

MuseLetter

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Predicting the future is a fool's errand, but everybody does it. As long as we've had language—for tens of thousands of years, at last estimate—we've been able to formulate the question, "What will tomorrow bring?" The answers have ranged from idyllic to hellish, though the reality has been, more often than not, "a lot like today."

Since the Industrial Revolution, the dominant method employed by forecasters has been to extrapolate recent trends forward in time—trends which, due to the availability during this period of cheap, abundant energy, have been mostly in the directions of economic growth and technological progress. With the advent of coal, oil, and natural gas, industrial societies were able to build a middle class, create jobs, extract and process raw materials in ever-greater amounts, make a cascading array of consumer products, and transport people and goods in quantities, and at speeds and distances, never previously imaginable. Sanitation and health care improved dramatically, lowering the human death rate and helping spur the greatest population expansion in the history of our species.

For planners, it seemed eminently sensible to align a ruler with these upward-sloping lines on graphs and extend them out a few more inches, indicating years or decades of yet more growth and progress (yes, I know, the process was more complicated than this—but not much). The method produced moderately accurate forecasts. Moreover, forecasters were applauded, as most people would very much like to think that growth and progress can indeed be maintained for the foreseeable future, since failure to do so would imply shattered dreams and expectations.

However, during the past 40 years experts who study ecology, climate, population, resource depletion, and debt dynamics have pointed out that recent growth trends simply cannot go on much longer; instead, a reckoning with natural limits will almost certainly occur during the course of this century. Followers of each relevant discipline have pointed out dire consequences that will ensue if policy makers do not implement certain course corrections, such as population stabilization and decline, rapid carbon emissions reductions, and habitat conservation on a vast scale.

In the main—that is, aside from the adoption of a few important but non-transformative environmental regulations—society has failed to correct course, and so dire and multivalent consequences should now be expected. If the more conservative estimates of planetary limits

are approximately correct, we should anticipate a future that is profoundly challenging; one characterized by societal disintegration and ecosystem failure. In the very worst case, the extinction of most animal and plant species, including humans, is conceivable. And the downward slide will begin soon, if it has not already done so.

The enormous gap between these outcomes—business-as-usual growth and progress on one hand, and limits-induced collapse on the other—has always constituted a disputed yet vital space. The goal of those who say we can't maintain business-as-usual has never been to *promote* collapse, but rather to suggest things we could do to alter current behavior and trends so that a crash will be more moderate and survivable. In effect, they have been exploring the gap, looking for landing points on the way up or down the growth escalator; or seeking to close the gap, lessening the boom so that the bust isn't as severe.

Recent years have seen policy makers continuing to pursue growth above all other priorities. At the same time, the news and entertainment media (nourished by pro-growth advertising revenues) have sought to shelter the masses from exposure to the dangerous truth that rapid expansion of population and consumption on a finite planet is a recipe for disaster.

Unfortunately, many of those who are aware of limits have either chosen to avoid the question altogether or made a concerted effort to soften their message in order to gain traction with power-holders; thus some PR-savvy environmentalists now promise endless "green growth" that can somehow be achieved through an elusive "decoupling" of social benefits, on one hand, from population growth, energy use, and materials consumption on the other. Of course, those who are aware of limits are somewhat rare; the majority of those who are concerned about the climate crisis or other environmental issues don't see these as manifestations of a deeper systemic pattern of "overshoot."

Meanwhile, however, the warning signs that industrial civilization is rapidly approaching non-negotiable planetary limits now flash red. Each of the last 16 months has established an all-time global temperature record. The oil industry appears to have entered a terminal crisis due to its requirement for ever-higher levels of investment in order to find, produce, refine, and deliver ever-lower-quality resources. Plant and animal species are disappearing at a thousand times the normal extinction rate. And global debt levels have soared since the 2008 financial crisis, setting the stage for an even greater financial convulsion whenever the next cyclical recession hits.

Those who study limits have grown more numerous and they now comb the evidence more skillfully and meticulously. Some have emerged to announce publicly that there is now effectively nothing that world leaders can do to prevent civilization collapse, mass suffering and die-off, and ecosystem ruin. Humanity, they say, has squandered its opportunities for course correction; now the worst-case scenario is guaranteed.

In effect, the gap between anticipated outcomes has become bigger

and more politically contested than ever. That means it is now even harder to explore the gap or to narrow it. Which is a tragedy, because it's only by grasping opportunities that lie within the gap that we are likely to find shelter from the approaching storm.

Perhaps I can illustrate the current challenges of gap exploring with an example from my own work. Recently I collaborated with co-author and energy expert David Fridley on a yearlong research project whose findings are summarized in our new book, [Our Renewable Future](#). We examined the potential transition to a mostly wind-and-solar energy economy with the goal of being ruthlessly honest. We looked at prior analysis from grid operators and fuel suppliers as well as from wind and solar engineers. Further, we studied not just energy supply requirements, but also needed changes in the ways energy is currently used so as to fit with new sources. We viewed the project (though we didn't use this exact terminology) as critical gap-exploring work: society's transition away from fossil fuels and toward renewable alternatives will be key to averting the worst of climate change, and it will have to occur in any case due to the ongoing depletion of economically recoverable oil, coal, and natural gas resources. What are the prospects for this transition? What are the potential roadblocks?

We concluded that, while in theory it may be possible to build enough solar and wind supply capacity to substitute for current fossil energy sources, much of current energy usage infrastructure (for transportation, agriculture, and industrial processes) will be difficult and expensive to adapt to using renewable electricity. In the face of these and other related challenges, we suggest that **it likely won't be possible to maintain a consumption-oriented growth economy in the post-fossil future, and that we would all be better off aiming to transition to a simpler and more localized conserver economy.**

The response to our book has been a little underwhelming. Few readers (or potential readers) seem to want to engage with the issues our analysis raises. Some have responded by insisting that solar and wind power can't possibly prevent the wholesale collapse of our economy and planetary life support systems. They are convinced that renewables can't meaningfully replace fossil fuels and therefore dismiss our vision for a "100 percent renewable energy future" as overly optimistic. Meanwhile, others say the shift to renewables is an unstoppable juggernaut and that any doubt about their capabilities amounts to defeatism or worse.

The latter attitude was epitomized [in a recent essay](#) by science historian and *Merchants of Doubt* author Naomi Oreskes. In it she equates critical comments about solar and wind power with climate denialism. Oreskes builds her case on reports by Stanford environmental engineer Mark Jacobson, who merely shows how (again, in theory), given enough investment, supplies of renewable electricity could be ramped up to match current and projected total energy usage levels. Jacobson either ignores, or quickly glosses over, most of the issues raised in [Our Renewable Future](#). In his view, the only thing standing in the way of a renewably-powered but otherwise business-as-usual future is political will on the part of policy makers.

On the other side of the divide are those who dismiss renewable energy sources entirely—such as actuary and energy writer Gail Tverberg, who claims that building solar and wind capacity actually makes societies [worse off than they already are](#). Her critiques of renewables appear to be based almost entirely on literature from fossil fuel and utility companies; she doesn't seem to cite much data from solar and wind engineers. Her criticisms have some merit—but not nearly as much as they would have if they reflected a more balanced survey of the subject.

The reality that David Fridley and I encountered is complicated and nuanced. On the plus side, solar and wind technologies do produce a significant net surplus of energy (that is, energy over and above the amount that must be invested in building and installing panels and turbines). Further, a lot of current energy usage can be electrified and made substantially more efficient. But key aspects of our current industrial system (including cement production, the chemicals industry, shipping, and aviation) will be difficult to maintain without cheap fossil-fuel inputs; during the transition, these sectors may have to be downsized, perhaps quite dramatically. The adaptations required in how society uses energy will be transformative for the entire economy and for the ways ordinary people live. We won't know exactly what a post-fossil industrial economy will like until we get busy addressing a list of questions. *(Here are just three: How much investment capital are we willing and able to muster for this purpose? Can the economy continue to function in the face of much higher costs for industrial processes? What happens to the financial system if GDP growth is no longer possible?)*

We'll never find out if we refuse to budge from where we are. Indeed, if we don't make the effort to push the transition forward quickly, there simply won't be a post-fossil economy; society will shudder and falter until it lies in ruins.

Given that business-as-usual airports, shopping malls, skyscrapers, and container ships have a vanishingly small likelihood of remaining useful or replicable much longer, what we really ought to be doing is to explore structures that *are* sustainable—and that implies identifying simpler pathways for meeting basic human needs. Since maintaining and adapting current levels of transport will be a big, likely insurmountable challenge, we might start by aiming to shorten supply chains and localize economies.

Social innovation will probably play a more important role in this adaptive and transformative process than the invention of new machines. Yes, we need research and development in hundreds of technical areas, including ways of building and maintaining roads without asphalt or concrete; ways of producing essential pharmaceuticals without fossil fuels; and ways of building solar panels and wind turbines using a minimum of fuels and rare, exotic materials. But in fact we already have lower-tech ways of solving a lot of problems. We know how to build wooden sailing ships; we know how to construct highly energy-efficient houses using local, natural materials; we know how to grow food without fossil inputs and distribute it locally. Why don't we use these methods more? Because they're not as fast or convenient, they can't operate at the same scale, they're not as profitable, and they don't fit with our

vision of “progress”.

That’s where social innovation comes in. In order for the transition to occur as smoothly as possible, we’ll need to change our expectations about speed, convenience, affordability, and entitlement. We’ll need to share what we have rather than competing for increasingly scarce resources. We’ll need to conserve, reuse, and repair. There will be no room for planned obsolescence, or for growing disparities between rich and poor. Cooperation will be our salvation. So, too, will be recognizing that there are limits—both to the planet’s capacity to support our numbers and activities, and to the role of technology in “fixing” these crises. But just because we can no longer continue to grow population, consumption, and complexity does not mean we can no longer grow happiness, well-being, or prosperity.

However, we’ll be making these behavioral and attitudinal shifts in the context of periodically profound disruptions to the economy and the environment. That’s why a very big part of our gap-closing work will consist of building community resilience. That word *resilience* is now frequently invoked by large philanthropic foundations and by military planners who see climate disruptions on the horizon. Yet often their visions of resilience seem to consist mostly of building walls to protect business districts in coastal cities from rising seas, or designing combat equipment to withstand harsher weather. For most communities, though, meaningful resilience-building efforts are likely to be more grassroots and less bureaucratic. Improving resilience will consist of assessing specific vulnerabilities, and then building buffers (such as inventories of essential supplies), enhancing barriers (for example, by creating more resistance to flooding through wetlands restoration), or increasing redundancies (by diversifying local food sources through support of young farmers). It will also mean strengthening social cohesion and trust by encouraging participation in community organizations and cultural events.

At Post Carbon Institute we’ve been looking into how to build community resilience for several years. We’ve published [a series of books](#) on strengthening local food systems, starting local renewable energy projects, and keeping investment capital circulating within communities rather than letting it flow to distant financial centers. We also host a robust, daily updated website, www.resilience.org, that provides readers with thoughtful essays and descriptions of best practices gleaned from gap-closing projects around the world. There are other projects in the wings, including a video series for college students studying sustainability and resilience, and a *Community Resilience Reader*.

We would like to do a great deal more, but we’ve found that funding for exploring or narrowing the gap is relatively puny compared to what’s available for business-as-usual projects. Want to build a highway for commuters; an LNG export terminal; or a new housing complex comprised of structures designed to last a mere 50 years, to use exorbitant amounts of energy for heating and cooling, and to employ building materials that have the highest possible amounts of embodied energy? No problem! How many millions do you need? But for a local food hub, a [Transition Town](#) effort, a marketplace for locally produced wares, a cooperative enterprise incubator, or a tool library, there’s spare change at best.

Even some otherwise smart and knowledgeable funders of nonprofits shy away from gap work in favor of continued support for big, conventional environmental organizations that attempt to slow the tide of environmental destruction or offer the promise of a clean energy future that won't require profound shifts in how we live. These are evidently considered a safer bet, though their high-profile efforts to battle fossil fuel and mining interests may offer little tangible help to ordinary people as the energy transition accelerates due to the thermodynamic failure of the global oil industry.

The many thousands of people working at gap-closing and resilience-building efforts deserve more attention and support, and not just because they are practical and caring individuals—as most of them are. They are, after all, providing society with the equivalent of fire insurance and seat belts at a time when metaphoric and literal fires and crashes are certain to become far more frequent and severe. It's the amount and quality of work that can be accomplished within the gap that will determine who survives, and how many survive, as boom turns to bust.

When it comes to forecasting the future, count me among the pessimists. I'm convinced that the consequences of decades of obsession with maintaining business-as-usual will be catastrophic. And those consequences could be upon us sooner than even some of my fellow pessimists assume.

Yet I'm not about to let this pessimism (or is it realism?) get in the way of doing what can still be done in households and communities to avert utter doom. And, while decades of failure in imagination and investment have foreclosed a host of options, I think there are still some feasible alternatives to business-as-usual that would actually provide significant improvements in most people's daily experience of life.

The gap is where the action is. All else—whether fantasy or nightmare—is a distraction.

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