

Nature 4.0

Il ruolo delle foreste nel sistema agro-forestale del futuro

La Transizione
Ecologica

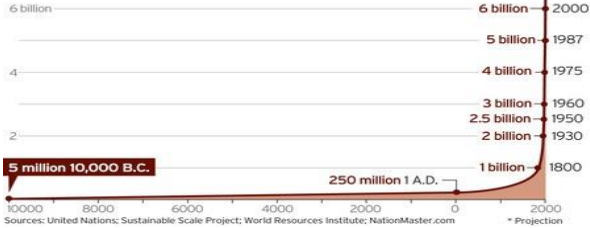
*Prof. Riccardo Valentini
University of Tuscia, Viterbo Italy,
CMCC Foundation, Lecce, Italy*



TRANSIZIONE 1/4

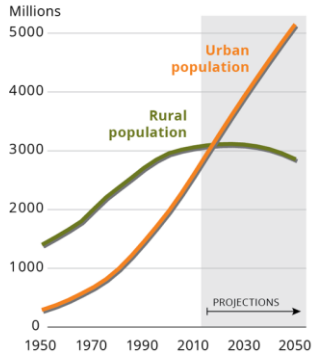
World population growth

Fertility rates are declining, the United Nations says, but not fast enough to stop population growth. The U.N.'s medium-level projection is for the world's population to reach 9.2 billion by 2050 but still more than 3 billion higher since the turn of the century. Population activists say that's too much for the world to handle.



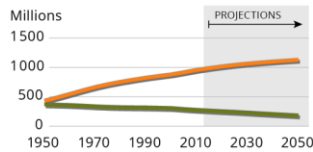
Less developed regions

Africa, Asia (excluding Japan), Latin America and the Caribbean, Melanesia, Micronesia and Polynesia.



More developed regions

Europe, Northern America, Australia, New Zealand and Japan.



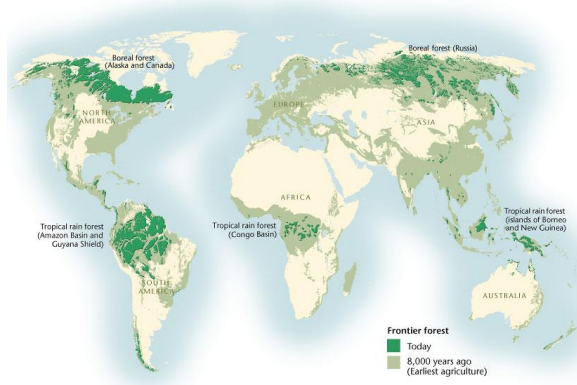
URBAN FOOD AND URBAN HUMANS (Homo Urbanus)



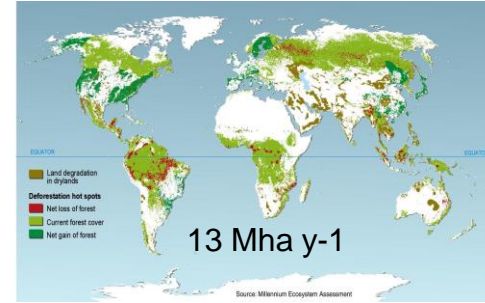
1. The need of higher production with less labour requirements
2. Food processing and transformation for feeding urban humans
3. Changes in cultural lifestyles and food consumption patterns
4. Food and packaging waste
5. Energy consumption
6. Volatility of prices
7. Climate change impacts on food production

TRANSIZIONE 2/4

Frontier forests

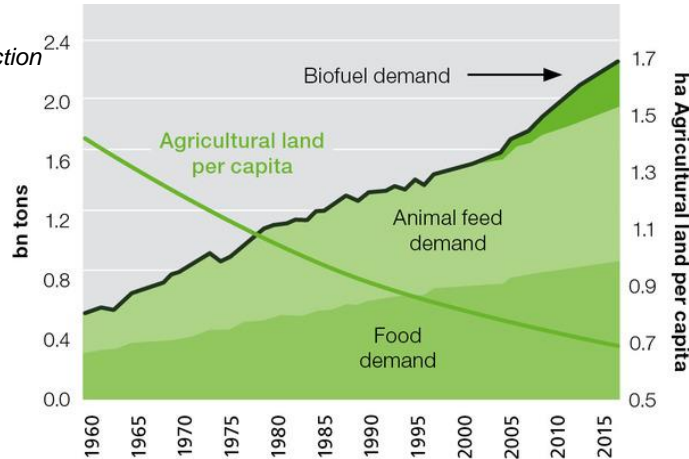


Tropical deforestation

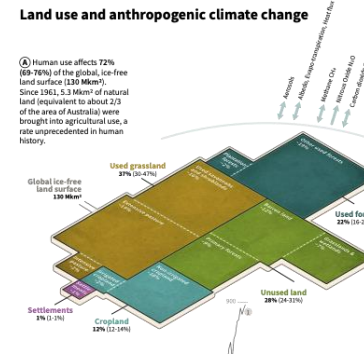


73% della superficie terrestre (senza ghiacci) è utilizzata dall'uomo

Land reduction



Land use and anthropogenic climate change



TRANSIZIONE 3/4

DIE OF HUNGER OR OBESITY?

Today, worldwide, for every malnourished person, there are two people who are obese or overweight.



TODAY IN THE WORLD

868 million UNDERNOURISHED PEOPLE

1.5 billion OBESE OR OVERWEIGHT PEOPLE

FOR EVERY UNDERNOURISHED PERSON, THERE ARE TWO WHO ARE OBESE OR OVERWEIGHT

DEATHS EVERY YEAR WORLDWIDE FROM:

36 million LACK OF FOOD

29 million TOO MUCH FOOD

FEED PEOPLE, ANIMALS, OR CARS?

One-third of all food production worldwide is destined for feeding livestock. In addition, a growing share of agricultural land is used for the production of biofuel. As a result, we are choosing to feed automobiles instead of people.



* allocation of the use of grains as a percentage between animal food, human food, and the production of biofuel

GRAIN PRODUCTION IN THE WORLD AND ITS USE*

Category	Today	2020	Change
Human Food	2,245,000,000 t	2,633,000,000 t	+17.3%
Animal Fodder	-	-	-3.9%
Biofuels	-	-	+2.1%
Population	7 billion	7.7 billion	+10%

Allocation of grain use (Today vs 2020):

- Human Food: 47.4% (Today) vs 45.6% (2020)
- Animal Fodder: 32.9% (Today) vs 33.6% (2020)
- Biofuels: 6.6% (Today) vs 7.6% (2020)

FEED WASTE OR FEED THE HUNGRY?

Every year worldwide, 1.3 billion tons of perfectly edible food are wasted, while 868 million people suffer from hunger.



1/3 OF GLOBAL FOOD PRODUCTION = **1.3** OF FOOD ARE WASTED billion tons

ENDS UP IN THE GARBAGE EACH YEAR

4 TIMES WHAT IT WOULD TAKE TO FEED THE 868 MILLION PEOPLE WHO ARE HUNGRY

THE PLANET'S BALANCE IS NEGATIVE

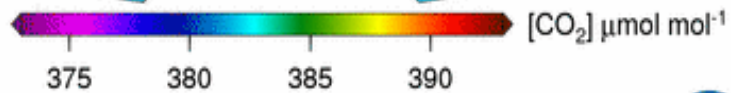
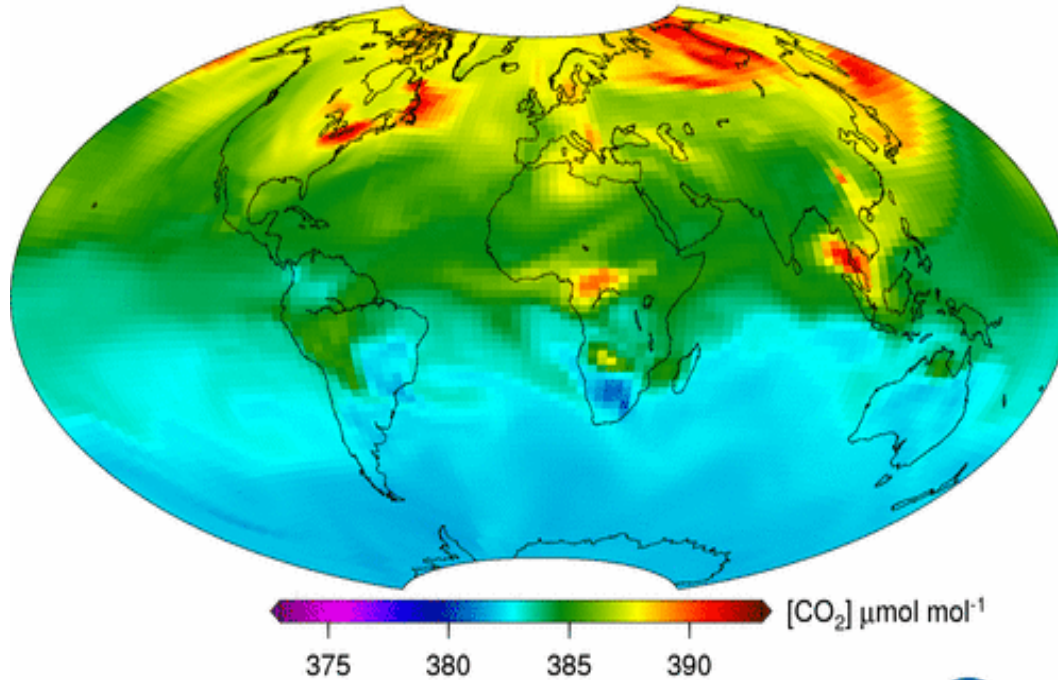
Today, what is consumed is greater than what we are able to regenerate. For our current lifestyle, we will need 1.5 planets, and in 40 years we will need 3

TODAY 1.5 planets

2050 3 planets

TRANSIZIONE 4/4

CarbonTracker free troposphere CO₂
2008-Jan-01

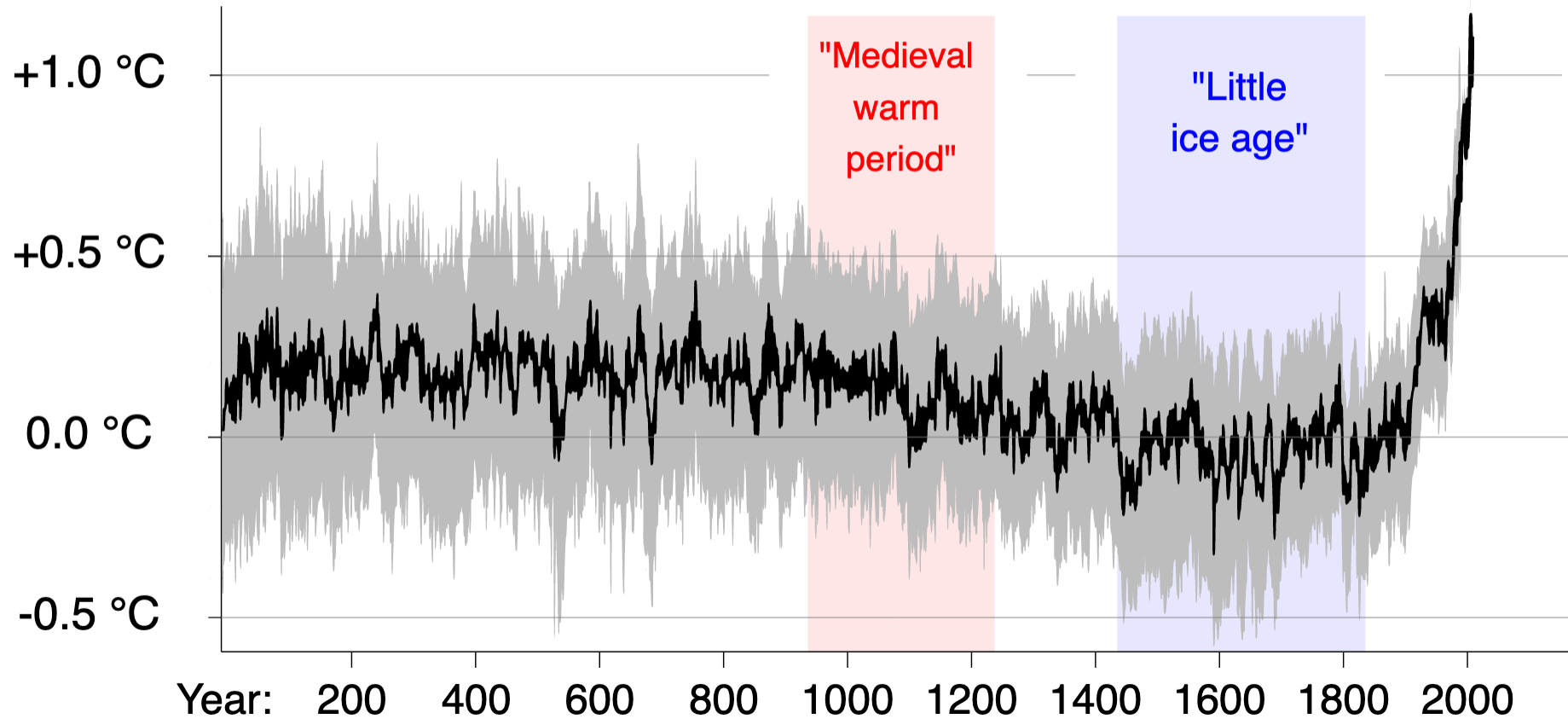


NOAA Earth System Research Laboratory
CarbonTracker CT2009 release



Apr. 18, 2022	420.49 ppm
Apr. 16, 2021	418.37 ppm

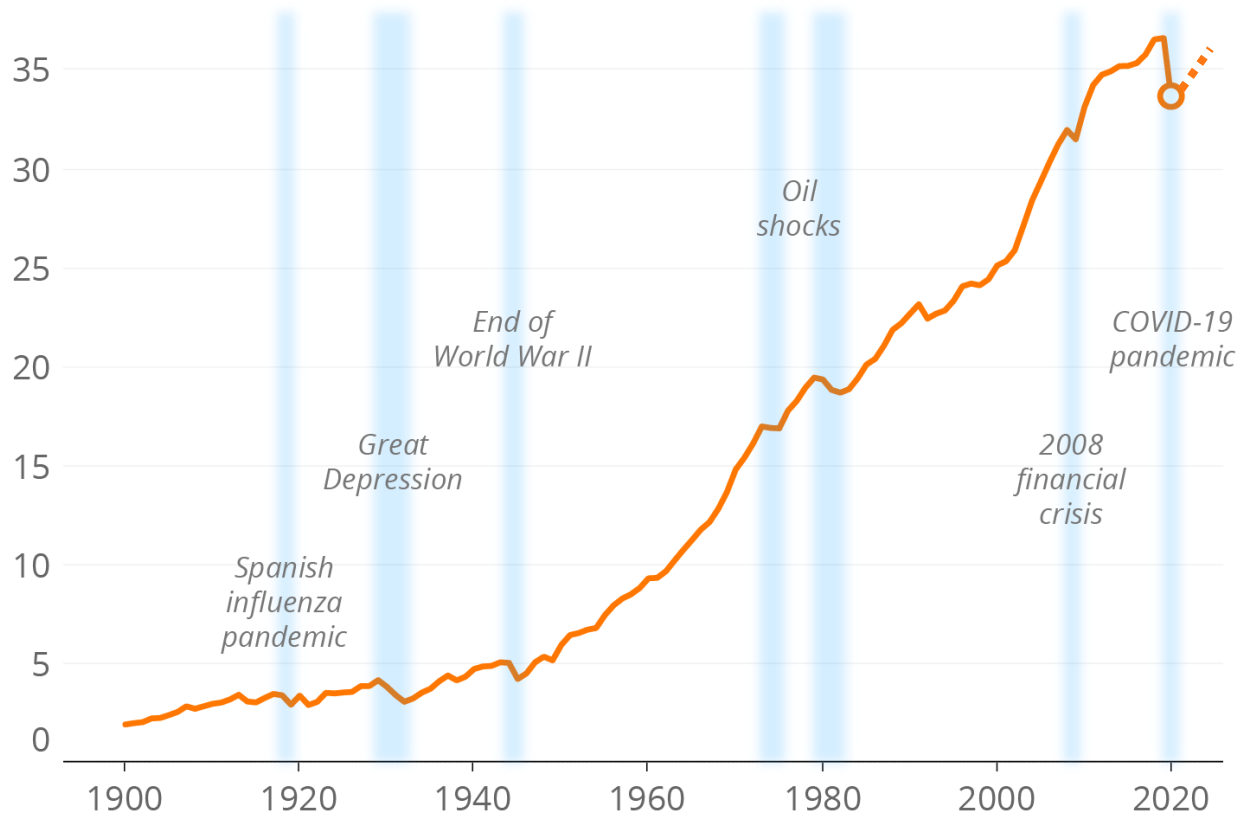
Global Average Temperature Change



A familiar pattern

Annual global fossil emissions, billion metric tons of CO₂

CO₂ emissions do not stop !

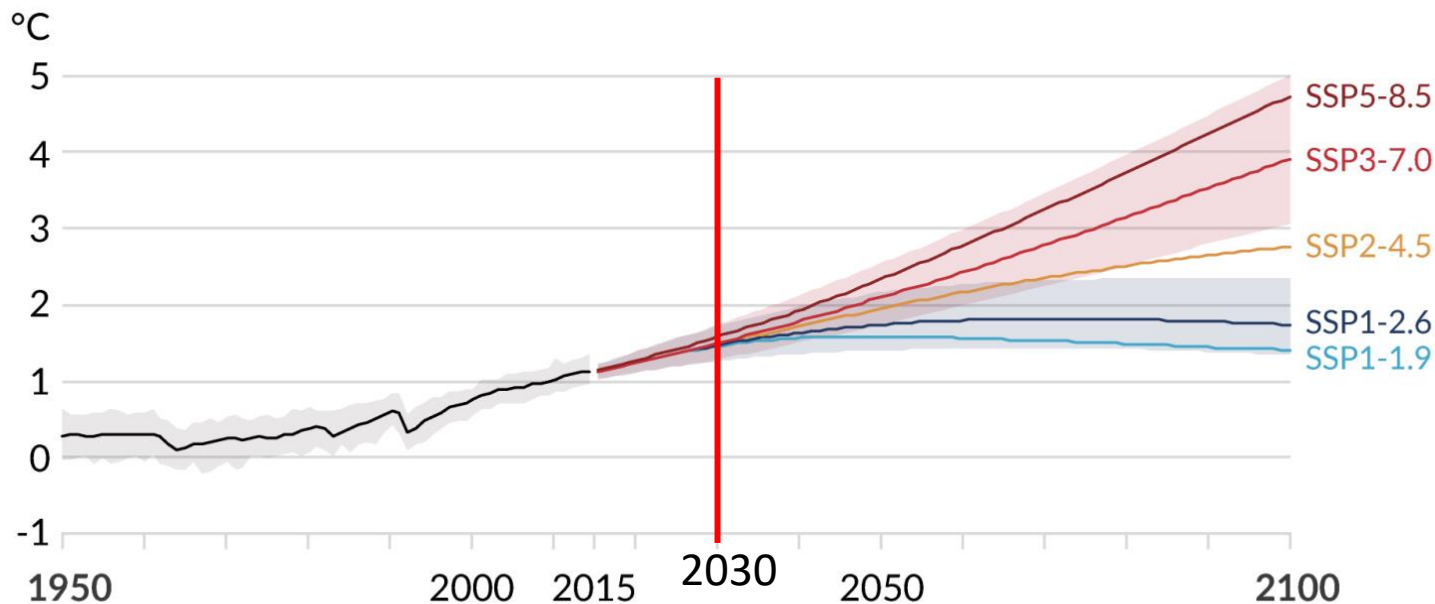


Source: Global Carbon Project

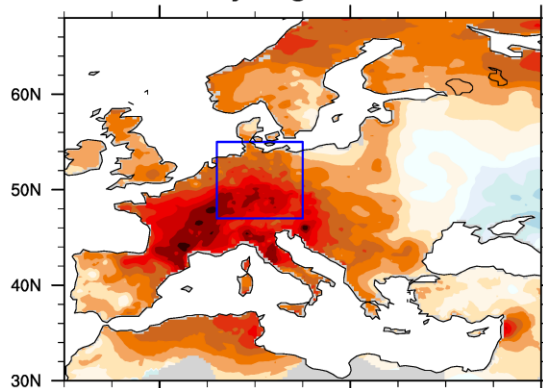
grist

Human activities affect all the major climate system components, *Figure SPM.8* with some responding over decades and others over centuries

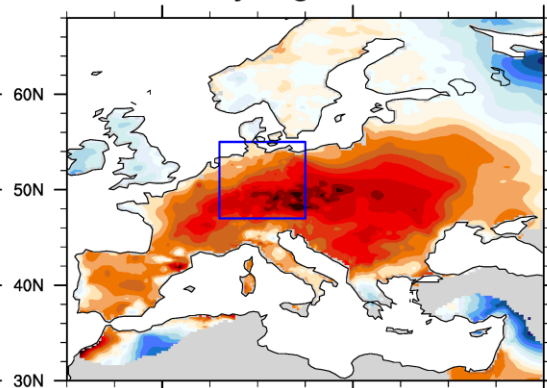
a) Global surface temperature change relative to 1850-1900



July-August 2003



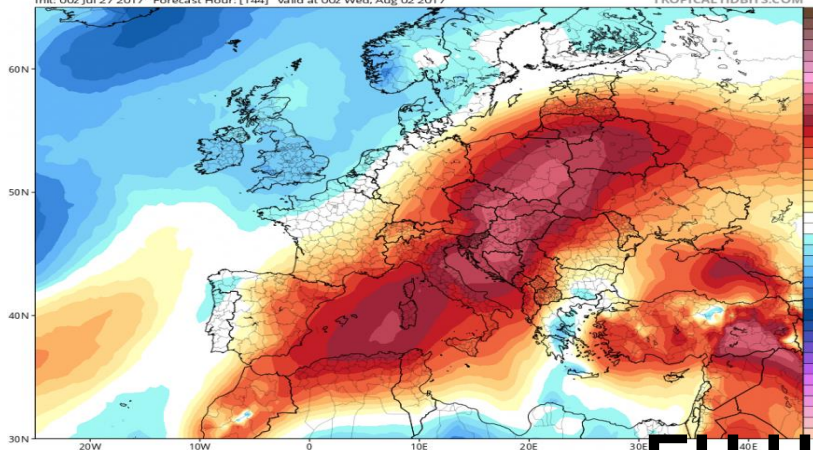
July-August 2015



EPS 850 hPa Temperature Anomaly (°C) (based on CFSR 1981-2010 Climatology)

Init: 00z Jul 27 2017, Forecast Hour: [144] valid at 00z Wed, Aug 02 2017

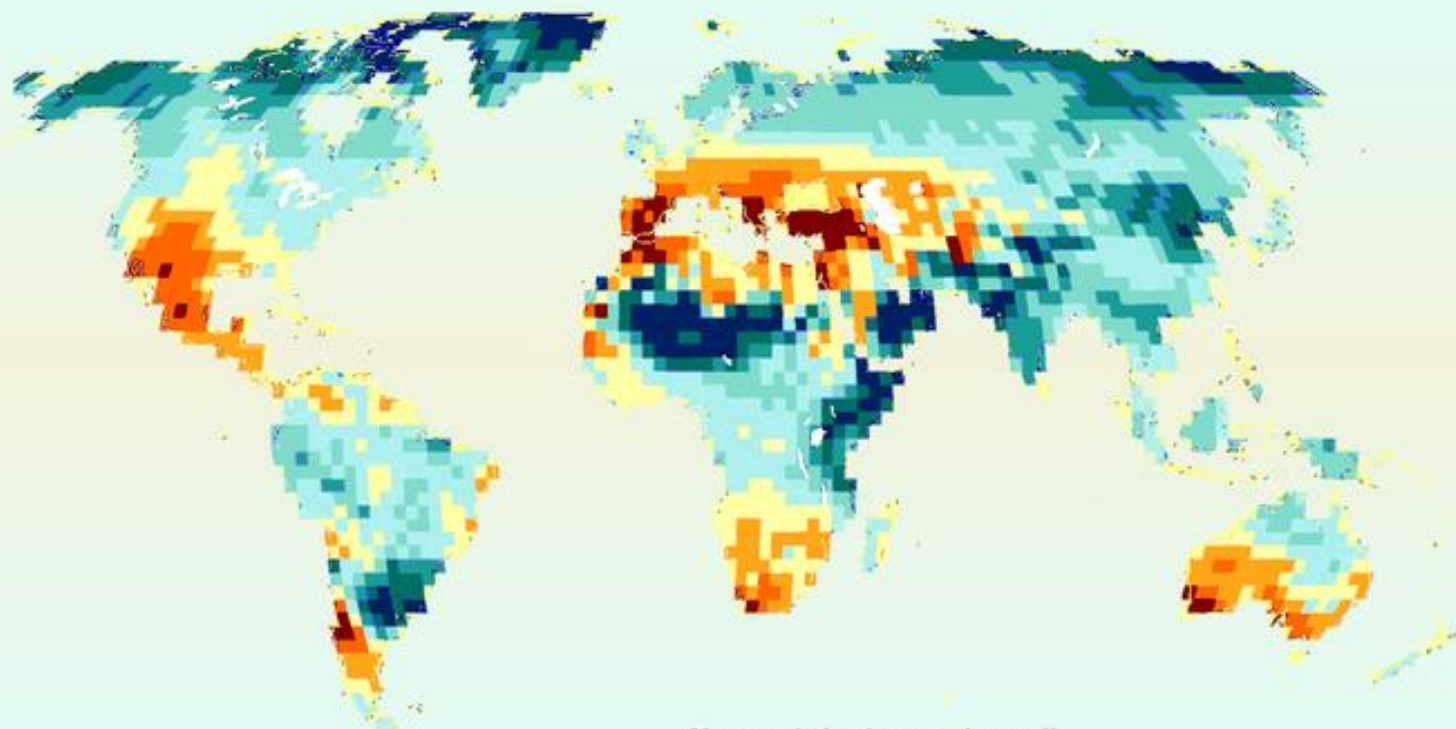
TROPICALTIDBITS.COM



2017 July -August

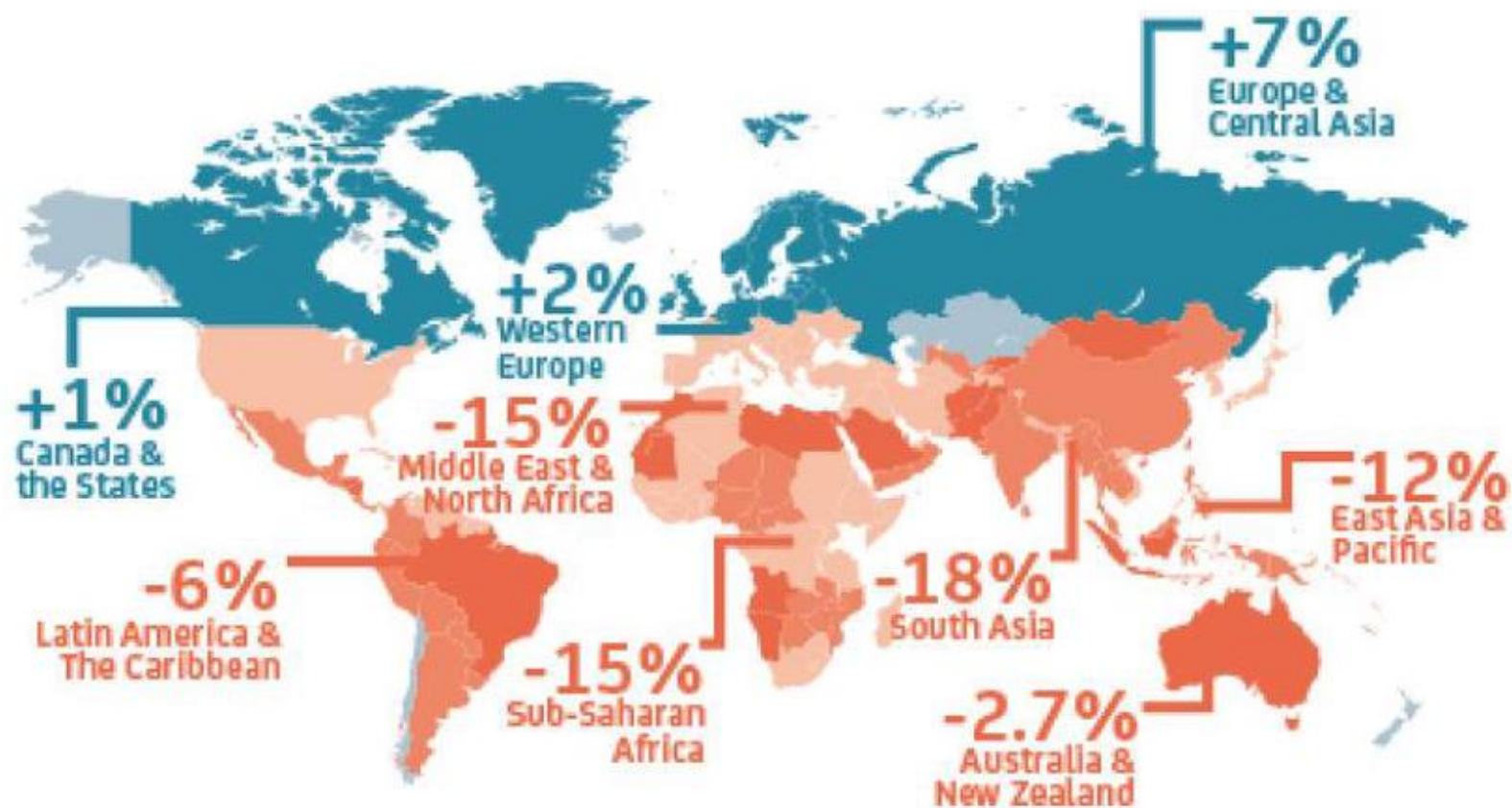
EU HEAT WAVE
S

Projected impacts of climate change on freshwater flows



Mean variation in annual run-off
in 1981-2000 and 2081-2100





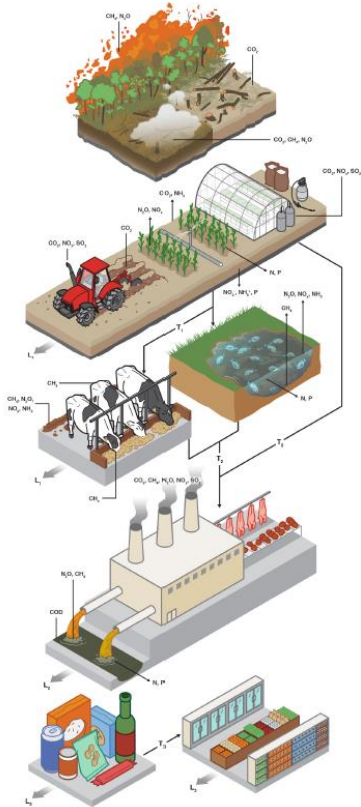
Percentage Change in Yields
from Present and 2050



Agriculture GHG Emissions



What do we mean in this project with sustainability?



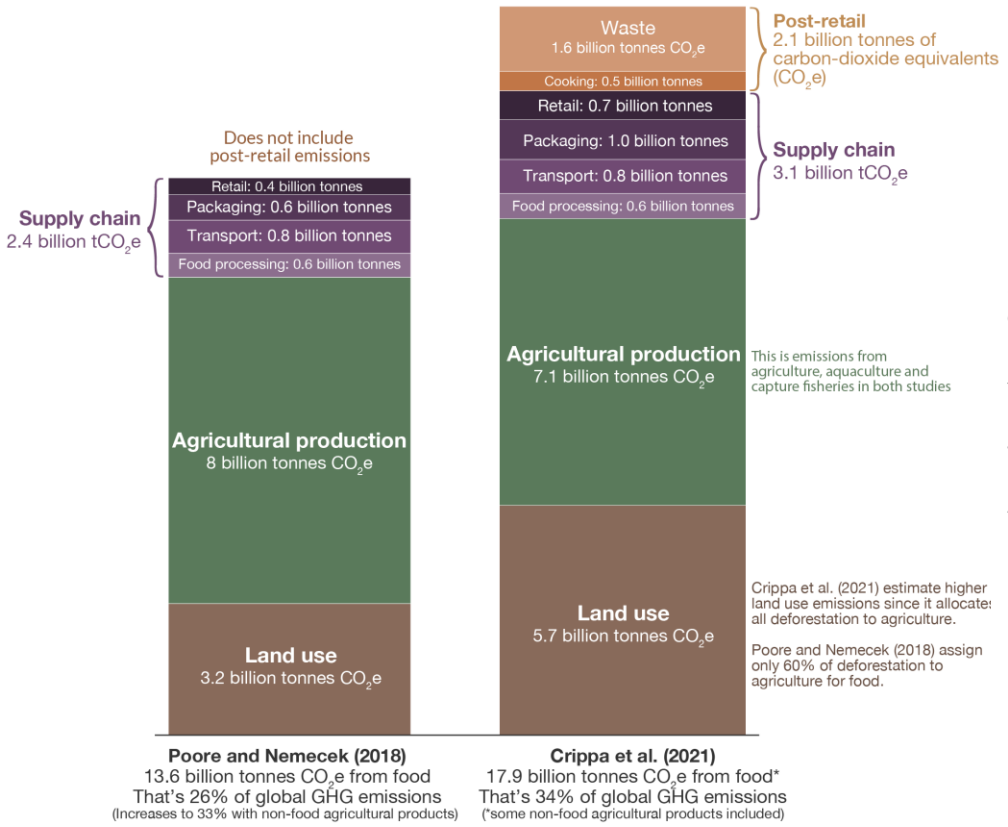
Impacts on Climate
Emissions of GHGs (C footprint)
Kg CO₂eq/ kg or litres of food product

Impacts on water resources quality and quantity
(Water footprint)
Litres of water/kg or litres of food product

How much of global greenhouse gas emissions come from the food system?



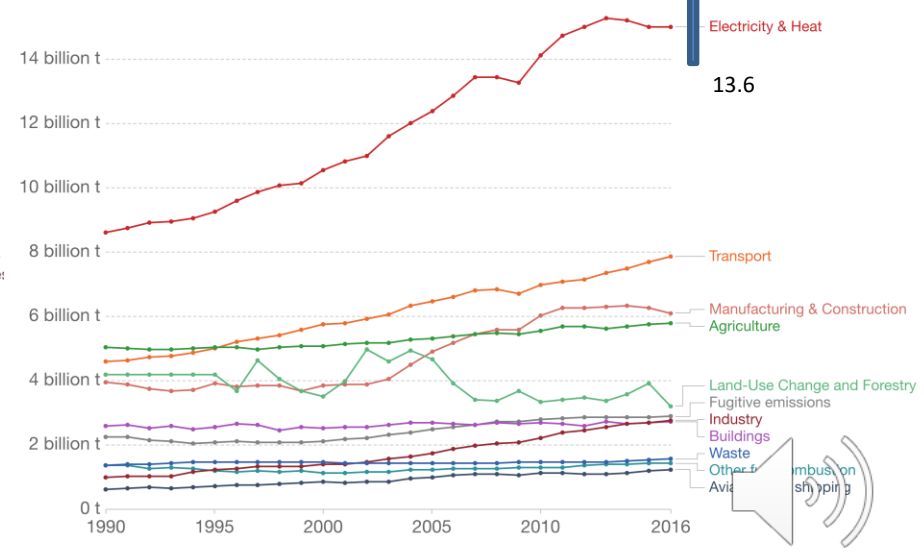
Shown is the comparison of two leading estimates of global greenhouse gas emissions from the food system. Most studies estimate that food and agriculture is responsible for 25% to 35% of global greenhouse gas emissions.



Total 55.3 billions tons CO₂e

Greenhouse gas emissions by sector, World

Greenhouse gas emissions are measured in tonnes of carbon dioxide-equivalents (CO₂e).



Source: CAIT Climate Data Explorer via. Climate Watch

Source: OurWorldInData.org/co2-and-other-greenhouse-gas-emissions · CC BY

*Crippa et al. (2021) include emissions from a number of non-food agricultural products, including wool, leather, rubber, textiles and some biofuels. Poore and Nemecek (2018) do not include non-food products in their estimate of 13.6 billion tonnes CO₂e. This may explain some of the difference.

Data sources: Joseph Poore & Thomas Nemecek (2018). Reducing food's environmental impacts through producers and consumers. *Science*. Crippa, M., et al. (2021) Food systems are responsible for a third of global anthropogenic GHG emissions. *Nature Food*.



Plant-based food

Eating a diet full of a range of veg, fruit, pulses and whole grains is a great way to ensure you're eating in a healthy and climate-friendly way.

Red meat



ONE PORTION A WEEK

Red meat can have a large impact on your health and on the Planet if you eat it too much.

Pulses and legumes



MAKE THEM THE STAR OF YOUR MEAL

They are versatile, sustainable, high in fibre and low in fat, salt and sugar.

Add variety

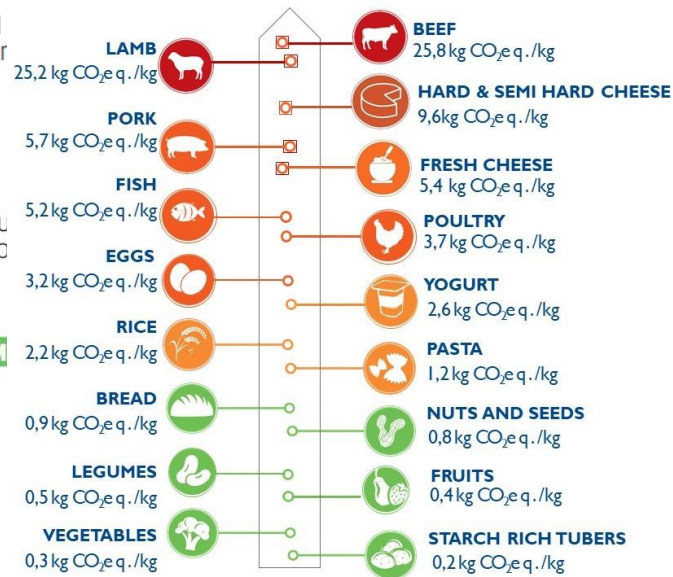


UP TO THREE TIMES A WEEK



UP TO TWICE A WEEK

Fish, poultry, eggs and cheese have a lower impact on the Planet than red meat.



Do European citizens eat sustainably and healthy?

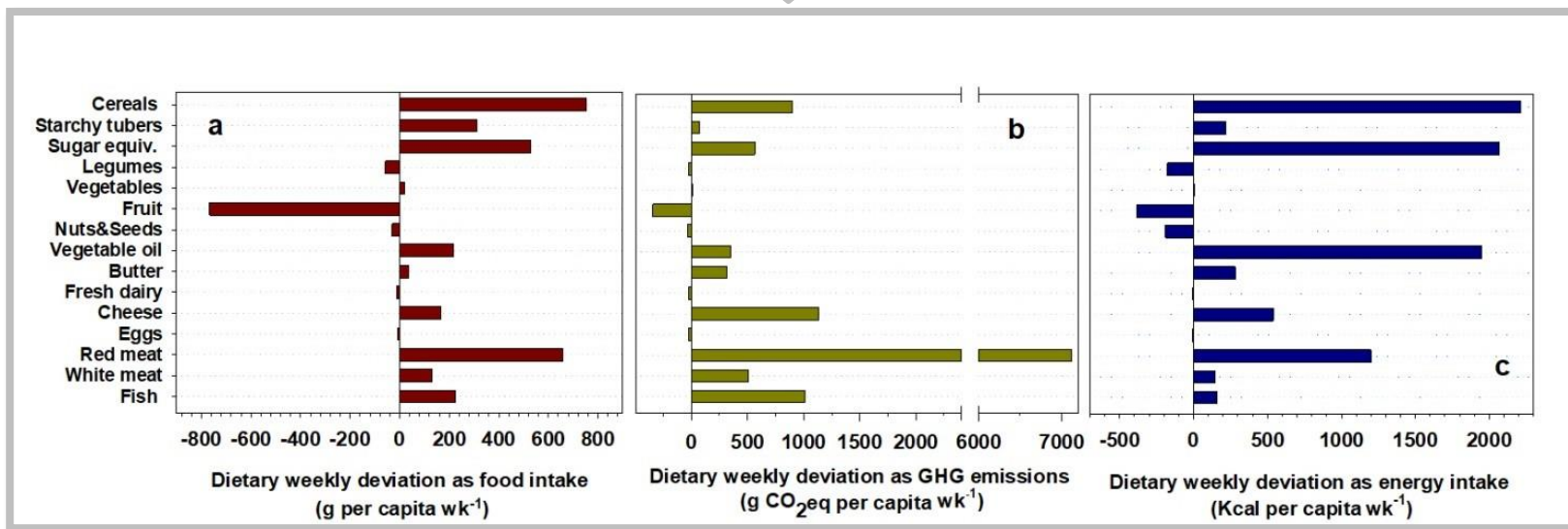


(Castaldi et al. in review)

Ideal daily average
GHG emission per capita
2.3 kg CO₂eq.

Daily GHG excess
2.2 kg CO₂eq.
(0,77 tons CO₂eq. yr⁻¹)

Real daily average
GHG emission per capita
4.5 kg CO₂eq



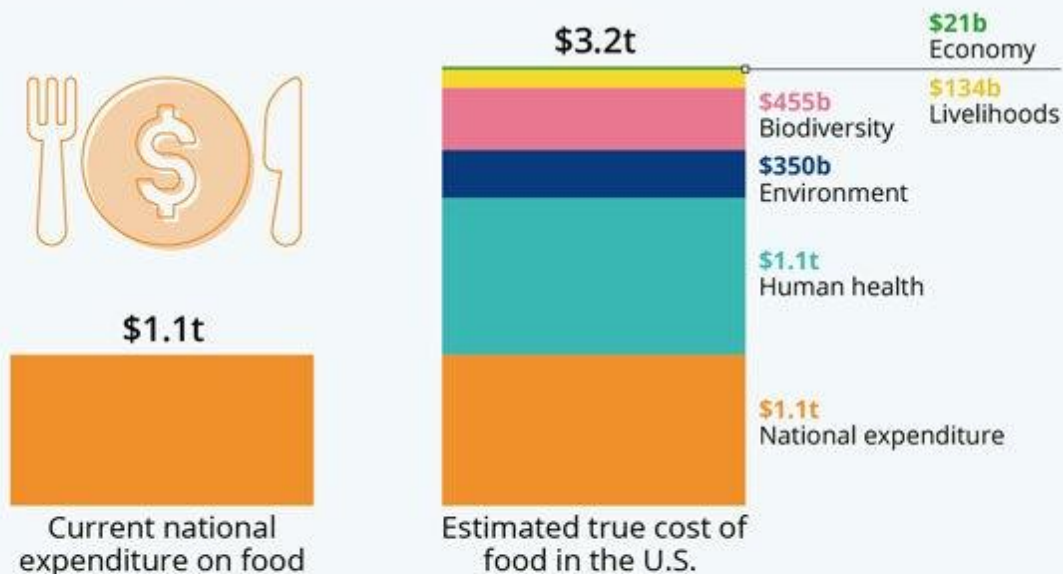


WHAT IS THE FOOD PRICE ?



The True Cost Of Food Is Three Times What Americans Pay For it

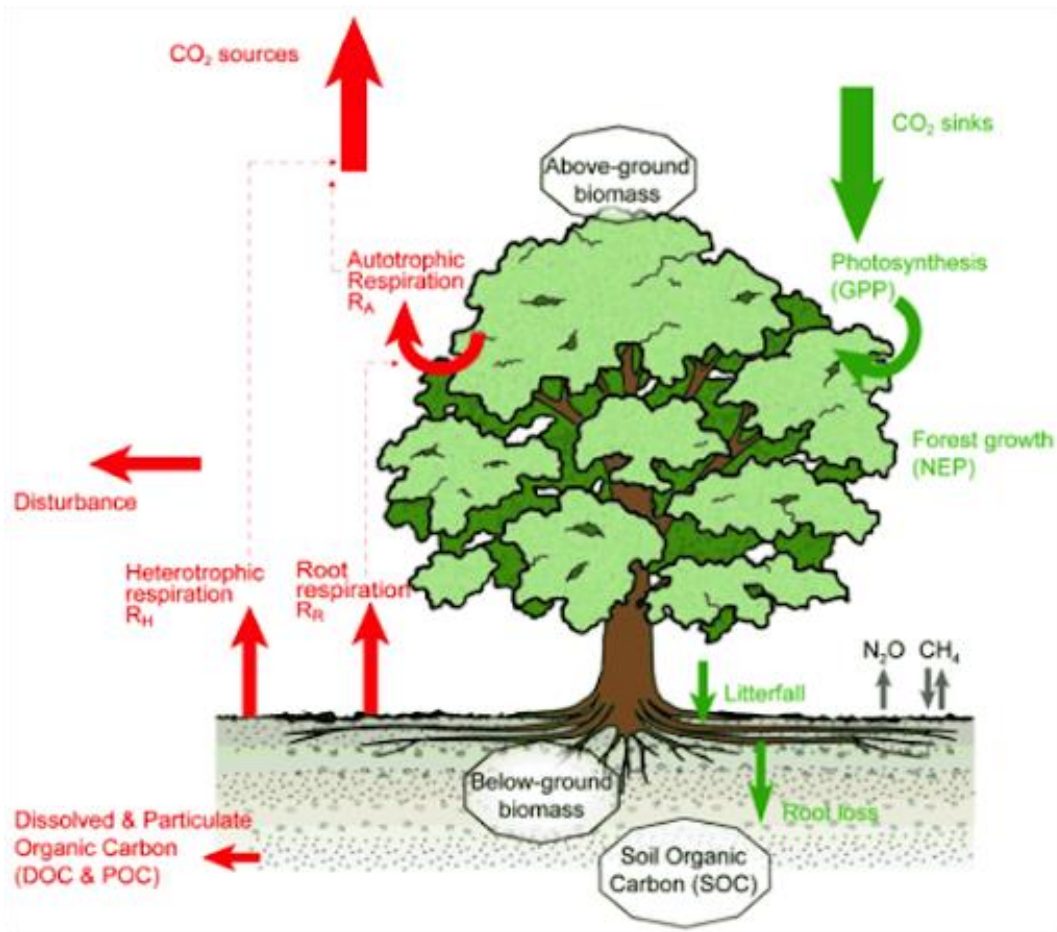
National annual U.S. food expenditure and its estimated true cost as of 2021*



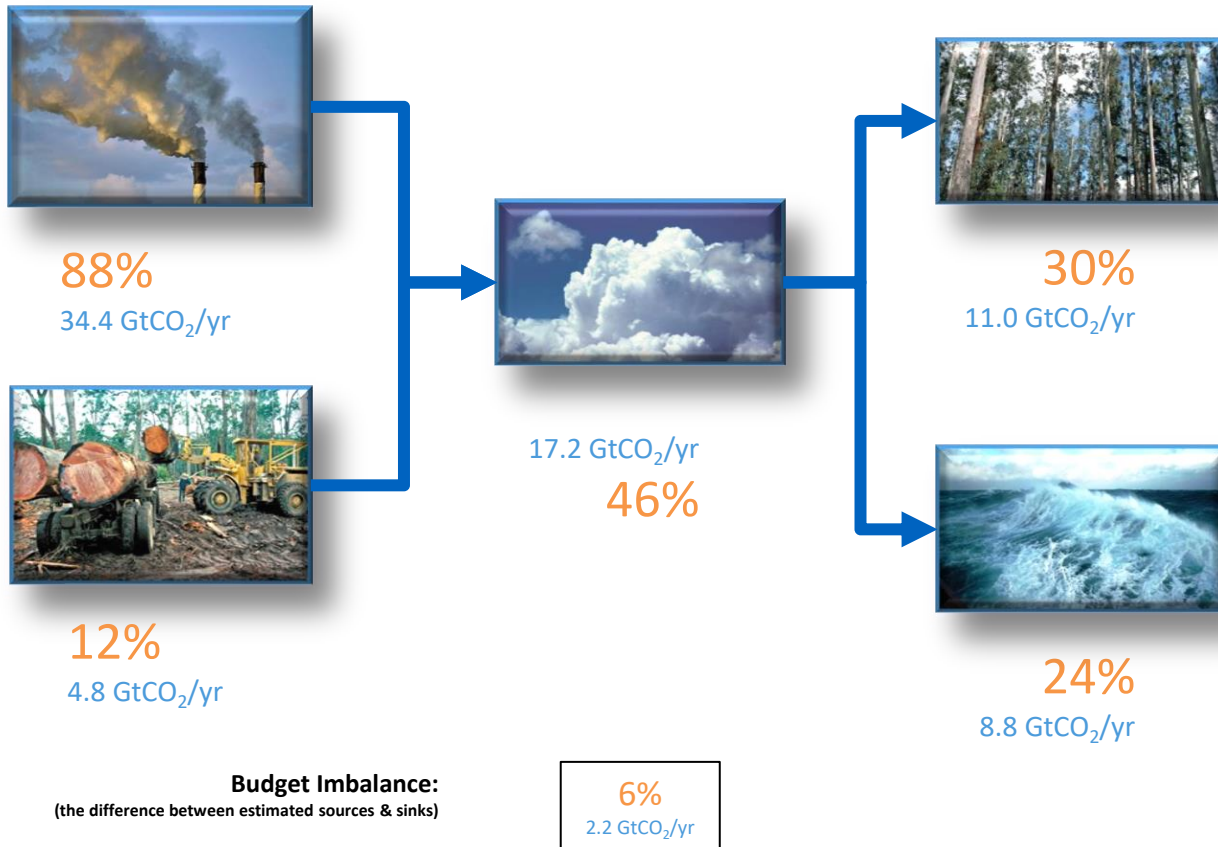
* True cost includes hidden factors such as health, environmental and economic impact of the U.S. food system.

Source: The Rockefeller Foundation

Carbon sequestration by forests



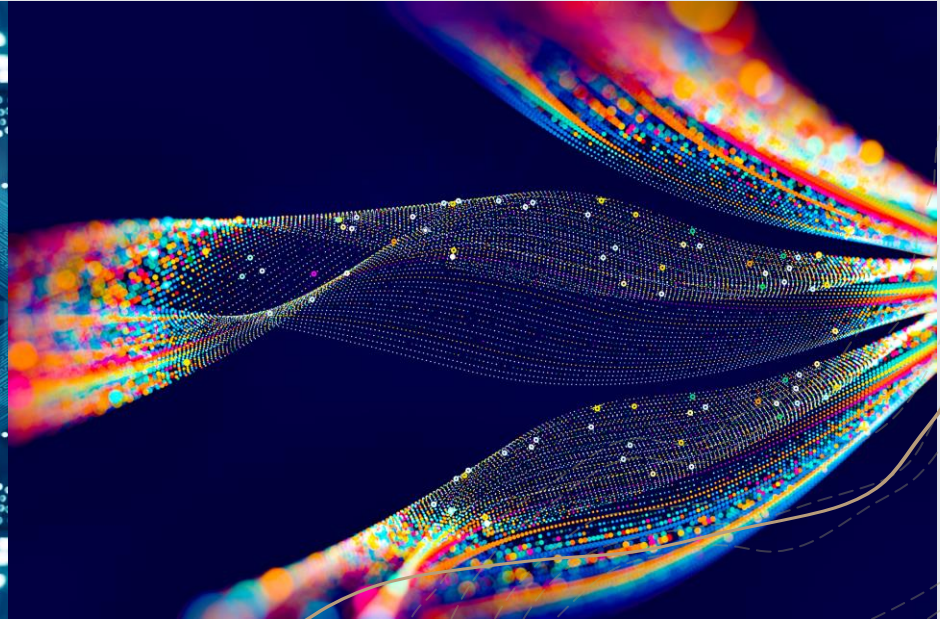
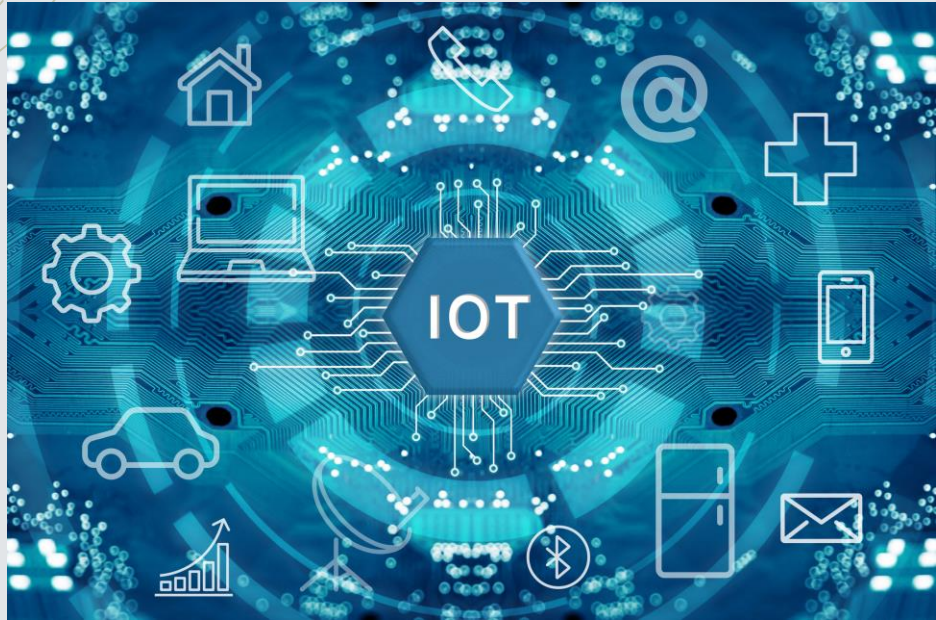
Fate of anthropogenic CO₂ emissions (2007–2016)



Budget Imbalance:
(the difference between estimated sources & sinks)

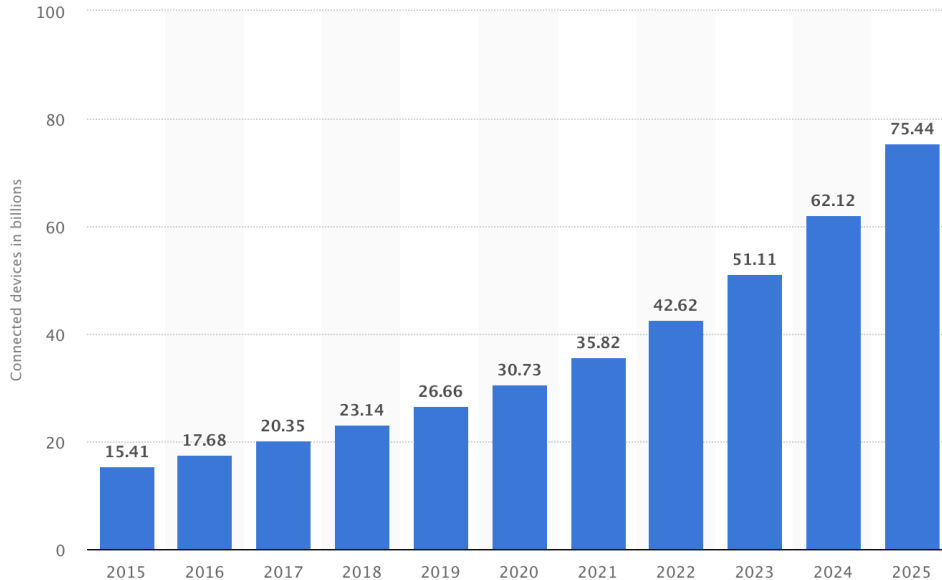
6%
2.2 GtCO₂/yr

From INDUSTRY 4.0 to NATURE4.0



Technology & Telecommunications > Consumer Electronics > Internet of Things - number of connected devices worldwide 2015-2025

Internet of Things (IoT) connected devices installed base worldwide from 2015 to 2025 (in billions)



DOWNLOAD SETTINGS SHARE



PNG



PDF



XLS

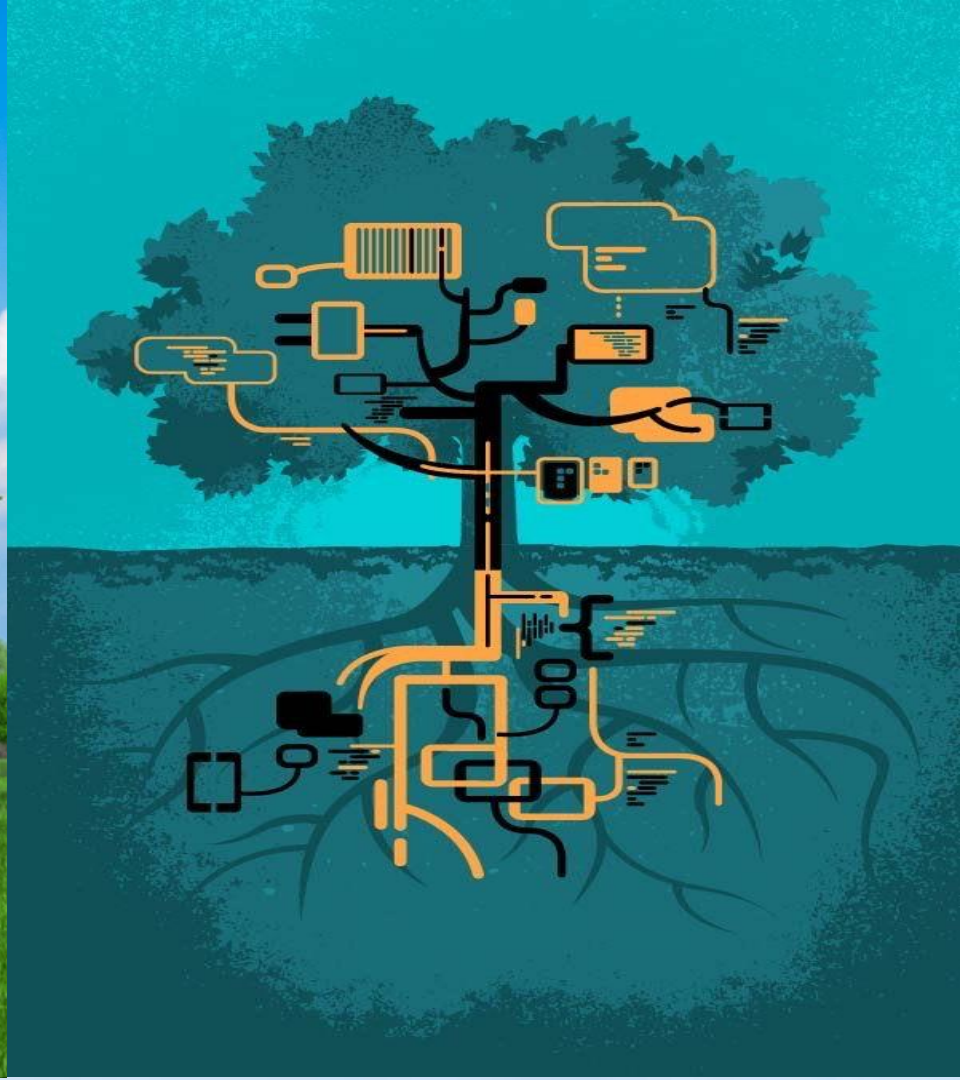


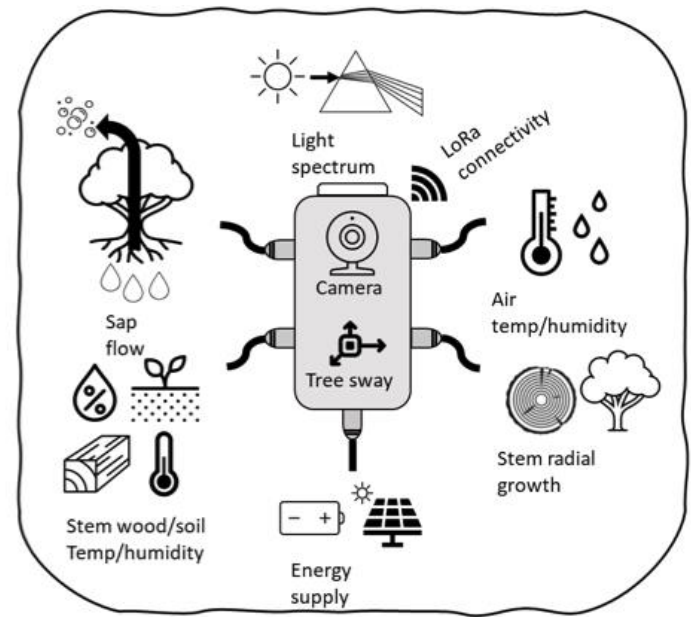
PPT

DESCRIPTION SOURCE MORE INFORMATION

This statistic shows the number of connected devices (Internet of Things; IoT) worldwide from 2015 to 2025. For 2020, the installed base of Internet of Things devices is forecast to grow to almost 31 billion worldwide. The [overall Internet of Things market](#) is projected to be worth more than one billion U.S. dollars annually from 2017 onwards.





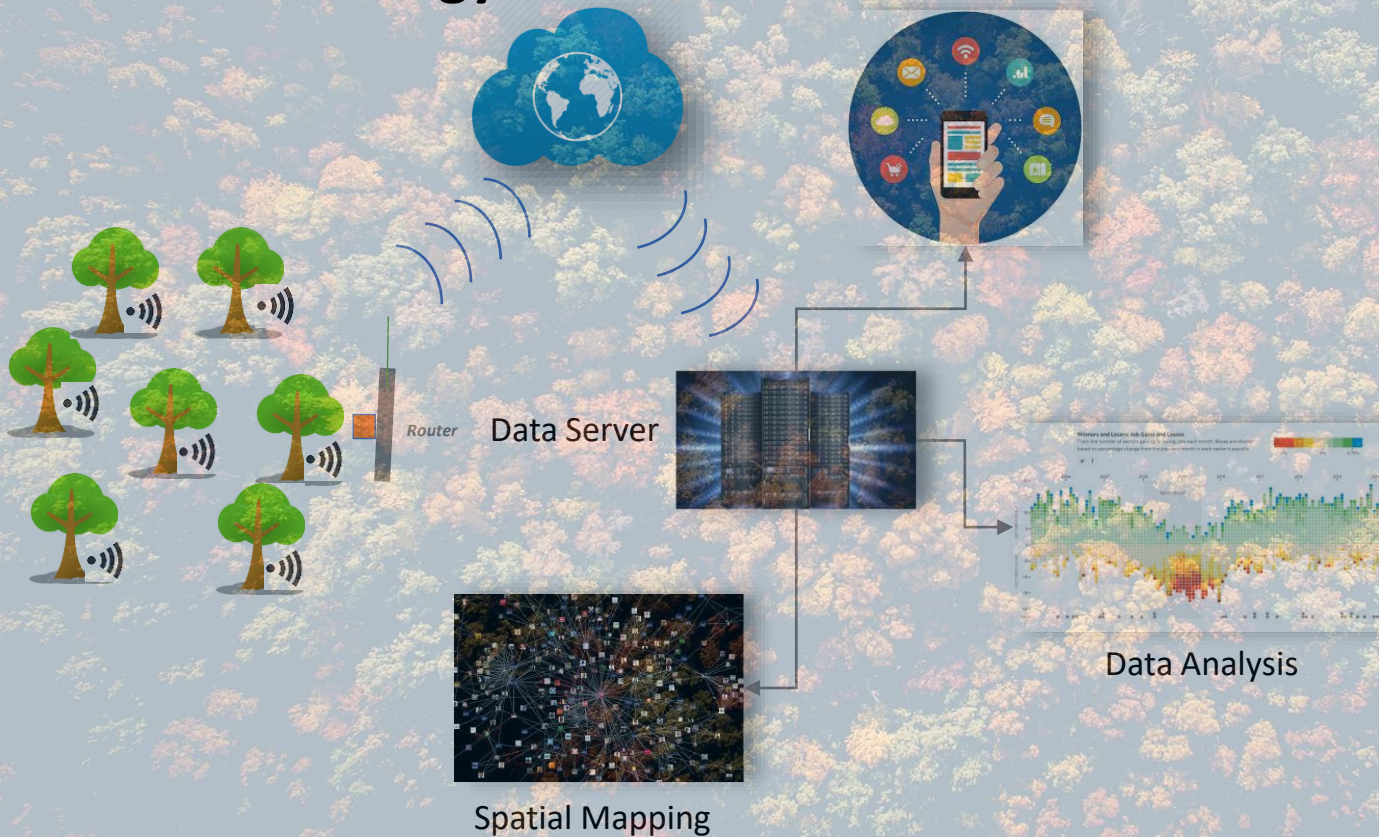


THE TREETALKER

The Network

LoRa Technology

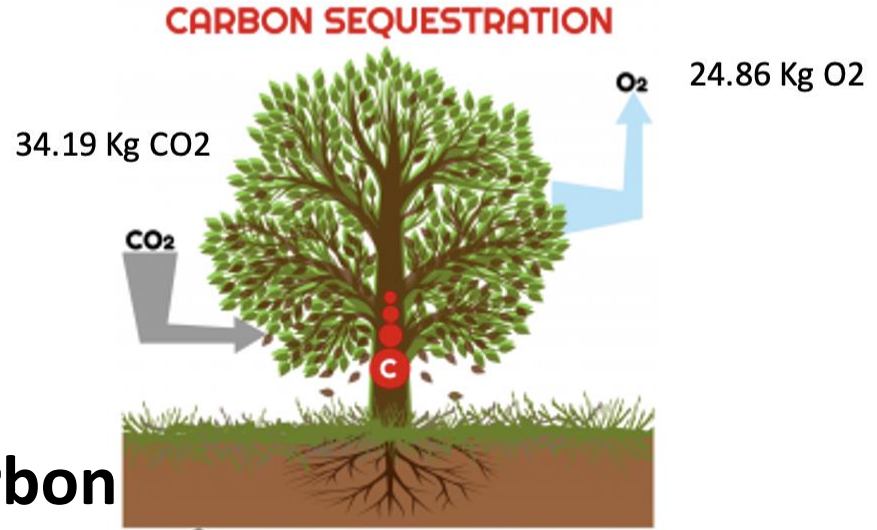
Dedicated APPS and WEB visualization



The MonteRe Plum Tree



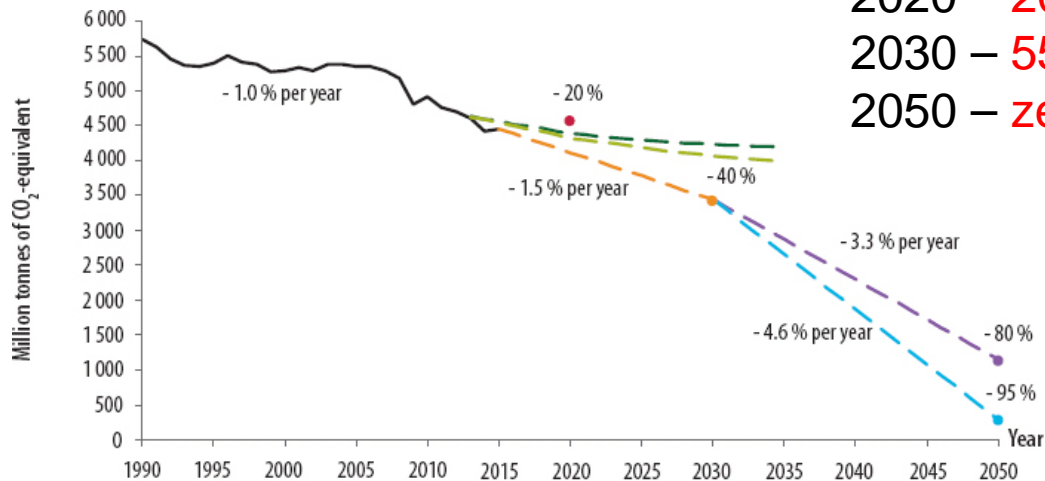
TreeTalker - carbon



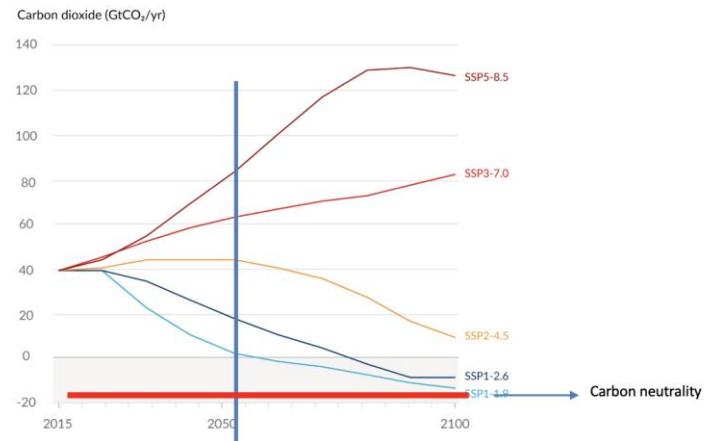
- ✓ Carbon Dioxide is absorbed by trees.
- ✓ Trees capture and store Carbon.
- ✓ Oxygen is released back into the air.

Il cammino EU verso la neutralità

2020 – 20% since 1990 → 23%
 2030 – 55 % since 1990 → Paris agreement
 2050 – zero net emission



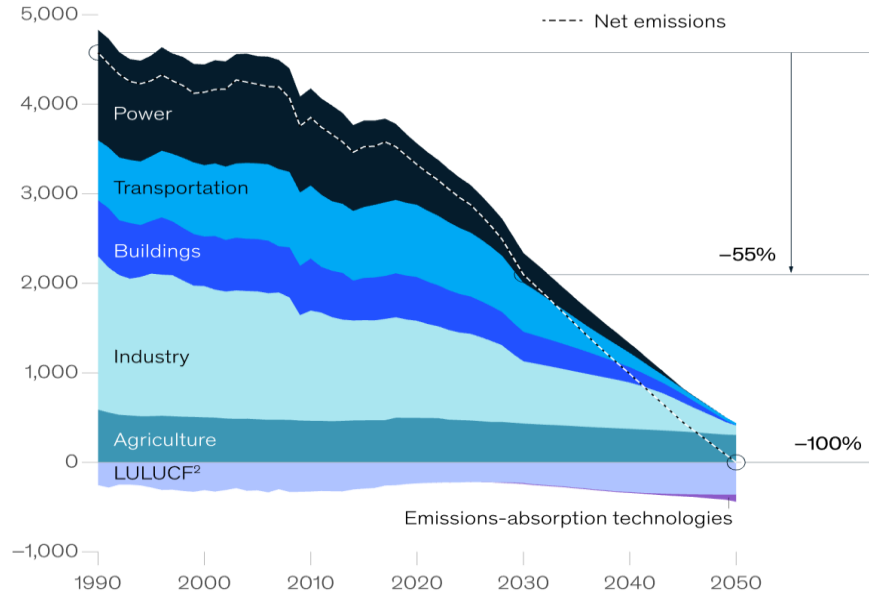
- Historic greenhouse gas emissions
- Projections 'with existing measures'
- Projections 'with additional measures'
- 2020 target (-20% vs 1990)
- 2030 target (-40% vs 1990)
- 2050 objective (-80% vs 1990)
- 2050 objective (-95% vs 1990)
- Effort needed to reach 2030 target
- Effort needed to reach 2050 objective (-80%)
- Effort needed to reach 2050 objective (-95%)



The «resistent» Agricultural sector

The power sector would reach net-zero emissions before the others.

Total emissions per sector in cost-optimal pathway for EU-27,¹ megatons of carbon dioxide equivalent



¹Excluding international aviation and shipping.

²Land use, land-use change, and forestry entails all forms in which atmospheric CO₂ can be captured or released as carbon in vegetation and soils in terrestrial ecosystems.

Source: UNFCCC; McKinsey analysis

I numeri del carbon farming

ATTUALE EUROPA settore LULUCF **255** Mt CO₂

IMPEGNO EUROPA 2030 ---→ **310** Mt CO₂ (diff 55 Mt CO₂)

IMPEGNO EUROPA 2050 ----→ **425** Mt CO₂ (diff 70 Mt CO₂)

ATTUALE ITALIA settore LULUCF **32** Mt CO₂

IMPEGNO ITALIA 2030 -----→ **35** Mt CO₂ (diff 3MtCO₂)

IMPEGNO ITALIA 2050 (stima) -→ **40** Mt CO₂ (diff 8Mt CO₂)

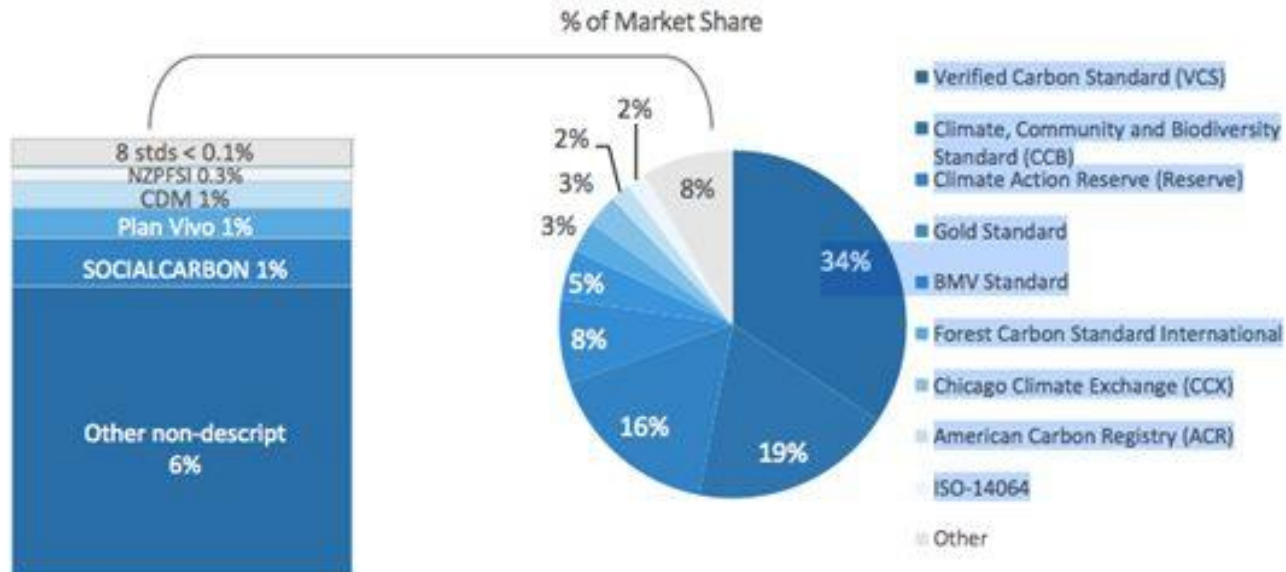


EUA (EU ETS) Futures Prices



Valore LULUCF sink Europa **17 Miliardi Euro** (50% del prezzo ETS)
Valore LULUCF sink Italia **1.6 Miliardi di Euro**

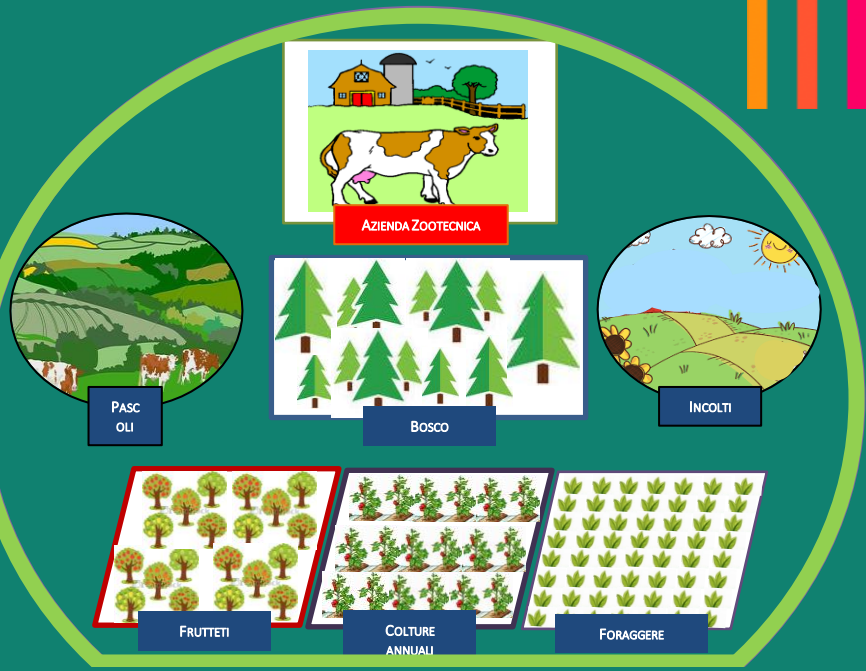
Voluntary market



Source: Ecosystem Marketplace, Bloomberg New Energy Finance.

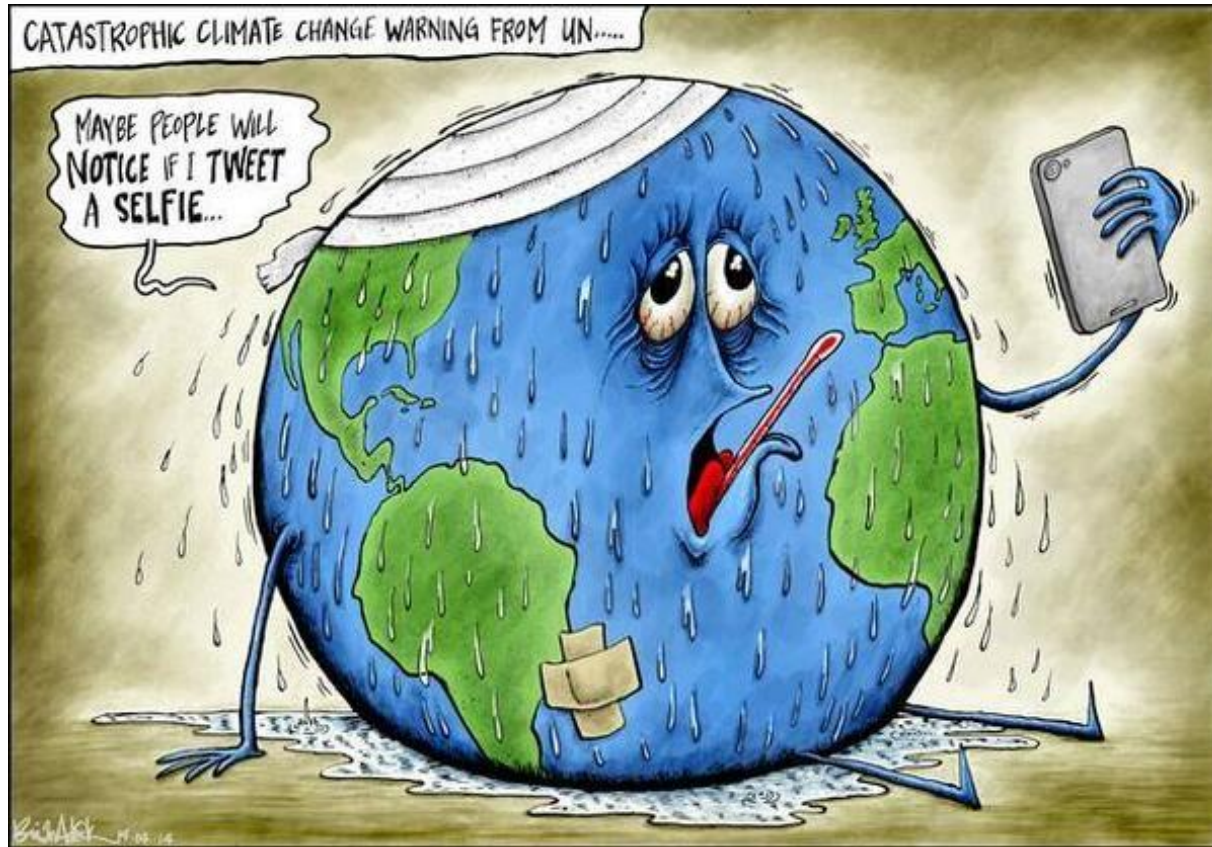
Note: Based on 676 observations.

Manca uno standard certificazione italiano



DISTRETTO AGRICOLO-FORESTALE:

- Nucleo con continuità territoriale
- Vocazione agricola-forestale
- Forte componente zootecnica
- Possibilità di espansione nel tempo
- Presenza di una Cabina di Regia in cui partecipa un'istituzione pubblica (es. Regione, Comune, etc.)



Grazie !!!