

Sociétés ET TRANSITIONS

Economie et environnement # 2



ECONOMIE ET ENVIRONNEMENT #2

RYM ALOUI

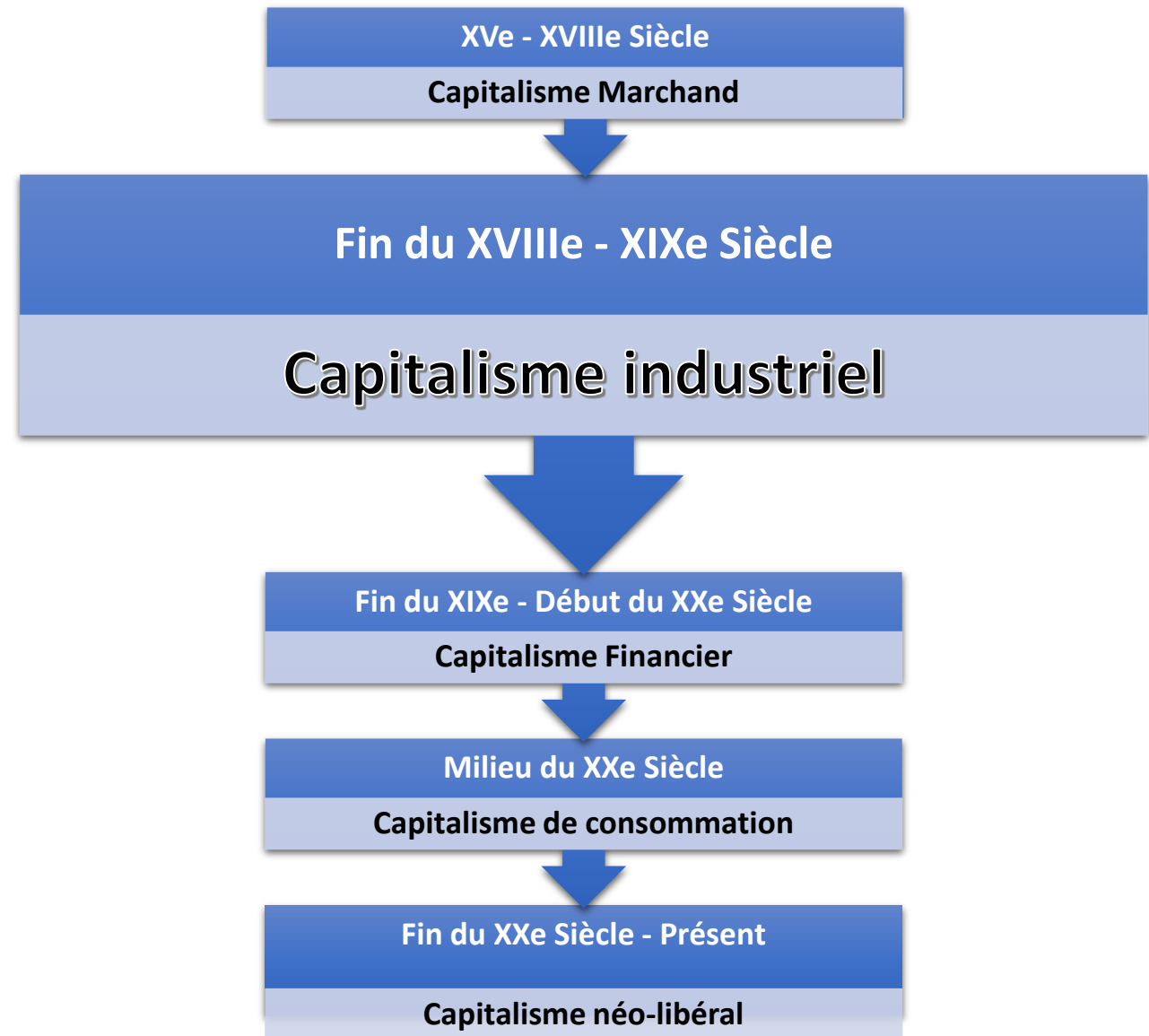
MAITRESSE DE CONFERENCES

UFR SEG et GATE-LSE



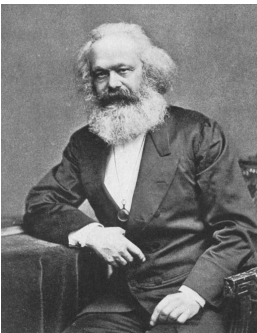
UFR de sciences
économiques
et de gestion





Croissance économique

- Croissance économique sans précédent.
- Innovations clés: la machine à vapeur, le développement des chemins de fer,...
- Production mécanisée et essor des usines.
- Urbanisation rapide.
- Changements profonds et rapides dans les économies.
- Emergence de la classe ouvrière (La lutte des classes, Karl Marx).
- Inégalités croissantes.



1818-1883

Cycles économiques

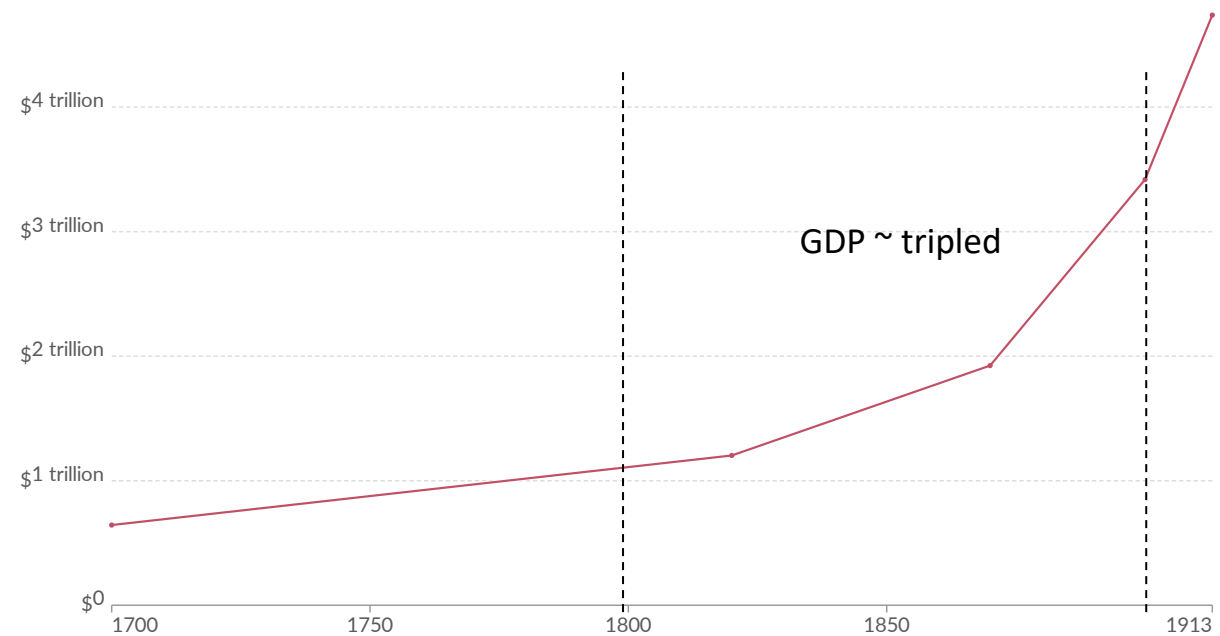
- Cycles économiques: expansion et récession
 - Innovations technologiques
 - Fluctuations des marchés des matières premières (charbon, coton, fer, ...)
 - Spéculation et crise financière
 - Panic 1825, panic de 1847 et Krach de Vienne 1873

Evolution du PIB dans le monde

Global GDP over the long run

Our World
in Data

Total output of the world economy. This data is adjusted for inflation and differences in the cost of living between countries.



Data source: World Bank and Maddison (2017)

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Note: This data is expressed in international-\$¹ at 2011 prices.

1. **International dollars:** International dollars are a hypothetical currency that is used to make meaningful comparisons of monetary indicators of living standards. Figures expressed in international dollars are adjusted for inflation within countries over time, and for differences in the cost of living between countries. The goal of such adjustments is to provide a unit whose purchasing power is held fixed over time and across countries, such that one international dollar can buy the same quantity and quality of goods and services no matter where or when it is spent. Read more in our article: What are Purchasing Power Parity adjustments and why do we need them?

Evolution du PIB en Angleterre

Gross domestic product (GDP) in England

This data is expressed in British pounds, adjusted for inflation.

Our World
in Data



Data source: Broadberry, Campbell, Klein, Overton, & Van Leeuwen (2015)

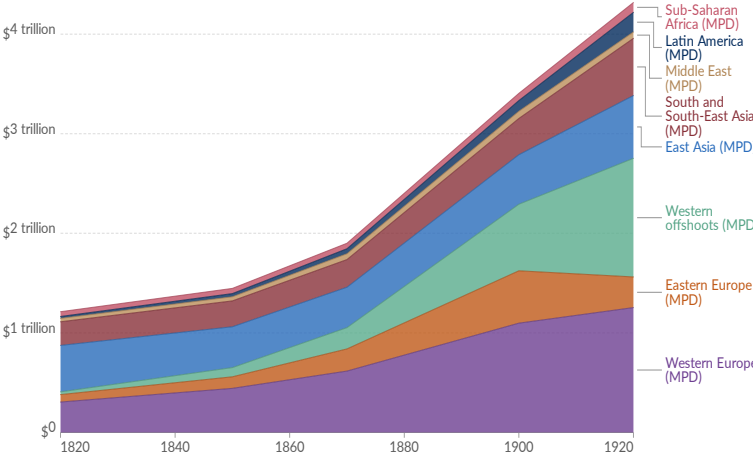
Note: This data is expressed in constant 2013 British pounds. Data refers to England until 1700 and the UK from then onwards.

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Evolution des inégalités

Gross domestic product (GDP) by world region

This data is adjusted for inflation and differences in the cost of living between countries.



Data source: Maddison Project Database 2020 (Bolt and van Zanden, 2020)

Note: This data is expressed in international-\$¹ at 2011 prices.

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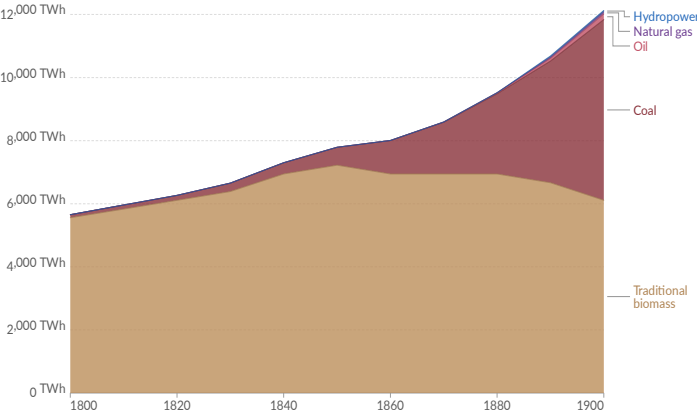
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Régions	PIB en Milliard \$US	
	1820	1900
Afrique Subsaharienne	48	73,1
Amérique Latine	19,15	106,8
Moyen-Orient	34,67	72,8
Asie du Sud et du Sud-Est	237,54	364,02
Asie de l'Est	465,65	496,56
Pays d'immigration européenne (Western Offshoots)	28,22	668,78
Europe de l'Est	74,26	525,67
Europe de l'Ouest	305,38	1100
Total	1210	3410

Utilisation massive de combustibles fossiles dans le monde

Global primary energy consumption by source

Primary energy¹ is based on the substitution method² and measured in terawatt-hours³.



Data source: Energy Institute - Statistical Review of World Energy (2023); Smil (2017)
Note: In the absence of more recent data, traditional biomass is assumed constant since 2015.
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1. **Primary energy:** Primary energy is the energy available as resources – such as the fuels burnt in power plants – before it has been transformed. This relates to the coal before it has been burnt, the uranium, or the barrels of oil. Primary energy includes energy that the end user needs, in the form of electricity, transport and heating, plus inefficiencies and energy that is lost when raw resources are transformed into a usable form. You can read more on the different ways of measuring energy in our article.

2. **Substitution method:** The 'substitution method' is used by researchers to correct primary energy consumption for efficiency losses experienced by fossil fuels. It tries to adjust non-fossil energy sources to the inputs that would be needed if it was generated from fossil fuels. It assumes that wind and solar electricity is as inefficient as coal or gas. To do this, energy generation from non-fossil sources are divided by a standard 'thermal efficiency factor' – typically around 0.4. Nuclear power is also adjusted despite it also experiencing thermal losses in a power plant. Since it's reported in terms of electricity output, we need to do this adjustment to calculate its equivalent input value. You can read more about this adjustment in our article.

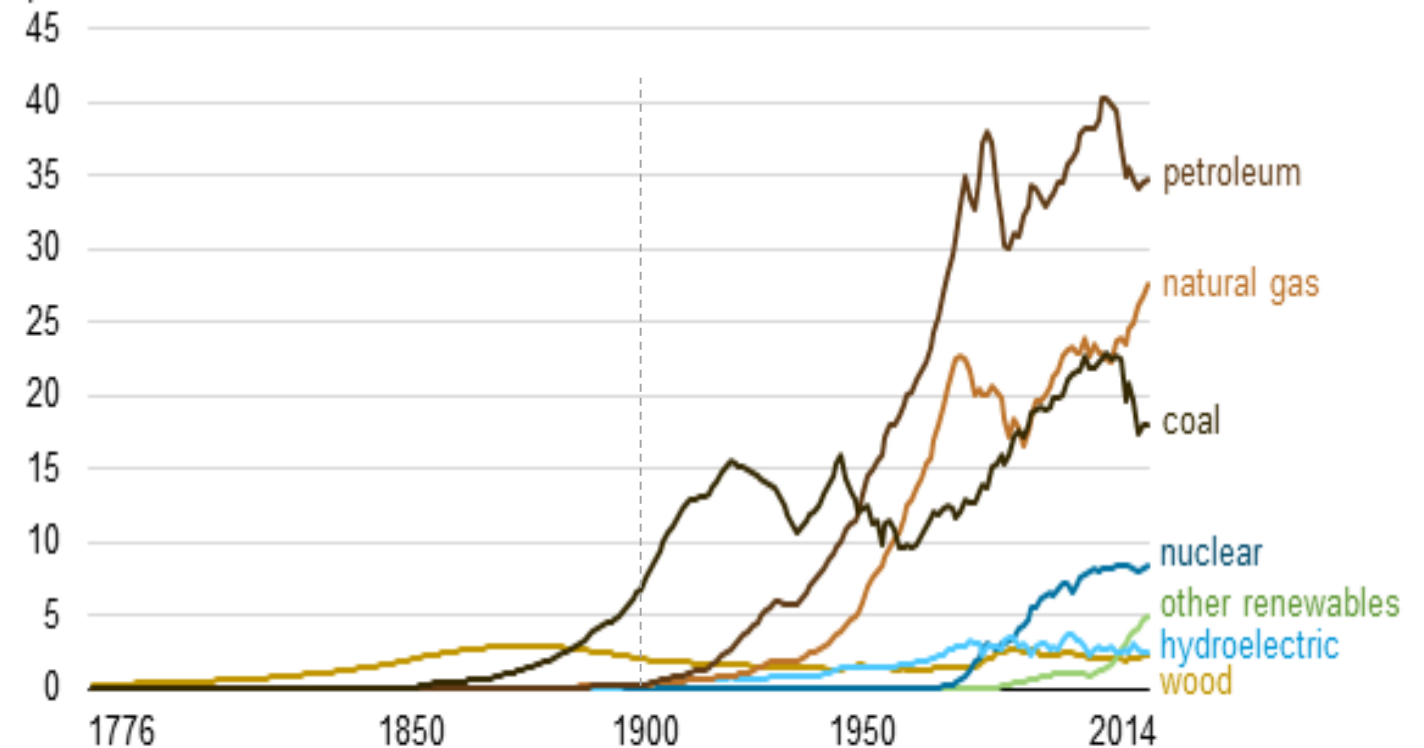
3. **Watt-hour:** A watt-hour is the energy delivered by one watt of power for one hour. Since one watt is equivalent to one Joule per second, a watt-hour is equivalent to 3600 Joules of energy. Metric prefixes are used for multiples of the unit, usually: - kilowatt-hours (kWh), or a thousand watt-hours. - Megawatt-hours (MWh), or a million watt-hours. - Gigawatt-hours (GWh), or a billion watt-hours. - Terawatt-hours (TWh), or a trillion watt-hours.

Source d'énergie	Térawatt heures	
	1820	1900
Biomasse traditionnel	6111	6111
Charbon	153	5728
Pétrole	0	181
Gaz naturel	0	64
hydroélectricité	0	47
Total	6264	12131

Utilisation massive de combustibles fossiles aux Etats-Unis

Energy consumption in the United States (1776-2014)

quadrillion Btu



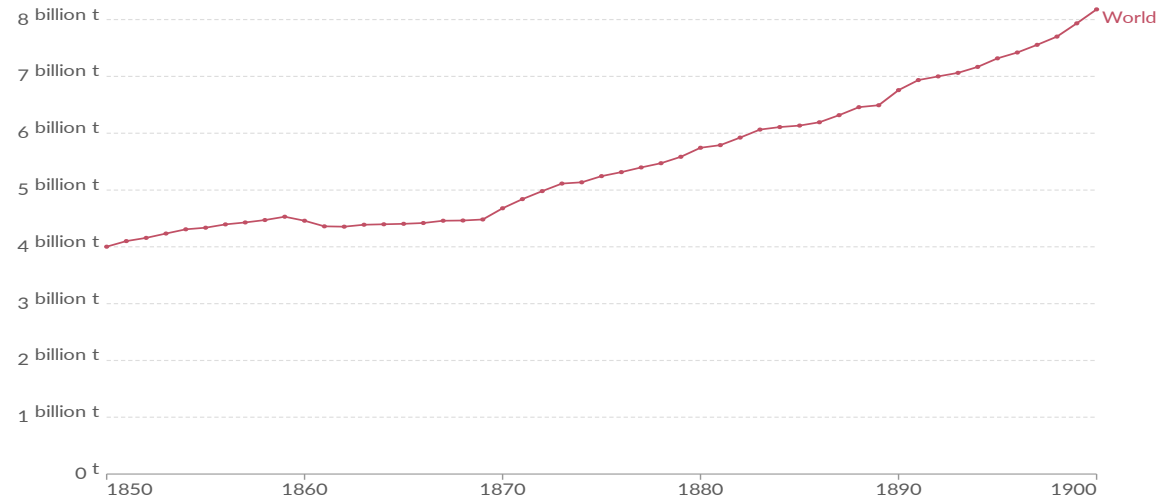
Source: Energy Information Administration

Emissions de GES dans le monde

Greenhouse gas emissions

Our World
in Data

Greenhouse gas emissions¹ include carbon dioxide, methane and nitrous oxide from all sources, including land-use change. They are measured in tonnes of carbon dioxide-equivalents² over a 100-year timescale.



Data source: Jones et al. (2023)

OurWorldInData.org/co2-and-greenhouse-gas-emissions | CC BY

Note: Land-use change emissions can be negative.

1. Greenhouse gas emissions: A greenhouse gas (GHG) is a gas that causes the atmosphere to warm by absorbing and emitting radiant energy. Greenhouse gases absorb radiation that is radiated by Earth, preventing this heat from escaping to space. Carbon dioxide (CO₂) is the most well-known greenhouse gas, but there are others including methane, nitrous oxide, and in fact, water vapor. Human-made emissions of greenhouse gases from fossil fuels, industry, and agriculture are the leading cause of global climate change. Greenhouse gas emissions measure the total amount of all greenhouse gases that are emitted. These are often quantified in carbon dioxide equivalents (CO₂eq) which take account of the amount of warming that each molecule of different gases creates.

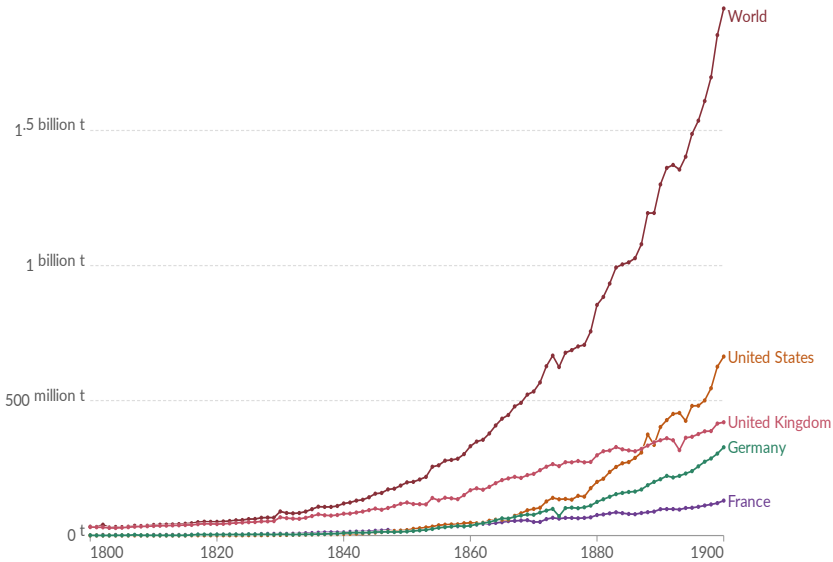
2. Carbon dioxide equivalents (CO₂eq): Carbon dioxide is the most important greenhouse gas, but not the only one. To capture all greenhouse gas emissions, researchers express them in "carbon dioxide equivalents" (CO₂eq). This takes all greenhouse gases into account, not just CO₂. To express all greenhouse gases in carbon dioxide equivalents (CO₂eq), each one is weighted by its global warming potential (GWP) value. GWP measures the amount of warming a gas creates compared to CO₂. CO₂ is given a GWP value of one. If a gas had a GWP of 10 then one kilogram of that gas would generate ten times the warming effect as one kilogram of CO₂. Carbon dioxide equivalents are calculated for each gas by multiplying the mass of emissions of a specific greenhouse gas by its GWP factor. This warming can be stated over different timescales. To calculate CO₂eq over 100 years, we'd multiply each gas by its GWP over a 100-year timescale (GWP100). Total greenhouse gas emissions – measured in CO₂eq – are then calculated by summing each gas' CO₂eq value.

Emissions de CO2 dans le monde

Annual CO₂ emissions

Carbon dioxide (CO₂) emissions from fossil fuels and industry¹. Land-use change is not included.

Our World
in Data



Data source: Global Carbon Budget (2023)

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¹ **Fossil emissions:** Fossil emissions measure the quantity of carbon dioxide (CO₂) emitted from the burning of fossil fuels, and directly from industrial processes such as cement and steel production. Fossil CO₂ includes emissions from coal, oil, gas, flaring, cement, steel, and other industrial processes. Fossil emissions do not include land use change, deforestation, soils, or vegetation.

Pays	Million de tonnes	
	1820	1900
Le Royaume Uni	42,57	419,74
L'Allemagne	3,38	326,76
Les Etats-Unis	0,791	662,74
La France	2,9	11,93
Le Monde	50,73	1950

Travaux scientifiques

- Comprendre les effets de serre:
- Eunice Newton Foote (1818-1888), pionnière en science du climat
 - L'augmentation du CO₂ dans l'atmosphère pourrait augmenter la température de la Terre.
- Jon Tyndall (1820-1893)
 - Sensibilisation d'un public scientifique plus large à la question des GES



Conclusion

- Le capitalisme industriel (fin du XVIIIe au XIXe siècle):
 - Croissance économique significative
 - Production mécanisée et essor des usines
 - Impact climatique observable
 - Travaux scientifiques en progression
 - Conscience écologique limitée