



Climate change, energy peak and public sector audit institutions

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Three elephants in the room





Three problems we have for a long time preferred **not to talk about**

Climate change



Fossil fuels peak



Scarcity of minerals for the energy transition and technological progress



- First elephant, **climate change**. It has been denied for many years, but it starts to be accepted as a problem. However, there is confidence in the energy transition with large-scale renewable sources to mitigate the problem.
- Second elephant, **fossil fuels peak**. The numerous warnings about reaching it have been rejected. Now it can no longer be denied. However, there is confidence in the energy transition with large-scale renewable sources to mitigate the problem.
- Third elephant, **scarcity of minerals**. Scarcity of minerals prevents a large-scale energy transition and questions further technological progress. Without a massive transition to renewable sources, the other two problems **CANNOT** be mitigated ... **UNLESS a shift in the economic and social paradigm takes place.**
- All of this **affects the public sector.**



Difficulties in imagining the exponential growth

3%

implies that it doubles every 25 years

Infinite growth is not possible
in a finite world,
a world that is already colliding with its
biophysical limits

World population (million people)

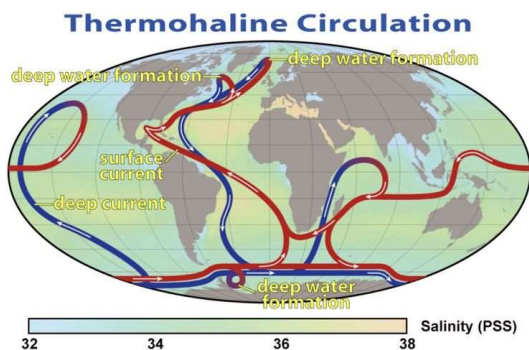




Water shortage

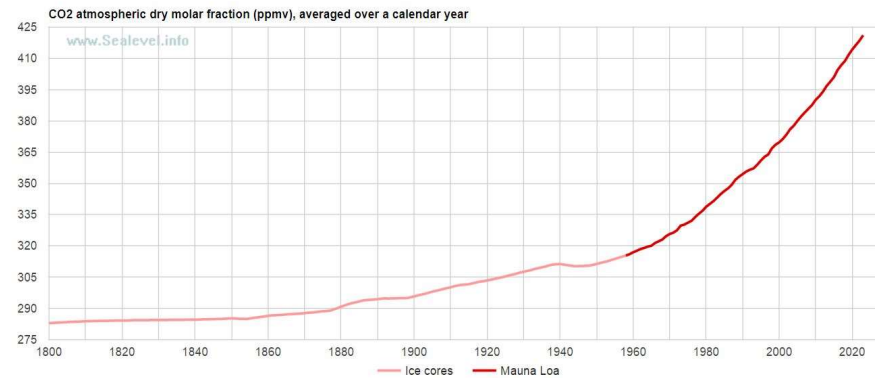


Loss of biodiversity

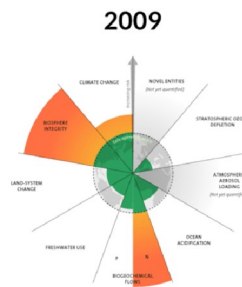


Weakening of thermohaline circulation

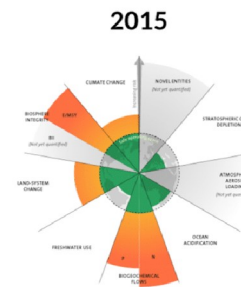
Atmospheric Carbon Dioxide (CO₂) levels, 1800–present



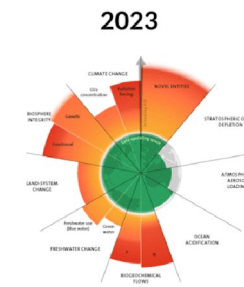
Increased CO₂ emissions



3 límites planetarios superados
Integridad de la biósfera, cambio climático, flujos biogeoquímicos.

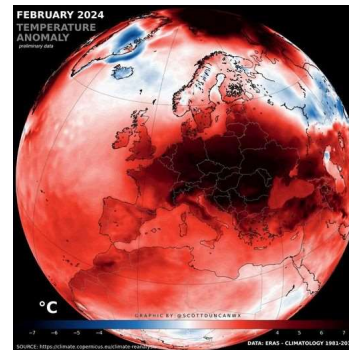


4 límites planetarios superados
Integridad de la biósfera, cambio climático, flujos biogeoquímicos, cambios en el uso del suelo.



6 límites planetarios superados
Integridad de la biósfera, cambio climático, flujos biogeoquímicos, cambios en el uso del suelo, uso de agua dulce, incorporación de nuevas entidades.

Six out of nine planetary boundaries exceeded

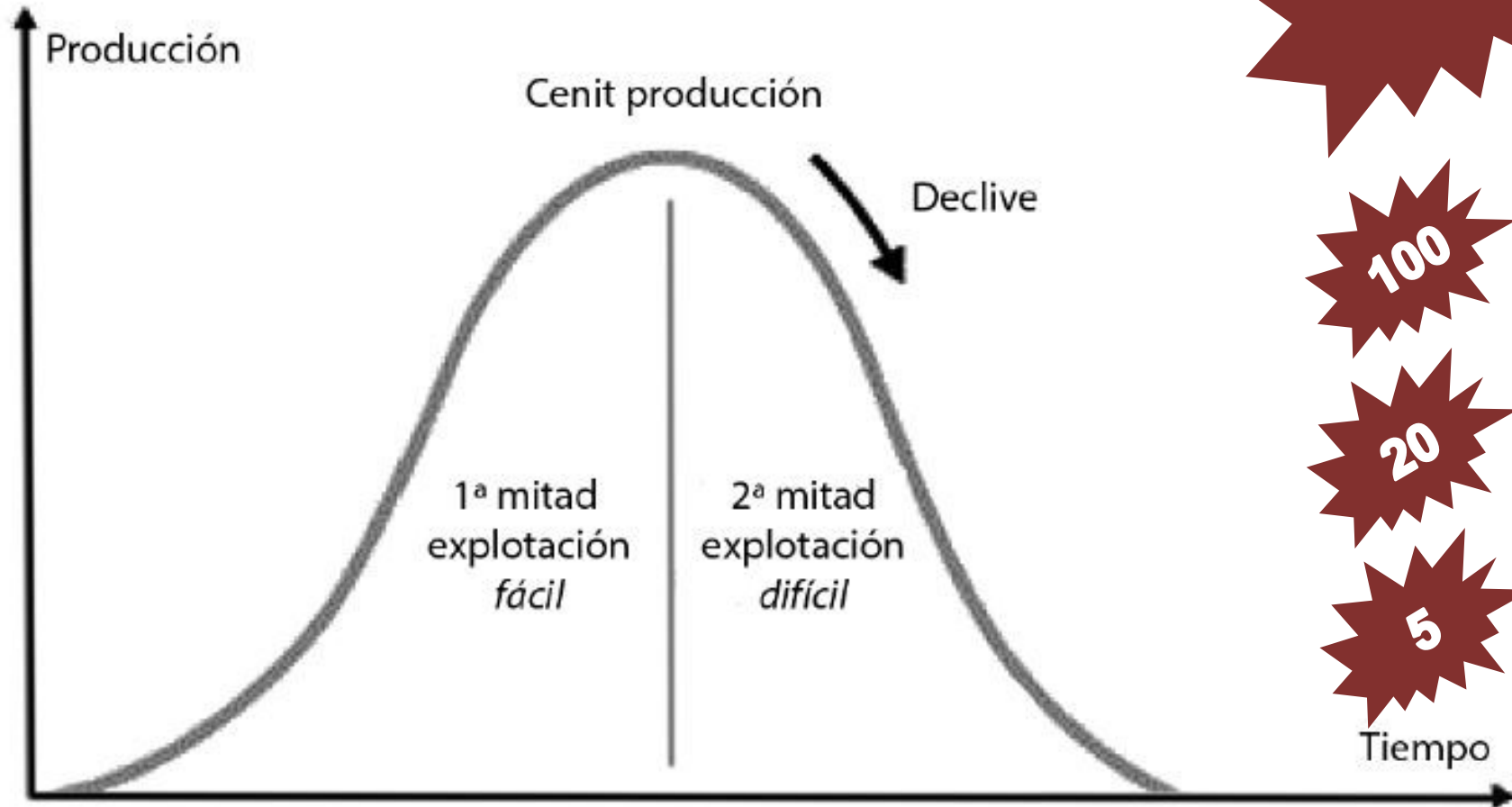


Climate change and trespassing of biophysical limits [first elephant]



Energy peak [second elephant]

For instance, OIL: the Hubbert curve

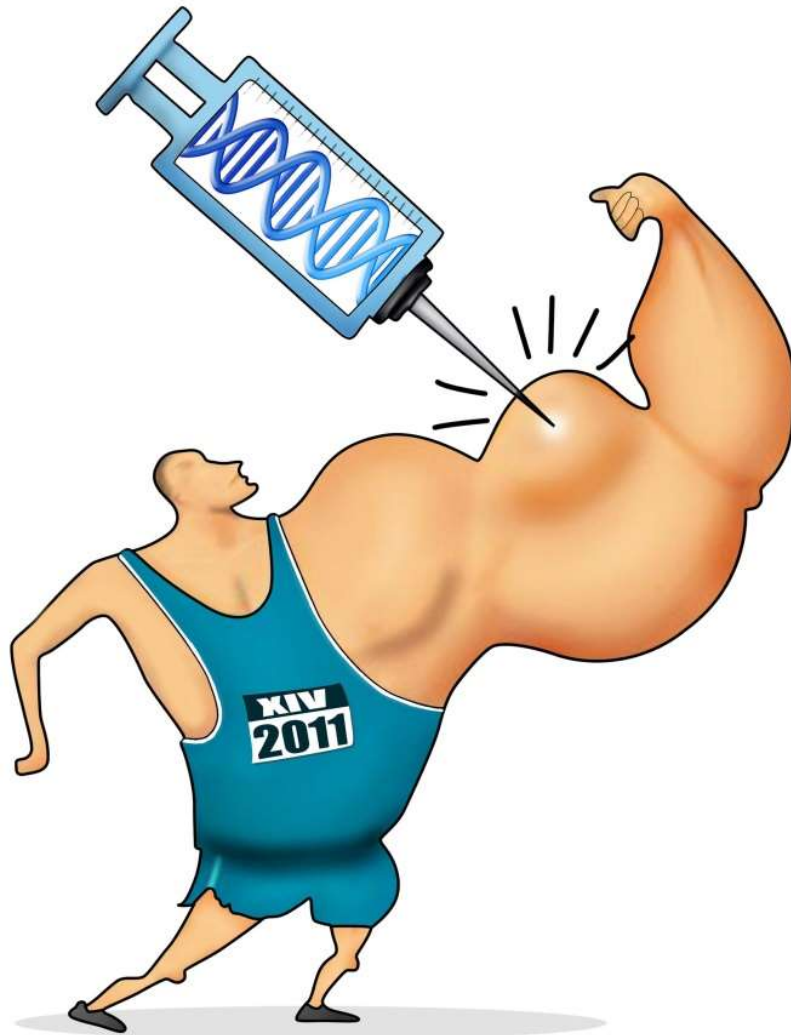


1971 (USA conventional oil)

2005 (global conventional oil)

2018 (total world oil)

Our society has grown up *doped*



**“growth
hormone”
=
fossil fuel
energy**

**(also used for plastics,
fertilizers, pesticides, ...)**

We can use other energy sources



Wind energy, photovoltaic power, concentrating solar power, nuclear energy (fission and... fusion?), geothermal energy, tidal energy, biomass energy, biofuels...

Exploitation of tar sands, fracking...

Gravitational storage, compressed-air storage or hydrogen-based storage, lithium batteries, graphene batteries? etc.

However...



Limitations of renewable sources

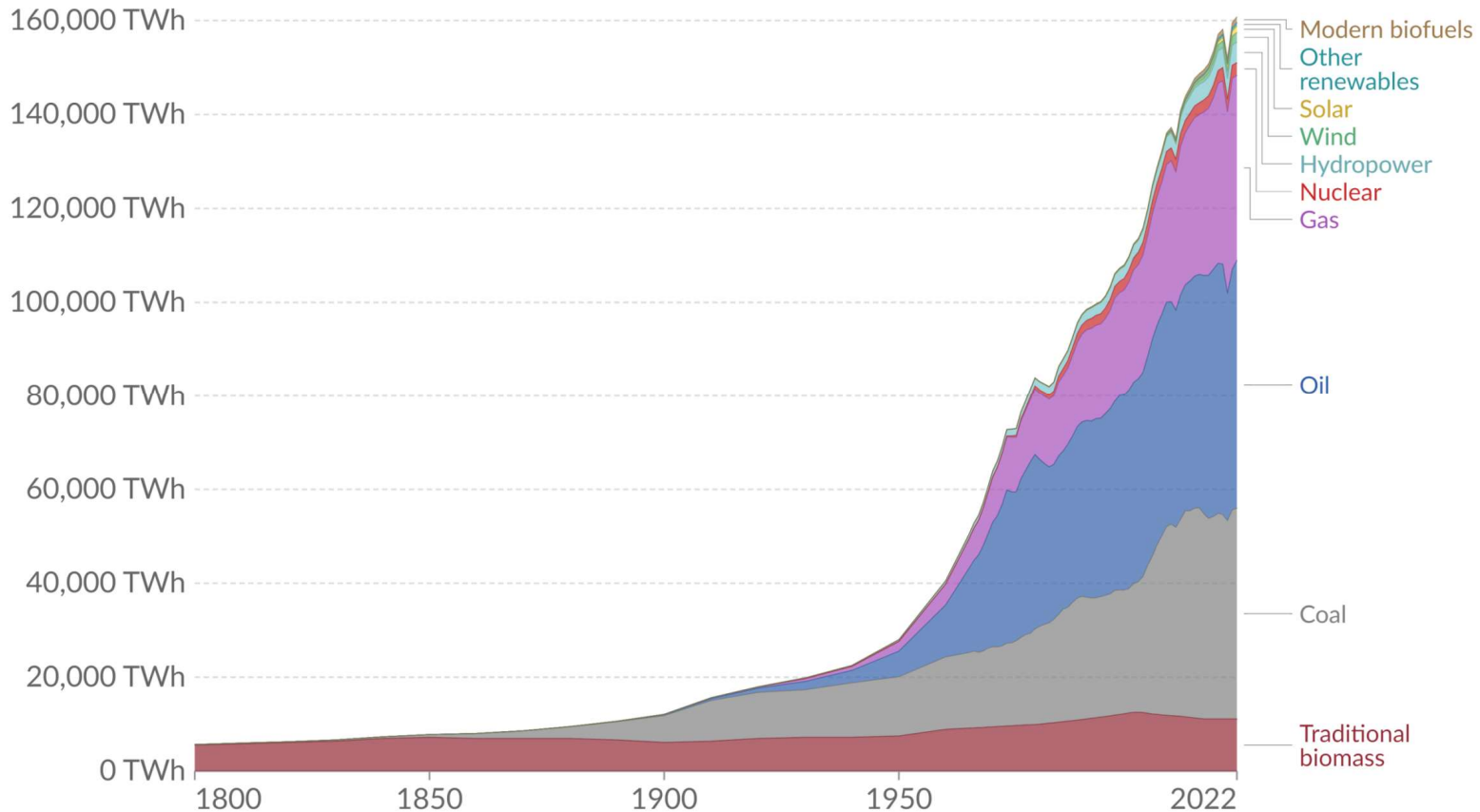
- **Low** Energy Return on Investment (EROI)
- They are **intermittent** and depend on uncontrollable circumstances
- They use **scarce minerals** and rare earths [**third elephant**]
- Electricity represents only **one-fifth** of energy consumption (and it is an **energy carrier** with losses in generation)
- There are difficulties in replacing the large consumption of hydrocarbons dedicated to **land, sea, and air transport**
- Renewable energies **depend on** fossil fuels
- They use **non permanent** capturing systems
- **They are not as green** as they look (extraction, production, recycling)
- **No energy transition has ever existed**

Limitations of renewable energies

Global direct primary energy consumption

Direct primary energy consumption does not take account of inefficiencies in fossil fuel production.

Our World
in Data



Data source: Energy Institute Statistical Review of World Energy (2023); Vaclav Smil (2017)

OurWorldInData.org/energy | CC BY

Therefore, with renewable energies we will have to **reduce energy consumption and economic growth.**
Ultimately: **CHANGE THE CURRENT WAY OF LIFE**

In short, society is faced with the following choice:

- To initiate a **planned and equitable reduction in production and consumption** to mitigate climate change and gradually adjust to the reduction of energy and basic minerals
→ **DECREASE/SUBSEQUENT GROWTH** ←
- Or to suffer/experience **“the game of musical chairs” with interlinked and inequitable social breakdowns**, due also to the reduction of net energy and basic minerals, with the aggravation of climate imbalance
→ **CRISIS/COLLAPSE** ←



The background of the slide features a photograph of a building's exterior, showing windows and architectural details. A large, dark red diagonal overlay covers the left and bottom portions of the image, creating a modern, graphic design.


Public sector audit institutions in the face of climate change and energy peak

How can the public sector be affected?

- REVENUE/INCOME

- **Difficulty to increase real income** due to lack of economic growth.
- The need to increase the **effectiveness in tax collection**.
- The need to analyse the **performance and progressivity of all taxes**, as well as **questioning** tax **avoidance schemes**.

- EXPENDITURE

- 
- Increasing **expenditure on social programmes** in order to protect groups at risk of social exclusion. It should be recalled that **distribution of income is achieved mainly by means of expenses** and that requires a strong and sound public sector.
 - Public sector **should be realistic** in view of the possibilities of its budget. Public sector **should set priorities** of public spending, considering its current funding and also the **subsequent maintenance** in adverse situations (difficulties to maintain infrastructures).
 - It will be necessary to **raise efficiency and effectiveness** of public expenditure. It will also be necessary to generalize **prior cost-benefit analyses**, the **evaluation of public policies** and **performance audits**.
 - Scarcity → high **inflation** → high level of interest rates → **problems of reimbursement of high public debt** → the financial bubble bursts.



What can we do as public sector audit institutions?

- **To consider the “three elephants”** previously mentioned when analysing risks and factors of public management.
- **To include** in reports **the warnings of the scientific community** and analyse how they affect the public sector.
- To produce reports that examine the efficiency and effectiveness of public management (**performance audits** or **assessment of public policies**), as well as other specific reports **related to the challenges** described.
- Review our **internal functioning**:
 - ✓ Reduce **travel** and avoid domestic **flights**
 - ✓ Increase **teleworking** (reduces transport, time, cost and danger. It increases flexibility and reconciliation) and **videoconferencing**
 - ✓ Reduce **waste** (paper, plastic bottles, etc.)
 - ✓ Purchases with a smaller carbon footprint, circular economy, local economy
 - ✓ Reduce **energy** consumption and strive to consume/generate electricity from “renewable” sources





For example, in the introduction to the report of the General Account of the Administration of the Valencian Government 2022

- The Audit Office of the Valencian Community has recalled that:
 - ✓ The Spanish Constitution establishes the right to enjoy an environment suitable for the development a person, as well as the duty to preserve it; and adds that public authorities shall ensure the rational use of all natural resources in order to protect and improve the quality of life and to defend and restore the environment. Therefore, **tackling climate change is a duty of the public sector**.
 - ✓ The numerous reports, manifestos, seminars, and congresses calling for converting the **economic system** into one **that does not need to grow**. Warnings not only from the **scientific community**, but also from the **UN**, the **European Parliament**, the **European Court of Auditors**, and even the **Catholic Church**.
- We insist that not only an energetic transition is desirable but also **a social and economic transition towards a model with decreasing energy needs is essential**.
- We are concerned that an increasing share of the public budget is allocated to **energy policies of dubious effectiveness** to the detriment of other measures to **enhance resilience** and **prepare society for scenarios with less net energy available**.
- The specific action plans seem to be more concerned with maintaining business activity at all costs, ignoring the **public indebtedness** that this causes, which could make it difficult **to sustain essential public services in the future**.



Some findings of performance audits of the Audit Office in the field of energy and environment

- ***Performance audit of the Valencian Climate Change and Energy Strategy 2030:***
 - ✓ The Strategy bases the achievement of the objectives on the sustainable development theory and does not envisage any alternative scenario that takes into account the limits to growth, so it ignores specific measures to prepare society and the economy for a possible energy shortage in future.
 - ✓ Energy transition is envisaged simply as an instrument to mitigate climate change, ignoring the inherent constraints of the decrease of energy from fossil fuels, as well as the difficulty in implementing energy harvesting systems that rely on scarce minerals. Therefore, the Strategy does not foresee a decrease in the production and consumption of goods and services, as called for by scientists.
- ***Performance audit of the integral water cycle in municipalities with less than 100,000 inhabitants:***
 - ✓ Ageing of infrastructures reduce the efficiency of the installed capacity, increasing not only economic but also environmental costs through water loss and/or untreated discharge as well as social costs, due to the increased risk of system failures and service disruption.



Some findings of performance audits of the Audit Office in the energy and environment field

- ***Performance audit of the management of street public lighting in municipalities:***
 - ✓ The work carried out has shown that replacing luminaires not only increases energy efficiency and reduces consumption but also reduces light pollution.
 - ✓ Few municipalities have an action plan for sustainable energy, an instrument that allows to specify their political commitment into practical measures and projects.
 - ✓ The use of luminaires managed by astronomical clock is a measure widely implemented, as well as luminous flux regulation systems. However, remote management is not widespread.
 - ✓ The energy consumption per luminaire is lower in those municipalities which, in addition to replacing luminaires, have adopted other efficiency measures, such as reducing the luminous flux at certain night-time hours, implementing centralised management, or conducting energy audits.
 - ✓ Although the payback period for the economic investments is relatively short and lower than the lifetime of LED luminaires, the high costs of these may be incompatible with the economic and financial situation of local authorities, which must cope with potential budgetary constraints or liquidity problems.

Some findings of performance audits of the Audit Office in the energy and environmental field

- ***Performance audit of public policies on sustainable urban mobility and intermodality of urban public transport:***
 - ✓ **Intermodality** of public transport in the Valencian Community is of **little significance**, with a very low passenger demand for public transport transfers. (This **changed** shortly after publishing the report).
- **Other performance audits** conducted in recent years:
 - ✓ Of the **forest fire fighting** services
 - ✓ Of the management of the **waste water treatment** service
 - ✓ Of the management of the **water supply and sanitation service** in the municipalities of the Valencian Community
 - ✓ Etc.



To sum up

In our reports on public management, public sector audit institutions must **regard the risks** for the public sector inherent to **climate emergency, energy peak and scarcity of essential minerals**.



This implies the **analysis** of measures taken to increase **resilience of public revenue and expenditure in scenarios with no economic growth**.



Thank you!