

Hâtons-nous lentement:

Urgence et inertie dans la transition énergétique

Greg De Temmerman

Managing director, Zenon Research

Associate researcher, Mines Paris PSL

greg@zenon.ngo

Zenon
Research

MINES PARIS

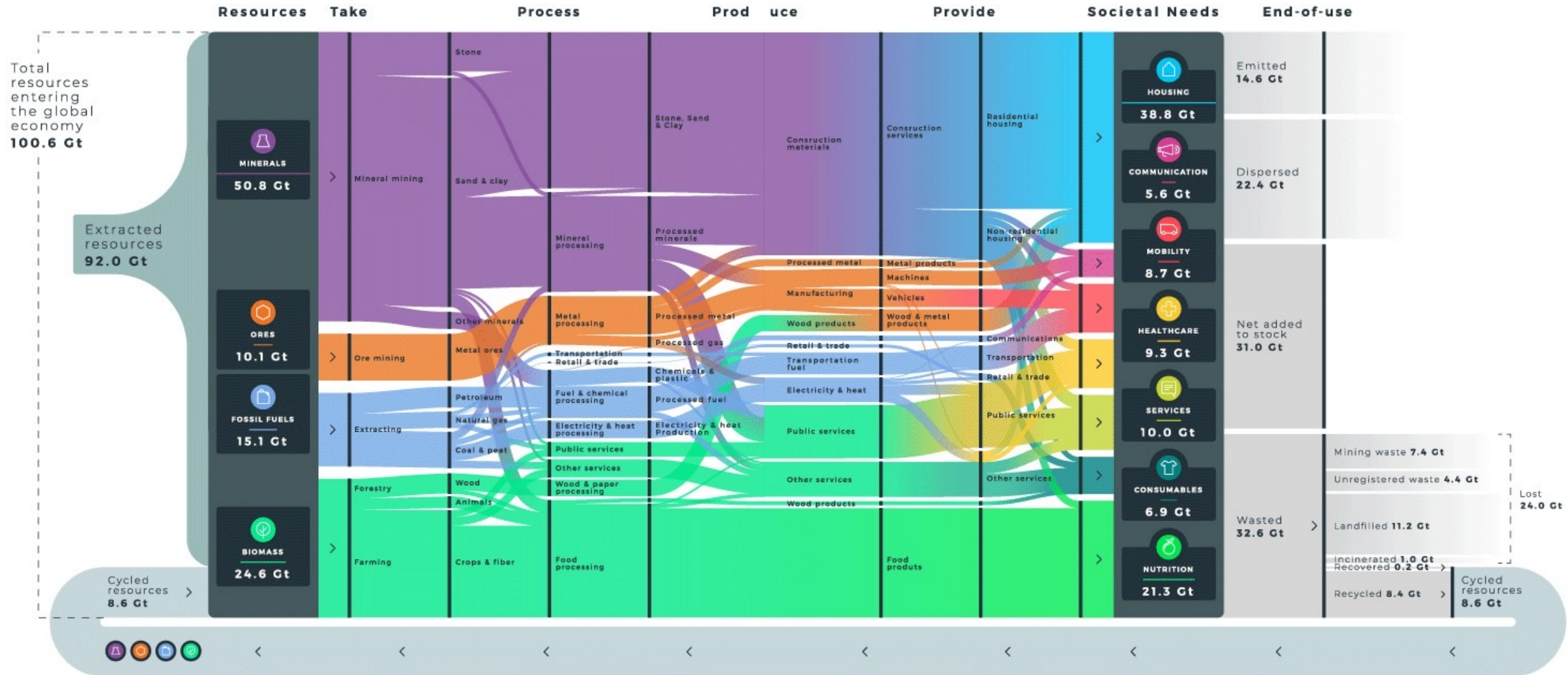
PSL 

- ✧ L'énergie c'est la capacité d'un système à fournir du travail
- ✧ L'énergie est la grandeur qui caractérise le changement d'état d'un système
 - ✧ Température, vitesse, forme...

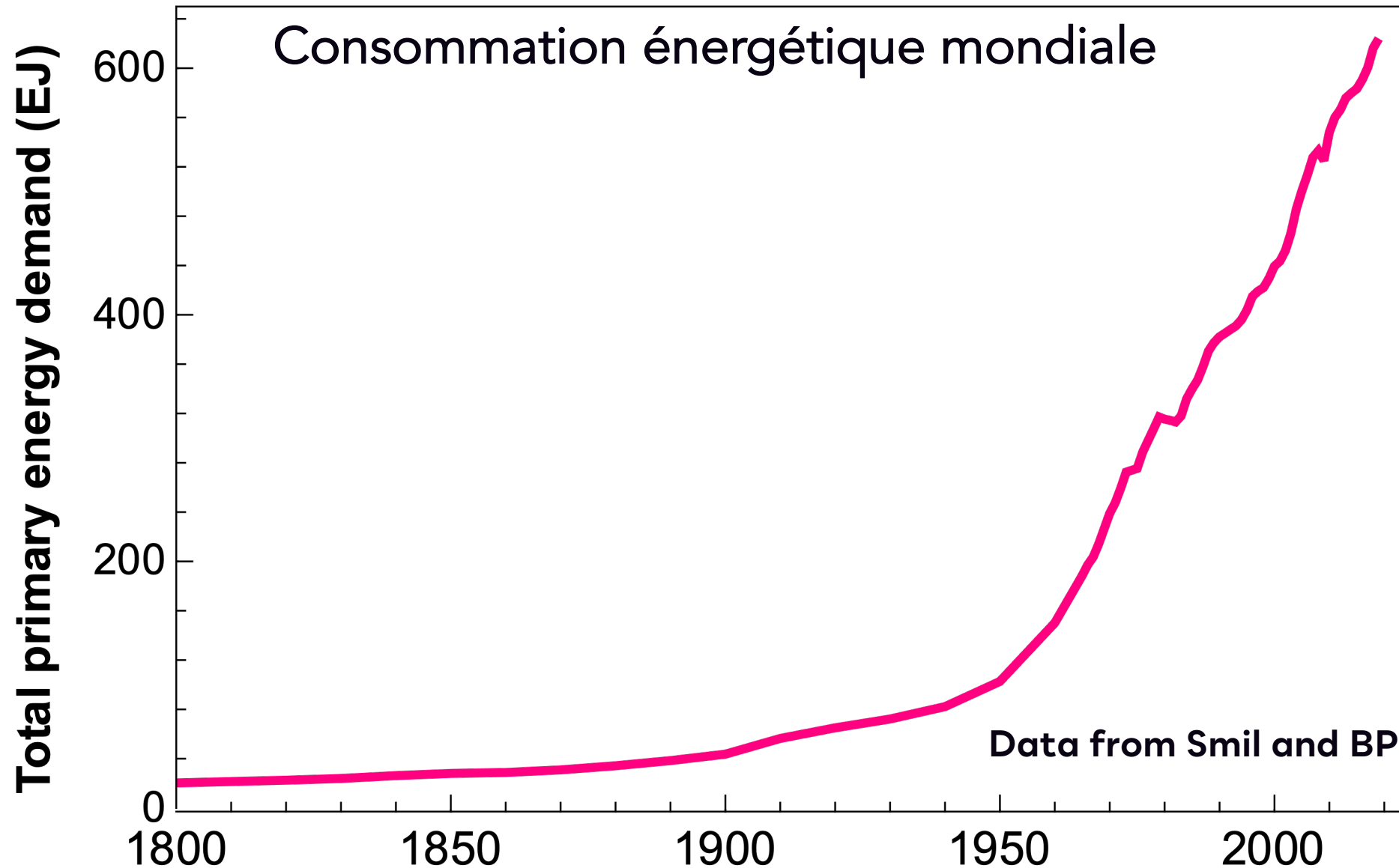


**L'énergie quantifie notre
capacité à changer le
monde!!!**

Nous transformons le monde...

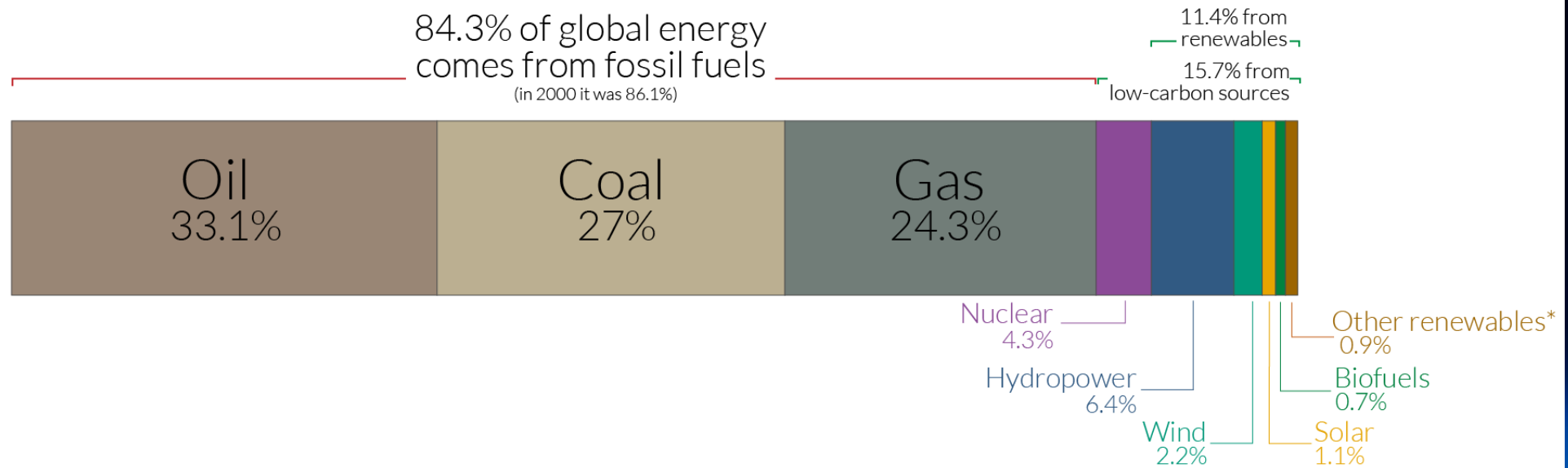


- | | |
|--|--|
| RECOVERED | RECYCLED |
| <ul style="list-style-type: none"> • Waste-to-Energy more than 65% efficient • Biogasification • Component recovery | <ul style="list-style-type: none"> • Recycling/Reclamation • Backfilling • Composting • Regeneration |



Global primary energy consumption by source

The breakdown of primary energy is shown based on the 'substitution' method which takes account of inefficiencies in energy production from fossil fuels. This is based on global energy for 2019.



*'Other renewables' includes geothermal, biomass, wave and tidal. It does not include traditional biomass which can be a key energy source in lower income settings.

OurWorldinData.org - Research and data to make progress against the world's largest problems.

Source: Our World in Data based on BP Statistical Review of World Energy (2020).

Licensed under CC-BY by the author Hannah Ritchie.

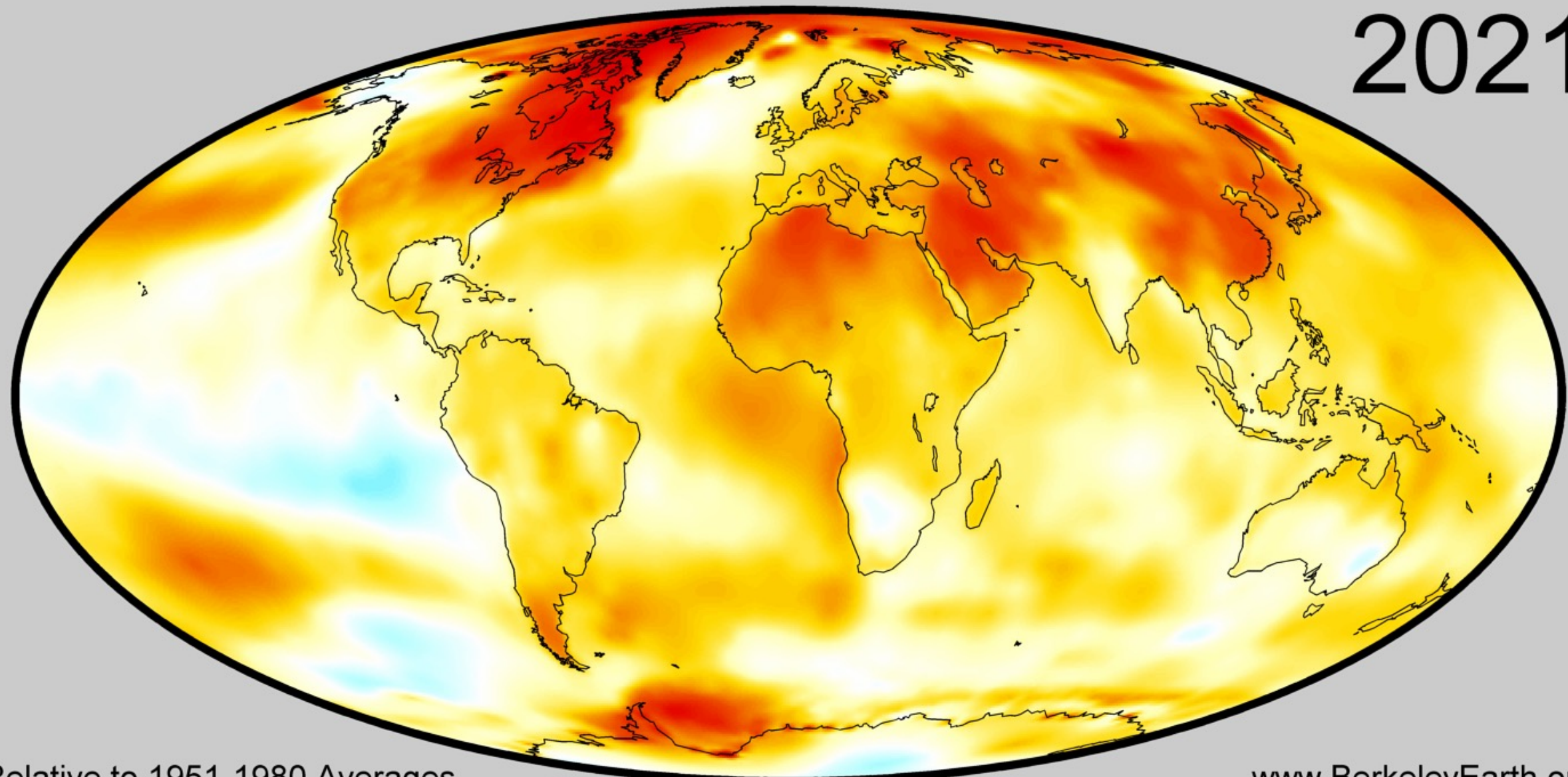
Emissions 2019: 12Gt eqC

**1700 par
an!!!**



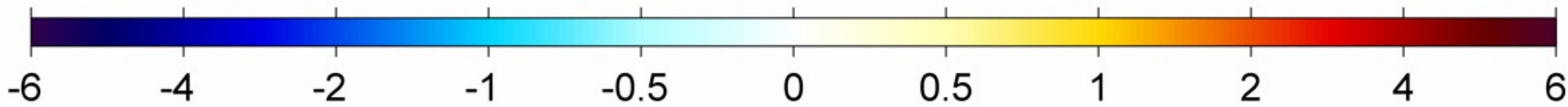
G. De Temmerman, Chroniques énergétiques, 2021

2021



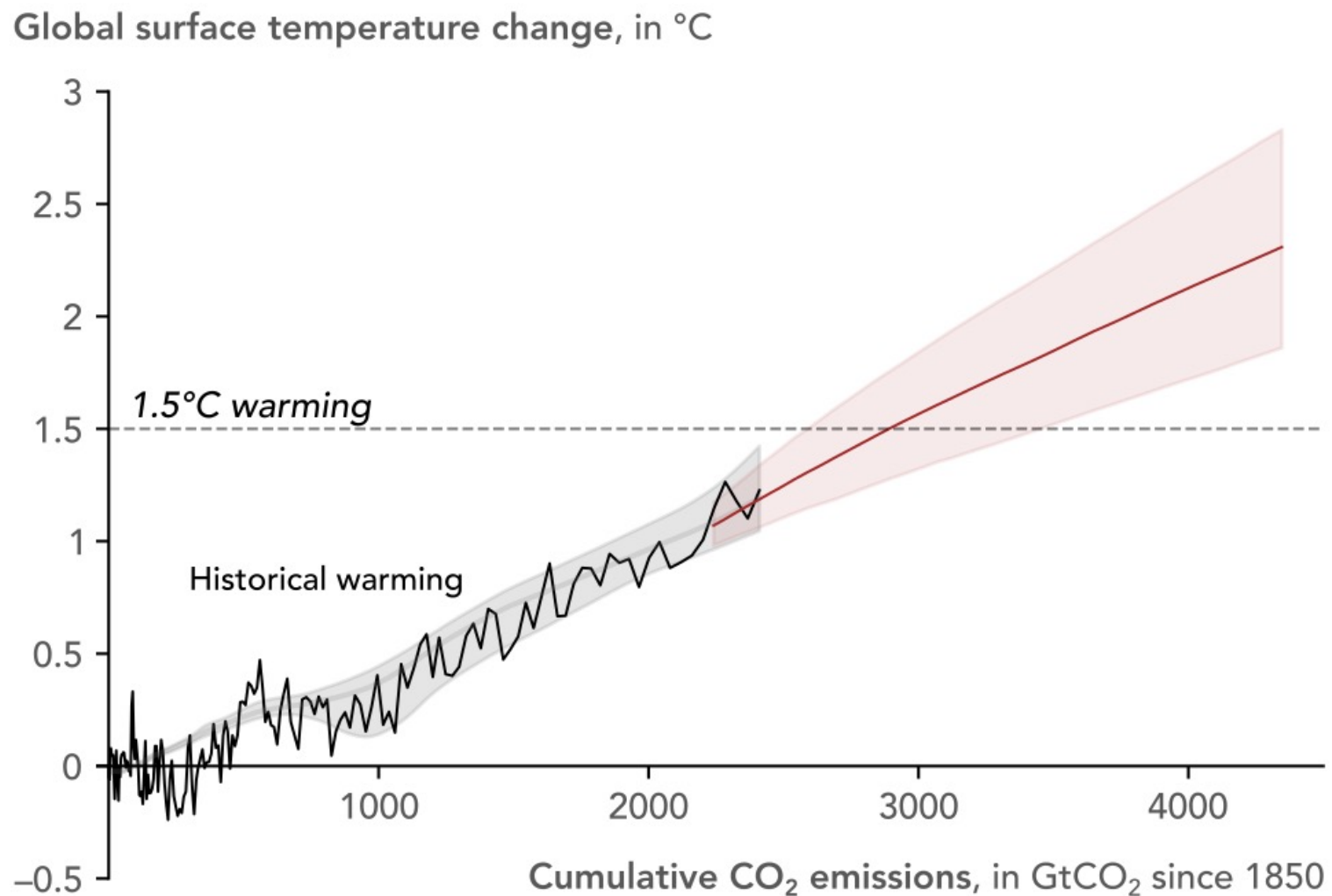
Relative to 1951-1980 Averages

www.BerkeleyEarth.org

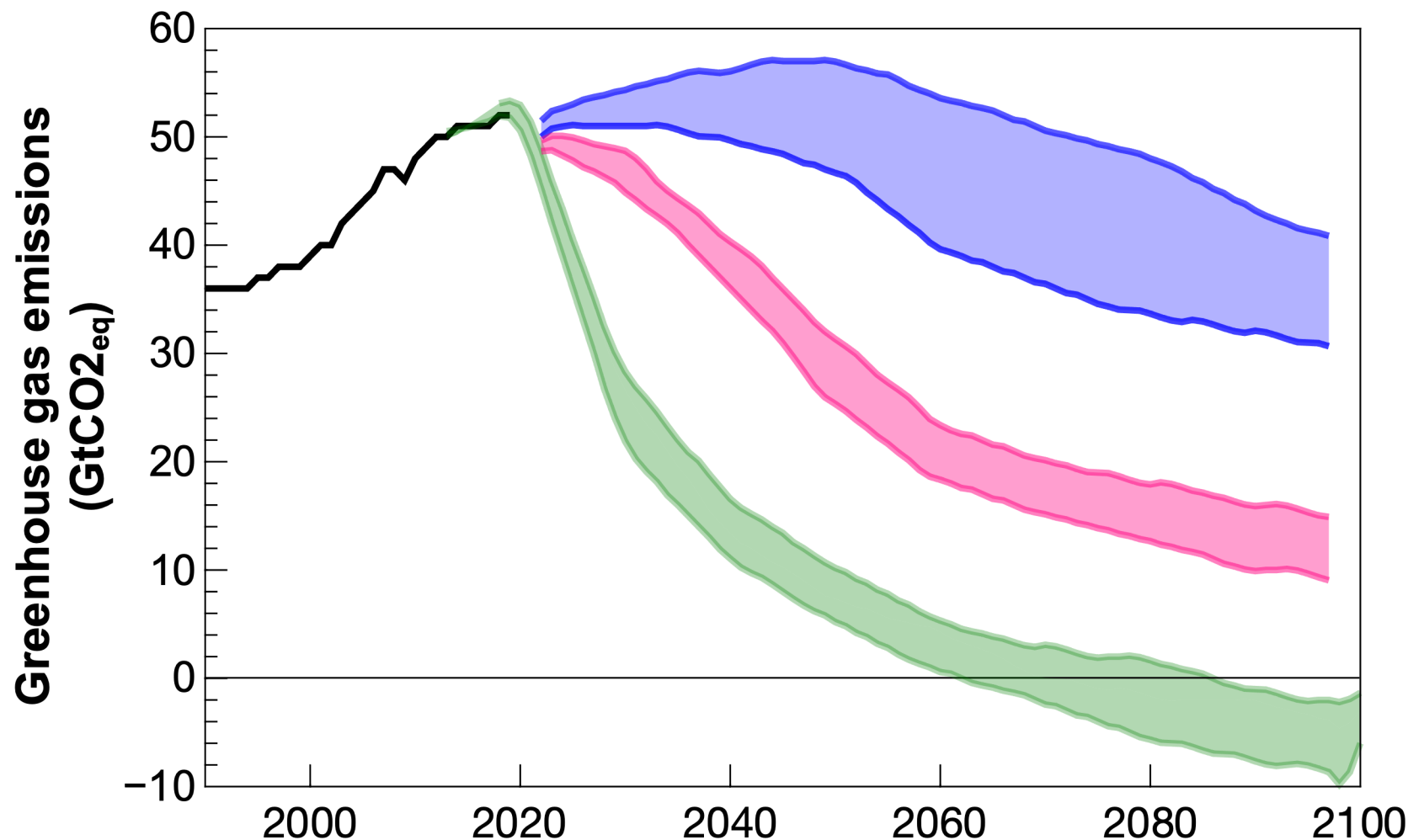


Temperature Anomaly ($^{\circ}$ C)

Le réchauffement dépend des émissions



Trajectoires d'émission

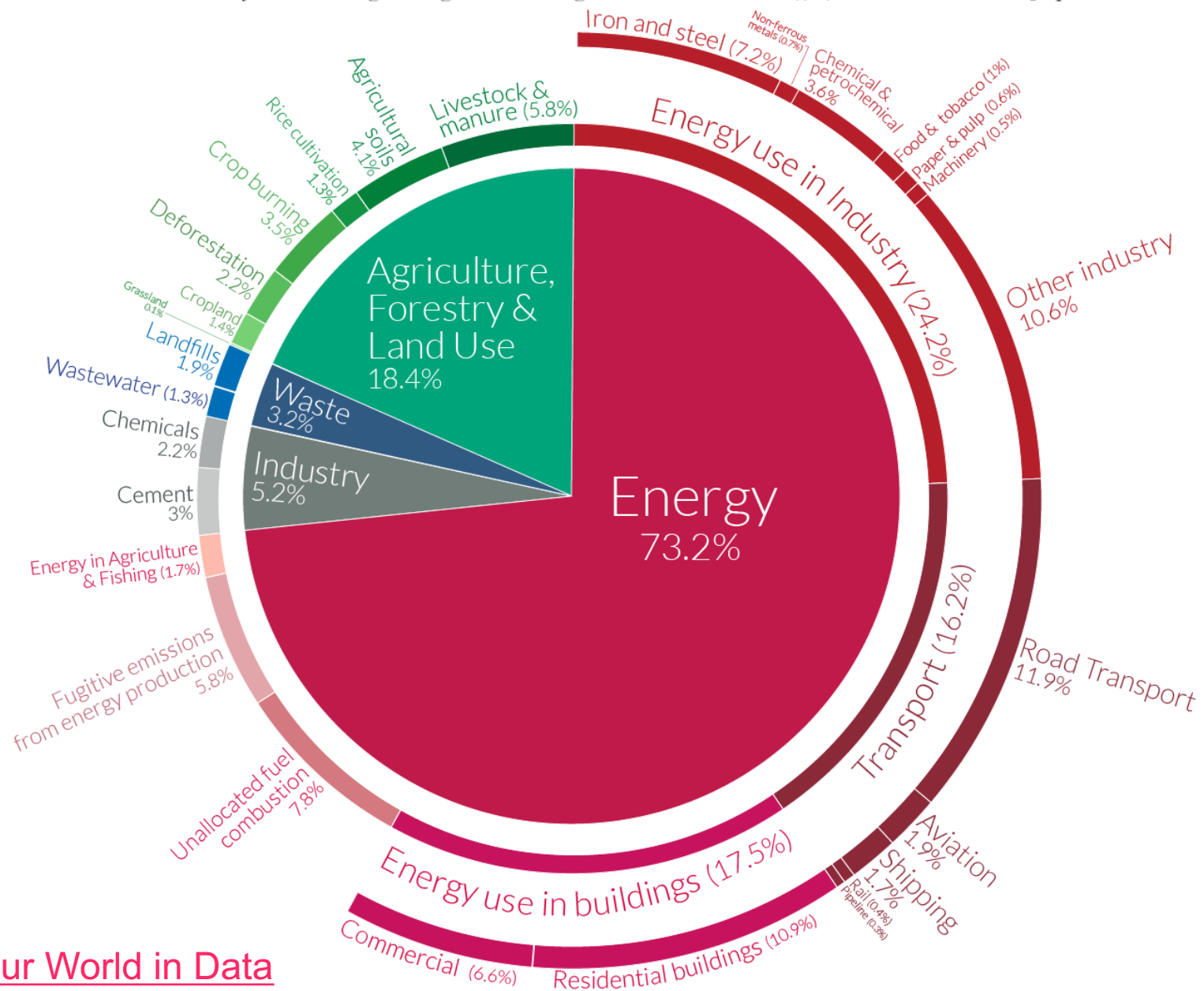


Politiques
en cours
(+2.5-2.9°C)

Promesses
COP 26
(+1.8-2.1°C)

1.5 degrés
COP 21

Emissions de CO₂ par secteur (Monde)



Source: [Our World in Data](https://ourworldindata.org)

Emissions de CO₂ par secteur (France)

Les émissions territoriales de gaz à effet de serre de la France sont estimées à 436 Mt éqCO₂ pour 2019.



Transports = 136 Mt éqCO₂



Industrie = 84 Mt éqCO₂



Agriculture = 83 Mt éqCO₂



Bâtiments = 75 Mt éqCO₂ (79 Mt éqCO₂ après correction des variations météorologiques)



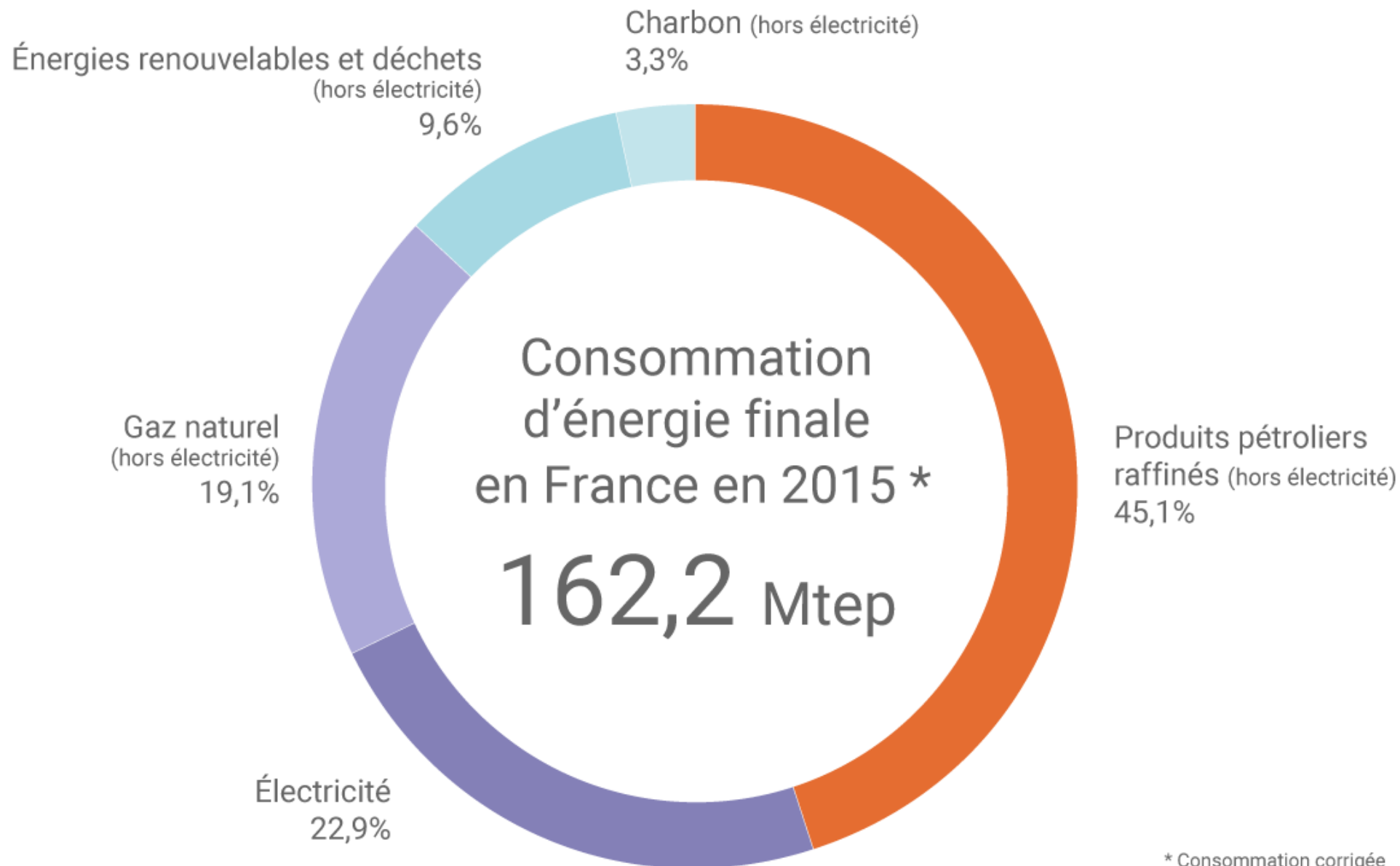
Transformation d'énergie = 42 Mt éqCO₂



Déchets = 15 Mt éqCO₂



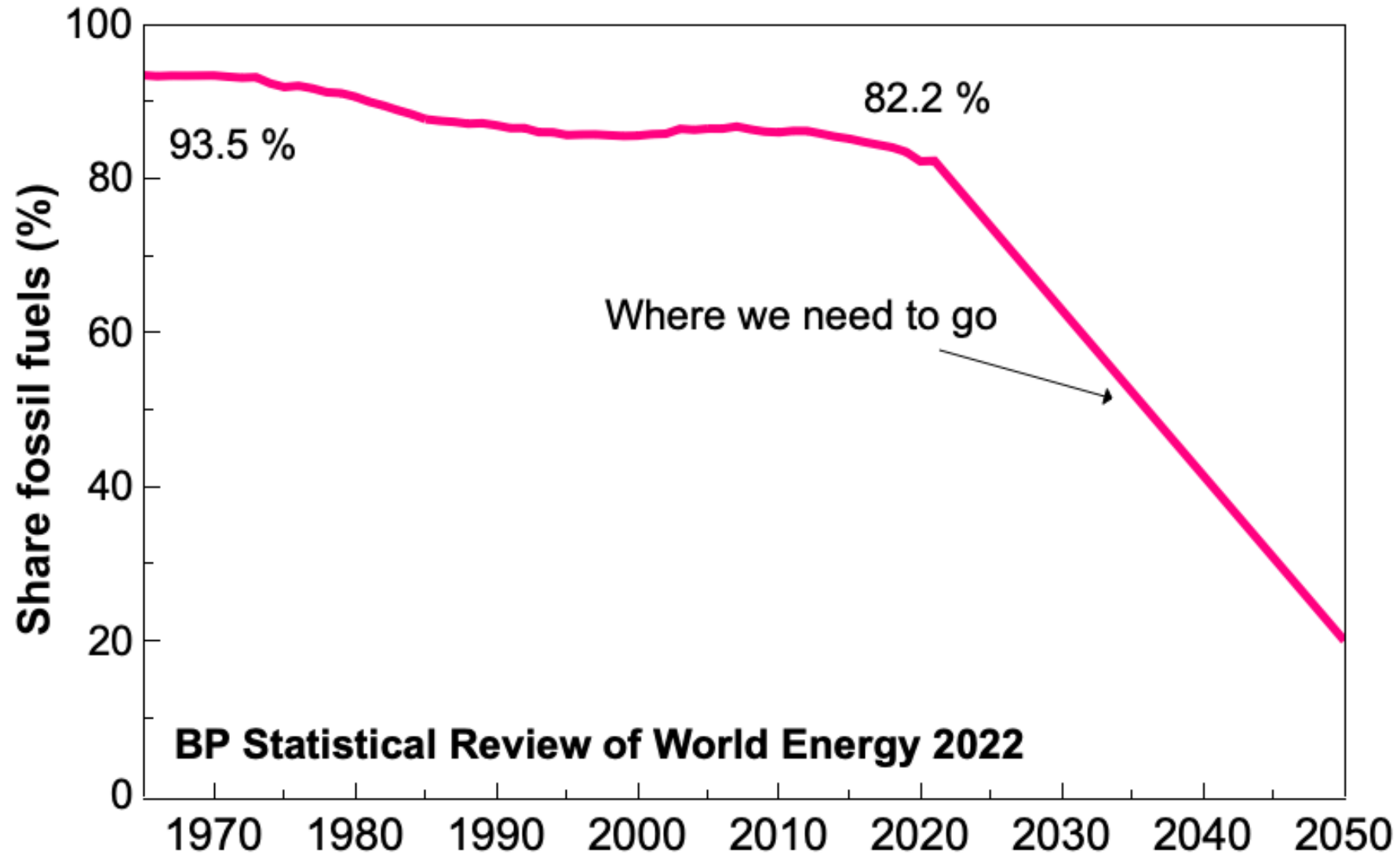
En France aussi l'énergie est fossile



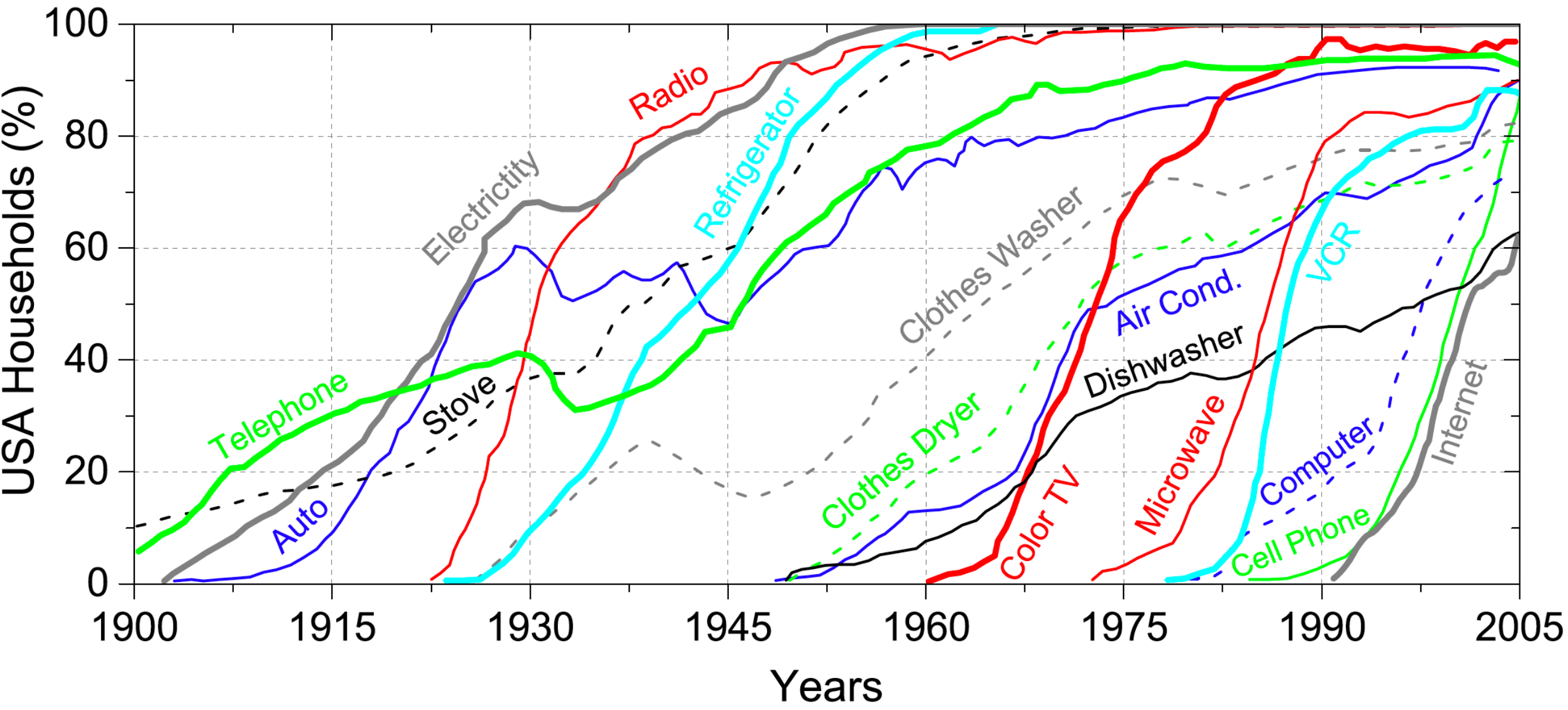
Source : Ministère de l'Environnement, de l'Énergie et de la Mer

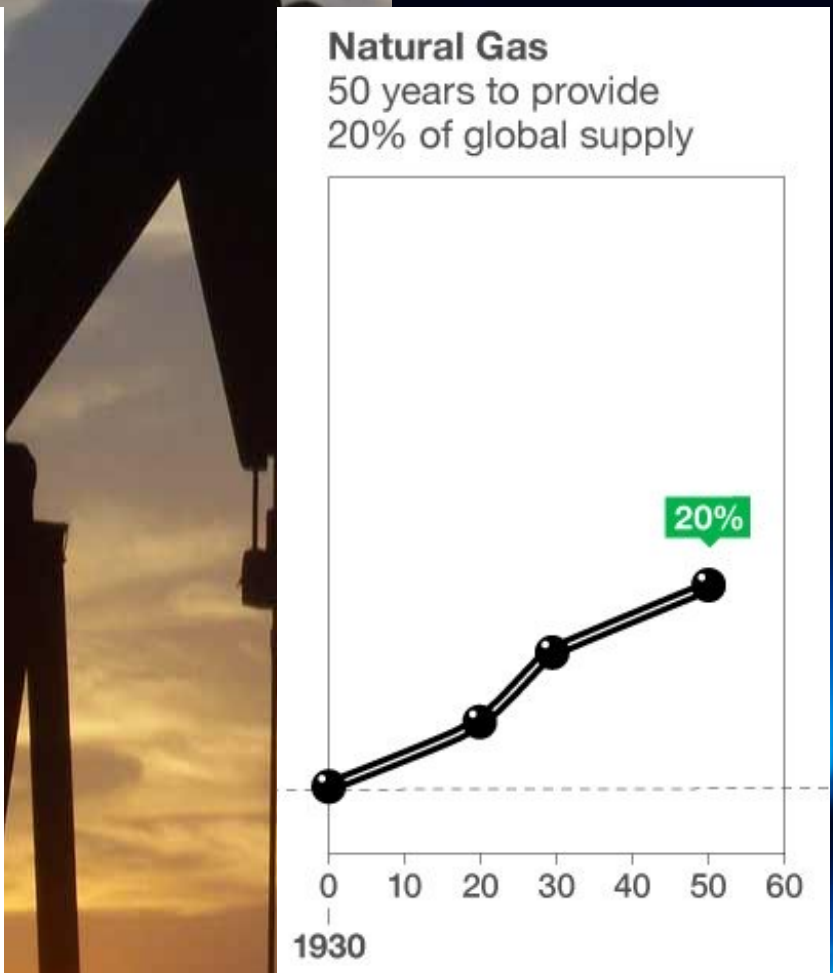
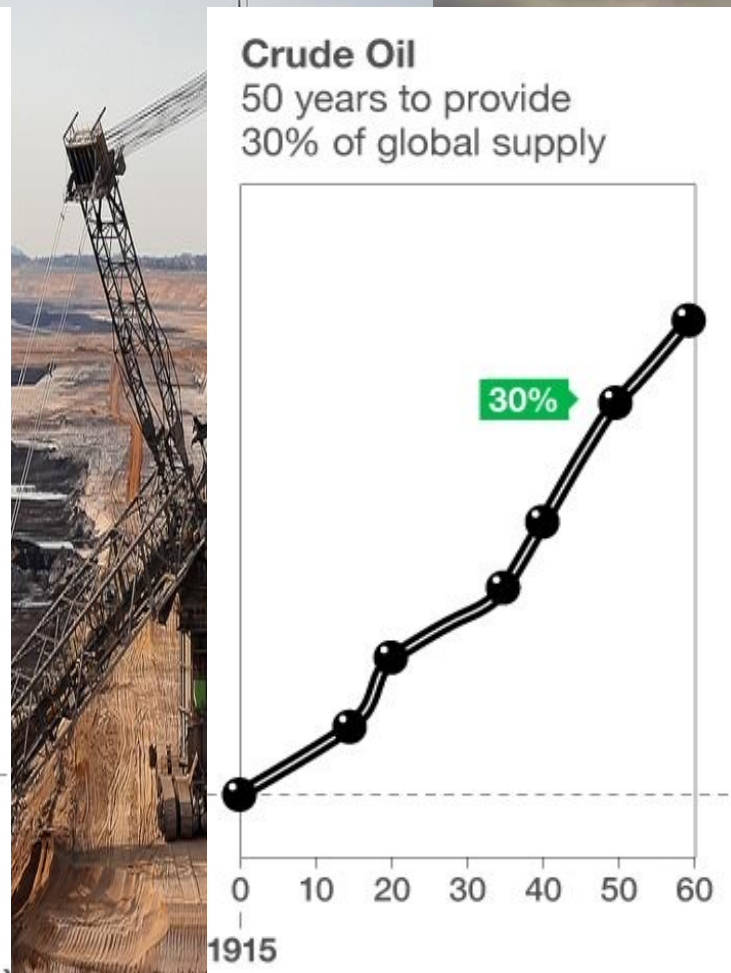
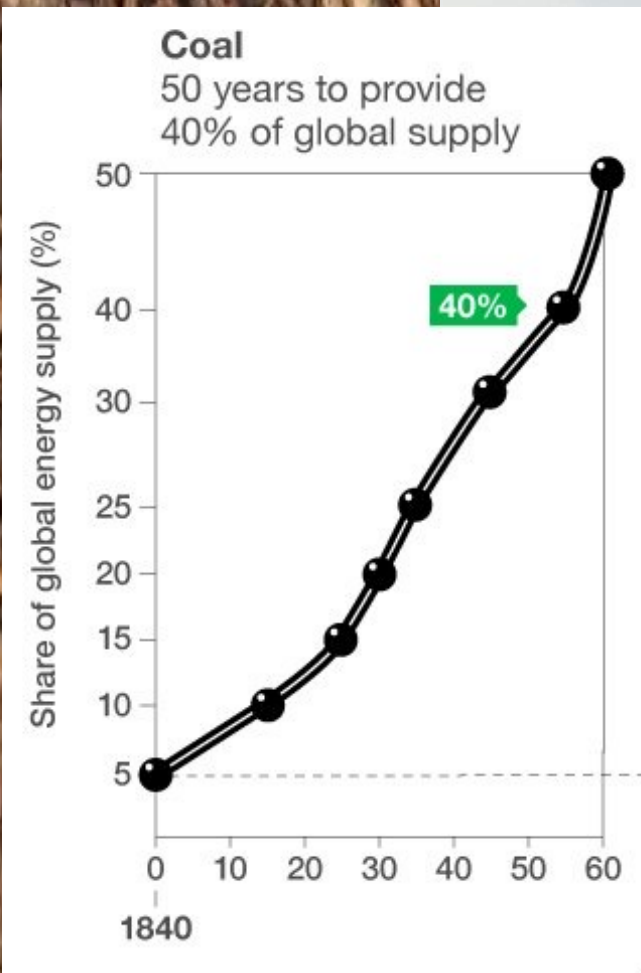
* Consommation corrigée des variations climatiques.

Un sevrage rapide est nécessaire

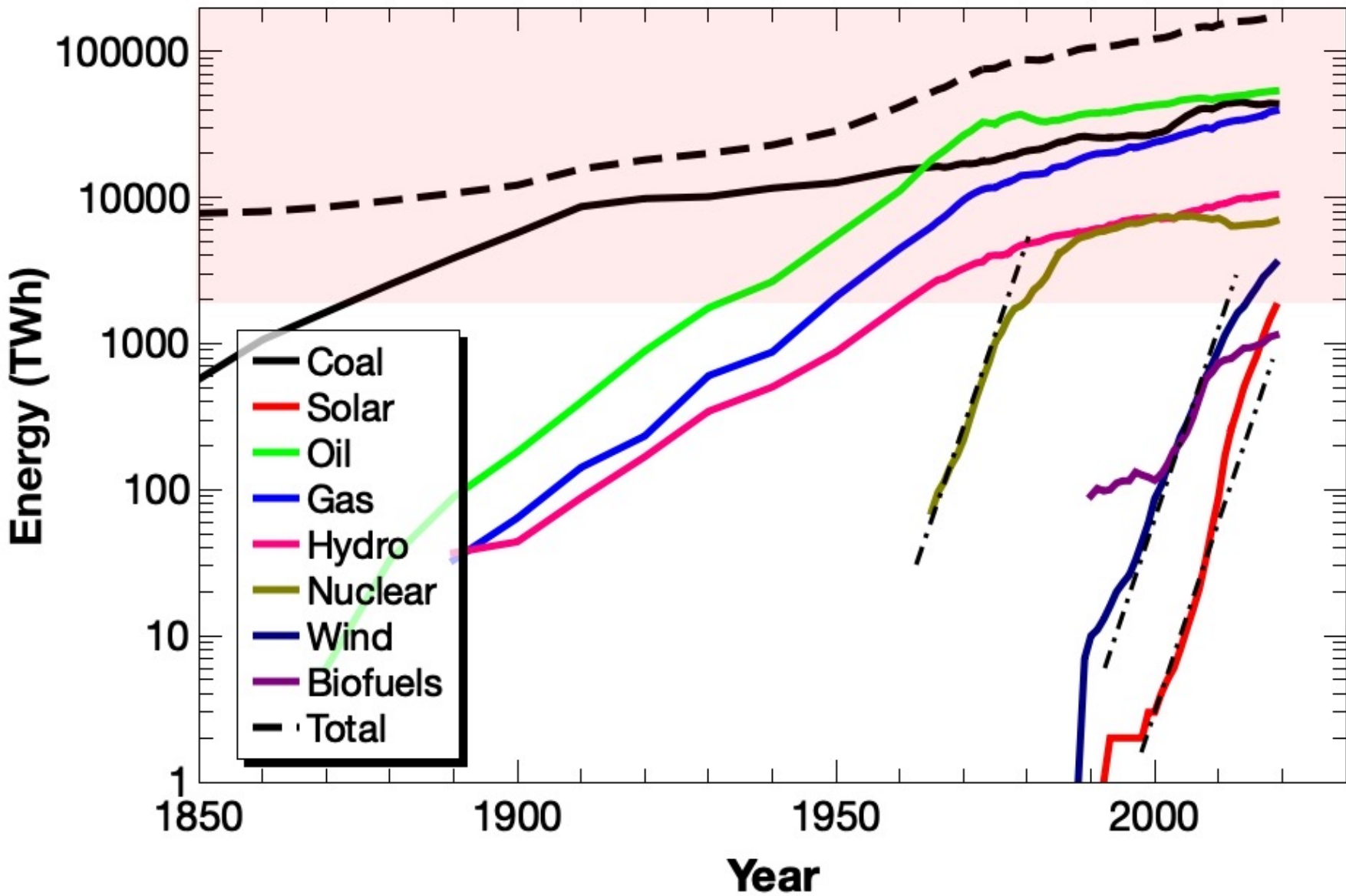


Diffusion rapide de certaines technologies

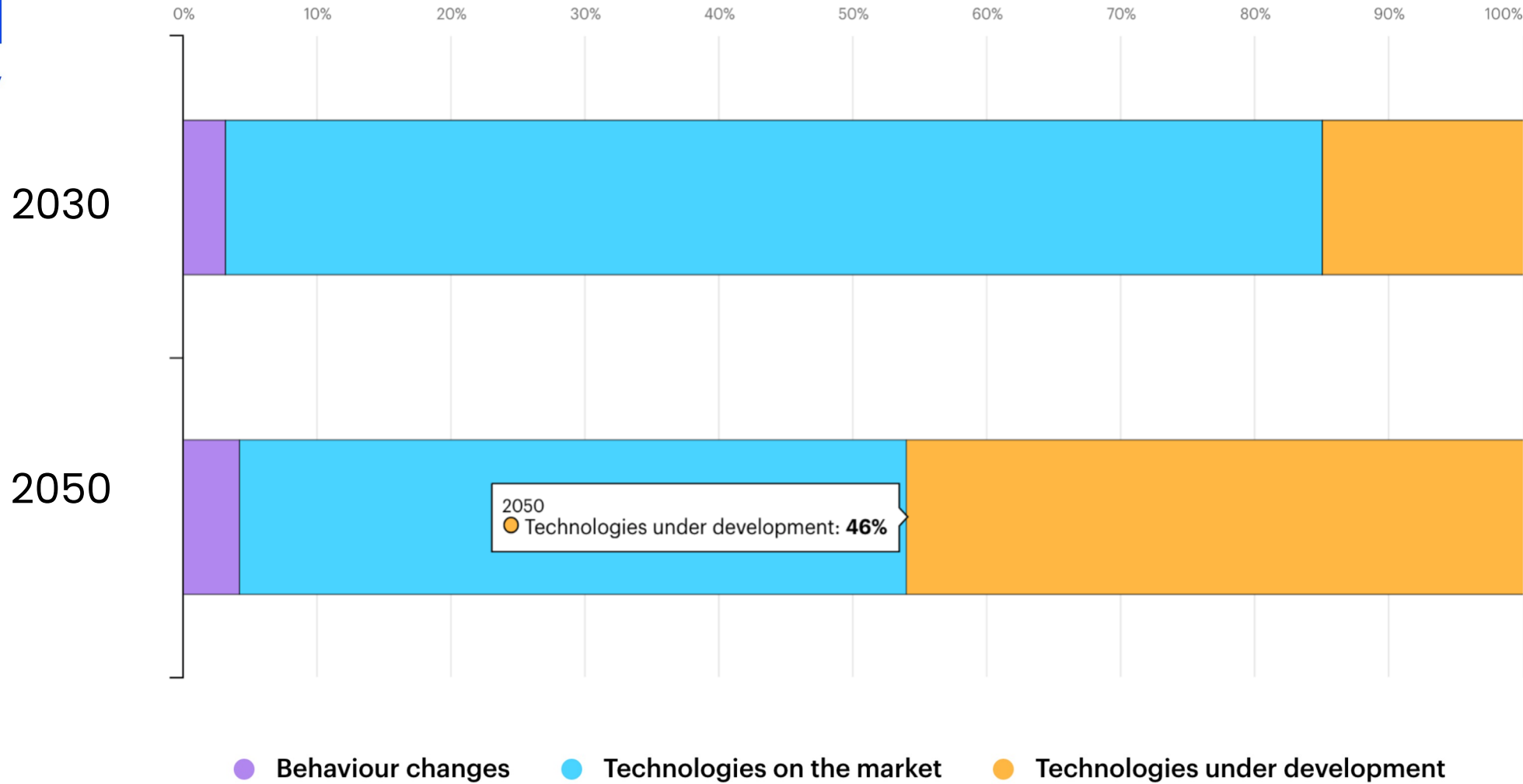




Une accélération aussi dans l'énergie

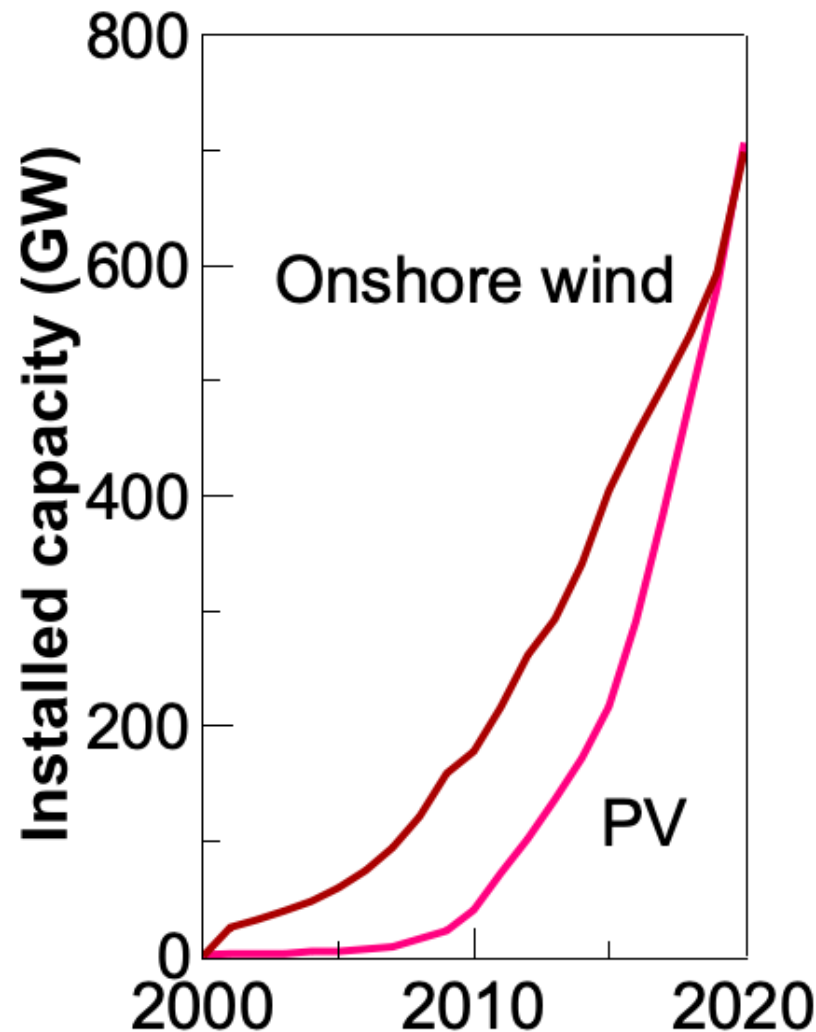
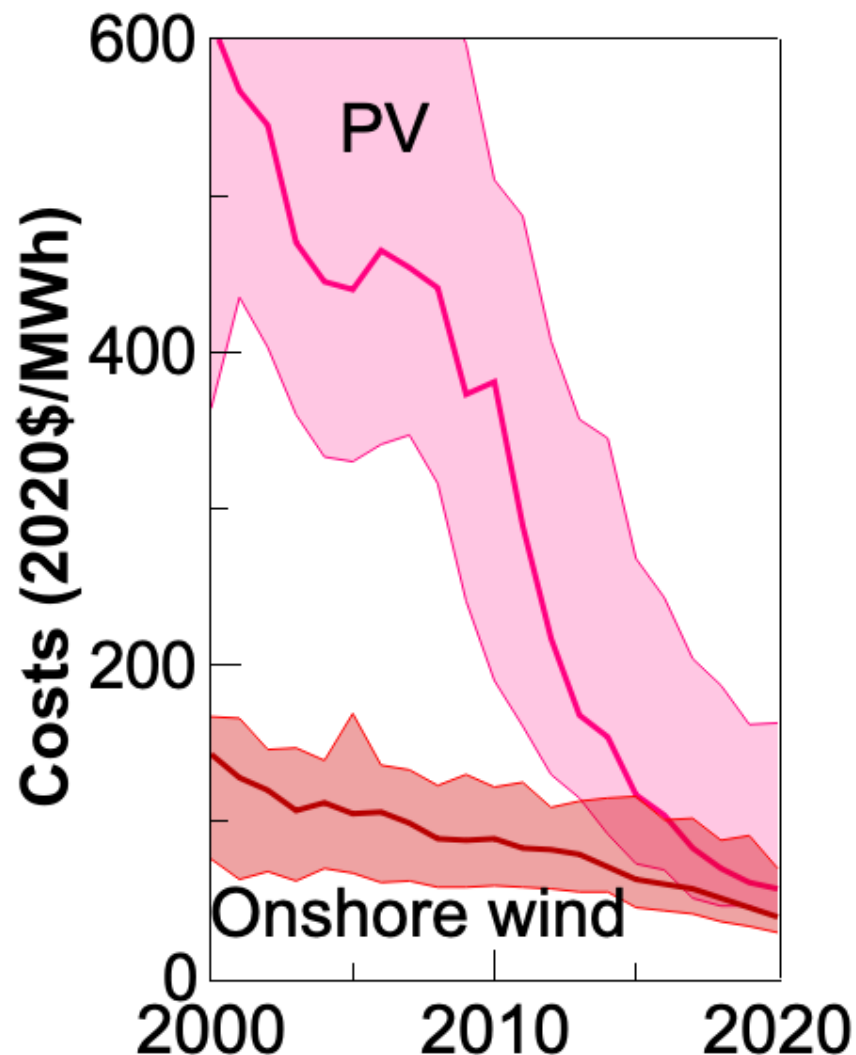


L'innovation est nécessaire



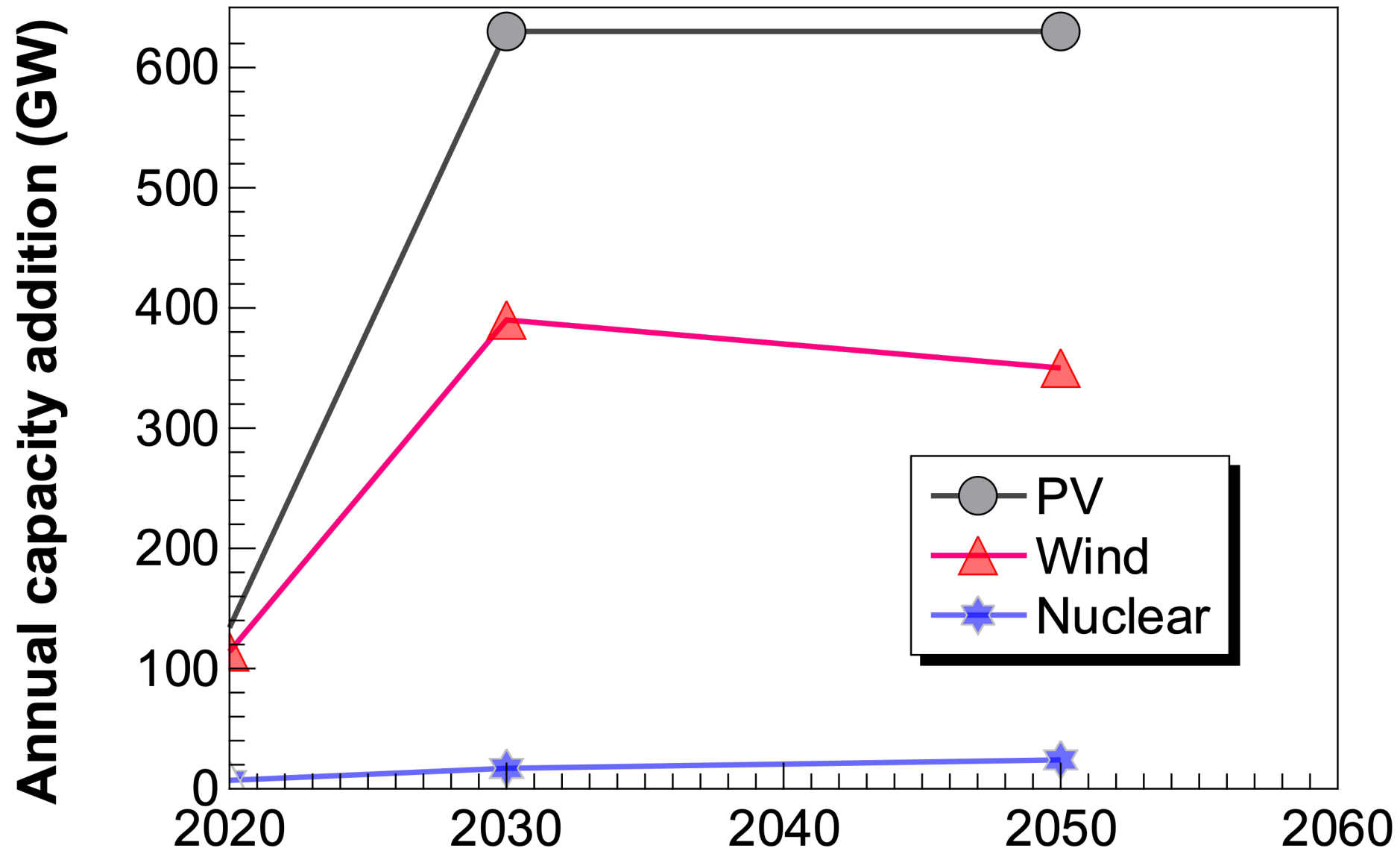
Source

Déployer les technologies existantes

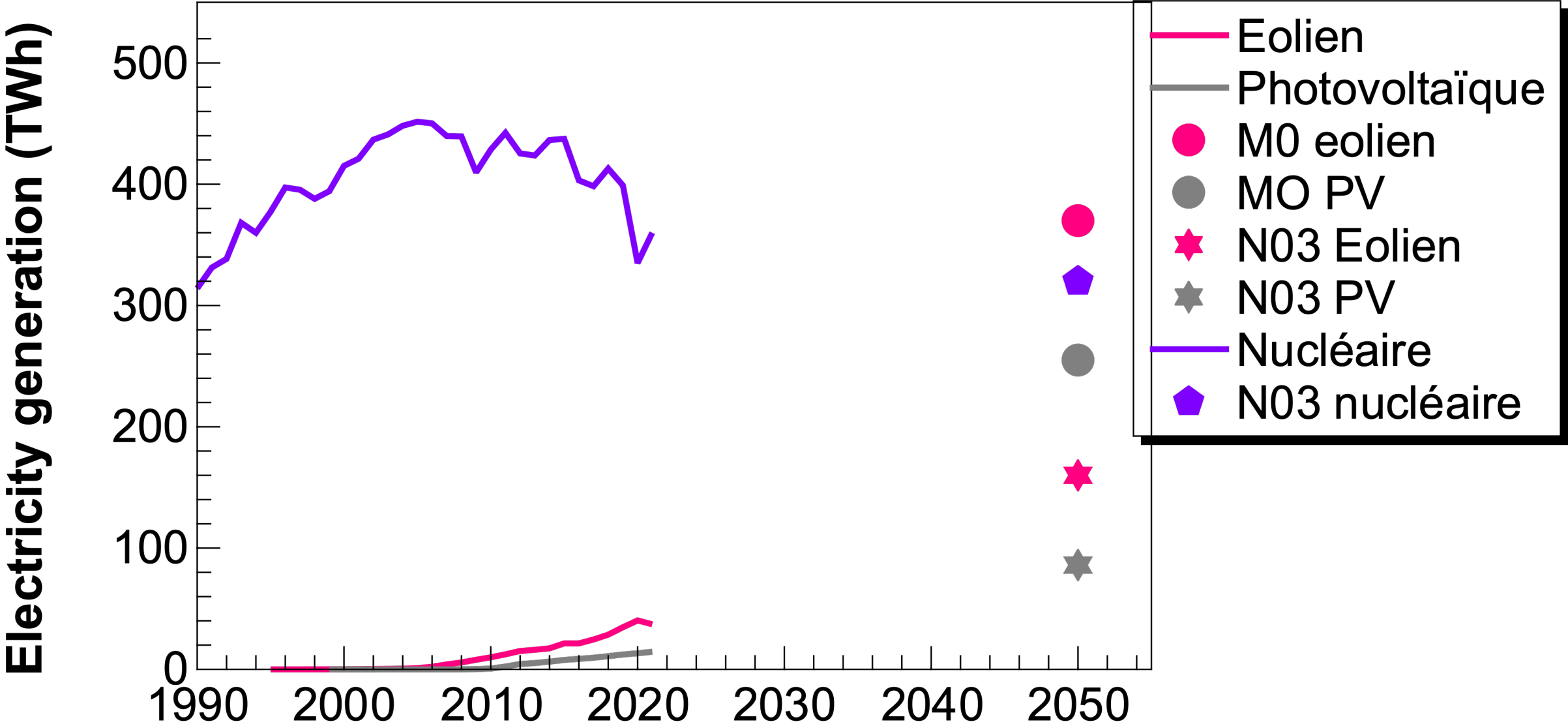


Since 2015
+26%/an
+13%/an

Un déploiement qui doit encore accélérer

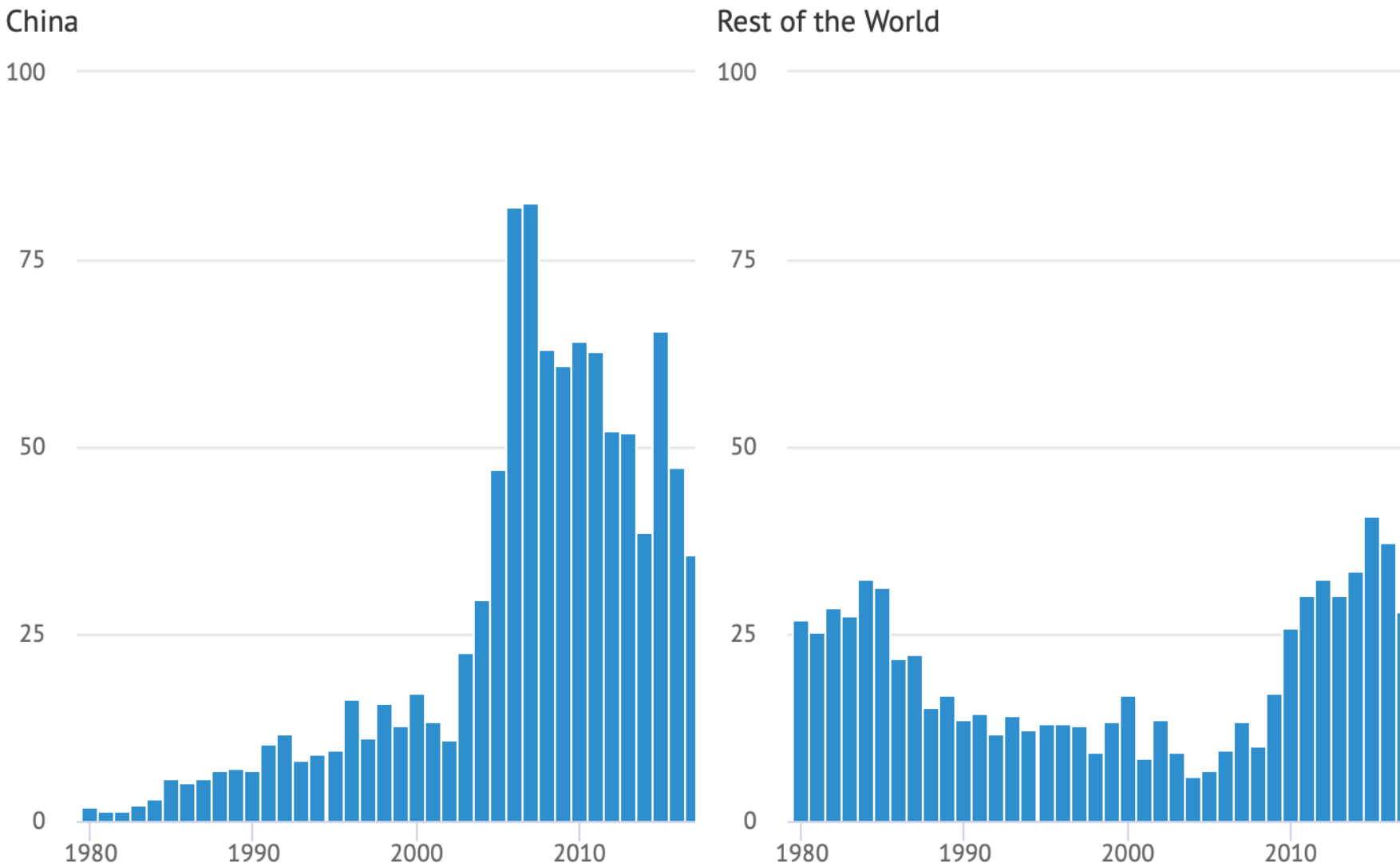


Des EnR qui prendront plus de place



King coal: mourir peut attendre

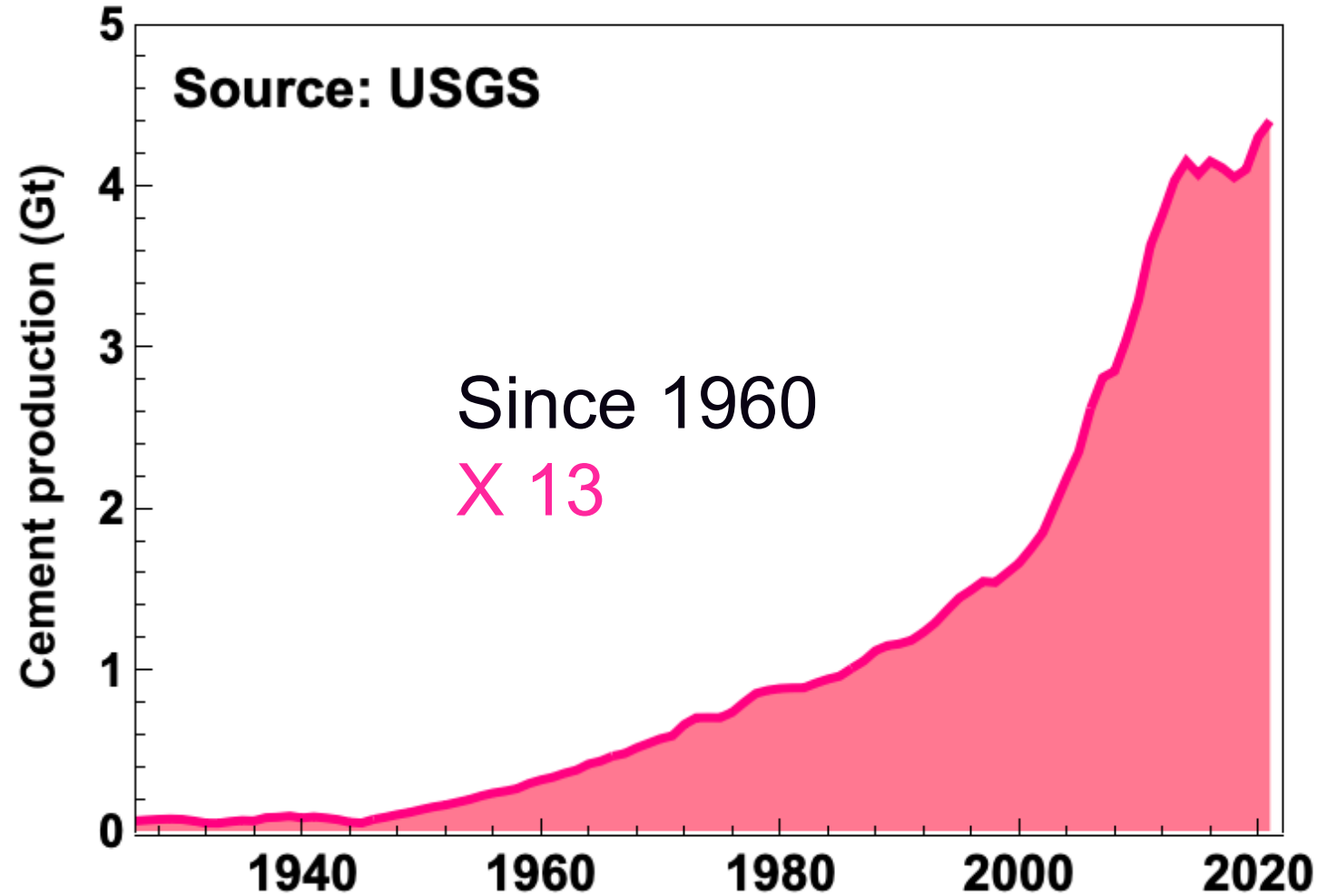
Newly commissioned coal-fired capacity by year, GW



Les piliers de la civilisation moderne (1/3)

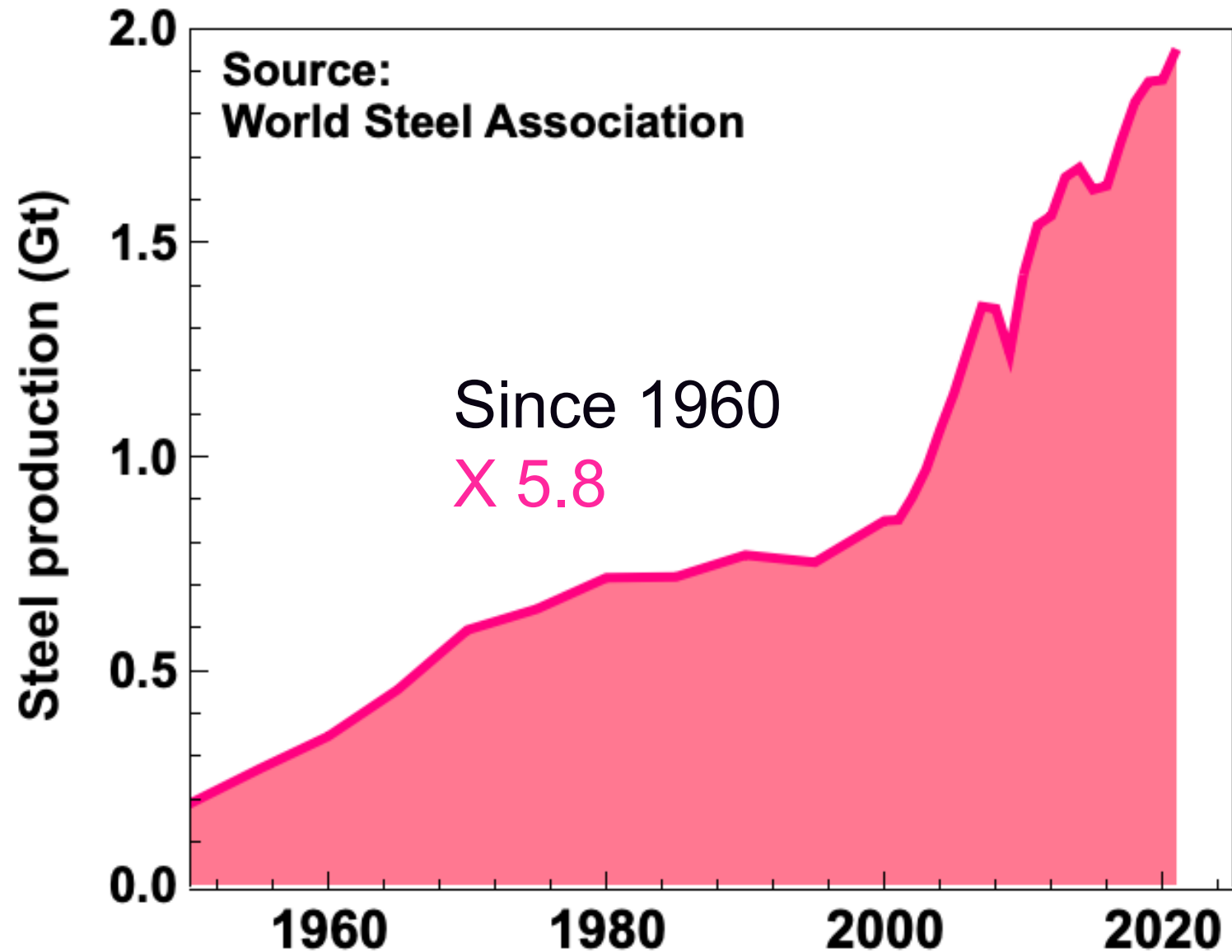


6.5%
of global
CO₂
emissions





7%
of global
CO₂
emissions

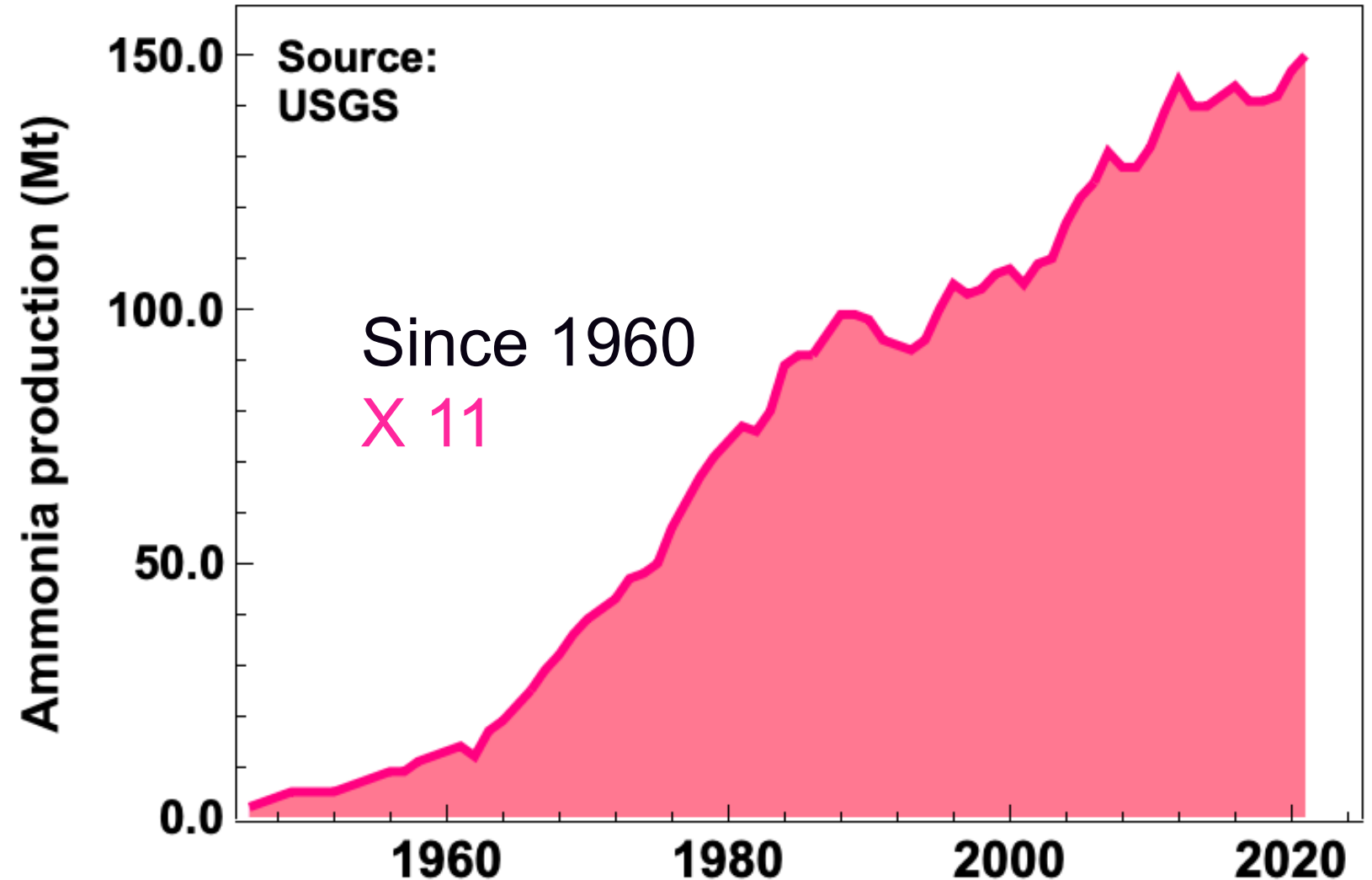


Les piliers de la civilisation moderne (3/3)



Ammonia

2%
of global
CO₂
emissions





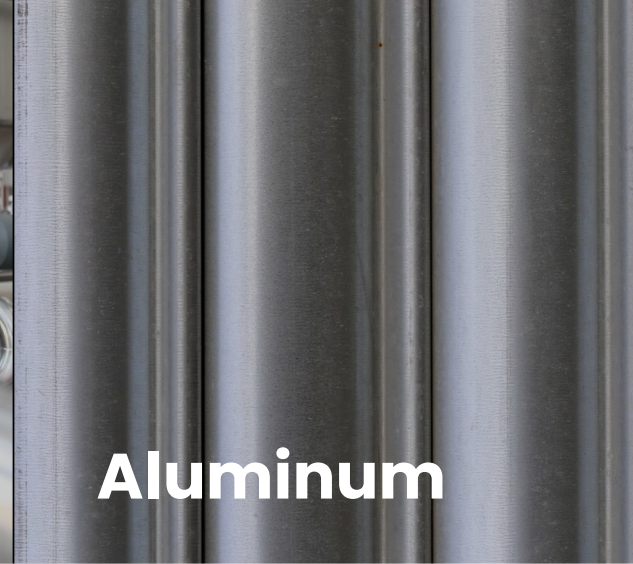
Mining



Hydrogen



Chemicals



Aluminum



Shipping



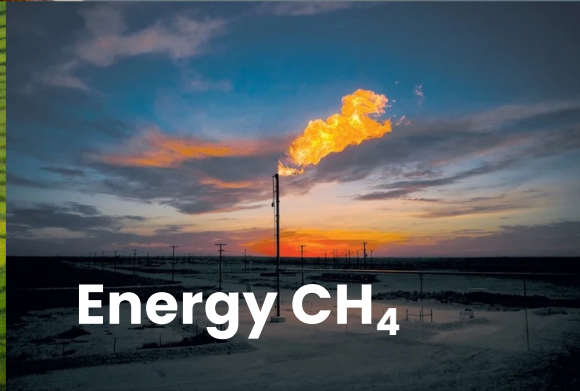
Trucking



Aviation



Agriculture



Energy CH₄

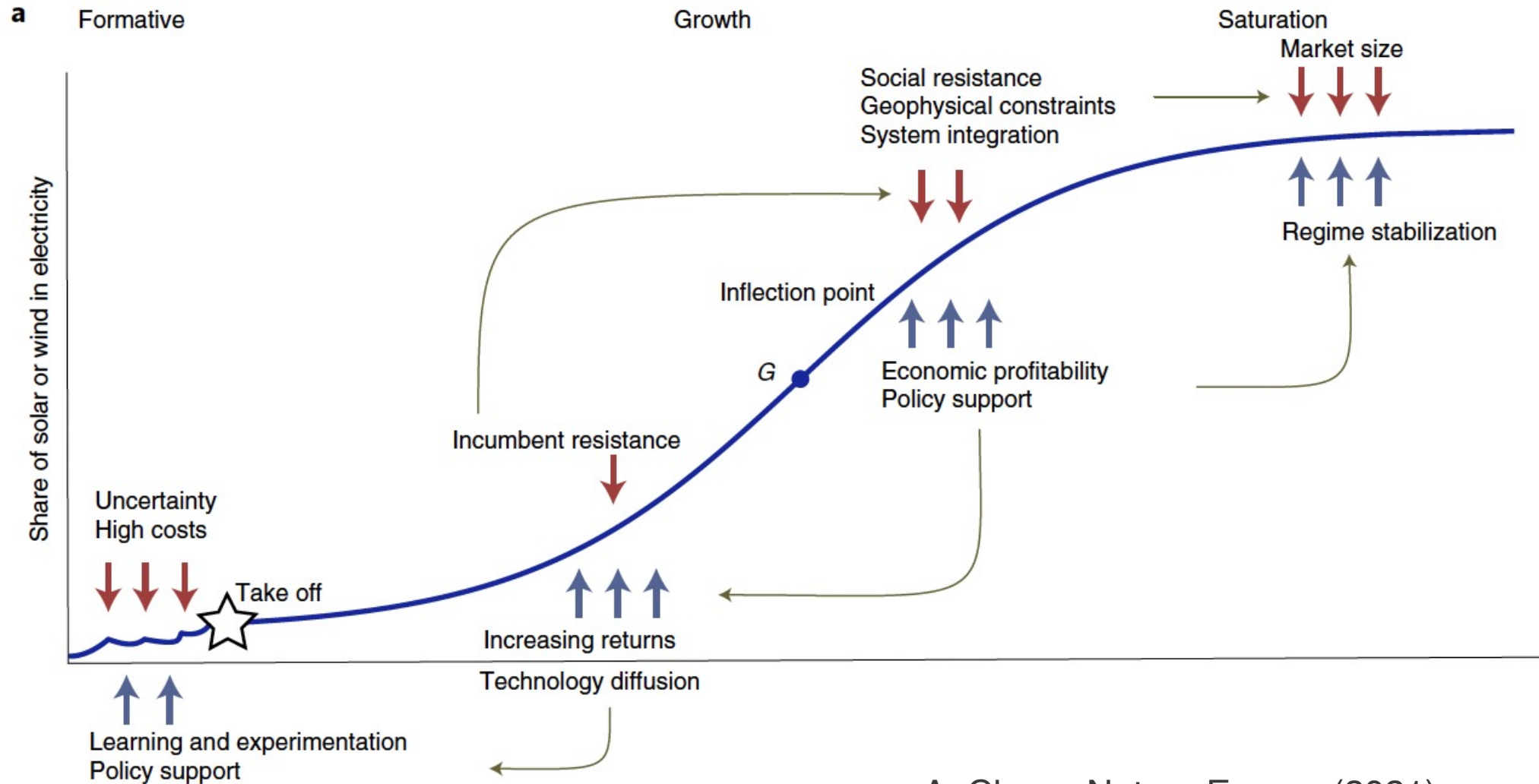


Landfill CH₄



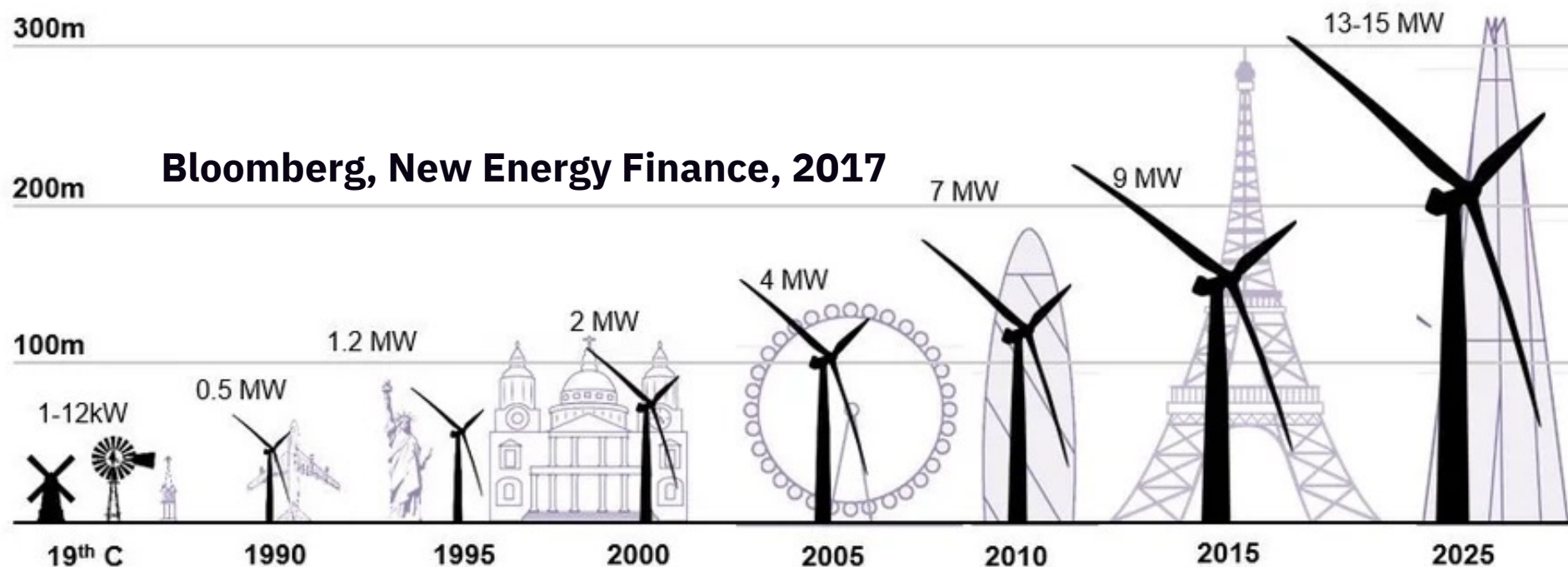
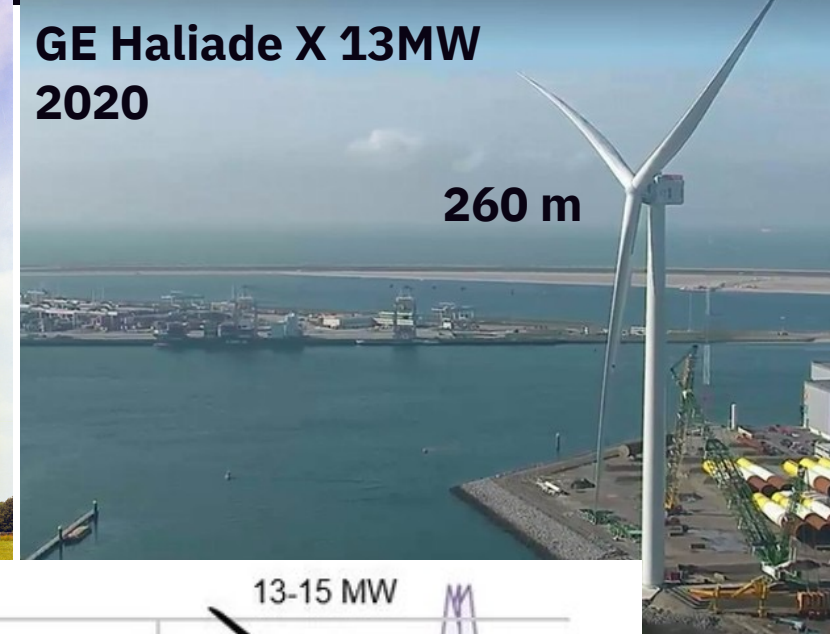
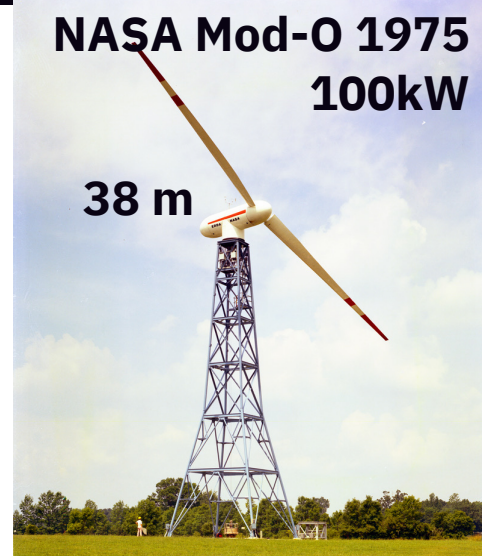
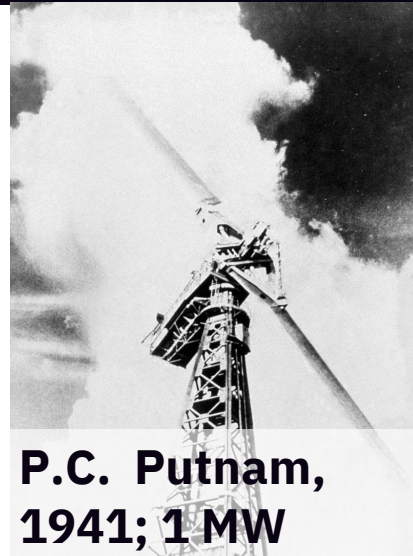
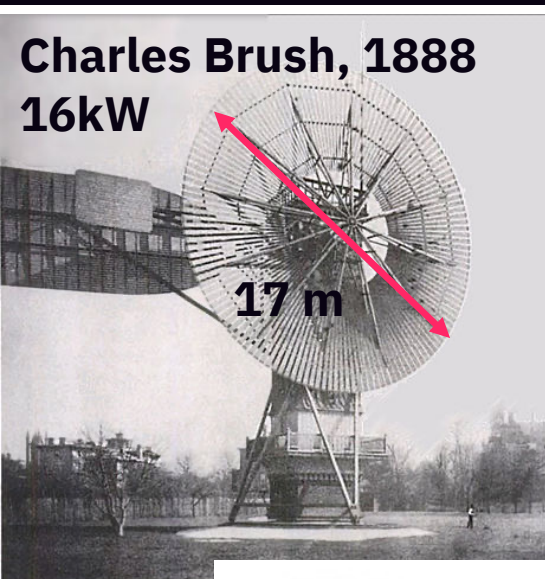
Wastewater

Transition: 'festina lente'?



A. Cherp, Nature Energy (2021)

Développement de l'éolien



[Published: 21 June 1974](#)

Prospects for hydrogen as an energy resource

[J. K. Dawson](#)

[Nature](#) 249, 724–726 (1974) | [Cite this article](#)

583 Accesses | 35 Citations | 5 Altmetric | [Metrics](#)

Storing energy in the form of hydrogen is an attractive possibility to provide fuel for transport and the reduction of iron ore. The main obstacle is the expense of the electricity needed to synthesise hydrogen.

Global Food Waste

Approximately 1.3 billion tons of food is lost or wasted every year. That is about **one-third** of all the food produced for human consumption in the world.

6% of global greenhouse gas emissions come from food losses and waste

Our World in Data

Emissions from food that is never eaten accounts for 6% of total emissions



Food production is responsible for 26% of global greenhouse gas emissions

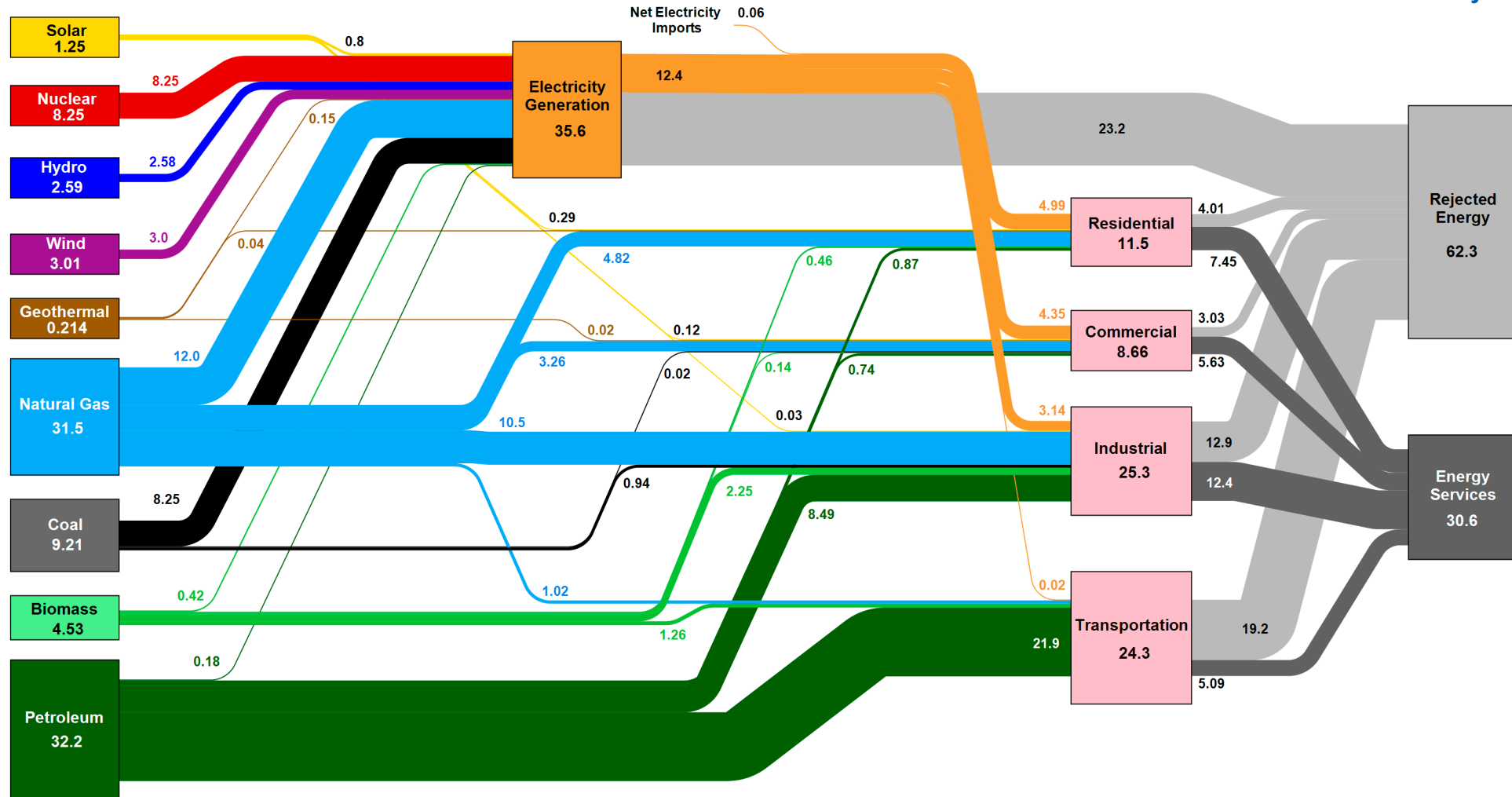
Note: One-quarter of food emissions comes from food that is never eaten: 15% of food emissions from food lost in supply chains; and 9% from consumer waste.

Data source: Joseph Poore & Thomas Nemecek (2018). Reducing food's environmental impacts through producers and consumers. *Science*.

[OurWorldinData.org](https://www.ourworldindata.org) – Research and data to make progress against the world's largest problems.

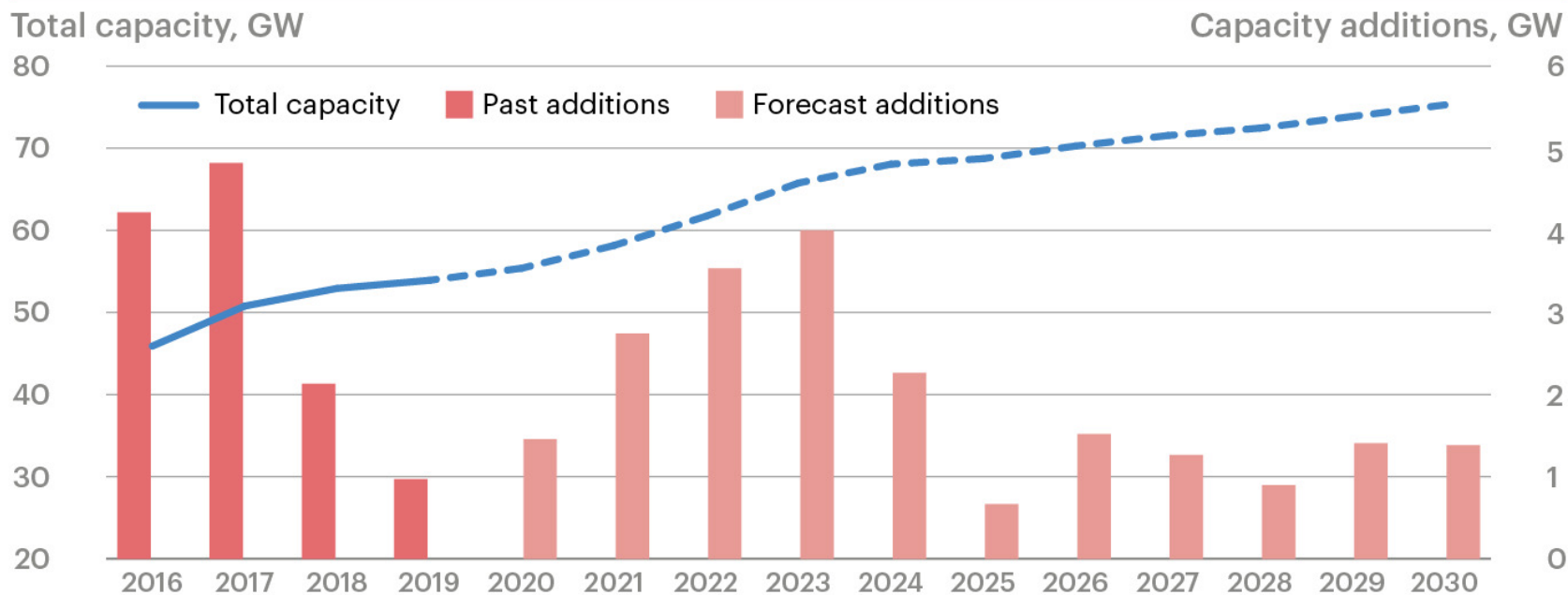
Licensed under [CC-BY](https://creativecommons.org/licenses/by/4.0/) by the author Hannah Ritchie.

Estimated U.S. Energy Consumption in 2020: 92.9 Quads



Source: LLNL March, 2021. Data is based on DOE/EIA MER (2020). If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the Department of Energy, under whose auspices the work was performed. Distributed electricity represents only retail electricity sales and does not include self-generation. EIA reports consumption of renewable resources (i.e., hydro, wind, geothermal and solar) for electricity in BTU-equivalent values by assuming a typical fossil fuel plant heat rate. The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary energy input into electricity generation. End use efficiency is estimated as 65% for the residential sector, 65% for the commercial sector, 21% for the transportation sector and 49% for the industrial sector, which was updated in 2017 to reflect DOE's analysis of manufacturing. Totals may not equal sum of components due to independent rounding. LLNL-MI-410527

German onshore wind capacity addition expectations



Source: ICIS, Deutsche Windguard

Q Search

Bloomberg CityLab

Sign In

CITYLAB

When Residents Support Solar—Just ‘Not in My Backyard’

While the American public broadly favors expanding renewable energy, that support doesn't always extend to the photovoltaic panels next door.

27 Mar 2019 | Benjamin Wehrmann

Limits to growth: Resistance against wind power in Germany

#Renewables #Wind #Society



Wind turbines have become one of the most visible components of Germany's energy transition and increasingly dominate the landscape in many parts of the country. While most people support a roll-out of the technology, Germany's most important renewable

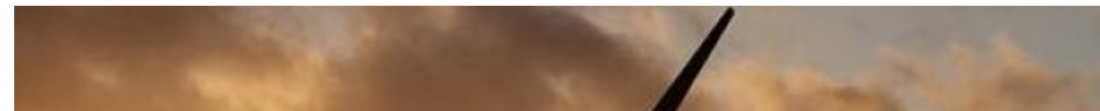
Opposition to wind farm says plans are being assessed based on old guidelines

Locals in Sligo and Leitrim are opposing 10 new 170m wind turbines

© Wed, Sep 2, 2020, 01:34

Marese McDonagh

LISTEN NOW 3:24



15/09/2017
Partager ce contenu

Hydrogène : solution ou mirage ?

▶ ÉCOUTER (58 MIN) 

À retrouver dans l'émission
LA MÉTHODE SCIENTIFIQUE par Michel Alberganti

 S'ABONNER  CONTACTER L'ÉMISSION

Bill Gates: This is what we need to do to tackle climate change

How batteries could charge up the fight against climate change

By [Jonathan Eckart](#)

January 5, 2018

OPINION

Want to stop climate change? Embrace the nuclear option.

USA Today, 2020

Without nuclear, even if we achieved net-zero new emissions globally, we'd continue to add extra heat at the same rate we are adding it today.

BRET KUGELMASS | OPINION CONTRIBUTOR

Is nuclear fusion the answer to the climate crisis?

Promising new studies suggest the long elusive technology may be capable of producing electricity for the grid by the end of the decade

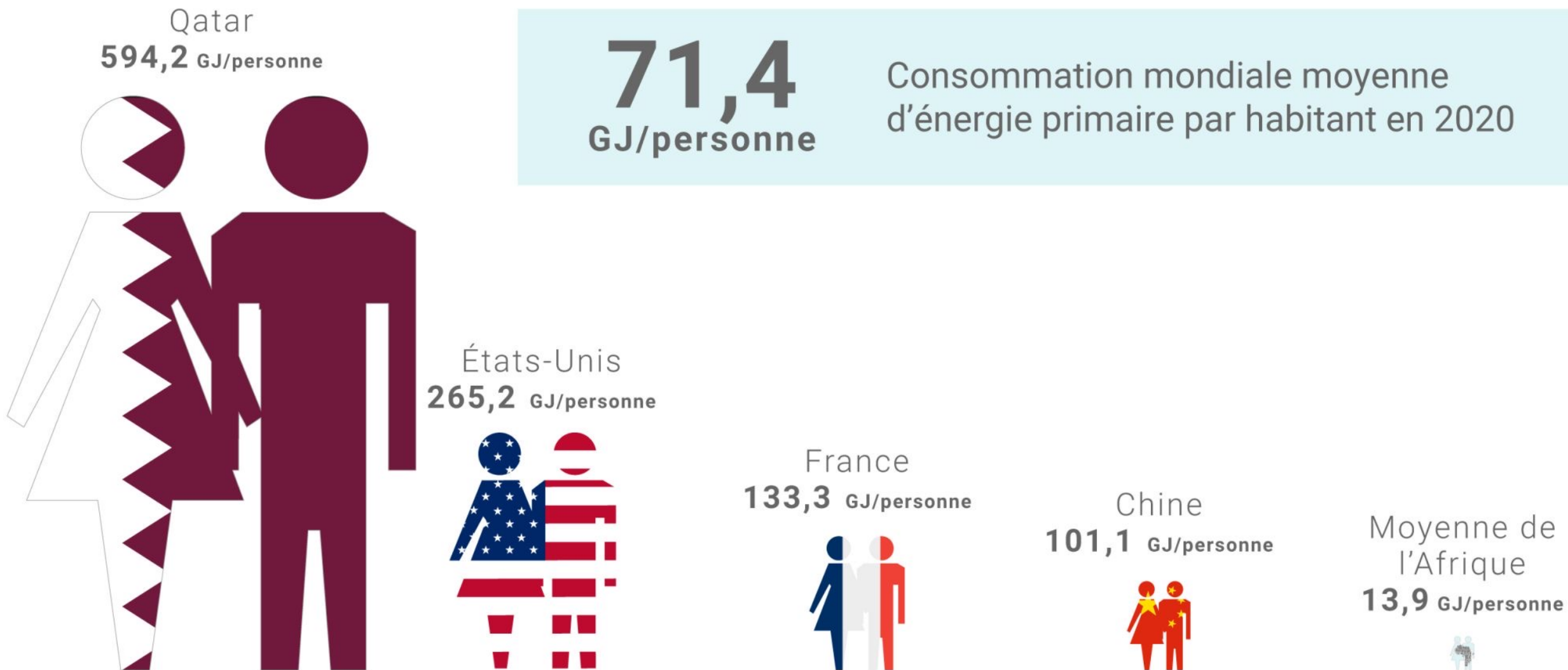
Guardian, 2020



L'hydrogène est-il une solution d'avenir ?

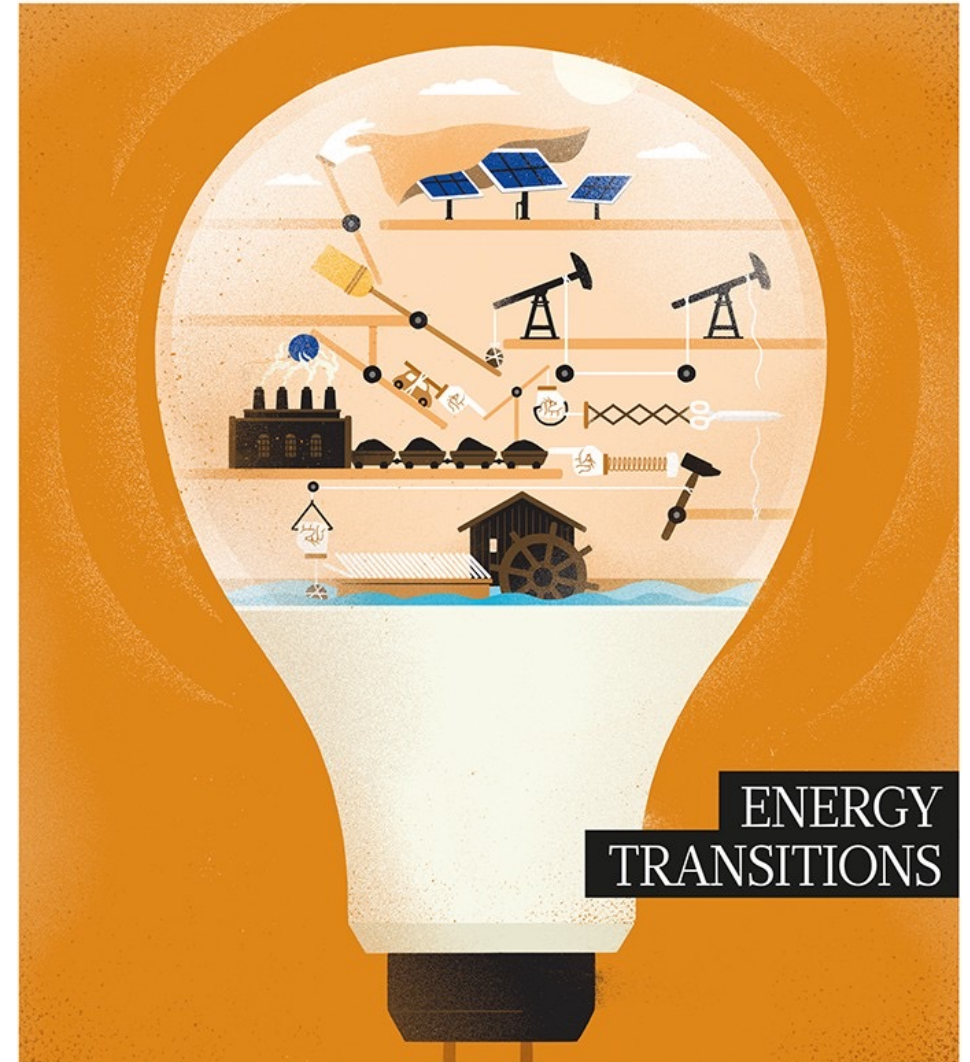
De fortes disparités

Monde La consommation d'énergie par habitant en 2020



" The time that elapses between the introduction of a new primary energy source (or prime mover) and its rise to claiming a substantial share of the market."
V. Smil, Energy Myths and Reality, (2010)

natureOUTLOOK



Produced with support from:



Power for the
next generation