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# Introduction: Economics and civilization in ecological crisis

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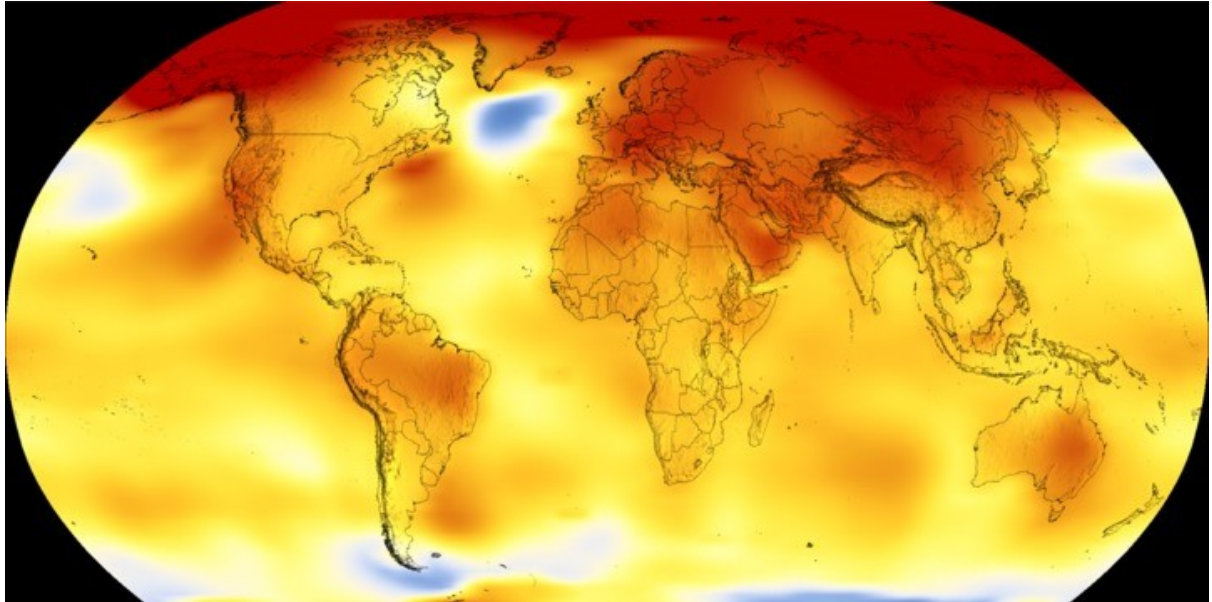
## What is the problem?

The essays collected here grapple with different aspects of what, if natural scientists are to be believed, is the most profound set of issues humanity has ever faced. The United Nations Framework Convention on Climate Change (UNFCCC) was created in 1992. Article 2 of the Convention, states its goal as the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system” (UNFCCC, 1992: p. 4). The subsequent “Conference of the Parties” process is formally supposed to achieve this. However, during the period since then, despite the Kyoto Protocols signed at COP 3 in 1997, and the subsequent 2015 Paris Agreement, which will come into force in the new decade, annual global greenhouse gas (GHG) emissions have increased massively (UNFCCC, 2015; Morgan, 2016). The *rate of increase* of carbon emissions has markedly reduced in recent years, but the absolute annual figure remains huge. In 2017 total annual gigatonnes of CO<sub>2</sub> equivalent emissions reached a record high of 53.5 (UNEP, 2018). This is important because emissions remain in the atmosphere for long periods - CO<sub>2</sub> can remain in the atmosphere for well over a century. As the cumulative parts per million (ppm) in the atmosphere increase, then the warming effect created by the gases also increases which leads to positive feedbacks and the increased chance of a global ecosystem collapse.

The estimated pre-industrial revolution atmospheric carbon level ranged at considerably less than 300ppm over several hundred thousand years. In 2013 it exceeded 400ppm for the first time in human history and as of 2019 is averaging over 407ppm. Standard models collated by the Inter-Governmental Panel on Climate Change (IPCC) use 450ppm as the trigger level for a 2<sup>o</sup>C average warming. As a “carbon budget”, this has translated into total cumulative emissions at the lower end of 3,000+ GtCO<sub>2</sub> to achieve the target of remaining below 2<sup>o</sup>C warming. Since the industrial revolution began we have already produced more than 2,000 GtCO<sub>2</sub>. More recent work and observations by climate scientists indicate that prior standard models have likely underestimated the subsequent rate of warming and the thresholds at which positive feedback effects might begin and which could become irreversible. This resulted in the inclusion in the Paris Agreement of an “aspiration” to restrict warming to 1.5<sup>o</sup>C involving a further restriction of the remaining carbon budget. However, it is also the case that even this target is no guarantee that “Hothouse Earth” irreversible effects can be avoided (see Steffen et al, 2018; Hansen et al, 2017). And yet the current emissions trends and country commitments stated as “Nationally Determined Contributions” (NDCs) to reductions under the Paris Agreement look set to exceed the 3000 target in a matter of a few short years and this leads, even under previous standard models, to estimated warming between upper 2 and over 4<sup>o</sup>C over the second half of this century and into the next. This *entire range* is extremely serious in terms of its consequences for our species.

As the NASA global temperature database makes clear, almost all the hottest years on record have occurred since the beginning of the twenty-first century, and erratic weather effects are observably increasing around the world.<sup>1</sup>

Earth temperature differential 2018



Data source: NASA/GISS Credit: NASA Scientific Visualization Studio

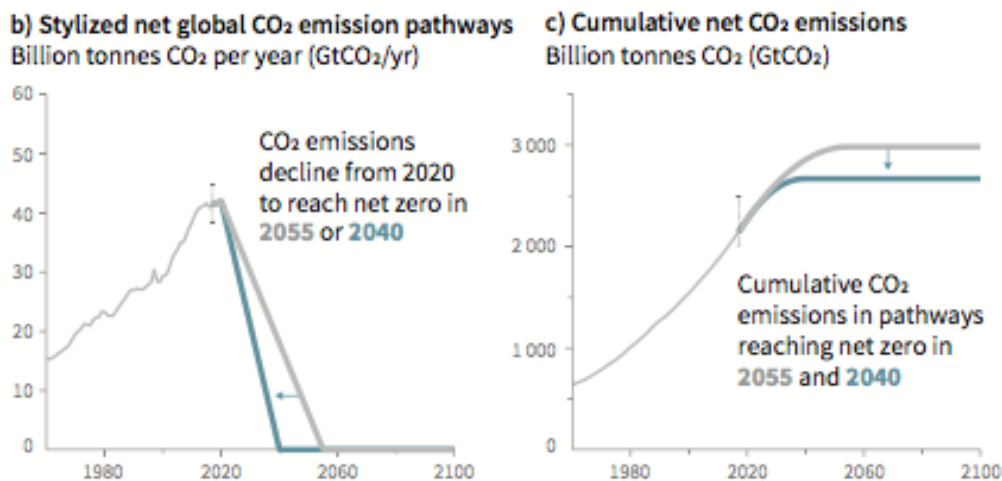
The identified consequences include: heatwaves, droughts, flooding, loss of landmass, inability of species to adapt exacerbating extinction rates, falling yields and rising crop failures, food and water insecurity, famine, loss of life from “natural” disaster, increasing poverty and escalating problems of induced safety-seeking mass migration. So, adverse climate change is already here and we seem to be sleepwalking towards catastrophe. The needed changes were stated quite starkly by the IPCC in October 2018 and in the UNEP 9<sup>th</sup> *Emissions Gap Report* in the following month:

“Current commitments expressed in the NDCs are inadequate to bridge the emissions gap in 2030. Technically, it is still possible to bridge the gap to ensure global warming stays well below 2°C and 1.5°C, but if NDC ambitions are not increased before 2030, exceeding the 1.5°C goal can no longer be avoided. **Now more than ever, unprecedented and urgent action is required by all nations. The assessment of actions by the G20 countries indicates that this is yet to happen;** in fact, global CO<sub>2</sub> emissions increased in 2017 after three years of stagnation. (UNEP, 2018, p. xiv) Global greenhouse gas emissions show no signs of peaking. Global CO<sub>2</sub> emissions from energy and industry increased in 2017, following a three-year period of stabilization. Total annual greenhouse gases emissions, including from land-use change, reached a record high of 53.5 GtCO<sub>2</sub>e in 2017, an increase of 0.7 GtCO<sub>2</sub>e compared with 2016. In contrast, **global GHG emissions in 2030 need to be approximately 25 percent and 55 percent lower than in 2017** to put the world on a least-cost pathway to limiting global warming to 2°C and 1.5°C respectively.... **Global peaking of emissions by 2020 is**

<sup>1</sup> <https://climate.nasa.gov/vital-signs/global-temperature/>

**crucial** for achieving the temperature targets of the Paris Agreement” (UNEP, 2018, p. xv; bold added).

To be clear, our best estimates based on the scientific consensus is that emissions *must* fall to 55% of their current level by 2030 and then (if one reads both reports) reduce further to *net zero* by mid-century.



IPCC, 2018: p. 8

As has started to become obvious, this is a deep problem of political economy. Mayer Hillman and others have previously stated and the IPCC now confirms that the problem seemingly requires a fundamental reorientation of how we organize and live based on mass mobilization to an extent never previously seen outside of a war setting.

However, as the essays set out here address. The very form and function of our political economies resists recognizing the seriousness of the situation and resists translating any recognition into concrete and immediate action. Events and published progress at COP 24 in Katowice, Poland, confirm this (see UNFCCC, 2018). We have rhetoric and some limited changes... We have had decades of global agreements such as Kyoto, discourse concerning sustainable development, education for environmental awareness, recycling and policies focused on carbon trading and efficiency enhancing innovations. At the same time, our economies as currently operative have been and are dependent on material expansion and growth, and remain configured to foster continual expansion and diffusion of industrialisation and consumption. The planet is deaf to good intention, it responds only to what we actually do, rather than merely what we say. Moreover, we have been socialised to conflate larger economies with necessarily better economies and to consider expansionary economies as a predicate of technological solutions to induced problems of economic activity. At the same time, we have been discouraged from thinking about the basic incompatibility of an ever-expanding material economy *within* a finite world.

The essays collected here serve to confirm various insights. There has never been a zero-carbon industrial-consumption economy, and we are now in a situation where we must *really recognise* that (as Meadows et al stated years ago) there are limits to growth and that one cannot blithely hope expansion + technologies is a simple source of salvation that requires no sacrifice. We are also in a situation where we must realise that our economies have powerful

actors of one kind or another, so markets are currently not “free”, and yet there is no single centre of decision making that has demonstrated it is currently capable of dictating what needs to be done to solve a global problem: states and corporations are resisting recognition or action based on the true scale of the problem, and many of the citizenry remain unaware of the true nature of the problem. This is extraordinary. Moreover, climate change based on carbon emissions is merely one consequence of a broader set of changes induced by the way we are changing the planet.

Emissions are a by-product of our socio-economic practices. It is these broader practices that account for cumulative consequences that have been catalogued in (so far) five *Global Environmental Outlook Reports* from the UNEP. Those practices and consequences include: deforestation, extension of intensive agriculture, industrial scale fishing, extraction of minerals, gas and oil, the proliferation of energy production, transportation, and manufacturing, and consumption patterns that treat our environment as a bottomless disposal site for plastics, pesticides, cosmetics, fertilizers, food waste, heavy metals, medicines and more, cumulatively resulting in, *in addition to global warming*, water table depletion, desertification, eutrophication and rising toxicities in soil and air, sea level rises, rapid species extinction and general loss of biodiversity on land and sea, ultimately creating pressure on food chains and culminating in progressive ecosystem collapse (UNEP, 2012). The global population has increased from about 1.6 billion in 1900 to over 7.5 billion in 2018. The global economy has increased from about US\$1.1 trillion in 1900 to over US\$80 trillion in 2018. Along with these changes has come amazing transformations in the way we live, but the issue is not whether there are aspects of the way (some of us) live that we like, the *real* issue is whether our design for life is survivable.

The situation, then, is ultra-serious. With this in mind, *Real-World Economics Review* has invited a range of experts to consider how we arrived in our current predicament and to what degree there is scope to address the challenges now confronted.

## **The essays**

The essays collected here are predominantly informed by an ecological economics perspective. As such, they are implicitly or explicitly critical of the theory and role of both mainstream economics, in its general neglect of environmental issues, and environmental economics in so far as it has operated as a sub-discipline in ways highly constrained by mainstream economic concepts that have been antithetical to a more realistic approach to recognizing environmental limits and remaining within them. A primary concern is that economics has contributed to complacency and has helped to limit the collective imagination or proper context for solutions that might (starting *far earlier* than today) have steered humanity along a different path. This, for example, is basic in different ways to the essays by Herman Daly, Max Koch, Peter Söderbaum, Ted Trainer and Samuel Alexander, Clive Spash and Tone Smith, and Richard Smith. Each builds on well-established prior work (see, for example, Smith, 2016; Daly, 2014; Söderbaum, 2018; Spash, 2017; Koch, 2012). This basic commitment is, in many ways, a sub-set of a general theme that contributors to the *Real-World Economics Review* have repeatedly expressed. That is, though mainstream economics frequently celebrates its use of data and statistical analysis, the trajectory of mainstream economics has typically been pseudo-scientific and antithetical to progress in both normative-ethical terms and realistic theory terms (and these are in fact aspects of the same issue in so far as social reality is normatively informed). By contrast the goals of humanity might better be

fostered by a pluralistic and realistically founded economics (see Fullbrook, 2016, 2009, 2008).

In general, ecological economics recognizes that an economy is a materially significant activity (Georgescu-Roegen, 1971). It is embedded in an environment of physical and biological processes that create limits. Fundamentally, one must recognize that economic activity is a processing of “throughput” that involves energy use, resource transformation and depletion, waste creation and an underlying entropy. It *may* be possible to produce more with less, it *may* be possible to recycle, but there *are* limits to the degree of circularity and of energy (re)use, resource use and scale. An economy is *not* an isolated system that can be treated as a mere circular flow of ever-expanding output and values. It is a component in a social system that is dependent on and causally related to the environment it is operative within. Ultimately the whole is an open system with path dependent characteristics. No reasonable vision of the future can neglect this (for example, Morgan, 2017). The adverse evidence from the IPCC and UNEP is making this ever clearer. Positive feedback, thresholds of transition and irreversibility of consequences all apply in the real world and there is no reason to think that an economic system is better suited than science to identifying points of no return and rowing back from them, not least because all of the individual incentive structures in an economic context of decision making are against this.

As all the contributors are aware, from an open system point of view, it is deeply concerning that conventional economics *does not* begin from material processes and real limits, but rather notional concepts in models of subjective values of goods and services in idealised market equilibrating situations. Issues of the environment are delegated to sub-discipline specialists to grapple with as and when markets “fail”. This foundational position has by default committed economic theory to reckless expansion, and, as a consequence (unintended or otherwise), limited the scope of solutions, since solutions have tacitly been required to take expansion as given. Within this framing, solutions only become relevant where markets fail in terms of pricing structures. Solutions mainly orient on correcting market failures, applying state intervention as a limited last resort. By elimination, prohibition is thus a thought that is mainly prevented. This framing takes it as given that corrected markets mainly solve the problems they create, as the system as a whole inexorably expands... The very idea of limits is, therefore, peripheralized.

Of course, at the same time, common sense tells economists of all hues, as it does all other citizens, that *everything* has its limit. And yet, economics as an ideational resource has worked against common sense. In mainstream economics, *some* applications have limits but there is always scope to substitute and transfer to other market situations of exploitation and development. In working against common sense, mainstream economics has followed a direction of travel of convenient compatibility that has been convergent with the concerns of corporations to expand and profit, and with the overriding competitive interest of countries to grow and materially develop. As citizens of wealthy countries, we have collectively been mainly ok with this because it has been easy to accept the logic of least cost future adaptations based mainly on solutions (efficiencies of innovation and technology) simply emerging from market processes (perhaps with some behavioural nudging, a few minor tax changes and seed investment for new transformative markets). For most of us this has become a rather dull somnambulant-inducing and eminently ignorable concern with externalities, discount rates, backstop resources and matters of marginal abatement and mitigation.

And so here we are, now requiring solutions that *begin* from a 55% cut in emissions by 2030 and a fall to net zero by the middle of the century. The challenge is great. However, the essays collected here provide insight and points of departure for the problem. Many, for example, will find inspiration in Richard Smith's work that takes the idea of the Green New Deal forward.<sup>2</sup> Others will see value in Ted Trainer and Samuel Alexander's anarcho-syndicalism, with its practical localism. It is to be hoped that all readers will respond with a sense that they need to take personal responsibility for their (our) own actions, and for the actions of those who claim to represent us. If there is one outcome we cannot currently afford it is a sense that the problem is overwhelming. Doing something is liable to initiate a sense that it is not enough and that every (in)action involves some degree of hypocrisy. However, perhaps the more we are sensitized to this, the more we are progressively prone to practical reorientation.

## Conclusion

History is replete with harbingers of apocalyptic civilizational crisis. The very fact there is *history* to attest to this indicates that vocal dread has typically been ill-founded. However, we have now entered a phase where we have truly placed ourselves in jeopardy. The overwhelming weight of evidence regarding our collective environmental consequences as a species suggests that the common sense of the last forty years is now forced to confront its own complacency. "Extinction Rebellion" and other new civil society and expert activist movements have begun to appear.<sup>3</sup> Encouragingly the young seem particularly attuned to the scale of the problem they have been bequeathed. A call to sanity has been initiated. Are we sufficiently rational as a species to respond?

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<sup>2</sup> [https://en.wikipedia.org/wiki/Green\\_New\\_Deal](https://en.wikipedia.org/wiki/Green_New_Deal), <https://www.greennewdealgroup.org>.

<sup>3</sup> <https://rebellion.earth>, <https://www.sunrisemovement.org/%20>

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