Decarbonization: A systems perspective of humanity's impending failure to stop the onset of catastrophic global warming.

(A current pdf of this essay is at https://melconway.com/Home/pdf/DecarbonizationSystem.pdf)
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There are two interacting subsystems in play.
1. The Earth's climate subsystem.
2. The Human species' political/economic system.
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Until the onset of the Industrial Revolution these two subsystems were effectively decoupled. Their recent coupling is the source of the "climate change" problem.
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Why frame the situation this way? Because Conway's Law (https://melconway.com/Home/Conways_Law.html)
Is a cautionary tale about the social costs of problem-solving teams not finding solutions that might have been found if certain people had been talking to each other, except that they weren't.
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Our present failure to organize around effective approaches to decarbonization is a spectacular use-case of Conway's Law. I'll begin to explain in this essay. Here is a summary in four tweets:
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The solution team structure, with all skills necessary to deeply understand the problem domain, must map onto the entire problem structure.

The climate subsystem is well represented by climate scientists,
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but a solution team for the political/economic subsystem, which must be truly pan-disciplinary, is absent, and our discipline-stovepiped research establishment is not equipped to create one.
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So while climate activists are urging us to do more, faster, in fact doing more faster does not address the whole problem.
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We don’t even know how to organize to address the whole problem because we haven’t studied the political/economic subsystem as a *homeostatic dependency network*.
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(Note: Biologists have been studying homeostatic dependency networks for centuries. Why aren’t biologists part of this conversation?)
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Here is a systems framing of the decarbonization problem.

Since the onset of the Industrial Revolution the extraction and burning of fossil fuels has created a new coupling between the two major subsystems.
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Human economic activity is changing the composition of the atmosphere, which is warming the surface of the planet.
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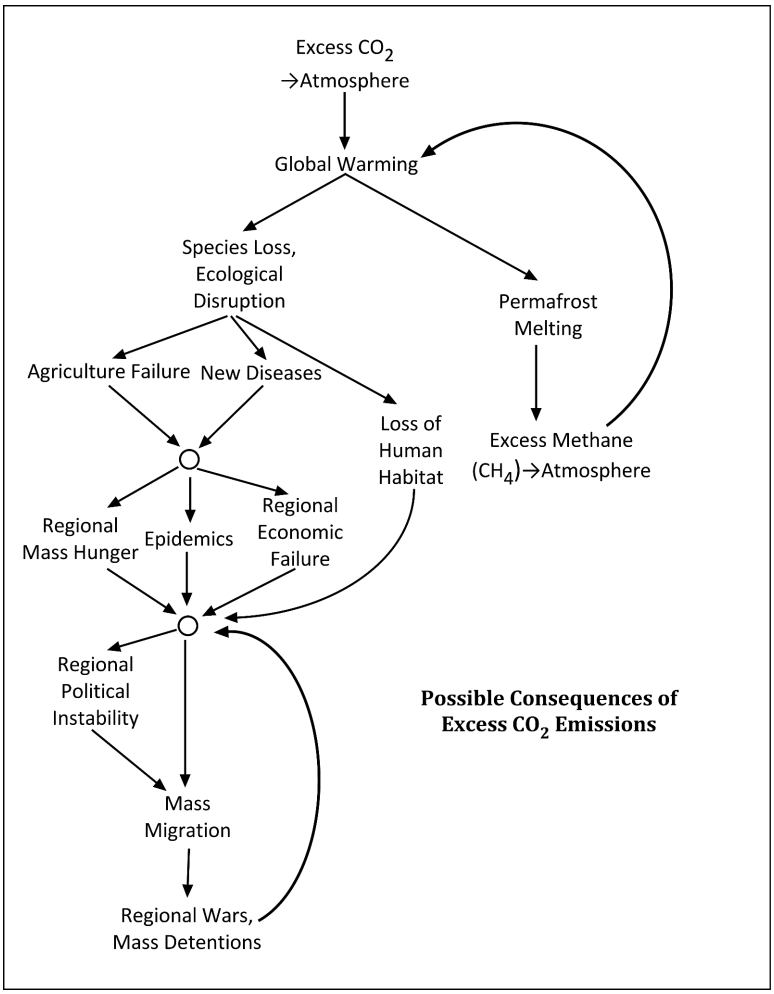
We have a closed loop; human-caused warming is beginning to disrupt the human political/economic subsystem, and all forecasts suggest that this disruption will increase; see this graphic and the Twitter essay below, for example.



https://twitter.com/conways_law/status/1661728581293096960
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(Aside: It's curious that the human part of this interaction is not consistent with popular interpretations of Lovelock's Gaia Hypothesis. The maladaptive rigidity of the human political/economic response to warming is seriously threatening the nature of life on earth.
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This article makes clear that Lovelock understood the threat. https://www.theguardian.com/theguardian/2008/mar/01/scienceofclimatechange.climatechange)
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Let's focus on this maladaptive rigidity; what is behind it? In my view, it arises naturally from recent inventions in our legacy political/economic subsystem, which we must think of as a homeostatic dependency network.
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There are myriad dependencies among the participants of our political/economic system. Everywhere you see political or economic relationships you find dependencies in operation. They generate economic activity, which supports life.
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What makes human history as a whole nearly stable (as opposed to chaotic) is that many of these dependencies are accompanied by negative feedback processes that go into action to restore the status quo ante of a dependency when there is a perturbation.
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For example, if a disruption makes one supplier in a supply chain suddenly unavailable, the downstream users of the output of that supplier will scramble to replace it, in order to continue their processes.
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But secular cultural change can occur more slowly. Civilizational changes occur at a generational, rather than an individual, pace. For big ideas to shift across a population, people won't be changing their minds; people with different ideas have to replace them over time.
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In science, this observation is captured in Max Planck's "Principle", ironically stated as "Science progresses one funeral at a time".
https://en.wikipedia.org/wiki/Planck%27s_principle
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But science has processes that support major changes in one generation. This is not true for politics/economics, where there are institutional couplers (education and religion, for example) that act to synchronize multiple overlapping generations.
https://twitter.com/conways_law/status/1672288539592257539
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Add to this the recent invention of long-term contracts and financial instruments, which can freeze certain behaviors for more than a generation.
https://twitter.com/conways_law/status/1633874374934827008
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Our problem (and therefore the problem of most other species on Earth) is that avoiding the looming dangers of global warming requires that we make major changes to our political and economic systems in less than a human generation.
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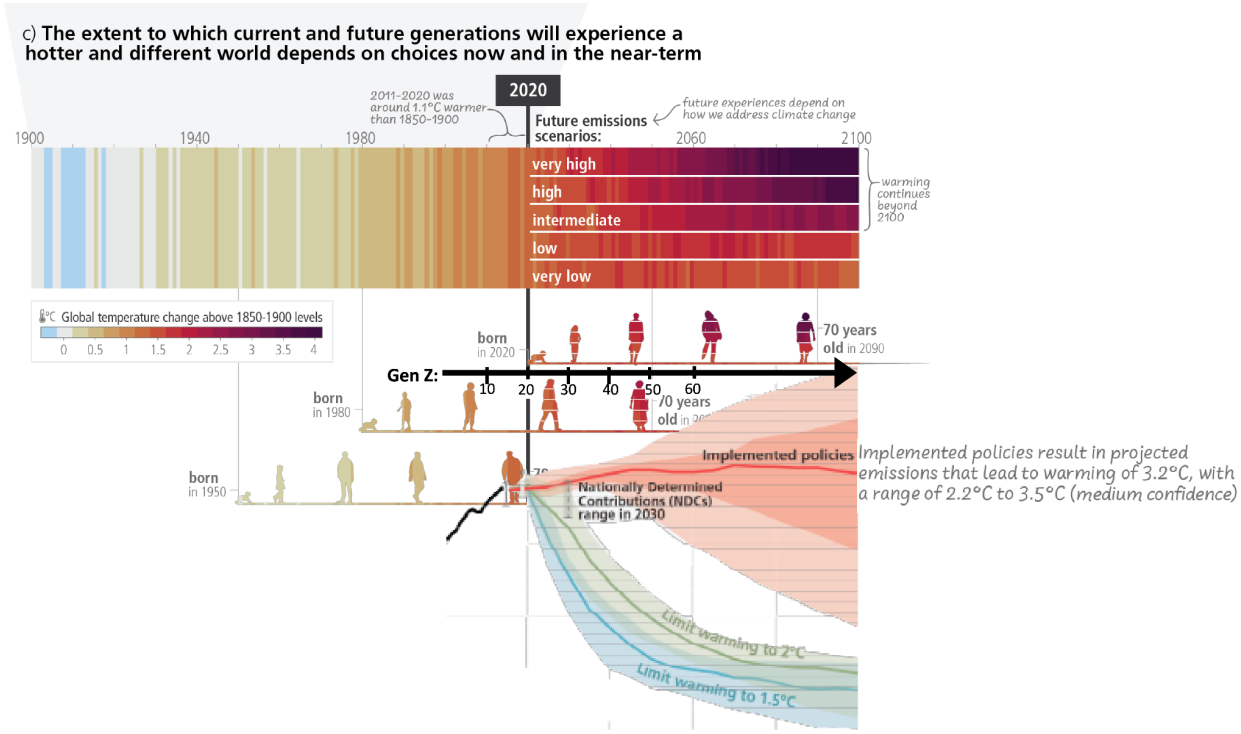
I have expressed this relationship between human and warming rates of change by reconciling their time scales in two IPCC figures and superimposing them into one graphic:
https://twitter.com/conways_law/status/1661728628089012224



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This is a problem. We benefit from many of our institutional inventions that block a one-generation rate of change. But the negative feedback processes that stabilize our homeostatic dependency networks also slow down change.
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Decarbonization is being treated in the popular media as a change-human-behavior problem. It is much more than that; it is a change-system-design problem. That is, and always has been, politics in its most difficult form.
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Human agency is necessary but is not sufficient. Decarbonization in one generation would require changing not just personal behavior, but changing the very feedback processes in our dependency networks. We have almost no experience doing that.
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We thus have an industrial-age tragedy: some of our beneficial inventions that have provided humanity with scale and stability are now blocking necessary responses to the looming destruction that others of our beneficial inventions are causing. Stay tuned.
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