

# What if we thought about sustainable scientific research ?

# **Laurent JEANNEAU**

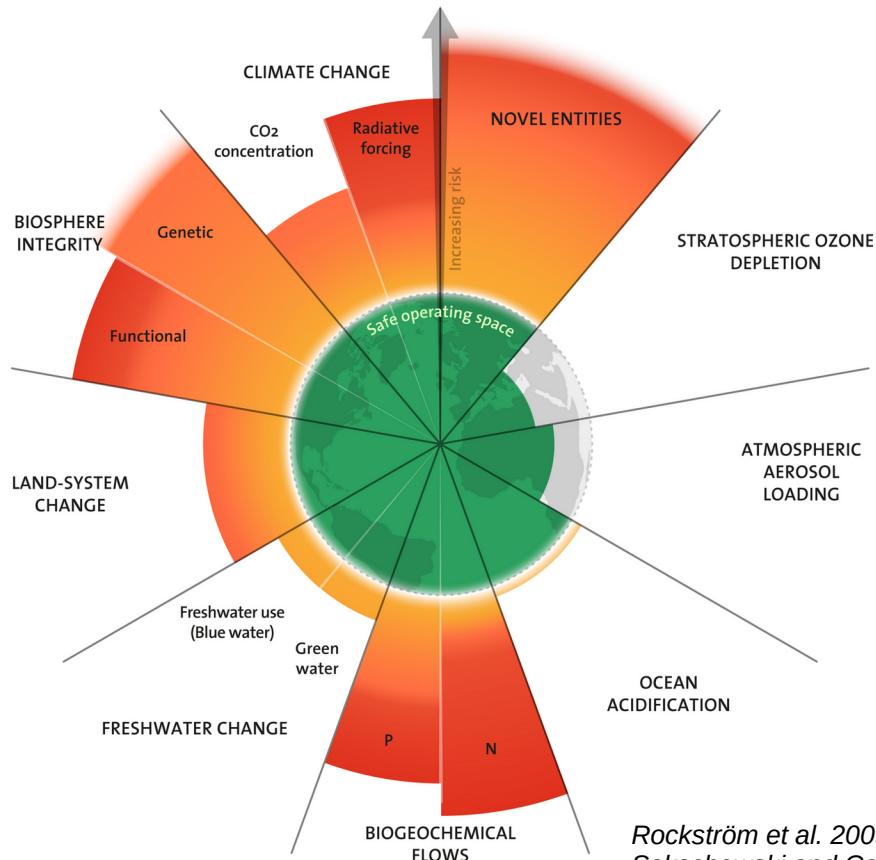
CNRS researcher  
Organic geochemist

# Project manager for socio-environmental transition for research activities at Université de Rennes

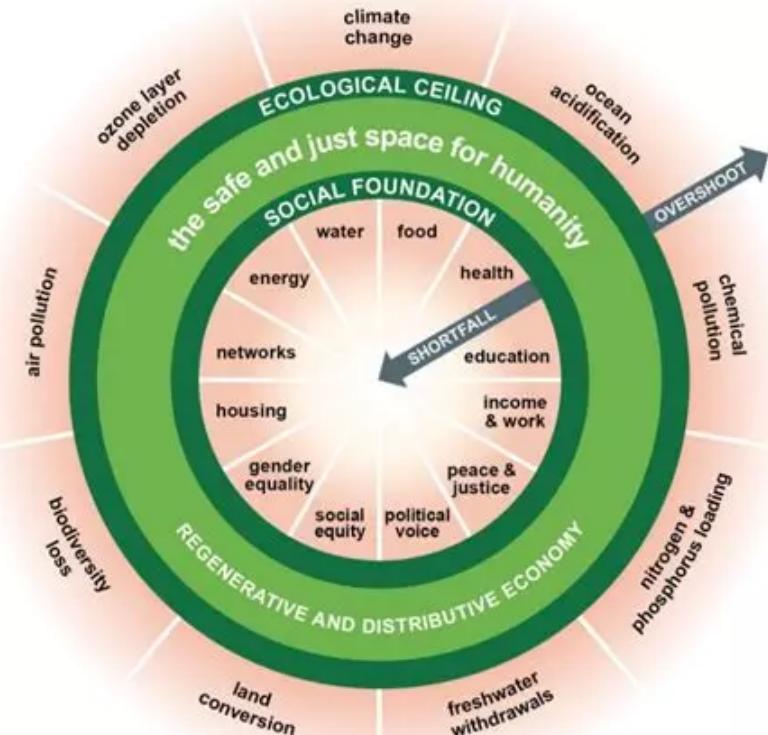
*laurent.jeanneau@univ-rennes.fr*

# **Part 1. Why can scientific research be considered unsustainable in social and environmental terms ?**

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Rockström et al. 2009  
Sakschewski and Caesar et al. 2025

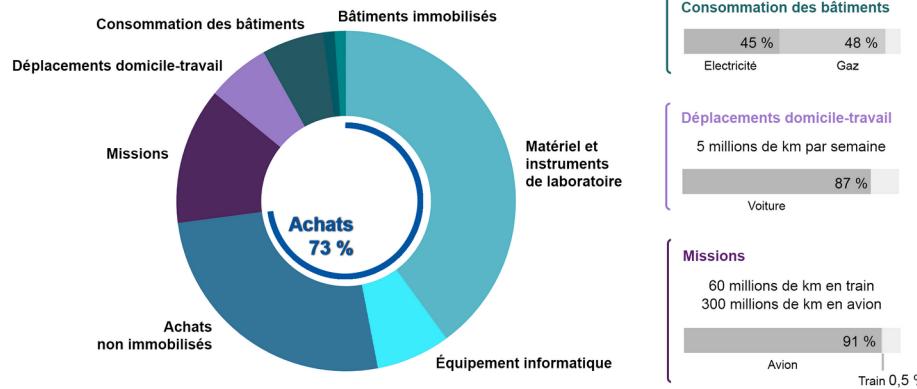


Raworth 2017

# Part 1. Why can scientific research be considered unsustainable in social and environmental terms ?

## Le CNRS fait le bilan de ses émissions de gaz à effet de serre

Empreinte carbone (en % des émissions) des activités du CNRS à l'échelle nationale



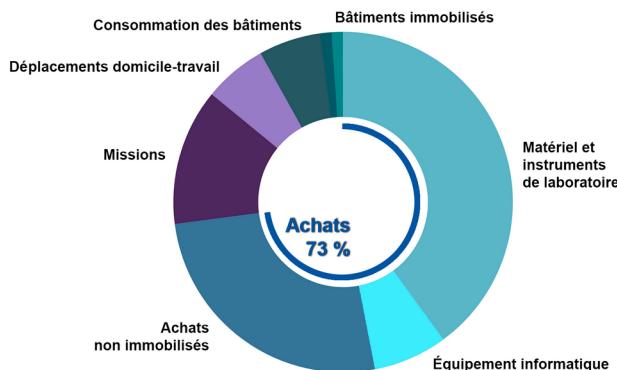
© CNRS - Source : BGES 2022 sur les données 2019 - Les incertitudes, parfois importantes, ne sont pas représentées ici.

2022 : 14,7 T eCO2 / agent

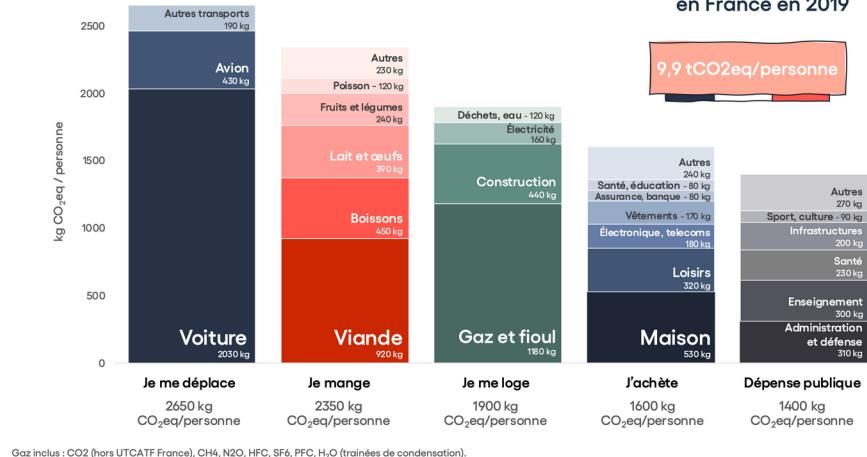
# Part 1. Why can scientific research be considered unsustainable in social and environmental terms ?

## Le CNRS fait le bilan de ses émissions de gaz à effet de serre

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carbone4 MY CO<sub>2</sub>

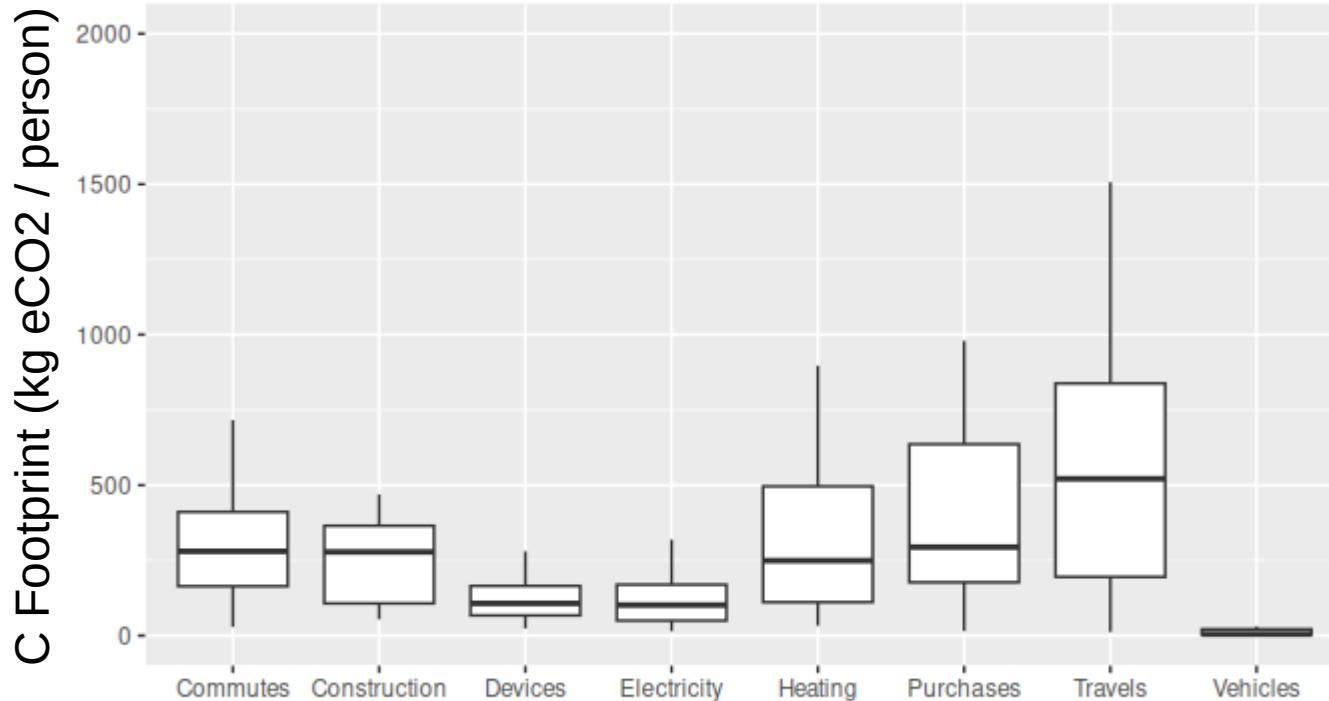


2022 : 14,7 T eCO<sub>2</sub> / agent

Target to limit climate change : 2 T eCO<sub>2</sub> / person in 2050

To achieve that, public services are asked to divide their emissions by 6

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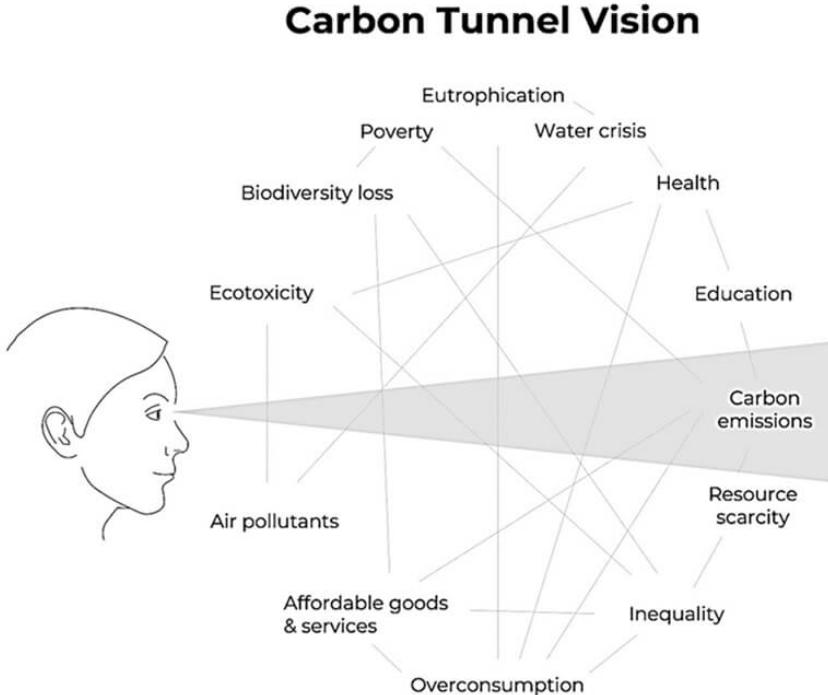


37 GHG inventories  
from 22 laboratories  
from 2019 to 2024

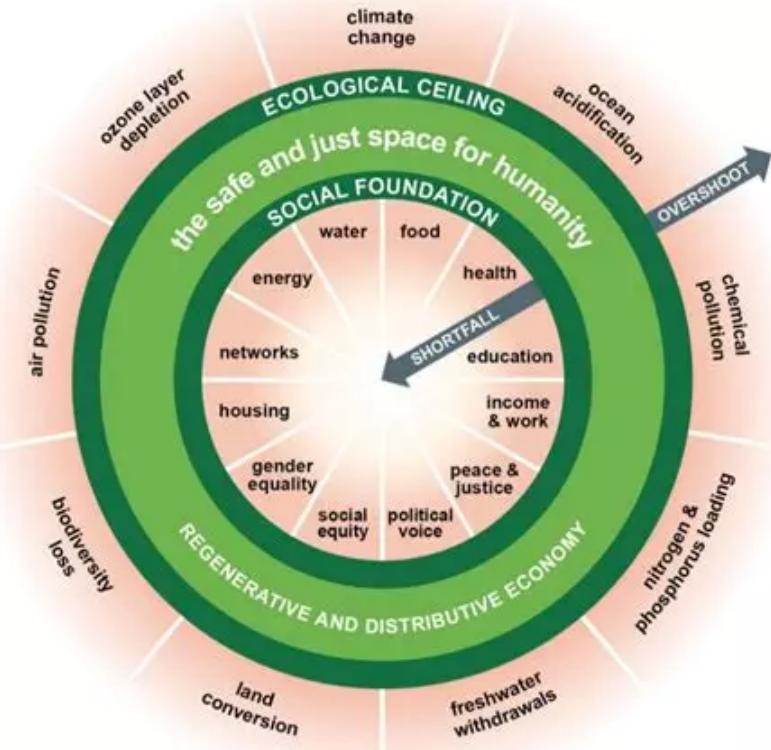
For the 13 GHG  
inventory including  
Construction and  
Purchases

Mean = 2.1 T eCO<sub>2</sub>  
SD = 0.6 T eCO<sub>2</sub>

# Part 1. Why can scientific research be considered unsustainable in social and environmental terms ?



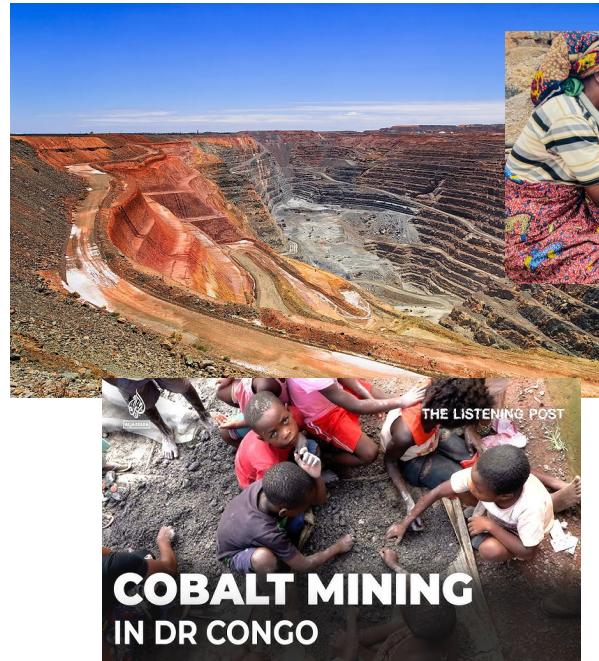
Sustainability transition



Graphic by Jan Konietzko

# Part 1. Why can scientific research be considered unsustainable in social and environmental terms ?

Because all the products we are using, from equipment to consumables have large environmental and social impacts due to every step of their life cycle from mining to waste industries.



# Part 1. Why can scientific research be considered unsustainable in social and environmental terms ?

Because our modern societies are extractive, colonialist and predatory towards humans and nature,

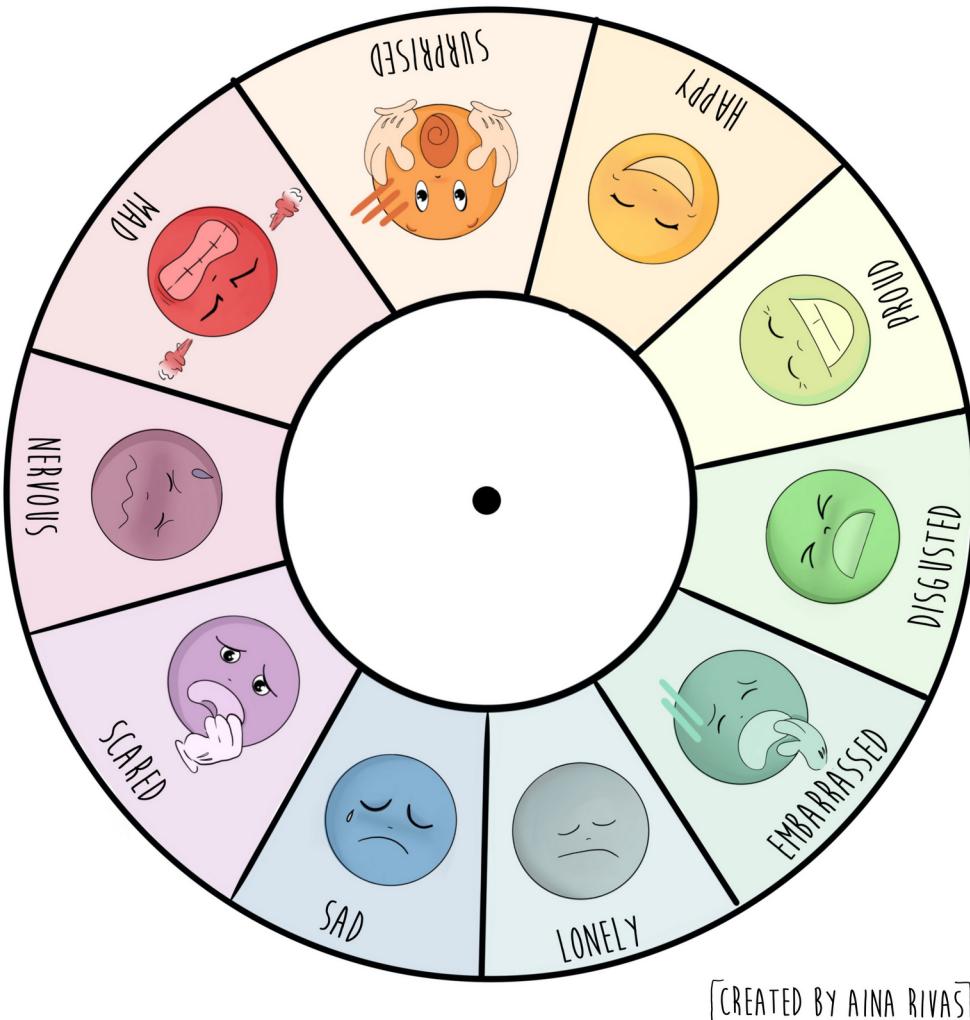
Because the scientific research has made the development of these societies possible,

Because the scientific research we do today is intertwined with the functioning of these societies,

Today's scientific research is socially and environmentally unsustainable.

As highlighted by the CNRS Ethics committee, reducing our negative social and environmental impacts is a matter of ethics, such as animal testing or genetic engineering.

*How do you  
feel about  
this issue ?*



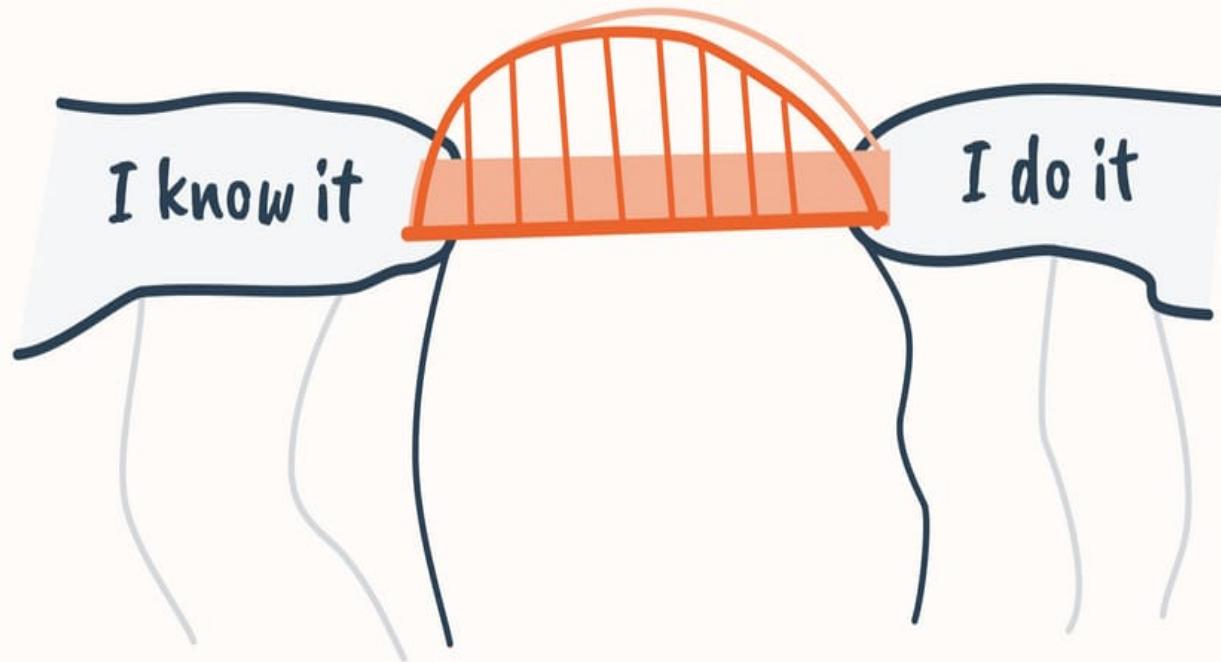
Now that we've established that, all we have to do is take a step back, isn't it?



But this is not so easy !

## **Part 2. What are the individual and systemic obstacles to the development of sustainable scientific research ?**

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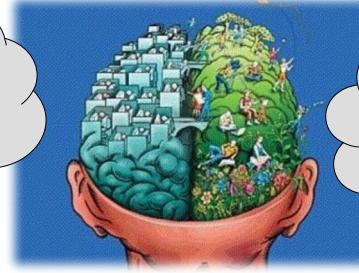
## Cognitive biases



Quick and intuitive ways of **making judgements or decisions** that are less laborious than analytical reasoning that takes all relevant information into account.

These biases are conditioned by our **beliefs**, i.e. our **convictions** that we accept as true without formal proof. The more deeply rooted they are, the more they influence biases.

Infinite growth,  
technologic  
solution



Cognition 1

Climate  
change,  
biodiversity  
crisis

Cognition 2



Cognitive  
dissonance



Strategies to reduce  
the dissonance

# Part 2. What are the individual and systemic obstacles to the development of sustainable scientific research ?

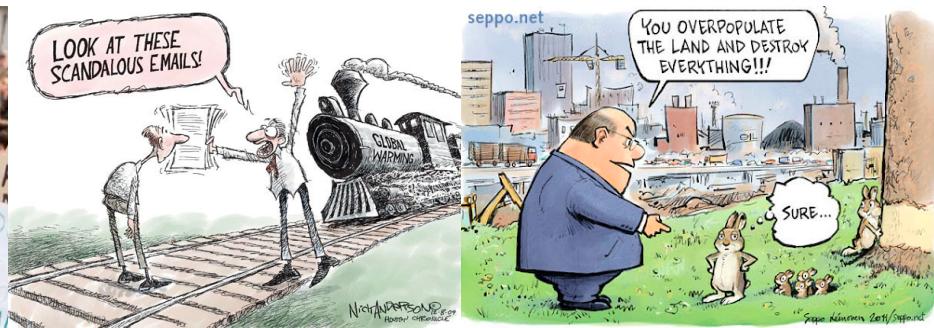
## Strategies to reduce the dissonance

### REACTIONS

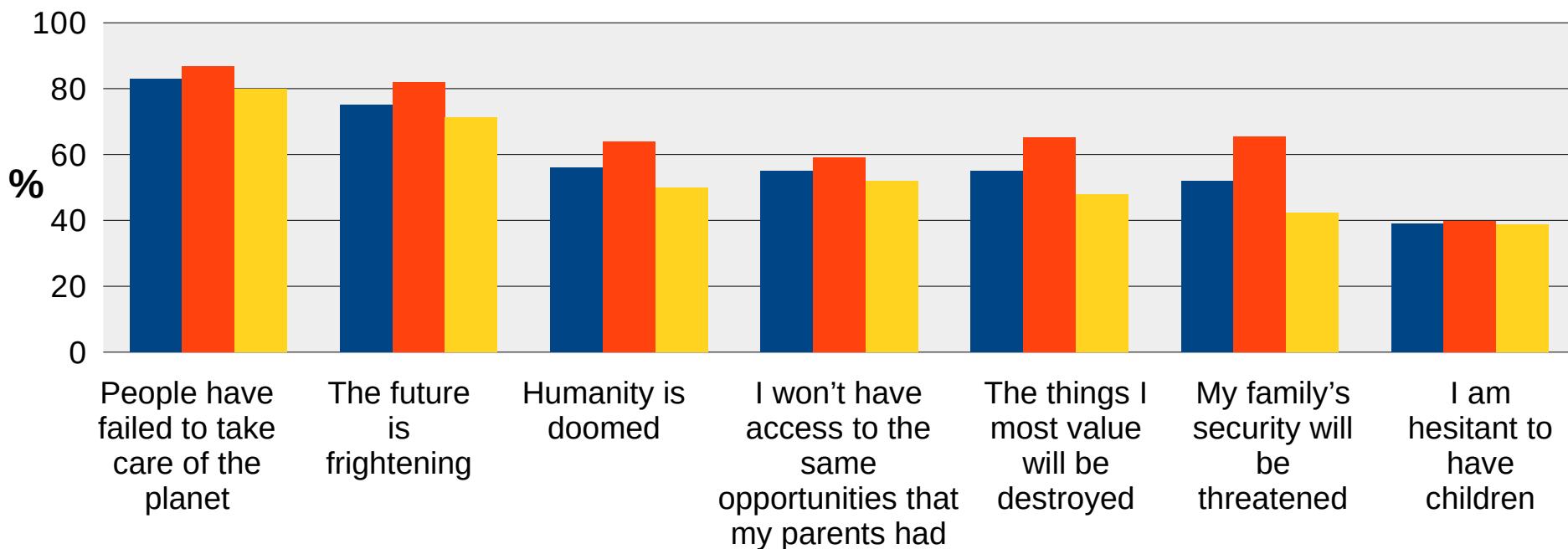
- Feeling guilty

### EMOTIONS

- Anxiety



## Part 2. What are the individual and systemic obstacles to the development of sustainable scientific research ?



Blue : mean of 10 countries / Orange : developing countries / Yellow : developed countries

**Survey of 10 000 young people from 16 to 25 years old and from 10 countries**

Hickman et al., 2021

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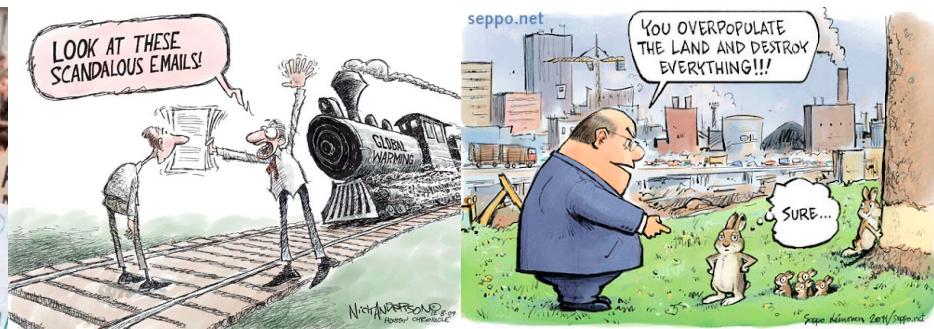
## Strategies to reduce the dissonance

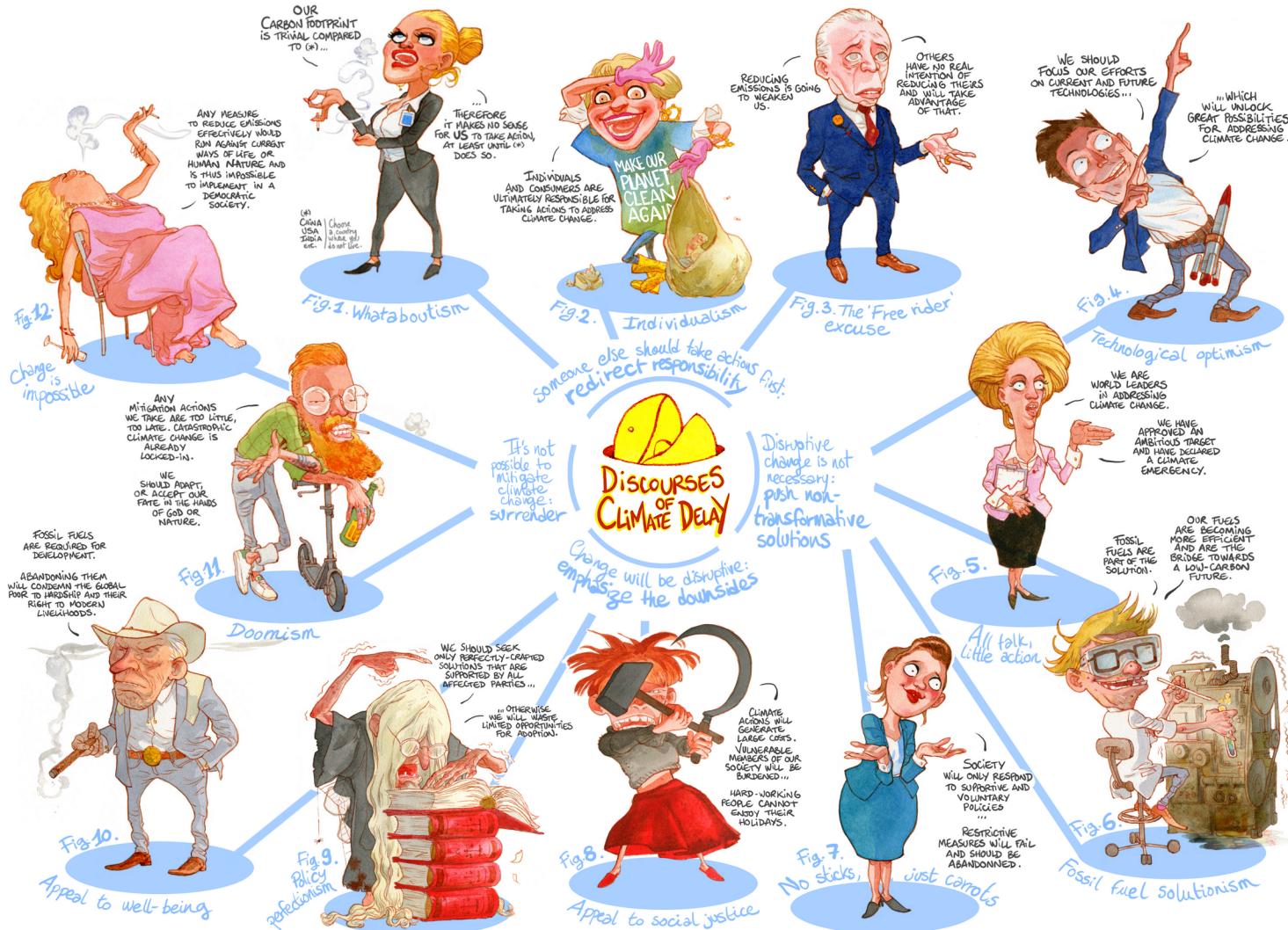
### REACTIONS

- Feeling guilty
- Engaging in self-deprecation
  - Doubting oneself
- Minimising, rationalising, justifying
- Rejecting information or responsibility

### EMOTIONS

- Anxiety
- Coping strategy, avoidance
- Loss of confidence in one's abilities
- Emotional distancing
- Denial, rejection





Lamb et al., 2020

Illustrations  
Léonard  
Chemineau

# Part 2. What are the individual and systemic obstacles to the development of sustainable scientific research ?



In the scientific community, the same discourses are found plus four additional ones that are specific

## 1. Obsession with measurement: prioritising measurement over action

This argument involves putting concrete proposals for action on hold on the grounds that it is first necessary to accurately measure the ecological footprint of institutions .

The insistence on describing, evaluating and measuring seems to be a real « professional bias » on the part of scientists.

## 2. Researcher freedom

A second argument typically put forward by the scientific community is to defend academic freedom against any restrictions that might be imposed on it for environmental reasons.

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In the scientific community, the same discourses are found plus four additional ones that are specific

## 3. The neutrality argument

It consists of asserting that acting explicitly in accordance with ecological goals amounts to breaking out of the stereotypical framework of scientific activity: « Our job is to advance the pursuit of knowledge in a neutral manner, so above all, we must not become activists. »

## 4. Sacred science

This consists of rejecting any questioning of scientific activities on the grounds of their intrinsic value. This stance often takes the form of a presupposition or obvious fact: any suggestion of ecological measures that would undermine the core business of scientists is immediately considered absurd or unthinkable. This argument thus calls for a form of sanctification of scientific activity.

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## Strategies to reduce the dissonance

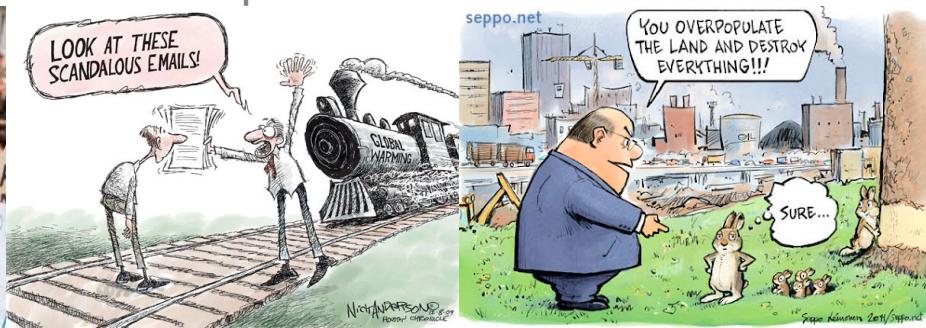
### REACTIONS

- Feeling guilty
- Engaging in self-deprecation
  - Doubting oneself
- Minimising, rationalising, justifying
- Rejecting information or responsibility
  - Changing beliefs



### EMOTIONS

- Anxiety
- Coping strategy, avoidance
- Loss of confidence in one's abilities
- Emotional distancing
- Denial, rejection
- Acceptance



# Part 2. What are the individual and systemic obstacles to the development of sustainable scientific research ?

## What are the beliefs we have to change ?

IN OUR  
EVERYDAY  
WORK ?



The newer the **equipment**, the better the quality of the result produced (4/6).  
« equipment race for innovation »  
« high tech = high concept ».

The values relating to **competition** focus on excellence  
« *Competition is necessary and generates excellence* ».

« *Freedom of research, not inhibiting creativity with low-carbon constraints* »

The **competition** is divided into two topics:  
recognition: « *We manage the competition. The important thing is visibility* ».  
the ever-increasing « *race for data, race for projects, race for publications* ».



IN RELATION TO  
THE  
ORGANIZATION  
OF RESEARCH ?

**Assessment** focus on indicators

« *Quantitative rather than qualitative assessment* »  
and the internationalization  
« *Research evaluation: a lot of international collaboration is needed; it's better that way* ».

# Part 2. What are the individual and systemic obstacles to the development of sustainable scientific research ?

## What are the beliefs we have to change ?

IN OUR  
EVERYDAY  
WORK

### IN A NUTSHELL...

Among the values/beliefs identified by colleagues as **barriers** to reducing the environmental impact of research are **technosolutionism**, the **digitization** of work, the **ever-increasing** data, publication, grants... and **competition** as a driving force behind innovation.

produced (4/6).

« equipment race for innovation »

« high tech = high concept ».

The values relating  
to competition  
focus on excellence

« Competition is  
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IN RELATION TO  
THE  
ORGANIZATION  
OF RESEARCH?

Production  
Assessment  
Structuring  
Competition  
Funding  
Commitment

Law Ethics  
Skills  
Internationalization  
Mutualization

Assessment  
Qualitative assessment

and the internationalization

« Research evaluation: a lot of  
international collaboration is  
needed; it's better that way ».

**Part 3. How we can overcome them to unleash our capacity to invent the kinds of research that could fit a just, safe and desirable world for humanity ?**

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*Respect*

*Kindness*

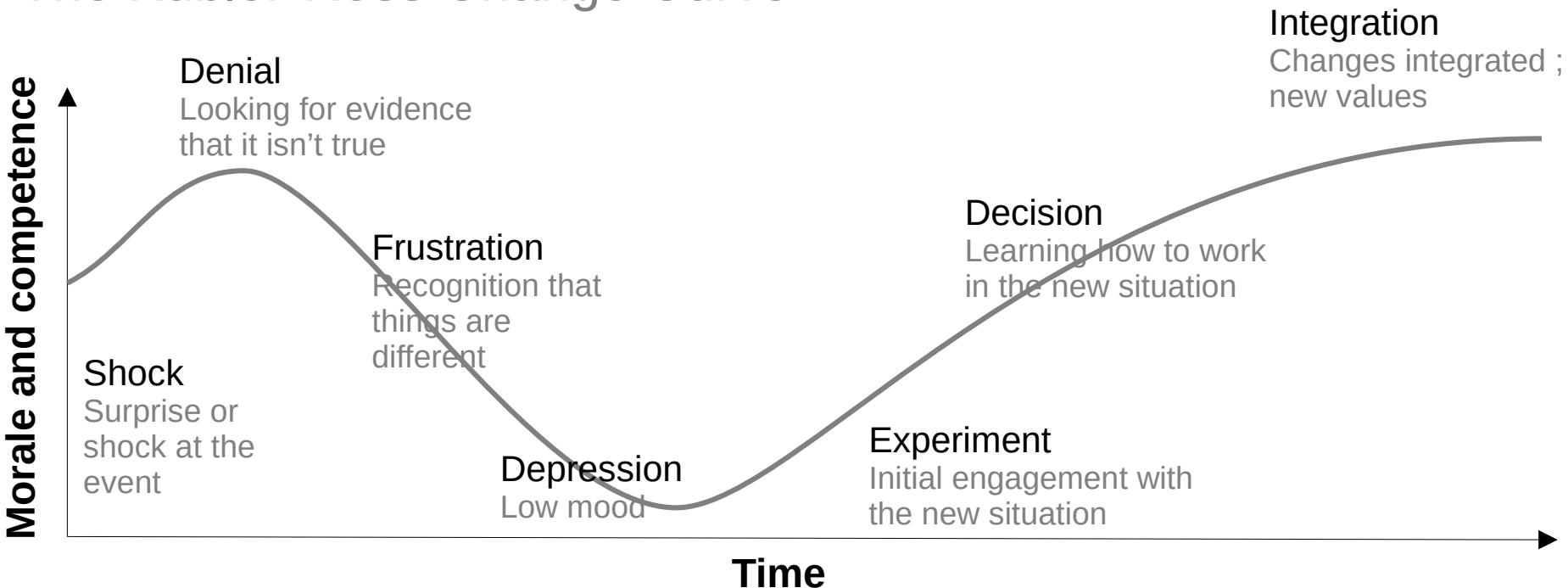
*Mutualization*

*Organizational freedom*

*Slow science*

# Part 3. How we can overcome them to unleash our capacity to invent the kinds of research that could fit a just, safe and desirable world for humanity ?

## The Kübler-Ross Change Curve



# **Part 3. How we can overcome them to unleash our capacity to invent the kinds of research that could fit a just, safe and desirable world for humanity ?**

We have now to experiment... good news : this is our job !

*Respect*

A research that is conceived with society and not for society

*Kindness*

A research that seeks to understand and not to control, whether humans or non-humans

*Mutualization*

A research that shows humility in the face of its subject and does not allow itself to be intoxicated by the power it derives from believing it can dominate it

*Organizational freedom*

... and new attributes, if you want to contribute

*Slow science*

# Take home message

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This transition to sustainable research is perceived as a constraint by the majority of the scientific community. However, it can also be seen as a tremendous opportunity to mobilise our knowledge and innovation skills to create sustainable scientific research.

**Thank you**