The imperative for climate action to protect health

Andy Haines
Difference from 1981-2010 average temperature ° F -- August 2020
Greenland ice sheet record annual mass loss of $532 \pm 58$ Gt yr in 2019

Envisioning 3 gigatonnes of water compared to Manhattan Skyline

Source: Alex Gardner
Carbon dioxide – a legacy for future generations, 15 to 40% of emitted CO2 will remain in the atmosphere longer than 1,000 years.

**CARBON DIOXIDE OVER 800,000 YEARS**

- **2019 average**: (409.8 ppm)
- **Highest previous concentration**: (300 ppm)
- **Warm period (interglacial)**
- **Ice age (glacial)**

Data: NCEI
## Highly Potent Short-Lived Climate Pollutants—Sources and Impacts

<table>
<thead>
<tr>
<th>POLLUTANT</th>
<th>SOURCES</th>
<th>MAJOR IMPACTS</th>
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<tbody>
<tr>
<td><strong>BLACK CARBON</strong></td>
<td>black coal, diesel exhaust, biomass for cookstoves</td>
<td>local/regional</td>
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<tr>
<td><strong>METHANE</strong></td>
<td>natural gas, livestock, landfills</td>
<td>global</td>
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<tr>
<td><strong>TROPOSPHERIC OZONE</strong></td>
<td>CH₄, CO, NO, VOCs</td>
<td>local/regional</td>
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<td><strong>HYDROFLUOROCARBONS</strong></td>
<td>air conditioning, refrigeration</td>
<td>global</td>
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**Source:** The Climate and Clean Air Coalition.

**Notes:** Black carbon and tropospheric ozone also have a small global impact. Methane also has small local and regional impacts.
Rising temperatures, rising risks

Key to impacts and risks

- Undetectable
- Moderate
- High
- Very high

Global mean surface temperature change relative to pre-industrial levels, C

<table>
<thead>
<tr>
<th>Temperature Change</th>
<th>Threatened ecosystems</th>
<th>Extreme weather events</th>
<th>Large-scale singular events (e.g. ice sheet collapse)</th>
<th>Coral die-off</th>
<th>Arctic region</th>
<th>Coastal flooding</th>
<th>River flooding</th>
<th>Crop yields</th>
<th>Heat-related morbidity and mortality</th>
<th>Impact on tourism</th>
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<td>2.0°C</td>
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</table>

2006-2015 relative to pre-industrial levels

Guardian graphic. Source: IPCC Special Report on Global Warming of 1.5°C
(Haines and Ebi NEJM 2019)
~1 billion people exposed to extreme heat preventing moderate physical labour in the hottest month after global temperature >2.5°C above pre-industrial levels.

(Andrews et al 2018 Lancet Planetary Health)
Major increases (~97,000 annually) by 2100 in US heat related deaths in a high emission future-- RCP 8.5-- even with adaptation (Shindell et al Geohealth 2020)
Typical urban heat-island effects in a US city by day and night
(Source: NASA 2010, credit EPA).
Recent review of 116 papers confirmed increased wildfire risks from climate change.

https://sciencebrief.org/topics/climate-change-science/wildfires

Health effects -- Xu et al NEJM 2020
Impacts of climate change on the productivity of food crops in 2050

World Bank Publishers
World Bank Development report 2010
http://wdronline.worldbank.org/

NOTES: * Values for 2010 are projections as illustrated by dotted lines and empty circles. The entire series was carefully revised to reflect new information made available since the publication of the last edition of the report; it replaces earlier published series. See Box 2.

SOURCE: FAO.
Future climate change and dengue

Climate change is expected to increase the proportion of the global population exposed to dengue from about 35% (upper figure), to 50-60% (lower figure), by 2085.

Hales et al, Lancet 2002
Mental health effects of environmental change (e.g. Ahern et al 2005)

Solastalgia is - “the distress caused by environmental change”. Albrecht et. al. (2007)

Many studies have shown increase in common mental disorders for considerable periods after floods

Source --Burke et al 2018, Nature Climate Change
A healthy, climate-friendly, post-covid recovery
The benefits of clean air policies

**DEATHS LINKED TO OUTDOOR AND HOUSEHOLD AIR POLLUTION**

7 million people die prematurely every year from air pollution – both household and outdoor. Among these deaths:

- **21%** are due to pneumonia
- **20%** from stroke
- **34%** from ischaemic heart disease
- **19%** from chronic obstructive pulmonary disease (COPD)
- **7%** from lung cancer

**CLEAN AIR FOR HEALTH #AirPollution**

World Health Organization
Fossil fuel burning leads to ~3.6 million deaths annually from ambient air pollution (~190,000 in USA) (Lelieveld, Klingmüller Pozzer, Burnett, Haines, Ramanathan PNAS 2019)
Reforming taxes and subsidies for health, equity & climate.

Energy subsidies=the gap between existing and efficient prices (including health & environmental costs) ~US$5.2 trillion in 2017; equivalent to 6.3% global GDP – local pollution a major component (IMF 2019).

Only ~ 22 % GHG emissions covered by carbon pricing (World Bank) which is often too low.
The EAT-Lancet Commission - planetary health diet and targets for sustainable food production that can prevent 10-11 million premature adult deaths per year and lead to a sustainable global food system by 2050.
Increased active travel and low carbon transport – health and environmental benefits

( Woodcock et al 2009, Jarrett et al 2012)

Figure 1: Potential annual NHS expenditure averted by year and health outcome from Increased Active Travel scenario
Increasing green space & reducing traffic in cities - the example of Superblocks in Barcelona (Mueller et al Env. Int. 2020)

The Health Benefits of Natural Spaces

**ADULTS**
- Stress reduction
- Improved life expectancy
- Better general mental and physical health
- Improved cognitive performance
- Improved sleep quality
- Reduction in cancer risk

**CHILDREN**
- Attention capacity
- Concentration
- Emotional and behavioural development
- Coordination
- Balance
- Agility
- Self-confidence
- Self-discipline
- Social skills
- Weight of newborns

*Further studies are needed to confirm these results*
Reducing the carbon emissions from health care
--NHS England commits to net zero by 2040 for direct emissions and by 2045 for indirect emissions
Achieving a healthy, zero carbon economy

- These actors join 120 countries in the largest ever alliance committed to achieving net zero carbon emissions by 2050 at the latest. [https://unfccc.int/climate-action/race-to-zero-campaign](https://unfccc.int/climate-action/race-to-zero-campaign)