

Changing paradigm: Thinking global crises and their solutions 'outside the box'

First part: When dealing with complex and intertwined crises, mainstream economic solutions prove ineffective and generate more inequalities

The case of the climate crisis

1. Crises and the issues they raise

1.1. A large number of economic, social, cultural, physical and biological processes operating within current systemic crises

The systemic crises faced by the world today are of a generally underestimated level of complexity. The crises that we usually find easier to consider individually (climate, natural resources - biodiversity, water, land, forests -, energy, economy, food, health and geopolitics) are in fact closely interrelated through multiple causal relationships and feedback¹.



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¹ For instance, the water crisis is greatly amplified by climate change, as illustrated by the consequences of droughts observed during the summer of 2022; the climate crisis is exacerbated by the energy crisis and the use of GHG emitting fossil fuels, the energy crisis being in turn aggravated by the geopolitical crisis; the food crisis, in its most acute occurrences, is often linked to geopolitical crises or to meteorological events resulting from climate change. Climate change has also become a major cause for biodiversity loss [read]. Many other examples could be listed.

As a consequence, an isolated analysis of one of these crises is likely to overlook important factors affecting it. Similarly, partial solutions aiming at solving an individual crisis outside of its broader context are bound to fail if they are applied in isolation.

Moreover, crises affect systems whose evolution depends on the result of a variety of processes: social, economic, political, cultural, physical and biological, as illustrated by the COVID-19 pandemic [[read](#)]

Human behaviour is largely determined by structures on which social, economic and cultural processes impact, transforming them. This process can be the object of negotiations, agreements and deals.

On the contrary, the environment in which humans live and act is made of physical and biological processes and laws that are non-negotiable, but can nevertheless be influenced by human action. They are far from being completely and perfectly known, particularly for those that pertain to the biological field (physiology and ecology², in particular).

As a result, while it is possible to shape the behaviour of individuals or of human societies through incentives or disincentives, rules or concerted collective action (social and economic policies and programmes), it is impossible to modify the profound nature of physical or biological processes. It is, however, feasible to alter the conditions within which they occur so as to change their outcome and make it more favourable to humans. Modifications that humans can bring to these conditions are essentially made of flows of matter and energy resulting from human activities.

1.2. The world seems uncertain, because of insufficient knowledge of ongoing crises and of human behaviour

Paradoxically, humanity has never been as conscious as today of an uncertain world, at a moment in history when it has accumulated an unparalleled amount of scientific knowledge. This might be an illustration of what Montaigne was claiming, five centuries ago: "Real science is an aware ignorance"³. It is quite symptomatic to observe that the frequency of the word "uncertainty" in published documents is greater today than at the beginning of the 19th century and that it has grown rapidly during the 1960-1980 period [[see graph online](#)].

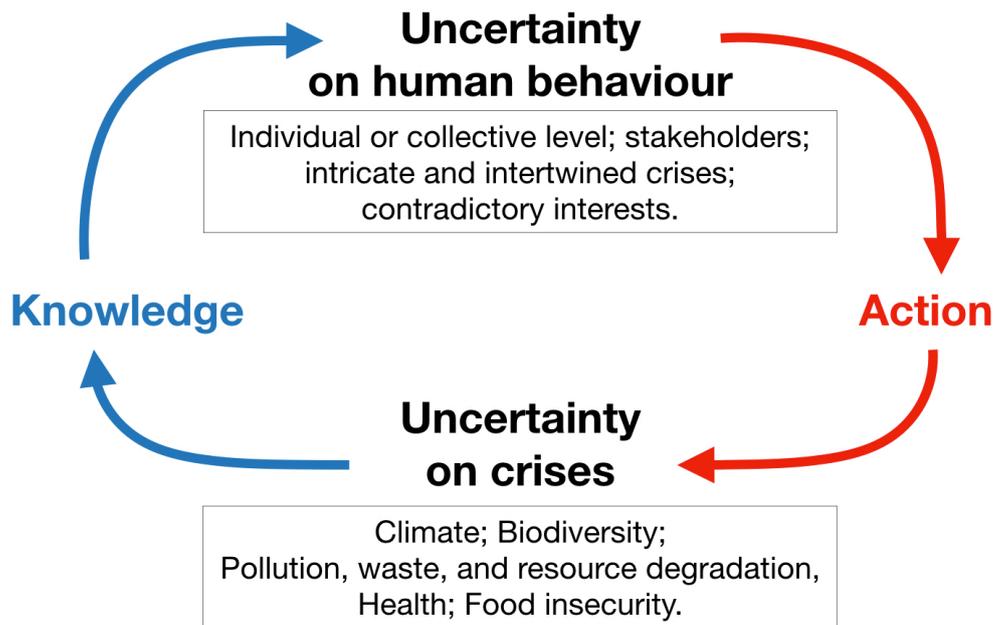
There are two major aspects to this uncertainty:

- The first has to do with uncertainty on crises themselves. It has to do with our lack of understanding of them and their evolution in the future, because of the limits of science. Hence, descriptions of the future are always loaded with "maybes", "possibles" and "probables", and expert views constantly diverge as to the importance and intensity of threats [[read](#)]. Besides, it is rare that analyses deal with synergies between various factors of uncertainty (Fig.1) [[read](#)]. It can nevertheless be expected that uncertainty on crisis nature and mechanisms will decrease, as scientific knowledge improves.

² Ecology: science of mutual interrelations among biological systems and of their interactions with the environment.

³ « La vraie science est une ignorance qui se sait ».

Fig.1 The two aspects of uncertainty



- The second is related to the uncertainty on human behaviour in crisis situations, whether at individual or collective level. This aspect is well illustrated by the debates and commitments taken (or not) at the COP26 of Glasgow [\[read\]](#). A great number of countries were represented, others were not. Some signed the non-binding agreements to end deforestation by 2030 or to abandon and stop constructing and investing in coal-fired power plants, while other actors of importance claimed these commitments were “inappropriate and unfair” and that they could not “promise what [they] can’t do” [\[read here and here\]](#). Others, like the US in the past, signed agreements, then withdrew later, to recommit once more, pending possibly a future...

1.3. Assessing the importance of issues at stake to judge required actions

In 2018, it was possible to wonder whether the global food crunch was a myth or reality [\[read\]](#). Four years later, it is fair to be worried about the fact that synergies among multiple systemic crises might lead to a collapse, in the medium to long term, that could threaten the very existence of humanity in viable conditions.

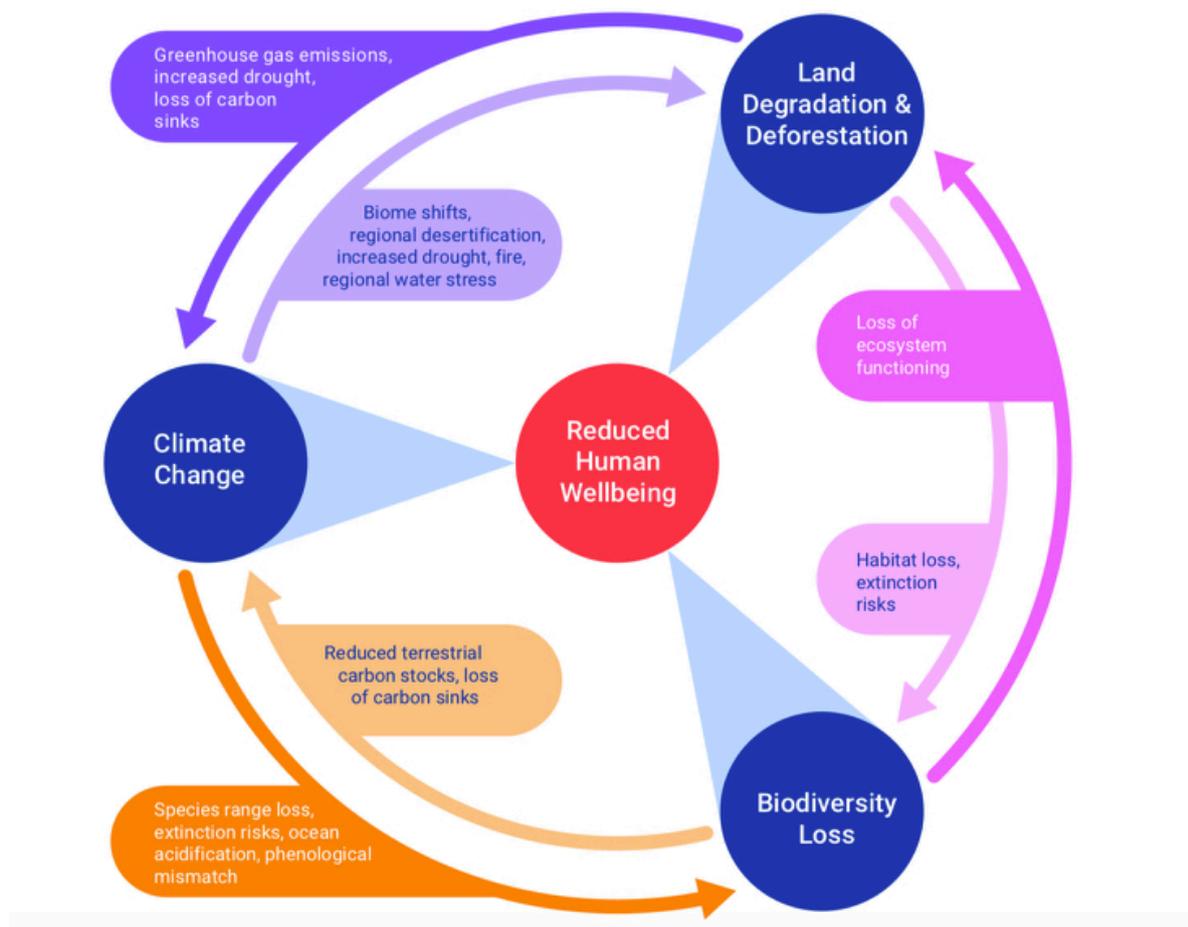
In 2021, in their report entitled « Making Peace With Nature » [\[read\]](#), the United Nations analysed how climate change, land degradation and deforestation, and loss of biodiversity reinforced each other, creating a cascade of consequences, synergies and cumulated impacts with a risk of snowball effect that could generate a serious danger of disaster in the future, whose boundaries are difficult if not impossible to imagine today (Fig.2).

This disaster is possible, if humanity does take appropriate action in the field of food and agriculture, in particular. In 2020, UN Secretary-General António Guterres declared: “To put it simply, the state of the planet is broken”. Behind this speech, whose objective was to mobilize without frightening, a more terrible message can be heard that tells that, without a strong reaction, humanity is heading to ruin and likely to suffer such a setback in its development that its survival itself will be at stake.

The seriousness of the issues - including the survival of humanity - creates a situation such that business as usual becomes a no option and that solutions, unimaginable until today, could be envisaged as crises accelerate and are amplified to come to a point where the prevalence of unliveable conditions is plausible. The question, then, is what humanity is ready to accept to survive.

This stage has not yet been reached, but every day of inaction brings humanity close to the moment when it will be obliged to give an answer to this question.

Fig.2 Interactions among climate change, land use and biodiversity



Source : [UNEP](#).

2. Mainstream economic thinking does not provide acceptable solutions: the case of greenhouse gas (GHG) emissions

2.1 The tyranny of economism: when decreasing GHG emissions, it is economic efficiency that matters most and that determines priorities of action

In a world where economics and its econo-mystics dominate [\[read\]](#), the most frequently mentioned solutions for avoiding - or solving - problems, whatever they are, are of a financial nature. Usually, the objective is to limit the economic attractiveness of certain types of behaviour and to increase it for others, hoping to be able to tackle the issue, rather than having to resort to other means such as public investment or any kind of strict

regulation that, for the most liberal economists, would be a constraint preventing a smooth functioning of market forces.

Hence, if there is a shortage of water, prices should be raised so as to reduce its consumption and orient it towards the most efficient uses from an economic point of view, while maybe encouraging technological development. If there is a need to cut carbon emissions, a price will be fixed for carbon (equivalent to the establishment of some kind of taxation, even if the term “carbon tax” has become a bad word from the political view point in a considerable number of countries), that will be equal to the marginal damage created by its emission, hoping that private firms will adopt practices and techniques that generate less carbon emissions, thus aligning private interests and public interest. The problem then remains to determine this marginal cost and shove it down the throats of the population.

2.2. “There is no alternative to the price of carbon”

This view is illustrated and justified by [Christian Gollier](#) in his inaugural lecture⁴ at the prestigious Collège de France. Holder of the temporary professorship “Common sustainable future” (Avenir commun durable), he articulates what he calls the “scientific” logic of the method he proposes. A critical analysis of his narrative, however, shows that this logic is at best partial, full of approximations and some arbitrariness, characterized by dogmatism and a total faith in economics, and locked into an ideological straightjacket that prevents him from thinking outside the box.

Yet, Gollier, renowned expert, is among the “prince’s advisors” in France and he boasts that he is being consulted by the committee established by President Biden for fixing the price of carbon in the US. He may be considered as one of the leaders of mainstream economics.

Claiming to have found the only solution to align individual behaviour and general interest, inspired by “scientific underpinnings of the theory of the individual and of the firm ... from which one could deduct an operational technique to judge every action on the basis of its contribution to the common good”, Gollier has the ambition to “put rationality in a debate where ideologies have the upper hand, at the expense of efficiency and credibility of adopted policies” and he complains that “democracy is the dictatorship of the present”. This solution, incentives, Gollier claims it is “natural”, a way of closing the discussion of possible alternatives, and he awards it the power of giving more responsibility to the population. One wonders, while listening to him, what the meaning (and philosophical implications) is of arguing that money would be the only (and therefore the best) path to responsibility! This statement is highly significant and loaded with corollaries regarding his econo-mystic vision of human behaviour, of life in society and even of what responsibility might be.

Are his statements justified?

By choosing from the start to adopt a purely economic and mono-disciplinary framework that provides the central role to the market, Gollier is obliged to assume that the only way to combat effectively GHG emissions is to “make sacrifices today” to obtain “future benefits” by establishing a price of carbon.

⁴ « Entre fin du mois et fin du monde : économie de nos responsabilités envers l’humanité » [\[watch, in French\]](#).

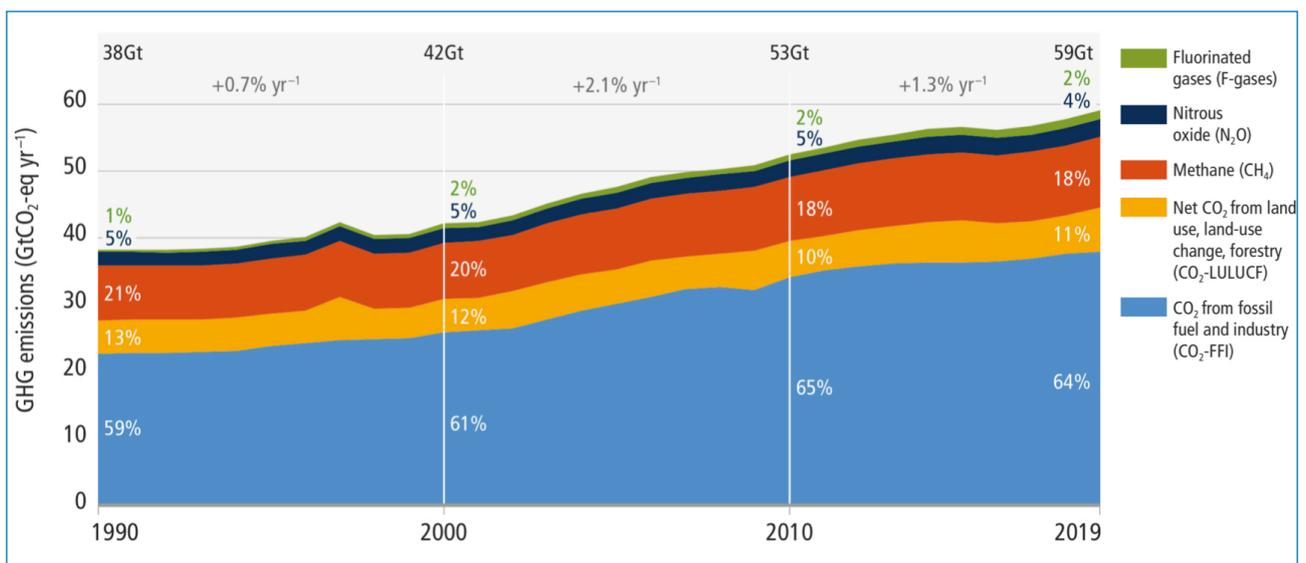
Incidentally, he forgets one important fact: future benefits of a GHG reduction correspond mostly, in reality, to the prevention of future costs and sacrifices, and maybe a fatal disaster (see above), for which our past, present and future actions are responsible, and not today's sacrifices that would allow future generations to benefit from a standard of living much higher than ours today (although this perspective is desirable). His choice therefore puts the decision maker in a framework within which an ecological approach becomes necessarily punitive and generates intergenerational inequality, particularly when he pushes off the issue of urgency. Indeed, any delay in action today will mean, if we trust the IPCC, much greater and more painful consequences and efforts in the future. Moreover, if action is missing, slow or partial, the moment will come when there will be no more time left to avoid a disaster that is now considered as possible by the United Nations. It will be too late to act, then.

2.3 Price of carbon: a measure impacting fossil fuels only

Starting from the assumption (non-proven as usually assumptions are) that “the energy transition will be costly” and that energy will become more expensive in the future, Gollier considerably simplifies the problem by reducing the issue of anthropogenic GHG emissions to cutting fossil-fuel consumption, while, according to IPCC findings, GHGs emitted by fossil fuels and industry only represented around 64% of anthropogenic GHGs in 2019 (see Fig.3).

He reiterates this approximation (GHGs=GHGs produced by fossil fuels and the industry) that ignores reality, when, in his comparison of Spanish and French tomatoes available on a French market, the only difference he sees between them from the point of their impact on climate, is the GHGs emitted during the transport of tomatoes between Spain and France, as if any way of producing tomatoes were necessarily emitting the same quantity of GHGs everywhere in the world and whatever the technology used - for example open-field or greenhouse cultivation!

Fig.3 Total anthropogenic GHG emissions (1990-2019)



Source : [GIEC, 2022](https://www.giec.org/).

2.4 Surprising (to say the least) priorities

For Gollier, a rational way of cutting GHGs consists in giving priority to the most efficient reductions, efficiency being measured by the unit cost of the tonne of CO₂ emitted spared in different processes.

Processes considered include the adoption of solar energy, replacing coal by natural gas, the limitation of speed for cars (these last two options being methods of decarbonation that do not end reliance on carbonated fossil fuels which is, however, necessary according to the IPCC [\[read\]](#)) or the introduction of electrical vehicles, among others. His estimates indicate that substituting coal by gas would be almost ten times cheaper than adopting solar energy, thus giving priority to the former, at the expense of the latter. (One may “reasonably” wonder whether this conclusion is also related to the fact that Total Energie⁵ is supporting financially the broadcasting of his conference!)

Is this not a case of some kind of ideological blindness, when the objective pursued is not just reducing GHG emissions but also decreasing them **rapidly**, so as to be able to respect COP21 commitments?⁶ What really crucial here, is not the price of carbon, but the volume of GHG emitted that should not be exceeded and the speed of the reduction of emissions that impacts on future changes of climate. These crucial aspects, however, are secondary, if not absent, from Gollier’s proposals.

We have here another example where a complex political choice relies on a decision grounded on the result of a computation that suffers from the disqualifying weaknesses that will be reviewed below. This denotes a scientist orientation that revives “the old Western dream of a computation-based harmony” and the dominating position of governance by the numbers “in which law gives way to programme, and rule to control” [\[read in French\]](#). Indeed, according to Gollier, rules (standards, norms and bans) are a method for hiding costs, and it goes against making the population more responsible!

2.5. A technique marred with arbitrariness

Questionable methods for estimating prices. From a technical point of view, priority given to financial aspects of decarbonation usually relies on an evaluation resting on prices (current or future) often based on very imperfect indications on the real costs and benefits of the consequences of this process, for reasons not fundamentally distinct from those analysed on [hungerexplained.org](#) for the cost of food. Sometimes, this evaluation uses costs computed with alternative methods that may lead to very different - even diverging - values [\[read\]](#). For instance, Gollier tells us that in the case of wind turbines, the drop of the value of property located nearby is an important component of the cost of the ton of CO₂ spared... An extreme example of this method is found in another domain, when a study in France conducted on speed limitation on roads [\[read in French\]](#) estimates at 3 million euros the “value” of human life. The absurdity of this evaluation is rather evident

⁵ Note that Total continues to invest in gas and envisages to launch deep-sea gas off the coast of South Africa.

⁶ During his conference, Gollier admits that his proposals would mean an increase by 3 degrees of the average temperature on Earth by 2100, “omitting” to enumerate the dire consequences in reality of such an outcome which is slightly higher than the IPCC’s scenarios in which there is no ice left in the Arctic Ocean in summer, food production decreases, heat is extreme, droughts and floods are frequent, and inequality increases [\[read p.4\]](#). Hence, the chances are high that the costs of these consequences are not included in his computations.

and it raises the complex issue of the financial value of something that has irreversibly disappeared. In your case, what would be your response to the question: “Are you ready to give you life if you received 3 million?” This illustrates that money and value are essentially social products. Money has no other practical utility than to be a means to acquire other useful goods with the help of the concept of the value that is given to them through a fundamentally anthropocentric process. Value itself is not without paradox, like that of utility and exchange value which give high value to an almost useless good (but for industry), and give water an almost zero value when it is of vital utility. To base survival of humanity on such a tool does not seem to make any sense even to the insane.

Costs and benefits with fluctuating boundaries. They are estimated using a method that leaves a lot of space to intuition (arbitrariness?) regarding the depth of the analysis and the costs and benefits that are accounted for. This can lead to inconsistent and even contradictory results, as already stressed elsewhere on hungerexplained.org [[read](#)].

2.6 “À la carte” discounting of costs and benefits

For long, economists have been confronted with the issue of how to compare costs and benefits in time. What is the worth today of a euro earned or lost in 5 or 10 years? Golliers embarks on a lengthy technical discussion on how to fix the discounting rate (the coefficient applied to compute the value today of one euro in the future), and ends up by rightly rejecting the alternatives he considered on the ground that they rely on absurd assumptions in an uncertain world, an uncertain world that, in everyday life, encourages people’s propensity to save by making precautionary savings (mainly for the well-off income groups). He infers from this that the discounting rate chosen should be lower than the rate usually used - equal to the capital interest rate - to analyse the profitability of investment projects. This lower rate would give more weight to the point of view of future generations as their costs and benefits weigh more in today’s computations.

This principle, that makes sense intuitively, is nevertheless marred with arbitrariness in practice and leads to very different results, as illustrated by the varied rates recommended by commissions working on the topic in France or the US that are quoted by Gollier: 1.2% +inflation (?) for projects with no risk, 3.2% for project that contribute to greater risk, -0.8% for projects that reduce risk, etc. This becomes a quasi-philosophical speculation that results in rather subjective choices of an apparent scientific precision (one significant digit after the decimal place!).

One may wonder whether the process of fixing this rate does not mean disguising an essentially political decision behind a quite convoluted pseudo-technical justification that is more or less negotiated.⁷ Could this be a way for economists to keep the floor (and control) and avoid confessing their incapacity to deal with the problem by working outside of their usual framework, in other words, by thinking outside the box?

⁷ The snake is chewing its own tail, and the political decision uses a “scientific” computation to become natural, normal, unavoidable! Behind the governance by numbers hides a governance that spells out neither its objectives nor its principles.

“Future generations” a tool to downplay climate emergency

For many experts, it future generations who will be the victims of climate change. This idea conveys the illusion that the consequences of the climate crisis will only be felt by our distant descendants.

For those of us who are less vigilant and critical, this fiction could make them believe that there is no climate emergency, that climatic disasters will only take place in a far away future, and that we can be happy to simply replace, in priority, coal by gas, as suggested by C. Gollier.

In reality, however, **we are already the victims of extreme meteorological events** that result from climate change. And if we don't act today, it will be our children - not distant descendants - who will suffer from our inaction.

For example, when he was interviewed on a French radio in September 2022, Thierry Martel, director-general of the French insurance group Groupama and president of the association of mutual insurers, emphasized that the costs of disasters are skyrocketing and that there is **already now** a spectacular increase in what he calls “climatic accidents”. For him, there has been “a change of gear since 2016”, as the average cost of climatic disasters has virtually doubled, raising from **2 billion** euros to **3.5 billion** euros in 5 years. According to him, “2022 shatters all records”, as there has already been a damage of more than **5 billion euros** during the first semester, meaning that in 6 months, the damage has been that of 18 months or “three times the standard costs”, mainly because of hail [[listen in French, particularly after 2'40](#)]

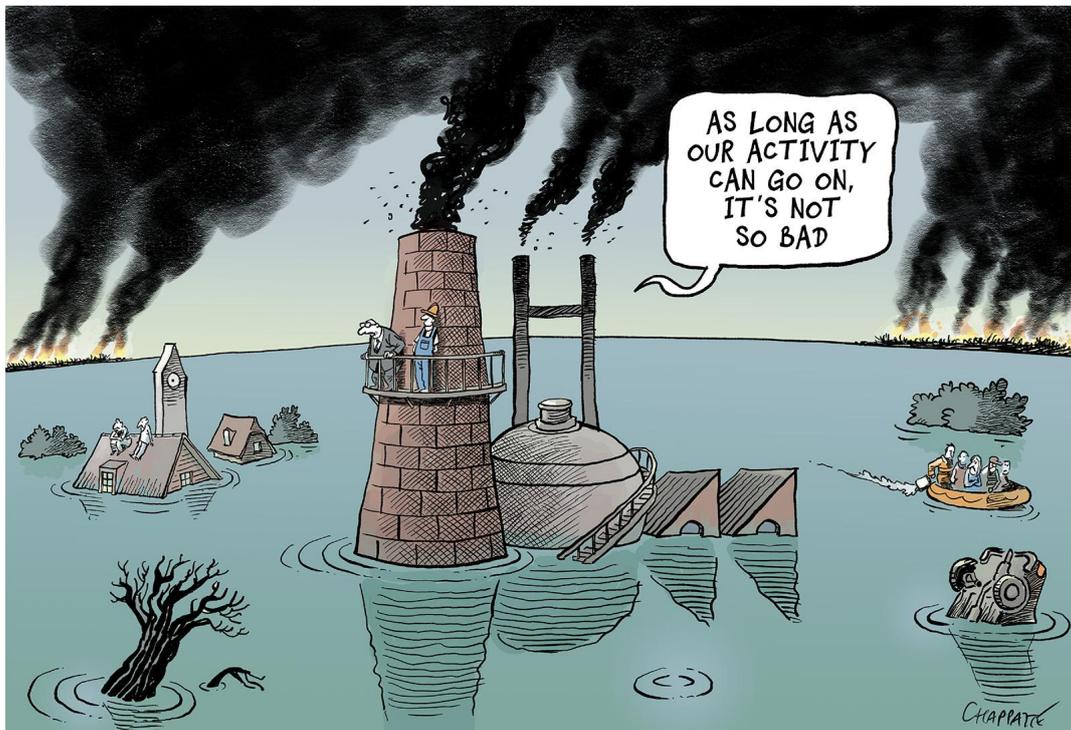
In other words, standards have lost their usefulness and the crisis is already here. It is not the problem of future generations, but ours, sorry for those who want to make us waste our time in lengthy and useless discussions on the rate for discounting costs and benefits. Soon, it will be increasingly expensive - and difficult - to be insured. Here too, the limits to financial instruments will become clearer, as we are confronted with the tough reality [[read](#)].

2.7 What mode of operation?

As always, the devil is in the details when it comes to translate ideas into action. In his lecture, although he started by claiming that he would be operational, he later carefully evades the topic.

Understandably so, as the methods of implementing the price of carbon used to date are quite chaotic. The two main approaches are:

- The carbon tax on CO₂ emissions, potentially extended to other GHGs taking into account their warming power (for example, fluorinated gases have a warming power several thousand times greater than that of CO₂). This tax is quite decried, particularly in France, being politically loaded and one of the main triggers of the “yellow jackets” movement at the end, of 2018.
- The carbon market based on the exchange of quotas, emissions rights and carbon credits. It has been strongly criticized for being ineffective and it has even been considered counterproductive by some [[read](#)].



<https://www.chappatte.com/>.

2.8 What is left unsaid

In addition to all the limits of the economist approach that have been listed above, there is one more that is absolutely key. Giving a price to carbon is an **inequitable measure** that amplifies inequalities. In his conference, Gollier dwells for long on inequality between present and future generations, but he hardly mentions those resulting from the implementation of the price of carbon in today's societies.

A very simple simulation easily illustrates this. If you consider a worker earning the French minimum salary (1,329.05 euros net per month, in September 2022), who has to travel every day over 20 km in his small vehicle consuming 5 l per 100 km, a carbon tax of 1 euro/l of fuel will represent a sizeable amount (23 euros per month, or 1.73% of his income). For a senior executive earning 10,000 euros per month, the excess cost caused by the carbon tax will only be equivalent to 0.55% of his income (even if it is assumed that he travels every day 30 km in a vehicle consuming 8 l per 100 km). For a millionaire making 400,000 euros per month and travelling 30 km in a luxury limousine consuming 12 l per 100 km, the additional cost will weigh only 0.02% of his income, basically, peanuts (Table 1).

From this example, it is possible to infer that that an increased price of energy resulting from the application of a price of carbon creates an excess cost that will hit more the poor, who already consume less energy, while it will have relatively little impact on the living standard of the rich who will not really be encouraged to reduce their energy consumption. This impact will even be greater if compared with the income once unavoidable expenditures (rent, subscriptions, insurance, tax, etc.) are deducted that use up almost half of total income in a country like France for the low- and middle-income groups.

Tab. 1 Simulated impact of a carbon tax of 1 euro/litre of fuel for different categories

	Minimum salary worker	Senior executive	Millionaire
Monthly income (in euros)	1,329.05	10,000	400
Kilometres travelled	460	690	690
Litres of fuel used	23	55.2	82.8
Additional cost due to the carbon tax (in euros)	23	55.2	82.8
Share of additional cost in income (in %)	1.73%	0.55%	0.02%

This conclusion remains valid if it is extended to all GHGs emitted by different income groups and if the huge inequality in the quantity of emissions by these groups is taken into account (Table 2)

Tab.2 At world level, the rich emit more GHGs than the poor (year 2015)

	Richest 0.1%	Richest 1%	Richest 10%	40% middle income	50% poorest
Minimum annual income per head ('000 dollars)	402	109	38	6	
Average annual emissions per head (tonne of CO ₂ eq.)	216.7	74	23.5	5.3	0.69
Share of carbon emissions	4 %	15 %	49 %	44 %	7 %

Source: [Kartha et al., 2020](#).

The regressive nature of transition is inevitable, being “natural”, says Gollier, thus giving more arguments to those who surf on the absurd and counterproductive opposition between “end of the month” and “end of the world” and heavily criticize punitive ecology. To mitigate this nature, he proposes that the income collected through the carbon tax be re-injected into the economy to the benefit of the poorer groups of population. But, if one considers the flows of emissions and of tax income, it seems unlikely that a reallocation of the money could fully compensate the excess spending supported by low- and middle-income population groups.

3. Conclusion of the first part

The **first conclusion** is that the multiple systemic crises faced by the world are complex and intertwined, and result of a great variety of social, economic, political, cultural, physical and biological processes. They occur in an uncertain world, by lack of knowledge of these processes and their interlinkages, and because of the unpredictability of human behaviour.

There is a growing consensus on the fact that the perpetuation of humanity is at stake, and this raises the question of what humanity is ready to change in its way of life in order to survive.

The **second conclusion** is that mainstream economic thinking does not propose science-based solutions for reducing anthropogenic GHG emissions responsible for climate change that are credible, rational, operational and effective, contrarily to what its champions claim.

The solution proposed by one of its most representative experts:

- (i) is partial as it does not deal with all types of GHG emissions identified by science;
- (ii) is based on incomplete data and computations and estimates that rely on a good part of subjectivity;
- (iii) does not come up with new operational modalities that could correct shortcomings of those already in use that have proven to be ineffective; and,
- (iv) does not comply with the Paris COP21 objectives of 2015.

Moreover, it exacerbates inequalities and requires from households a higher relative level of investment when their income is lower, giving arguments to those who absurdly oppose “end of the month” and “end of the world” and thus contribute to lower the degree of priority population places on combatting climate change.

More generally, policy instruments of a financial type to resolve crises will affect the rich only marginally, who will not change their behaviour (emissions of large quantity of GHGs, use of huge volumes of water in a drought situation, as “they don’t really care about high bills” [read in English [here](#) and [here](#) and in [French](#)]).

The **third conclusion** is that it is absolutely vital to look for other solutions that are simultaneously effective and just (fair), and for this, to think outside the box of mainstream economics and its simplistic framework.

[Materne Maetz](#)
(September 2022)

[Second Part : Thinking outside the box - A solution to cut GHG emissions while reducing inequalities](#)

To know more :

Read :

- GIEC/IPCC, [Summary for Policymakers](#). In: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA 2022.
- UNEP, [Making Peace With Nature](#), United Nations Environment Programme, 2021.

- GIEC/IPCC, [Summary for Policymakers](#). In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press, 2021.
- Kartha, S., Kemp-Benedict, E., Ghosh, E., Nazareth, A. et Gore, T.. [The Carbon Inequality Era: An assessment of the global distribution of consumption emissions among individuals from 1990 to 2015 and beyond](#). Joint Research Report. Stockholm Environment Institute et Oxfam International, 2020.
- Supiot A., [La gouvernance par les nombres](#). Fayard (2015) (in French).

Listen (in French) :

- Gollier, C., [Entre fin du mois et fin du monde : économie de nos responsabilités envers l'humanité](#), Inaugural lecture, Collège de France, Paris, 2021.

Selection of earlier articles on hungerexplained.org related to the topic:

- Opinions : [From vanguard to rearguard - When econo-mystics categorize reality as an uncertainty](#) by Materne Maetz, 2022.
- [COVID-19: Is agriculture the main culprit?](#) 2021.
- Opinions : [Climate Injustice at Glasgow Cop-Out](#) by Jomo Kwame Sundaram and Anis Chowdhury, 2021
- [Climate is changing.... food and agriculture too](#), 2021.
- [The real cost of food - Can the market alone guide our food systems towards more sustainability?](#) 2020.
- [Income inequality impacts on the level of greenhouse gas emissions and on vulnerability to the consequences of climate change](#), 2020.
- [The dangers of a "partial" impact analysis: the example of a study on the impact of a 100% conversion to organic farming in England and Wales](#), 2019.
- [The global food crunch: myth or reality?](#) 2018.