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What Futures Are Possible?

People have been forecasting the future for as long as they've had language. Premodern ideas of what's to come often [featured](#) either a catastrophic end of the world or an eventual paradisiacal condition of peace and plenty. This was true both for many, though not all, Indigenous peoples and for followers of the world's missionary religions (i.e., Christianity and Islam, and to a lesser degree Buddhism). For some cultures, the arc of time was imagined as a progression from ancient virtue to present corruption and eventual ruin or salvation; for others, time was cyclical, with multiple Golden Ages and periods of decline.

Today, most scientific futurists regard such traditional concepts of collective human destiny as worthy of ethnographic study but otherwise useless. In their place, the modern futurist supplies scenarios based on quantifiable trends. Extrapolating trends in population, economic activity, and technology can lead, in their view, to projections reliable enough to be used by city planners, policy makers, and CEOs. In fact, some municipalities, like those in Oregon, are *required* to base their planning on [population forecasts provided by the State](#), which are in turn based on historical and current trends.

But there's a problem with these scenarios: trends change. They encounter limits, countervailing trends, and [contradictions](#) inherent in social systems. For example, simply extrapolating human population growth that occurred during the past century leads to a world, only eight centuries from now, where there is one person for every square foot of Earth's land surface. That scenario won't be realized for many reasons, including insufficient food to feed such an immense population. Long before we achieve a standing-room-only planet, our recent population growth trend will slow, stop, and reverse itself (as is [already starting to occur](#)).

Failed technology predictions make for [colorful and amusing reading](#). Just one example: in 1959, Arthur Summerfield, the U.S. Postmaster General, forecast that "before man reaches the moon," mail would be delivered long distances (e.g. from New York to Sydney) using guided missiles. Instead, we got email.

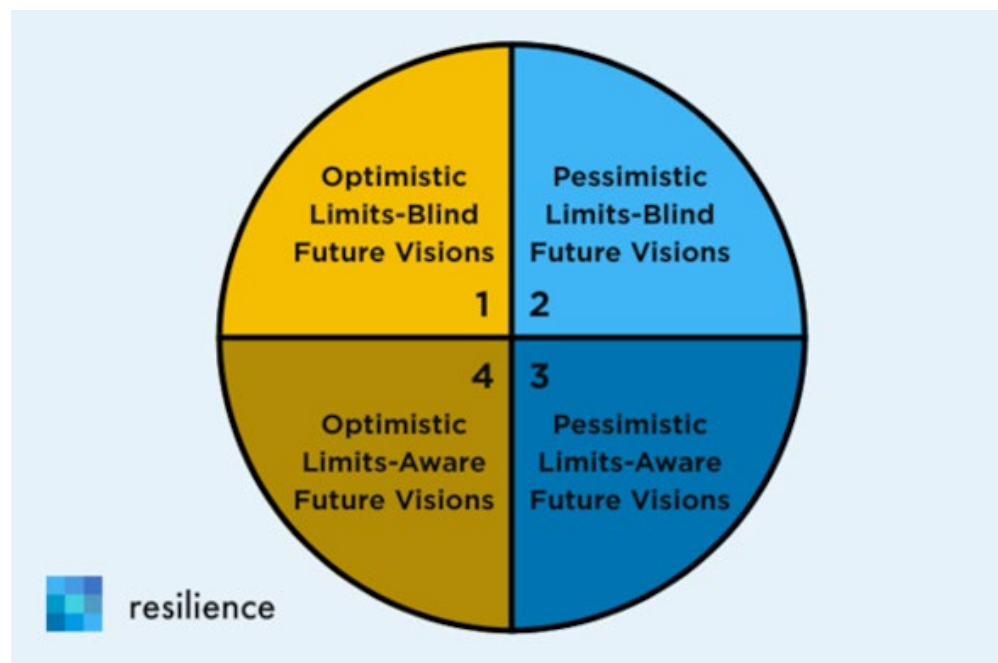
Socio-political forecasting has likewise produced some clinkers. In 1992, political scientist Francis Fukuyama proclaimed that the fall of the Soviet

Union would usher in “[the end of history](#),” meaning “the end-point of mankind’s ideological evolution and the universalization of Western liberal democracy as the final form of human government.” Fukuyama’s forecast seems quaint today, following the rise of Vladimir Putin in Russia and the [decline of democracy in the United States](#).

In the 1950s, spectacular technological and scientific achievements led to bold predictions of eventual human interplanetary or even interstellar supremacy; yet, at the same time, the prospect of nuclear war posed the possibility of human annihilation. The traditional [paradise-versus-end-of-world dichotomy](#) had taken on trendy new garb—as it has done again more recently, with [climate change](#) and unregulated [artificial intelligence \(AI\)](#) as potential vectors of societal shattering.

In this article, we’ll explore a four-part typology of futures from the perspective of physical constraints, which are often overlooked by futurists concerned only with culture, technology, or politics. As we’ll see, this approach—like others—generates both best-and worst-case scenarios. Its main virtue is that it prioritizes future scenarios that are likely to be realized from the standpoint of physical factors like energy and materials; in effect, we’ll be sorting the possible from the purely fanciful.

The use of energy and material constraints as the basis for scenario forecasting is most famously identified with the [Limits to Growth](#) (LTG) study of 1972 (which also considered pollution, food, and population constraints). That study has shown itself to be more [reliable](#) than competing scenario forecasts that tended to ignore physical limits while simply extrapolating existing socio-economic trends. In this article, we won’t be using computer modeling (as the LTG team did); what I have in mind is less formal and more playful—think broad-brush, best-guess scenarios that lean on science fiction novels and movies rather than data and systems models.



For the purposes of this article, I’ve divided fictional futures into four quadrants. The first quadrant describes *optimistic* limits-blind visions of the future. The second quadrant focuses on *pessimistic* limits-blind visions. The

third quadrant describes limits-aware *pessimistic* possibilities, while the fourth quadrant focuses on *optimistic* limits-aware possibilities. Spoiler alert: only one quadrant is worthy of our serious, long-term attention and effort.

Note: For most economists, an “optimistic future” is one in which human population and consumption grow endlessly. As we’ll see, we humans need a very different kind of optimism.

1. Optimistic Limits-Blind Future Visions

If we ignore natural constraints, lots of things—good and bad—seem possible. On the hopeful side (as economists interpret it), ignoring limits to soil and water encourages expectations of ever-increasing food abundance. Ignoring limits to energy opens the possibility of humans voyaging to other star systems and colonizing space. Ignoring limits to computer power and complexity leads to expectations of AI surpassing human beings in intelligence, thereby removing any future requirement for human toil. This kind of limits-blind speculation is widespread. Indeed, for the past few decades, even the “sustainable development” agenda of international agencies that aim to end poverty and disease has been [mired in ignorance](#) of physical limits.

Fictional depictions of resource- and energy-unconstrained futures are numerous and familiar—from the cartoon suburbia of [The Jetsons](#) to the utopian interstellar voyages of [Star Trek](#). In the late 19th and early 20th centuries, the unleashing of vast amounts of energy from fossil fuels created temporary abundance, especially in the oil-rich United States. Most science fiction extrapolated that abundance forward in time, depicting a future of technology-assisted ease and plenty. This was exemplified in the [1939 New York World’s Fair](#), which foreshadowed the modern suburb in its fictional “[Democracity](#),” where nuclear families own their homes and tend their yards while children frolic on green lawns, ride bicycles, and play softball, all far from the business hub of the planned metropolis. Disneyland’s “[Tomorrowland](#)” exhibit (originally constructed in 1955), gave visitors a view of the Interstate Highway System, which would be constructed at the [cost](#) of hundreds of billions of inflation-adjusted dollars over the coming decades. Suburbs and superhighways were built during humanity’s short period of energy super-abundance; however, we haven’t gotten around to the creation of an exploratory *Star Trek*-envisioned [Starfleet](#), and it’s a [safe bet](#) that we never will.

Starting in the 1950s, with the advent of the nuclear arms race, along with growing realizations that suburban life could be less than liberating and that bigger highways just meant even worse traffic jams, many visions of the future began to have a distinctly dystopian flavor. Which brings us to quadrant two.

2. Pessimistic Limits-Blind Future Visions

With the enormous amounts of energy that are being unleashed by burning fossil fuels, and that could potentially be released by the explosion of atomic weapons, it really is possible to create hell on Earth. Not much fictionalizing is required.

Nevertheless, some dystopian visions of the future, because they assume a continuation of the growth trends of the past century, are unrealistic. For example, projecting AI growth into the coming decades can lead to expectations of universal human slavery to the machines we've created, as in the 1999 film *The Matrix*. We already live in a *Matrix*-like web of electronic illusion and disinformation; however, a full-scale *Matrix* (as portrayed in the movie) would require many thousands more [data centers](#), each devouring energy and water at unsustainable rates. Indeed, energy and water limits are already problems for AI, and are one reason AI will probably not, in fact, take over the world (or, if it does, not for very long). The scientifically laughable premise of *The Matrix* was that AI was using human bodies as a power supply. Given the [energy efficiency of metabolism](#), that will never happen.

Here's another dystopian future we don't have to worry about: alien invasion. Sci-fi books and movies that revolve around this theme are plentiful, perhaps best typified by the 1979 horror film *Alien*. But, as astrophysicist Tom Murphy has [argued persuasively](#), space travel on any scale greater than the deployment of a few interplanetary probes is physically impossible: distances are too great, energy sources are insufficient, and space is too inhospitable.

Some climate fiction ("cli-fi") is similarly unrealistic because of its failure to appreciate energy and materials limits. Cli-fi is, by its very nature, mostly doomy. It seeks to help readers understand how our world is changing, and will change, due to humanity's destabilization of geosystems and ecosystems. Cli-fi that attempts to be optimistic often features fictionally portrayed climate solutions that are unlikely to be realized due to natural limits. Kim Stanley Robinson's 2020 novel *The Ministry for the Future* is a case in point: in it, as horrific climate impacts ravage India, nations cooperate to reduce carbon emissions and undertake geoengineering projects. They succeed in greatly slowing climate change, and global industrial civilization persists—though with airships replacing jetliners and carbon farming supplanting conventional agriculture. However, in view of energy and material limits, even those sorts of tweaks can't make current levels of population and industrial activity sustainable for more than another few decades.

Not doomy enough for you? Onward to quadrant three!

3. Pessimistic Limits-Blind Future Visions

The 1973 dystopian thriller film *Soylent Green* was an early and quintessential exemplar for this third quadrant of scenarios. By 2022, according to the movie's plot, the cumulative effects of overpopulation, global warming, and pollution have triggered a collapse of ecosystems, leading to severe worldwide shortages of food, water, and housing. Civilization is on the brink. Most people live in squalor and eat highly processed food wafers made by the Soylent Corporation—whose latest product, Soylent Green, is purportedly made from plankton. In one of cinema history's biggest reveals, we later learn from Charlton Heston's cry at the film's conclusion that, "Soylent Green is people!" Soylent Green may be the most brutal solution imaginable to the problem of too many people and not enough resources, but it's not viable long-term, since humans would be an [extremely inefficient](#) food-energy source.

Most novels that fit in this quadrant of futures simply describe people trying

to survive in a world that's falling apart. One example, [The Windup Girl](#) by Paolo Bacigalupi (2009), tells of a climate-ravaged future where fossil fuels are depleted and genetically engineered plagues repeatedly decimate the population. The story follows several characters in Thailand struggling to persist in a world of cutthroat competition for scarce food and water.

Another example, [One Second After](#) by William R. Forstchen (2009), highlights our current profound dependency on the electricity grid. In the story, an electromagnetic pulse (EMP) attack cripples the United States, causing civilization to collapse. The rest of the book chronicles a small town's struggle to persist without electricity.

Post-apocalyptic fiction doesn't always specify the cause of the disaster that has laid waste to civilization. Such is the case in [The Road](#) by Cormac McCarthy (2006), and the [2009 movie](#) based on it. These are unrelievedly grim portrayals of what the future might hold for survivors in the wake of societal collapse, whatever the trigger event might be.

4. Optimistic Limits-Aware Future Visions

Sometimes fictional collapse eventually leads to cultural renewal, a signal element of quadrant four. A classic in this vein is [Earth Abides](#) by George R. Stewart (1949), in which a virus-borne plague wipes out nearly all of humanity. The scattered survivors gradually find one another and begin to re-learn the social and practical skills of their ancient ancestors. In the ensuing three generations, humanity starts over, now living closer to the Earth.

While *Earth Abides* doesn't attribute civilizational collapse to humanity's abuse of its environment, later hopeful post-apocalyptic fiction often takes this route. One example is [All the Water in the World](#) (2025) by Eiren Caffall, in which a young woman and her family navigate a flooded, post-collapse, climate change-battered New York while trying to preserve the best of human culture and human nature.

As I wrote in a [recent essay](#), a future long-term sustainable human culture would need to value ecosystems, cooperation, humility, and sharing; building it would effectively require us to re-indigenize ourselves. If such is our aim, then one futurist literary genre we should consult for guidance is [Indigenous futurism](#). [Walking the Clouds](#) (2012) is an anthology edited by Grace Dillon, who coined the term "Indigenous Futurisms"; it collects a wide range of speculative fiction by Indigenous authors exploring future possibilities for Native peoples through the lenses of science fiction, alternative histories, and Indigenous knowledge. Another example is Rebecca Roanhorse's [Trail of Lightning](#) (2018), which prominently features Diné (Navajo) cosmology, heroes, and monsters in a landscape reshaped by both climate change and Indigenous knowledge.

Two other sub-genres fit into this quadrant: [solarpunk](#) and [eco-fiction](#). They are poles of a spectrum, ranging from futures bristling with high-tech sustainability solutions at one end, to stories of [human re-wilding](#) on the other. [Glass and Gardens: Solarpunk Summers](#), an anthology edited by Sarena Ulibarri (2018), is a good entry point for readers wanting to explore solarpunk; Diane Cook's [The New Wilderness](#) (2020), which follows a mother and daughter who are members of a nomadic tribe living in a

government-controlled “Wilderness State” after the collapse of modern society, is emblematic of eco-fiction.

Hopeful post-apocalyptic fiction often describes the breaking apart of great nation-states into smaller bioregional communities. This was a theme of Ernest Callenbach’s [Ecotopia](#) (1975), which was fictionally set in the year 1999; it describes a small country that secedes from the U.S. in 1980 following an economic collapse. The new nation of Ecotopia consists of Northern California, Oregon, and Washington, and has adopted a range of solarpunk practices (though the word had not yet been coined in 1975). Similarly, in Starhawk’s [The Fifth Sacred Thing](#) (1993), which is fictionally set in 2048, the northern Pacific coastal region of the U.S. has politically broken away from the rest of the country, which is authoritarian and corporate-controlled. The new eco-utopia must defend itself from hostile outside forces, thereby testing its people’s commitment to nonviolence, equity, and consensus decision-making.

Altogether, this quadrant of futures offers gritty realism with a dose of optimism. We have come nearly full circle, again envisioning hopeful futures, but ones far afield from the naïve imaginings of *The Jetsons*. The general message of most fiction in this quadrant is that humanity has already exceeded natural limits and broken boundaries; there will be consequences—some of them horrific. Still, collapse brings the opportunity to abandon global economic and political structures that have driven us to the point of ruin, and to build instead a fabric of locally adapted, rooted, re-indigenized human cultures that are both capable and worthy of thriving for many generations.

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My favorite adage about the future is from what is widely considered the worst sci-fi movie ever made, [Plan 9 From Outer Space](#) (1958): “We are all interested in the future, for that is where you and I are going to spend the rest of our lives.” It’s essential that we imagine futures that are both possible and desirable—and then, that we work toward realizing them. Otherwise, we become irrelevant bit players in a world shaped by people who simply seek power above all. Community-scale and bioregional-scale responses to the Great Unraveling invite personal action and lead both to convivial social arrangements and to the discovery of ways to live more in cooperation with, less in domination of, the web of life.

Feature image credit: [Earthship Community home 2](#) by Dameon Hudson (CC-BY 3.0). Solarpunk may take practical inspiration from Earthships, a form of sustainable architecture.