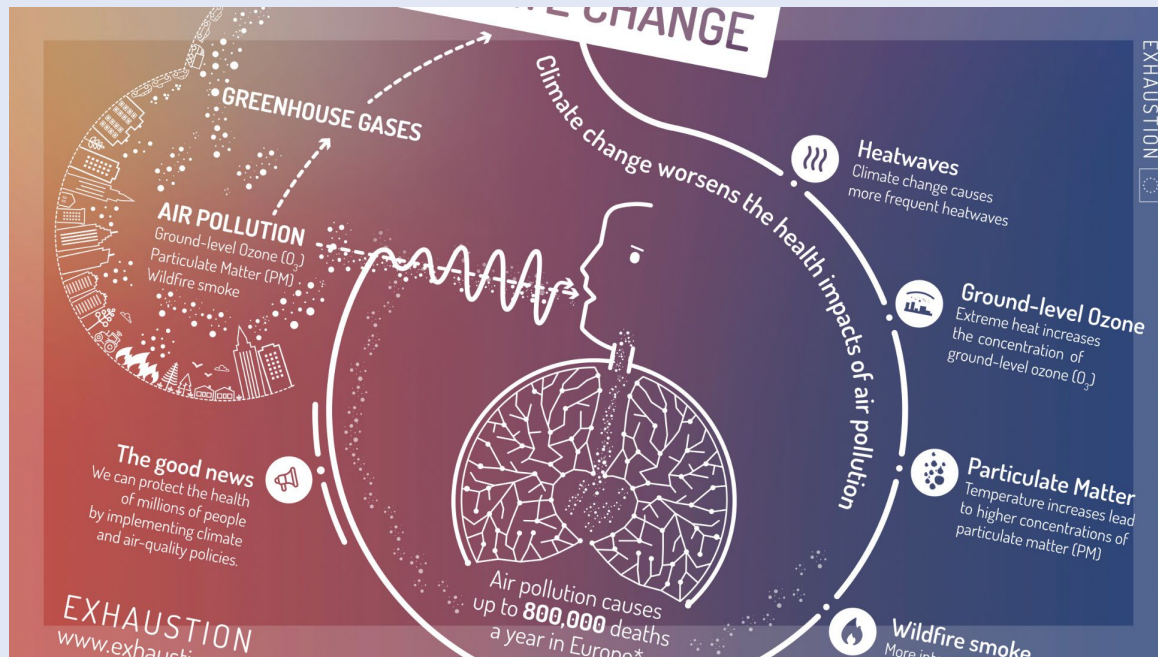




Helserisiko når hetebølger og luftforurensning treffer samtidig - funn fra en studie i Europa

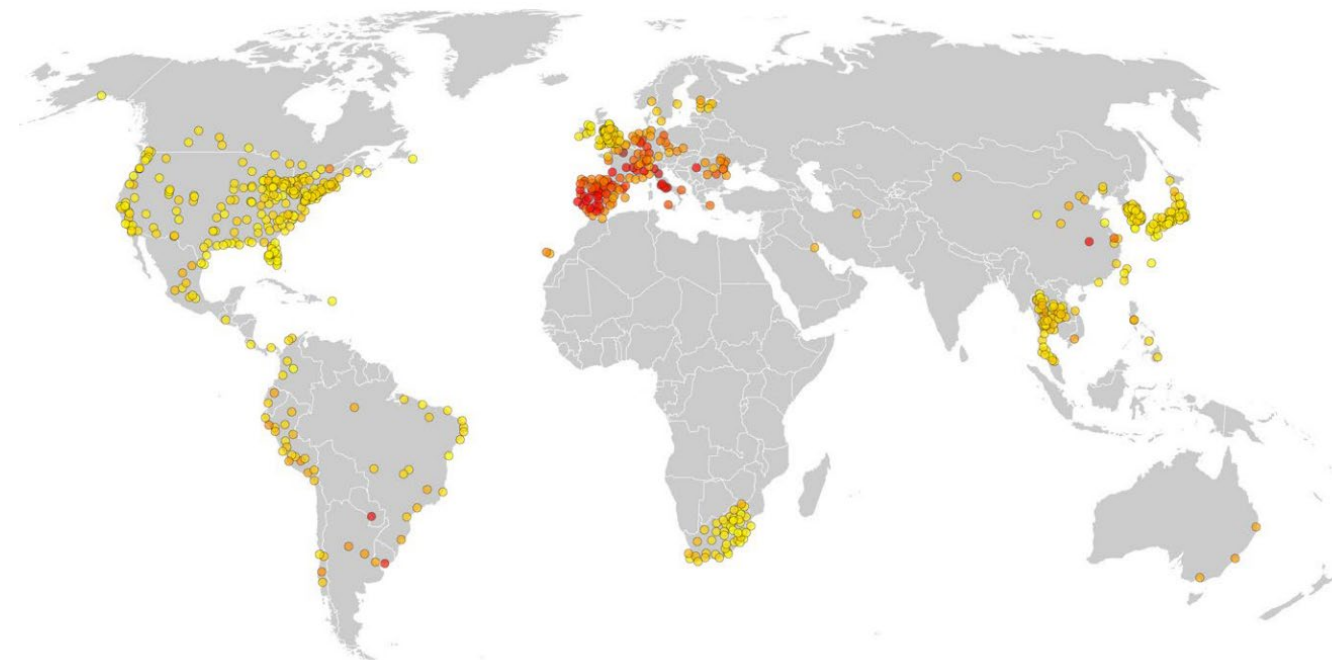
CIENS frokostseminar, 24. august 2022
(online)

Kristin Aunan, CICERO

Økte temperaturer - økt dødelighet

Basert på data for daglig dødelighet og temperatur fra 43 land:

- Globalt ~500.000 heterelaterte dødsfall per år (2000-2019)
- 37% (21% -76%) av heterelaterte dødsfall om sommeren tilskrives klimaendringer (1991-2018)
- Økt dødelighet observeres på alle kontinenter - men mangler data mange steder



Heat-mortality risk (relative risk) 1.0 1.5 2.0

Relative risk at the 99th percentile of the location-specific warm-season temperature distribution using the temperature of minimum mortality as reference.

Ekstremhete - den mest dødelige klimarisikofaktoren i Europa

Accelerated western European heatwave trends linked to more-persistent double jets over Eurasia

Efi Rousi¹, Kai Kornhuber^{1,2,3}, Goratz Beobide-Arsuaga^{4,5}, Fei Luo^{6,7} & Dim Coumou^{1,6,7}

Persistent heat extremes can have severe impacts on ecosystems and societies, including excess mortality, wildfires, and harvest failures. Here we identify **Europe as a heatwave hotspot, exhibiting upward trends that are three-to-four times faster compared to the rest of the northern midlatitudes over the past 42 years.** This accelerated trend is linked to atmospheric dynamical changes via an increase in the frequency and persistence of double jet stream states over Eurasia. We find that double jet occurrences are particularly important for



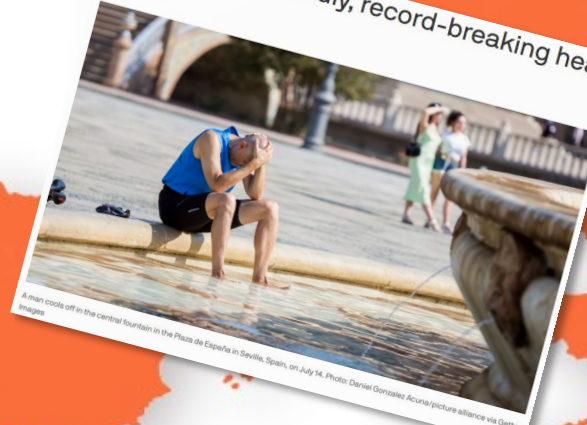
- 60% av dødsfall i øst-Europa
- 52% i sentral-Europa
- 34% i vest-Europa



UK issues first-ever 'red' warning for extreme heat in coming days

By Clarica Kirka, Associated Press
Updated: July 15, 2022
Published: July 15, 2022

Europe faces deadly, record-breaking heat wave

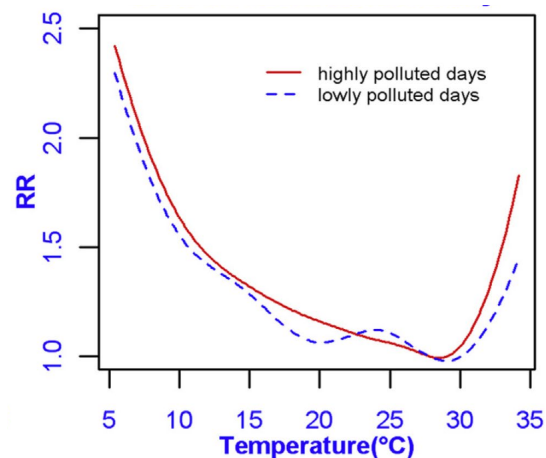


A man cools off in the central fountain in the Plaza de España in Seville, Spain, on July 14. Photo: Daniel Gonzalez Acuna/picture alliance via Getty Images

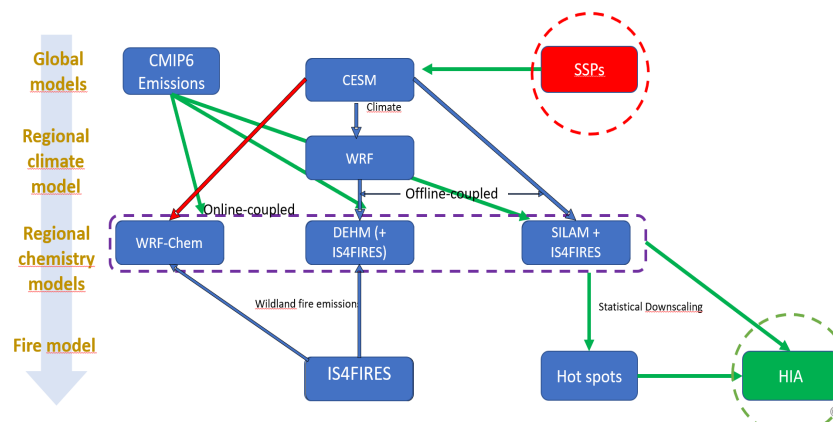


EXHAUSTION - et tverrfaglig prosjekt om klimaendringer og helse

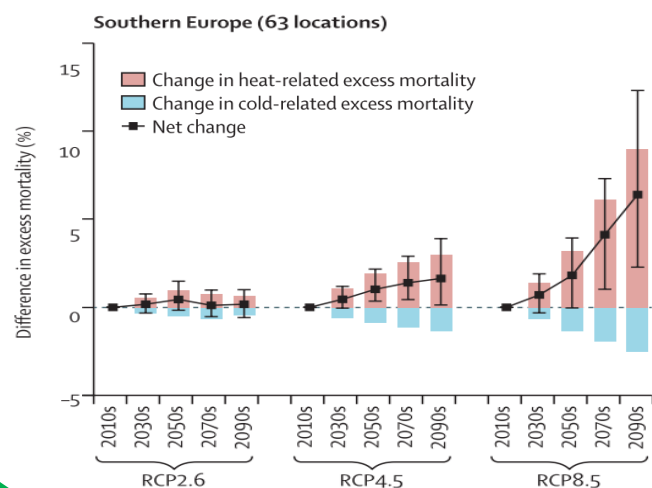
Epidemiologi: 'Dose-respons'



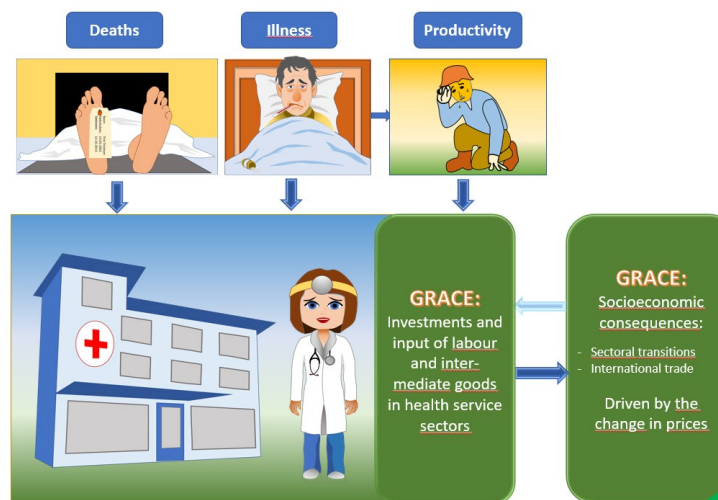
Modellering av klima og luftkvalitet



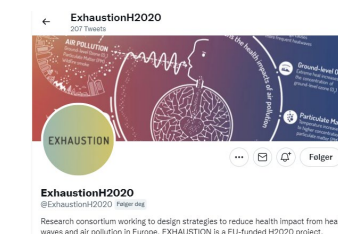
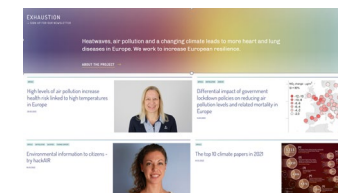
Framtidig helsebyrde - scenarier



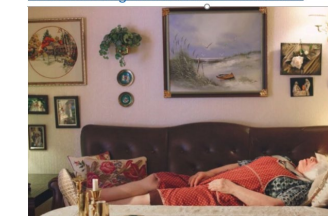
Sosio-økonomiske konsekvenser



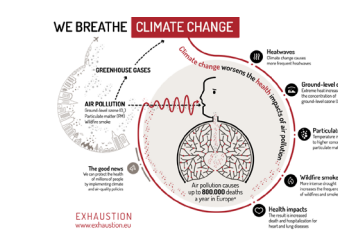
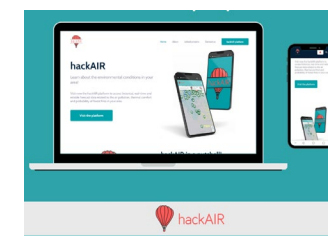
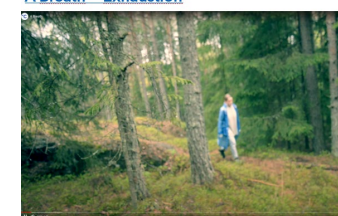
Kommunikasjon - DEC aktiviteter



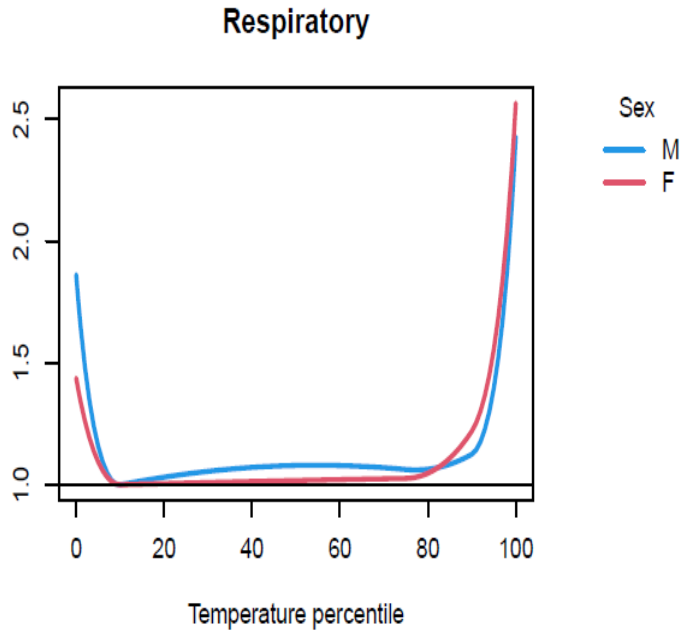
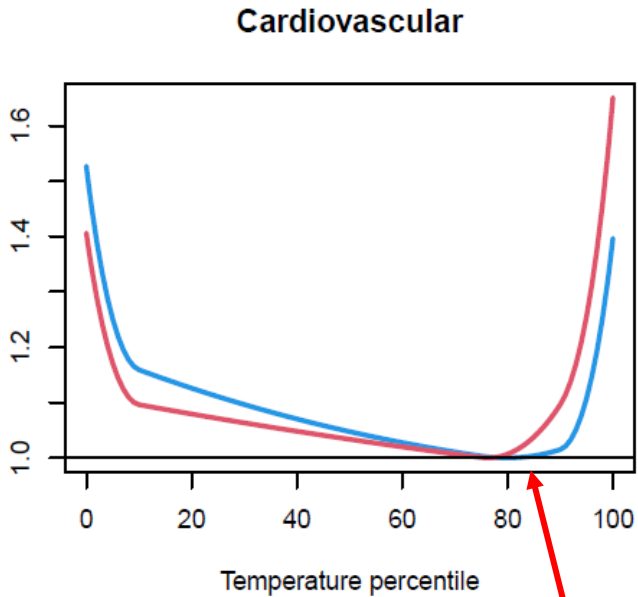
We are looking for solutions! – Exhaustion



A Breath – Exhaustion



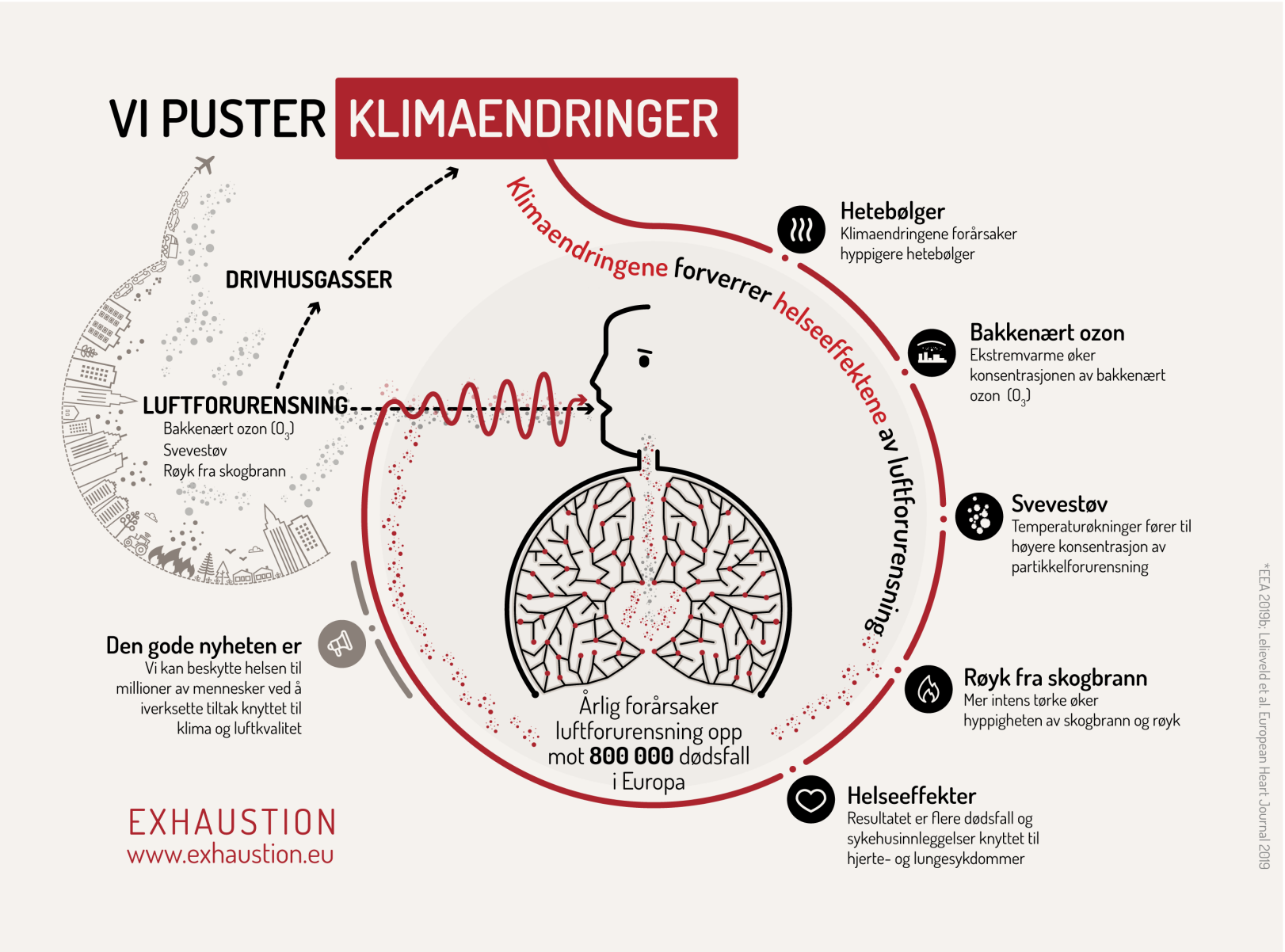
Sammenhengen mellom uteluft-temperatur og daglig dødelighet i Europa



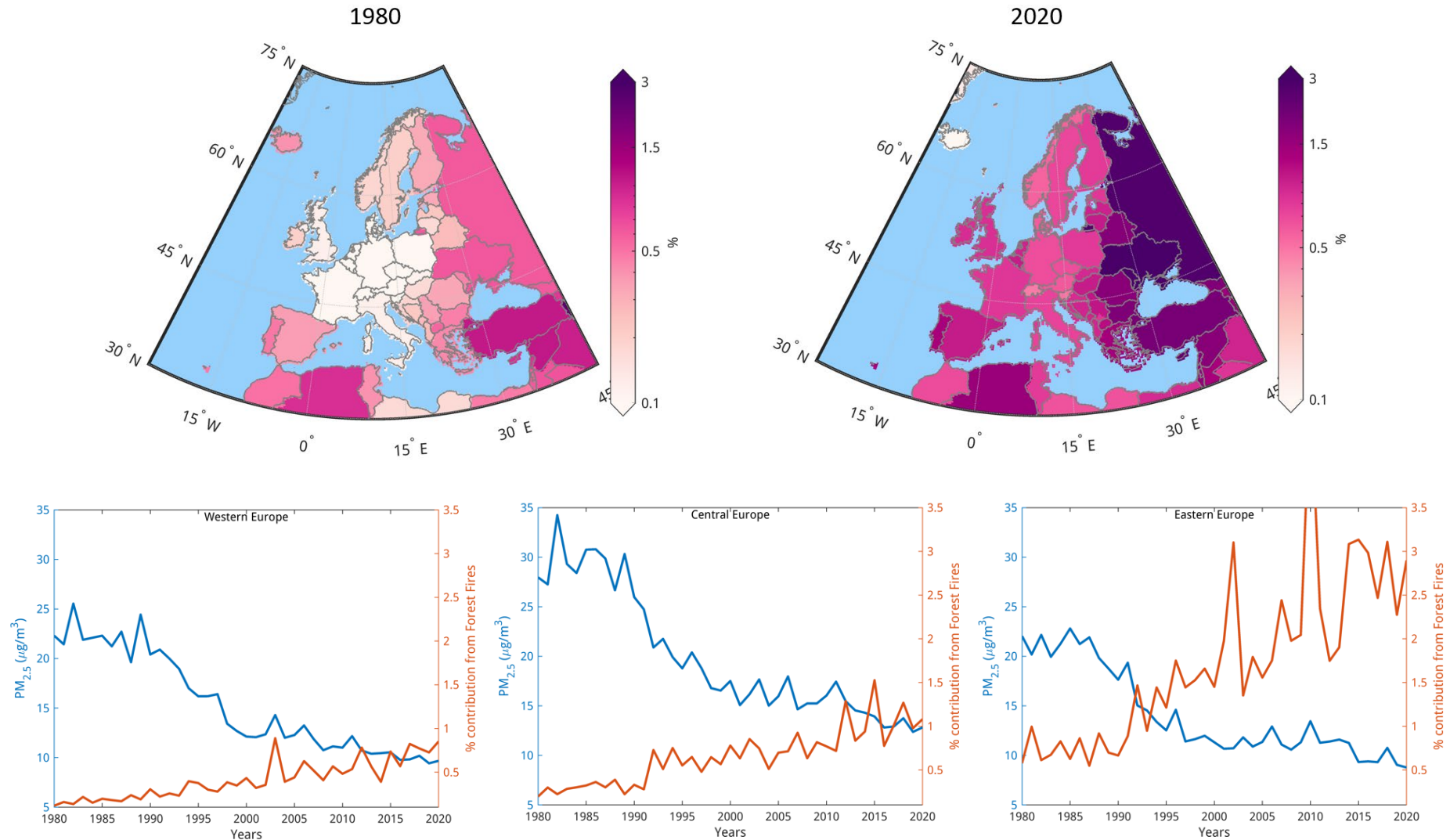
EXHAUSTION

«Optimal temperatur» - temperatur ved minimum dødelighet (MMT)

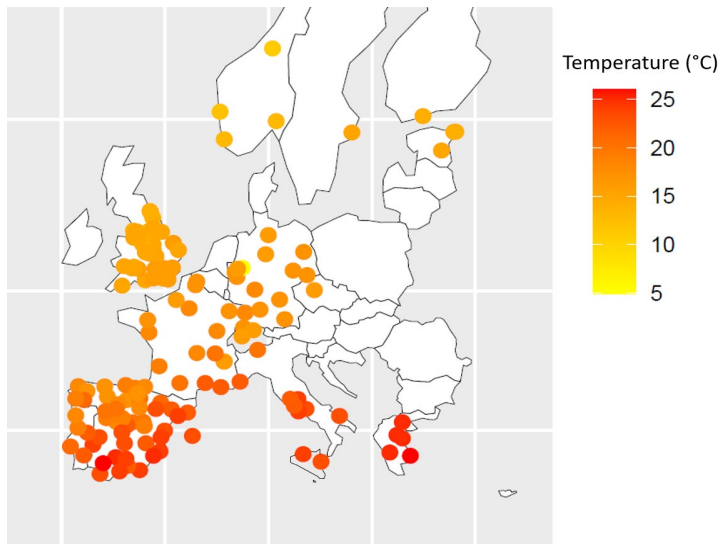
Hetebølger, tørke, skogbranner - luftforurensning!



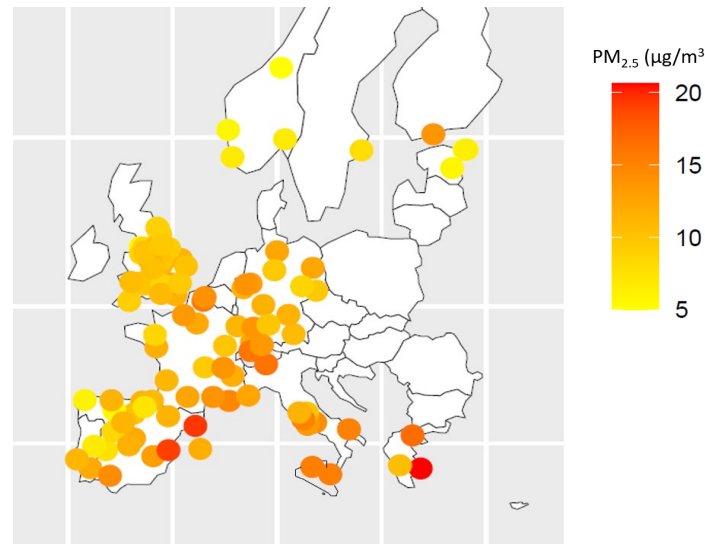
Økende bidrag fra skogbranner til luftforurensning over Europa



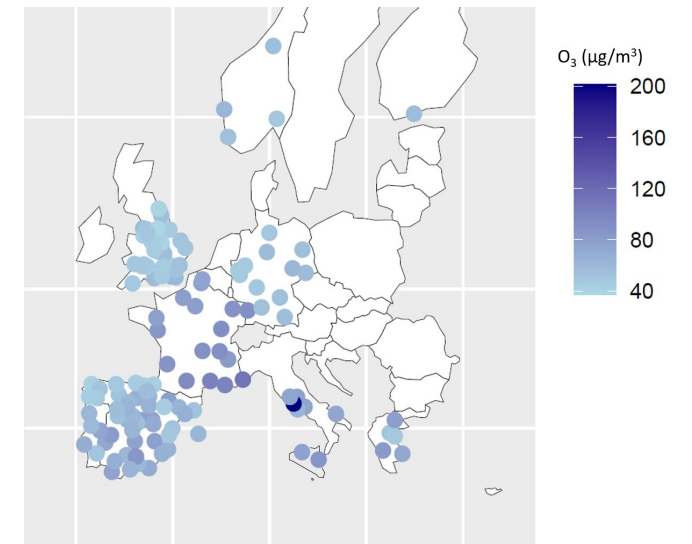
Samspillseffekter hete – luftkvalitet for helse



Daily average summer temperature during the study period

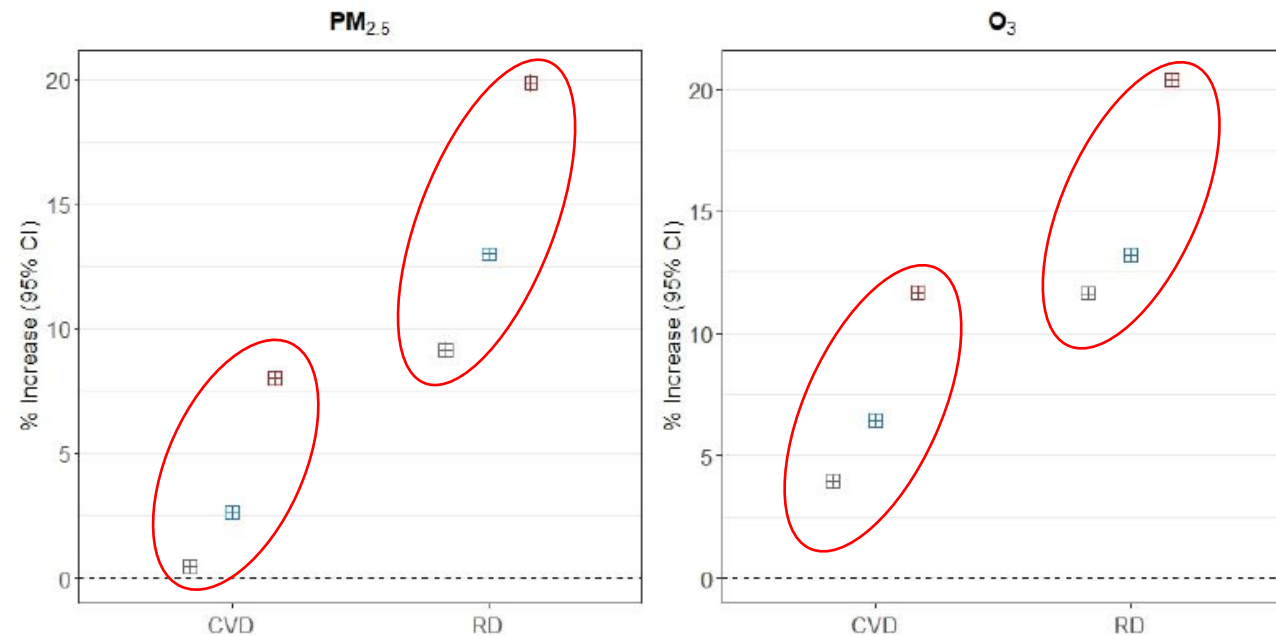


Daily average summer (May-September) concentration of PM_{2.5} and O₃ during the study period
WHO Air Quality Guideline PM_{2.5} (24 h): 15 µg/m³
WHO Air Quality Guideline ozone (summer season): 60 µg/m³



Hete-effekt ved ulike nivåer av PM_{2.5} og bakkenært ozon

- % økning i dødelighet når Temp øker fra den lokale 75 percentilen til 99 percentilen gitt lav, middels og høy ozon-konsentrasjon (5, 50, 95 prctl)

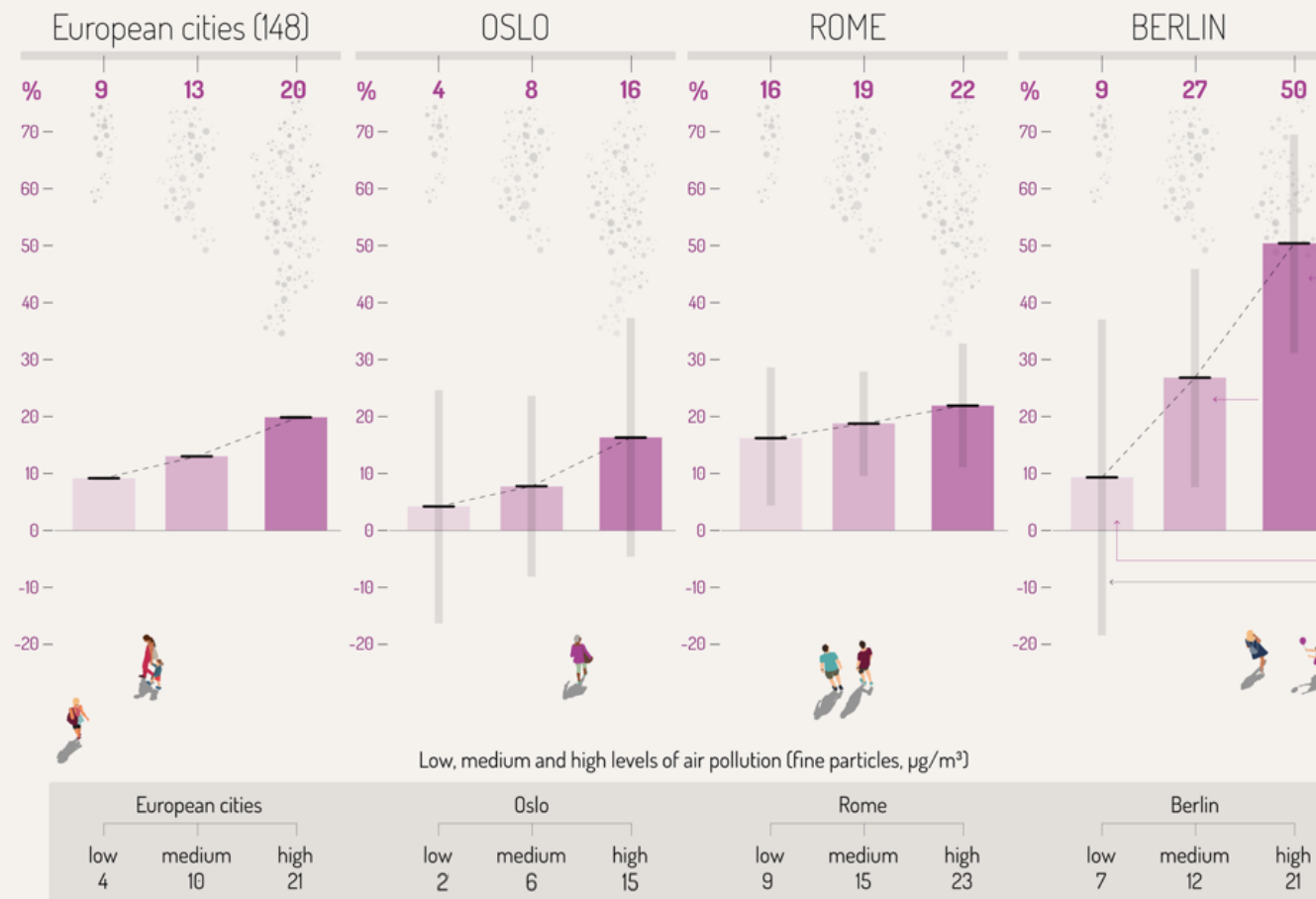


High air pollution
Medium air pollution
Low air pollution

WE BREATHE CLIMATE CHANGE

More people will die of lung diseases in our cities when high temperatures are combined with high levels of air pollution. This is especially true for those of us who are 65 and older.

Change in n° of deaths from lung diseases in European cities (%) in association with high temperatures, by different levels of air pollution



The good news

Policies that make us less exposed to heat and air pollution will maximise our health and wellbeing.



LEGEND

Change in n° of deaths from lung diseases when we are exposed to moderate temperatures compared to:

High temperatures and high air pollution

High temperatures and medium air pollution

High temperatures and low air pollution

Confidence interval: the estimate lies in this interval, with very high probability

Moderate temperature level: in the study period, 75% of the days in the city have a temperature below this level (°C)

European cities	Oslo	Rome	Berlin
20.2	15.3	25.7	20.2

High temperature level: in the study period, 1% of the days in the city have a temperature above this level (°C)

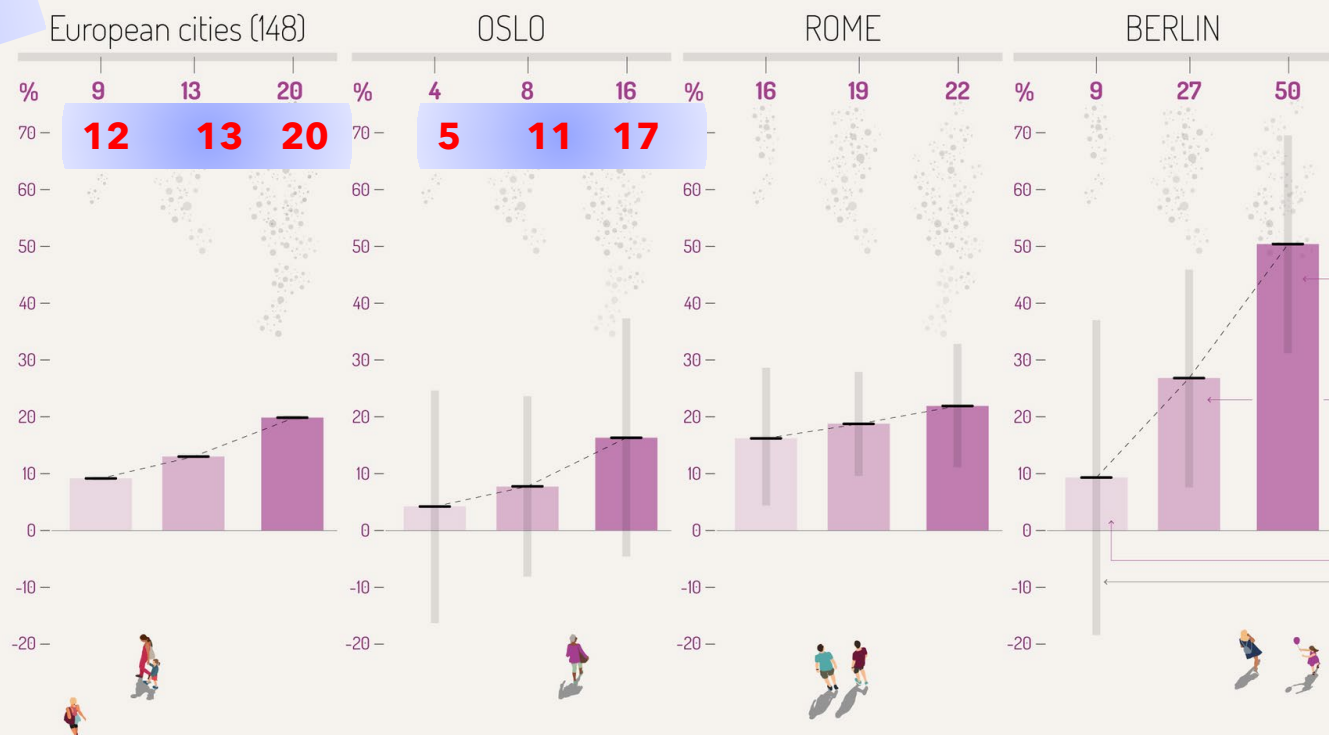
European cities	Oslo	Rome	Berlin
26.4	21.7	29.6	27.1

WE BREATHE CLIMATE CHANGE

More people will die of lung diseases in our cities when high temperatures are combined with high levels of air pollution. This is especially true for those of us who are 65 and older.



Change in n° of deaths from lung diseases in European cities [%]
in association with high temperatures, by different levels of air pollution



Tilsvarende for ozon
(4 norske byer)

Oppsummering

- Vi observerer en klar sammenheng mellom temperatur og dødelighet/sykkelighet for hjerte- og karsykdommer og luftveissykdommer. Effekten forsterkes ved samtidig dårlig luftkvalitet
- Norge og Norden er neppe forskånet for effekter knyttet til hetebølger framover
- Klimaendringer kan gjøre det vanskeligere å oppnå god luftkvalitet

Takk for oppmerksomheten!

Kristin Aunan

Kristin.aunan@cicero.oslo.no

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