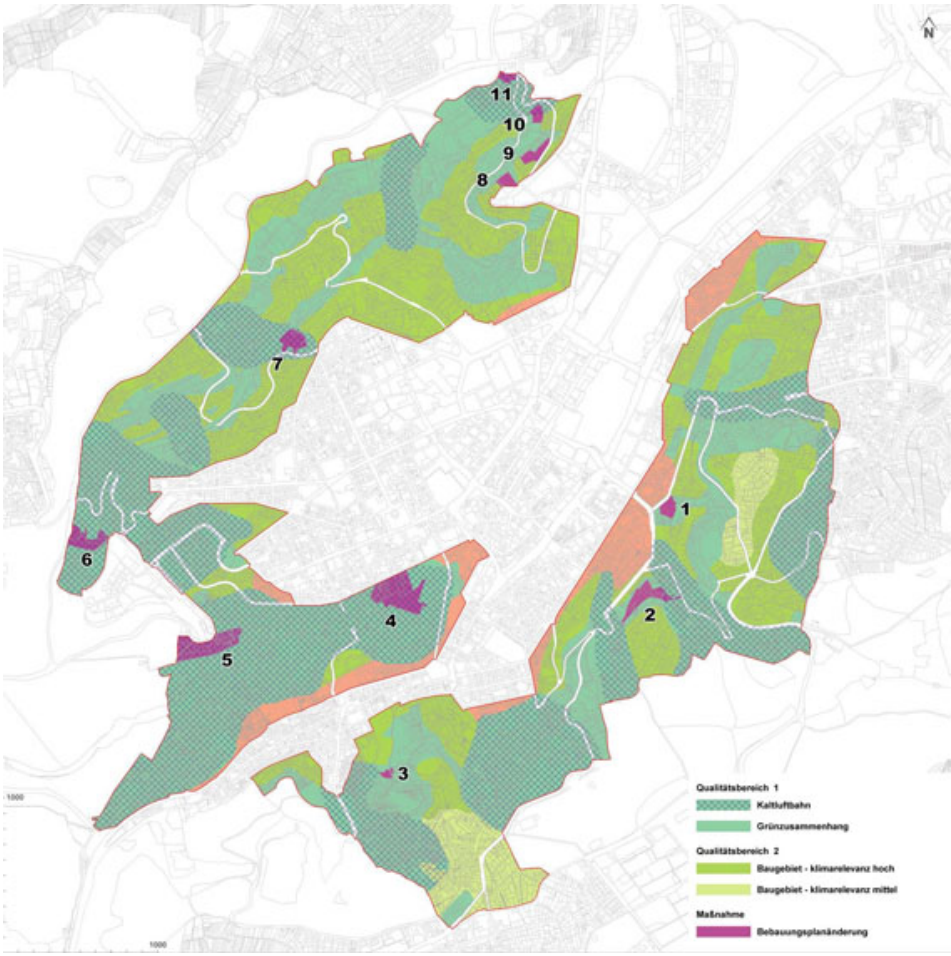
# Adaptation in urban planning, Stuttgart




from: Stuttgart Municipality, Bebauungspläne

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# Heat map, Arnhem


from: gemeente Arnhem

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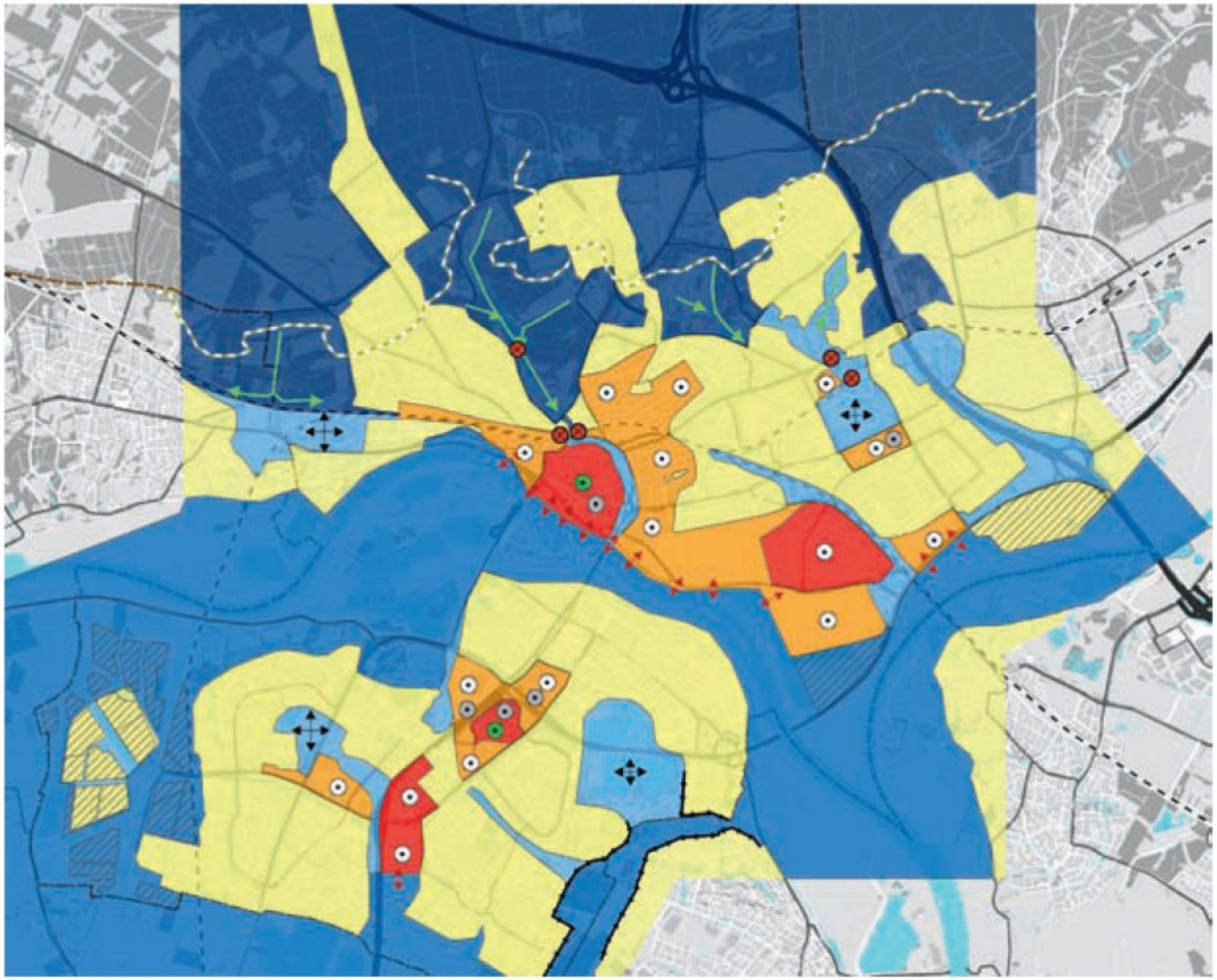
# Heat adaptation map, Arnhem




from: gemeente Arnhem

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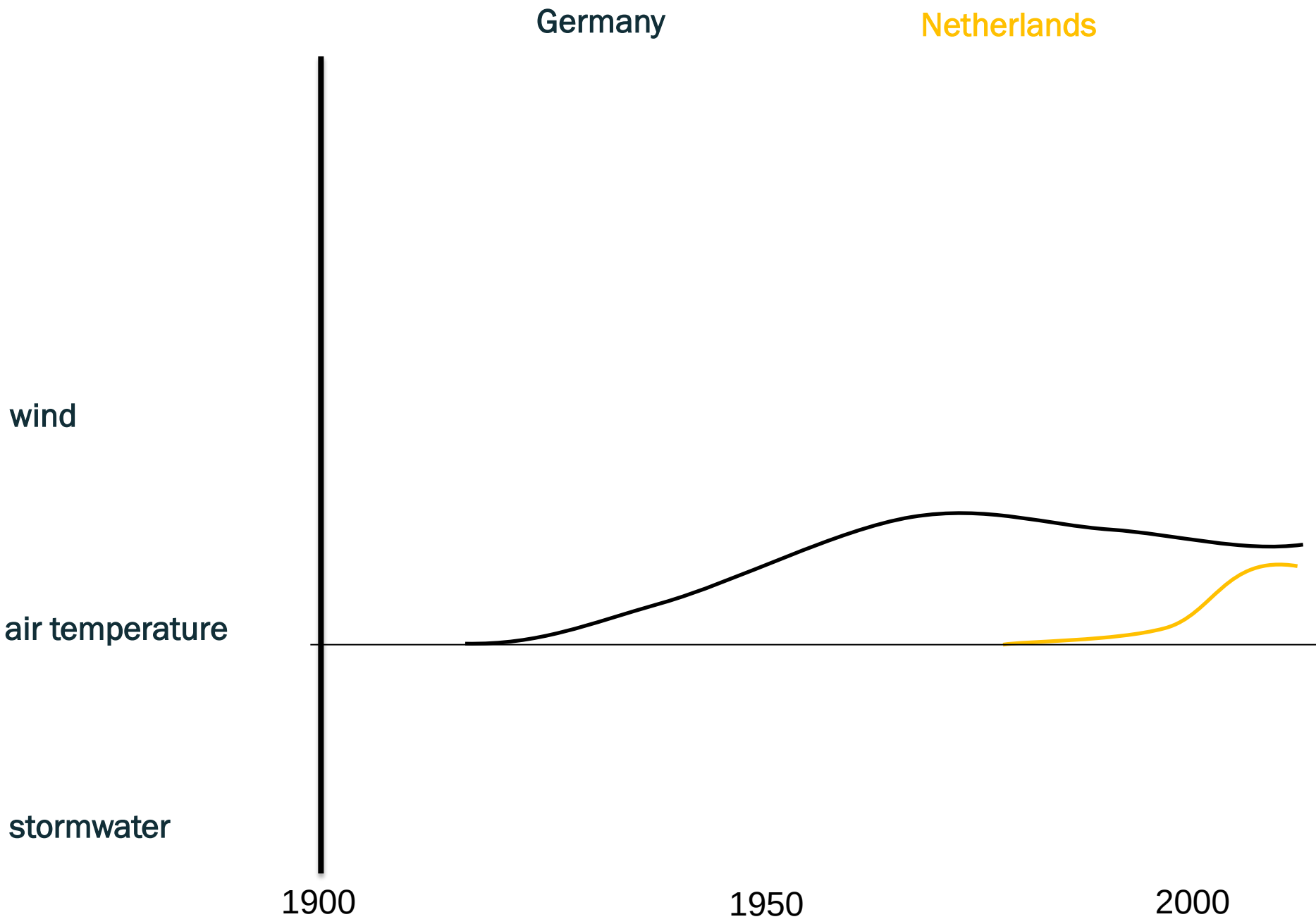


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# SUDS in Germany

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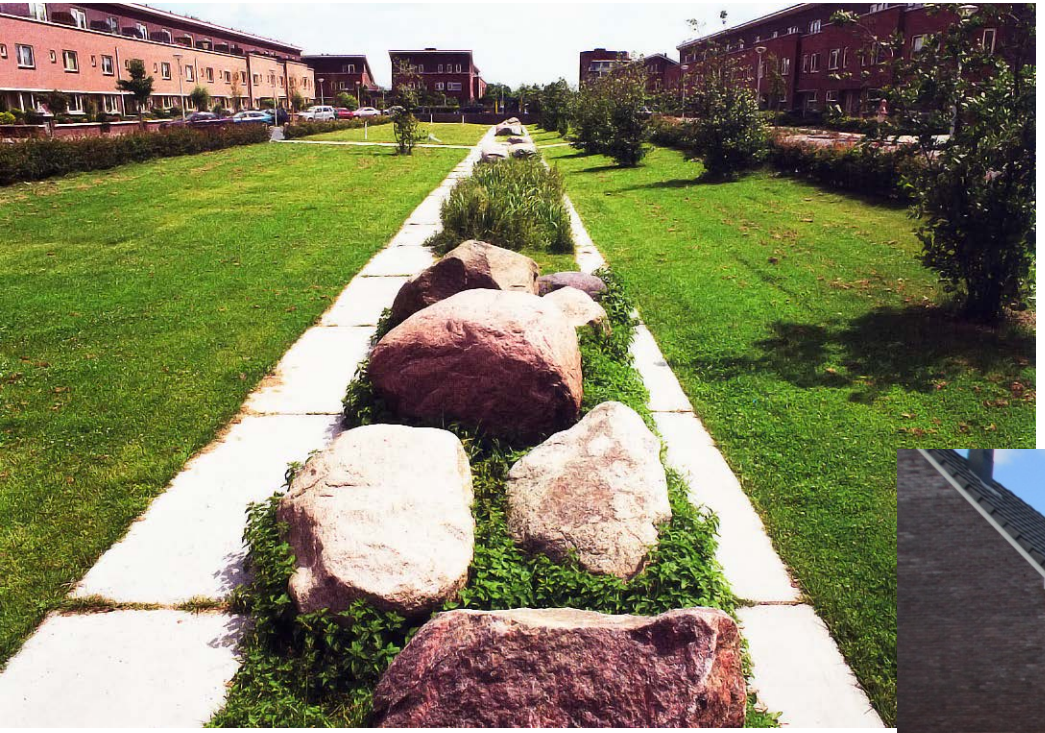
# SUDS in The Netherlands



Waterschap Rijn en IJssel
WATERBEHEER: VEILIG EN OP MAAT

waterschap Hollandse Delta

WATERSCHAP ZUIDERZEELAND

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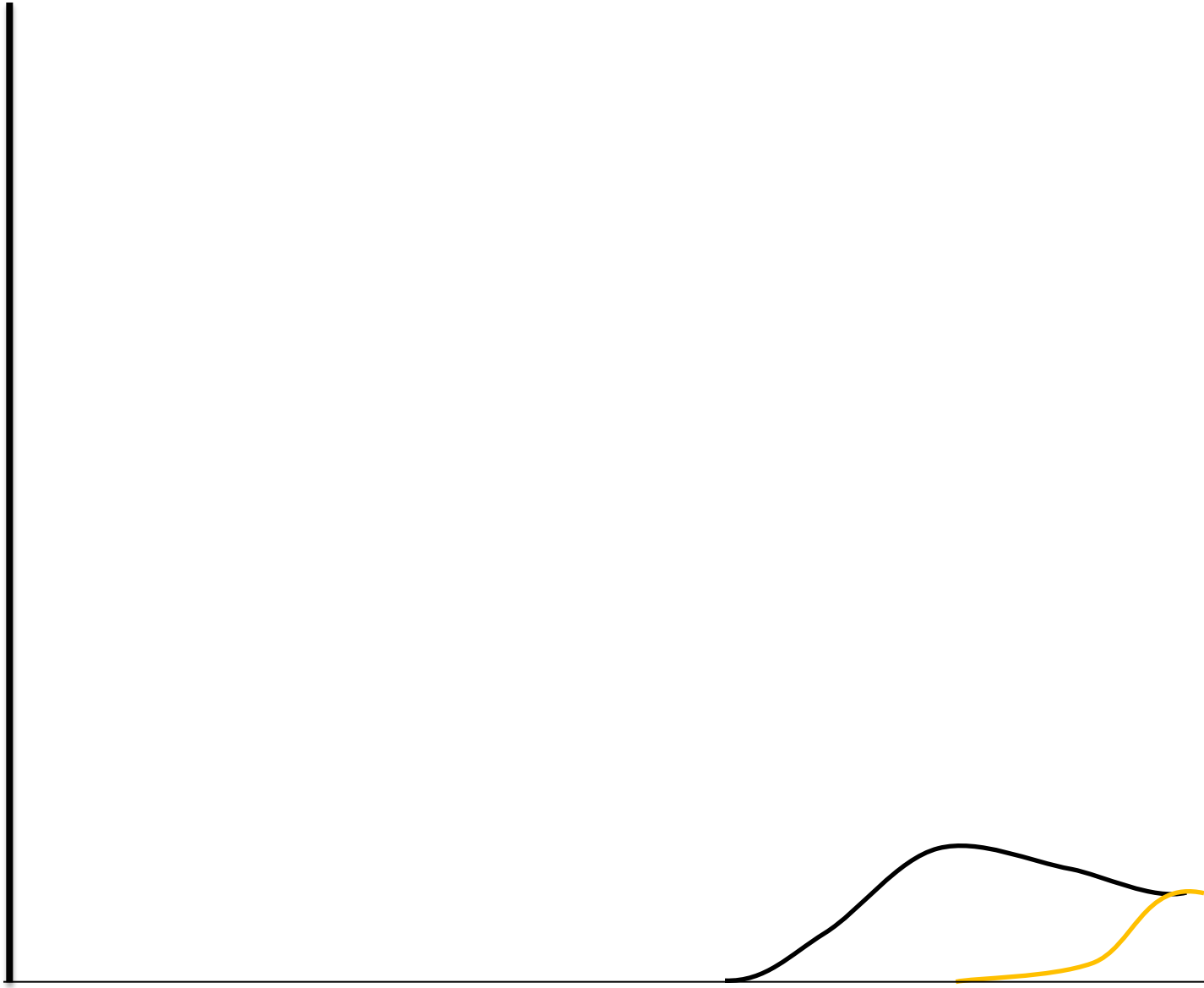
Netherlands




stormwater

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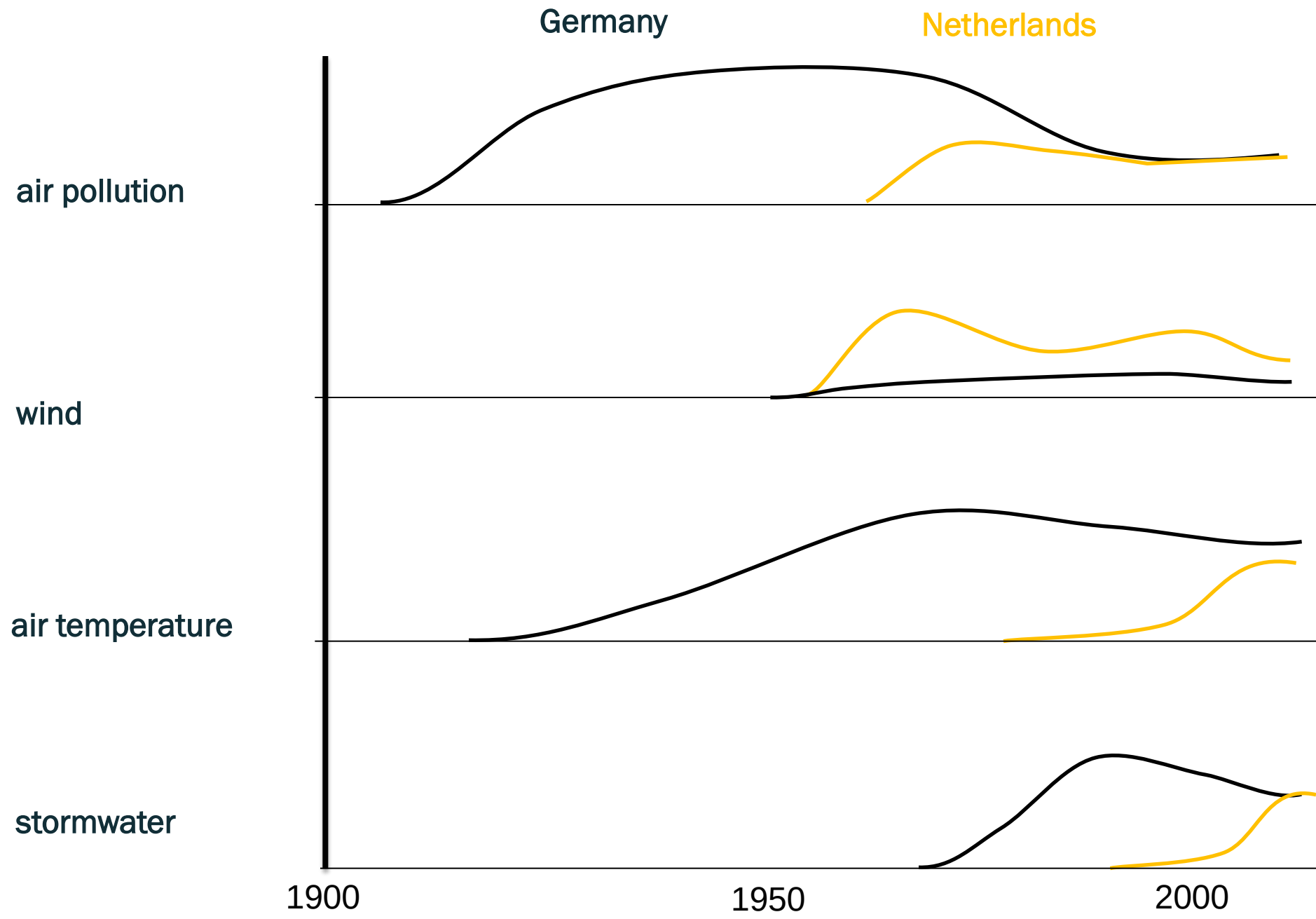


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Germany

Netherlands

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wind

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3 : 1

but...

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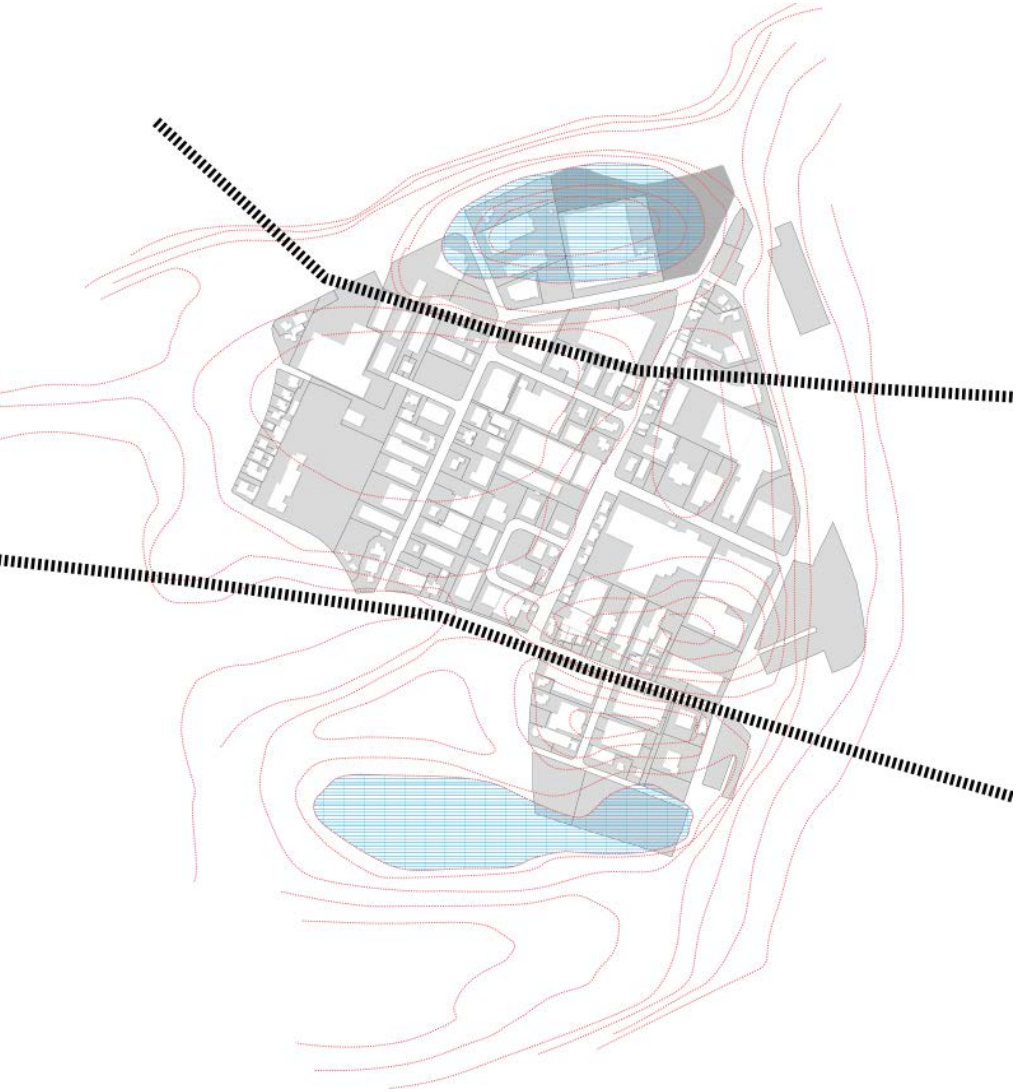
# Water and heat in Latenstein, Tiel (Darius Reznek)



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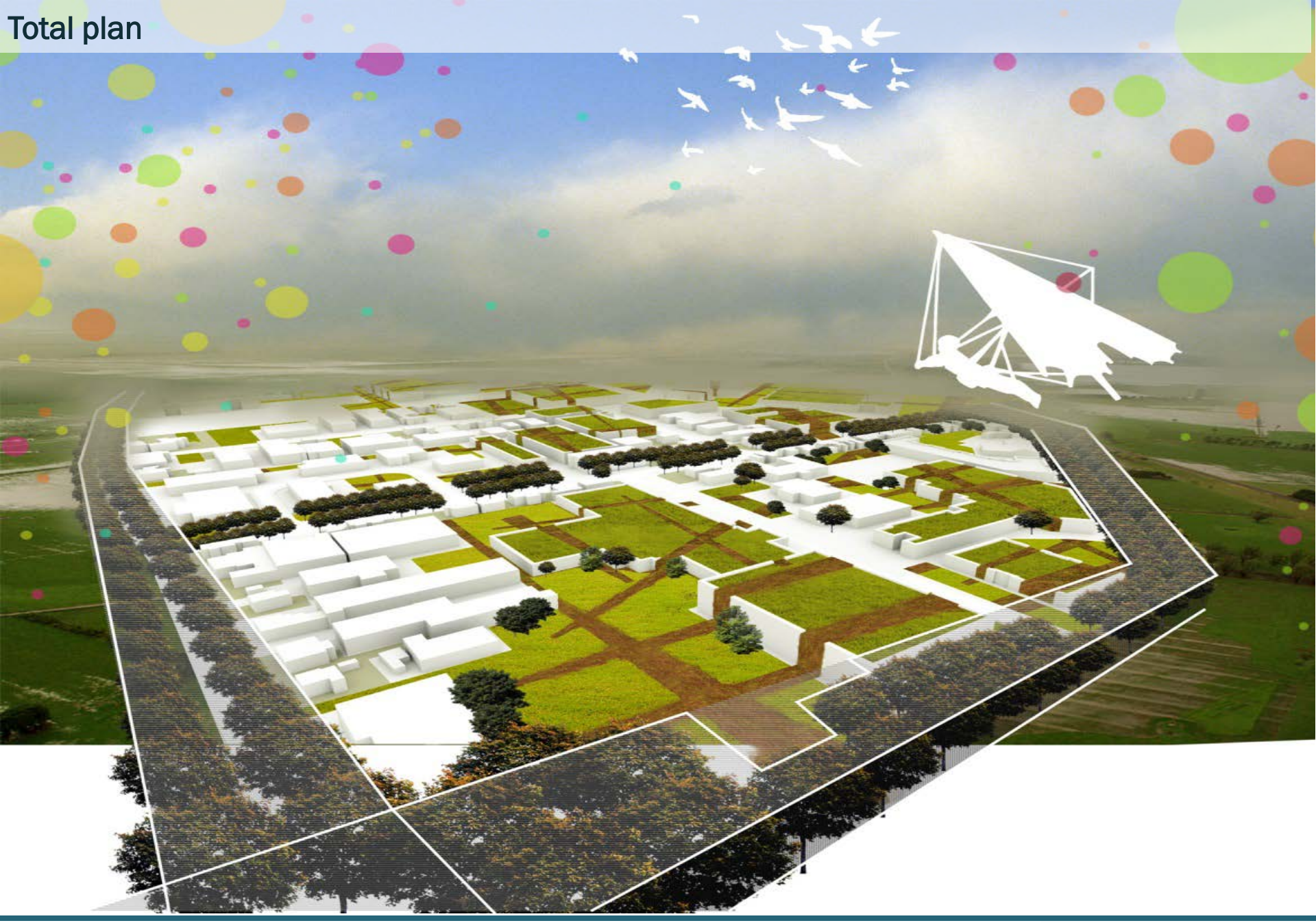
# Total plan



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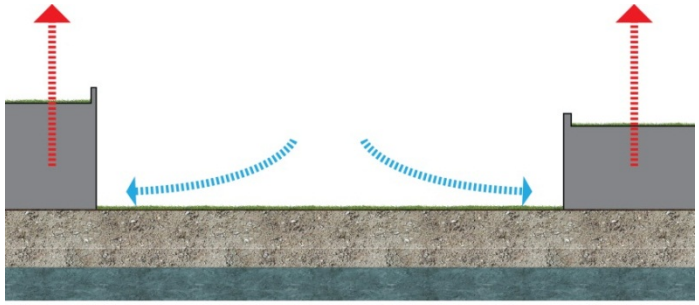
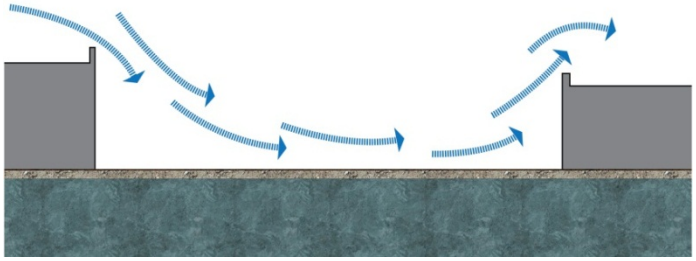
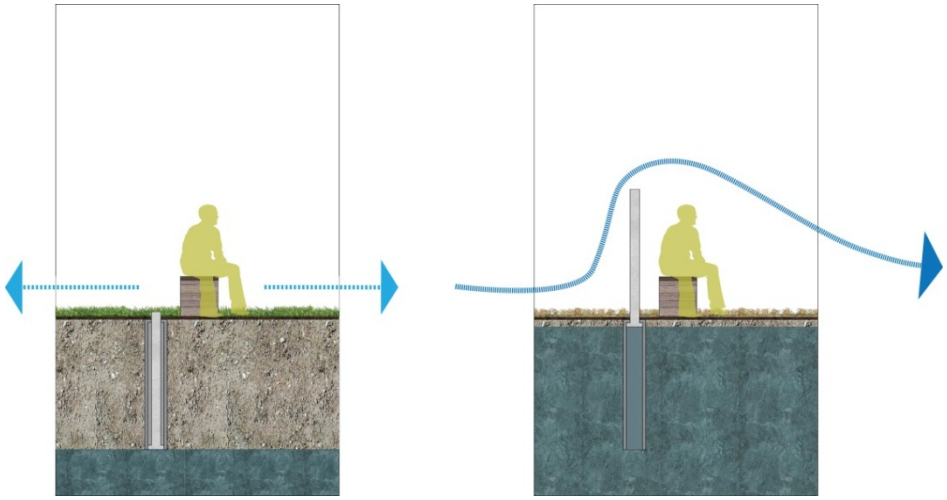
# Dynamics of water and wind in different seasons and the ‘climate buoy’





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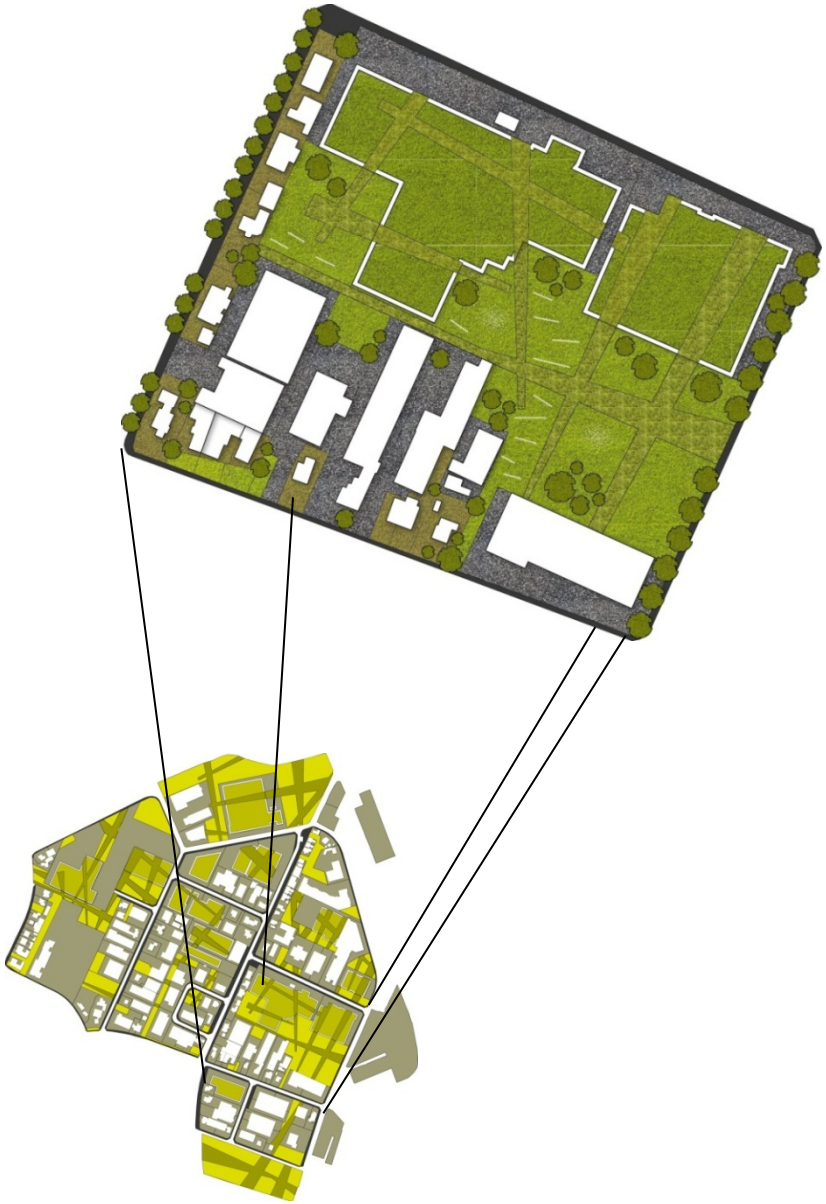
# Local plan



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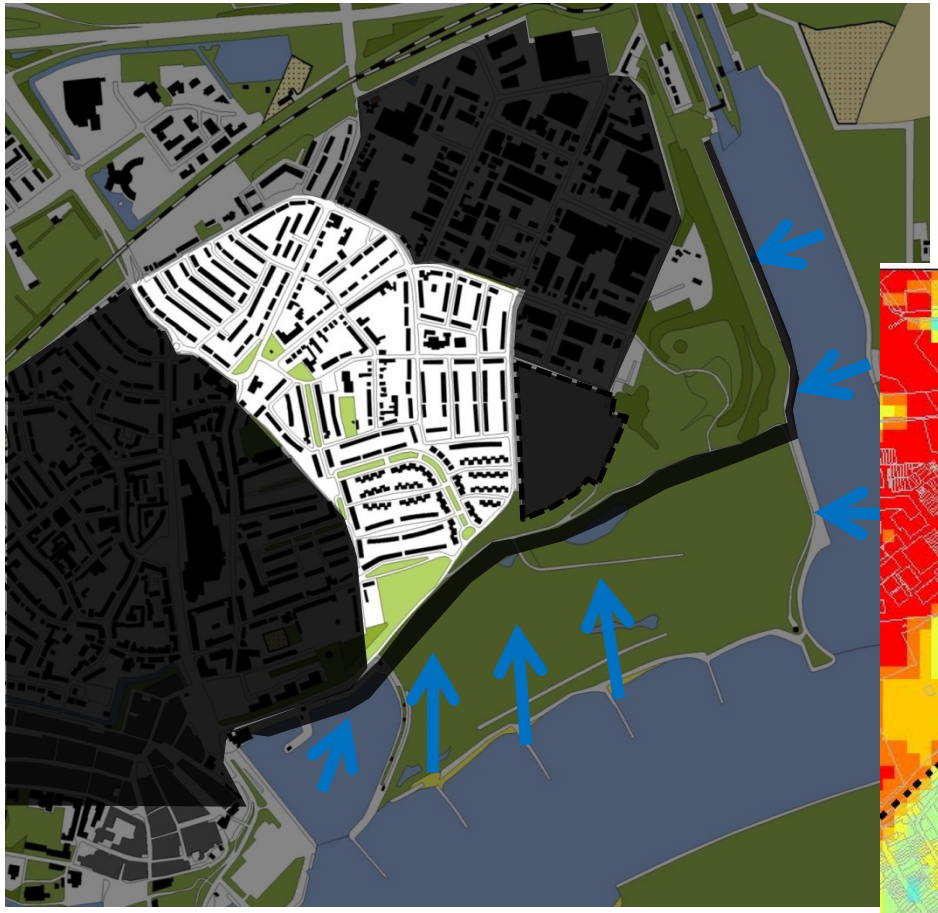
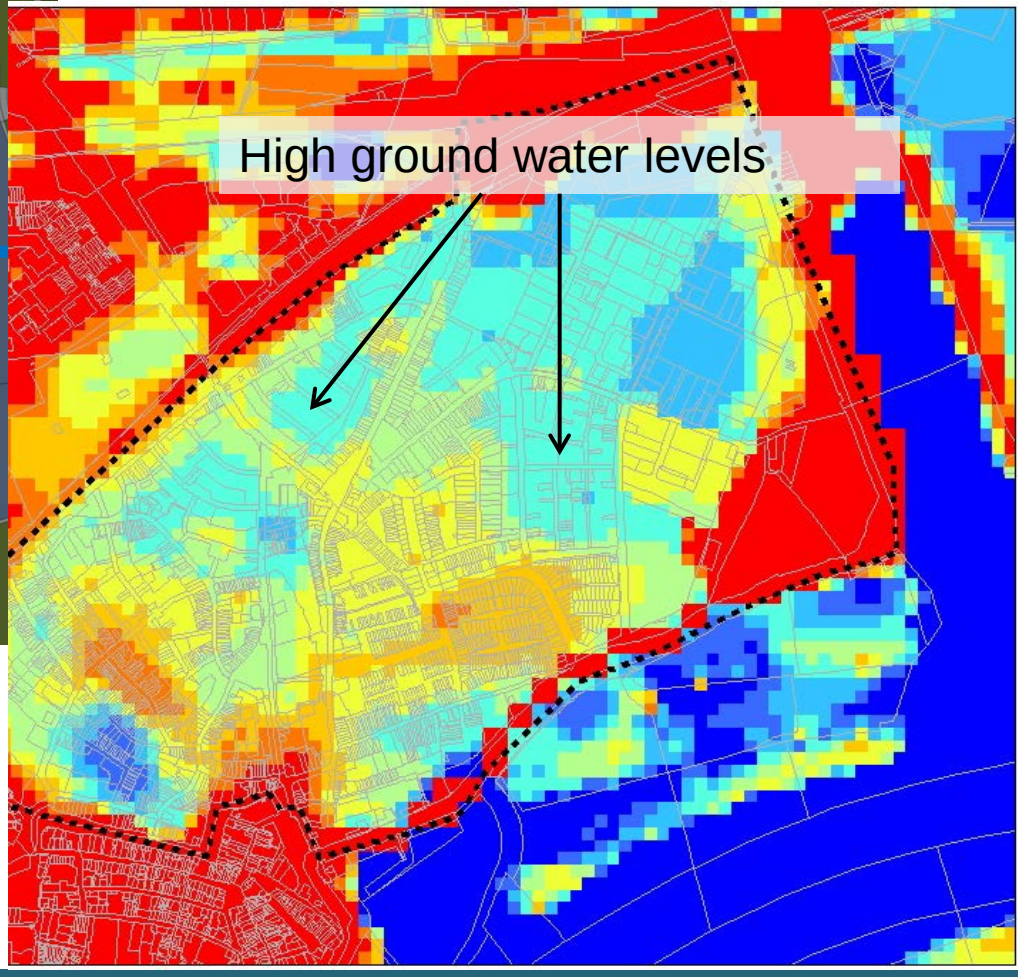
# Heat and seepage water in Tiel Oost (Ya-Ping Chang)



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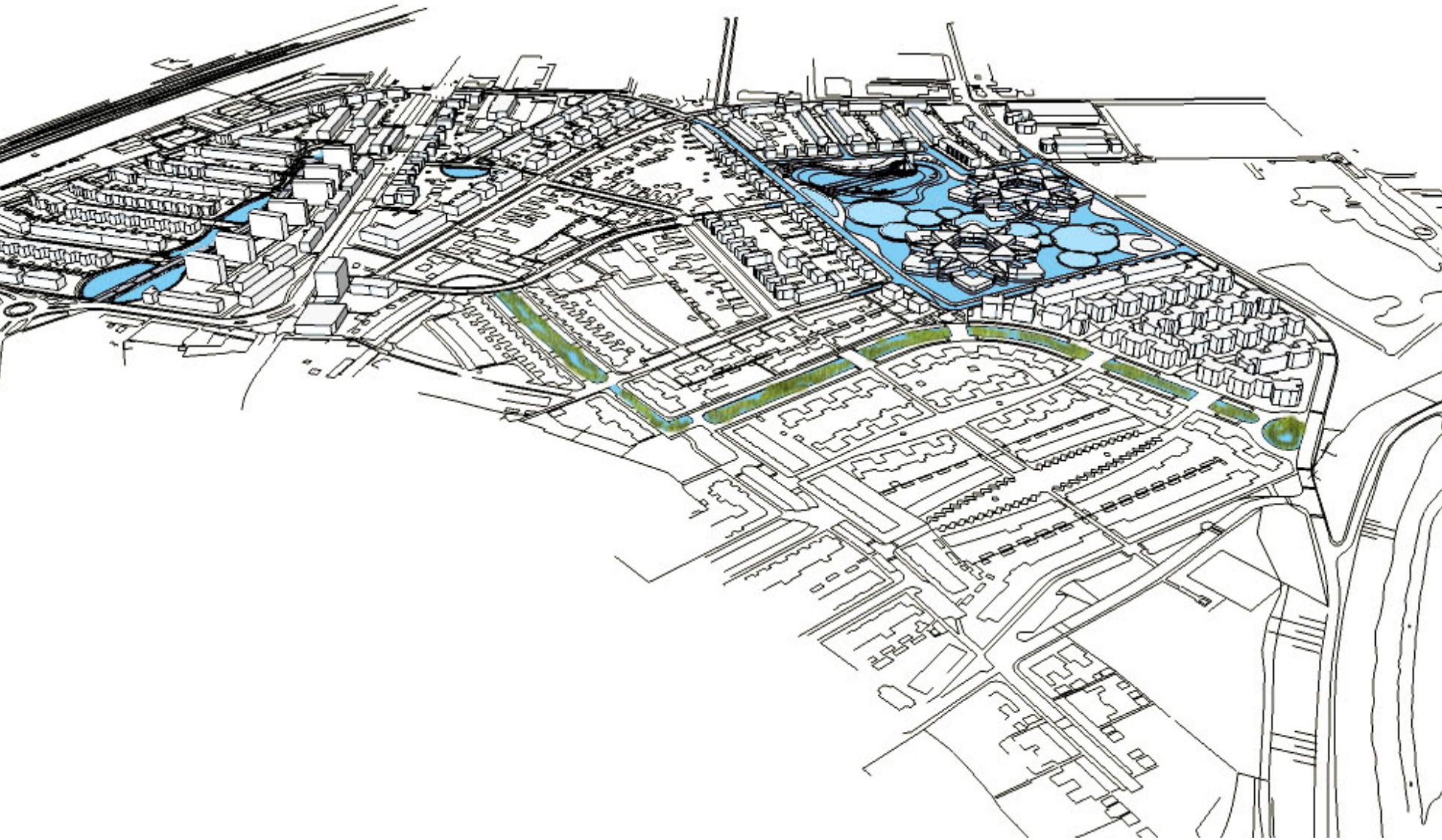
# Overview



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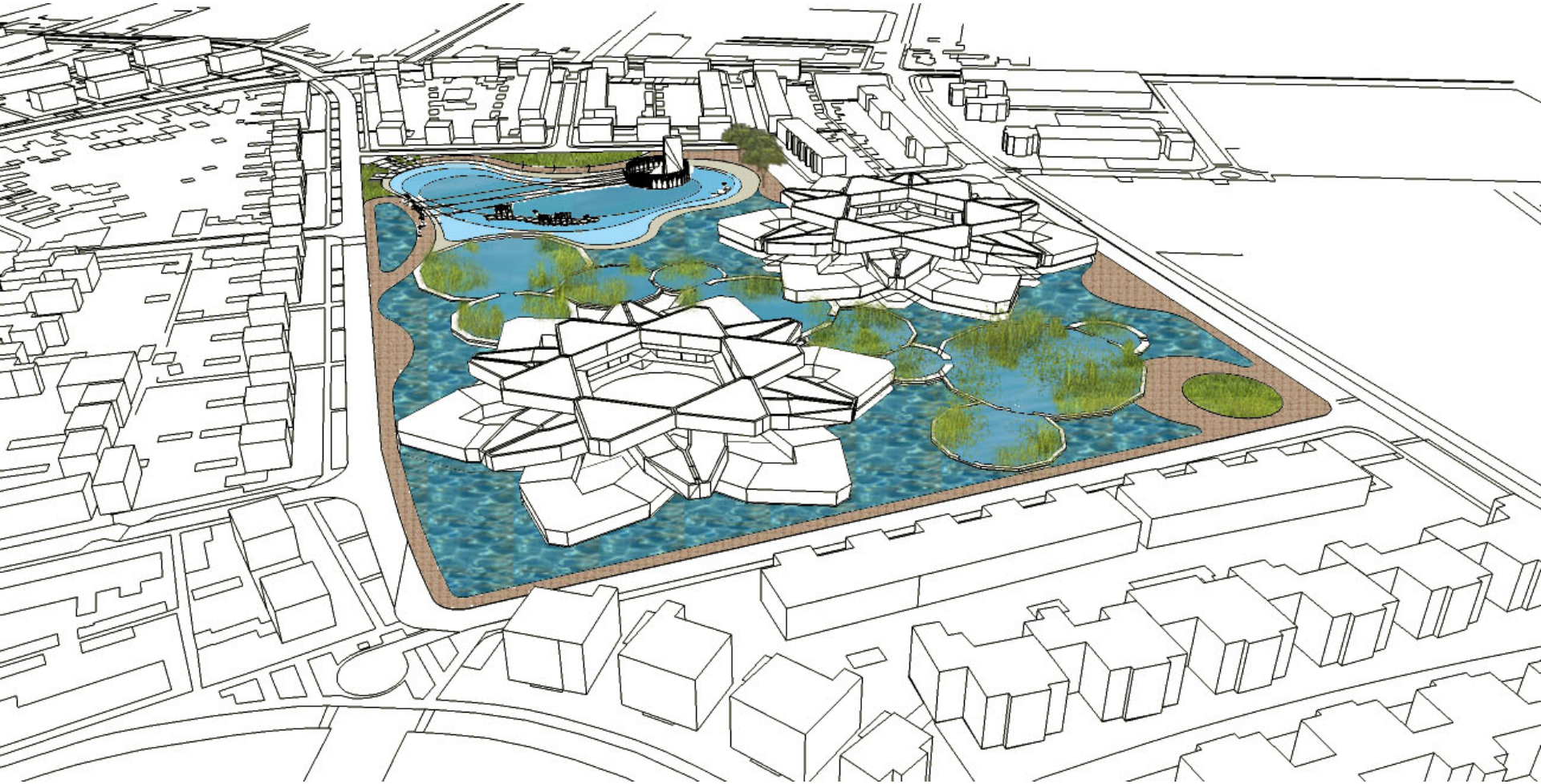
# Green water square and lotus houses



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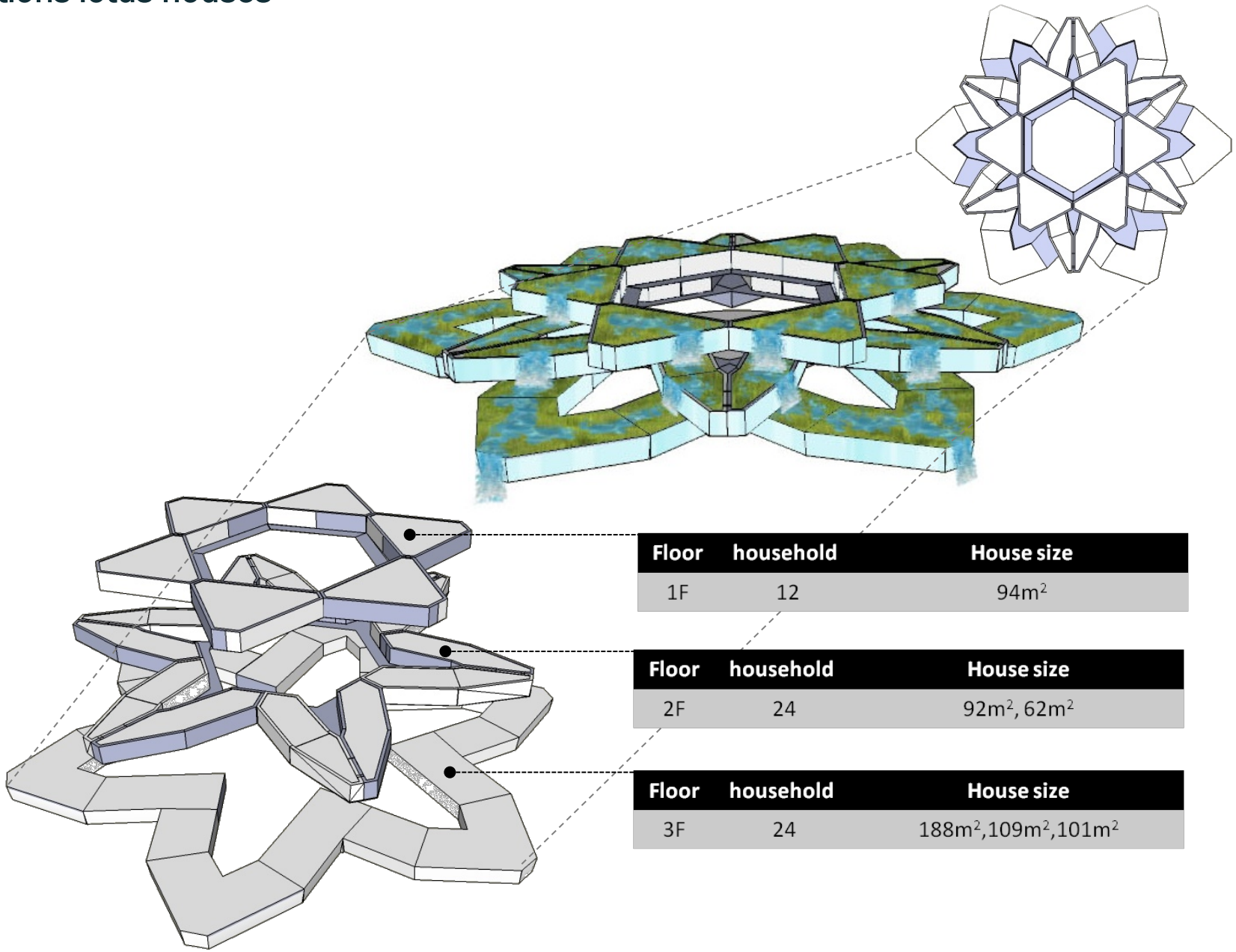
# Functions lotus houses



| Floor | household | House size |
|---|---|---|
| 1F | 12 | 94m$^2$ |

| Floor | household | House size |
|---|---|---|
| 2F | 24 | 92m$^2$, 62m$^2$ |

| Floor | household | House size |
|---|---|---|
| 3F | 24 | 188m$^2$,109m$^2$,101m$^2$ |

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# Passive waterspray-installations

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