



Book Review - 2052: A Global Forecast for the Next Forty Years

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2052: A Global Forecast for the Next Forty Years is a report to the CoR commemorating the 40th anniversary of *The Limits to Growth*, written by one of the four original authors. This broad forecast is “an informed guess tracing the big lines in what I see as the probable global evolution toward 2052...the most likely global roadmap to 2052 so that I would know what I am in for.” Since publication of *The Limits to Growth* in 1972, “humanity remains in solid overshoot...and we can discern the early signs of the coming gradual destruction of the ecosystem” (p.xv).

1. Five Big Issues toward 2052

“The big question is how fast the transition to sustainability will happen...the sustainability revolution has started, but is still in its infancy” (p13). The transition will require a fundamental change to a number of systems that govern current world developments. The next 40 years will be strongly influenced by how we handle five central issues:

- ***The End of Uncontrolled Capitalism:*** “slow and insufficient response to our challenges will dominate”; old-fashioned capitalism will survive in parts of the world, but will be strongly modified elsewhere;
- ***The End of Economic Growth:*** continuing technological advance will come to our partial rescue, but lack of space and cheap resources will force solutions with a lower ecological footprint to fit within the carrying capacity of the planet;
- ***The End of Slow Democracy:*** the fundamental question is whether democracies will agree on a stronger state and faster decision-making before we run into the brick wall of self-reinforcing climate change;
- ***Intergenerational Conflict:*** the era of generational harmony will come to an end, leading to slower economic growth and a smaller pie to share;
- ***The End of Stable Climate:*** negative impacts will be significant, but not disastrous before 2052; there will be more droughts and floods, and

sea level will be 0.3 meters higher; “self-reinforcing climate change will be worry number one, with methane gas emissions from the melting tundra leading to further temperature increase, which in turn will melt even more tundra” (p47); the world will still be operational, but with higher operating costs and scary prospects for the rest of the 21st century.

2. The Global Forecast

Several *Highlights* of the forecast:

1. “global population will stagnate earlier than expected because fertility will fall dramatically in an increasingly urbanized population”;
2. “resource and climate problems will not become catastrophic before 2052” due to increased social investment, but there will be much unnecessary suffering;
3. the short-term focus of democracy and capitalism will ensure that “wise decisions needed for long-term well-being will not be made in time”;
4. “global population will be increasingly urban and unwilling to protect nature”;
5. the impact will differ among five regions analyzed here: “the most surprising loser will be the current global economic elite, particularly the US...China will be the winner” (p355).

Some *Details* of the forecast:

- Disparities:The world in 2052 will be one of huge regional and class differences; there will be social friction because of distributional inequity; regional variations in increased temperature will range from 0°C to >4°C;
- World Population: Continuing decline in fertility, only partly offset by a continuing rise in life expectancy, will cause “global population to reach a maximum of some 8.1 billion people in the early 2040s,”thereafter “declining at 1% per year and it will be back to current levels (7 billion people) by 2075”(pp62-64);
- Workforce: Potential workforce will follow the pattern of population: it will first grow, then peak, and then start to decline; “the number of people aged 15 to 65 will peak some five years before the peak in total population”; thus, the support burden will stay more or less constant because the rise in the number of the elderly population will be offset by a decline in the number of children;
- Productivity: Productivity growth will peak in the 2020s and then decline toward the middle of the century; in 2052, GDP per person will

grow at only 1%/year; productivity growth will be hampered by erratic weather and growing inequity that will disturb the peace;

- GDP Growth: World GDP will be 2.2 times as big as today, enabling higher average consumption rates but also resulting in higher emissions and more rapid depletion of resources; world GDP will start to decline just after 2052, despite dramatic increases in resource and energy efficiency;
- Investment Growth/Consumption Decline: Emerging problems will mean increased investment, forced or voluntary; this will take up a larger share of GDP, lowering the share available for consumption; investment is currently 25% of GDP and will need to be increased to >30%; “global consumption will grow toward stagnation in 2040 and begin to fall around 2050”;
- Rising Costs: New costs will emerge, e.g.: substitutes for scarce resources, solutions for dangerous emissions, replacements for ecological services such as water that were formerly free, protections against future climate damage like sea-level rise, rebuilding real estate and infrastructure destroyed by extreme weather, and maintaining armed forces to defend resource supplies and fight off immigration; the cost of such developments “could easily exceed 10% (of world GDP) in the long run of a badly handled future”;
- Energy Use: About 87% of today’s global energy use is supplied by coal, oil, and gas; energy intensity will fall by a third by 2052 while the global economy doubles—thus energy use will grow by 50%;
- Changing Energy Mix: Use of conventional oil has probably peaked, and peaks in both coal and gas use are expected before 2040 due to very rapid increase in use of renewable energy, which will grow from 8% of energy use in 2010 to 37% in 2050 (this shift will be slowed by the cheap intermediary solution of replacing coal with gas); the nuclear share of world energy will be one-half of today’s contribution—below 3%;
- Emissions: CO₂ emissions from energy will peak in 2030, but overall emissions from energy use will still be 40% above global emissions in 1990; carbon capture and storage (CCS) will have a limited role in reducing CO₂ emissions in 2052, dwarfed by increases in energy efficiency and renewables;
- Rising Temperature: “Average temperature will go from plus 0.8°C relative to preindustrial times in 2012 to plus 2.0°C in 2052, and a maximum of plus 2.80°C in 2080” (p241). In 2052, “there will be visible climate damage and growing worry about the future” (p119);

- Urbanization: “More people will seek shelter inside modern city walls, leaving a small rural population to fend for itself against increasingly violent weather and ecosystem change”;
- Adaptation: “By 2052, voters in the well-governed part of the world will have seen enough damage to be genuinely concerned about the possibility of self-reinforcing climate change in the last half of the century”; a tremendous effort will finally be under way to reduce emissions for the benefit of all, in parallel with an extraordinary effort to adapt to the new climate;
- Food: Production will continue to grow in the decades ahead, and Homo affluens will have moved down the food chain to less refined foods; but food will be unevenly distributed then as now, and many will starve; as we get closer to 2052, agriculture will be increasingly affected by climate change; use of genetically modified organisms will increase but prove unsustainable in the long run;
- Managed Degrowth: Forward-thinking regions within some nations will increasingly focus on managing their inevitable degrowth by trying to build regional resilience focusing on local food and energy;
- Sustainability Paradigm: Growth in GDP will remain a central ambition in most countries for many decades; “the sustainability crowd is still a tiny minority, and the paradigm shift is probably several decades into the future”; by 2052 global society will increasingly be seeking sustainable well-being based on planet-friendly energy and resources;
- Modified Capitalism: Global society will interfere, to some extent, with operation of the free market to ensure that investments flow toward what is publicly needed rather than what is most profitable; thus, under “modified capitalism,” a stronger role for wise government;
- China as World Leader: “China will be the world leader in 2052...the premier driving force on the planet,” with a population 3.5 times bigger than the US, an economy nearly 2.5 times larger, and consumption >70% of the US equivalent (the US could maintain its hegemony, but its system of governance does not seem capable of quick, bipartisan decision making);
- Jobs: There will be as many jobs in the future as in the past, relative to the workforce; “I see little reason why there should be higher levels of unemployment in the future”;
- Wild Cards: Some wild cards: abundant oil or gas making new renewables less competitive, a financial meltdown, nuclear war, a deadly disease killing two billion people, collapse of ecological services

such as bee pollination, counter-revolution in China leading to lower emissions and reduced investment in green technology, a citizen's rebellion in the US that fundamentally changes the tax laws, a dedicated global effort to stop climate change.

3. Regional Futures

- The US: The economy will grow at an average rate of only 0.6%/year over the next 40 years (reaching zero by 2052), because it is already a mature economy with high productivity, it has not been investing sufficiently (investment is only 16% of GDP—less than two-thirds the 24% global average), and the US must repay the debt run up over the last decades; as a consequence, “per capita consumption levels in 2052 will be some 10% lower than in 2010” (p267); energy use will be more or less constant, with a huge shift from coal and oil to gas, and renewables as the largest source of energy by 2052; emissions from energy use will decline nearly one-half by 2052—35% below 1990 levels;
- China: “Tremendous economic growth” is expected over the next 40 years, averaging 3.5% per year but much higher in the next 20 years. Despite high savings and investment (currently at >35%), consumption per capita will grow fivefold by 2052. But China’s “footprint on the planet will be substantial,” and climate change will create significant problems of sea level rise and desertification; energy use will more than double by the 2030s; agricultural output will increase by 25% before it peaks in the 2030s and starts to decline;
- OECD-less-US: The old industrialized market economies other than the US have more than twice as much population as the US; population will remain constant until 2025 and then start a slow decline so that it will be 10% lower in 2052 than today; aging will lead to an increase in the support burden by some 10% after 2030; total GDP will peak in the early 2030s at some 15% above current level; very fast growth in renewables will reduce gas use after 2035, and the nuclear industry will be in steady decline; overall emissions will be 55% below the current rate and 50% below 1990 emissions;
- BRISE: Brazil, Russia, India, South Africa and ten big emerging economies (Indonesia, Mexico, Vietnam, Turkey, Iran, Thailand, Ukraine, Argentina, Venezuela, and Saudi Arabia) had a total of 2.4 billion people in 2010 (half in India) and will peak by 2052 at well below 3 billion; collective GDP in the 14 countries will triple by 2052, with per capita GDP growing from \$6K to \$16K; emissions from fossil fuels will not plateau until the 2040s despite efficiency increases; the

region is subject to potential climate disasters (e.g., inundation of SE Asian countries by melting glaciers in Tibet, drying out of the rain forest in Brazil, insects killing the boreal forest in Russia); in sum, the region will be “in lively development” over the next 40 years, but with widely varying quality in governance;

- Rest of the World: This eclectic blend of 186 countries had a total population of 2.1 billion in 2010, which will peak in the 2050s at 3.1 billion due to education and contraception; GDP will grow three times its current size by 2052, and GDP will grow from \$4K to \$8K. Food production will outpace population growth, and the energy system will grow gradually. The area of cultivated land will start to decline around 2040, and the ROW region will need food imports by 2052.

4. “Overshoot and Collapse” Updated

The concern about “overshoot and collapse” was first articulated in the 1972 Limits to Growth report. This forecast chooses “Scenario 3” from The Limits to Growth, which describes a shortage of nonrenewable resources and dangerous pollution postponed until the mid-21st century due to application of technology. “The story of the 2052 forecast is one of overshoot caused by delayed societal response to greenhouse gas emissions being allowed to increase beyond sustainable levels for generations. It is a story of lower consumption growth (and in the rich world consumption decline) resulting partly from the costs of trying to mitigate the climate problem” (p305). The world will experience numerous cases of overshoot and decline before 2052, but it will not experience overshoot and collapse before 2052, when average per capita consumption will peak, and global average temperature will surpass the danger threshold of 2°C. This forecast of developments to 2052 is “quite gloomy,” but “not catastrophic” (p323).

The human ecological footprint has expanded continuously since 1972, and will become heavier. The human footprint can expand beyond planetary limits. When the footprint approaches a limit, society normally reacts, but only after some delay. “Currently the human demand on the biosphere exceeds the global bio-capacity by some 40%” (p311). The world of 2012 is in overshoot, but this is a temporary phenomenon. In each instance of overshoot, humanity has to move back into sustainable territory, either through “managed decline” or by “collapse induced by nature.” The world has not yet experienced large-scale environmental collapse. The challenge is solvable in principle, but hard to address in practice.

5. What We Should Do

“It took 30 years from when the current success measure of GDP was invented in the 1930s to regular use for policy guidance in the 1960s; we now need to institute 'monthly measures of national well-being in much less than 30 years'.”

The final chapter discusses what “global society ideally should have done”: increase energy efficiency, shift to renewable energy, stop destroying forests, and invest in carbon capture and storage. All of these actions are technically feasible and not especially expensive. If properly executed, the effort would not reduce employment. With a lower discount rate and more realistic pricing, many climate-friendly solutions are competitive at current prices.

“The saddest aspect of my forecast is probably the fact that there will be no wage rise—and possibly a decline in real disposable income—in the rich world over the next 40 years...for most who are younger and poorer, this will seem like an ominous future” (p327). The answer is to decide on a different success criterion, choosing well-being rather than material gain as the appropriate goal. It took 30 years from when the current success measure of GDP was invented in the 1930s to regular use for policy guidance in the 1960s; we now need to institute “monthly measures of national well-being in much less than 30 years” (p328).

This said, 21 provocative “pieces of personal advice” are offered:

1. Focus on satisfaction as a core goal, rather than income (e.g., maximizing life satisfaction as long as income stays above a certain threshold);
2. Don't acquire a taste for things that will disappear (the future will be urban, dense, and crowded; don't develop a taste for life in suburbia);
3. Invest in great electronic entertainment and learn to prefer it (virtual worlds will increasingly compete with the real world for our attention; fascination with the real appears to be an acquired taste, and tastes are changing);
4. Don't teach your children to love the wilderness (humanity is eliminating wild nature from the planet; those who have been taught to love wilderness will have fewer places to go, farther away; however, love of untouched nature is largely an acquired taste);
5. If you like great biodiversity, see it now (despite continued efforts to conserve and restore biodiversity, climate change will take its toll);

6. Visit world attractions before they are ruined by the crowd—or increasing social unrest (cultural diversity is seemingly disappearing even faster than biological diversity);
7. Live in a place that is not overly exposed to climate change (the general picture is well-known: avoid traditional flood zones, sea level locations, areas that are already too hot or too dry, and mountains that are currently frozen—which will “give off landslides when the permafrost lifts 200 vertical meters by 2052);
8. Move to a country that is capable of decision-making (democracy and the free market have solved a number of complex problems in past generations, but society will be facing problems not easily solved by these well-tested means, notably global warming; thus “choose as your new homeland a country that is capable of acting proactively in the decades ahead”);
9. Know the unsustainabilities that threaten your quality of life (map out the problems your location will face in the next decade or two—both physical threats such as erratic weather, brownouts, and migration flows and non-material threats such as higher taxes, new legislation, and cultural decline);
10. Get an education (it guarantees a more interesting life and ensures greater choice; if unemployed, fight for your rights, because “unemployment is a distributional issue” that can always be solved by changing national policy, e.g.: tax the rich and/or print more money so as to create public employment);
11. Encourage your children to learn Mandarin Chinese (more than 1.5 billion people already know this language, and it is important to have “direct access to the future hegemon”);
12. Stop believing that all growth is good (if you want to stay happy in the next 40 years, refine and revise your thinking about growth, because “a number of things are going to decline” for better and worse; “in the future growth won’t be generally good”);
13. Remember that fossil-based assets will lose their value (as global energy use peaks around 2040 and energy efficiency increases);
14. Invest in things that are not sensitive to social unrest (in that tensions will rise in the next several decades because of mounting inequities);
15. Do more than your fair share to promote sane perspective, policy, and practice in your communities, companies, and households;
16. In business, explore the most urgent unsustainabilities on the corporate radar—the first things that will go seriously wrong if the world evolves

- according to this forecast (the solution is not always unprofitable, e.g. Philips moved from producing cheap but energy-intensive light bulbs to much more intensive low-watt bulbs);
17. In business, don't confuse growth in volume with growth in profits (e.g. windmills and photovoltaics are fast-growing markets but do not guarantee a profit because of too many investors);
 18. In politics, support only initiatives with short-term benefits if you want reelection. The only leaders able to force wise long-term policy onto their people seem to be the EU and China's Communist Party;
 19. In politics, remember that the future will be dominated by physical limits (future politicians will have to use much time on issues of depletion and pollution—issues that won't go away for a long time, such as land for agriculture and forests, freshwater, oceans; the aim is to reduce energy intensity and climate intensity);
 20. In politics, accept that equal access to limited resources will trump free speech (in a resource-constrained world, allowing scarce resources to be in the hands of a minority will lose legitimacy; “over the next 40 years politicians will increasingly be pushed to consider the rights of future generations...hopefully by the end of the century there will be an International Court of Intergenerational Justice” (p350); in an increasingly crowded world, “collective well-being will be more important than individual rights”);
 21. As a final word of encouragement, “don't let the prospect of a suboptimal long-term future kill your hope...even if we do not succeed in our fight for a better world, there will still be a world with a future—just less beautiful and less harmonious than it could have been” (p351).

6. Comment

This 40-year forecast is very useful and highly provocative. It is particularly useful for pointing to the necessary rise of social investment in response to global warming that will displace some consumption. The 21 pieces of advice for individuals and organizations are especially thought-provoking. A close reading is strongly advised for anyone concerned about world futures and the turbulent decades ahead, although everyone will surely find some points of disagreement.

At first glance, this report appears to be unique. However, it is useful to contrast **2052 with 2025: Scenarios of US and Global Society Reshaped by Science and Technology** by Joseph F. Coates, John B. Mahaffie, and Andy Hines (Oakhill Press, 1996/508p), an equally audacious work that made 107 generally optimistic assumptions about the future, mostly about technological

progress (e.g, many natural disasters mitigated or prevented by 2025, and, less probably, 120mpg cars in widespread use). Global warming is mentioned, but is not a central theme as in Randers' forecast. In Chapter 8 on “Managing the Planet,” Coates et al. offer a hopeful scenario where “sustainability has emerged as a core global value” (p227), which is far from the case today. Could Randers also be overly optimistic?

Randers' forecast is assisted (but perhaps complicated) by thirty-four “2052 Glimpses” of 3-4 pages each by writers such as Herman Daly, Jonathan Porritt, Mathis Wackernagel, John Elkington, Paul Gilding, and original Limits to Growth co-author William W. Behrens. These brief contributions, which Randers endorses fully or in part, appear throughout the text, and are listed together on pp359-365, but not in the table of contents.

Most important, some of the **2052** assumptions and oversights deserve highlighting and critique.

The most questionable assumption is the startling core forecast of world population peaking at 8.1 billion in the early 2040s, and then declining to the present level of 7 billion by 2075. Randers justifies this by assuming rapid decline in fertility rates offsetting more gradual decline in mortality rates. But decline in fertility may be slower than expected in Muslim areas and among religious fundamentalists, while decline in mortality may be faster by conquering cancer and other diseases, and perhaps even aging itself. In contrast, the just-issued **2012 World Population Data Sheet**, by veteran demographer Carl Haub of the Population Reference Bureau, projects world population at 9.624 billion in mid-2050, a slight increase from Haub's 2010 projection of 9.485 billion (see Global Foresight Books' Book of the Month, Aug 2010). The difference of >1.5 billion in Randers' and Haub's forecasts is significant, and deserves debate. (Also note that Haub's forecast for 2050 has been slowly creeping upward over the last decade!)

Randers' assumption of 2°C temperature rise by 2052 with a maximum of 2.8°C in 2080 may be somewhat conservative. See, for example, the discussion by Clive Hamilton in *Requiem for a Species* (Global Foresight Books' Book of the Month, May 2010), reporting that the new consensus among a select group of worried climate scientists, revised upward, is for a warming of a very worrisome 4°C or more by the 2070s or 2080s, or possibly the 2060s. Hamilton also cites Hans Schellnhuber, director of the Potsdam Institute for Climate Impact Research, warning that if much of the methane trapped in permafrost is released, “we will be toast.” Randers makes some reference to this trend (which is already apparent), but is more restrained.

Randers does briefly mention several negative “wild cards” such as methane (more accurately a “not-so-wild card” possibility, if not a probable development). But wild cards can also be positive, and Randers does not mention possible game-changing contributions that might be made by nanotechnology and new energy technologies such as ultra-low-cost designed biofuel from algae, or small modular nuclear reactors. Similar to widespread release of methane, the possibility of major new technology is also a “not-so-wild card”— a critical distinction that, unfortunately, is not made in the futures literature (a major development of 10-30% probability is far different than a “wild card” of literally 2% probability, or a “black swan” event that is even more improbable).

Randers' assumption that unemployment will more or less stay at current levels should also be questioned, as well as his lack of attention to potential climate tipping points.

Anyway, despite these complaints, Randers' forecast deserves widespread attention, and will hopefully accelerate the long-term sustainability trend and rekindle attention to the limits to undifferentiated growth as defined by obsolete industrial-era measures.

About the Author(s)



Michael Marien

WAAS Fellow; Director, Global Foresight Books

Email: mmarien@twcny.rr.com

Website: www.globalforesightbooks.org

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