ESR NEWSLETTER
June 2023

Introduction

The first three articles in this newsletter give some positive news on actions and research responding to climate change challenges.

Item 5 on Los Angeles deals with how the residents of some US cities are responding to the ongoing effects of the covid pandemic, and identifies some urban planning and design implications. While our own urban planning policies and objectives reflect some of these challenges (at least on paper), our transport planning often seems to look backwards. There is too much emphasis on very expensive public transport and/or major new road projects in our larger urban areas, and too little effort put into developing and actioning a programme of targeted smaller projects supporting a more diverse urban form with a mixture of land uses in attractive, walkable town centres serving and reflecting the local communities.

The final article is my summary of a new book by the philosopher William Macaskill entitled "What we owe the future," Oneworld Publications (ISBN 978-0-86154-250-5 hardback, eISBN 978-0-86154-251-2). The book subtitled "A million year view," is a broadly optimistic look at what human beings need to do to ensure that humanity survives and future human beings can have a good life. I have directed my summary to those parts of the book which I think might be of specific interest to ESR members so have missed out large sections. Anyone wanting to look further into what William Macaskill has to say should definitely read the book.

Contents

1. The clean energy investment boom

Jillian Ambrose, Guardian website, 25 May 2023

Russia's invasion of Ukraine has helped ignite a boom in clean energy investment which will significantly outpace spending on fossil fuels, according to the International Energy Agency. A report from the IEA has found that clean energy investment is on track to reach $1.7tn

(£1.4tn) this year as investors turn to renewables, electric vehicles, nuclear power, grids, storage and other low-carbon technologies.

The Paris-based agency found that clean energy investments have been boosted by many factors including periods of strong economic growth and volatile fossil fuel prices as well as heightened concerns about energy security after Russia's invasion of Ukraine.

Fatih Birol, the executive director of the IEA, said: "Clean energy is moving fast – faster than many people realise. This is clear in the investment trends, where clean technologies are pulling away from fossil fuels.

"In very simple, but very striking terms, five years ago global energy investment was $2tn, of which $1tn was for clean energy and $1tn was for fossil fuels. Today, $1tn is for fossil fuels and $1.7tn is for clean energy. This is a dramatic shift which will have consequences for the energy markets and climate change. In my view, it's very exciting."

The clean energy boom is particularly apparent in solar power investment, Birol said. "For the first time in history the amount of investment going to solar is higher than the amount going to oil production. It may be symbolic but it is very important because it shows the tide turning," he said.

Clean energy investment has climbed steadily in recent years as governments and investors have sought to take advantage of the low cost of renewables such as wind and solar power.

The IEA report showed that clean energy investment has accelerated well beyond spending on gas, coal and oil as governments become increasingly concerned about developing secure, homegrown energy sources. However, the IEA report warned that Russia's war in Ukraine has also prompted increased investment in upstream oil and gas, which is expected to rise by 7% in 2023 in a return to 2019 levels.

At the same time global coal demand reached an all-time high in 2022, in part owing to record high gas prices, which has spurred estimated coal investment for this year to nearly six times the levels that are aligned with global 2030 climate targets.

Birol said the single most important barrier facing the expansion of renewable energy remains problems with projects being able to connect to electricity grids. "We are seeing a pipeline of projects in Europe, US and Asia and Africa where the grid is the main problem. If you cannot reduce permitting time we will not be able to see the rapid expansion of renewables," he said. In the UK, developers of renewable energy projects have complained that they have been forced to wait for more than a decade to connect to the electricity grid.

2. Rock 'flour' from Greenland can capture significant CO2, study shows

Damian Carrington Environment editor Guardian website 30 May 2023

Rock "flour" produced by the grinding under Greenland's glaciers can trap climate-heating carbon dioxide when spread on farm fields, research has shown for the first time. Natural

chemical reactions break down the rock powder and lead to CO_2 from the air being fixed in new carbonate minerals.

Scientists believe measures to speed up the process, called enhanced rock weathering (ERW), have global potential and could remove billions of tonnes of CO_2 from the atmosphere, helping to prevent extreme global heating. Soil fertility naturally depends on rock weathering to provide essential nutrients, so enhancing the process delivers an extra benefit. Spreading the Greenland rock flour on fields in Denmark, including those growing barley for the Carlsberg brewery, significantly increased yields.

Greenland's giant ice sheet produces 1bn tonnes a year of rock flour, which flows as mud from under the glaciers. This means the potential supply of rock flour is essentially unlimited, the researchers said, and removing some would have very little effect on the local environment.

The weathering process is relatively slow, taking decades to complete, but the researchers said ERW could make a meaningful difference in meeting the key target of net zero emissions by 2050. The research on the CO_2 uptake of Greenland rock flour, published in the International Journal of Greenhouse Gas Control, estimated that 250kg of CO_2 can be trapped per tonne of rock flour. After three years in soil in Denmark, the researchers found about 8% of this had been achieved.

Another study by the same team, published in the journal Nutrient Cycling in Agroecosystems, showed increases in yields of maize and potatoes of 24% and 19% respectively after rock flour was spread in Denmark. The team is also running experiments in less fertile soils, in Ghana, where even greater increases in maize yield have been seen.

Other ERW research has used mechanically ground basalt and a 2020 study estimated that treating about half of global farmland with this could capture 2bn tonnes of CO_2 each year, equivalent to the combined emissions of Germany and Japan.

Prof David Beerling at the University of Sheffield, who led the 2020 work, said basalt had significant advantages. Its chemical composition absorbs CO_2 faster than glacial rock flour, may increase crop yields by more and it is widely available close to many farming areas. The advantages and disadvantages of both types of rock dust are still being studied. The Danish group is planning trials in Australia and assessing the energy requirements of shipping. Beerling's team expects to publish results of yield gains in corn following basalt application in the US in the near future.

3. The path to radically lower emissions

From an article by Damian Carrington, Down to Earth, Guardian website, 6 April 2023

Tucked away in the recent (and devastating) landmark report from the Intergovernmental Panel on Climate Change (IPCC) is a chart that provides the road

map for an escape from catastrophe. It assesses with extraordinary clarity the potential for emissions cuts of more than 40 options. The simplicity of the chart is deceptive. It was compiled by a team of the world's best scientists, based on 175 studies. Its power is amplified by the fact that it was signed off by all of the world's governments, from the cleanest and greenest to the darkest petrostates.

So what does it show? First, solar and wind power are by far the best option, with the potential to cut a staggering 8bn tonnes from annual CO2 emissions by 2030. That is equivalent to the combined emissions of the US and European Union today. Even more startling is that most of that potential can be achieved at lower cost than just continuing with today's electricity systems.

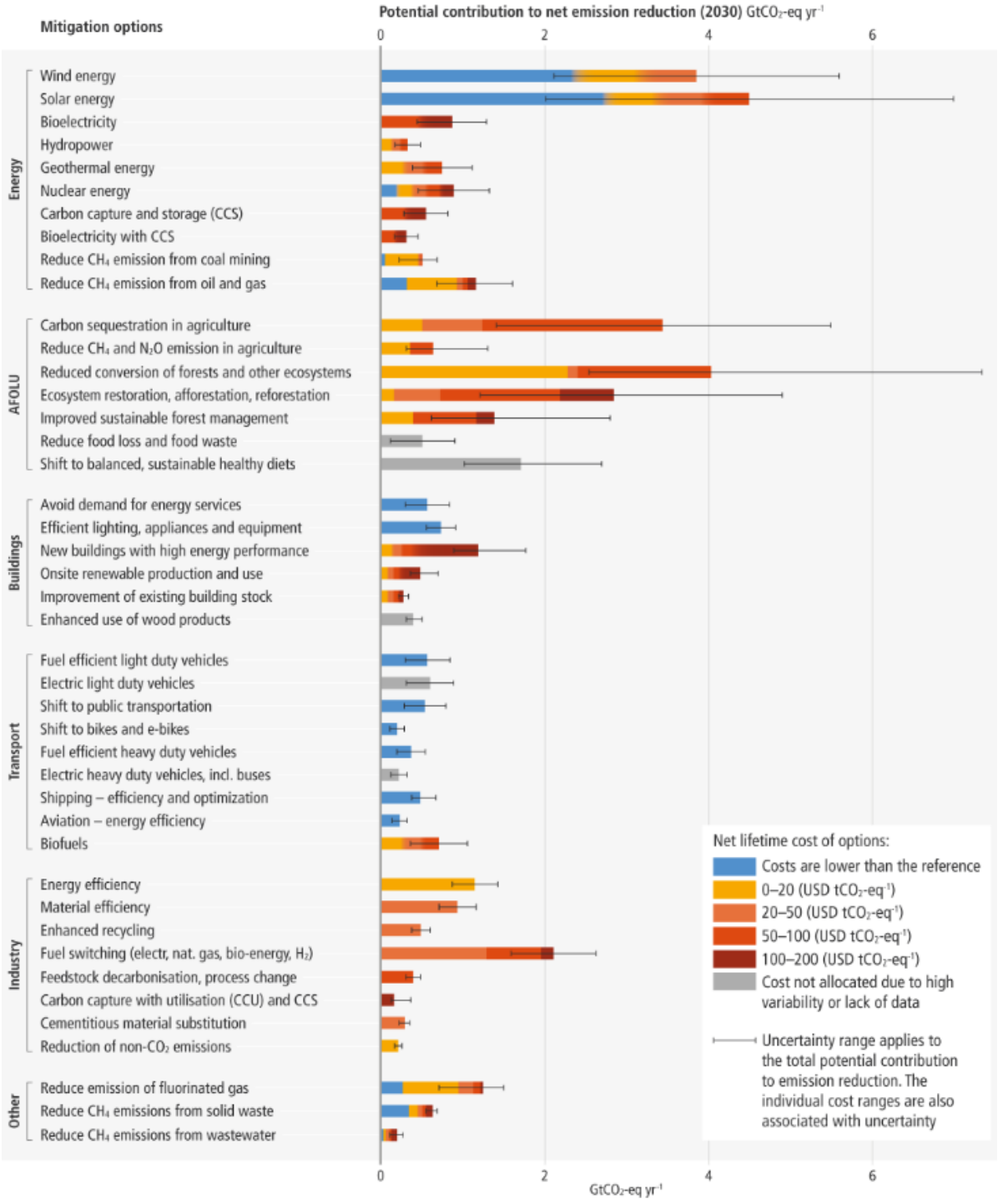
"What struck me especially was that wind and solar was so big," Prof Kornelis Blok, at Delft University of Technology in the Netherlands, told me this week. Blok, who led the work on the chart, identified the winners: "The big five are wind, solar, energy efficiency, stopping deforestation and reducing methane emissions."

After wind and solar, the biggest prize is stopping the destruction of forests and other wild places, the IPCC scientists found. That has the potential to cut 4bn tonnes of emissions a year by 2030, not far off double the fossil fuel emissions from the whole of Africa and South America today. Including the restoration of degraded forests adds almost 3bn tonnes. Much of this could be achieved for less than US$50 per tonne – half the price polluters pay for carbon permits in Europe today. Energy efficiency in buildings, industry, lighting and appliances remains a no-brainer **–** 4.5bn tonnes a year by 2030 **–** as does slashing methane emissions, particularly from leaky fossil fuel installations. The latter could save the equivalent of about 3bn tonnes.

There are some interesting details too. A shift to "sustainable diets" – ie eating much less red meat in rich nations – could cut 1.7bn tonnes of emissions, equivalent to all the annual pollution from fossil fuel giant Russia. A push towards public transport, bikes and e-bikes has the potential to cut emissions more than the rollout of electric cars, showing both are needed. An often overlooked option **–** burying charcoal in fields (biochar) **–** is relatively costly to implement but potentially huge. Along with avoiding the ploughing of fields, which releases carbon, biochar could save 3.4bn tonnes of CO2 a year.

The IPCC chart is a map of climate optimism. It shows we can cut emissions by half by 2030 with options costing at most $100 per tonne, which is a bargain when set against the further damages that climate inaction will inevitably bring. The solutions – wind, solar, trees, energy saving and methane cuts – require no new technology. But what they do require is a resource heavily lacking so far: the political will to push aside vested interests and rapidly pursue the policies that will work.

Many options available now in all sectors are estimated to offer substantial potential to reduce net emissions by 2030. Relative potentials and costs will vary across countries and in the longer term compared to 2030.



Source: IPCC AR6 WGIII Figures SPM7

4. Global Energy News

Source: Energy Sources & Distribution Magazine, Mar/Apr 2023

Germany turned off the last of its three nuclear power plants in April. It is aiming for fully renewable electricity generation by 2035.

Ireland has committed to major wind energy projects off the Irish coast.

Dutch offshore solar firm Oceans of Energy will install and operate a floating solar farm at the 759MW Hollandse Kust Noord offshore windfarm located 18.5km off the coast. The project is designed to support floating solar, battery and green hydrogen production in future stages.

China Energy has constructed the first phase of a solar and wind energy project in the Gobi Desert. It has an installed capacity of 1 million kw.

5. L.A. and other (US) cities are recovering, but not their downtowns. Why?

From an article by Tracy Hadden Loh, Brookings Metro. First published by the Los Angeles Times, 14 June 2023

A fiscal “doom loop.” A transit “death spiral.” The “office apocalypse.” Since the traumatic disruption of the COVID-19 pandemic, these pessimistic terms have been applied repeatedly to the state of our cities. Analysis of census data from a Brookings Institution colleague William H. Frey found that from 2020 to 2021, during the peak of the pandemic, major metropolitan areas including New York and Los Angeles lost a significant number of residents. A net 175,000 people left L.A. for Riverside, the Sun Belt, or smaller metro and rural areas.

But new research shows clear signs this trend is reversing. As many downtowns struggle, residential neighbourhoods are thriving. While L.A. also lost population in 2022, that year’s rate of population loss was half what it was in 2021. Other cities, such as Seattle and Washington, D.C., have flipped from losses to gains. Yet office vacancy rates continue to rise, and transit ridership remains well below 2019 levels on every major U.S. system. If people are back, where are they?

Not at the office or on the train. Instead, people are enjoying walkable, mixed-use neighbourhoods where they can both live and work, in contrast to the 20th century mode of cities and suburbs that rigidly separates work zones from other activities.

This has benefits not just for individuals but also for communities and places. For example, while overall transit ridership in San Francisco is only 54% of the pre-pandemic level on weekdays, the 22 Fillmore line serving the neighbourhood of Mission Bay, just south of the historic downtown, is at 107% of pre-pandemic ridership. In L.A., while retail vacancy downtown is 9.3% and trending upward, the citywide rate is only 6.1%, data from CoStar shows. In a diverse range of neighbourhoods, retail is close to or even outperforming that average.

Why are some neighbourhoods doing extraordinarily well? These are not the richest parts of L.A. Rather, they gather big, diverse collections of economic, social, physical, and civic assets in close proximity. Figueroa, Los Feliz, and Highland Park have some of the highest population densities in L.A. County, as well as access to amenities including the USC campus and Griffith and Hermon parks. They are close enough to downtown to be accessible to and from elsewhere in the region. And finally, all of these places are served by hyperlocal (place based) governance entities, including business improvement districts that provide extra coordination and support, such as clean-and-safe patrols.

Demand in cities remains strong—so much so, in fact, that in many of the biggest metro areas the concern is not abandonment but affordability. Nowhere in the United States is the housing crisis as acute as Los Angeles, the least affordable metro area in the U.S. Citywide, the average rent for a one-bedroom apartment is more than $2,000. In Los Feliz, it's $2,250, according to CoStar data. Off Figueroa near USC and in Highland Park, you can get a one-bedroom for $1,400 or $1,600, but those sorts of offerings are few and far between. And even those rents are out of reach for many in a city where half of households make $70,000 a year or less. People are leaving L.A. not to ditch a struggling city, but to find housing.

The solutions for both neighbourhood affordability and downtown revitalization are the same: ending policy and infrastructure that segregate people and most types of land use and create under-resourced neighbourhoods as well as downtowns overly dependent on offices. It also makes sense to invest more in basics that proved throughout the pandemic to support quality of life, such as parks and community-based organizations.

6. Asia's largest timber building

From an article by Oscar Holland, CNN, June 5, 2023

Asia's largest wooden building, Gaia, has been unveiled in Singapore.

Singapore has long billed itself as a "garden city," a term coined in the 1960s by the country's founding father and former prime minister, Lee Kuan Yew. In the decades since, the island has embarked on extensive tree-planting programs and embraced so-

called “biophilic” architecture, with greenery often seen creeping up urban facades or spilling out from skyscrapers.

A new six-story college campus building stands as Singapore’s latest ode to nature. Home to Nanyang Technological University’s (NTU) business school, the gently curved design features sunlit atriums, open-air study areas set against lush backdrops and elevators that descend into beds of tropical plants. Everything from handrails to benches, door frames to room dividers (and even an adjoining bus stop), were built using wood.

So, too, were the structural beams and columns. In fact, the building is made almost entirely from mass timber — a new generation of engineered wood, arranged in layers and bonded with strong adhesives, that is pushing the boundaries of architecture. Sprawling across 43,500 square meters (468,000 square feet), it is now Asia’s largest timber building, by floor area.

Named Gaia, after the ancient Greek goddess of the Earth, the project opened in May and cost 125 million Singapore dollars (US$93 million) to build. Its exposed timber frame is free from cladding or paint, a design decision that celebrates natural materials while giving visitors the feeling of walking between trees. According to the celebrated Japanese architect behind the project, Toyo Ito, this was precisely the point. “I always try to envision a connection with — and a feeling of — nature, such as trees and water, in my designs”.

Ito, who was awarded the Pritzker Prize (often dubbed the “Nobel” of architecture) in 2013, designed Gaia alongside Singaporean design firm RSP. It features a 190-seat auditorium and a dozen lecture theatres, as well as research facilities, faculty offices and airy study terraces. Aside from toilets, ground-floor slabs and external staircases, which were built using concrete (in part due to local regulations), the structure was made with timber harvested from spruce trees in Austria, Sweden and Finland. The wood was prefabricated into panels and heavy-duty beams in Europe before being shipped to Singapore.

Recent years have heralded a huge increase in the number of large-scale wooden structures being built around the world. Some countries now even allow for high-rises (or “plyscrapers”), like Milwaukee, Wisconsin’s 25-story Ascent, which at 86.6m, is the world’s tallest mass timber structure. Singapore’s building codes only allowed timber architecture to rise to 24 meters at the time Gaia was approved, though this height restriction has since been lifted.

Singapore’s Building and Construction Authority (BCA) claims that using mass timber can reduce dust and noise at construction sites, while speeding up projects by as much as 35%. Advocates for mass timber point to the relatively slow and predictable rate at which the material burns. Gaia’s designers have also added a “sacrificial layer” of wood to the building’s beams that, in the event of a blaze, would char while protecting the timber beneath it.

Around 40% of the world's energy consumption is attributed to the construction and operation of buildings. But unlike concrete and steel, whose energy-intensive production is responsible for a significant portion of buildings' environmental footprint, trees absorb carbon dioxide throughout their lifetime. If a tree is then turned into mass timber, this embodied carbon is sequestered, or "locked in," rather than being returned to the atmosphere. Studies suggest that 1 cubic meter of wood can store about a ton of carbon dioxide.

Timber is also a natural insulator that, in warm places like Singapore, traps less heat than concrete ones (or reduces heat loss in colder climates). These energy savings are not just about materials. For one, the building's exterior features strategically placed fins that cast shade over the facade, helping to keep it cool.

Eschewing mechanical fans — some feat in a country less than 140 kilometers north of the equator — Gaia's AC system instead relies on "passive cooling," which pushes cold water through coils to chill the surrounding air. The breezy building's north-south orientation meanwhile encourages natural ventilation by aligning with the direction of Singapore's prevailing winds. The country's authorities have designated Gaia as a "zero energy" building that (with the help of rooftop solar panels) produces as much energy as it consumes.

Ito, whose grandfather was a lumber dealer, said that his design ethos remains underpinned by the comfort of those who use his buildings. "I always consider comfort," he explained. "(If a building is comfortable), people will stay in the space and visit every day. I want to create architecture that gives people the will to live."

7. What we owe the future – A summary of the book

Introduction

The philosopher William Macaskill's book What We Owe The Future makes the case for a very long term view of a potential future for human beings; identifies and discusses the major threats to humanity having a good future over the next hundreds or thousands of years, and beyond; then sets out actions to deal with these threats. His book promotes "longterminism" and encourages adopting careers that support achieving a better and more sustainable future for humanity.

I have tried to set out a summary of some of the key parts of his book that might be of particular interest for Engineers for Social Responsibility members. As I have only briefly touched on those sections of the book that are more philosophical in content, it is far from complete.

The author regards replacing fossil fuels with more sustainable sources as a proof of concept for longterminism. It has substantial immediate health benefits in addition to long term climate benefits. By helping keep fossil fuels in the ground (and therefore potentially available for future use) it guards against the risk of unrecovered collapse. By furthering technical progress, it reduces the risk of long-term stagnation.

The present era is extremely unusual compared to the past, but is also unusual compared to the future, he says. The rapid rate of change cannot continue for ever. Every decade we live through sees an extremely unusual number of economic and technological changes. Some of these changes – like the inventions of fossil fuel power, nuclear weapons, engineered pathogens, and advanced artificial intelligence – have the potential to impact the whole course of the future. The fact that our time is so unusual gives us an outsized opportunity to make a difference. Few people who ever live will have as much power to influence the future as we do.

William Macaskill identifies two main ways we can impact the longterm future. First, we can help *ensure civilisation's survival*. This involves decisions about how to handle risks of extinction or unrecovered civilisation collapse. Second, we can *change trajectory*, (by) trying to improve the quality of future people's lives over the life span of civilisation. He argues that the values that humanity adopts in the next few centuries might shape the entire trajectory of the future.

Artificial General Intelligence (AGI)

Artificial Intelligence is described as a branch of computer science that aims to develop machines that can mimic or replicate human intelligence. Artificial general intelligence (AGI) is described as a single system or collection of systems working together, that is capable of learning as wide a variety of tasks as humans can and performing them to at least the same level as human beings. Such artificial agents would be capable of forming plans and executing them in just the way human being can.

AGI might greatly speed up the rate of technological process, or economic growth (through productivity improvements), or both. The author argues that two features of AGI, namely potentially rapid technological progress and in-principle immortality, combine to make value lock-in a real possibility. AGI is a way for values to get locked-in indefinitely. The key issue is which values will guide the future. Those values could be narrow-minded, parochial, and unreflective, or they could be open-minded, ecumenical, and morally exploratory. Removing the risk of value lock-in altogether would avoid the permanent entrenchment of flawed human values. An entirely laissez-faire approach would make it impossible to avoid the lock-in of bad moral views. The ideologies that lead to the greatest military power and that try to eliminate their competition would suppress all others.

Extinction

Engineered pathogens are pathogens designed by ourselves using the tools of biology. These could be deliberately created and spread or could escape from a laboratory. The possibility of bioweapons causing the extinction of humanity cannot be ruled out.

Great-power war risk has increased significantly following Russia's invasion of Ukraine. Growing military spending and new technologies are increasing humanity's capacity to wage war. Weapons far more destructive and lethal than those used in World War II are available. A new Cold War could increase the risk of an AI arms race. It would increase the risk that

nuclear weapons are used, and would undermine our ability to cooperate internationally to deal with climate change.

Civilisation collapse

If 99% of the world's population dies in the aftermath of a nuclear war (which includes the effects of a nuclear winter on food production) leaving a global population of around 80 million, would civilisation collapse?

The author's opinion is that society *probably* would not collapse. Much of the physical infrastructure like buildings, tools and machines would be preserved and could be used. Most knowledge would be preserved, in the minds of those alive, in digital storage, and in libraries many of which are in countries without nuclear weapons or alliances with countries with nuclear weapons. Critical skill sets would still remain. Because all countries with nuclear weapons are (currently) in the Northern Hemisphere, the impacts of nuclear winter would be more limited in the Southern Hemisphere. Because oceans retain heat, coastal areas would be much less affected. If bioweapons were used, some island nations not involved in the conflict might be better able to defend themselves by closing their borders. It is suggested countries such as Australia and New Zealand (which could be self-sufficient in food, and between them have ample fossil fuel reserves) might be able to continue functioning after the catastrophe. (Among other things, this assumes they are not directly affected by the conflict.)

He then discusses a scenario where there is a complete collapse of global civilisation and where we could rely only on preindustrial technology. He states that agriculture would survive or would be quickly redeveloped. He also considers that we would reindustrialise. The generations following a global catastrophe would in some ways have a serious head start. Surviving tools and machines would ensure that postcollapse survivors would know that such technology was possible and they could reverse engineer some of the tools and machines they found. Knowledge of industrial technology, politics and economics would be preserved in libraries.

The author regards what he describes as possible nonlinear tipping points as the greatest threat that climate change poses to our longterm future. He points out that climate change effects might make it harder to recover from nuclear or biological war.

Fossil fuel depletion might make civilisation recovery more difficult by using up a nonrenewable resource that, historically, seemed to be critical to industrialisation. Easy to access coal would be especially important in a postcollapse world. He suggests that extensive use of carbon capture could significantly increase the risk that we keep burning fossil fuels indefinitely using up the easily accessible resources that might be crucial for recovery.

Stagnation

William Macaskill discusses the risk that society stagnates technologically in which case it could remain stuck in a period of high catastrophic risk for such a long time that extinction or collapse would be all but inevitable. He argues that since 1970 the pace of progress

seems to have slowed. The growth rate of total factor productivity of the United States has been generally declining. There has been substation progress in information and communication technologies, but otherwise progress has been largely incremental, he says.

The author quotes a recent article in which economists from Stanford and the LSE conclude that in order to double our overall level of technological advancement we need to put in at least four times as much research effort as we did for the previous doubling. So far, exponential growth in the number of researchers has compensated for progress becoming harder over time. However, population growth is slowing and is expected to cease later this century after which the world population is expected to decline. An increasing number of researchers and engineers from lower-income but high growth countries and an increasing proportion of the population doing R&D could potentially be enough for another century's worth of technical progress he says, but after that technological progress and economic growth would come to a near standstill.

Artificial general intelligence replacing human workers could avert this stagnation. The author considers that there is a significant chance that we will develop AGI this century, but we should not be confident that we will do so. Another possibility is advances in biotechnology that enable cloning or genetically engineering human being to have greater research abilities, assuming this is socially acceptable at all.

The author believes that stagnation would not continue indefinitely into the future. For example, it would just need one society to adopt a high growth/high fertility culture to (eventually) restart technological advance. He does, however, identify some situations where it might last for centuries:

- a world government with a single global culture opposed to science and technology
- global population decline, e.g. at 1.5 children per woman within 500 years the world population would fall to below 100 million
- a global catastrophe causing world population to decrease dramatically

According to the author, we may be about to enter what he refers to as an unsustainable state. We are becoming capable of bioengineering pathogens. Over the next century there is a good chance we will develop further, extremely powerful means of destruction. We need to get beyond this state and develop technologies to defend against these risks. If we stagnate and get stuck at an unsustainable level of technological advancement, we would remain in a risky period. Sooner or later some cataclysm would occur, causing catastrophe or extinction.

What to Do

The threats identified in the book

1. The lock-in of bad values, perhaps initiated by artificial general intelligence or the dominance of a single world ideology
2. The end of civilisation which could be brought about by war involving nuclear weapons or bioweapons, or made more likely by technological stagnation, depleting fossil fuel reserves, or greatly warming the planet.

Actions we should take

Continue using the (rate of) carbon dioxide emissions decline as a yardstick of progress. Encourage clean-tech innovation through political advocacy or by funding or working for non-profit organisations.

Promote innovation to produce cheap and fast universal diagnostics and extremely reliable personal protective equipment. Support organisations which are helping to promote pandemic preparedness solutions internationally.

General disaster preparedness including:

- increasing food stockpiles
- building bunkers to protect more people from worst-case catastrophes
- developing forms of food production not dependent on sunlight in case of a nuclear winter
- building seed vaults with heirloom seeds that could be used to restart agriculture
- building information vaults with instructions for creating technologies necessary to rebuild civilisation.

We should also mitigate AGI risks by building a field of morally motivated people who can start reducing our uncertainty about what to do. Groups like the Center for Human-Compatible Artificial Intelligence and the Future of Humanity Institute have helped to build a field of researchers who are focused on safe AI developments. The issue is also being taken seriously in technology policy.

We still have a lot to learn about practical ways to reduce the risk of war. Organisations like the Stockholm International Peace Research Institute may help us find the policies and programmes which, if implemented, give us the best chance of maintaining peace between great powers in the coming decades.

How to Act

1. Personal consumption decisions e.g. recycling, flying and driving less, reducing meat consumption
2. Donating part of your income to effective non-profit organisations working to promote innovation in, say, clean-energy technologies, global poverty reduction or far-reaching political change.
3. Political activism
4. Talk to your family and friends about important ideas, like better values or issues around war, pandemics, or AI.
5. Consider the benefits of having children. Among other things, if you bring them up well, they can be change-makers who help create a better future.
6. Career choice – according to the author by far the most important decision you make in terms of your lifetime impact is your choice of career. More and more people do not just want money to pay their bills, they also want a sense of purpose and meaning. The author encourages a “learn more, build options, do good” career

approach. However, the specific path that works best for an individual depends on their "personal fit." For many people personal fit can mean the best way of contributing is through donations to, say, effective charities.

The last section of the book refers to the need to build a movement of morally motivated people, concerned about the whole scope of the future. He ends the book with "This is a time when we can be pivotal in steering the future onto a better trajectory. There's no better time for a movement that will stand up, not just for our generation or even our children's generation, but for all those who are yet to come."

Ross Rutherford,

ESR Newsletter Editor

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