

# Inovar e Criar Valor

pela via da



# Sustentabilidade

Vergílio Folhadela

The geology of the planet

# Welcome to the Anthropocene

Humans have changed the way the world works. Now they have to change the way they think about it, too

May 26th 2011, 10:46 | From the print edition



May 26th 2011

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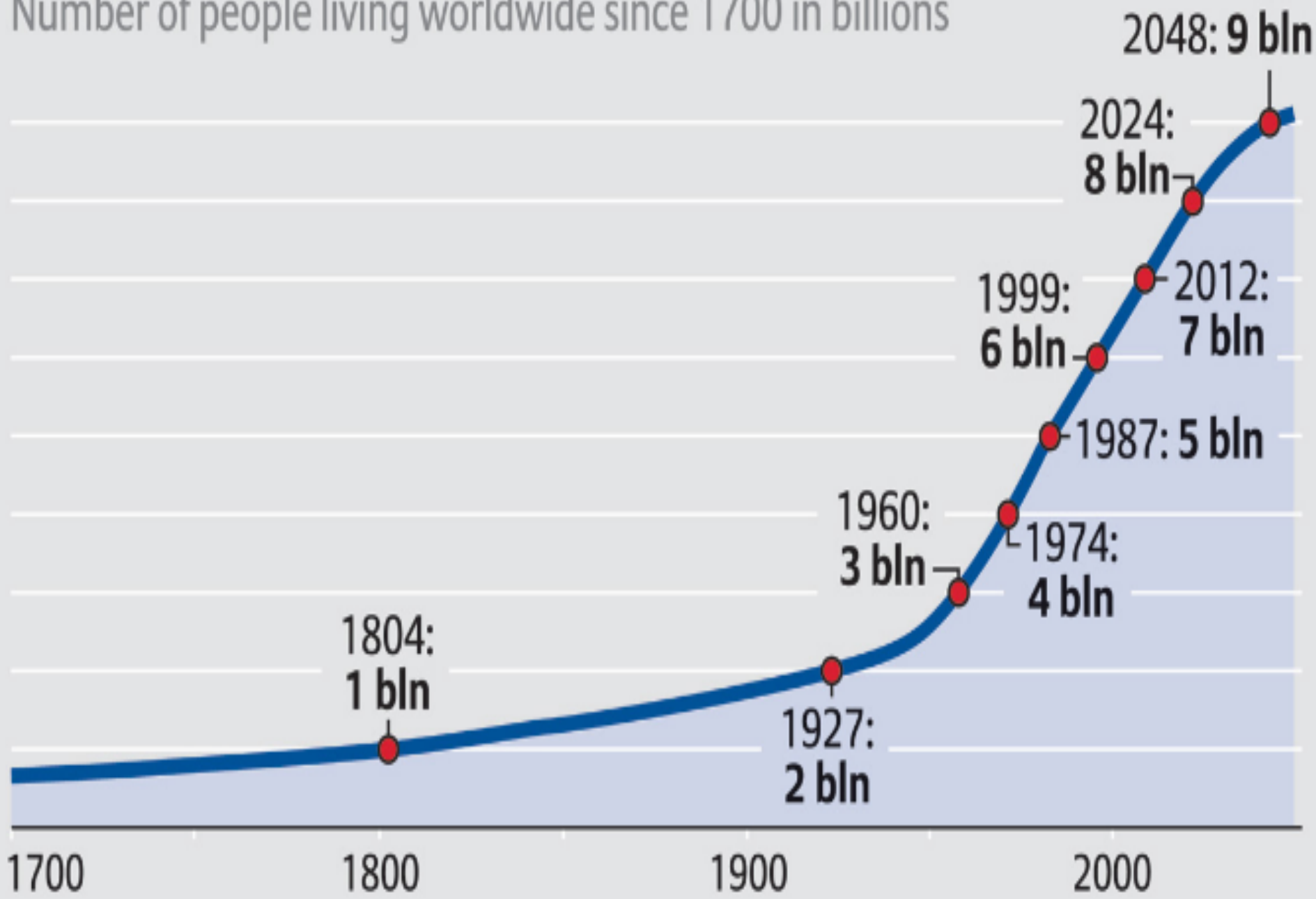
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Jon Berkeley

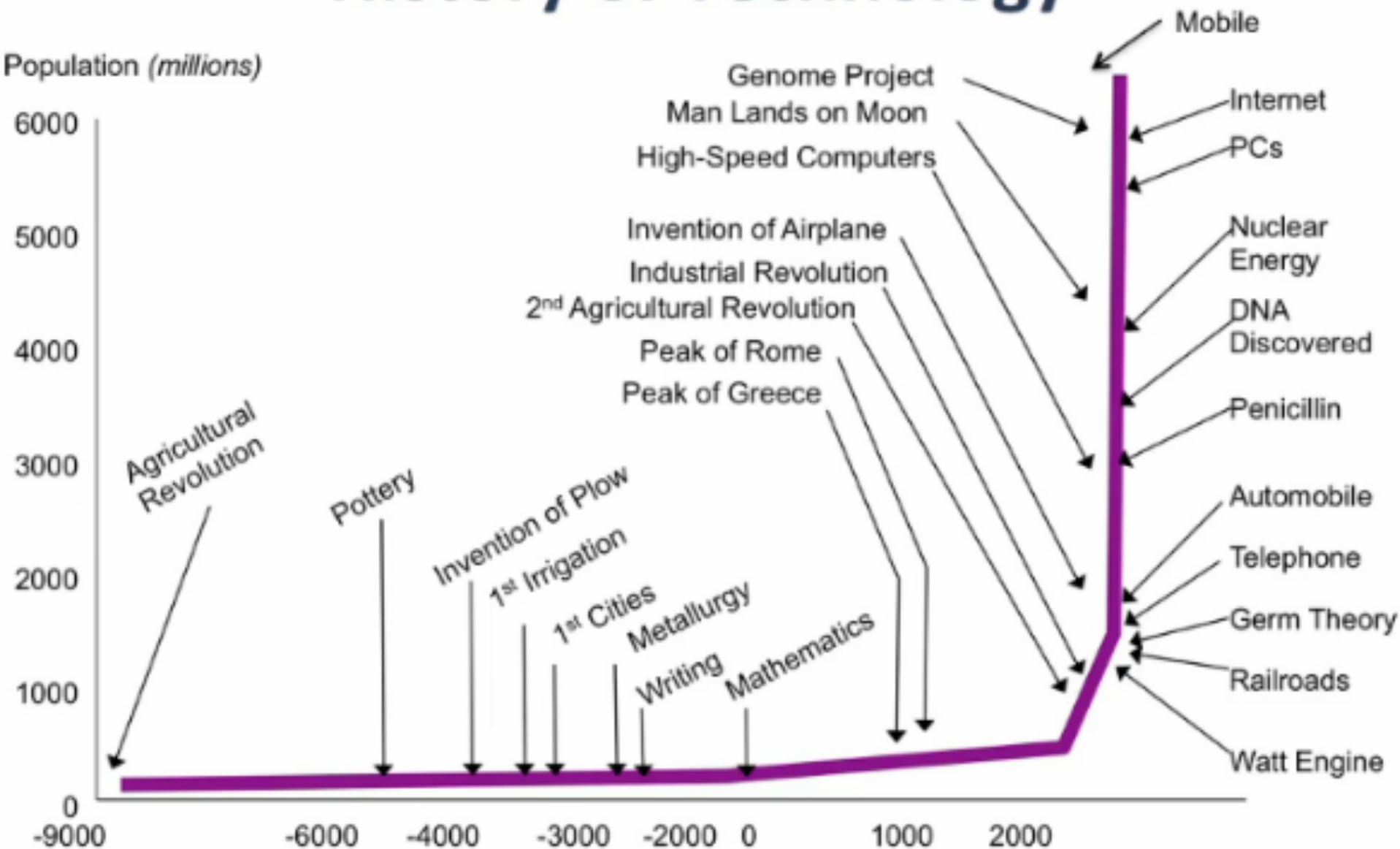
THE Earth is a big thing; if you divided it up evenly among its 7 billion inhabitants, they would get almost 1 trillion tonnes each. To think that the workings of so vast an entity could be lastingly changed by a species that has been scampering across its surface for less than 1% of 1% of its history seems, on the face of it, absurd. But it is not. Humans have become a force of nature reshaping the planet on a geological scale—but at a far-faster-than-geological speed.

# Number of people living worldwide since 1700 in billions

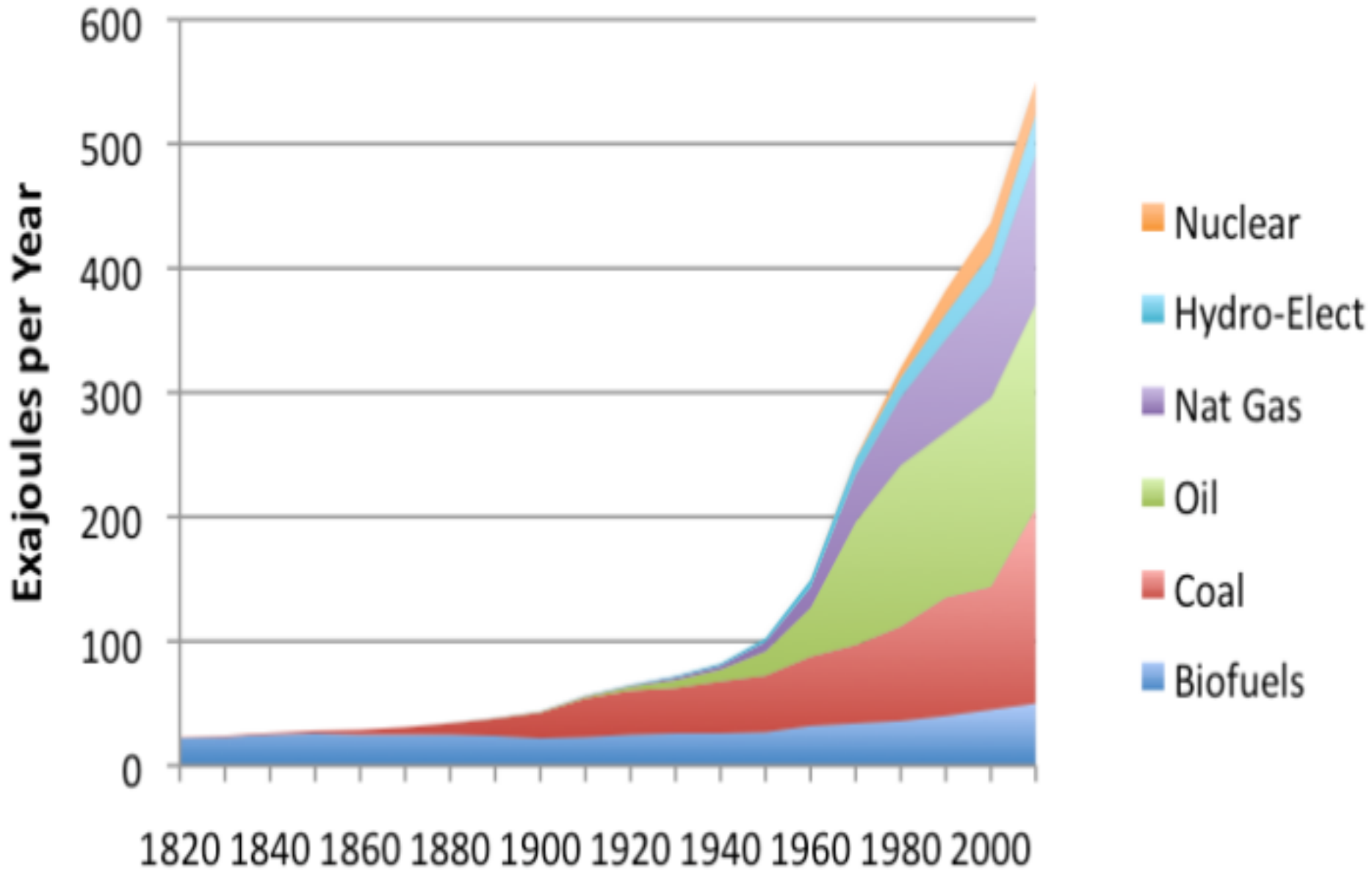


Source: United Nations World Population Prospects, Deutsche Stiftung Weltbevölkerung

# Growth of World Population and the History of Technology

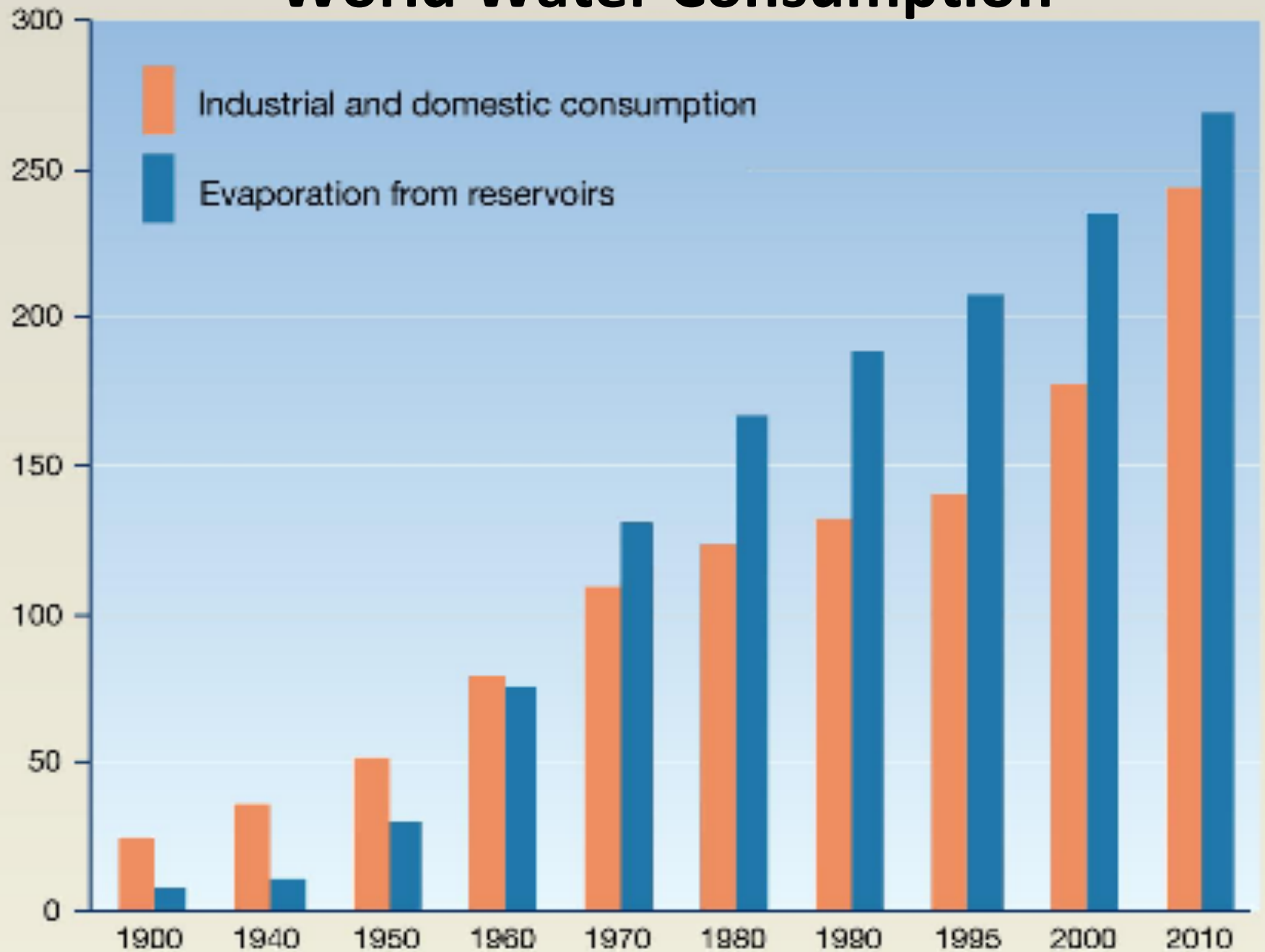


# World Energy Consumption



# World Water Consumption

km<sup>3</sup> per year



# World Water Consumption

Cubic km per year

Forecast

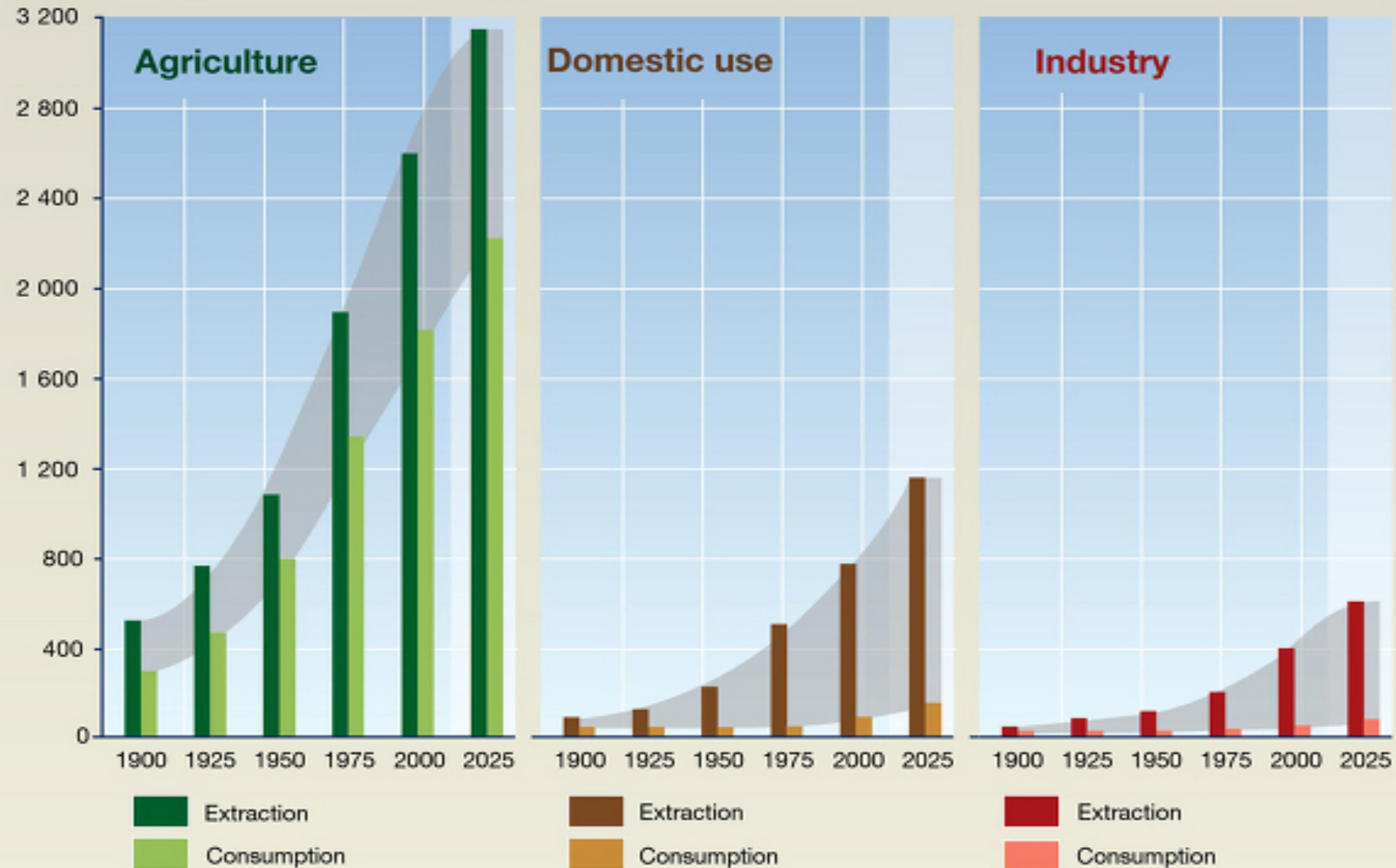
Forecast

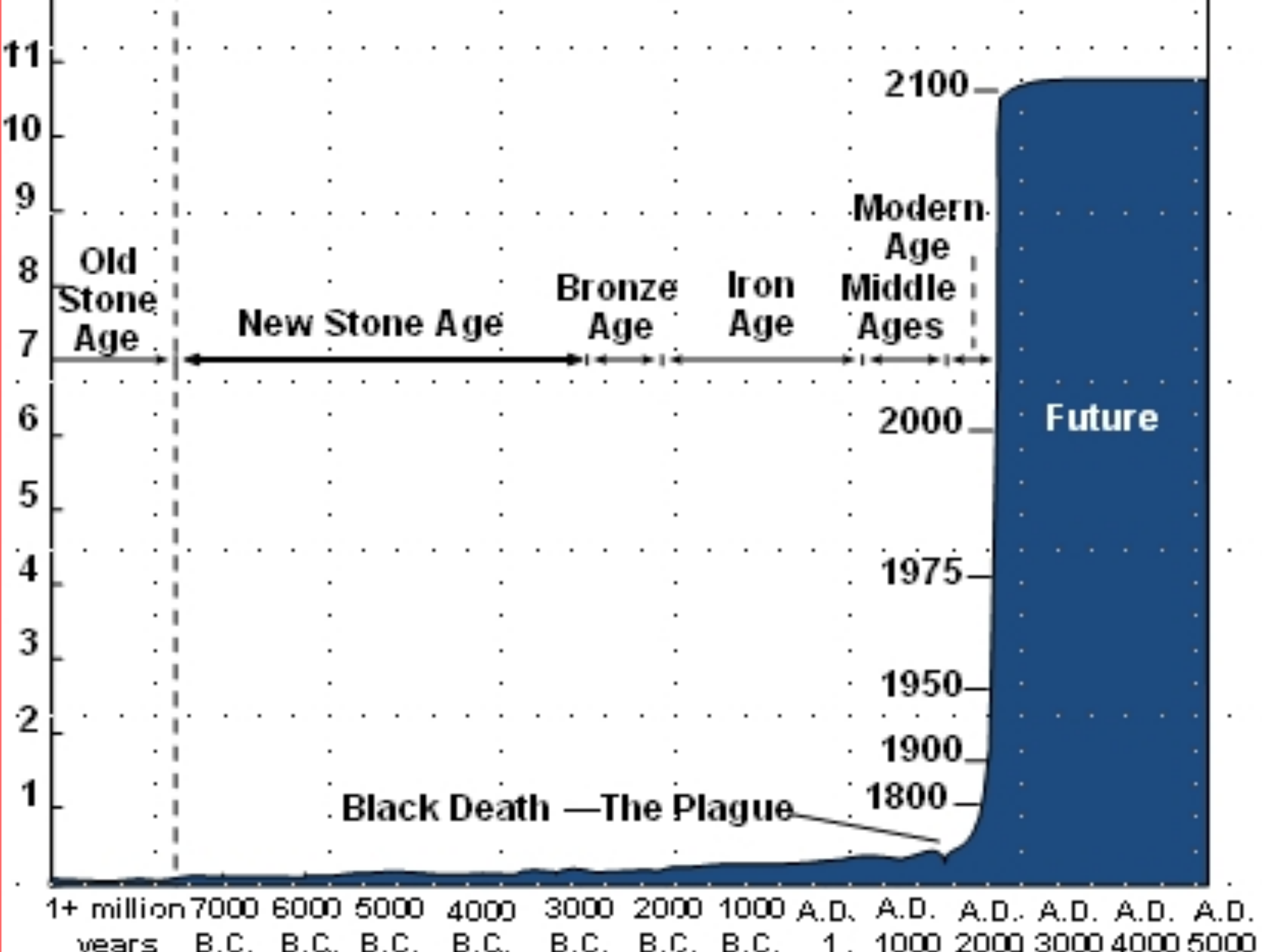
Forecast

## Agriculture

## Domestic use

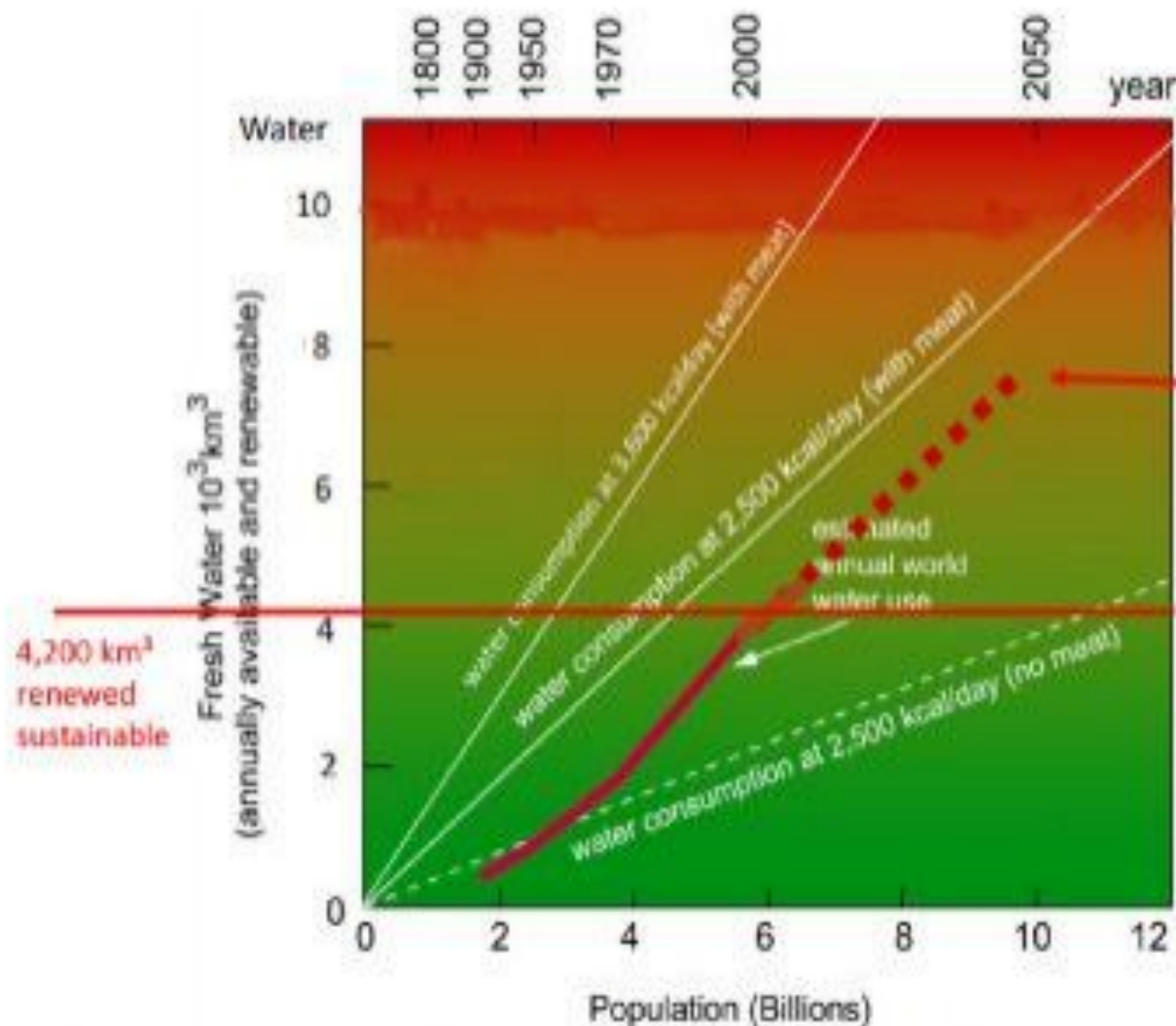
## Industry







# Global water withdrawals, population and diet: scenario 2050... We have a problem!



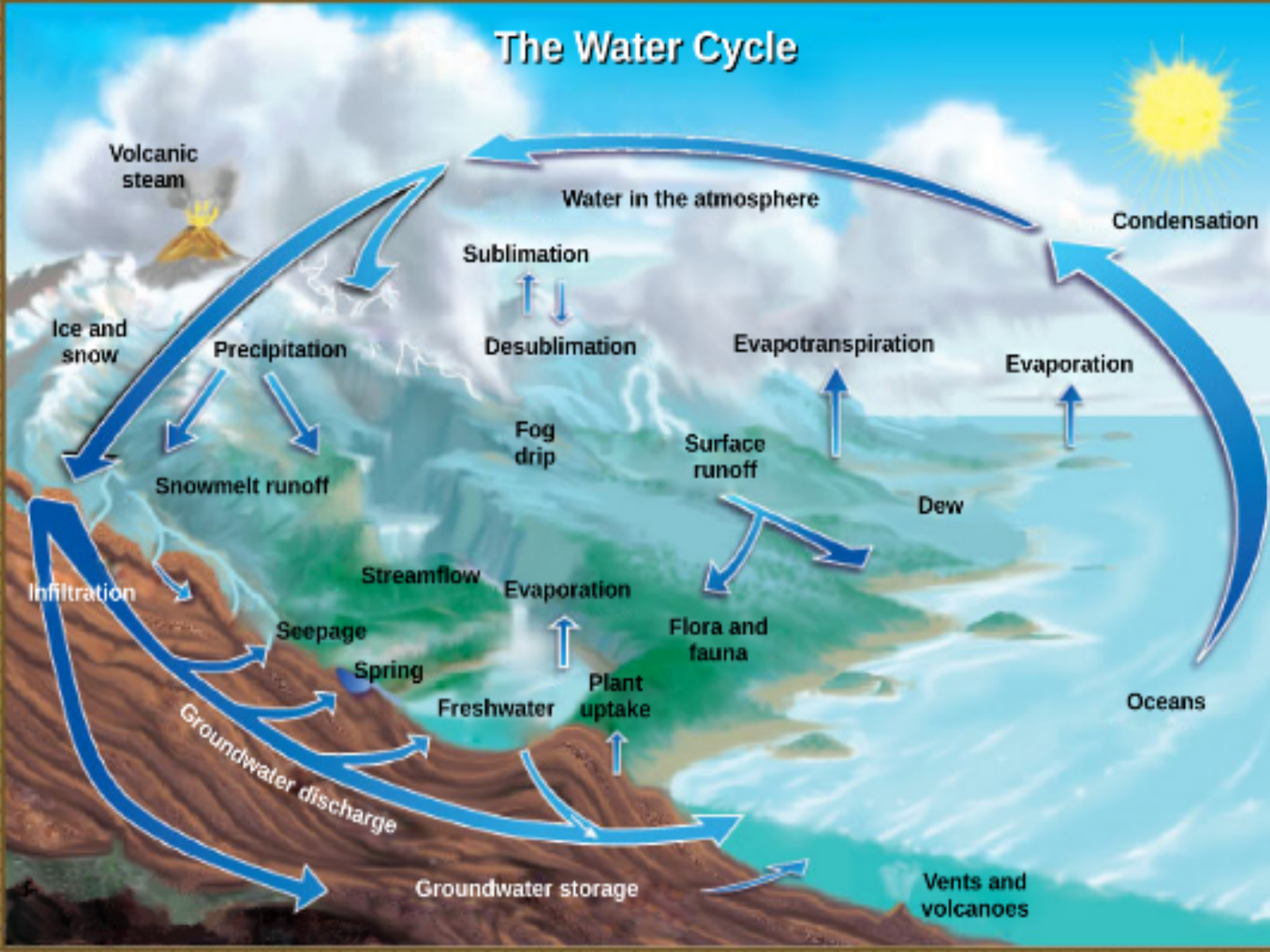
World water withdrawals: actual and scenario 2050

Source: A. Zehnder, Swiss Federal Institute of Aquatic Science and Technology ETHZ 1999 and 2030 Water Resources Group

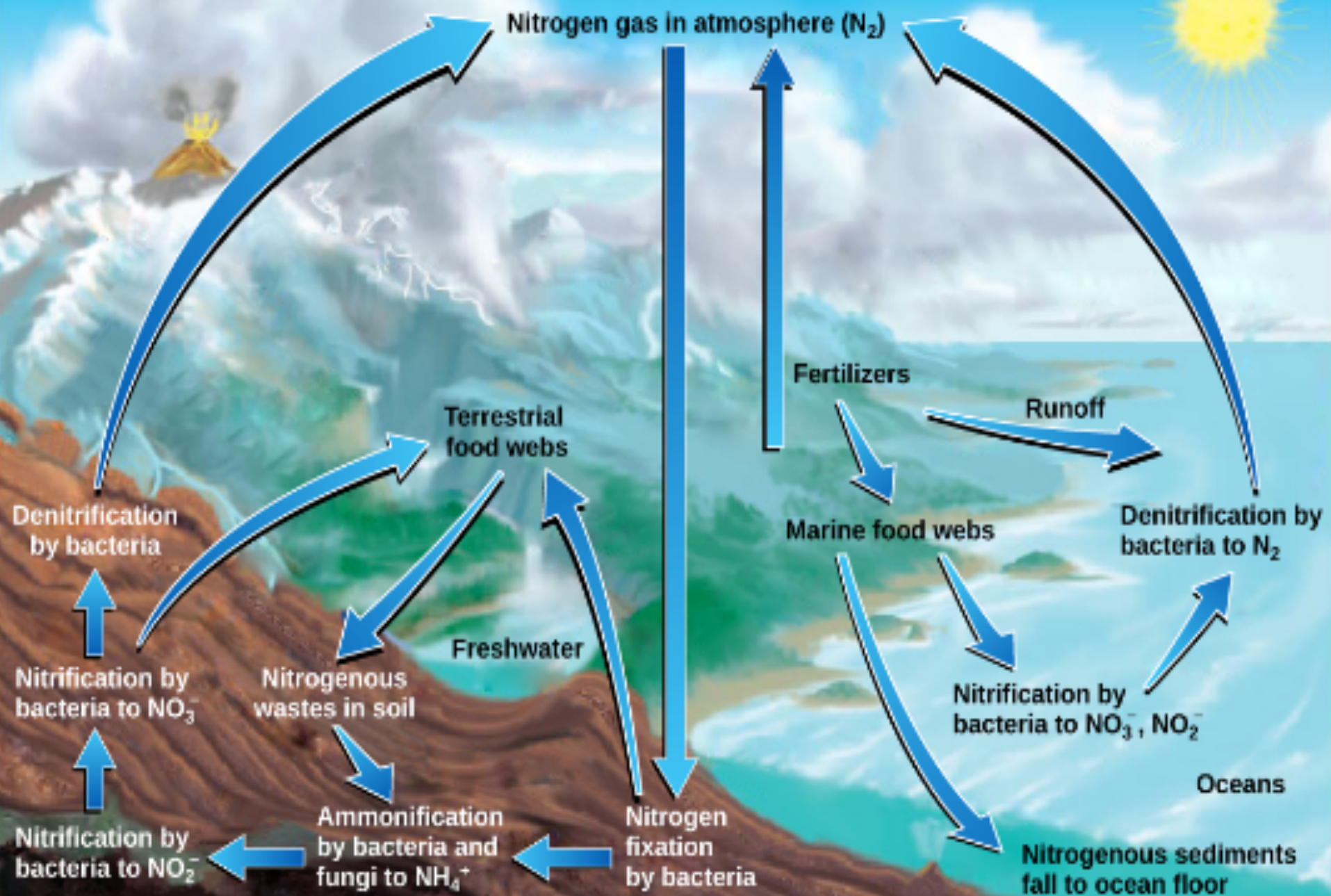
Outlook: Falkenmark/Lannerstadt: Consumptive water use to feed humanity – curing a blind spot; in: Hydrology and Earth System Sciences, 9.2005, pp 15-28 (published by European Geoscience Union) and Shiklomanov 1999



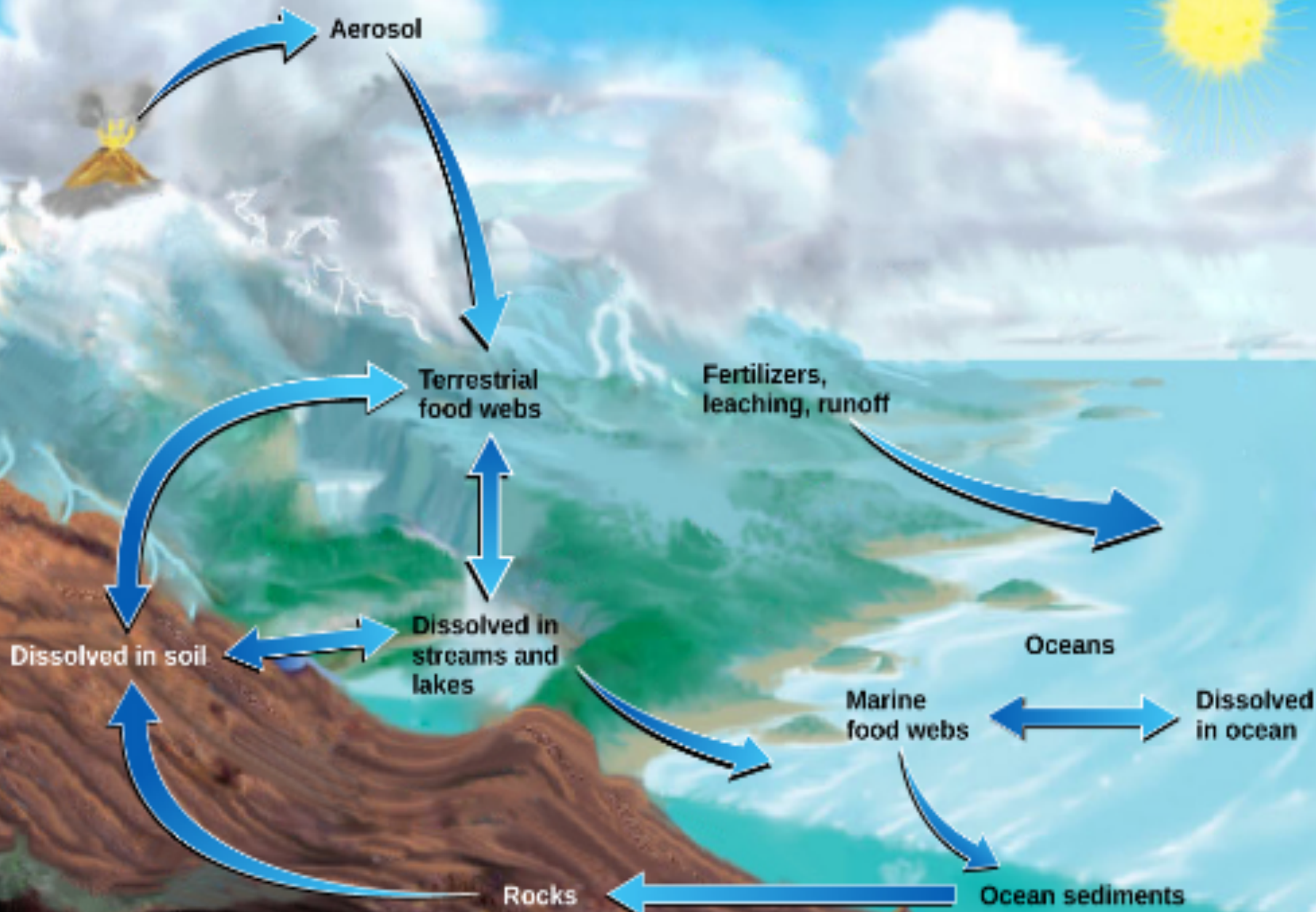
# The Water Cycle



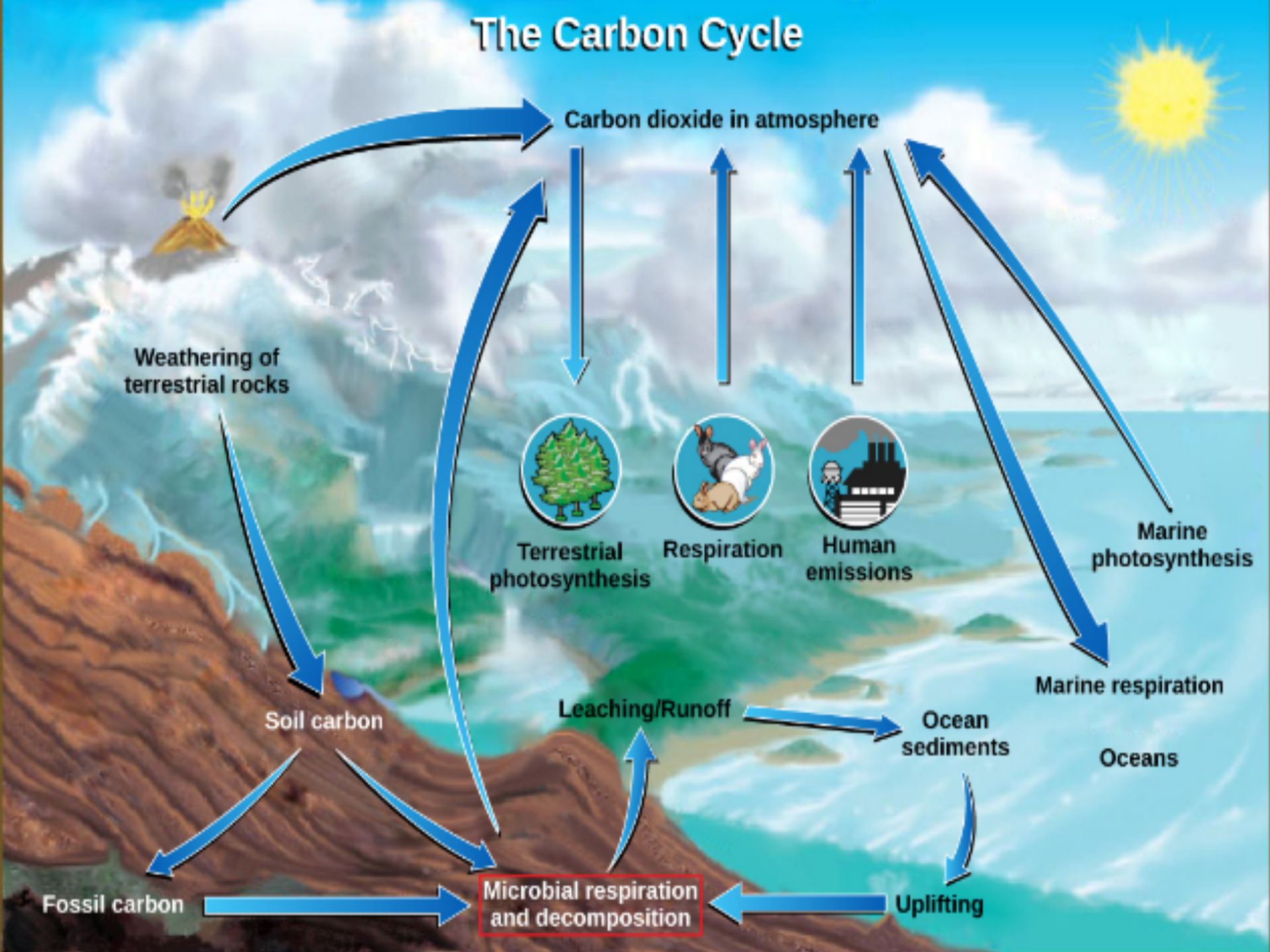
# The Nitrogen Cycle

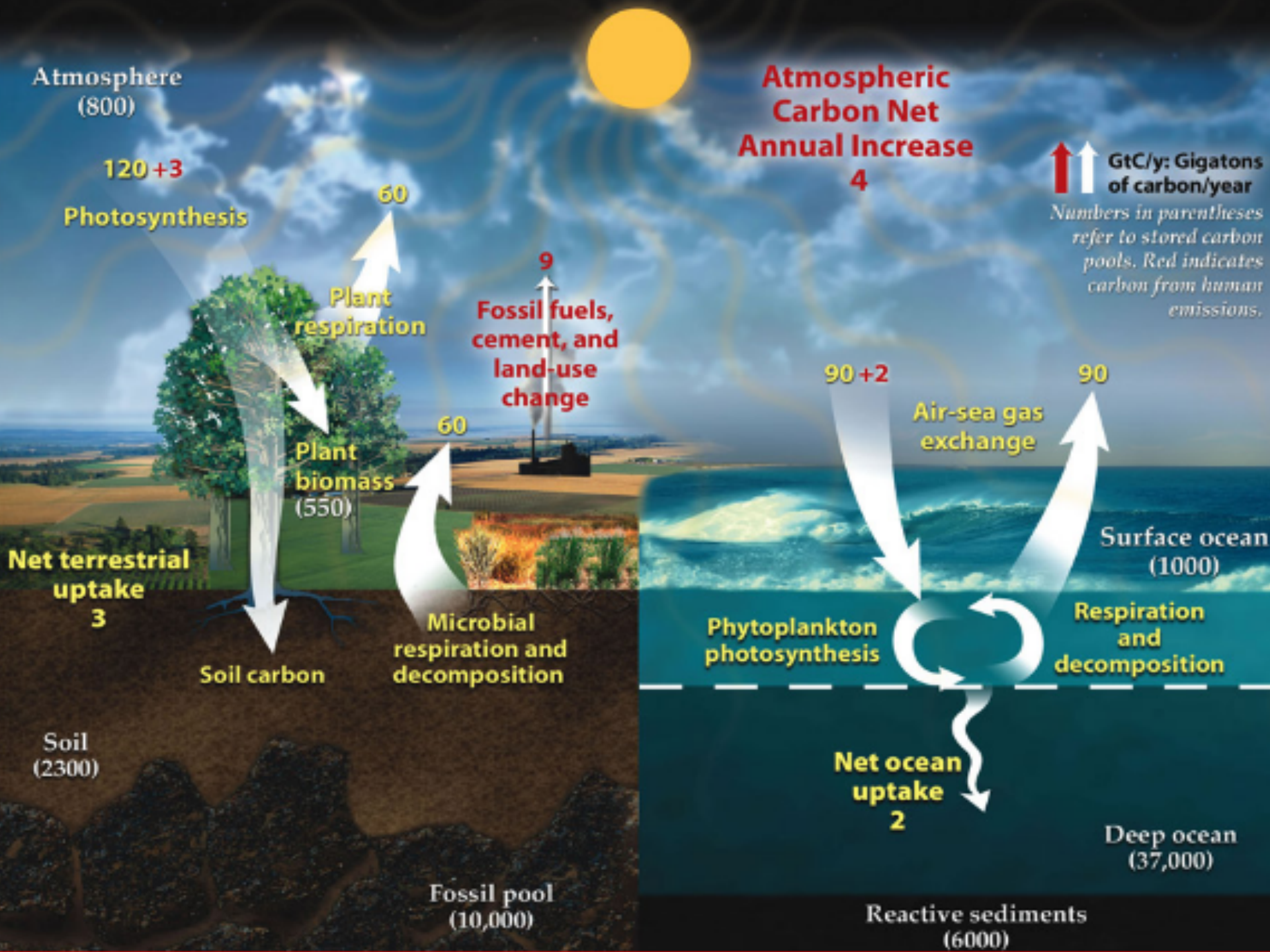


# The Phosphorus Cycle



# The Carbon Cycle





Atmosphere  
(800)

**Atmospheric  
Carbon Net  
Annual Increase**  
4

↑↑ GtC/y: Gigatons  
of carbon/year

*Numbers in parentheses  
refer to stored carbon  
pools. Red indicates  
carbon from human  
emissions.*

120 + 3

**Photosynthesis**

60

**Plant  
respiration**

9

**Fossil fuels,  
cement, and  
land-use  
change**

**Plant  
biomass**  
(550)

60

**Microbial  
respiration and  
decomposition**

90 + 2

**Air-sea gas  
exchange**

90

**Surface ocean**  
(1000)

**Phytoplankton  
photosynthesis**

**Respiration  
and  
decomposition**

**Net terrestrial  
uptake**  
3

**Soil carbon**

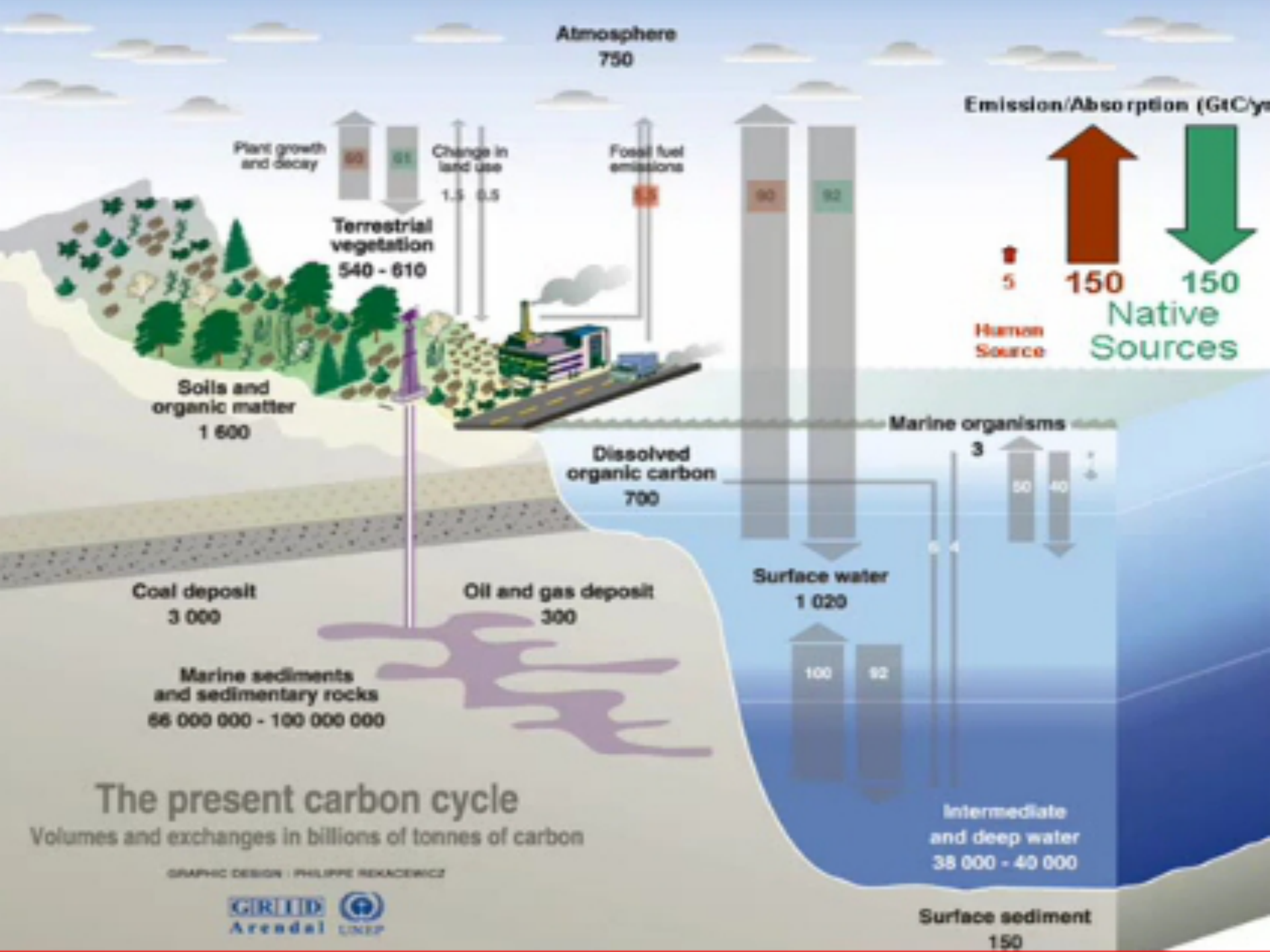
**Net ocean  
uptake**  
2

**Soil**  
(2300)

**Deep ocean**  
(37,000)

**Fossil pool**  
(10,000)

**Reactive sediments**  
(6000)



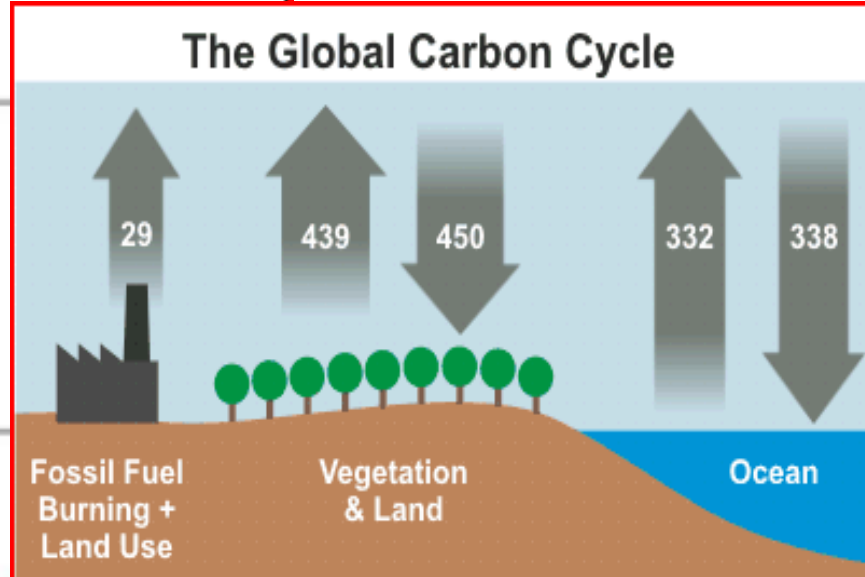
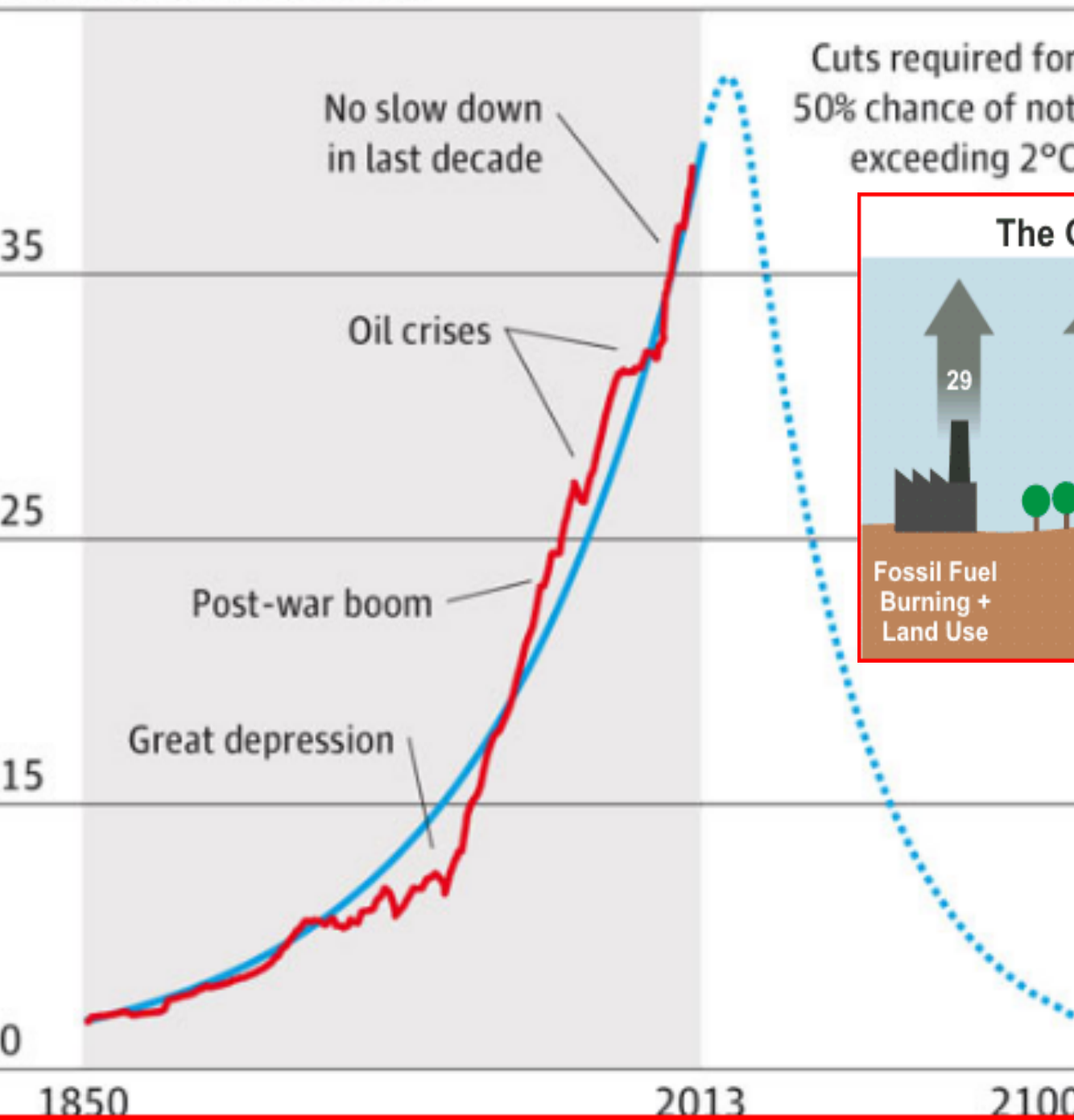
## The present carbon cycle

Volumes and exchanges in billions of tonnes of carbon

GRAPHIC DESIGN | PHILIPPE REKACEWICZ



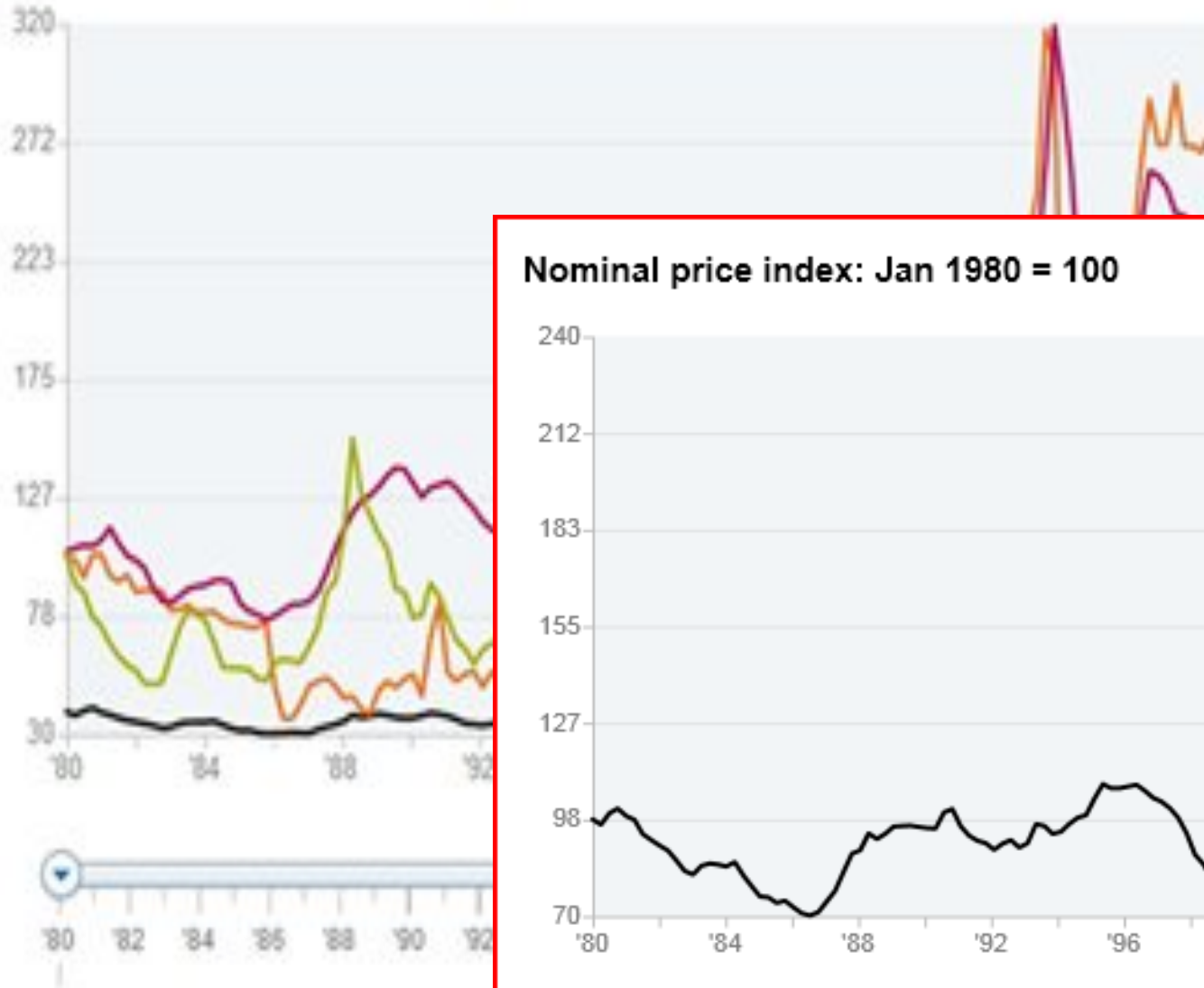
# 45 Billion tonnes of CO2



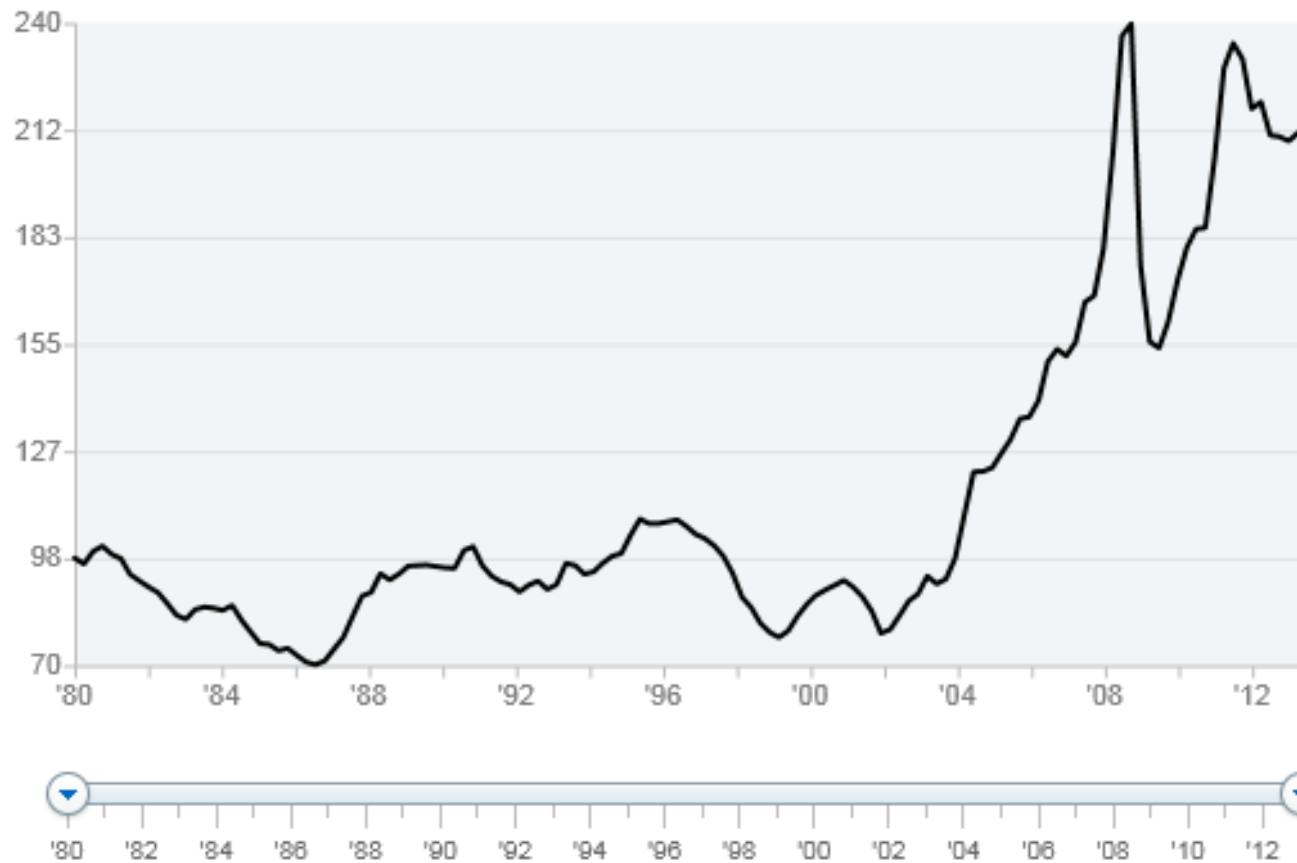
# Nominal price index: Jan 1980 = 100

Compare overall average price trends with those for specific resources.

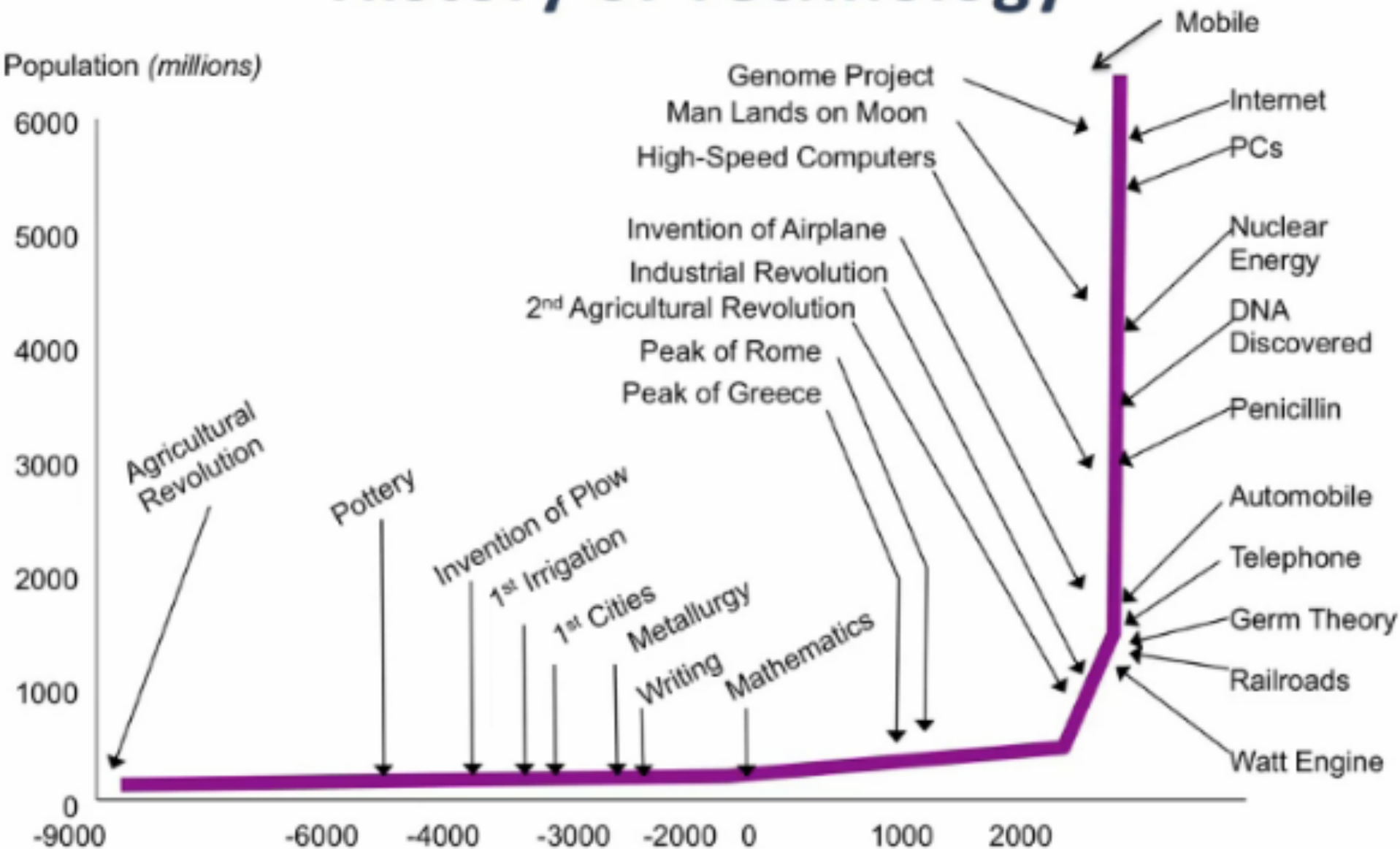
Overall average

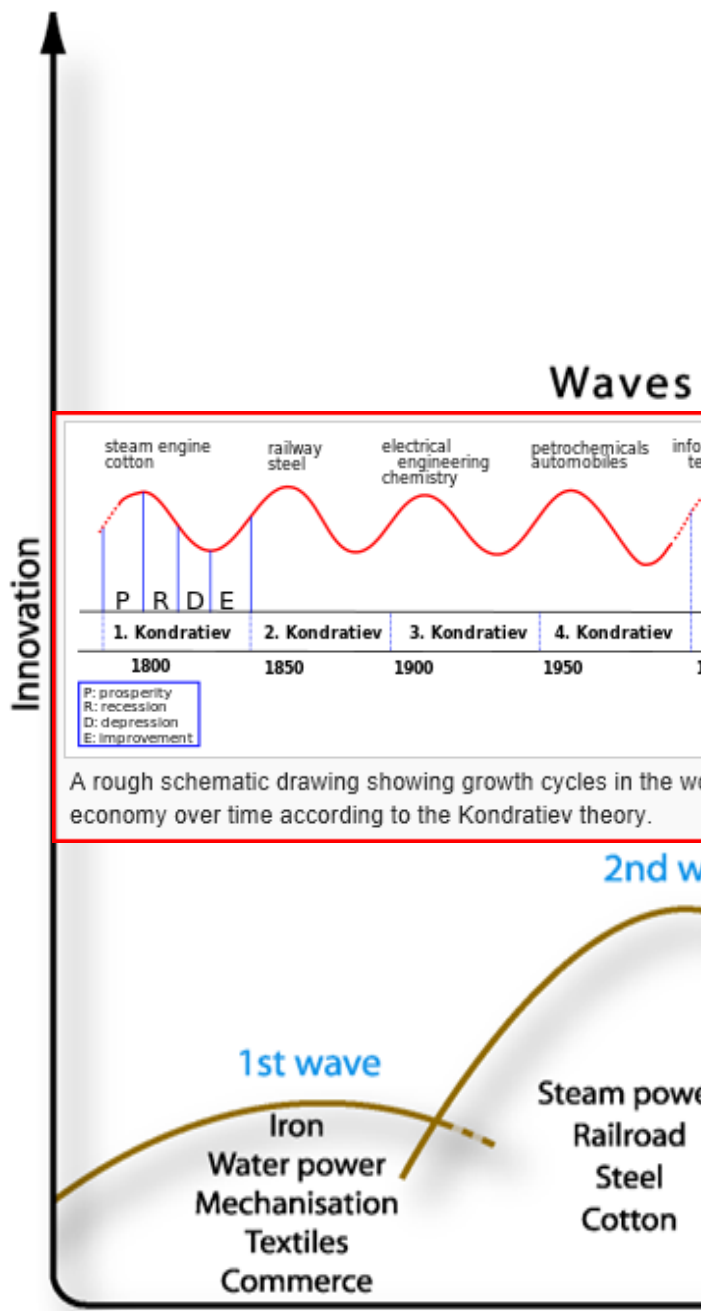


# Nominal price index: Jan 1980 = 100



# Growth of World Population and the History of Technology





A rough schematic drawing showing growth cycles in the economy over time according to the Kondratiev theory.


**6th wave**

- Sustainability
- Radical resource productivity
- Whole system design
- Biomimicry
- Green chemistry
- Industrial ecology
- Renewable energy
- Green nanotechnology

# Negócios Sustentáveis

## Empreendedorismo + Ecologia



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The geology of the planet

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**More companies are managing sustainability to improve processes, pursue growth, and add value to their companies rather than focusing on reputation alone.**

**The business of sustainability: McKinsey Global Survey results**  
October 2011

45 Billion tonnes of CO2

Exajoules per Year

600  
500  
400  
300  
200  
100  
0

1820

35  
25  
15  
0

1850

2013

2100

No slow down  
in last decade

Oil crises

Post-war boom

Great depression

Cuts required for  
50% chance of not  
exceeding 2°C

Oil Fuels  
n FF

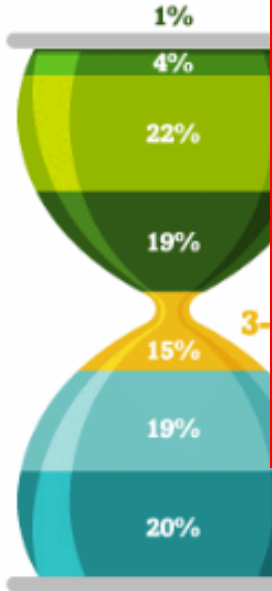
F



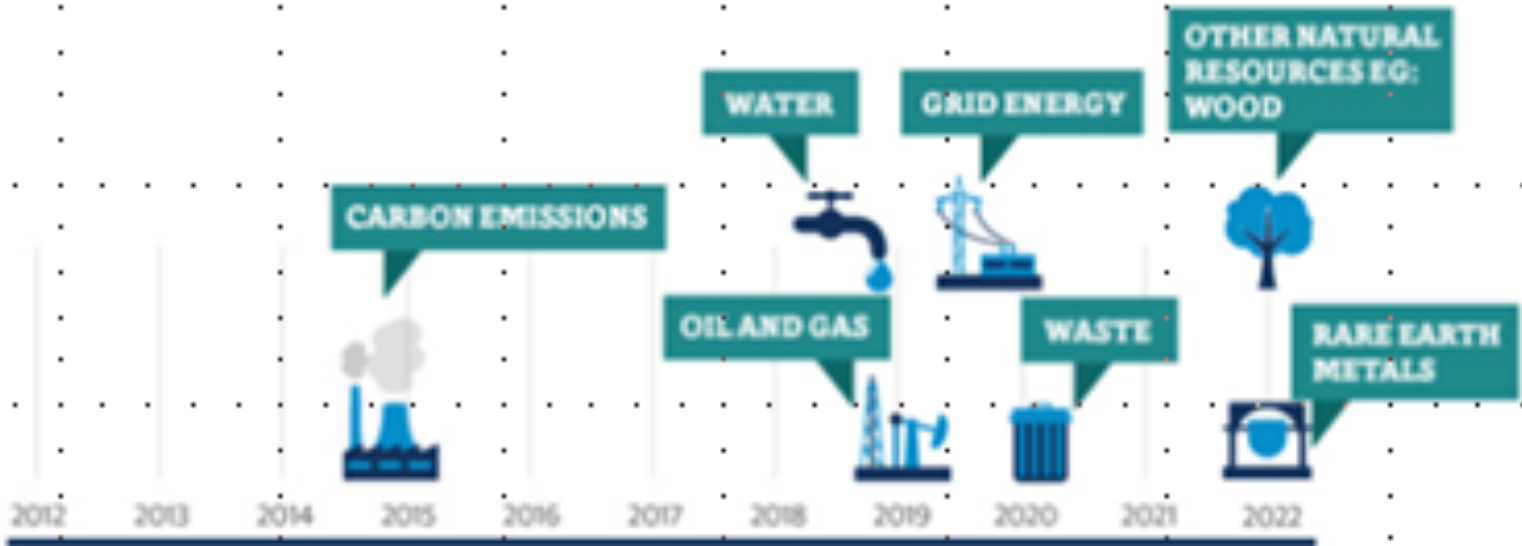
# ARE BUSINESSES SLEEPWALKING?

## RESOURCE

When businesses think about sustainability in their business operations...



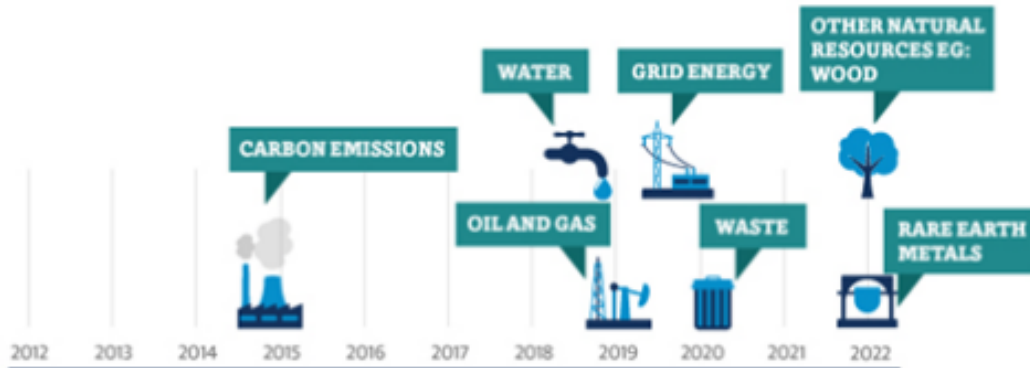
Number of years before these environmental areas become of critical importance to business operations:



ALREADY MAKING CHANGES

# 6 YEARS

Number of years before these environmental areas become of critical importance to business operations:



Decrease in quality of products/services

product/service offerings



Significant change to business processes

26%

UK businesses are most likely to have a sustainability programme in place:

## BUT businesses are doing little to pre-empt these effects:



**43%**

of organisations do not monitor the risks to their business of environmentally related shocks such as energy price rises and environmental disasters.



**52%**

haven't set targets for managing the reduction of carbon, water or waste.



Only  
**13%**

of board directors are remunerated for achieving sustainability metrics.

% of respondents<sup>1</sup>

### How sustainability activities are organized

2011, n = 3,203

2010, n = 1,946

A few activities but no formal program to address issues



Sustainability is embedded in business practices, with a formal program to address issues



A formal sustainability program to address issues



Sustainability is embedded in business practices, with no formal program to address issues



No sustainability activities



<sup>1</sup> Respondents who answered "don't know" are not shown; an answer choice in the overall effectiveness question.

% of respondents<sup>1</sup>

## How sustainability activities are organized

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A formal sustainability program to address issues



Sustainability is embedded in business practices, with no formal program to address issues



No sustainability activities



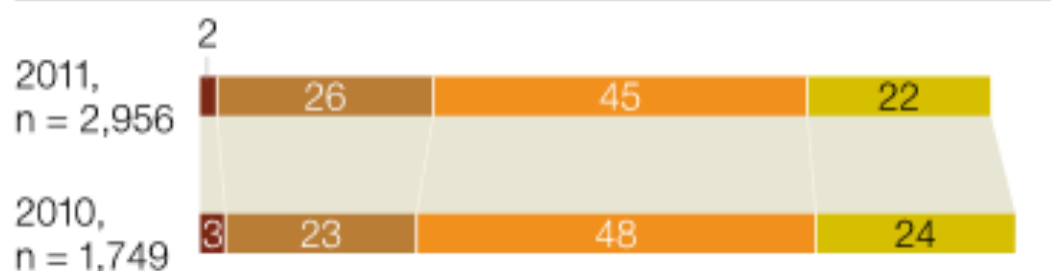
## Where sustainability falls on the CEO's global agenda

Most important agenda priority

A top-three agenda priority

A priority, but not top three

Not a significant agenda item



## Company's overall effectiveness at managing its sustainability

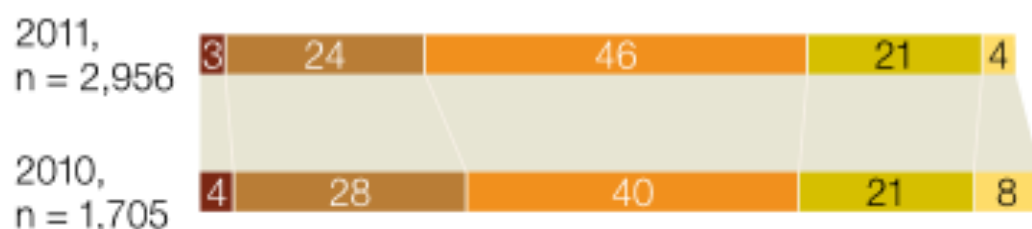
Extremely

Very

Somewhat

Slightly

Not at all



<sup>1</sup> Respondents who answered "don't know" are not shown; in 2010, "don't know" was not given as an answer choice in the overall effectiveness question.



## How much CO<sub>2</sub> is created by...



# How much CO<sub>2</sub> is created by...



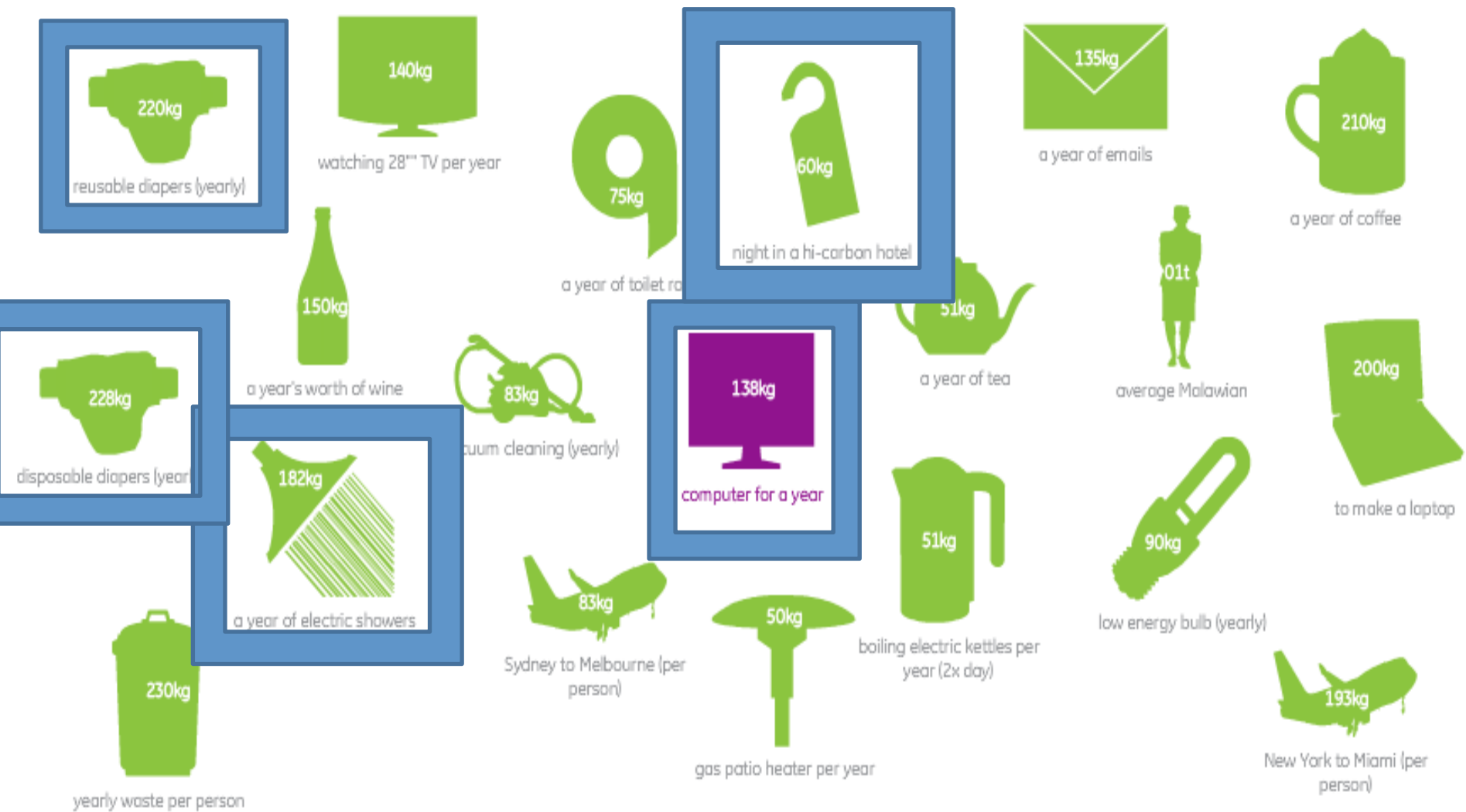
enter CO2 tons



kilos  lbs

electronics energy food & drink global grooming household transport web

# How much CO<sub>2</sub> is created by...

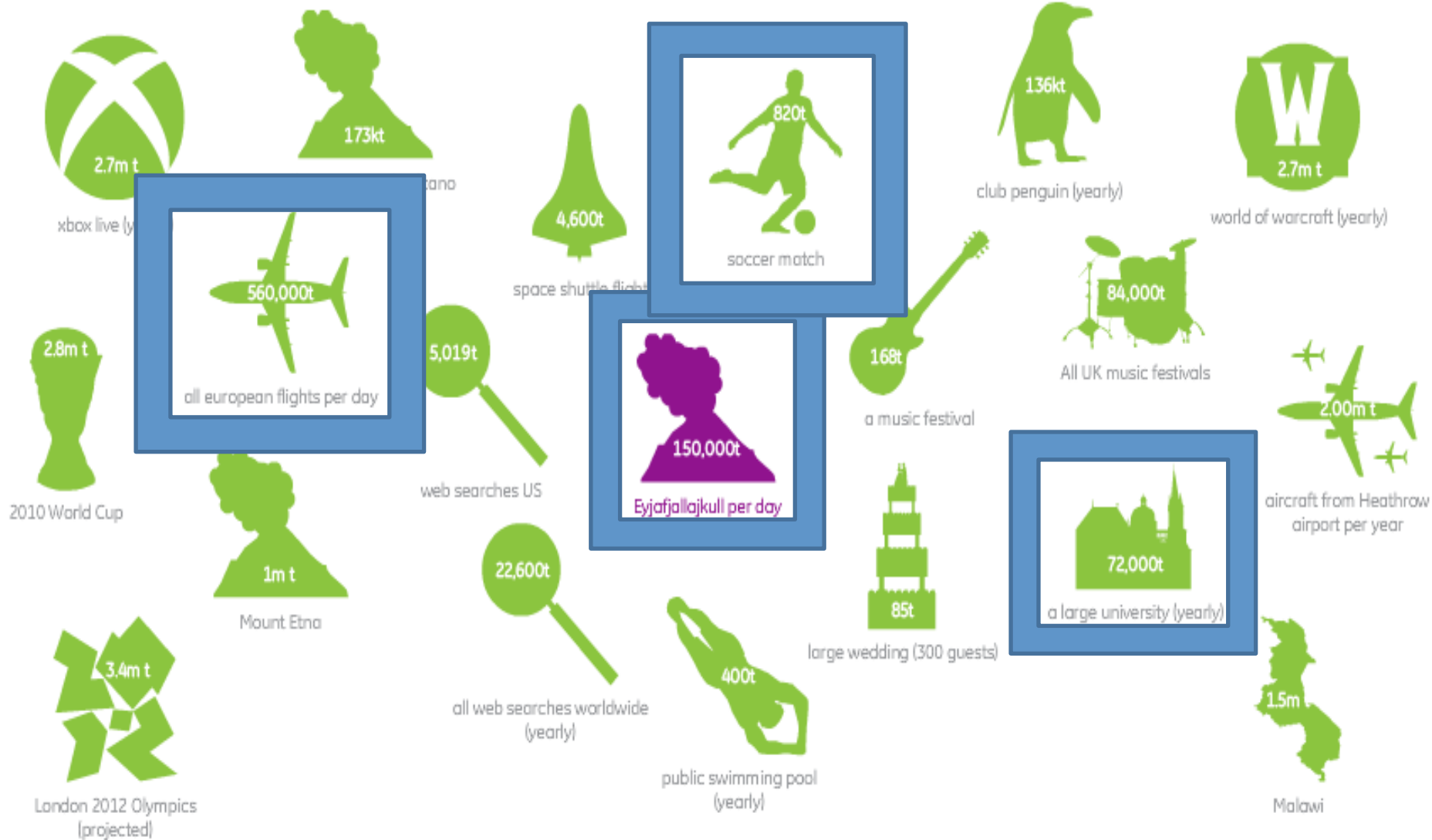


enter CO<sub>2</sub> tons



kilos  lbs

# How much CO<sub>2</sub> is created by...



enter CO<sub>2</sub> tons



kilos  lbs

1g 100g 1kg 100kg 1t 10t 100t 1kt 100kt 1mt

electronics energy food & drink global grooming household transport web

Time for a resource revolution

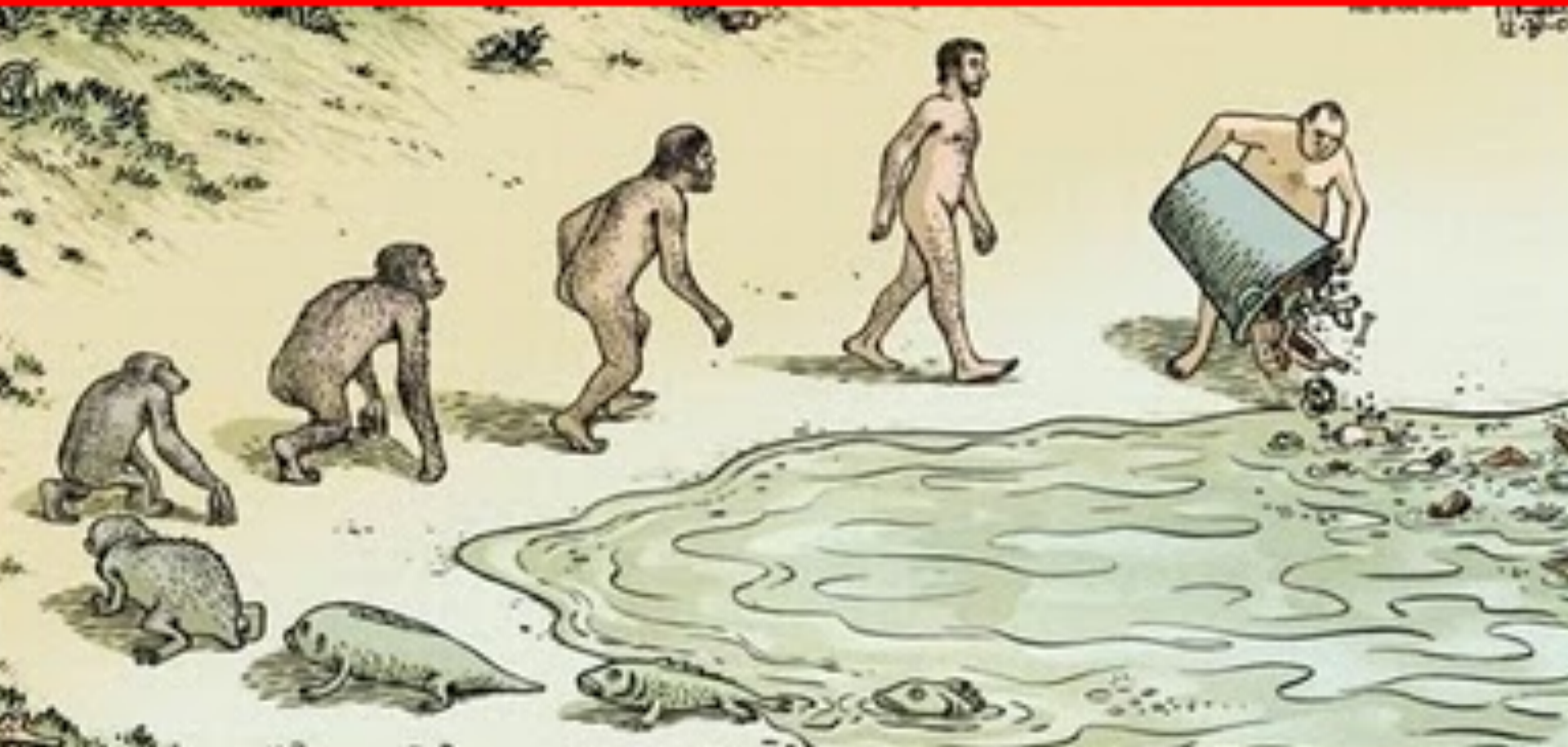
Heat Trapping Greenhouse Gases  
Produced by Cattle and Automobiles

Average amount of  
methane produced  
by two cows each year

Average amount of  
carbon dioxide  
produced by one  
car each year



Are you ready for the resource revolution?





Humans  
about it,



They think

In a sustainable society, nature is not subject to systematically increasing...



...concentrations of substances extracted from the Earth's crust,



...concentrations of substances produced by society,



...degradation by physical means,

and, in that society...



...people are not subject to conditions that systematically undermine their capacity to meet their needs.

# Soluções Sustentáveis



**3R**

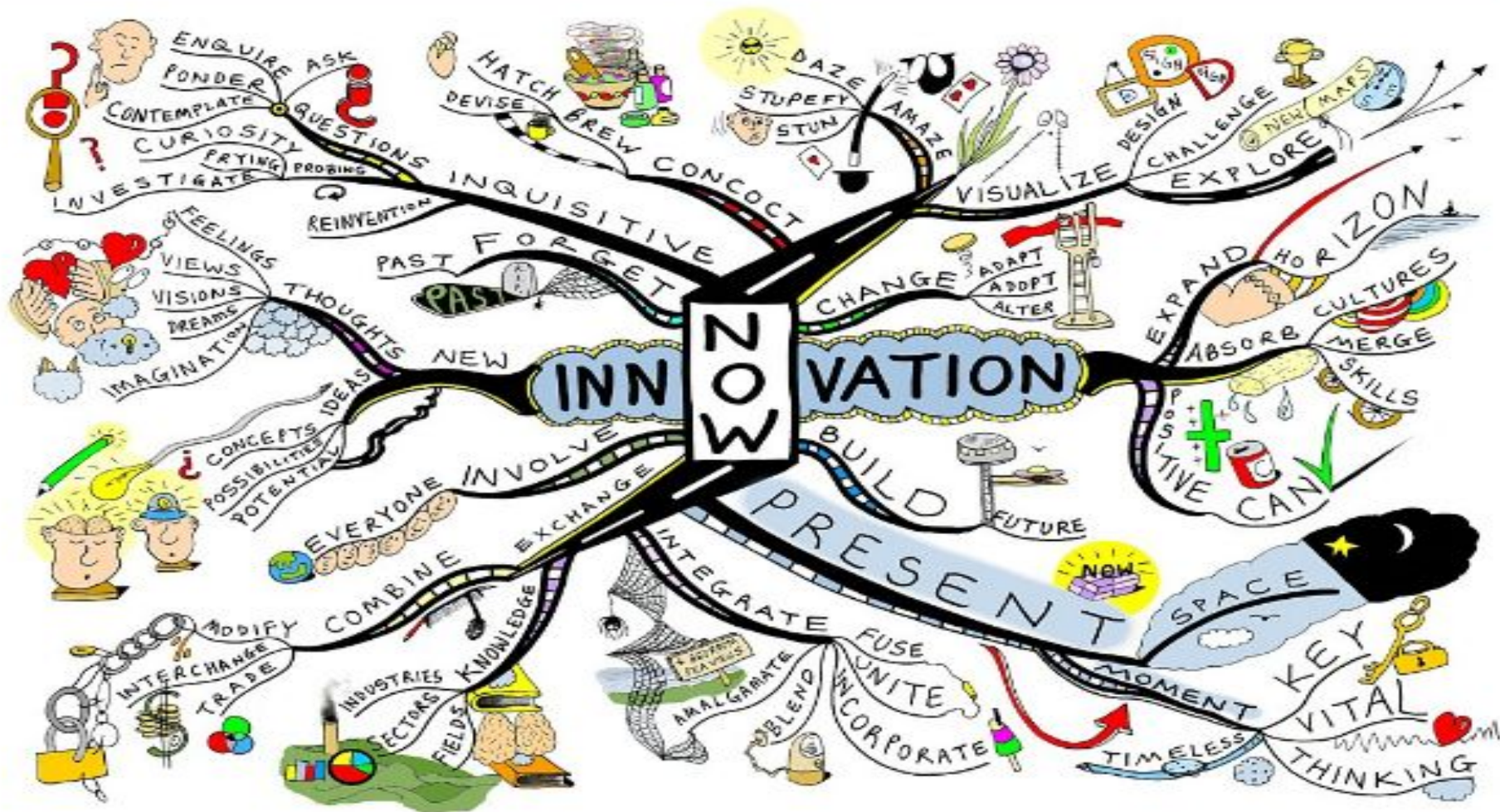
**Reduzir**

**Reutilizar**

**Reciclar**

# Inovação

O é pôr as ideias em ação!



# Tipos de inovação

*novas ideias  
novos usos para  
velhas ideias*

- **Produto** (tecnologia): introdução de novos ou renovados produtos ou serviços : alteração de especificações técnicas, componentes, materiais, *software*, interface com utilizadores ou características funcionais.
- **Processo** : implementação de novos ou renovados processos de produção ou logística de bens ou serviços: alteração de técnicas, equipamentos ou *software*.
- **Organizacional**: implementação de novos métodos de organização, trabalho ou relações nas práticas do negócio.
- **Marketing**: implementação de novas abordagens de marketing: produto ou embalagem, preço, distribuição e promoção.

# Inovação

é a utilização (económica) de um novo

método para criação de

melhores ou mais efetivos produtos,

processos, serviços, tecnologias ou ideias

que são

**é inovação que chega**

**ao mercado!**

aceites pelo mercado, governo e sociedade

# Inovação Sustentável

## Inovação Sustentável...

é a utilização (económica) de um novo método para a criação de melhores ou mais efetivos produtos, processos, serviços, tecnologias ou ideias que sejam aceites pelo mercado, governo e sociedade e

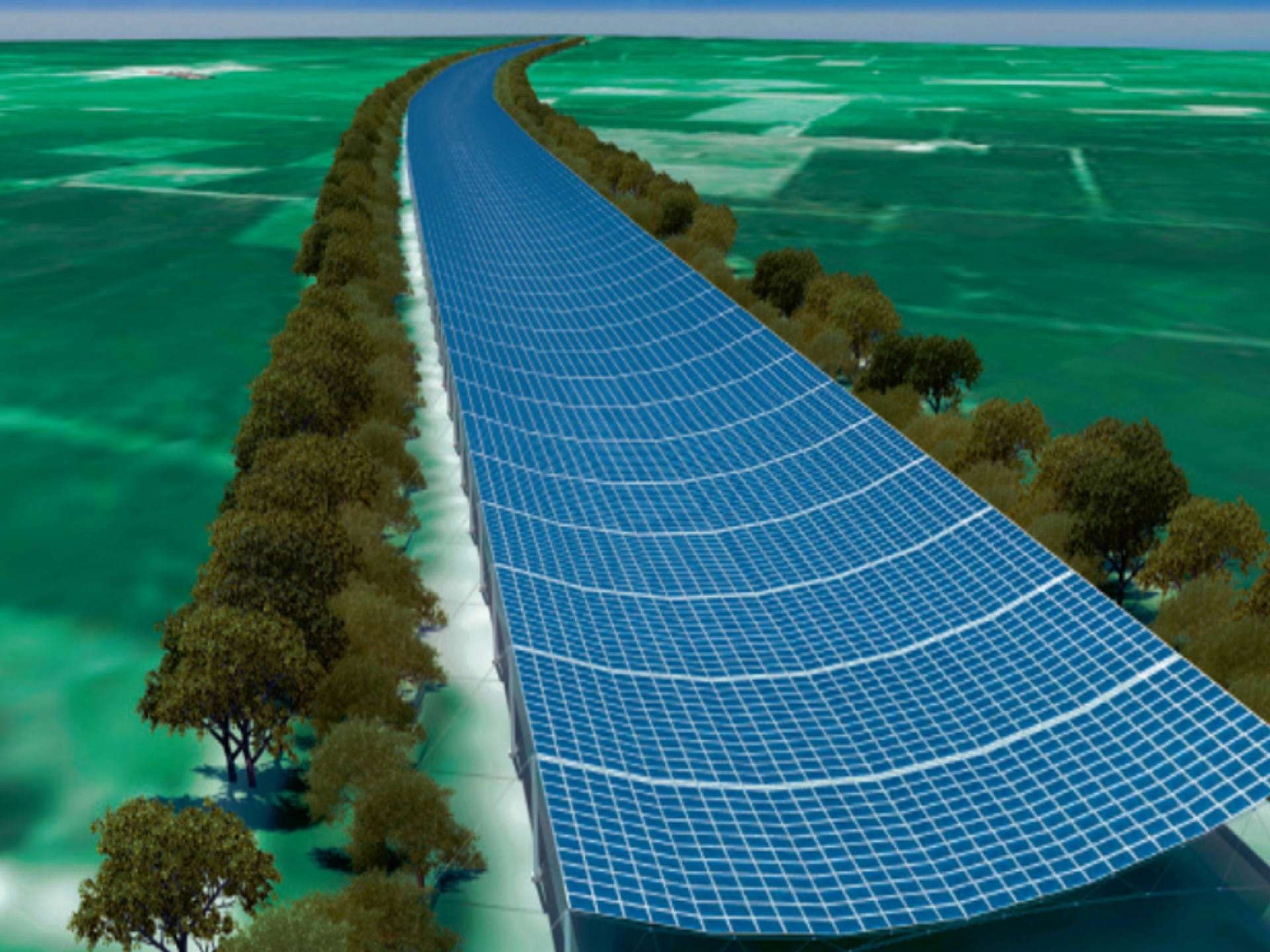
chegam ao mercado!  
que respeitem os quatro  
princípios da sustentabilidade

















# Sustentabilidade



Inovar e Criar Valor