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**Counterplan: The appropriation of outer space by private entities through asteroid mining should only be permitted under the one-eighth principle.**

**Asteroid mining is crucial for resource extraction, BUT leads to over-exploitation. The one-eighth principle sets a limit on exploitation and still provides over 1 million times greater resources than Earth.**

**Elvis**, a Harvard astrophysicist in 20**19**

“How Much of the Solar System Should We Leave as Wilderness?” Acta Astronautica, vol. 162, Sept. 2019, pp. 574–580, www.sciencedirect.com/science/article/abs/pii/S0094576517318507, 10.1016/j.actaastro.2019.03.014. Accessed 13 Jan. 2022. //AB

‌To make this case, we will focus upon **the mining of the asteroid Main Belt.** This **is where most of the raw materials** that we are likely to appropriate **in space are to be found.** Setting aside the special cases of the largest objects in the belt (Ceres, Vesta, Pallas, Hygiea and half a dozen other objects of similar order to the latter) the vast majority of objects in the belt do not display anything like the uniqueness of planets or moons. Concerns about their integrity (in the sense relevant to the ethics of protection) do not apply. We have no special reason to protect surface area rather than mass, which is a more useful measure for mining operations. But just how demanding would the **one-eighth principle** be in this pivotal case, when applied to the mass of the asteroid belt? It would certainly require us to leave a great deal behind, unused. But it **would** also **set an upper limit** upon use that could **not** easily be **regarded as excessively restrictive.** More precisely, **one eighth of the iron ore in the asteroid belt** would still be **more than a million times greater than all** the known **iron reserves on Earth.**  [...]

While the principle that we should use, at most, **one eighth of the resources** present in the solar **system relies upon an ethical duty towards** humanity (or, more specifically, a duty to near **human generations**) it does not rest upon any particular and perhaps idiosyncratic ethical theory. Rather, it rests only upon a minimal set of ethical claims which happen to be common to a variety of different theories. Rights based approaches, **consequentialist approaches and virtue ethical approaches all** tend to **accept that we do indeed have a duty to consider the interests of future generations.** We have, throughout, sought to keep the ethical claims minimal. There are, finally, at least two practical consequences. First, a full **science based inventory of the solar system should be undertaken in order to apply the one eighth principle wisely.** This implies a great increase in the rate of exploration if it is to be **completed** in a small fraction, say **10%, of the time available before** the **earliest** likely **point of exhaustion, i.e.** about **40 years.** Second, there is a need for more detailed ethical theories about the various reasons for protection and use, as well as **deliberations about wise policy for choosing which eighth should be exploited.**

**Asteroid mining independently solves extinction from scarcity, climate, terror, war, and disease. Pelton 17**

(Director Emeritus of the Space and Advanced Communications Research Institute at George Washington University, PHD in IR from Georgetown).. Pelton, Joseph N. 2017. The New Gold Rush: The Riches of Space Beckon! Springer. Accessed 8/30/19.

Are We Humans Doomed to **Extinction**? What will we do when Earth’s resources are used up by humanity? The world is now hugely **over populated**, with billions and billions crammed into our over**crowded** **cities.** By 2050, we may be 9 billion strong, and by 2100 well over 11 billion people on Planet Earth. Some at the United Nations say we might even be an amazing 12 billion crawling around this small globe. And over 80 % of us will be living in congested cities. These cities will be ever more **vulnerable to terror**ist attack, **natural disaster**, and other plights that come with overcrowding and a dearth of jobs that will be fueled by rapid automation and the rise of artifi cial intelligence across the global economy. We are already rapidly **running out of water** and **minerals**. **Climate change** is threatening our very **existence**. Political leaders and even the Pope have cautioned us against inaction. Perhaps the naysayers are right. **All humanity is at tremendous risk.** Is there no hope for the future? This book is about hope. We think that there is literally heavenly hope for humanity. But we are not talking here about divine intervention. We are envisioning a new space economy that recognizes that there is more water in the skies that all our oceans. Th ere is a new wealth of natural resources and clean energy in the reaches of outer space—more than most of us could ever dream possible. There are those that say why waste money on outer space when we have severe problems here at home? Going into space is not a waste of money. It is our future. It is our hope for new jobs and resources. The great challenge of our times is to reverse public thinking to see space not as a resource drain but as the doorway to opportunity. The new space frontier can literally open up a “gold rush in the skies.” In brief, we think there is new hope for humanity. We see a new a pathway to the future via new ventures in space. For too long, space programs have been seen as a money pit. In the process, we have overlooked the great abundance available to us in the skies above. It is important to recognize there is already the beginning of a new gold rush in space—a pathway to astral abundance. “New Space” is a term increasingly used to describe radical new commercial space initiatives—many of which have come from Silicon Valley and often with backing from the group of entrepreneurs known popularly as the “space billionaires.” New space is revolutionizing the space industry with lower cost space transportation and space systems that represent significant cost savings and new technological breakthroughs. “New Commercial Space” and the “New Space Economy” represent more than a new way of looking at outer space. These new pathways to the stars could prove vital to **human survival**. If one does not believe in spending money to probe the mysteries of the universe then perhaps we can try what might be called “calibrated greed” on for size. One only needs to go to a cubesat workshop, or to Silicon Valley or one of many conferences like the “Disrupt Space” event in Bremen, Germany, held in April 2016 to recognize that entrepreneurial New Space initiatives are changing everything [ 1 ]. In fact, the very nature and dimensions of what outer space activities are today have changed forever. It is no longer your grandfather’s concept of outer space that was once dominated by the big national space agencies. The entrepreneurs are taking over. The hopeful statements in this book and the hard economic and technical data that backs them up are more than a minority opinion. It is a topic of growing interest at the World Economic Forum, where business and political heavyweights meet in Davos, Switzerland, to discuss how to stimulate new patterns of global economic growth. It is even the growing view of a group that call themselves “space ethicists.” Here is how Christopher J. Newman, at the University of Sunderland in the United Kingdom has put it: Space ethicists have offered the view that space exploration is not only desirable; it is a duty that we, as a species, must undertake in order to secure the survival of humanity over the longer term. Expanding both the resource base and, eventually, the habitats available for humanity means that any expenditure on space exploration, far from being viewed as frivolous, can legitimately be rationalized as an ethical investment choice. (Newman) On the other hand there are space ethicists and space exobiologists who argue that humans have created ecological ruin on the planet—and now space debris is starting to pollute space. Th ese countervailing thoughts by the “no growth” camp of space ethicists say we have no right to colonize other planets or to mine the Moon and asteroids—or at least no right to do so until we can prove we can sustain life here on Earth for the longer term. However, for most who are planning for the new space economy the opinion of space philosophers doesn’t really fl oat their boat. Legislators, bankers, and aspiring space entrepreneurs are far more interested in the views of the super-rich capitalists called the space billionaires. A number of these billionaires and space executives have already put some very serious money into enterprises intent on creating a new pathway to the stars. No less than five billionaires with established space ventures—Elon Musk, Paul Allen, Jeff Bezos, Sir Richard Branson, and Robert Bigelow—have invested millions if not billions of dollars into commercializing space. They are developing **new tech**nologies and establishing space enterprises that can bring the wealth of outer space down to Earth. This is not a pipe dream, but will increasingly be the **economic reality** of the 2020s. These wealthy space entrepreneurs see major new economic opportunities. To them space represents the last great frontier for enterprising pioneers. Th us they see an ever-expanding space frontier that offers opportunities in low-cost space transportation, satellite solar power satellites to produce clean energy 24h a day, space mining, space manufacturing and production, and eventually space habitats and colonies as a trajectory to a better human future. Some even more visionary thinkers envision the possibility of terraforming Mars, or creating new structures in space to protect our planet from cosmic hazards and even raising Earth’s orbit to escape the rising heat levels of the Sun in millennia to come. **Some**, of course, will say this is **sci-fi hogwash**. It can’t be done. We say that this is what people would have said in 1900 about air**planes**, rocket ships, cell phones and nuclear devices. The skeptics **laughed** at **Columbus** and his plan to sail across the oceans to discover new worlds. When Thomas Jefferson bought the Louisiana Purchase from France or Seward bought Alaska, there were plenty of naysayers that said such investment in the unknown was an extravagant waste of money. A healthy skepticism is useful and can play a role in economic and business success. Before one dismisses the idea of an impending major new space economy and a new gold rush, it might useful to see what has already transpired in space development in just the past five decades. The world’s first geosynchronous communications satellite had a throughput capability of about 500 kb / s. In contrast, today’s state of the art Viasat 2 —a half century later— has an impressive throughput of some 140 Gb/s. Th is means that the relative throughput is nearly 300,000 greater, while its lifetime is some ten times longer (Figs. 1.1 and 1.2 ). Each new generation of communications satellite has had more power, better antenna systems, improved pointing and stabilization, and an extended lifetime. And the capabilities represented by remote sensing satellites , meteorological satellites , and navigation and timing satellites have also expanded their capabilities and performance in an impressive manner. When satellite applications first started, the market was measured in millions of dollars. Today commercial satellite services exceed a quarter of a billion dollars. Vital services such as the Internet, aircraft traffi c control and management, international banking, search and rescue and much, much more depend on application satellites. Th ose that would doubt the importance of satellites to the global economy might wish to view on You Tube the video “If Th ere Were a Day Without Satellites?” [ 2 ]. Let’s check in on what some of those very rich and smart guys think about the new space economy and its potential. (We are sorry to say that so far there are no female space billionaires, but surely this, too, will come someday soon.) Of course this twenty-fi rst century breakthrough that we call the New Space economy will not come just from new space commerce. It will also come from the amazing new technologies here on Earth. Vital new terrestrial technologies will accompany this cosmic journey into tomorrow. Information technology, robotics, **a**rtificial **i**ntelligence and commercial space travel systems have now set us on a course to allow us humans to harvest the amazing riches in the skies—new natural resources, new energy, and even totally new ways of looking at the **purpose of human existence**. If we pursue this course steadfastly, it can be the beginning of a New Space renaissance. But if we don’t seek to realize our **ultimate destiny** in space, Homo sapiens can end up in the **dustbin of history**—just like literally **millions of already failed species**. In each and every one of the five mass extinction events that have occurred over the last 1.5 billion years on Earth, some 50–80 % of all species have gone the way of the **T. Rex**, the **woolly mammoth**, and the **Dodo bird** along with extinct **ferns**, **grasses** and **cacti**. On the other hand, the best days of the human race could be just beginning. If we are smart about how we go about discovering and using these riches in the skies and applying the best of our new technologies, it could be the start of a new beginning for humanity. Konstantin Tsiokovsky, the Russian astronautics pioneer, who fi rst conceived of practical designs for spaceships, famously said: “A planet is the cradle of mankind, but one cannot live in a cradle forever.” Well before Tsiokovsky another genius, Leonardo da Vinci, said, quite poetically: “Once you have tasted flight, you will forever walk the earth with your eyes turned skyward, for there you have been, and there you will always long to return.” The founder of the X-Prize and of Planetary Resources, Inc., Dr. Peter Diamandis, has much more brashly said much the same thing in quite diff erent words when he said: “The meek shall inherit the Earth. The rest of us will go to Mars.” The New Space Billionaires Peter Diamandis is not alone in his thinking. From the list of “visionaries” quoted earlier, Elon Musk, the founder of SpaceX; Sir Richard Branson, the founder of Virgin Galactic; and Paul Allen, the co-founder of Microsoft and the man who financed SpaceShipOne, the world’s first successful spaceplane have all said the future will include a vibrant new space economy. Th ey, and others, have said that we can, we should and we soon shall go into space and realize the bounty that it can offer to us. Th e New Space enterprise is today indeed being led by those so-called space billionaires , who have an exciting vision of the future. They and others in the commercial space economy believe that the exploitation of outer space may open up a new golden age of astral abundance. They see outer space as a new frontier that can be a great source of new materials, energy and various forms of new wealth that might even save us from excesses of the past. Th is gold rush in the skies represents a new beginning. We are not talking about expensive new space ventures funded by NASA or other space agencies in Europe, Japan, China or India. No, these eff orts which we and others call New Space are today being forged by imaginative and resourceful commercial entrepreneurs. Th ese twenty-fi rst century visionaries have the fortitude and zeal to look to the abundance above. New breakthroughs in technology and New Space enterprises may be able to create an “astral life raft” for humanity. Just as Columbus and the Vikings had the imaginative drive that led them to discover the riches of a new world, we now have a cadre of space billionaires that are now leading us into this New Space era of tomorrow. These **bold leaders**, such as **Paul Allen** and Sir **Richard Branson**, plus other space entrepreneurs including **Jeff Bezos of Amazon** and **Blue Origin**, and **Robert Bigelow**, Chairman of Budget Suites and Bigelow Aerospace, not only dream of their future in the space industry but also have **billions** of dollars in assets. These are the **bright stars of an entirely new industry** that are leading us into the age of New Space commerce. These space billionaires, each in their own way, are proponents of a new age of astral abundance. Each of them is launching new commercial space industries. They are literally transforming our vision of tomorrow. These new types of entrepreneurial aerospace companies—the New Space enterprises—give new hope and new promise of transforming our world as we know it today. The New Space Frontier What happens in space in the next few decades, plus corresponding new information technologies and advanced robotics, will change our world forever. These changes will redefi ne wealth, change our views of work and employment and upend almost everything we think we know about economics, wealth, jobs, and politics. Th ese changes are about truly disruptive technologies of the most fundamental kinds. If you thought the Internet, smart phones, and spandex were disruptive technologies, just hang on. You have not seen anything yet. In short, if you want to understand a transition more fundamental than the changes brought to the twentieth century world by computers, communications and the Internet, then read this book. There are truly riches in the skies. Near-Earth asteroids largely composed of platinum and **rare earth metals** have an incredible value. Helium-3 isotopes accessible in outer space could provide **clean and abundant energy**. There is far more water in outer space than is in our oceans. In the pages that follow we will explain the potential for a cosmic shift in our global economy, our ecology, and our commercial and legal systems. These can take place by the end of this century. And if these changes do not take place we will be in trouble. Our conventional petro-chemical energy systems will fail us economically and eventually blanket us with a hydrocarbon haze of smog that will threaten our health and our very survival. Our rare precious metals that we need for modern electronic appliances will skyrocket in price, and the struggle between “haves” and “have nots” will grow increasingly **ugly**. A lack of affordable and readily available **water**, natural **resources**, **food**, **health care** and medical supplies, plus systematic threats to **urban security** and **systemic war**fare are the alternatives to astral abundance. The choices between astral abundance and a downward spiral in global standards of living are stark. Within the **next few decades** these problems will be increasingly real. By then the world may almost be **begging** for new, out of- the-box thinking. International peace and security will be an indispensable prerequisite for exploitation of astral abundance, as will good government for all. No one nation can be rich and secure when everyone else is poor and insecure. In short, global space security and strategic space defense, mediated by global space agreements, are part of this new pathway to the future.

**Bizcon DA**

**High business confidence is driving the fastest growth in decades.**

**Mutikani ’21** [Lucia; July 27; reporter at Reuters, citing Priscilla Thiagamoorthy, an economist at BMO Capital Markets in Toronto, Pooja Sriram, an economist at Barclays in New York, and Will Compernolle, senior economist at FHN Financial in New York; Reuters, “U.S. consumer confidence at 17-month high; business spending on equipment strong,” https://www.reuters.com/world/us/us-core-capital-goods-orders-rise-solidly-june-2021-07-27/]

U.S. consumer confidence inched up to **a 17-month high** in July, with households' spending plans rising even as concerns about higher inflation lingered, suggesting the economy maintained **its strong growth** clip early in the third quarter.

**The economy's prospects** were **further brightened** by other data on Tuesday showing **a solid increase** in **new orders** for **manufactured capital goods** in June despite **supply constraints** hampering production at **some factories**, indicating that business spending on equipment could remain **strong** for a while.

The reports could ease worries about a sharp slowdown in growth in the second half of the year as the boost from massive fiscal stimulus fades. The economy is believed to have **notched its second-fastest growth pace** since 1983 in the second quarter.

"**Higher confidence** suggests that consumer spending should support **robust growth** in **the second half of this year**," said Priscilla Thiagamoorthy, an economist at BMO Capital Markets in Toronto.

The Conference Board said its consumer confidence index ticked up to a reading of 129.1 this month, the highest level since February 2020, from 128.9 in June. Economists polled by Reuters had forecast the index would fall to 123.9.

Consumers' inflation expectations over the next 12 months dipped to 6.6% from 6.7% last month. The Conference Board survey places more emphasis on the labor market. The University of Michigan's survey of consumers showed sentiment falling in early July because of inflation concerns.

Consumer confidence held up despite the Delta variant of the coronavirus driving a surge in new infections mostly among the unvaccinated. Confidence fell in the West South Central and West North Central states, as well as the Mountain region, which have low vaccination rates and are experiencing a surge in infections.

"The Delta variant does pose some downside risk, although we do not expect it to derail confidence entirely, given that its spread is uneven and largely concentrated in areas with low vaccination rates," said Pooja Sriram, an economist at Barclays in New York.

The survey's so-called labor market differential, derived from data on respondents' views on whether jobs are plentiful or hard to get, nudged up to 44.4 in July. That was the highest level since 2000 and up from 44.2 in June. This measure closely correlates to the unemployment rate in the Labor Department's closely watched employment report.

More households intended to buy long-lasting manufactured goods such as motor vehicles and household appliances such as refrigerators and television sets, which should help to underpin consumer spending and manufacturing, the survey showed. Consumers were also keen to purchase homes.

Households are sitting on at least $2.5 trillion in excess savings accumulated during the pandemic.

Stocks on Wall Street were trading lower ahead of earnings reports from major companies and as the Federal Reserve held a two-day policy meeting. The dollar (.DXY) slipped against a basket of currencies. U.S. Treasury prices were higher.

Surging House Prices

In a separate report on Tuesday, the Commerce Department said orders for **non-defense capital goods** excluding aircraft, **a closely watched proxy** for **business spending plans**, rose 0.5% last month. These so-called core capital goods orders gained 0.5% in May. Shipments of core capital goods increased 0.6% after accelerating 0.9% in May.

Core capital goods shipments are used to calculate equipment spending in the government's gross domestic product measurement.

"Supply chain issues are holding back faster capacity adjustment, but **business investment** is showing **no signs of slowing down** or **a lack of confidence** in **continuing strength** in **consumer demand**," said Will Compernolle, senior economist at FHN Financial in New York.

Business investment on equipment has **boomed** during the pandemic, underpinning **manufacturing**, which accounts for **11.9% of the U.S. economy**. Consumer spending shifted to goods from services, with millions of Americans cooped up at home. Record low interest rates and massive fiscal stimulus measures offered a further boost, causing supply constraints.

Though demand is reverting to services, with just under half of the population fully vaccinated against the coronavirus, spending on goods is **likely to remain strong**.

**Business spending** on equipment has recorded **three straight quarters** of **double-digit growth**. Another solid quarter of growth is expected when the government publishes its advance estimate of GDP growth for the second quarter on Thursday.

According to a Reuters survey, GDP growth **likely increased** at **an 8.5% annualized rate last quarter**, an acceleration from the first quarter's 6.4% pace. **The anticipated growth** in the second quarter would be **the fastest since 1983** and could mark **a peak** in the current cycle.

### **The US private sector is key for leadership in space. Nelson ‘21**

### (Center for European Policy Analysis)

Pellicore, Blaine, and Nicholas Nelson. “America Needs New Mechanisms to Compete with China in Space.” *Defense News*, Defense News, 16 Mar. 2021, www.defensenews.com/opinion/commentary/2021/03/16/america-needs-new-mechanisms-to-compete-with-china-in-space/. //ZW

2020 was a breakthrough year for China’s space program. It completed the BeiDou-3 navigation satellite constellation, launched its first independent unmanned mission to Mars, and executed a lunar surface sample collection and return. In launch services, China successfully completed 35 orbital launches (topping the 33 launches from U.S. soil) and hit key funding and technology milestones across its 10 [“independent”](https://www.defensenews.com/top-100/2020/08/17/chinas-industry-reaps-the-benefits-of-political-connections-international-trade/) launch-focused companies. The Chinese government demonstrated its commitment to expanding space capabilities through significant state-directed capital investment, increasingly ambitious mission profiles, and a whole-of-government and industry approach. At the strategic level, China is blending civil, defense and commercial segments to advance its access to and capabilities in space. While other countries, including the U.S., talk about blurring these lines, China is already doing so, enabled in part by its command economy. hina made a clear statement on the importance of space as a war-fighting domain in 2015 when it [established](https://www.defensenews.com/c2-comms/2019/05/03/new-report-explains-how-china-thinks-about-information-warfare/) the People’s Liberation Army Strategic Support Force, complementing the existing Chinese National Space Administration. China has also continued to fund ambitious programs across space access capabilities. Part of that strategy is meaningful private-sector engagement. Since 2014, China has seeded at least 10 space launch companies with access to previously restricted technology, financing them through state-sponsored and “independent” private investment. These are efforts outside of the core Chinese launch infrastructure powered by the Long March family of vehicles. What differentiates the Chinese approach is the magnitude of government investments in technology — consistently in the hundreds of millions of dollars — compared with that of other nations. A prime example of this strategy was the Chinese government’s awarding a $225 million program last year to the Chinese space launch company Galactic Energy to build a research, development and production facility for the country’s future liquid rocket engine program. A prime example of this strategy was the Chinese government’s awarding a $225 million program last year to the Chinese space launch company Galactic Energy to build a research, development and production facility for the country’s future liquid rocket engine program. Additionally, Beijing Financial Street Capital Operation Center, a state-sponsored investment fund, led a [$173 million Series B funding round](https://pitchbook.com/newsletter/ispace-picks-up-173m-series-b) for iSpace, another launch company, to develop a new series of reusable launch vehicles. This strategy is producing results: China now has three operational space launch companies that have completed an orbital launch outside of the core China Aerospace Science and Technology Corporation, and it is likely to make further progress in building a resilient and diverse space access infrastructure in 2021. While China’s command economy provides an advantage in accelerating its space capabilities, the U.S. is **unmatched** in large private investment and associated innovation. Of total global venture capital, 52 percent is in the U.S. alone; and in terms of per capita venture capital, the U.S. has more than twice that of any other large country. Despite this advantage, the U.S. government has only made incremental progress in engaging with and incentivizing these sources of private capital to meaningfully support key technologies and capabilities that align with national security priorities. This is especially true in the case of long-lead and capital-intense technologies for space and hypersonics. There are promising moves being made. Current U.S. government funding efforts championed by organizations like AFWERX have had success in attracting an unprecedented number of new, innovative companies into advancing national security through small on-ramp contracts. The key, however, is finding the right mechanism for the U.S. government to bring the most valuable of these new entrants through the so-called [valley of death](https://www.defensenews.com/smr/cultural-clash/) to deliver meaningful new technology. The U.S. government’s ability to better define and communicate its strategic space priorities to industry, and then back that up with consistent revenue streams, would enable the country to capitalize on its advantages and stay ahead of China. The recent executive order on America’s supply chains is a good first step, but it must be complemented with action-oriented acquisition policy improvements. To forge a working mechanism for the U.S. government to bring the most valuable of these new, innovative companies through the so-called valley of death to deliver meaningful new technology, we propose two actionable solutions. These solutions are designed to bring these companies into the U.S. government ecosystem while also incentivizing private capital to invest in and support companies working on critical national security technologies: **Innovative matching programs:** In the near term, the U.S. government should enhance existing contract awards through a fund-matching ratio between a central government funding office, the government customer for the service or product, and the company performing on the contract. The Air Force has demonstrated the success of this approach through the AFWERX STRATFI program. In this case, AFWERX is enhancing Small Business Innovation Research Program’s Phase II contracts with a combination of public and private funds to launch up to $60 million worth of programs. In its first year, the STRATFI program issued $200 million in government funding to 21 companies, attracting an additional $350 million in private matching. Scaling this to even more ambitious program funding levels is a fast and effective way to take advantage of the United States’ unique private capital advantage. Government Debt Programs: In the medium term, the U.S. government should create domestic loan programs that would enable the U.S. to deploy meaningful capital to companies that have demonstrated sufficient commercial traction but are not yet in the position to qualify for a standard private loan. Through this, the U.S. would be able to direct funds to key strategic priorities more quickly and with mitigated risk compared with a traditional contracting vehicle. A robust credit-worthiness evaluation model, explicit government support and a private investment contribution requirement would increase the likelihood of repayment and ensure strategic alignment with national security priorities. This could also generate a positive return for taxpayers through the interest on the loan, while also supporting the capital-intensive requirements of space companies. The structure for this already exists — in part within areas such as the U.S. International Development Finance Corporation — and could be rapidly scaled. The U.S. government has recognized the need to expand the defense-industrial base and bring new companies and capabilities into its ecosystem, particularly for capital-intensive technologies. The current selection of incentives and tools must be improved to maintain the shrinking capability gap in critical domains, such as space, over near-peer nations, such as China. The loss of these advantages would not only cause significant economic damage, but also pose a threat to U.S. national security in space and across all war-fighting domains that rely on space-enabled capabilities.

**Unpredictable shifts ruin biz con AND overall growth**

Sarah Chaney **Cambon 21**, Reporter on The Wall Street Journal's Economics Team, BA in Business Journalism from the University of North Carolina-Chapel Hill, “Capital-Spending Surge Further Lifts Economic Recovery”, Wall Street Journal, 6/27/2021, https://www.wsj.com/articles/capital-spending-surge-further-lifts-economic-recovery-11624798800

Business investment is emerging as a **powerful source** of U.S. economic growth that will likely help **sustain the recovery**.

Companies are **ramping up** orders for computers, machinery and software as they **grow more confident** in the outlook.

Nonresidential fixed investment, a proxy for business spending, rose at a seasonally adjusted annual rate of 11.7% in the first quarter, led by growth in software and tech-equipment spending, according to the Commerce Department. Business investment also logged double-digit gains in the third and fourth quarters last year after falling during pandemic-related shutdowns. It is now higher than its pre-pandemic peak.

Orders for nondefense capital goods excluding aircraft, another measure for business investment, are near the highest levels for records tracing back to the 1990s, separate Commerce Department figures show.

“Business investment has really been an **important engine** powering the U.S. economic recovery,” said Robert Rosener, senior U.S. economist at Morgan Stanley. “In our outlook for the economy, it’s certainly one of the **bright spots**.”

Consumer spending, which accounts for about two-thirds of economic output, is driving the early stages of the recovery. Americans, flush with savings and government stimulus checks, are spending more on goods and services, which they shunned for much of the pandemic.

Robust capital investment will be **key** to ensuring that the recovery maintains strength **after** the spending boost from fiscal **stimulus** and **business reopenings** eventually **fade**s, according to some economists.

Rising business investment helps fuel **economic output**. It also lifts **worker productivity**, or output per hour. That metric grew at a sluggish pace throughout the last economic expansion but is now showing signs of resurgence.

The recovery in business investment is shaping up to be much stronger than in the years following the 2007-09 recession. “The events especially in late ’08, early ’09 put a lot of businesses really close to the edge,” said Phil Suttle, founder of Suttle Economics. “I think a lot of them said, ‘We’ve just got to be really cautious for a long while.’”

Businesses appear to be less risk-averse now, he said.

After the financial crisis, businesses grew by adding workers, rather than investing in capital. Hiring was more attractive than capital spending because labor was abundant and relatively cheap. Now the supply of workers is tight. Companies are raising pay to lure employees. As a result, many firms have more incentive to grow by investing in capital.

Economists at Morgan Stanley predict that U.S. capital spending will rise to 116% of prerecession levels after three years. By comparison, investment took 10 years to reach those levels once the 2007-09 recession hit.

Company executives are **increasingly confident** in the economy’s trajectory. The Business Roundtable’s economic-outlook index—a composite of large companies’ plans for hiring and spending, as well as sales projections—increased by nine points in the second quarter to 116, just below 2018’s record high, according to a survey conducted between May 25 and June 9. In the second quarter, the share of companies planning to boost capital investment increased to 59% from 57% in the first.

“We’re seeing really strong reopening demand, and a lot of times capital investment follows that,” said Joe Song, senior U.S. economist at BofA Securities.

Mr. Song added that less **uncertainty** regarding trade tensions between the U.S. and China should further **underpin** **bus**iness **con**fidence and investment. “At the **very least**, businesses will **understand** the **strategy** that the Biden administration is trying to follow and will be **able to plan** around that,” he said.

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**American economic strength prevents US-China-Russia war, baby-proofs emerging tech, and makes international cooperation great again.**

Matthew **Burrows 16**, Director of the Atlantic Council’s Strategic Foresight Initiative, PhD in European History from the University of Cambridge, September 2016, “The Difficult Transition to a Post-Western Order,” Chapter 8 of *Global Risks 2035*, https://espas.secure.europarl.europa.eu/orbis/sites/default/files/generated/document/en/Global\_Risks\_2035\_web\_0922.pdf

**The multilateralist global system** that the United States and the West built after the end of the Second World War was premised on **an economically strong** United States and West. In 1945, the United States was the only victor that was not completely devastated. World War II had brought the country out of the Great Depression, and the US GDP constituted more than 50 percent of the world’s total. Into the twenty-first century, the members of the Group of Seven (G7) were the world’s political and economic heavyweights. It has only been in the past several years that the collective GDP of the developing world—led by China—has surpassed the developed world’s. Even as non-Western powers grow, it is psychologically hard for the West to think about relinquishing its reins.

Demographically, the West has, for a long time, been in the minority. What’s more recent is the aging of the Western population (analyzed in chapter 2), which is already occurring in Japan and Europe, beginning to squeeze the availability of resources for anything but health, social security, and interest payments on debt. Unless healthcare becomes far more efficient, the US economy will be overburdened with healthcare and pension costs as the “baby boomer” generation ages. Healthcare constitutes a whopping 18 percent of the US GDP—significantly more than is the case for other industrialized countries—without necessarily providing better results.

With more going to health and pensions, there will be **less capacity** for **defense and military spending**. The United States is **the biggest military spender**, but China is increasing its portion of **worldwide military spending**, while **the worldwide share** of **European NATO members** is **diminishing**.

China’s military probably will **not** rival the United States’ **power-projection capabilities** even by 2035, but it will have greater **anti-access and denial powers**. In a military contest, China may never be able to deliver a **knockout blow**, but it could tarnish **the US image** of **military invincibility** in a conventional state-on-state contest held in its region. Equally, **a confrontation** that results in a Chinese humiliation could set back China’s aspirations for regional leadership, if not trigger **a domestic legitimacy crisis** for **the Communist Party leadership**.

Biggest Problem Is Domestic

The biggest psychological blow to ordinary Western citizens has been their sagging standard of living (more analysis in chapter 1). Despite a much better record of overall growth in the United States since the 2008 financial crisis, those with median incomes have taken a hit.

Worrisome for future US growth potential has been the drop in the labor-participation rate, from the 67 percent range before the 2008 financial crisis to 62-63 percent in the years since. The labor-participation rate was destined to drop due to a growing numbers of retirees, but much of the current sharp decrease comes from unskilled males in their prime working years—forties and early fifties—dropping out. Additionally, many younger women are not entering or staying in the job market. Global Trends 2030 looked at two scenarios for future US growth—one in which the United States maintained or slightly increased its average 2.5 percent pre-2008 growth rate, or one in which growth would slow to an average of 1.5 percent a year. In the first, there would still be the global economic shift to China. On the other hand, the 2.5 percent average growth would help boost average living standards, engendering a “feel-good” factor, which would make more Americans interested in reengaging with world issues.91

Given the record of slower growth and labor-force decline since the 2008 financial crisis, the likelihood of the second scenario is increasing. That scenario anticipated lower growth rates—which accelerated declines in average living standards—**mak**ing it harder to continue **trade-liberalization efforts**. Indeed, the IMF warned in June 2016 that the United States faces potentially significant longer-term challenges to strong and sustained growth, saying, “concerted policy actions are warranted, sooner rather than later… focusing on the causes and consequences of falling labor force participation, an increasingly polarized income distribution, high levels of poverty, and weak productivity.”92

Moreover, it is not as if traditional US partners—Europe and Japan—are doing much better. Japan and many European countries are aging faster than the United States, eliminating labor-force growth as a driver of future economic growth. Europe’s and Japan’s economic performances have been declining since the 1990s.

In Europe, the public discontent with high unemployment and declining incomes has helped to spur the rise of antiestablishment far-right and populist parties that want to weaken the EU and transatlantic ties. Even in richer European countries, such as Germany, a backlash has been growing against the Transatlantic Trade and Investment Partnership (TTIP), out of fear that Europe’s rewards would be meager and European standards would be diluted. McKinsey Global Institute, for example, believes a “return to sustained growth of 2-to-3 percent” is possible for Europe, but would require many politically difficult reforms.93 These include: reducing dependence on imports (much coming from Russia) for crude oil and natural gas; fostering a more vibrant digital economy; increasing workforce participation by the elderly, women, and migrants; and promoting flexibility in labor markets. China now spends a greater share of its GDP on research and development than does Europe. The latest OECD figures show that Europe now spends even less than the rest of the OECD.94

In both the United States and Europe, there is increasing anti-immigrant sentiment despite documented economic benefits from immigration. According to EU Commission Employment Analyst Dr. Jorg Peschner, productivity, by itself, will not be enough to reverse the negative employment trend absent more immigration: “EU’s productivity growth would have to double in order to keep the EU’s economy growing at the same pace as it did before the crisis started.” For employment growth to remain positive as long as possible, improving the labor participation of women, low-educated people, and migrants will also have to be a priority. In the United States, many of the new businesses started every year are started by first- or second-generation immigrants.95

Politically, there has been a large rise in support for right-wing and populist parties in the United States and Europe, undermining traditional parties. The gaps, for example, between the leadership and supporters in the US Republican and UK Tory and Labor Parties have been particularly evident in the selection of Donald Trump as presidential candidate and the June 2016 victory of the “Leave” vote in Britain. Unfortunately, there is no end of economic disruption. The job churn will continue as more and more skills and professions are automated, also increasing the potential for more “losers” from globalization, greater political polarization, and inequality. The increased competitiveness of the developing world with the West is a particular morale buster for Western middle classes who got used to ever-increasing prosperity for themselves and succeeding generations. Adapting to a new norm of economic turbulence—more prevalent in other eras—may be one of the biggest mental hurdles for Westerners. The West is used to thinking of the “Third World,” not home, as the place where economic turmoil happens.

And a Multipolar Financial Architecture, Too

Historically, **US and Western power** has rested on having a monopoly on reserve currencies and **a Western-dominated financial system**. In 2035, the dollar will be the biggest reserve currency, but its share of global financial transactions is expected to drop from 60 percent today to 45 percent. The euro will probably remain the second reserve currency, while the Chinese yuan or RMB—which became a part of the IMF benchmark-currency basket in 2015—will become a third reserve currency, accounting for 10 to 15 percent of global finance in two decades’ time.96

The financial architecture will also become more regionalized. The central role played by the financial centers of New York and London will also diminish, and a multitiered financial architecture will develop. Following the UK Brexit, those centers’ share in financial intermediation will decrease, as a second pole of global finance forms in the Eurozone. A third pole will develop in East Asia and Southeast Asia.

Gradually, a growing share of global financial resources will be concentrated in those regional clusters. As with the growth of regional trade, the regional clusters will be more self-encapsulated, spurred by rising domestic demand in China and other developing countries with growing middle classes. With the role of electronic money likely to grow, the traditional banking system will probably also undergo major revision, with potential impacts on governmental powers.

A more multipolar reserve system and regionalized financial architecture should lessen risks and contribute to greater stability. But the large-scale technological innovations—some of which contributed to the 2008 breakdown—will continue, making global finance still volatile. Emerging-market countries with fragmentary regulatory regimes will be particularly prone to suffering financial crises. The aging-population factor also increases risks to public finances. This report anticipates modestly increased volatility, lower than what occurred in the global economy during the 1890s through the 1940s, but higher than in the 1950s and 1960s—more of a continuation of what has been the trend line since the mid-1980s.

Are There Alternative Visions to Western Order?

Four years ago, when Global Trends 2030 was published, the answer was largely no.97 Increasingly, the facts on the ground would suggest otherwise. They do not add up to a cohesive plan to substitute wholesale all Western institutions and practices. However, they clearly indicate that there are some no-go areas, particularly those connected to regime change, democracy promotion, state control over NGOs, and maintaining sovereignty. Russia and China, in particular, see themselves as great powers and, as such, believe they have special rights to dominance in their regions. However, as other powers like India develop, it is likely that they will see themselves as regional powers with inherent prerogatives. It is worth recalling the United States’ expansive Manifest Destiny and nineteenth-century Monroe Doctrine, claiming special rights to determine the future of the Western Hemisphere.

The Mercator Institute for China Studies (MERICS) has been closely following Beijing’s efforts to build a network of parallel structures to existing international organizations. It has concluded that China “is not seeking to demolish or exit from current international organizations…It is constructing supplementary— in part complementary, in part competitive—channels for shaping the international order beyond Western claims to leadership.”98

As the accompanying chart indicates, China’s shadow network of alternative international structures encompasses everything from financial and economic partnerships (the Silk Road Economic Belt and the Asian Infrastructure Investment Bank) to full-blown political groupings like the Shanghai Cooperation Organization, Conference on Interaction and Confidence Building Measures in Asia (CICA), and the BRICS association of Brazil, Russia, India, China, and South Africa.99

Moreover, there is increasing cooperation among many of the emerging powers—beyond just authoritarians—to not just limit what they see as Western meddling in domestic affairs, but to go on the attack globally. According to a recent academic study, the “Big Five” authoritarian states of China, Russia, Iran, Saudi Arabia, and Venezuela “have taken more coordinated and decisive action to contain democracy on the global level.” They have sought to “alter the democracy and human-rights mechanisms of key rulesbased institutions, including the Organization of American States, the Council of Europe, the Organization for Security and Cooperation in Europe, and international bodies concerned with the governance of the Internet.”100

How durable are these preferences for nondemocracy and state control? By 2035, if not sooner (in the case of Venezuela), some of the now-authoritarian states could be liberalized, and the perceived threat posed by Western civil-society NGOs may ease. However, China and Russia are more likely than not to want to dominate their regions. Nationalism and democracy have been shown to be highly compatible. It is not clear that an even more powerful China or India would defer to Western leadership of the global order, even if both sides’ values in other areas begin to converge.

What Kind of Post-Western World? Clearly, there is a need to plan for a world that will not have the West as **its big economic powerhouse**—a prospect hard for Western elites and publics to conceive of, despite a decade or more of publicity about the “rise of the rest.” According to a recent survey, Europeans and Americans are more comfortable with each other than they are with anybody else. Although a majority of Europeans said, in the most recent German Marshall Fund transatlantic-trends polling, that they would like to see their country take an approach more independent from the United States, both Americans and Europeans still prefer each other over more Russian or Chinese leadership in the world.

The Obama administration—considered among the most multilateralist of recent administrations— campaigned hard in 2015 to convince Europeans not to join China’s proposed Asian Infrastructure and Investment Bank (AIIB). It was as if the United States was against any governance structure not “made in the USA,” even when those running the AIIB have made clear their intentions of operating with the World Bank and the Asian Development Bank.

More and more, the talk among Western elites is about locking in as much as possible the status quo, which favors the West, so that it will be harder for the newcomers to overcome. The TPP was sold as a way to set the rules before China gains much more power. A former Obama administration official advised that now might be the best time to undertake UN Security Council reform, before China and other uncooperative powers become more powerful. “A new US administration may be able to advance a proposal to address the Security Council’s anachronistic makeup while perpetuating a council that Washington can work with.”101

For Westerners, the challenge will be to plan for a future that will not be solely run by them, but which they can live with. Handovers have been **historically difficult and fraught**—more often than not, decided by **bloody contests**. One could envisage different scenarios, some already described in the earlier chapter on conflict, of **military contests** between the United States and China, or the United States and China with Russia, or the United States with NATO against Russia. Without delivering a knockout blow by one side or the other, these contests would most likely pit West against East, creating something akin to **a new Cold War**. Even if there were a knockout blow by the United States against China, it is hard to imagine a defeated China deferring permanently to the West. Its population has been imbued with such a narrative about the injustices by the West against China that any defeat or setback would be confirmation that the United States and West are dead set against a rising China.

Perhaps the most harmful effect of such a contest would be to convince both sides that neither is trustworthy. For the non-West, it would confirm the suspicion that the West does not want to relinquish its leadership position. For the West, it would make it harder to ever reach out and help establish a truly global system.

Need for a Second-Generation US and Western Leadership Model

War is **not**, and should not be, **inevitable** as the West struggles with the growing clout of China and other developing states on the world stage. Unlike during other transitions, the tools exist for ensuring more peaceful outcomes. They will require Western acquiescence to greater roles for the developing world to set and implement new rules of the road for the international order. A key feature of the post-1945 US design for the world order is its multilateralist structures. Many of these operate below most people’s radar. This plumbing of the international system has enabled the daily functioning of globalization. To keep it viable, China, as well as other developing countries, must be accorded more representation. There are too many long-term risks involved, for example, in China having only the equivalent of France’s voting rights in the IMF, when it is the first or second economic power in the world. This is how resentments are nurtured—all the more dangerous in China’s case because of its underlying “century of humiliation” mental complex.

As **emerging technologies** come online, the lack of **a truly global institutional framework** could be particularly **dangerous**. Assuring the future security of the Internet is particularly important in this regard, because all the new emerging technologies—bio, 3D printing, robotics, big data—take for granted a secure, global Internet. Everyone loses if cyber crime and cyber terrorism undermine the Internet. In the worstcase scenarios, in which cyber crime proliferates or strong national borders fragment the Internet, an Atlantic Council study, as mentioned, found that the economic costs could be as much as $90 trillion out to 2030, in addition to the risk of open conflict.102

Besides bringing the emerging powers into leadership roles in the panoply of multilateral institutions, the United States will need to temper its often “exemptionalist” stance to ensure the survival of the multilateralist order. According to the Council on Foreign Relations’ Patrick Stewart, a prominent scholar of global governance, one of the persistent paradoxes of the post-1945 decades has been that the “United States is at once **the world’s most vocal champion** of **a rules-based international order** and the power most insistent on opting out of the constraints that it hopes to see binding on others.”103 No country has **the networks and connections** that the United States does, but the system is now polycentric, rather than unipolar, and others resent the “exceptional” privileges that the United States claims. The Global Trends works have talked about the need for a new model of US global leadership. The United States needs to be **guid**ing the international system as a “**first among equals**,” and willing to play by its own rules. Paradoxically, there is likely to be **no vibrant global-governance system** without US and Western leadership, but too much domineering behavior could doom it.

Even if the United States adapted its global role, this is not to say that the tensions and differences with many emerging powers would all disappear, or that the governance system would function seamlessly. In addition to the growing number of new state actors, the increasing importance of nonstate actors adds a new complexity to the functioning of global institutions. Moreover, there are clear-cut differences between the West and emerging powers on values-based issues, such as democracy promotion and the responsibility to protect. Many developing-country publics still resent Western colonialism and equate any intrusion with past historical wrong. They point to the 2011 humanitarian intervention in Libya, for example, as cover for the Western goal of regime change. Hence, the UN Security Council failure to stop the fighting in Syria, with more than two hundred thousand killed and 7.6 million displaced. Russia and China want to make a stand against the United States and the West getting their way and ousting the Assad regime. On the other hand, the lack of a solution smacks more of anarchy than global governance. Certainly, it shows one of the gaps that remains, and likely will remain, limiting global governance because of differences in values.

The speed with which new technologies are **com**ing online and becoming an important political, military, and economic tool—for both good and bad—carries **big risks** for global governance. Stewart Patrick lists four potential new technologies that “cry out for regulation”: **geoengineering**, **drones**, **synthetic biology**, and **nanotechnology**. Without some setting of rules for their operation, there is the risk of major disruptions, if not **catastrophes**, stemming from their abuse. The recent advances in synthetic biology lower the bar to abuse by amateurs and terrorists alike, forever affecting human DNA. Geoengineering involves planetary-scale interventions that could interfere with complex climatic systems.

However cumbersome, politically unpopular, and ineffective at times, there is **little alternative** to **increased global cooperation** if one does not want to see **higher risks of conflict** and **economic degradation**. Without some sort of bolstered global governance, the West would end up with less sovereignty in a “dog-eat-dog” world, in which it was increasingly in the minority. But can the United States and the West rise to the challenge of investing in a global-governance system that will not always favor their interests on every issue? Historically, the United States could be especially generous because it was on top of the world in about everything after the Second World War. Europeans came to truly believe in pooling sovereignty and joint governance after centuries of internecine conflict. The tough economic times at home have seen US and European publics become distrustful of overarching multilateral institutions, believing the will of the United States or individual European countries will not be served. It is oftentimes easier for political leaders to fall in with the public mood rather than display leadership that might appear to work against it.

**Innovation DA**

#### **Space Commercialization drives Tech Innovation in the Status Quo – it provides a unique impetus.**

Hampson 17 Joshua Hampson 1-25-2017 “The Future of Space Commercialization”<https://republicans-science.house.gov/sites/republicans.science.house.gov/files/documents/TheFutureofSpaceCommercializationFinal.pdf> (Security Studies Fellow at the Niskanen Center)//Elmer

The size of the *space economy* is *far larger* than many may think. In 2015 alone, the global market amounted to $323 billion. *Commercial* infrastructure and *systems* *accounted for 76 percent* of that 9 total, with satellite television the largest subsection at $95 billion. The global space launch market’s 10 11 share of that total came in at $6 billion dollars. It can be hard to disaggregate how space benefits 12 particular national economies, but in 2009 (the last available report), the Federal Aviation Administration (FAA) estimated that commercial space transportation and enabled industries generated $208.3 billion in economic activity in the United States alone. Space is not just about 13 satellite television and global transportation; while not commercial, GPS satellites also underpin personal navigation, such as smartphone GPS use, and timing data used for Internet coordination.14 Without that data, there could be problems for a range of Internet and cloud-based services.15 There is also room for growth. The FAA has noted that while the commercial launch sector has not grown dramatically in the last decade, there are indications that there is latent demand. This 16 demand may catalyze an increase in launches and growth of the wider space economy in the next decade. The Satellite Industry Association’s 2015 report highlighted that their section of the space economy outgrew both the American and global economies. The FAA anticipates that growth to 17 continue, with expectations that small payload launch will be a particular industry driver.18 In the future, *emerging space industries* may contribute even more the American economy. Space tourism and resource recovery—e.g., mining on planets, moons , and asteroids—in particular may become large parts of that industry. Of course, their viability rests on a range of factors, including costs, future regulation, international problems, and assumptions about technological development. However, there is increasing optimism in these areas of economic production. But the space economy is not just about what happens in orbit, or how that alters life on the ground. The growth of this economy can also *contribute to* *new innovations across all walks of life.* Technological Innovation Innovation is generally hard to predict; some new technologies seem to come out of nowhere and others only take off when paired with a new application. It is difficult to predict the future, but it is reasonable to expect that *a growing space economy would open opportunities for technological and organizational innovation*. In terms of technology, *the difficult environment* of outer space helps *incentivize progress along the margins*. Because each object launched into orbit costs a significant amount of money—at the moment between $27,000 and $43,000 per pound, though that will likely drop in the future —each 19 reduction in payload size saves money or means more can be launched. At the same time, the ability to fit more capability into a smaller satellite opens outer space to actors that previously were priced out of the market. This is one of the reasons why *small, affordable satellites* are increasingly pursued by companies or organizations that cannot afford to launch larger traditional satellites. These small 20 satellites also provide non-traditional launchers, such as engineering students or prototypers, the opportunity to learn about satellite production and test new technologies before working on a full-sized satellite. That *expansion of developers, experimenters, and testers* cannot *but help increase innovation opportunities*. Technological developments from outer space have been *applied to terrestrial life* since the earliest days of space exploration. The National Aeronautics and Space Administration (NASA) maintains a website that lists technologies that have spun off from such research projects. Lightweight 21 *nanotubes*, useful in protecting astronauts during space exploration, are now being tested for applications in emergency response gear and electrical insulation. The need for certainty about the resiliency of materials used in space led to the development of an analytics tool useful across a range of industries. *Temper foam,* the material used in memory-foam pillows, was developed for NASA for seat covers. As more companies pursue their own space goals, more innovations will likely come from the commercial sector. Outer space is not just a catalyst for technological development. *Satellite constellations* and their unique line-of-sight vantage point can *provide new perspectives* to old industries. Deploying satellites into low-Earth orbit, as Facebook wants to do, can connect large, previously-unreached swathes of 22 humanity to the Internet. *Remote sensing technology could change how whole industries operate, such as crop monitoring, herd management, crisis response, and land evaluation*, among others. 23 While satellites cannot provide all essential information for some of these industries, they can fill in some useful gaps and work as part of a wider system of tools. Space infrastructure, in helping to change how people connect and perceive Earth, could help spark innovations on the ground as well. These innovations, changes to global networks, and new opportunities could lead to wider economic growth.

#### **Strong Innovation solves Extinction.**

Matthews 18 Dylan Matthews 10-26-2018 “How to help people millions of years from now”<https://www.vox.com/future-perfect/2018/10/26/18023366/far-future-effective-altruism-existential-risk-doing-good> (Co-founder of Vox, citing Nick Beckstead @ Rutgers University)//Re-cut by Elmer

If you care about improving human lives, you should overwhelmingly care about those quadrillions of lives rather than the comparatively small number of people alive today. The 7.6 billion people now living, after all, amount to less than 0.003 percent of the population that will live in the *future*. It’s reasonable to suggest that those *quadrillions* of future people have, accordingly, *hundreds of thousands of times* more moral weight than those of us living here *today* do. That’s the basic argument behind Nick Beckstead’s 2013 Rutgers philosophy dissertation, “On the overwhelming importance of shaping the far future.” It’s a glorious mindfuck of a thesis, not least because Beckstead shows very convincingly that this is a conclusion any plausible moral view would reach. It’s not just something that weird utilitarians have to deal with. And Beckstead, to his considerable credit, walks the walk on this. He works at the Open Philanthropy Project on grants relating to the far future and runs a charitable fund for donors who want to prioritize the far future. And arguments from him and others have turned “long-termism” into a very vibrant, important strand of the effective altruism community. But what does prioritizing the far future even mean? The most *literal* thing it could mean is preventing human *extinction*, to ensure that the species persists as long as possible. For the long-term-focused effective altruists I know, that typically means identifying concrete threats to humanity’s continued existence — like unfriendly artificial intelligence, or a pandemic, or global warming/out of control geoengineering — and engaging in activities to prevent that specific eventuality. But in a set of slides he made in 2013, Beckstead makes a compelling case that while that’s certainly *part* of what caring about the far future entails, approaches that address *specific threats* to humanity (which he calls “*targeted*” approaches to the far future) have to *complement* “*broad*” approaches, where instead of trying to *predict* what’s going to kill us all, you just *generally try to keep civilization running as best it can*, so that it is, as a whole, well-equipped to deal with *potential* extinction events in the *future*, not just in 2030 or 2040 but in 3500 or 95000 or even 37 million. In other words, caring about the far future *doesn’t mean just paying attention to low-probability risks of total annihilation*; it also means *acting on pressing needs now*. For example: We’re going to be *better prepared* to prevent extinction from *AI* or a *supervirus* or *global warming* if society as a whole makes *a lot of scientific progress*. And a significant bottleneck there is that the vast majority of humanity doesn’t get high-enough-quality education to engage in scientific research, if they want to, which reduces the **odds that we have enough trained scientists to come up with the breakthroughs** we need as a civilization to survive and thrive. So maybe one of the *best thing*s we can do for the *far future* is to improve school systems — here and now — to harness the group economist Raj Chetty calls “lost Einsteins” (*potential innovators* who are thwarted by poverty and inequality in rich countries) and, more importantly, the hundreds of millions of kids in developing countries dealing with even worse education systems than those in depressed communities in the rich world. What if living ethically for the far future means living ethically now? Beckstead mentions some other broad, or very broad, ideas (these are all his descriptions): Help make computers faster so that people everywhere can work more efficiently Change intellectual property law so that technological innovation can happen more quickly Advocate for open borders so that people from poorly governed countries can move to better-governed countries and be more productive Meta-research: improve *incentives* and *norms* in *academic work* to better advance human knowledge Improve education Advocate for political party X to make future people have values more like political party X ”If you look at these areas (economic growth and technological progress, access to information, individual capability, social coordination, motives) a lot of everyday good works contribute,” Beckstead writes. “An implication of this is that a lot of everyday good works are good from a broad perspective, even though hardly anyone thinks explicitly in terms of far future standards.” Look at those examples again: It’s just a list of what normal altruistically motivated people, not effective altruism folks, generally do. Charities in the US love talking about the lost opportunities for innovation that poverty creates. Lots of smart people who want to make a difference become scientists, or try to work as teachers or on improving education policy, and lord knows there are plenty of people who become political party operatives out of a conviction that the moral consequences of the party’s platform are good. All of which is to say: Maybe effective altruists aren’t that special, or at least maybe we don’t have access to that many specific and weird conclusions about how best to help the world. If the far future is what matters, and generally trying to make the world work better is among the best ways to help the far future, then effective altruism just becomes plain ol’ do-goodery.

**1NC: Framing**

**The standard is maximizing expected wellbeing.**

**Prefer:**

**1] Pleasure and pain *are* intrinsic value and disvalue – everything else *regresses* – robust neuroscience. We agree with the util framing, but prefer:**

**2] Death is bad and outweighs – a) agents can’t act if they fear for their bodily security which constrains every ethical theory, b) it destroys the subject itself – kills any ability to achieve value in ethics since life is a prerequisite which means it’s a side constraint since we can’t reach the end goal of ethics without life**

**3] Actor spec—governments must use util because they don’t have intentions and are constantly dealing with tradeoffs—outweighs since different agents have different obligations—takes out calc indicts since they are empirically denied.**

**Case**

**Overview: they don’t even know what a spatial fix is. They say it combats capitalism but a spatial fix is literally the idea that there is never ending expansion of capitalism AND WE DIRECTLY FIGHT AGAINST THAT. They say green tech doesn’t contribute to cap-- great, vote neg.**

#### **Green capitalism leads to CCS which turns their impacts – it’s profitable which proves incentives for global north and south.**

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GC: Green capitalism is a new economic system that values the natural resources on which human survival depends. It fosters a harmonious relationship with our planet, its resources and the many species it harbors. It is a new type of market economics that addresses both equity and efficiency. Using carbon negative technology™ it helps reduce carbon in the atmosphere while fostering economic development in rich and developing nations, for example in the U S., EU, China and India. How does this work? In a nutshell Green Capitalism requires the creation of global limits or property rights nation by nation for the use of the atmosphere, the bodies of water and the planet’s biodiversity, and the creation of new markets to trade these rights from which new economic values and a new concept of economic progress emerges updating GDP as is now generally agreed is needed. **Green Capitalism is needed** now **to** help **avert climate change** and achieve the goals of the 2015 UN Paris Agreement, which are very ambitious and universally supported but have no way to be realized within the Agreement itself. The Carbon Market and its CDM play critical roles in the foundation of Green Capitalism, creating values to redefine GDP. These are needed to remain within the world’s “CO2 budget” and avoid catastrophic climate change. As I see it, the **building blocks** for Green Capitalism are then as follows; (1) Global limits nation by nation in the use of the planet’s atmosphere, its water bodies and biodiversity - these are global public goods. (2) New global markets to trade these limits, based on equity and efficiency. These markets are relatives of the Carbon Market and the SO2 market. The new market create new measures of economic values and update the concept of GDP. (3) **Efficient use of Carbon Negative Tech**nologies to avert catastrophic climate change by providing a smooth transition to clean energy and ensuring economic prosperity in rich and poor nations. These building blocks have immediate practical implications in reversing climate change and can assist the ambitious aims of Paris COP21 become a reality. MR: What is the greatest advantage of the new generation **tech**nologies that **can capture CO2 from the air**? GC: These technologies build carbon negative power plants, such as Global Thermostat, that clean the atmosphere of CO2 while producing electricity. Global Thermostat is a firm that is commercializing a technology that takes CO2 out of air and uses mostly low cost residual heat rather than electricity to drive the capture process, making the entire process of capturing CO2 from the atmosphere very inexpensive. There is enough residua heat in a coal power plant that it can be used to capture twice as much CO2 as the plant emits, thus transforming the power plant into a “carbon sink.” For example, **a** 400 MW **coal plant** that emits 1 million tons of CO2 per year **can become a carbon sink absorbing** a net amount of **1 million tons** of CO2 instead. Carbon capture from air can be done anywhere and at any time, and so inexpensively that the CO2 can be sold for industrial or commercial uses such as plastics, food and beverages, greenhouses, bio-fertilizers, building materials and even enhanced oil recovery, all examples of large global markets and profitable opportunities. Carbon capture is powered mostly by low (85°C) residual heat that is inexpensive, and any source will do. In particular, renewable (solar) technology can power the process of carbon capture. This can help advance solar technology and make it more cost-efficient. This means more energy, more jobs, and it also means economic growth in developing nations, all of this while cleaning the CO2 in the atmosphere. Carbon negative technologies can literally transform the world economy. MR: One final question. You distinguish between long-run and short-run strategies in the effort to reverse climate change. Would carbon negative technologies be part of a short-run strategy? GC: Long-run strategies are quite different from strategies for the short-run. Often **long-run strategies do not work in the short run** and different policies and **economic incentives are needed.** In the long run the best climate change policy is to replace fossil fuel sources of energy that by themselves cause 45% of the global emissions, and to plant trees to restore if possible the natural sources and sinks of CO2. But the fossil fuel power plant infrastructure is about **87%** of the power plant infrastructure and about $45-55 trillion globally. This infrastructure cannot be replaced quickly, **certainly not in the short time period in which we need to take action to avert catastrophic climate change**. The issue is that CO2 once emitted remains hundreds of years in the atmosphere and we have emitted so much that unless we actually **remove the CO2** that is already there, **we cannot remain** long **within the carbon budget**, which is the concentration of CO2 beyond which we fear catastrophic climate change. In the short run, therefore, **we face significant time pressure**. The **IPCC indicates** in its 2014 5th Assessment Report that we must actually **remove the carbon that is already in the atmosphere** and do so **in massive quantities**, this century (p. 191 of 5th Assessment Report). This is what I called a carbon negative approach, which works for the short run. Renewable energy is the long run solution. Renewable energy is too slow for a short run resolution since replacing a $45-55 trillion power plant infrastructure with renewable plants could take **decades**. We need action sooner than that. For the short run we need carbon negative technologies that capture more carbon than what is emitted. Trees do that and they must be conserved to help preserve biodiversity. Biochar does that. But trees and other natural sinks are too slow for what we need today. Therefore, negative carbon is needed now as part of a blueprint for transformation. It must be part of the blueprint for Sustainable Development and its short term manifestation that I call **Green Capitalism**, while in the long run renewable sources of energy suffice, including Wind, Biofuels, Nuclear, Geothermal, and Hydroelectric energy. These are in limited supply and cannot replace fossil fuels. Global energy today is roughly divided as follows: 87% is fossil, namely natural gas, coal, oil; 10% is nuclear, geothermal, and hydroelectric, and less than 1% is solar power — photovoltaic and solar thermal. Nuclear fuel is scarce and nuclear technology is generally considered dangerous as tragically experienced by the Fukushima Daichi nuclear disaster in Japan, and it seems unrealistic to seek a solution in the nuclear direction. Only solar energy can be a long term solution: Less than 1% of the solar energy we receive on earth can be transformed into 10 times the fossil fuel energy used in the world today. Yet **we need a short-term strategy that accelerates long run renewable energy**, or we will defeat long-term goals. In the short term as the IPCC validates, we need carbon negative technology, carbon removals. The short run is the next 20 or 30 years. **There is no time in this period of time to transform the entire fossil infrastructure** — it costs $45-55 trillion (IEA) to replace and it is slow to build. We need to directly reduce carbon in the atmosphere now. We cannot use traditional methods to remove CO2 from smokestacks (called often Carbon Capture and Sequestration, CSS) because they are not carbon negative as is required. CSS works but does not suffice because it only captures what power plants currently emit. Any level of emissions adds to the stable and high concentration we have today and CO2 remains in the atmosphere for years. We need to remove the CO2 that is already in the atmosphere, namely air capture of CO2 also called carbon removals. The solution is to combine air capture of CO2 with storage of CO2 into stable materials such as biochar, cement, polymers, and carbon fibers that replace a number of other construction materials such as metals. The most recent BMW automobile model uses only carbon fibers rather than metals. It is also possible to combine CO2 to produce renewable gasoline, namely gasoline produced from air and water. CO2 can be separated from air and hydrogen separated from water, and their combination is a well-known industrial process to produce gasoline. Is this therefore too expensive? There are new technologies using algae that make synthetic fuel commercially feasible at competitive rates. Other policies would involve combining air capture with solar thermal electricity using the residual solar thermal heat to drive the carbon capture process. This can make a solar plant more productive and efficient so it can out-compete coal as a source of energy. In summary, the blueprint offered here is a **private/public approach**, based on **new industrial tech**nology and **financial markets**, **self-funded** and using **profitable greenmarkets**, with securities that utilize carbon credits as the “underlying” asset, based on the KP CDM, as well as new markets for biodiversity and water providing abundant clean energy to stave off impending and actual energy crisis in developing nations, fostering mutually beneficial cooperation for industrial and developing nations. The blueprint proposed provides the two sides of the coin, equity and efficiency, and can assign a critical role for women as stewards for human survival and sustainable development. My vision is **a carbon negative economy** that **represents green capitalism** in **resolving** the Global Climate negotiations and **the North–South Divide**. Carbon negative power plants and capture of CO2 from air and ensure a clean atmosphere together innovation and more jobs and exports: the more you produce and create jobs the cleaner becomes the atmosphere. In practice, Green Capitalism means economic growth that is harmonious with the Earth resources.

#### **SpaceX rockets are reusable -- UV floods wont happen**

**Martin & Wason 2020** (Colin Martin and Elizabeth Wason, “Privatizing Space Exploration, Climate Risks for Forest Offsets, and More,” June 19, 2020, <https://www.resources.org/on-the-issues/privatizing-space-exploration-risks-forest-offsets-and-more/>) //neth

Last month, SpaceX made history by becoming the first private company to send humans into orbit. The launch also represents a major achievement for NASA, which—after retiring its shuttles in 2012—has paid tens of millions of dollars to Russia to deliver American astronauts to the International Space Station. NASA Administrator Jim Bridenstine has indicated that the agency no longer plans to “purchase, own, and operate rockets and capsules” and will instead partner with the private sector, which has led the way in funding cost-effective innovations. But amid a new “space race” between companies like SpaceX and Boeing, private companies may have little incentive to fund space research that isn’t profitable, and increased private sector activity beyond Earth could create more pollution. For its part, SpaceX has responded to the excess of space junk by constructing spacecraft that is partially reusable—and its “Starship” prototype aims to be fully reusable. This week on a new episode of the Resources Radio podcast, Michael Toman—lead economist on climate change for the World Bank’s Development Research Group—discusses SpaceX’s recent successes and why the private sector is increasingly pursuing space exploration. A former RFF senior fellow, Toman clarifies that, despite the burgeoning trend of private companies sending spacecraft into orbit, NASA continues to play an important role in tracking space travel and enforcing safety standards. He predicts that SpaceX’s recent breakthrough could portend a major shift in how space technology is funded and launched. “There was always this thought: Are we willing to trust a non-NASA entity to build and launch, when we're going to have human beings on board?” Toman says. “With SpaceX, we now see that when there's a mission, when there are standards of safety that have to be met—we don't have to have NASA do this.”

#### **No impact to ozone-- won’t cause extinction**

#### **Lieberman**, 9/14/**2007** (Ben – Senior Policy Analyst on Energy and the Environment at the Heritage Foundation, Ozone: The Hole Truth, p.<http://www.heritage.org/research/commentary/2007/09/ozone-the-hole-truth>)

Environmentalists have made numerous apocalyptic predictions over the past several decades, virtually none of which has come to pass. Yet each time, the greens and their political allies proclaim victory, arguing that their preventive prescriptions averted disaster. Such is the case with the 1987 Montreal Protocol On Substances That Deplete The Ozone Layer (Montreal Protocol). The lurid predictions of ozone depletion-induced skin cancer epidemics, ecosystem destruction and others haven't come true, for which Montreal Protocol proponents congratulate themselves. But in retrospect, the evidence shows that ozone depletion was an exaggerated threat in the first place. As the treaty parties return to Montreal for their 20th anniversary meeting it should be cause for reflection, not celebration, especially for those who hope to repeat this "success story" in the context of global warming. The treaty came about over legitimate but overstated concerns that chlorofluorocarbons (CFCs, a then-widely used class of refrigerants) and other compounds were rising to the stratosphere and destroying ozone molecules. These molecules, collectively known as the ozone layer, shield the earth from excessive ultraviolet-B radiation (UVB) from the sun. The Montreal Protocol's provisions were tightened in 1990 and again in 1992, culminating with a CFC ban in most developed nations by 1996. So what do we know now? As far as ozone depletion is concerned, the thinning of the ozone layer that occurred throughout the 1980s apparently stopped in the early 1990s, too soon to credit the Montreal Protocol. A 1998 World Meteorological Organization (WMO) report said that, "since 1991, the linear [downward] trend observed during the 1980s has not continued, but rather total column ozone has been almost constant …" However, the same report noted that the stratospheric concentrations of the offending compounds were still increasing through 1998. This lends credence to the skeptical view, widely derided at the time of the Montreal Protocol, that natural variations better explain the fluctuations in the global ozone layer. More importantly, the feared increase in ground level UVB radiation has also failed to materialize. Keep in mind that ozone depletion, in and of itself, doesn't really harm human health or the environment. It's the concern that an eroded ozone layer will allow more of the sun's damaging UVB rays to reach the earth that led to the Montreal Protocol. But WMO concedes that no statistically significant long-term trends have been detected, noting earlier this year that "outside the polar regions, ozone depletion has been relatively small, hence, in many places, increases in UV due to this depletion are difficult to separate from the increases caused by other factors, such as changes in cloud and aerosol." In short, the impact of ozone depletion on UVB over populated regions is so small that it's hard to detect. Needless to say, if UVB hasn't gone up, then the fears of increased UVB-induced harm are unfounded. Indeed, the much-hyped acceleration in skin cancer rates hasn't been documented. U.S. National Cancer Institute statistics show that malignant melanoma incidence and mortality, which had been undergoing a long-term increase that predates ozone depletion, has actually been leveling off during the putative ozone crisis. Further, no ecosystem or species was ever shown to be seriously harmed by ozone depletion. This is true even in Antarctica, where the largest seasonal ozone losses, the so-called Antarctic ozone hole, occur annually. Also forgotten is a long list of truly ridiculous claims, such as the one from Al Gore's 1992 book "Earth in the Balance"that, thanks to the Antarctic ozone hole, "hunters now report finding blind rabbits; fisherman catch blind salmon."

#### **Cap is the only way to solve climate change and extinction.**

**Hill ‘20** [Victor; 11/3/20; Financial Economist with the International Finance Corporation at the World Bank, lead writer for Master Investor, holds degrees from the University of Oxford, Institut Européen d'Administration des Affaires, and Canterbury Christ Church University; "Only capitalism will save the planet," https://masterinvestor.co.uk/economics/only-capitalism-will-save-the-planet/]

While the global coronavirus pandemic has diverted attention away from the fraught issue of climate change and what to do about it, the environmental activism of groups such as Extinction Rebellion (XR) has continued to simmer. In fact, this year XR has blended with the Black Lives Matter (BLM) movement such that explicitly anti-capitalist environmental protest and anti-patriarchal, anti-colonial wokery have become intimately entwined. The underlying message is: If you want to save the planet you have to change the system. In practice, all protest movements have many threads – just look at the two-year campaign of the gilets jaunes in France – but the unifying thread is always resentment.

The **irony** is that both aspects of this **counterculture** are out-of-date. Rapid **advances in technology**, facilitated by the **free market**, have transformed the climate conversation. Whatever Mr Trump’s rhetoric on the issue (and he may well be in the departure lounge by the time you read this), the big **energy companies**, backed by a raft of environmentally conscious **investors**, are **already transitioning** towards **renewable** and **zero-fossil fuel** energy precisely because it is now **economically viable** to do so. And in that process, they are making money. Win-win.

Outright climate change denial was always a marginal school of thought. Thinking people – of which the **business** and **investment** community – understand well that manmade carbon emissions increase the concentration of CO2 in the atmosphere and thus precipitate a greenhouse effect by which the Earth’s atmosphere and seas warm up. That said, there is a respectable **scientific debate** about **how quickly** that process is taking place and how quickly it will cause **irreversible results** such as desertification. And it is **perfectly legitimate** to question the **climate models** which climate scientists construct to estimate these outcomes, since many have **questionable inputs** and **methodologies**. Claims that we have **ten years left** to save the planet can and **should be challenged**, though that should not be an argument for further delay in taking action.

The global policy framework has been constructed by the ongoing work of the Intergovernmental Panel on Climate Change (IPCC), an agency of the United Nations (UN). This body laid down two years ago that our target should be to limit the rise in ambient temperature to no more than 1.5 Celsius above pre-industrial levels. That said, there are many climate rebels who believe that this level will itself be disastrous to human and animal life; and still others who claim that even this target is entirely unrealistic given the direction of travel.

Ms Thunberg and her disciples would have us **shut down** the carbon-based **economy** forthwith. That would **cause** unparalleled **economic disruption**, mass **unemployment**, **poverty**, **adverse health** outcomes and – let us be honest – **starvation**. No mainstream politician is going to get behind that.

Zion Lights is a writer who has been an environmental campaigner all her adult life. She doesn’t drive, fly or eat meat. In April 2018 she joined XR because she thought it was evidence-based. She soon found that many of its claims were indefensible. She wrote recently:

That is the single biggest problem with most environmental groups: they don’t offer **realistic solutions** to the very real climate change threat. What they offer, if you follow their arguments to their logical conclusion, is eco-austerity: that we should all use less energy, stop going on holiday, live in colder homes, and so on[i].

In the latest papal encyclical published on 04 October (the feast day of St. Francis of Assisi), Fratelli Tutti (Brothers All), Papa Francisco wrote that the Covid-19 pandemic had proven that the “magical theories” of market capitalism have failed and that the world needs a new type of politics that promotes dialogue and solidarity. (Perhaps the unjustified restrictionism pursued by First Minister Drakeford in Wales?)

In fact, much as I respect Catholic social teaching (having been brought up with it), the **best chance** we have to **solve** the immense challenge of **climate change** and other **environmental problems** (such as plastic waste in the oceans) is to **harness market forces**. In this way, the **profit motives** of **finance** and **technology** will **re-engineer** the global economy **completely**.

Big money already decided that the fossil fuel economy is doomed and that renewable energy is the future long before Dame Emma Thompson swept in from LA (business class, of course) to gesticulate on Oxford Street, in those languorous pre-Covid days. The billionaire Davos Boys have been preaching climate orthodoxy for years. And the **Great Transition** is already **well underway**.

Renewable profitability

The good news is (don’t tell XR) that the United Kingdom has managed to reduce its carbon emissions by over 40 percent since 1990 by all but phasing out coal and investing massively in renewable power generation. As I write this on a blustery day in late October, according to the GB National Grid Status website, coal powered generation is contributing precisely zero to UK power generation. The UK has the world’s largest offshore wind power market with capacity still increasing rapidly. Earlier this year the UK government effectively dropped the ban on onshore wind turbine arrays in the drive to reach net zero carbon emissions by 2050.

As the **shift** from carbon-heavy sources to **carbon-free** electricity generation has **accelerated** so **economies of scale** have kicked in and **new technologies** have come online. Recent data from Bloomberg New Energy Finance shows that the latest generation of **solar** and **wind** power plants can produce electricity cheaper than the most modern coal plants even without subsidy for two thirds of the **global population**. The price of solar panels has dropped by almost 90 percent over the past decade. By mid-decade, solar and wind power will **outcompete** all existing coal plants on price – at which point a swath of coal plants will be deemed uneconomic and closed.

The economics of **energy storage** – battery technology – are also **improving**. On 22 September Tesla (NASDAQ:TSLA) unveiled its new battery known as the 4680[ii]. This fuel cell reportedly offers six times the power of Tesla’s previous cells, and five times the **energy capacity**. The company confirmed that the new cell measures 46 millimetres by 80 millimetres – hence the name. The iconic automaker says that these new fuel cells will be able to increase the range of a vehicle by 16 percent – that could be up to about 500 miles for its latest models. That kind of range makes medium-distance travel without recharging (say, London to Edinburgh in a UK context) quite feasible.

Red China goes green

China currently has new coal plants under construction which will have a capacity of another 94 Gigawatts of electricity per annum. China already emits more CO2 than all of Europe and America combined. But China now has a target of going carbon neutral by 2060, and by so aspiring has upped the moral ante with Mr Trump’s America. Now, some analysts predict that China may abandon its programme of building coal-fired power stations as much on economic grounds as on environmental ones.

China might yet gain a strategic advantage from global warming. Last month the UK First Sea Lord, Admiral Tony Radakin (the military head of the Royal Navy), warned that the melting of ice in the Arctic would create new maritime trade routes across the top of the world – the Arctic Ocean – which would halve the transit time between East Asia and Western Europe. China already has, according to the Pentagon, the world’s largest navy with 350 warships and submarines. That opens the prospect of Chinese naval vessels being able to penetrate the North Atlantic rapidly, and possibly threatening the European and American undersea cable network.

Hydrogen in three colours

The downside with the current generation of electric vehicles is that they require batteries which use expensive rare earth minerals of which lithium, and which are costly and messy to recycle at the end of their economic life. The extraction of these rare earth minerals in countries such as the Democratic Republic of Congo (DRC) is itself a cause of environmental degradation and carbon emissions. That is why there is **renewed focus** of attention on **hydrogen**.

Hydrogen comes in three colours. Gray hydrogen is made using fossil fuels like oil and coal, which emit CO2 into the air as they combust. The **blue variety** is made in the same way, but **carbon capture** prevents CO2 being released, enabling the captured carbon to be **safely stored** deep underground or utilised in industry. BP (LON:BP.) is working on that. As its name suggests, **green hydrogen** is the cleanest variety, producing **zero carbon emissions**. It is produced by electrolysis powered by renewable energy i.e. offshore wind.

The **holy grail** in energy now is to **extract hydrogen cheaply and cleanly from water by electrolysis** (i.e. separating the hydrogen and carbon atoms). Hitherto the energy required to perform the electrolysis has been unequal to the energy value of the hydrogen thus produced. That could be about to change.

Bill Brown, founder of NET Power has claimed that his firm’s techniques can produce clean hydrogen at 0.57 cents a kilo. This is a developmental technology based on the Allam Cycle which has been around in theory for some time.

Hydrogen can power vehicles, trains, ships and even aeroplanes. When hydrogen is ignited the only by-product is water. Hydrogen could also be used to **facilitate** the **manufacture** of steel, cement, glass, chemicals and fertilisers. Goldman Sachs reckons that, if the efficiency of hydrogen electrolysis could be sufficiently improved, then about 45 percent of all global **carbon emissions** could be **eliminated**.

Electric cars

Some estimates suggest that electric battery-powered cars could compete on price with conventional cars powered by internal combustion engines (ICEs) as soon as 2024. That is one reason why Tesla shares have rocketed this year. But even if you are not a true believer in Tesla, consider that established automotive giants such as Volkswagen and Daimler-Benz are fully committed to the phase-out of ICEs. In Germany, sales of electric and hybrid cars overtook diesel cars for the first time last month.

I’ll have a lot more to say about the outlook for electric cars soon.

From coal to wind

Dalmellington in Ayrshire, Scotland, was once known as a coal-mining town. But in future it is likely to be known as the location of a 50-turbine wind farm. The new 240 Megawatt facility will be built and run by Vattenfall (owned by the Kingdom of Sweden). But the array will be owned by the infrastructure fund, Greencoat UK Wind PLC(LON:UKW), which has acquired the project for £320 million.

Greencoat has emerged as a growing **renewables fund** which is now included in the FTSE-250 index and which has a market capitalisation of around £2.5 billion – that’s more than the better-known UK energy company Centrica PLC (LON:CAN), the owner of British Gas. The fund has acquired 36 wind power sites which collectively produce enough electricity to power about one million homes – that’s about five percent of all wind power generated in the UK. Some of those arrays were acquired from Scottish & Southern Energy (LON:SSE). Wind power now accounts for about 20 percent of Britain’s total electricity consumption.

Greencoat’s strategy is to encourage energy giants to **green** up their **portfolios** by taking all the development risk. It then buys the asset from the generator and pockets the cash flow arising. Greencoat UK Wind is run by Greencoat Capital, a specialist investor in renewable energy which has £5 billion of assets under management across both wind and solar energy. Greencoat raised £375 million from investors in May 2019.

A report last year by the research firm, Hardman & Co. found that returns for listed renewable energy funds over five years approached 10 percent. Such funds often carry a share price premium over their net asset value. At a moment when the share prices of the oil majors are under pressure and when BP and Shell have slashed their dividends, Greencoat’s 4.8 percent dividend yield is pleasing.

Nuclear

The latest thinking is that carbon-free energy capacity could be **ramped up quickly** by means of a cluster of British designed and manufactured small modular reactors (**SMRs**) which have a footprint smaller than two football pitches. A consortium of Rolls Royce (LON:RR), WS Atkins (LON:ATK), Laing O’Rourke (LON:JLG) and the National Nuclear Laboratory is in the vanguard of this technology. Rolls-Royce has experience and expertise in building nuclear reactors to power Britain’s fleet of nuclear submarines, so this is not new technology. Reportedly, the UK government is considering the injection of up to £2 billion of state funds to invigorate the concept – assuming it is permitted to do so by the EU (if there is an agreement).

The idea is that by 2050 more than 12 of these SMRs will be operational in the UK, each with a capacity of about 440 Megawatts – so about one seventh of the conventional nuclear plant currently under construction at Hinkley Point, Somerset. Hinkley Point C is a project led by France’s EDF (EPA:EDF), the costs of which have spiralled up to an estimated £22.5 billion. Cost considerations have caused Toshiba (TYO:6502) and Hitachi (TYO:6501) to pull out of projects to build nuclear plants in Wales and Cumbria. In contrast, SMRs might have a price tag of around £2 billion each.

SMRs are easier to switch on and off than conventional large-scale reactors; thus, they can be held on standby for when wind and solar power wanes. Thereafter, the remaining gas turbine plants that are currently used for that purpose can be **phased out**. But it does not follow that the new roll-out of SMRs would entail the closure of Britain’s conventional large-scale nuclear reactors which, as I write, are supplying 17.2 percent of total power to the national grid.

A US consortium, NuScale, is also looking at SMRs with a capacity of 60 Megawatts.

The fate of the oil majors

I wrote in the February 2020 edition of the MI magazine that the oil majors are here to stay. I meant by that that there would still be **continued demand** for oil, if much attenuated, after the transition to a net-zero carbon economy, not least because of the need for oil in **petroleum derivatives** (of which **plastic**). I did not foresee even then that the economic case for renewables would advance quite as rapidly as it has done this year; nor was it then apparent how the coronavirus pandemic would reduce the global demand for oil, at least in the short-term.

Another reason why the oil majors may **not go extinct** quite yet is that they have **embraced** carbon capture and storage (**CCS**). Indeed, they have become **advocates** of high **carbon pricing**, calculating that it will mobilise technology to **accelerate CCS**. Under US legislation enacted under the auspices of the US Department for Energy, operators can claim $50 for each tonne of CO2 sequestered underground and $35 per tonne if pumped back into declining wells.

A number of large players, including **Saudi Aramco** (TADAWUL:2222), **ExxonMobil** (NYSE:XOM), **BP** (LON:BP.), **Shell** (LON:RDSA), **Total** (LON:TTA) and others, have jointly formed the Oil and Gas Climate Initiative(OGCI) to drive CCS projects. The OGCI is a **consortium** that aims to accelerate the **industry response** to climate change. OGCI member companies explicitly **support** the **Paris Agreement** and its **goals**.

Just as with wind power and solar, the costs of CCS are in **free fall**. ExxonMobil has teamed up with FuelCell Energy to extract CO2 using carbonate fuel cells. Total, Shell and Equinor (NYSE:EQNR) are part of the Longship project in Norway which is planning to take CO2 captured in Europe’s industrial heartlands and pipe it to storage caverns beneath the North Sea. It hopes to lock in eight million tonnes of CO2 per year by the middle of this decade, for which they will charge around €60 per tonne. Memoranda have already been signed with ArcelorMittal and Heidelberg Cement.

Cement is responsible for an estimated eight percent of global carbon emissions. Under the auspices of the OGCI, a venture with LafargeHolcim, the materials giant, uses CO2 rather than water to cure concrete at much lower temperatures than in conventional manufacture, thereby breaking down the CO2 molecules and turning carbon into a form of glue. This enables a 70 percent reduction in CO2 emissions and an 80 percent reduction in water use.

In terms of their market capitalisations, **ExxonMobil**, **BP** and **Shell** combined are now **worth less** than **Tesla alone**. Exxon was once the world’s largest company by market cap. As I write it is worth just $136 billion against Tesla’s $390 billion.

The oil price is down from around $53 a barrel 12 months ago to around $37 today. That is partly a function of reduced global demand arising from the lockdowns across the world; but one should not assume that it will rebound even if the pandemic is behind us one year from now. That means that a lot of new exploration and drilling activity will be regarded as uneconomic – and a lot of known reserves will remain beneath the Earth for evermore. But if the oil majors can really crack the challenge of CCS and prospectively begin to reduce the volume of CO2 in the atmosphere, they will **succeed** in **reinventing themselves**.

#### **It's sustainable---transition is impossible and alternatives risk extinction.**

**Schrager ‘20** [Allison; Winter 2020; Ph.D. in Economics from Columbia University, Senior Fellow at the Manhattan Institute; "Why Socialism Won't Work," https://foreignpolicy.com/2020/01/15/socialism-wont-work-capitalism-still-best/]

WITH INCREASINGLY UBIQUITOUS **IPHONES**, **internet**, central **air conditioning**, flat-screen **TVs**, and **indoor plumbing**, few in the **developed world** would want to go back to life 100, 30, or even 10 years ago. Indeed, around the world, the last two centuries have brought **vast improvements** in material **living standards**; billions of people have been **lifted from poverty**, and **life expectancy** across income levels has broadly **risen**. Most of that **progress** came from **capitalist economies**.

Yet those economies are not without their problems. In the United States and the United Kingdom, the gap between the rich and poor has become intolerably large as business owners and highly educated workers in urban areas have become richer while workers' wages in rural areas have stagnated. In most rich countries, more trade has brought a bigger, better variety of goods, but it has also displaced many jobs.

With social instability in the form of mass protests, Brexit, the rise of populism, and deep polarization knocking at the capitalist economies' doors, much of the progress of the last several decades is in peril. For some pundits and policymakers, the solution is clear: **socialism**, which tends to be cited as a method for addressing everything from **inequality** and **injustice** to **climate change**.

Yet the very ills that socialists identify are best addressed through **innovation**, **productivity gains**, and better **rationing of risk**. And capitalism is still far and away the **best**, **if not only**, way to generate those outcomes.

TODAY'S SOCIALISM IS DIFFICULT TO DEFINE. Traditionally, the term meant total state ownership of capital, as in the Soviet Union, North Korea, or Maoist China. Nowadays, most people don't take such an extreme view. In Europe, social democracy means the nationalization of many industries and very generous welfare states. And today's rising socialists are rebranding the idea to mean an economic system that delivers all the best parts of capitalism (growth and rising living standards) without the bad (inequality, economic cycles).

But no perfect economic system exists; there are **always trade-offs**--in the most extreme form between total state ownership of capital and unfettered markets without any regulation or welfare state. Today, few would opt for either pole; what modern socialists and capitalists really disagree on is the right level of government intervention.

Modern socialists want more, but not complete, state ownership. They'd like to nationalize certain industries. In the United States, that's **health care**--a plan supported by Democratic presidential candidates Elizabeth Warren (who does not call herself a socialist) and Bernie Sanders (who wears the label proudly). In the United Kingdom, Labour Party leader Jeremy Corbyn, who was trounced at the polls in mid-December, has set his sights on a longer list of industries, including the **water**, **energy**, and **internet** providers.

Other items on the **socialist wish list** may include allowing the government to be the primary investor in the economy through massive infrastructure projects that aim to replace fossil fuels with renewables, as Green New Deal socialists have proposed. They've also floated plans that would make the government the employer of a majority of Americans by offering guaranteed well-paid jobs that people can't be fired from. And then there are more limited proposals, including installing more workers on the boards of private companies and instituting national rent controls and high minimum wages.

For their part, modern capitalists want some, but less, state intervention. They are skeptical of nationalization and price controls; they argue that today's economic problems are **best addressed** by harnessing **private enterprise**. In the United States, they've argued for more regulation and progressive taxation to help ease inequality, incentives to encourage private firms to use less carbon, and a more robust welfare state through tax credits. Over the past 15 years, meanwhile, capitalist Europeans have instituted reforms to improve labor market flexibility by making it easier to hire and fire people, and there have been attempts to reduce the size of pensions.

No economic system is perfect, and the exact right balance between markets and the state may never be found. But there are good reasons to believe that **keeping capital** in the hands of the **private sector**, and empowering its owners to make decisions in the **pursuit of profit**, is the best we've got.

ONE REASON TO TRUST MARKETS is that they are better at **setting prices** than people. If you set prices too high, many a socialist government has found, citizens will be **needlessly deprived** of goods. Set them too low, and there will be **excessive demand** and **ensuing shortages**. This is true for all goods, including health care and labor. And there is little reason to believe that the next batch of socialists in Washington or London would be any better at setting prices than their predecessors. In fact, government-run health care systems in Canada and European countries are plagued by long wait times. A 2018 Fraser Institute study cites a median wait time of 19.8 weeks to see a specialist physician in Canada. Socialists may argue that is a small price to pay for universal access, but a market-based approach can deliver both coverage and responsive service. A full government takeover isn't the only option, nor is it the best one.

Beyond that, markets are also **good** at **rationing risk**. Fundamentally, socialists would like to reduce risk--protect workers from any personal or economywide shock. That is a noble goal, and some reduction through better functioning safety nets is desirable. But getting rid of all **uncertainty**--as state ownership of most industries would imply--is a bad idea. **Risk is what fuels growth**. People who take more chances tend to reap bigger rewards; that's why the top nine names on the Forbes 400 list of the richest Americans are not heirs to family dynasties but are self-made **entrepreneurs** who **took a leap** to build new products and created many jobs in the process.

Some leftist economists like Mariana Mazzucato argue that governments might be able to step in and become laboratories for innovation. But that would be a **historical anomaly**; socialist-leaning governments have typically been **less innovative** than others. After all, **bureaucrats** and **worker-corporate boards** have **little incentive** to upset the status quo or compete to build a better widget. And even when government programs have spurred innovation--as in the case of the internet--it took the **private sector** to **recognize** the **value** and **create a market**.

And that brings us to a third reason to believe in **markets**; **productivity**. Some economists, such as Robert Gordon, have looked to today's economic problems and suggested that productivity growth--the engine that fueled so much of the progress of the last several decades--is over. In this telling, the **resources**, **products**, and **systems** that underpin the world's economy are all optimized, and little further progress is possible.

But that is hard to square with reality. **Innovation** helps economies **do more with fewer resources**--increasingly **critical to addressing climate** change, for example--which is a form of productivity growth. And likewise, many of the **products** and **technologies** people rely on every day did not exist a few years ago. These goods make **inaccessible services** more **available** and are changing the nature of work, often for the better. Such **gains** are made possible by **capitalist systems** that encourage **invention** and **growing the pie**, not by socialist systems that are more concerned with how the **existing pie** is cut. It is far **too soon**, in other words, to **write off productivity**.

Here, it is worth considering the lessons of a previous productivity boom: the Industrial Revolution. As the economist Joel Mokyr has shown, it took new innovations like the **steam engine** more than 100 years to appear in productivity estimates. The same could be happening today with **smartphones** and the **internet**. Meanwhile, even as that upheaval transformed the human experience, creating a more comfortable existence for most everyone, it was also messy and disruptive. The early part of that innovative cycle--like others since--displaced existing workers while the gains flowed to the owners of capital first, causing social instability.