

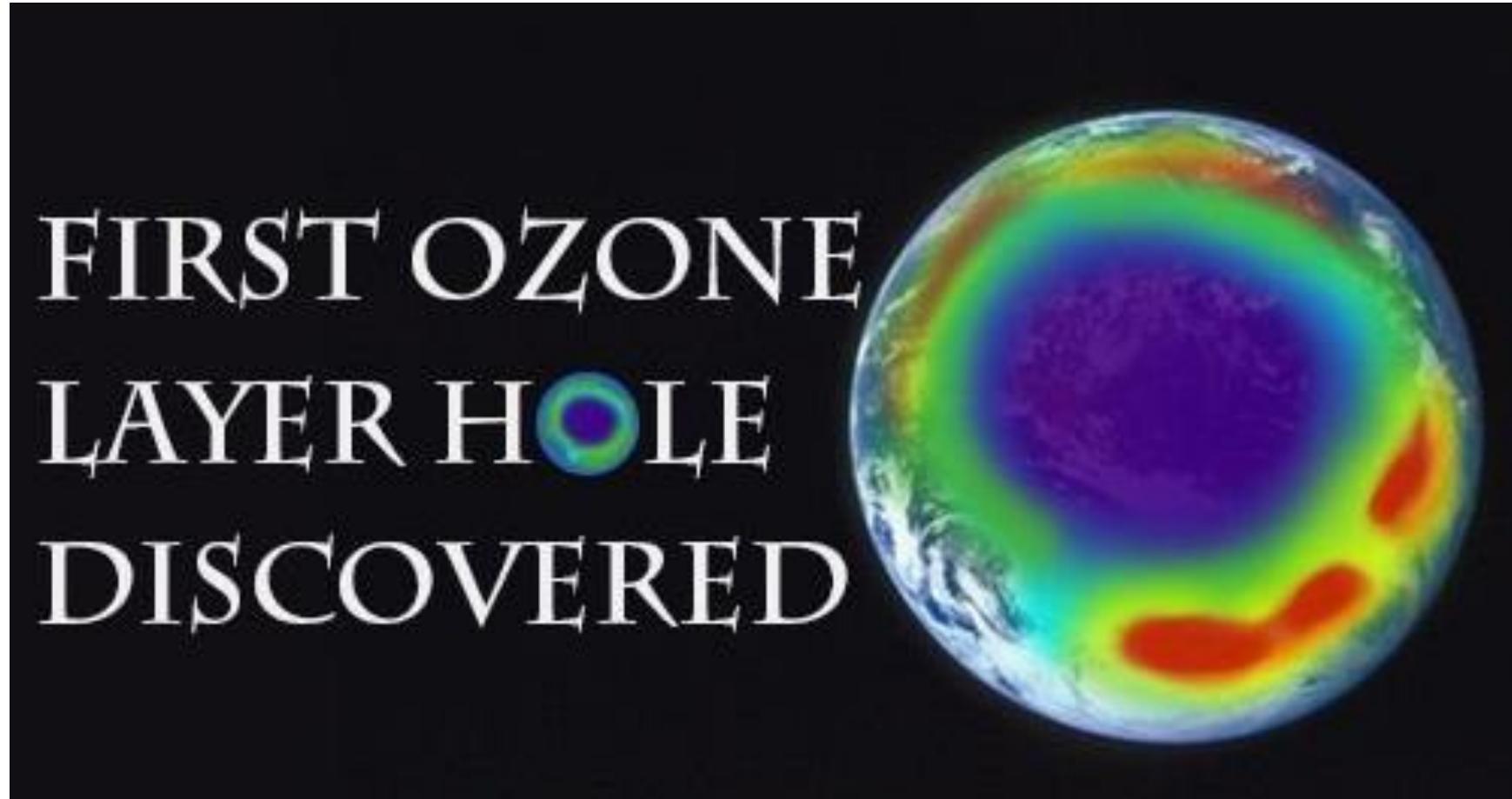


Schimbarile climatice, poluarea și plamanul

Prof.Dr. Ruxandra Ulmeanu

Președintele Societății Române de Pneumologie

In 1985 a fost identificata
o gaura uriasa si in crestere in stratul de ozon al planetei



Chlorofluorocarburile

Erau utilizate în anii '80 pentru

- refrigerare
- aerosoli propelanti



**Atunci Margaret Thatcher a actionat spectaculos
impreuna cu Ronald Reagan**





In numai 2 ani Protocolul de la Montreal a fost semnat
1987

- a eliminat productia si utilizarea chlorofluorocarburile -urilor

Un esec al liderilor mondiali atunci ar fi fost catastrofal



O provocare similar ne sta in fata acum





**Un valurias si in crestere de gaze cu efect de sera
POLUARE- SCHIMBARI CLIMATICE**

Catastrofele naturale s-au triplat incepand cu anii '60

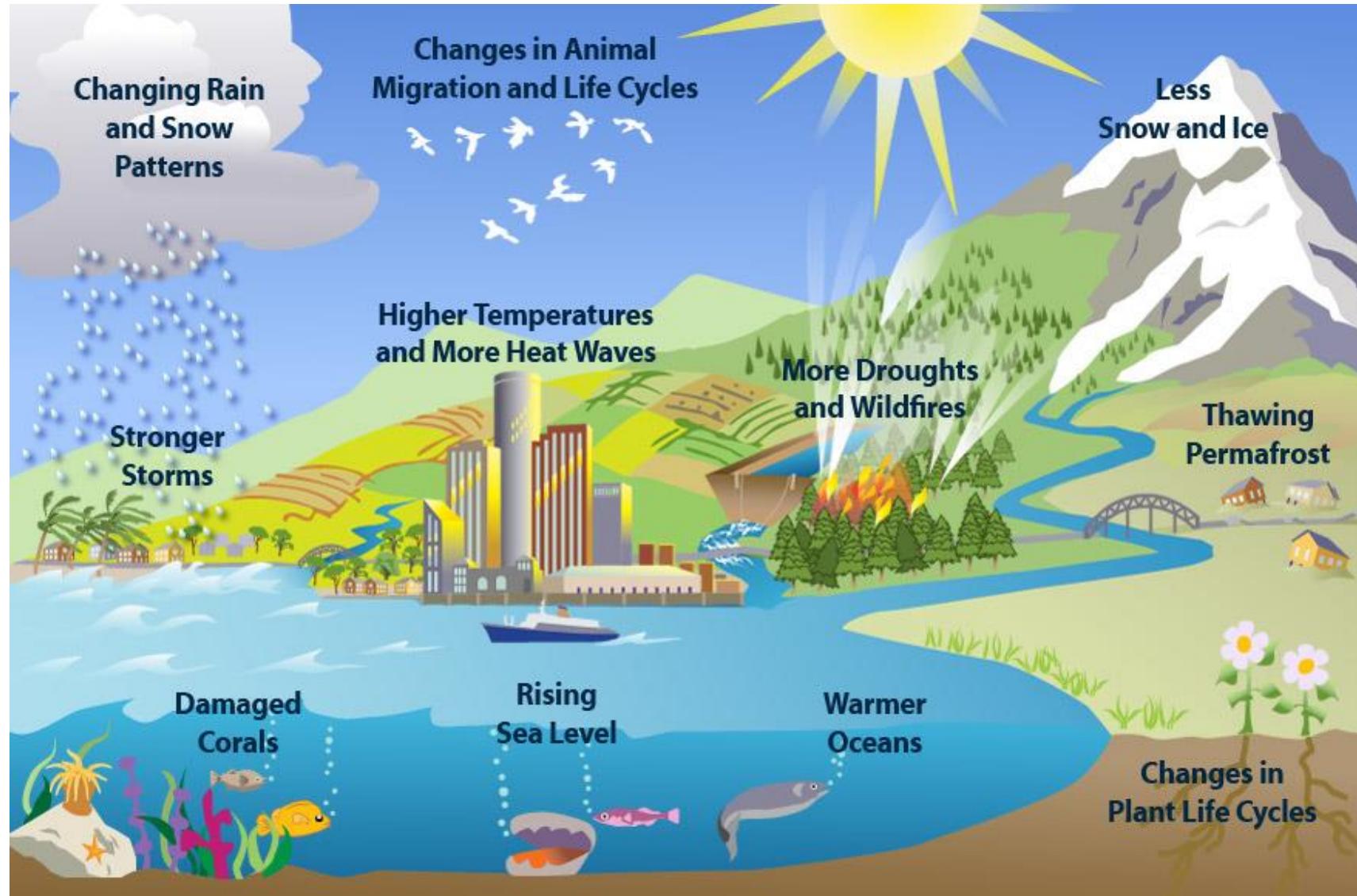


1. <http://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health>
2. Hopkinson NS, et al. Climate change and lung health: the challenge for a new president Thorax April 2017 Vol 72 No 4

**Shimbarile climatice si inclazirea globala
cauzeaza mai multe decese anual
decat traznetele,tornadele,cutremurele si inundatiile laolalta**



Schimbarile climatice



1. <http://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health>

2. Hopkinson NS, et al. Climate change and lung health: the challenge for a new president Thorax April 2017 Vol 72 No 4

- nivelurile marii sunt în creștere
- ghetarii se topesc
- modelul de precipitații se schimbă.



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Schimbarile climatice



Din 1850 fiecare din ultimul deceniu

- a fost mai cald decat oricare din deceniile anterioare

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Australia
2020
Catastrofa
naturală
de proporții
unice
ca amplecare



Dezastru fara precedent in Australia

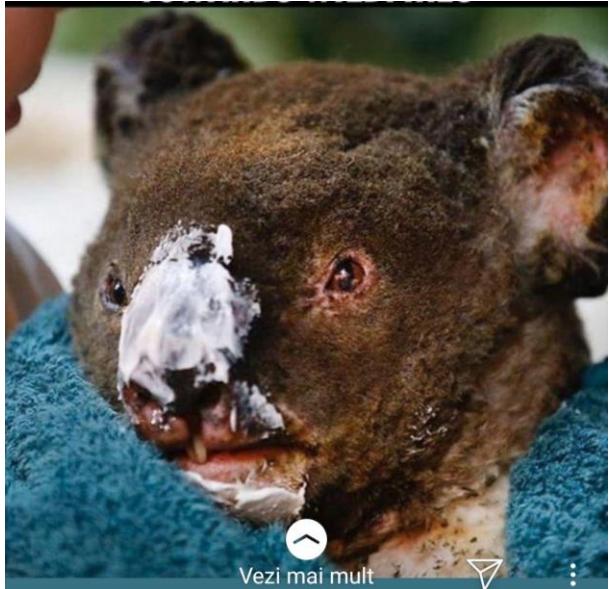
1/4



© DAVID MARIUZ/AAP



1,25 miliarde animale ucise



Vezi mai mult



Rescued Kangaroo Can't Stop Hugging
The Volunteers Who Saved Her LiFe
Animals have emotions too ❤️

IG : thescientistfacts

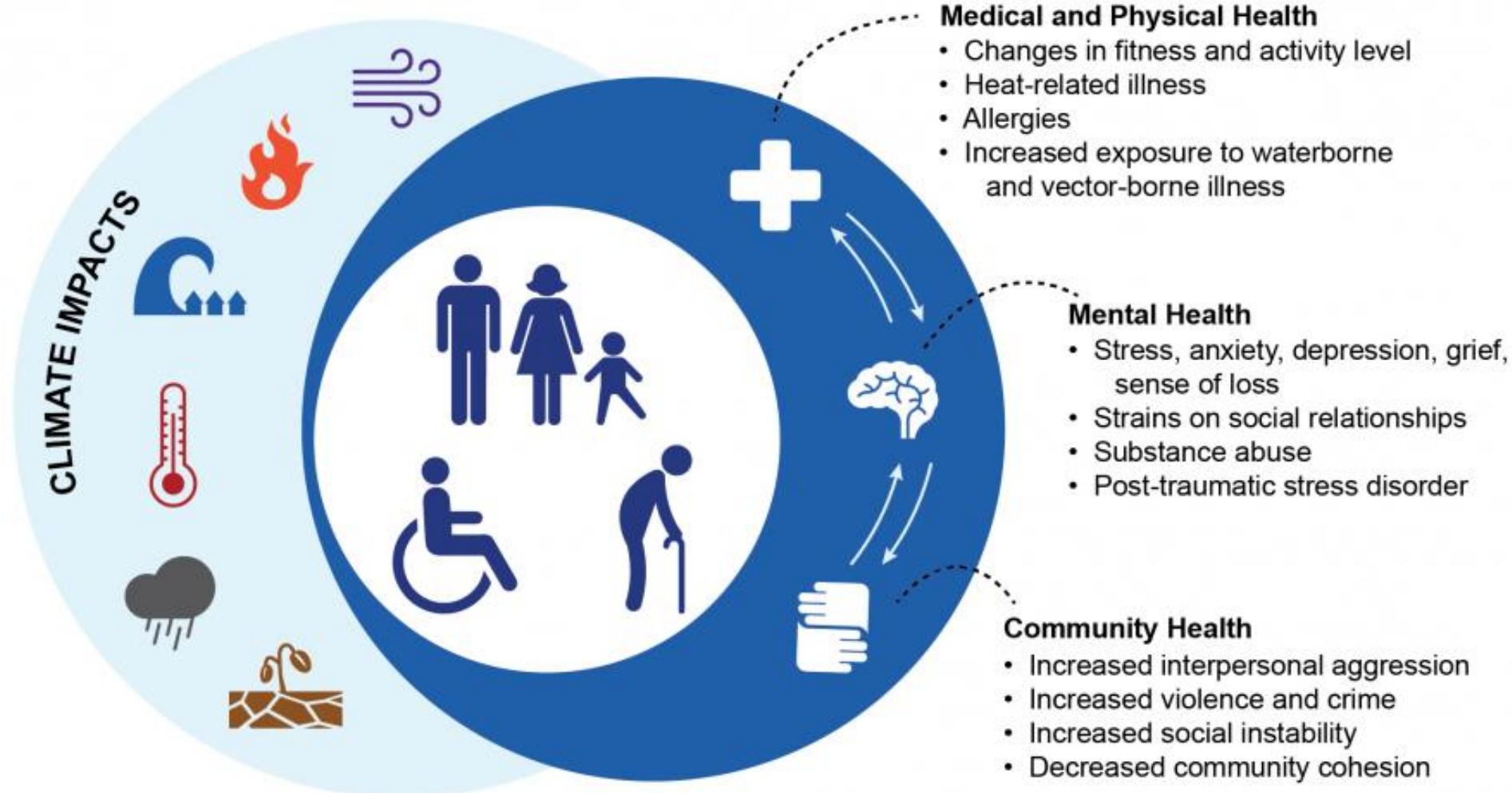


Schimbarile climatice au impact direct asupra sanatatii
asupra plamanului in particular

Incalzirea globală - efecte generale asupra sănătății

Afectează

- aerul curat
- apa potabilă
- hrana suficientă
- locuințele



1. <http://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health>

2. Hopkinson NS, et al. Climate change and lung health: the challenge for a new president Thorax April 2017 Vol 72 No 4

Caldura extrema contribuie la decese



Mortalitatea este mai mare pentru

- bolile respiratorii si cardiovasculare
- pacientii spitalizati



1. <http://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health>

2. Hopkinson NS, et al. Climate change and lung health: the challenge for a new president Thorax April 2017 Vol 72 No 4

Polenurile si alti aeroalergeni sunt in cantitati mai mari in conditii de caldura extrema



Cresterea continua a temperaturilor

- va conduce la cresterea poverii astmului



↑ temperaturilor
↑ particulelor de materie poluanta

↑ incidentei si severitatii

- astmului, rinosinuzitei
- BPOC-ului
- infectiilor de tract respirator
- **CANCERUL PULMONAR !**



1. <http://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health>

2. Hopkinson NS, et al. Climate change and lung health: the challenge for a new president Thorax April 2017 Vol 72 No 4

Inundatii, valuri de caldura

↑↑

- degradarea culturilor
- foametea



1. <http://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health>

2. Hopkinson NS, et al. Climate change and lung health: the challenge for a new president Thorax April 2017 Vol 72 No 4

La sfarsitul secolului al XXI-lea seceta la scara globala ↑ ↑ ↑



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2. Hopkinson NS, et al. Climate change and lung health: the challenge for a new president Thorax April 2017 Vol 72 No 4



Dupa HTA si fumat+BPOC

**Poluarea aerului
al 3-lea contributor pentru decese
la nivel mondial.**



1. Hopkinson NS, et al. Climate change and lung health: the challenge for a new president Thorax April 2017 Vol 72 No 4
2. Lim SS, Vos T, Flaxman AD, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012;380:2224–60.
3. Lozano R, Naghavi M, Foreman K, et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012;380:2095–128

9 din 10 persoane din lume respiră aer poluat



World Health Organization



WHO -Ambient (outdoor) air quality and health , May 2018

[http://www.who.int/en/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health](http://www.who.int/en/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health)



3 miliarde de persoane

GATESC SI INCALZESC LOCUINTELE cu FOC DESCHIS SI SOBE

carbune si biomasa : lemn, gunoi de grajd , deseuri de culturi de plante



WHO report 2019



- 4.2 milioane decese /an – poluare aer, apa
- 3.8 milioane decese /an expunere la fum in gospodarii

**continua depășirea pe scară largă în Europa
PM și oxizi de azot (NOx)**

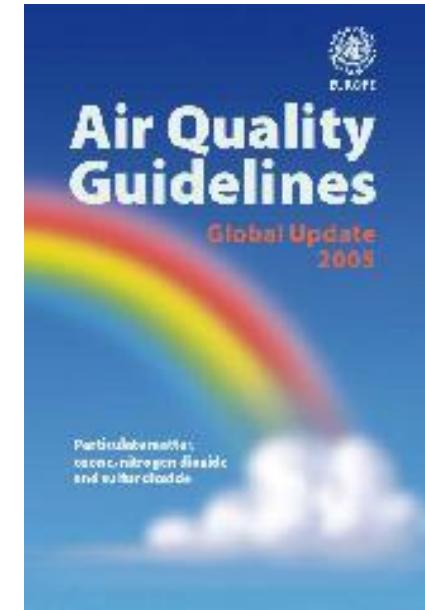


WHO report 2019



Ghidurile privind Calitatea Aerului limite pentru principalii factori poluanți

91% din populația lumii
locuiește în teritorii
în care aceste criterii nu sunt respectate.



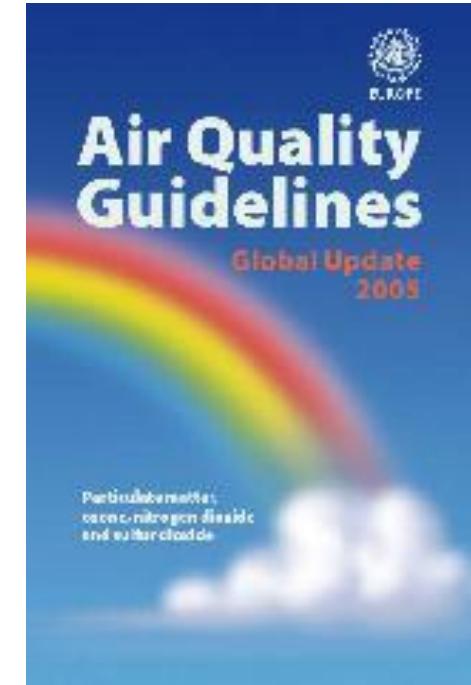
1. <http://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health>

2. Hopkinson NS, et al. Climate change and lung health: the challenge for a new president Thorax April 2017 Vol 72 No 4

Ghidurile privind Calitatea Aerului

Principalii factori poluanți

- particulele de materie (PM)
- ozonul (O_3)
- gazele cu efect de sera
 - dioxid de carbon (CO₂)
 - dioxid de azot (NO₂)
 - dioxid de sulf (SO₂)
 - metanul



1. <http://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health>

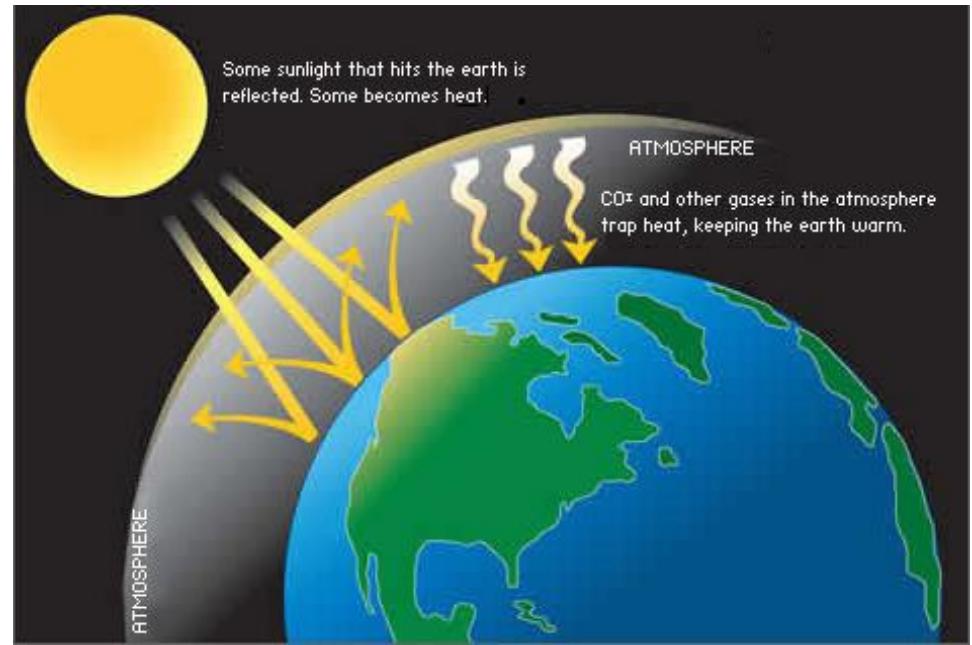
2. Hopkinson NS, et al. Climate change and lung health: the challenge for a new president Thorax April 2017 Vol 72 No 4

POLUAREA AERULUI

2 componente

particule de materie poluanta din aer

gazele cu efect de sera



Activitatile umane din ultimii 50 de ani

VEHICULE ,INDUSTRIE, INCALZIRE DOMESTICA

arderea combutibililor fosili

capteaza caldura suplimentara in atmosfera joasa

INCALZIRE GLOBALA

1. <http://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health>

2. Hopkinson NS, et al. Climate change and lung health: the challenge for a new president Thorax April 2017 Vol 72 No 4

Particulele de Materie poluanta din aer (PM)

Un amestec de particule solide si picaturi lichide din aer

Praful, murdaria, fumul
sunt suficient de mari sau de intunecate
pentru a fi vazute cu ochiul liber

**Celelalte particule sunt atat de mici
pot fi detectate numai cu ajutorul unui microscop electronic**



1. <http://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health>

2. Hopkinson NS, et al. Climate change and lung health: the challenge for a new president Thorax April 2017 Vol 72 No 4

Particulele Fine de Materie din aer sunt un Ucigas Global



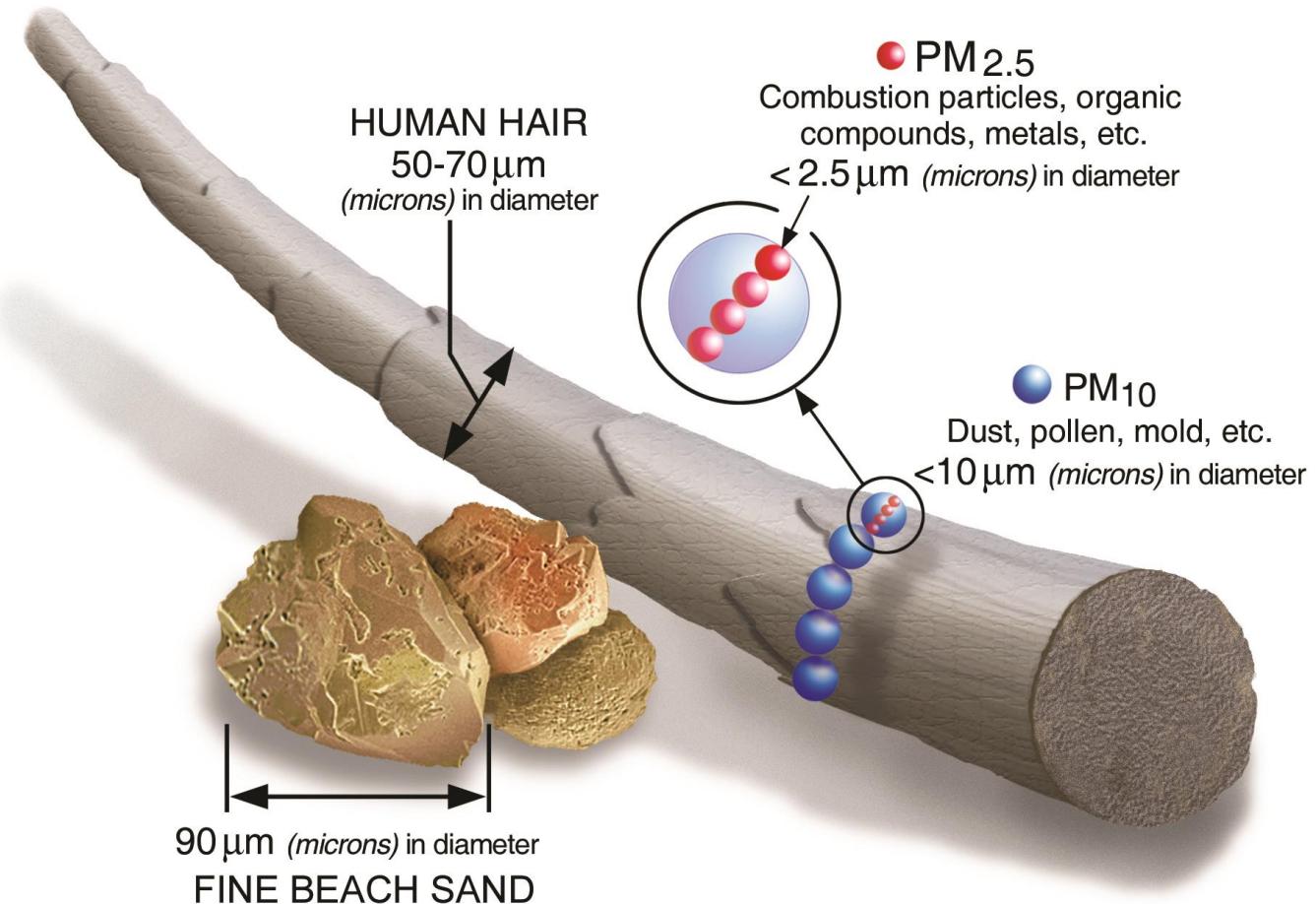
Sunt particule inhalabile de 2.5 um si mai mici

“Cat de mic” inseamna 2.5 microni?

1. <http://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health>
2. Hopkinson NS, et al. Climate change and lung health: the challenge for a new president Thorax April 2017 Vol 72 No 4

Un singur fir de par are 70 um

... asadar este de 30x mai mare decat cea mai mare particula fina!



1. <http://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health>

2. Hopkinson NS, et al. Climate change and lung health: the challenge for a new president Thorax April 2017 Vol 72 No 4

IARC este parte a OMS

International Agency
Research on Cancer



Grupuri de evaluare - Definitii

- **Grupul 1: Agentul este carcinogenic pentru oameni**
dovezi suficiente privind carcinogenicitatea la om
- **Grupul 2A: Agentul este probabil carcinogen pentru oameni**
dovezi limitate privind carcinogenicitatea la om
dovezi suficiente privind carcinogenicitatea la animale experimentale
- **Grupul 2B: Agentul este posibil carcinogen pentru oameni**
dovezi limitate privind carcinogenicitatea la om
dovezi mai putin decat suficiente privind carcinogenicitatea la animale experimentale



1. <http://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health>

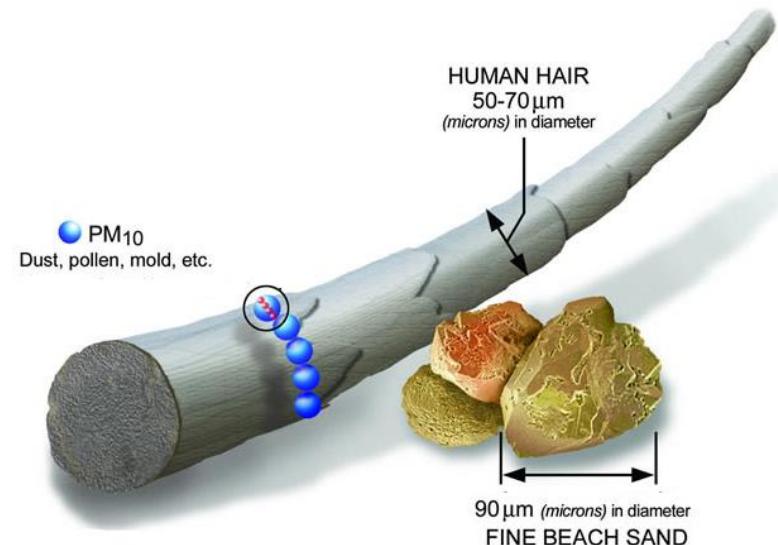
2. Hopkinson NS, et al. Climate change and lung health: the challenge for a new president Thorax April 2017 Vol 72 No 4



!!!!! Carcinogene pentru oameni

- particule de materie din aer PM

gazele de evacuare a motoarelor diesel



Particulele de Materie sunt cea mai nociva forma de poluare a aerului

capacitatea de a patrunde adanc in plamani si sange

Particule grose

PM10

- diametru 2.5 -10 μm

Particule fine

PM2.5

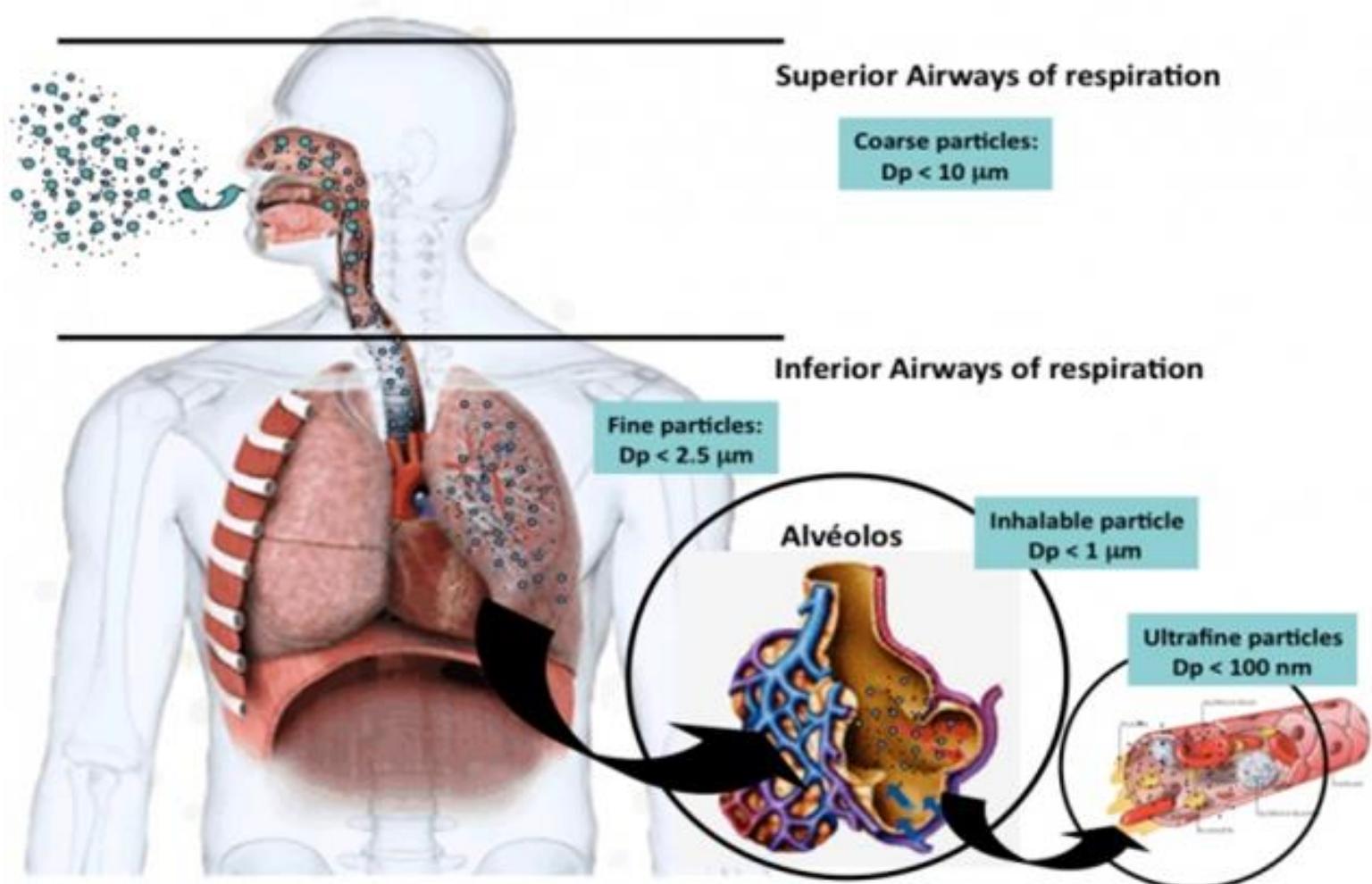
- diametru 2.5 μm sau mai mic

Particule inhalabile

$\leq 1 \mu\text{m}$

Particule ultrafine

$\leq 100 \text{ nm}$



1. <http://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health>

2. Hopkinson NS, et al. Climate change and lung health: the challenge for a new president Thorax April 2017 Vol 72 No 4

Particulele Fine de Materie (PM 2.5) sunt un Ucigas Global

COMPARATIA RATEI MORTALITATII GLOBALE
PRIN PARTICULE FINE DE MATERIE – PM 2.5



<https://www.rideshark.com/paticulatematterpollution/>



SOURCE: OURWORLDINDATA.ORG

**What represents
air pollution ?**

Lung Cancer

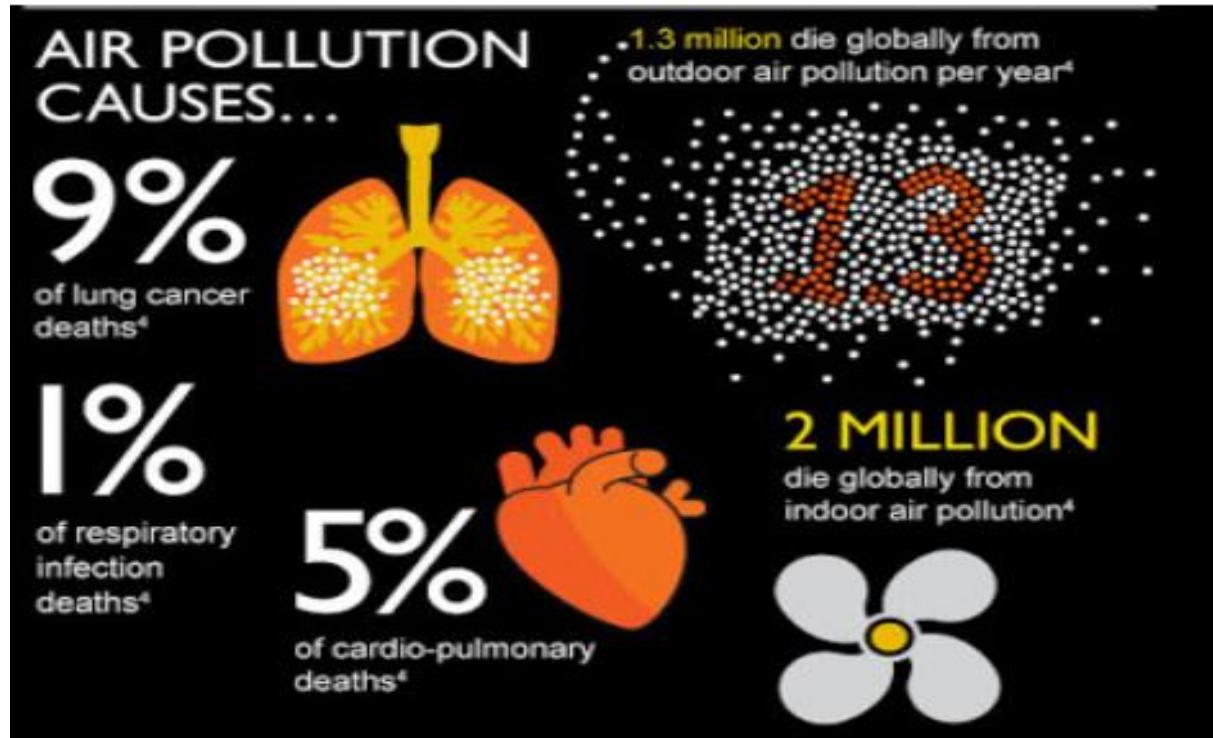
Invisible killer!!!



In ultimii 25 de ani

studii multiple - relatia dintre

poluarea aerului si cancerul pulmonar



1. Wang N. Short-term association between ambient air pollution and lung cancer mortality. *Environ Res.* 2019 Sep 17;179(Pt A):108748
2. Guo H. Air pollution and lung cancer incidence in China: Who are faced with a greater effect? *Environ Int.* 2019 Nov;132:105077
3. Bai L. Exposure to ambient air pollution and the incidence of lung cancer and breast cancer in the Ontario Population Health and Environment Cohort. *Int J Cancer.* 2019 Jul 15.
4. Kim HB. Long-Term Exposure to Air Pollutants and Cancer Mortality: A Meta-Analysis of Cohort Studies. *Int J Environ Res Public Health.* 2018 Nov 21;15(11).
5. Gogna P. *Estimates of the current and future burden of lung cancer attributable to PM2.5 in Canada.* Prev Med. 2019 May;122:91-99.
6. Tseng CH. The Relationship Between Air Pollution and Lung Cancer in Nonsmokers in Taiwan. *J Thorac Oncol.* 2019 May;14(5):784-792

Nu există un nivel sigur de particule

In 2013, un studiu a implicat 312,944 de persoane din 9 tari europene

↑ de 10 µg /m³ PM10 → rata cancerului pulmonar ↑ 22%.

PM2.5 au fost “↑ mortale” : pot patrunde mai adanc în plămâni

↑ de 10 µg/m³ PM2.5 → rata cancerului pulmonar ↑ 36%.



Study never-smokers enrolled by the American Cancer Society

PM2.5 - lung cancer MORTALITY

n - 188,699

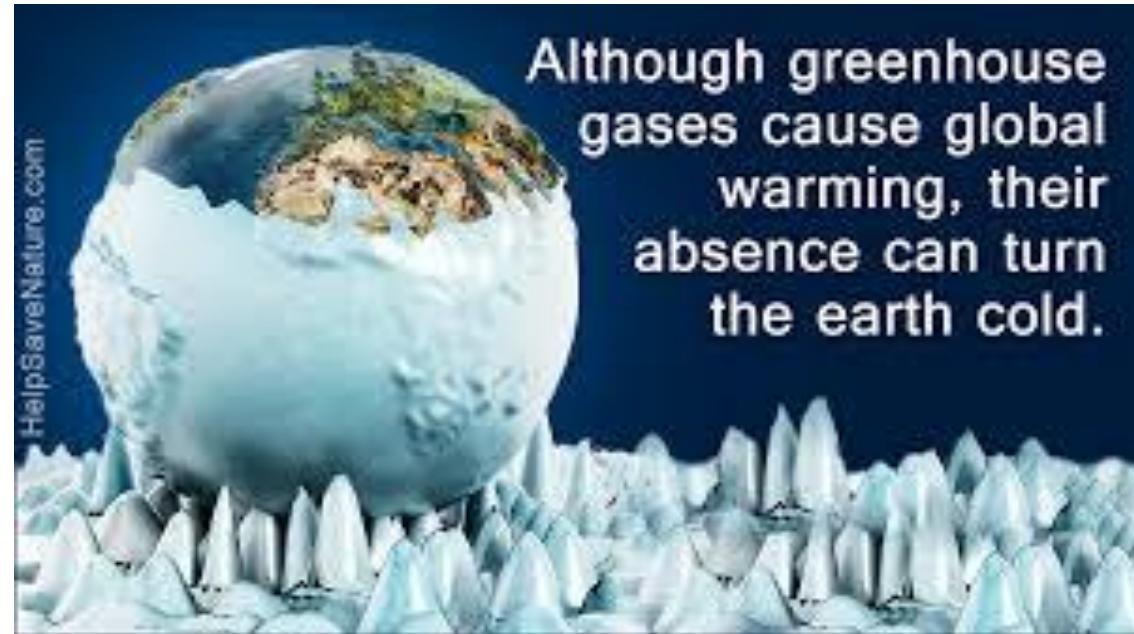
26-year follow-up 1982 - 2008

1,100 lung cancer deaths were observed

15-27% ↑ in lung cancer mortality - each ↑10 µg/m³ PM 2.5
similar in men and women

Gazele cu efect de sera

CO₂, NO₂, SO₂, Metan



Fara acestea planeta noastra ar fi pur si simplu prea rece

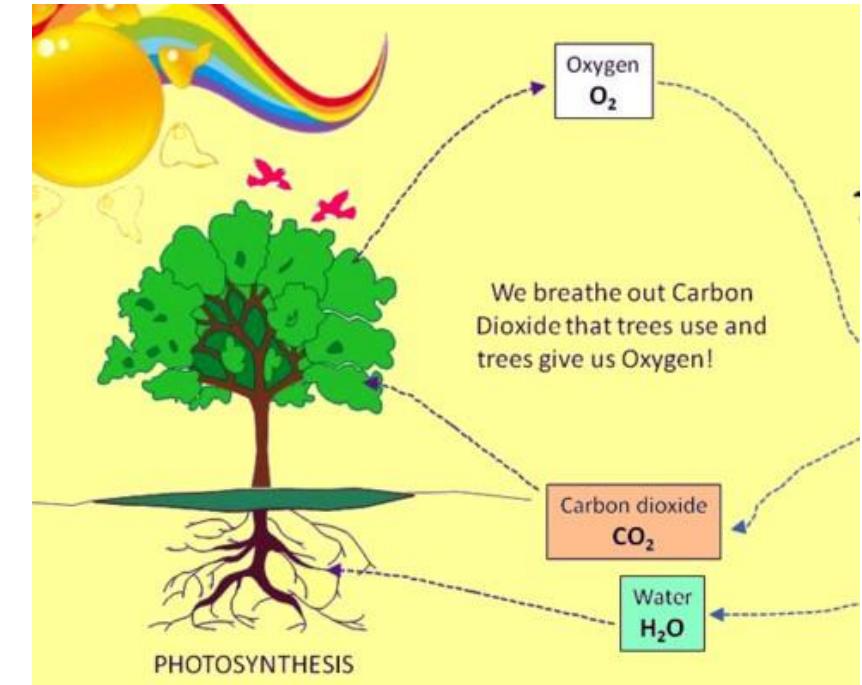
temperatura medie a Pamantului
ar fi de -18 grade Celsius

1. <http://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health>

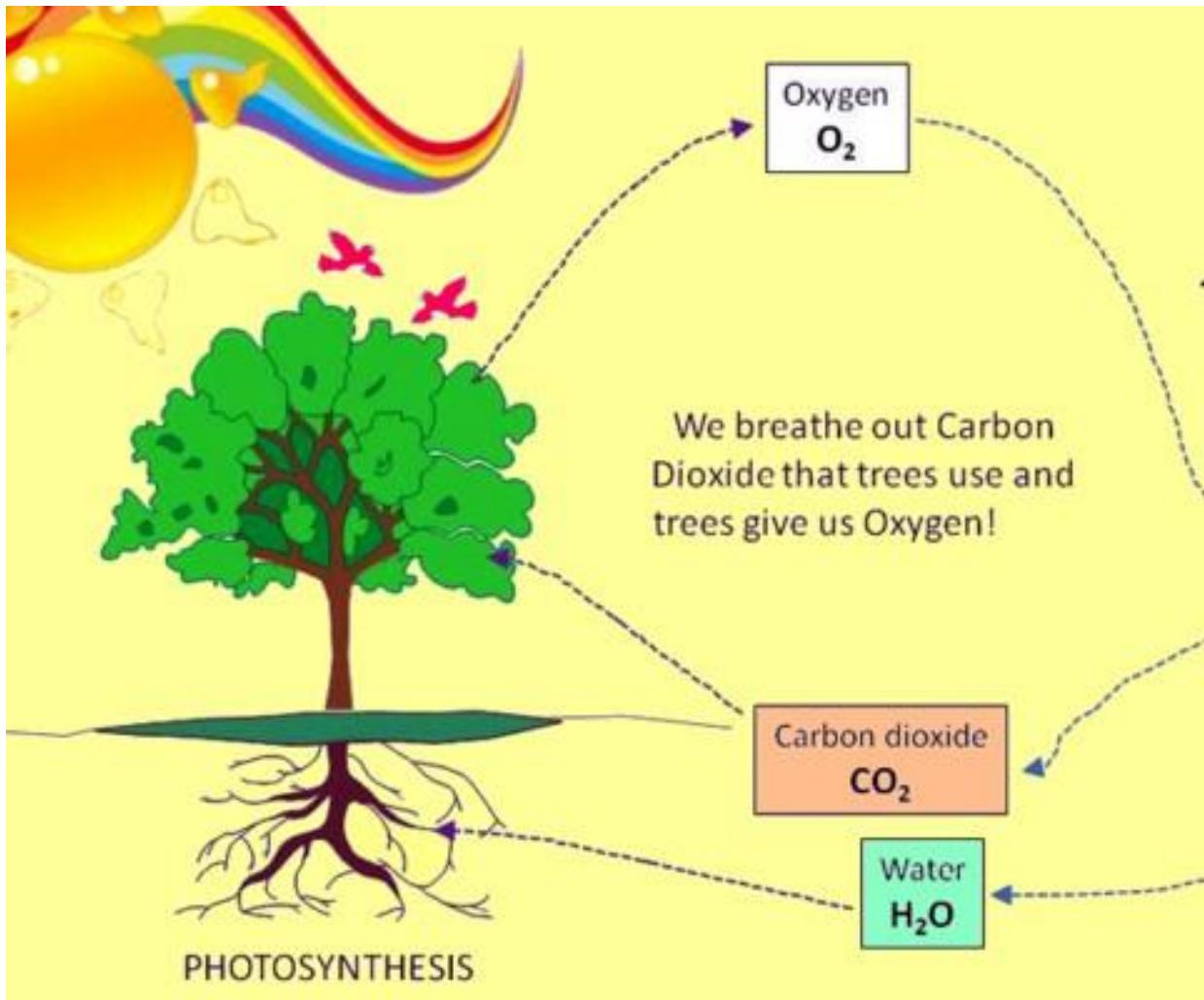
2. Hopkinson NS, et al. Climate change and lung health: the challenge for a new president Thorax April 2017 Vol 72 No 4

Dioxidul de carbon (CO₂) este un gaz esential pentru viata

- animalele il expira
- plantele îl consumă



**Principalul gaz cu efect de sera
care emite radiatii termice
creand 'efectul de sera'.**

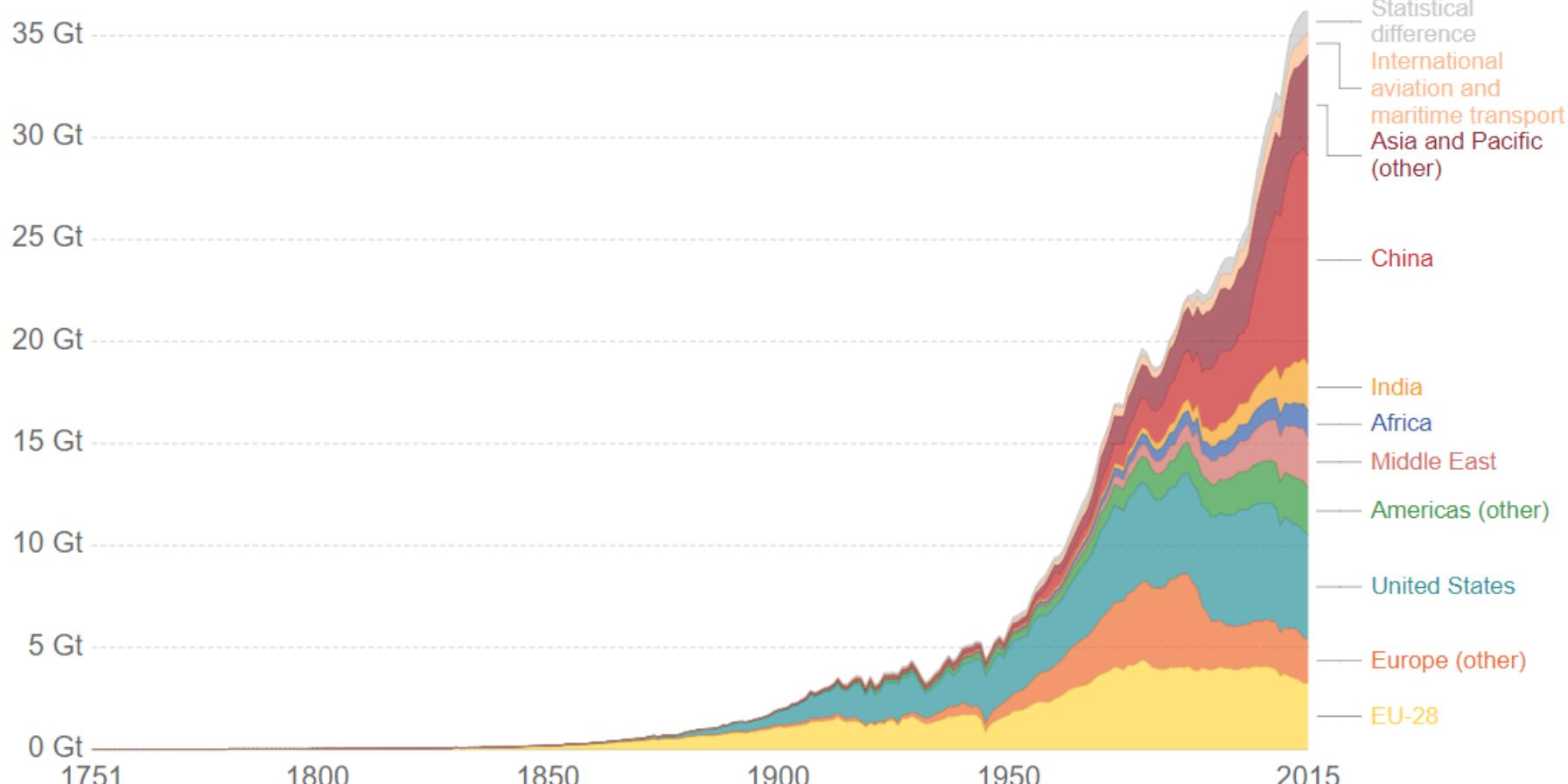


Padurile distruse !!!!



Emisiile anuale de CO₂ pe regiuni in lume

Emisiile anuale de dioxid de carbon (CO₂) masurate in miliarde de tone (Gt) pe an

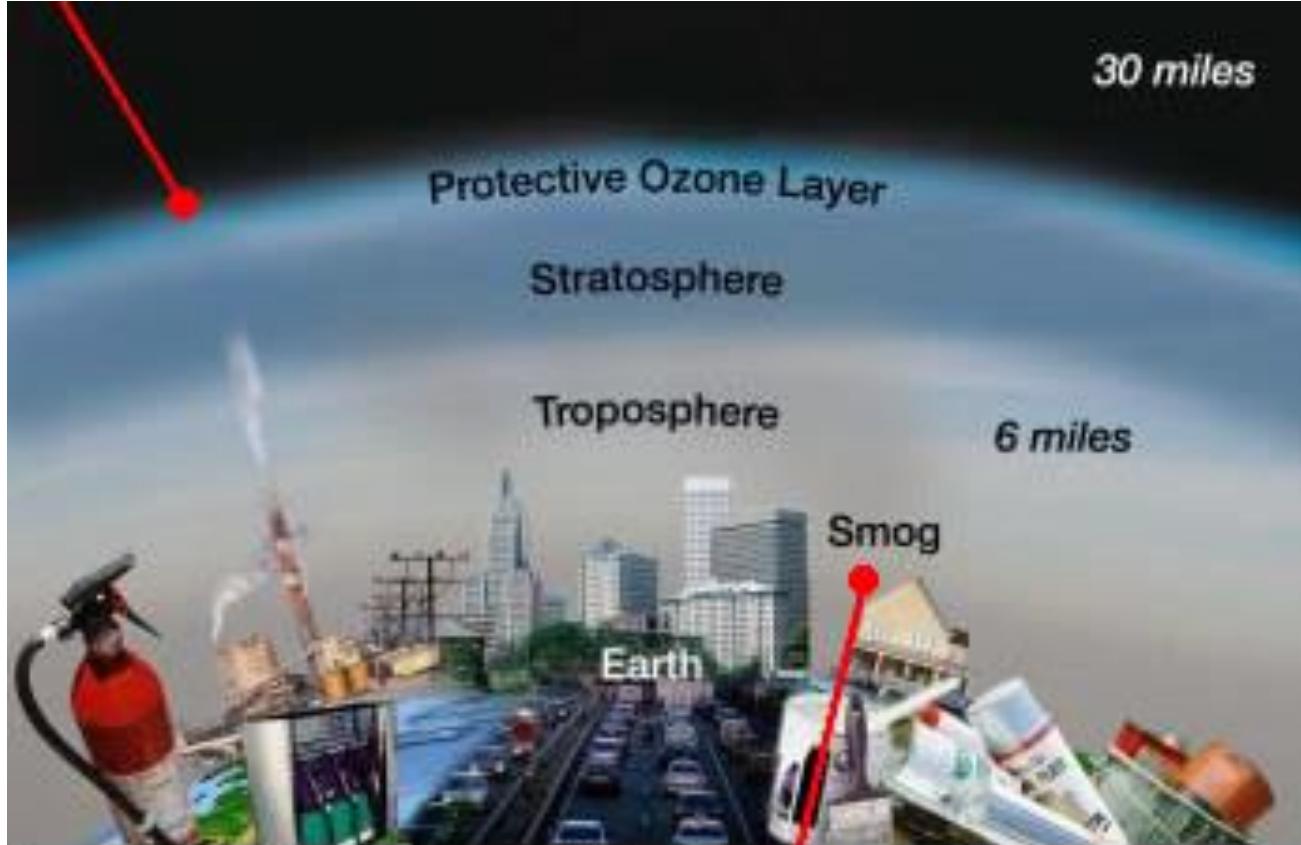


Source: Carbon Dioxide Information Analysis Center (CDIAC)

CC BY-SA

Note: Emissions data have been converted from units of carbon to carbon dioxide (CO₂) using a conversion factor of 3.67. Regions denoted "other" are given as regional totals minus emissions from the EU-28, USA, China and India. Here, we have rephrased the general term "bunker (fuels)" as "international aviation and maritime transport" for clarity.

Ozonul la nivelul solului



A nu se confunda cu
ozonul
din atmosfera inalta !!!!

Too much here... Cars, trucks, power plants and factories all emit air pollution that forms ground-level ozone, a primary component of smog.

Ozonul din atmosfera inalta

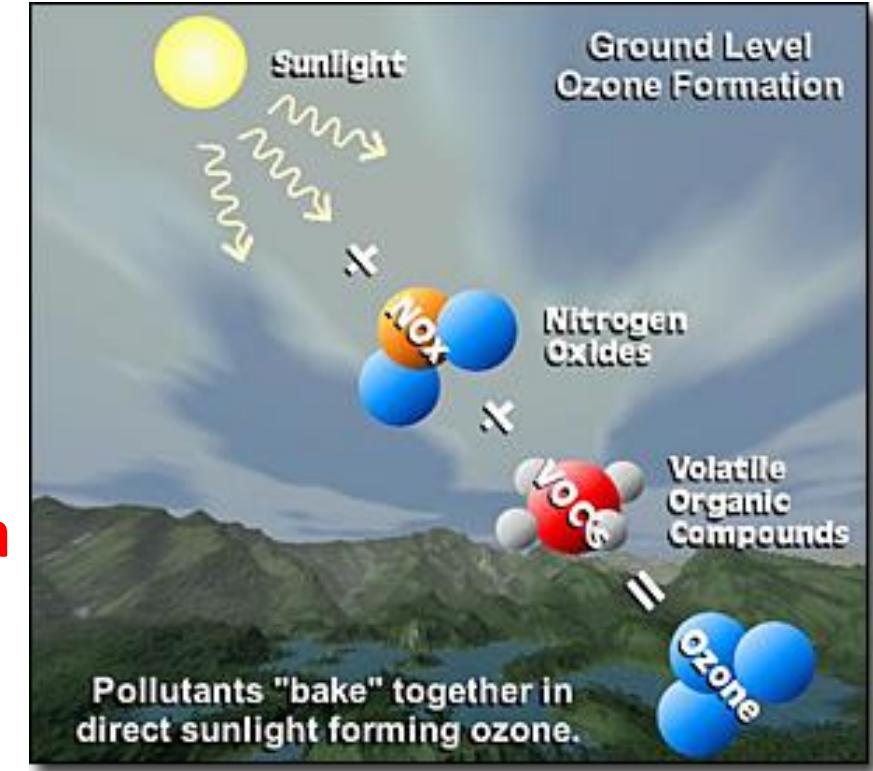


Blocheaza o parte din radiatiile ultraviolete solare
protejand astfel biosfera : care include oamenii

Ozonul de la nivelul solului

reactie fotochimica
poluanti din vehicule si industrie + lumina solară

oxizii de azot (NOx) compusii organici volatili (VOC)

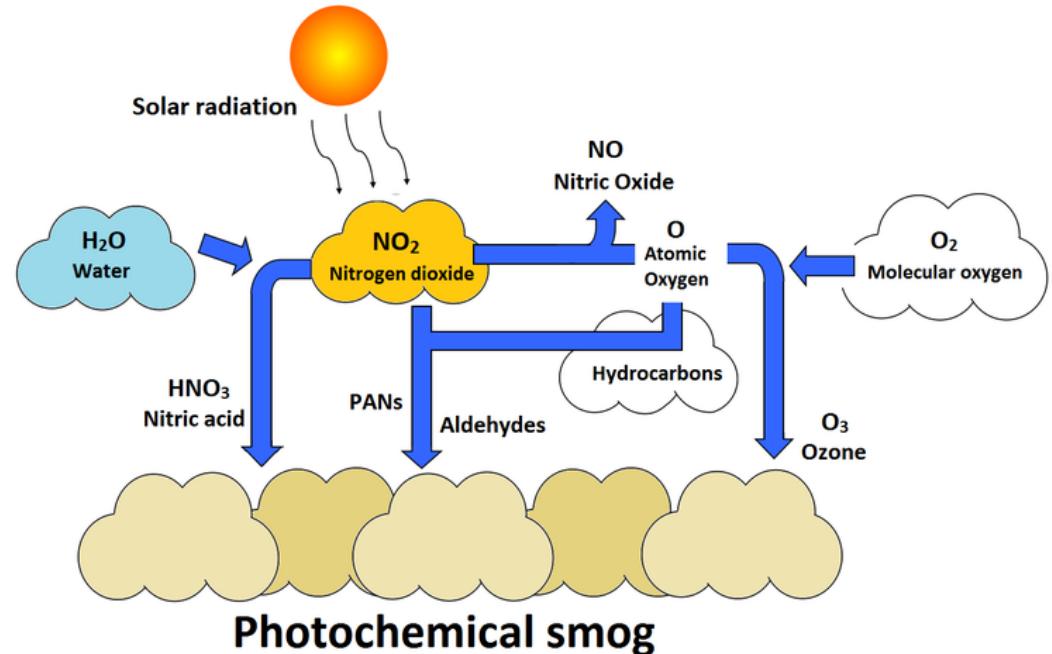


Cele mai ridicate nivele ozon apar in perioadele de vreme insorita.

NO_2

reactia fotochimica

poluanti din vehicule si industrie + lumina solară

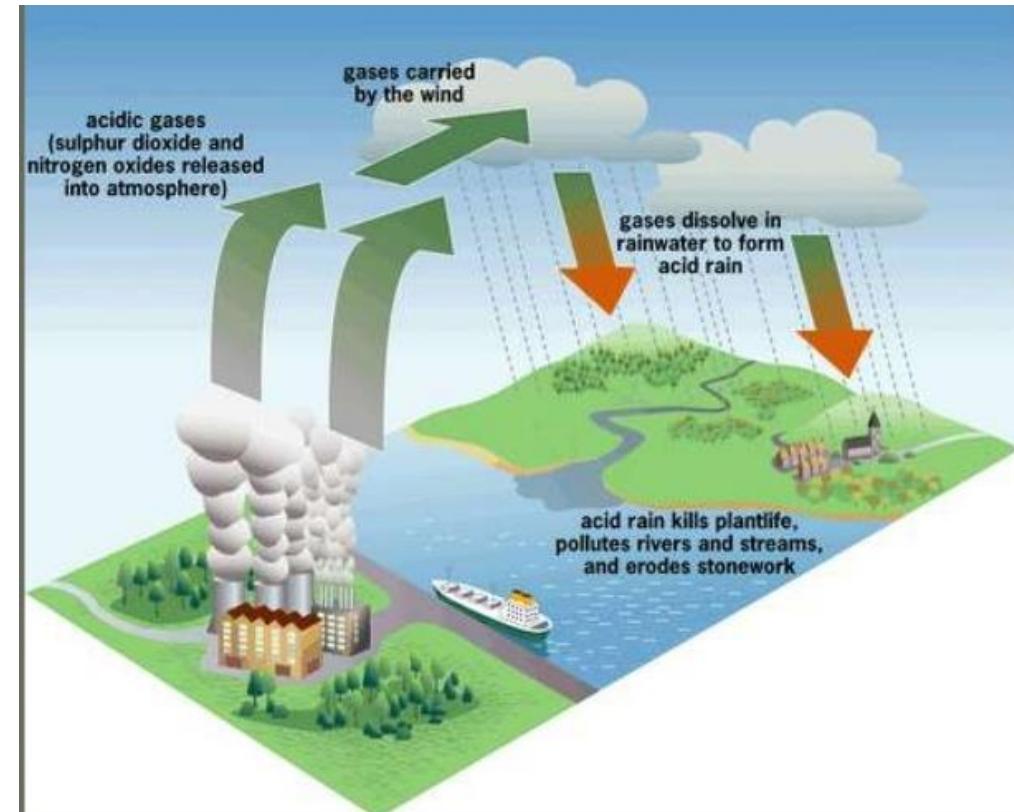


Principala sursa de Aerosoli Nitrati - o fractiune importantă a PM_{2.5}

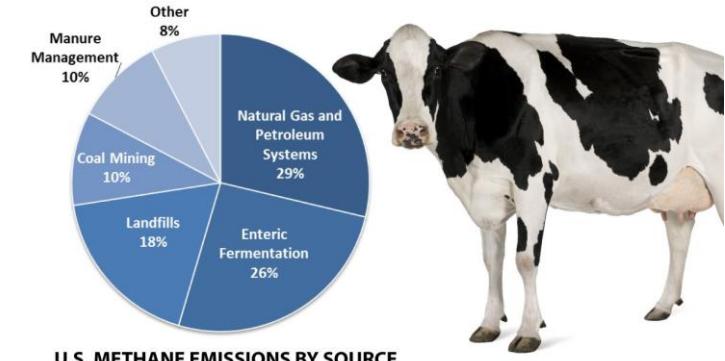
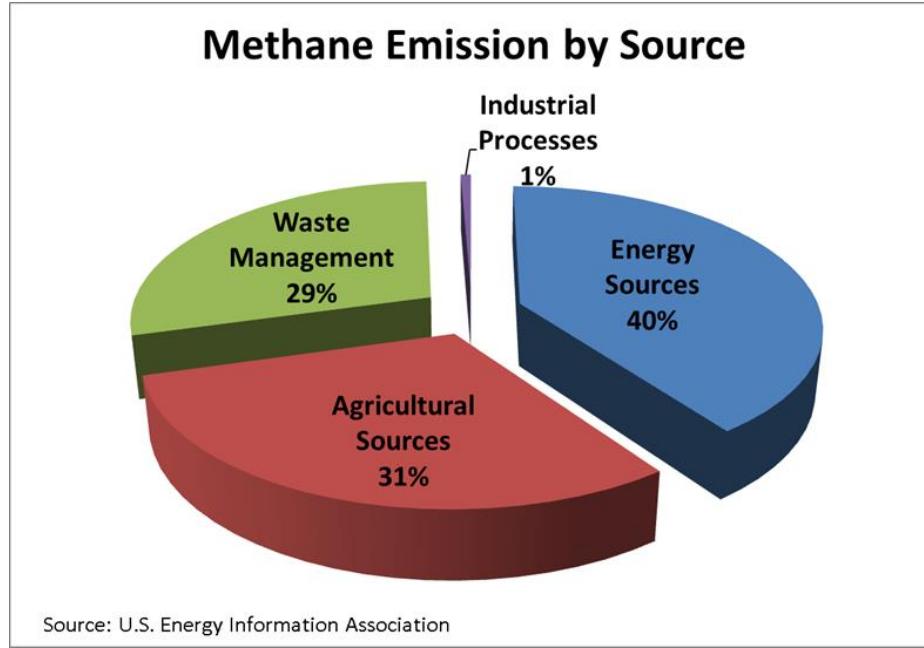
Dioxidul de sulf SO₂

SO₂ este un gaz incolor cu miros intepator.

- **vehicule si industrie, incalzire domestica**
- **topirea minereurilor**



Metanul

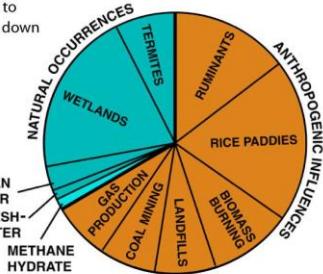


HOW COWS CONTRIBUTE TO GLOBAL WARMING

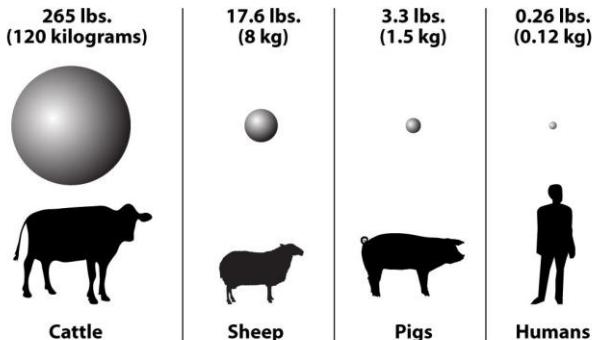
Ruminants are herbivores that regurgitate their food to re-chew it. Microorganisms in the animal's gut break down carbohydrates into simpler molecules.

Ruminants including cattle and deer produce large amounts of methane, a greenhouse gas with an impact on the atmosphere 23 times greater than that of carbon dioxide. The production of methane by this process is called enteric fermentation, and it accounts for more than a quarter of methane emissions in the United States (chart, above).

RIGHT: Naturally occurring and human-caused (anthropogenic) sources of methane.



METHANE EMITTED PER ANIMAL PER YEAR

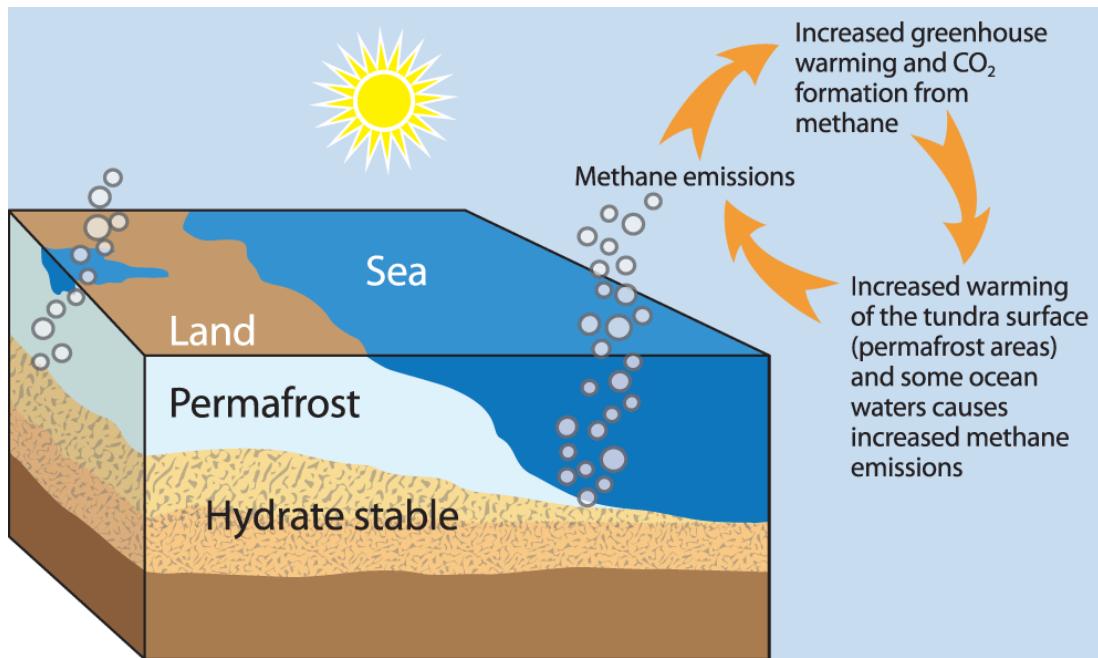


SOURCES: NASA GODDARD INSTITUTE FOR SPACE SCIENCE; ENVIRONMENTAL PROTECTION AGENCY; U.S. DEPT. OF ENERGY TECHNOLOGY LABORATORY; SHUTTERSTOCK

Strong methane emissions in Canada's Arctic linked to sub-permafrost methane banks

By Kelsey Lindsey - July 19, 2017

418





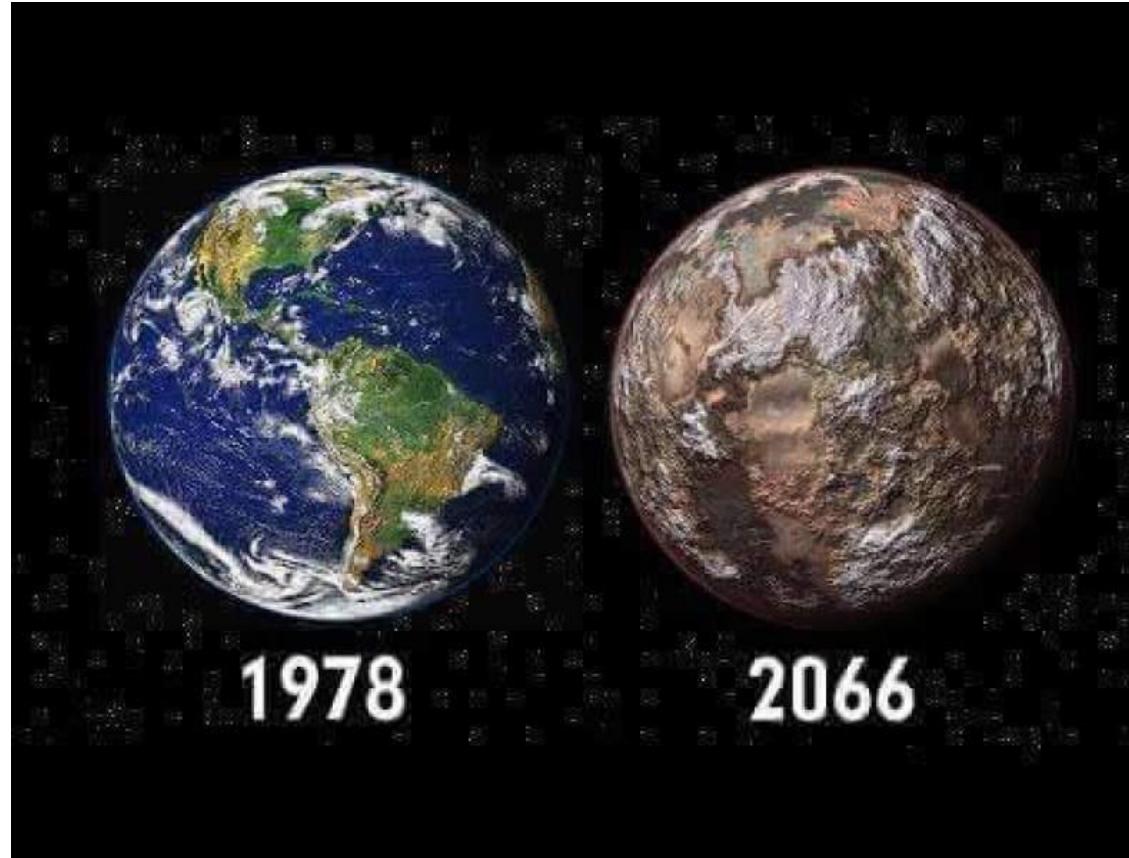
Romania - avem din ce in ce mai frecvent vreme extrema



Padurile



Fenomenele meteorologice extreme - consecinte devastatoare cu mai mare impact pentru mai putin responsabili pentru aceste schimbari dramatice



Transport Oslo, Norway



Oslo plans to increase tolls on its congested E18 highway on heavy pollution days as studies show this has the potential to cut nitrogen dioxide (NO₂) emissions through a 27% reduction in car traffic.

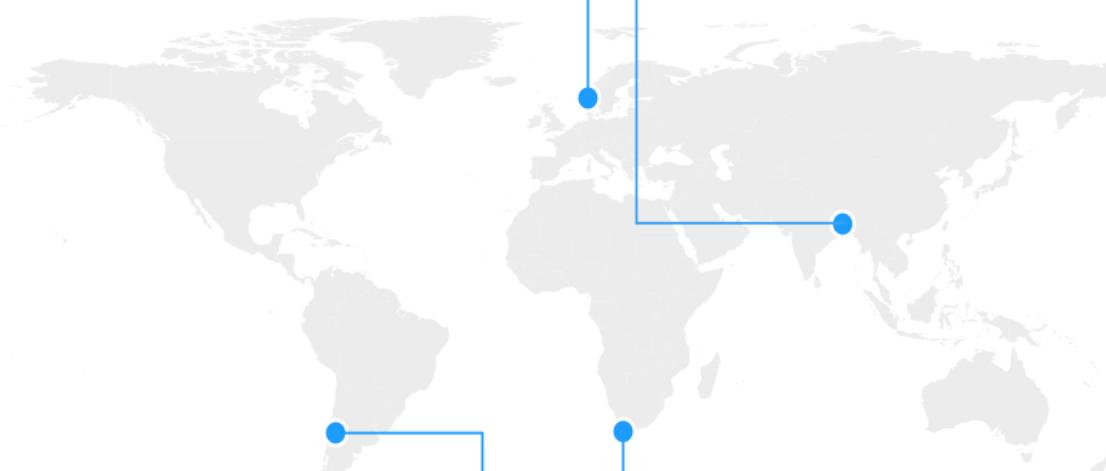
(Source: Oslo Kommune)

Industry

Kathmandu, Nepal

New brick kiln technology uses half the amount of coal during brick production, traps particles to prevent them from entering the atmosphere and protects factory workers and residents from inhaling pollutants. It is estimated this cuts annual emissions equivalent to removing 15,000 American vehicles off the road

(Source: Clean Air Asia)



Waste Management Santiago, Chile



Centralized treatment plants in Santiago are harvesting methane emissions during wastewater treatment. The process uses built-in bio-digesters or sludge pyrolysis to process the methane and produce natural gas or electricity.

(Source: CCAC)

Household Air Pollution Cape Town, South Africa

200+ homes in Khayelitsha were retrofitted with solar water heaters, insulated ceilings and energy-efficient lighting. This will result in reduced electricity consumption and CO₂ emissions with subsequent decreases in pulmonary pneumonia, carbon monoxide poisoning and other respiratory illnesses.

(Source: UNFCCC)



See more solutions and success stories:

www.BreatheLife2030.org

Începe cel mai important eveniment anual de diplomație la New York. Liderii mondiali caută soluții pentru climă și eradicarea sărăciei

23.09.2019 07:57





Acuzații dure și apeluri desperate pentru salvarea planetei de la activiști pentru mediu pe de o parte și promisiuni de la liderii lumii că vor lua măsuri pentru încetinirea încălzirii globale, de cealalată parte. Așa a arătat prima zi a summitului ONU pentru climă. Cea mai puternică și impresionantă voce a fost cea a Gretei Thunberg, adolescenta suedeză de



BBC prezintă live situația celor mai ample proteste pentru climă care au avut loc vreodată la nivel planetar. În Marea Britanie, manifestațiile sunt în plină desfășurare.



People's behaviour can reduce air pollution

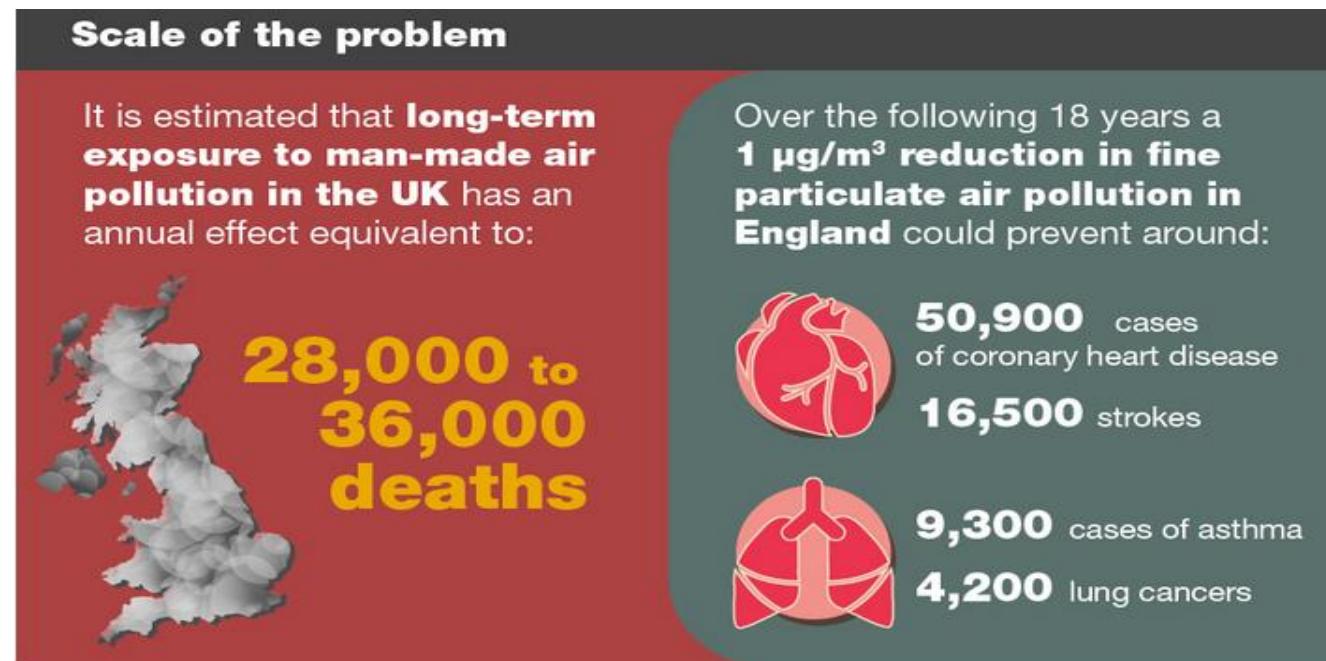


Positive example - UK

- A modeling framework for the following 18 year

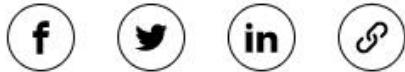
The UK Health Forum, Imperial College London and Public Health England (PHE)

Clean Air Strategy - published in May 2018



Grevă climatică în întreaga lume. Platforma Dexonline s-a alăturat mișcării și este indisponibilă vineri

20.09.2019 14:45



EU outlines 'Green Deal' to achieve carbon neutrality by 2050

European Commission President Ursula Von der Leyen's first major proposal since taking office on December 1 will commit the EU to achieving carbon neutrality by 2050.



Ursula von der Leyen

President of the European Commission since 1 December 2019.

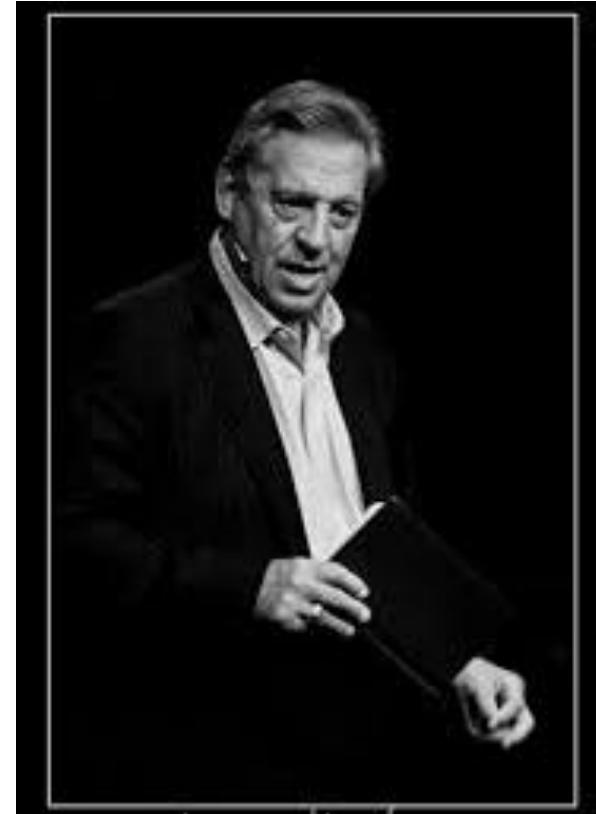
Costul limitarii schimbarilor climatice ACUM este mult mai mic decat abordarea consecintelor in viitor.



. Nici o societate nu este imuna la aceste schimbari devastatoare !!!

**“Nu va veti schimba viata pana cand nu schimbati
ceea ce faceti in fiecare zi. ”**

*“You will never change your life until you change
what you do every day. ”*



John Maxwell