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[00:00:00] Good morning. A few months ago I did a, frankly on global oil production and the straw where I likened shale drilling and unconventional oil extraction to a wider straw, mostly in contrast to a bigger milkshake. Not so much finding more resources, but extracting existing ones faster and thereby moving closer to what I referred to as the slurping sound.

[00:00:27] Today. I want to take that same idea and apply it more broadly beyond oil to technology and to wealth itself. So let's start with a simple question. How does technology relate to wealth? What do you think? What does our culture assume and what would a wider longer term view suggest? I think most of us are taught implicitly or explicitly that technology creates wealth, that innovation makes us richer, and that real productivity growth is synonymous with real prosperity.

[00:01:06] I've come to believe that this framing does not hold up when you zoom out either in space or in time, and at large scales. Technology tends to do three things. First, like with fracking, it acts like a straw, increasing the rate at which we draw down the stocks of the natural world. Second, it acts like a siphon concentrating the gains.

[00:01:30] And third, it acts like a sieve filtering long-term wealth away from the rest of life and towards one species, US, and often towards a small subset of that species. So none of what I'm about to unpack in this video comes from any hostility towards technology. It comes from trying to understand what technology does once it operates at civilization scale.

[00:01:56] Under certain system incentives like we have today.

[00:02:11] Okay. To make sense of the relationship between technology and wealth, we first need to be clear about what wealth actually is. When I say wealth, I don't mean money or bank accounts or financial digits. I mean usable energy, organized matter, and the stocks and flows that make life possible. And enjoyable and viable stocks are things like forests and the services that forests provide or topsoil, or fresh water stored in aquifers and productive fisheries and mineral deposits.

[00:02:54] Fossil hydrocarbons, the biodiversity woven through the web of life on planet earth. And even less tangible things like social trust and institutional stability. These are stocks. Flows are things like sunlight or rainfall, nutrient cycles, pollination, and more abstractly. Things like human care and attention.

[00:03:22] And if you really think about it, these stocks and flows are not just the foundations of real wealth. They are real wealth because everything else is built on top of them. And so every time we spend financial wealth, we're ultimately spending these things or relying on them, to make that financial transaction possible.

[00:03:44] Money digits in the bank in this framing is not wealth itself. It is only a claim on wealth, as I've often stated on this platform. Every good or service that's counted in global GDP is first an energy and material transformation. Second, an interaction and impact on the natural world and only then a financial transaction.

[00:04:09] As long as our financial claims grew in rough alignment with underlying stocks and flows, things felt stable. But when claims grow faster than biophysical reality, as they clearly are doing today, a gap opens up. And that gap widens inviting, fragility, hubris, overconfidence to grow. Which eventually blind us into mistaking abstract claims for abundance.

[00:04:37] This is where a wider lens on how we view technology becomes essential. Human technology and innovation does not start out as a bigger straw. It usually begins as a local solution. It starts as an idea, aiming to make improvements to life. A farmer trying to get a higher yield. a business owner looking for a tool that saves time or effort.

[00:05:03] A homemaker trying to reduce the burden from so many tedious and repetitive tasks. At those scales, technology feels helpful and often even restorative as it solves real constraints, it makes life easier and creates convenience or comfort or efficiency at the time and place where the tech is applied.

[00:05:27] But when a technology works, especially today in a globally interconnected economy, it spreads and when it spreads, it scales and when it scales across whole economies and decades, technology's role and its impact. Changes at that macro scale, technology becomes a set of tools that lets us as an economy and as a species pull more from the world per unit time.

[00:05:57] Fire. Plows, water wheels, spinning looms, steam engines, internal combustion engines, electricity, and now data centers, server farms, and the like. Each major technological step has made the straw that accesses earth stocks and earth's flows wider and usually faster. That doesn't mean technology is bad.

[00:06:24] Toolmaking is one of the most natural things that humans do. We are technologists, always have been. It's how we survived ice ages and eventually spread across the planet. But given the current incentive structures that we, the technologists are currently operating within, it does mean that at large scales, technology primarily extracts and rearranges real wealth.

[00:06:53] Contrary to common public narratives, tech does not create wealth from nothing. At Best Tech allows us to access energy or materials that were

previously dispersed or slow or difficult to reach. And at worst, it allows us to liquidate stocks so quickly that the systems underneath cannot regenerate.

[00:07:15] Okay. Instead of oil like I usually do, let's take food as an example. here for, most of human history, agriculture was limited by soil biology. Nitrogen came from microbes, manure, crop rotations, and time in the seasons, yields back then were coupled to the slow regeneration. Of living systems and then we learned how to make fertilizer from fossil gas using the Haber-Bosch process.

[00:07:49] Suddenly the straw in this case widened dramatically. We could pull fertility straight out of the atmosphere. As long as we burned enough energy to do it, yields exploded. Total food throughput. Mm-hmm. Surged population then followed. It stands to reason because today about half of the nitrogen in our bodies originates from fossil fuels.

[00:08:14] that's how deep this shift was in our food system. And of course, earth's soils changed in the process across much of the world. Living carbon rich soils became depleted, more eroded, and more chemically dependent. then rivers carried runoff downstream and into the oceans, farming skills and farming expectations, and our equipment gradually became locked into the cargo cult of continuous fossil energy subsidy.

[00:08:47] Pretty much mostly without realizing we were destroying the foundational resource in the process. So from one lens, this newfound agricultural productivity looked like extraordinary wealth creation. But from another, it was accelerated drawdown. It looked a lot like transmuting wealth into income because it was.

[00:09:09] And this pattern shows up again and again. Technology allows us to front load benefits and pulls future capacity into the present. It makes soil and

agricultural systems appear wildly productive in the short run, but much closer to the slurping sound, or whatever sound dirt makes when it's depleted.

[00:09:32] Okay, so there's another effect at large scales that tends to accompany this wider straw. As extraction speeds up, the gains resulting from it tend to concentrate. None of this is about ill intent or greed or dark triad psychology, at least not primarily. It's about structure and network effects, human networks reward size.

[00:09:59] So capital intensive tools, reward those who can finance them, data compounds and then early advantages reinforce themselves. And so over the last few decades, and even more clearly in the last few years, we're seeing this play out. In most advanced economies, the share of income going to labor has declined over the past 50 years, while the share going to capital has increased substantially.

[00:10:28] Corporate profits as a percentage of GDP are near. Historic highs. Market concentration has risen across sector after sector from energy, also agriculture to the rest of technology. in the United States, the top four firms now control, I believe over 40% of market share in almost all major industries.

[00:10:55] Okay. Technology, especially of the mass produced assembly line, variety lowers costs and increases output. But ownership of the systems that do this has also become increasingly concentrated. This is exacerbated when the productivity gains of a technology come from replacing the jobs. Within an industry, which has been a goal of a lot of the innovation in the past a hundred years, sometimes these replacements are for tough and dangerous jobs that no one wants to do, and we understandably celebrate that.

[00:11:30] But it also results in the automation of what was previously a someone steady job making it obsolete and further shrinking the number of people who

benefit financially from a company's success. So focusing on productivity via reducing labor costs, also concentrates claims on wealth. And as technology scales, something else happens that our cultural narrative misses almost entirely.

[00:11:58] They tend to create choke points. Choke point is simply a place where a lot of economic activity has to pass through some narrow gate, and whoever controls that gate does not need to extract more resources or make better products. They control access because they're the gatekeeper. So think about highways and railroads, ports, energy pipelines, electricity grids.

[00:12:27] app stores. Online shopping, choke points are everywhere, and once a platform becomes the default route in a large network. Choosing to opt out becomes costly, or in many cases impossible because businesses depend on it, workers depend on it, and our entire complex Rube Goldberg supply chain system depends on it.

[00:12:50] And at that point, the platform can set terms, collect fees, and skim value from everything that flows through, not because it produces all the value, because it sits between us and where the value has to pass through. And this tech dynamic did not exist at the local hardware store or when people back in the day were trading arrowheads.

[00:13:13] But today the toolmaker often becomes the rent taker. So as the straw widens a siphon forms alongside it, most people experience speed and convenience. And a much smaller group accumulates durable claims or. Pretty durable claims. This is why conversations about technology and inequality often talk past each other.

[00:13:39] One side is pointing out to rising output and falling prices, and the other points out precarity and concentration and risk and loss of agency. But both

are describing real phenomena. They're two different views of the same machine, and both can be true at the same time, and both are true at the same time.

[00:14:00] Again, I'm not bashing technology here, nor am I making any political statement. I am trying to describe what technology tends to do when you look at it from a wider biophysical perspective. And there's a third effect that's easier to miss because it still sits pretty far outside our current cultural accounting ledgers.

[00:14:25] At Planetary Scale technology also acts as a filter or a sieve. It reallocates energy, materials, and attention away from the rest of life and towards humans and within humanity, often towards a particular subset of humans. Over the last few centuries, the human share of earth's net primary productivity has surged to roughly 40% of all NP.

[00:14:51] It doesn't even include the mining, and use of ancient sunlight. As viewers of this program know, wild biomass has declined sharply. Large animals have been replaced by people, livestock and infrastructure. The technosphere, all the cement and buildings and plastics and asphalt and everything now outweighs all living things on earth.

[00:15:15] Not just animals, but grasses, trees, everything alive is outweighed by the things that humans have built. From the perspective of GDP, this looks like success from the perspective of the living world. The Great Simplification has already happened. Technology doesn't just pull faster and become more concentrated.

[00:15:39] It also redirects natural flows. It reshapes ecosystems to serve one species priorities often at the expense of resilience, diversity, and as we. Beginning to recognize long-term stability. Again, this isn't a complaint despite me caring a lot about this particular issue. This is what happens when human

systems scale faster than ecological ones, and again, productivity gains from new scalable technology can look and feel like and be experienced as wealth creation.

[00:16:17] If your time horizon is short and your accounting and circle of concern are narrow, same reality, different truth. Okay, so there's one more piece of this story that's easy to overlook, but important, and I mention it periodically. Debt. Debt functions a lot like technology in our system because it is technology.

[00:16:40] Debt is social technology. When we take on debt, we're making a claim on future energy, future materials, future labor and future ecosystem, impacts. We're assuming those future stocks and flows will be there and they will be large enough to pay back the promises made today. In that sense, the social tool of debt.

[00:17:02] Also acts like a straw pulling the future into the present. It accelerates extraction by allowing us to consume now what has not yet been produced. Debt also acts like a siphon. Interest payments and financial claims concentrate returns towards those who can issue credit and create rent funnels rather than those who do the physical or ecological work.

[00:17:29] And over time, more and more human effort is devoted not to meeting needs, but to serving prior claims. The productivity gains get skimmed off upstream before they ever show up as security or wellbeing, downstream in our societies. Debt also acts like a sieve. credit creation immediately converts non-human stocks and flows into human directed throughput.

[00:17:58] A loan becomes demand instantaneously for electricity, for coal, for fuel, for timber, for fish, for pretty much everything. And other species never receive claims. Or benefits or representation in that transaction. Forests didn't sign the contracts. Rivers aren't represented on corporate balance sheets.

[00:18:25] Soils have no seat at the table. The living world of planet Earth is silently and invisibly enrolled as collateral when we have a new debt transaction. In short debt makes systems look healthier than they are because it temporarily smooths over limits, and in the process it delays feedbacks. It accelerates overshoot, and it allows drawdown to continue long after underlying stocks are weakening Debt intensifies our commitment to growth while also shrinking the range of choices available to societies.

[00:19:10] and ecosystems later. And all this matters a great deal because every major technological system we're now building, especially ai, which I'm about to talk about, is being built inside this debt driven structure. Okay? fossil hydrocarbons reshaped the physical economy. AI is doing something similar now.

[00:19:34] But in the cognitive economy, same dynamics, but a different and a bigger game board. Fossil fuels multiplied physical labor. They gave us armies 500 billion strong of mechanical workers. The army's muscles were made of steel, fueled by ancient sunlight, and these armies transformed agriculture, manufacturing, transportation.

[00:20:00] And war, and everything pretty much in contrast. Artificial intelligence, large language models, multiplies our cognitive armies by scaling pattern recognition, prediction, coordination, content generation, as many things we used to use our own brains for. Lots of things. Things that until very recently were bottlenecked by human attention and human time, and hypothetically.

[00:20:32] Once trained, these systems can operate at near zero marginal cost. A model built once can be copied, endlessly deployed. Pretty much everywhere and run continuously as long as there's enough electricity, which is a big if of course, and water and supporting systems. So a small number of organizations with access to data and compute and capital can now perform tasks that once

required thousands or hundreds of thousands of people spread across institutions.

[00:21:05] And this has consequences. first, it accelerates extraction, not just of energy and materials, but of human attention and creativity and hominid decision space. Human time and attachment now becomes a resource to be harvested, optimized, and nudged, and then monetized at scale. Second. Again, it enlarges the siphon even further because the value created by AI enabled systems tends to flow towards the owners of the models and the platforms and the infrastructure.

[00:21:43] Yeah, training data comes from everywhere, but the benefits concentrate in relatively few places. This is the same ownership dynamic we saw with industrial machinery, but only faster and less obvious and much more concentrated. Third, it's a turbo boost for our current cultural aspirations and goals and metrics.

[00:22:08] AI is really good at optimizing for what we ask it to optimize for, but if soil health and ecosystem stability and the plight of the dolphins or future generations are not part of the game plan, they won't be part of the outcome either. AI can absolutely be used to improve efficiency, to reduce waste, to optimize logistics, as people are saying, to increase productivity and to improve scientific understanding, and medicine and, all that.

[00:22:42] But without new boundaries, new aspirations. It's also gonna shorten feedback loops, and the decisions are gonna get faster and the responses are gonna get automated, and scale will increase before the consequences become fully visible or visible at all. Systems move more quickly than human governance culture or our ethics can adapt to.

[00:23:09] And all of this, it draws on the natural world. So AI does not introduce a new set of dynamics, at least not yet, and I cannot imagine how it would. Unless our economic system changes first, artificial intelligence. If successful, compresses time and amplifies whatever existing incentives are already in place.

[00:23:35] Alright, so what do we do with all this? technology was, is and will continue to be. Powerful and important, but it's intertwined with physics and ecology in the hierarchy of our human reality. It moves claims around, across time, across people, and, for those followers of this show, no across species, there's no silver bullet response to these dynamics.

[00:24:04] But I believe that naming and understanding them matters. So before I conclude, some of you might be, holding a quiet objection here, Nate, if this is all true, how come Stock markets can be at all time highs at the same time? And the uncomfortable answer is that these things are not in conflict in many ways.

[00:24:29] They reinforce each other. 'cause when wealth is defined narrowly as financial claims and digits in the bank, rather than the underlying real world stocks and flows, then accelerating drawdown can look like. Prosperity, liquidating soils and minerals and burning fossil carbon, ecosystems. and all that.

[00:24:55] Future capacity, shows up as growth on a balance sheet today. And markets, kind of along the lines of the maximum power principle, they reward speed scale. And monetization. They don't measure what's being depleted underneath. So record financial wealth can coexist with declining real wealth almost by design.

[00:25:23] So the framing in this video, again, is not anti-technology or neo luddite. whatever. New tools at the scale of an individual or a village or a small business behave very differently than new tools operating across a global

civilization. The rules change with scale, and it's not lost on me that I'm explaining and critiquing technology while using technology to do so.

[00:25:51] So maybe the better way to end, this, video overview isn't with suggestions, but with some questions. At what point does scale change the moral and physical meaning of a tool? Does something that helps at a village level become destabilizing at a planetary one? When we say technology, are we really talking about tools or are we talking about large groups of humans doing what humans do?

[00:26:22] Best problem solving, innovating, scaling. If technology is inseparable from us, then what does that say about responsibility? Is this critique of technology, really just a critique of scale slash population. What would our economy look like if wealth meant the continuity of flows rather than the liquidation of stocks, sunlight, rain, soil, fertility, functioning ecosystems, biodiversity, as opposed to just this quarter's output.

[00:27:02] If money is a claim on real wealth, who or what is issuing those claims on behalf of the living world and what happens when no one is issuing those claims? How much of what we call technological progress is really just borrowing from the future and labeling it innovation, and how would we know the difference?

[00:27:26] How do these ideas play out when the incentives facing any one of us are very different from the outcomes we'd want if everyone acted together, in effect is the more than human predicament really at its core, a collective action problem. I don't have final answers to any of these questions or many related questions, but I do think about them and I'm increasingly convinced that if we don't start to ask.

[00:27:52] These questions explicitly, technology will keep answering them for us by default. And the cultural and behavioral defaults are likely to continue to favor speed over stability, financial claims over the foundations of real wealth and the present over the future. Probably, that's the lens I wanted to share here.

[00:28:21] This feels like a good place to pause. See you soon.