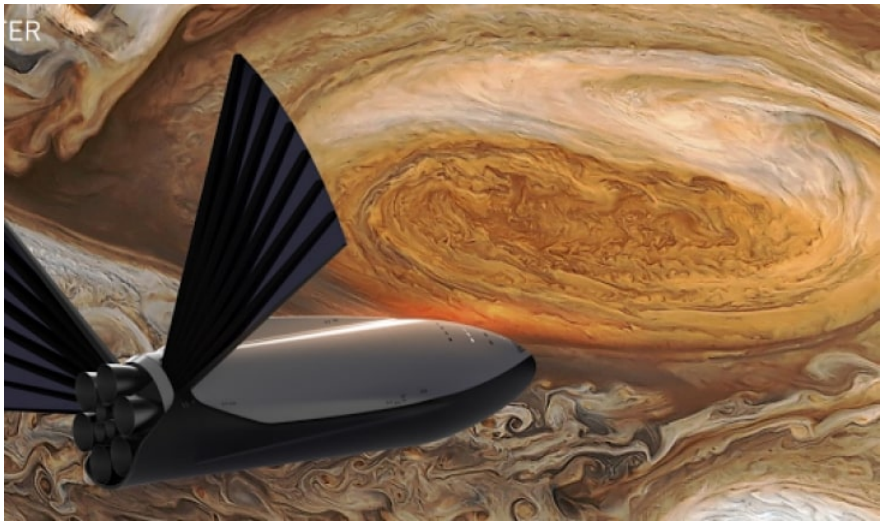
Supertechnology Will Define the 21st Century and Not Status Quo Trends

Brian Wang | November 19, 2019



53

There are many forecasts of the world out to 2100. There is the IPCC climate change report or UN population projections. The projections assume that all current trends continue for the next 80 years.

The assumptions are that there will not be any major technological or social developments that are big enough to alter global trends.

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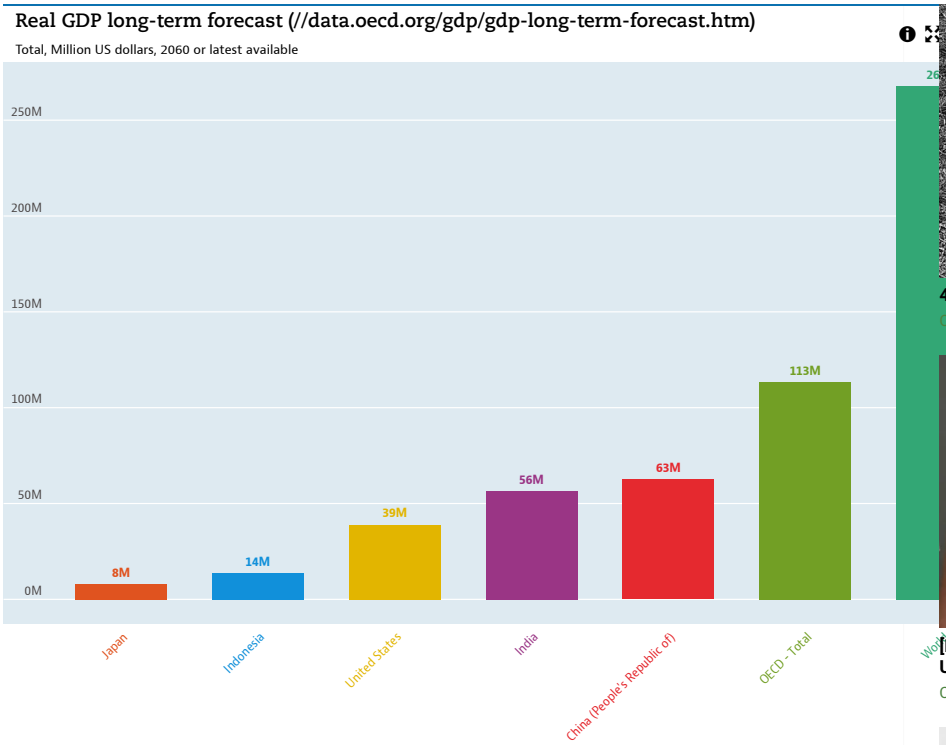

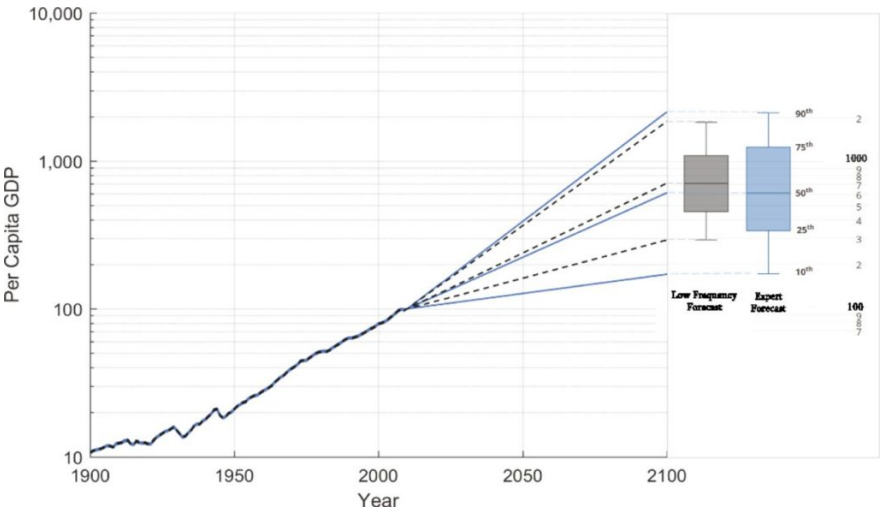

The IPCC and UN did not predict the rise of China's economy and later under-estimated the speed of China's rising economy.

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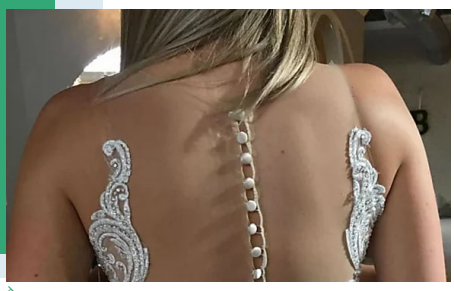

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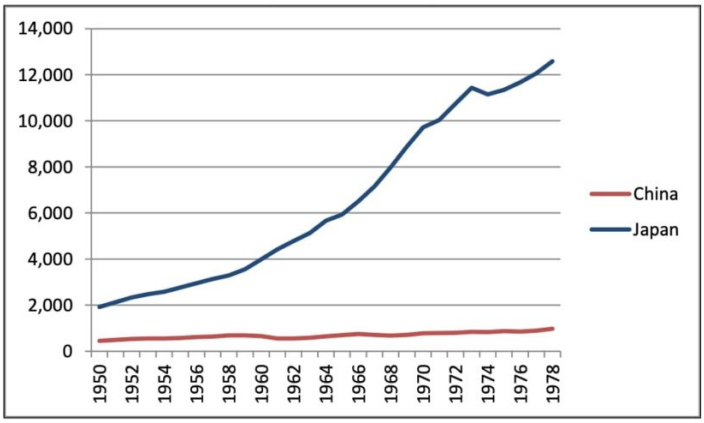
Figure 2. Comparison of Chinese and Japanese Per Capita GDP: 1950-1978

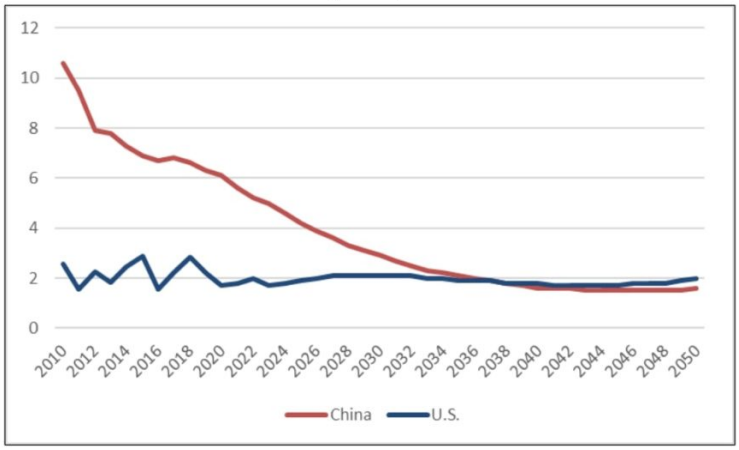
($ billions, PPP basis)



Source: Angus Maddison, Historical, Statistics of the World Economy: 1-2008 AD.

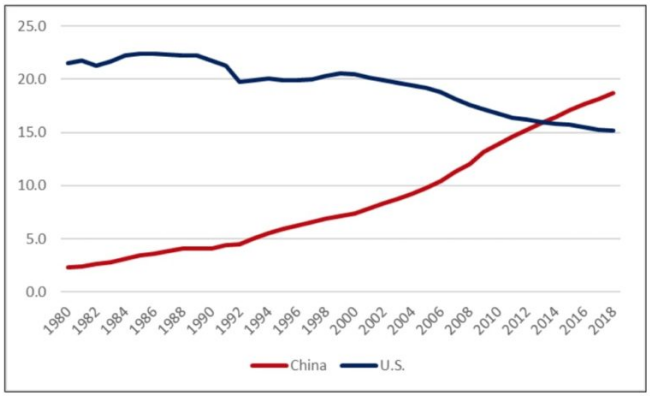
Figure 6. U.S. and Chinese Annual Real GDP Growth Rates in 2010-2018 and Projections through 2050

(percent)



Source:EIU Database (accessed on June 24, 2019).

Figure 7. U.S. and Chinese GDP (PPP Basis) as a Share of Global Total: 1980-2018 (%)



Source: IMF, World Economic Outlook, April 2019.

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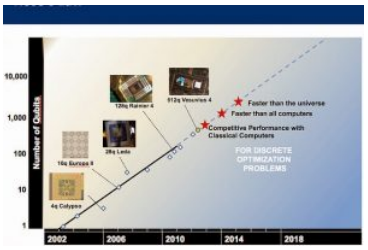

Dwave has a 1000 qubit quantum …

January 12, 2014

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No Preview

Stanford economist predicts 'large, short-run recession

August 11, 2011

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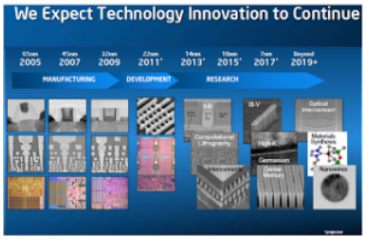

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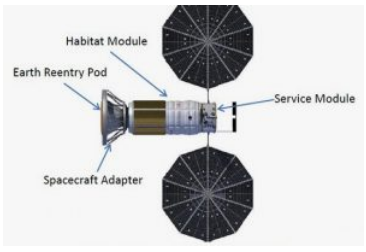
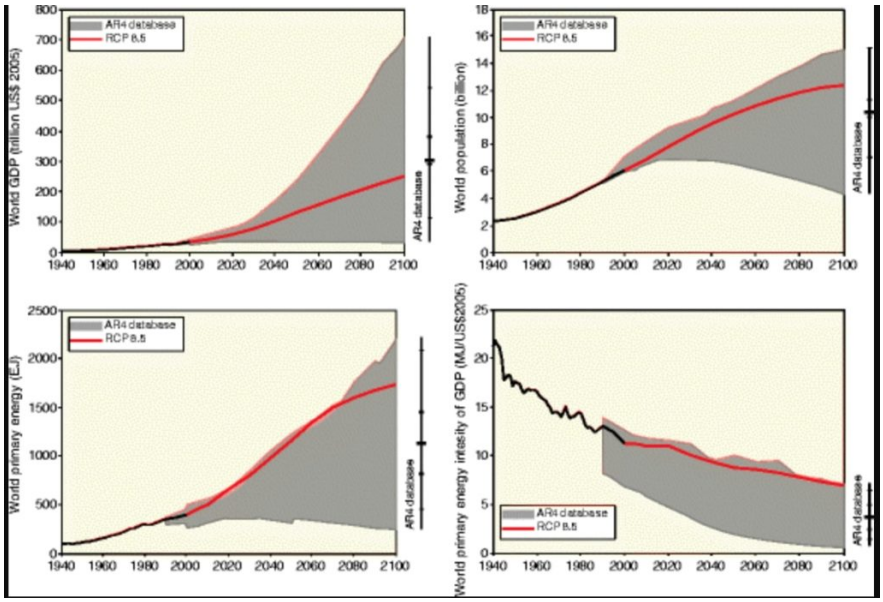




The current global economy is about $90 trillion. It has been growing an average of 3.1 percent annually for the next 12 years. continuing this trend GDP would rise to about $125 trillion by 2030.

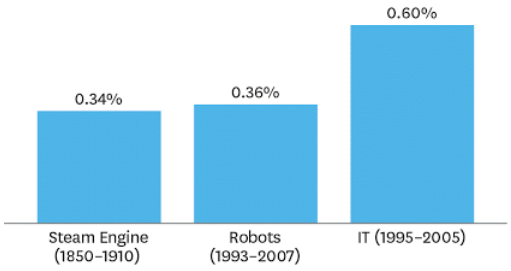
To get an idea of how powerfully AI could affect economic growth, let's assume that the last quarter's 4.2 percent GDP growth rate in the U.S. was somehow sustained through 2030.

A McKinsey Global modeling of the impact of AI is that it could boost world GDP by 1.2% per year through 2030. This would be about double the effect of the internet and Information technology.

The first wave of robotics had a significant but smaller GDP boosting contribution.

Robots' Impact on Productivity Is Already Significant Compared to Other Major Technologies

TOTAL PERCENTAGE CONTRIBUTION TO ANNUAL LABOR PRODUCTIVITY GROWTH RATES



SOURCE NICHOLAS CRAFTS, "STEAM AS A GPT: A GROWTH ACCOUNTING PERSPECTIVE," 2004; MARY O'MAHONY AND MARCEL P. TIMMER, "OUTPUT, INPUT, AND PRODUCTIVITY MEASURES AT THE INDUSTRY LEVEL: THE EU KLEMS DATABASE," 2009; GEORGE GRAETZ AND GUY MICHAELS, "ROBOTS AT WORK," 2015

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AI could potentially deliver additional economic output of around $13 trillion by 2030, boosting global GDP by about 1.2 percent a year. This would be four times the boost of 0.3% GDP per year from the steam engine.

Nextbigfuture does not expect the growth impact of AI to stop at 2030.

Nextbigfuture also expects more powerful robotics, factory improvements and the emergence of true molecular nanotechnology to further increase the economic growth.

There will be factory or shipyard mass-produced nuclear molten salt reactors and various forms of nuclear fusion.

There is a GP-write project to reduce the cost of engineering genomes by 1000 times.

Combination gene therapy modification of adults could massively longevity, health and intelligence.

Boring Company will enable rapid infrastructure improvements via tunnels. Self-driving cars and trucks could boost the volume of commerce by 20 times with more products moved at higher speeds.

Mars Flyby Architecture Study Report Summary
November 20, 2013
0

SpaceX could enable one to three-hour travel anywhere on the planet.

Tens of thousands of laser linked satellites will boost the speed of communication.

China showed that it is possible to have 9-12% GDP growth every year for over 30 years. Other countries have been in the 5-8% annual GDP growth levels.

An extra 1% of GDP growth for ten years is an extra 15%.
An extra 2% of GDP growth for ten years is an extra 27%.
An extra 3% of GDP growth for ten years is an extra 33%.
Growing at 10% per year means increasing by 2.59 times instead of 1.36 times every ten years.

It will still take some time for the various technologies to fully emerge and interact.

If the world economy accelerated by an extra 1% each year each decade, so that there was 4% per year GDP growth through the 2020s, 5% per year GDP growth through the 2030s, 6% per year GDP growth through the 2040s, and so on. There could be 10% per year GDP growth for the 2080s. A century of super-technology would mean a world economy that is 30 times larger than the 3% flat scenario.

A world with advanced AGI, super-robotics, molecular nanotechnology and abundant energy via nuclear fusion versus a world without that technology would be like Singapore ($64,000 per capita) versus Cambodia ($1500 per capita) or Vietnam ($2500 per capita).

A world with 3% annual GDP growth would have an economy of about $1000 trillion. This would be most economies with per capita income at least at current US levels and some places with triple current US income levels.

A world that accelerated to 10% annual GDP growth would have an economy of about $28000 trillion. This would be a world of per capita millionaires. How could an economy with AGI, massive space economy, molecular nanotechnology and anti-aging not have a transformed level of wealth?

Most of Asia stayed poor through to 1980. Most of Africa remains poor.

It is possible to screw things up and have a mostly stagnant future.

I think the big technology happens and there will be constant transformation. Rapid development and growth requires constant massive change. It would be a world of SpaceX instead of a world of United Launch Alliance (Lockheed-Boeing).

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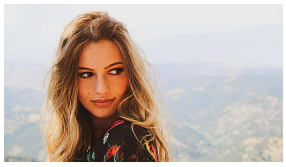

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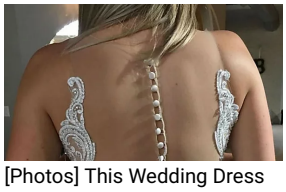

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Brian Wang

Brian Wang is a Futurist Thought Leader and a popular Science blogger with 1 million readers per month. His blog Nextbigfuture.com is ranked #1 Science News Blog. It covers many disruptive technology and trends including Space, Robotics, Artificial Intelligence, Medicine, Anti-aging Biotechnology, and Nanotechnology.

Known for identifying cutting edge technologies, he is currently a Co-Founder of a startup and fundraiser for high potential early-stage companies. He is the Head of Research for Allocations for deep technology investments and an Angel Investor at Space Angels.

A frequent speaker at corporations, he has been a TEDx speaker, a Singularity University speaker and guest at numerous interviews for radio and podcasts. He is open to public speaking and advising engagements.

Conversation 53 Comments

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MB **Mr Burns**
19 November, 2019

Trends do not last 80 years. 80 years ago WW2 barely started, no one could imagine a big rocket, space rockets were fantasy, there was no nuclear power or weapons, five vacuum tubes in a box were high technology, and the best computer was built with mechanical logic. No one is capable of projecting at 80 years into future without blatantly making stuff up and getting it all wrong. The future is unpredictable - it is just a scientific and historical fact.

Reply 8 1

Show 2 previous replies

M **martae** › Mr Burns
20 November, 2019

Trend towards faster, and more useful information technologies.
Trend towards more, and more worthless currencies all over the world.
Destruction, reinterpretation, or what ever other lie to take away the rights of American citizens.

Lie de jour, the American president is not in charge of diplomatic relations. The lie is made in an attempt to remove a duly elected president, while claiming to support democracy.

Reply 2 1

Show 1 more reply

M **Me** › Mr Burns
20 November, 2019

Your own words about our ability to project into the future should be applied to your ability to look into our own history. Much of what you said is your own bias and not based in fact, scientific or otherwise. Doctor Pat gave you one simple example. It seems to me you are the one blatantly making statements and getting it wrong. Not necessarily all of it. *(Edited)*

Reply 1

S **Snazster**
19 November, 2019

Well, yes. I pretty much as take it as a given that every major issue we face right now will be OBE (overcome by events) by mid-century, thereabouts.

Look to the past and you will find many disasters that never came about.

Not to panic, we will have plenty of new things to panic about. The Billy Joel song, "We didn't start the fire" seems especially apt here.

Also, while I don't believe it is especially prophetic, reading the book Accelerando by Charles Stross (which tells the story of one family's passage through what some might refer to as The Singularity) might very well convey just how radically things may change, and the incredible pace at which they do.
...**See more** *(Edited)*

Reply 4

Tom Craver › Snazster
20 November, 2019

Re: your last point - we wouldn't have to go back many years to find pretty much everyone agreeing that no one could make a small fortune playing <Video> games professionally.
(Edited)

Reply 1

Show 1 more reply

S **SoOverIt** › Snazster
20 November, 2019

I want No. 2 to happen so bad

Reply

P **PurpleBone**
19 November, 2019

Your wage does not depend on GDP growth rates if you make minimum wage.

Reply 2

Sprunk Soda › PurpleBone
21 November, 2019

It doesn't matter, technology advanced and becomes cheaper. The average minimum wage worker lives like a middle class person did in the 60's, even the poorest people with houses in the country can afford fridges and other tech. A person with minimum wage in the 60's couldn't afford nearly anything.

Reply 2

DrPat › PurpleBone
21 November, 2019

Your ability to get a better job **does** depend on GDP growth. In combination with your own drive and ability of course.

Reply 2

MK **Michael K**
19 November, 2019

Just AGI alone (coupled with robotics hardware advances) can bring about a post-labor economy.

Just APM alone (Atomically Precise Manufacturing, i.e. full nanotech) can allow most physical products to be formed on demand (if we can make utility fog) or almost on demand (with nanotech-based 3D printers, if utility fog turns out impossible or impractical) from digital files. The former would have a marginal cost of effectively zero: just the energy cost to rearrange the foglets.

The latter would be close to zero: energy + materials. The materials can be mostly CHON, which can be obtained from just air and water. Maybe add cheap organics like wood scrap or food leftovers for a more concentrated carbon source. Or the stuff that goes in your toilet - less sewage waste that way. Fully automated collection, disinfection, and recycling, so you don't need to handle it. So energy + air + toilet stuff for the 3D printer case.

Either of these nanotech scenarios could make most traditional manufacturing obsolete, and turn consumerism on its head. Rather than going to a shop or mall or ordering stuff online, you'd only buy a utility fog package or 3D printer once, then download the design for whatever physical goods you need. Each of these could cost next to zero. Post-consumerism.
...**See more**

Reply 3 1

Jean Baptiste › Michael K
19 November, 2019

While AI has certainly advanced a lot, AGI is still nowhere to be seen and it doesn't seem likely to arrive soon. It seems as if AI is rather going towards a myriad of fractured applications, with different problem solving approaches.

Which for me is totally fine, being human and appreciating having a job and living.

Nanotech is also advancing, but its time to shine hasn't yet fully arrived. Maybe it's something else to look for on this century?

Reply 3

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G **greywar**
20 November, 2019

Lets look first at things we can see coming:
Fusion power. Despite the refrain of its always 50 years out (and lately 30 and 20) the reality is that multiple groups are working on it, and it looks doable within 10 years or less. This changes a ton of things. Everything is cheaper to use or manufacture. Many of the designs currently underway woud be able to run planes, ships, and trains. Vastly reducing their cost.

AI. Its improving at a vast rate, a generic ai would be insanely capable of accelerating change and development, but even specific purpose ais such as self driving cars, and medical diagnostics are huge.

Robotics. More general purpose robotics that are reduced in cost due to their ability to be mass

manufactured would change tons of things.

Genetic manipulation. crispr and now a even more capable one thats recently came out open up fascinating possibilities in health care, manufacturing, etc etc. ...**See more**

Reply 3 1

M **mrseanpaul81** › greywar
21 November, 2019

"Improving" is a strong word for AI. Rodney Brooks is very skeptical that current deep learning tech can get us to AGI (Artificial General Intelligence). So the jury is still out on how much generalization one can get out of "line fitting" math.

Reply 1

M **martae**
20 November, 2019

The single most transformative medium term technology is power satellites. There's pretty much no practical limit on quantity, or delivery, except near the poles if using equatorial orbits. I suppose it's natures way of saying, "you should use that heat sink".
Replacement of other energy infrastructure with microwave, or laser receivers raises a question. If there's negligible human CO2 emission, what will the globalists use to try to control people's lives? Methane? Mexican quisine could be made illegal! Tacos rule.

Reply 2 1

MK **Michael K** › martae
20 November, 2019

> *no practical limit on quantity*

There is: beam too much energy down to Earth, and you'll be causing climate change just by thermodynamics. Any more than that we have to use in space.

There may also be lesser engineering limits such as how many power sats you can stick in a convenient orbit, or where you can place the receivers.

Reply

Show 1 more reply

Jean Baptiste › martae
20 November, 2019

They'll find something. What matters to any these ideologues is the restriction of human freedom. Any tech factorizing human beings out of the ecosystem and its resources and therefore, out of their direct control, is their principal enemy.

But it may become increasingly hard to sell as a control mechanism. After all, powering our civilization with solar power is the sum of everything these people have been fawning over for decades.

Maybe they'll focus on policing and punishing wrong think and wrong tech (e.g. pesticides and meat farming). Fighting much more abstract demons has done wonders for decades for them. *(Edited)*

Reply 2 1

O **Oldjar07**
21 November, 2019

Part I

It was around the mid-to-late 2000's when I first started following technology trends closely. At that time, a space elevator was considered to be the solution to cheap access to space. Also space related, an SLS type program was proposed and had people excited it would eventually take us to Mars. Practically noone thought it would be possible for a private space company with a reusable rocket to completely transform cheap access to space.

Nanotechnology was the big buzzword of the day. Practical applications that would transform the world were only a few years away. AI was not much above the level of a pseudoscience. If someone said in a decade there would be a huge push for self driving cars by almost every major auto manufacturer, they would have sarcastically replied "where's my flying car?" A Google duplex level AI with a voice practically indistinguishable from a human would have been considered impossible.

Tokamak fusion reactors were considered society's best hope for a future of clean cheap energy. Few people saw how rapidly the cost of renewable energy sources such as wind and solar would come down. It should be obvious by now that smaller fusion projects focused on novel techniques or even conventional fission reactors are a better approach than the massive international ITER project.

Reply 1

O **Oldjar07** › Oldjar07
21 November, 2019

Part 2

Even from the perspective of a decade ago, we're accomplishing things now that would have been considered practically impossible then. At the same time, there were several technologies that were "only a few years away" that are nowhere close to practical applications. Some of these technologies will require a lot more investment before they become practical and some ideas will die out completely.

I guess one thing you can take away from this is technology is hard to predict and it's hard to tell what the impact on society will be. "Sure thing" technology investments may be a complete failure while visionaries and innovators like Elon Musk can take impossible ideas and make them a reality. I think it's a safe bet that the world of 2100 will be a far different place than we imagine.

Reply 2 1

RK **R. Kimhi**
19 November, 2019

So nice to add annual percentages and see how accumulated growth explodes. We are constantly adding new technology, the internet in the 90, cellular communication in the 2000s, yet global growth rates stay constant. There are absorption limits. Developing countries can grow faster than mature ones because they are adopting technologies that have been tried elsewhere.

Global Annual GDP growth:
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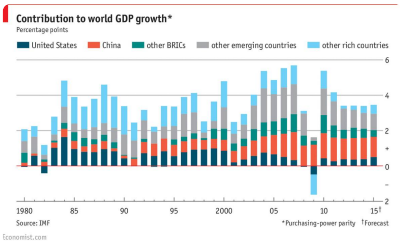

Reply

L **Lol**
20 November, 2019

Without clean and cheap energy there is no next big future.

Reply

E **elmaughan** › Lol
20 November, 2019

Yet we have clean cheap energy almost here and now. MSRs - the only thing stopping them is Leftist FUD and that the politically powerful do NOT want a solution to the energy problem that would take a away the "crisis" of climate change.

Reply 2 1

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DL **Dan Lantz**
19 November, 2019

This is true, esp when you realize that "the world" includes G. K. O'Neill settlements, on Amazon.

Reply

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