

The Great Simplification

Nate Hagens (00:00:00):

You are listening to The Great Simplification. I'm Nate Hagens. On this show, we describe how energy, the economy, the environment and human behavior all fit together and what it might mean for our future. By sharing insights from global thinkers, we hope to inform and inspire more humans to play emergent roles in the coming Great Simplification.

(00:00:29):

I'd like to welcome Lyn Alden to the podcast. Lyn is an investor, an independent analyst, very popular on social media. Like other guests I've highlighted in the past, Kirill Sokolov, Jeremy Grantham, Luke Gromen, and others to come, Lyn looks at the world from an energy lens, and it's my view that just looking at money and technology the way that we did in the past neglects energy and ecosystems, which is why I only like to talk to financial people that understand energy. Lyn has a recent book she wrote called Broken Money about the past, present, and future of money through the lens of technology. This conversation was fast moving, no nonsense, about how energy, technology and money integrate for the future of our financial and our economic system and the way that that's reflected in current global events. Please welcome Lyn Alden.

(00:01:51):

Hello, Lyn. Welcome to the show.

Lyn Alden (00:01:53):

Happy to be here. It took us a while to get this scheduled, but I'm happy to have the conversation.

Nate Hagens (00:01:58):

We have multiple mutual friends, but I've long followed your Twitter feed and your newsletter and of all the bright financial analysts, prognosticators out there, you're one of the few that has really integrated energy and how the biophysical balance sheet as it were relates and influences the financial situation of the world, so I'm keen to get to your thoughts on some of that. Maybe we'll just start there. You've always been in finance. When did you start to realize that energy and its role in our productivity and supporting society in the future would be important to your story?

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Lyn Alden (00:02:45):

I would say it largely came before that. Before I went into finance, I worked in electrical engineering. My background is in electrical engineering, and so I kind of have that strong physics background, the mathematical background, and so I kind of inherently think in terms of energy, matter, and the components there that are in finance often abstracted away. It's kind of like assume infinite energy, here's this problem, or assume away these kind of real world frictions and what does the world look like. Whereas especially as kind of an engineer, I like to take those frictions back in and say, "No, given these constraints, it's a different analysis than what you see in kind of pure economics."

(00:03:34):

I've always been interested in that kind of intersection between tech and finance. That's kind of where my background blends together. So just that focus on ... while most analysts are looking in one direction, while they're all kind of focused on one thing, I try to use the skills or the background, I have to bring a couple of things together. For me that is the technology of money. It's the importance of energy in the system rather than just what are equity markets doing? What are bond markets doing? Some of these more kind of surface level financial stuff, which the complication there especially, they're so deep that you can go on those things and that's where most financial people do. They'll focus deeply on market structure. They'll focus deeply on fund flows. They'll pick their niche because there's so many deep niches you can go down and it just so happens that my niche instead tends to take the broader components and pull them back into finance, go back to the energy, go back to the technology and try to pull those things back in and find that intersection in finance.

Nate Hagens (00:04:42):

I totally agree with that and I agree with your assessment of the general financial industry. Is that changing at all? Are people starting to understand the ecology and energy minerals materials are more important than they once thought, or is it still kind of a fringe group of people looking at it that way?

Lyn Alden (00:05:04):

I view that as still fairly fringe. I mean, you'll just kind of see it on graphs. They'll say, "Hey, here's our expected copper consumption. Here's our expected copper production."

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There's a gap", and it's like a footnote in a report or just a highlight and people go back to whatever 50 times earnings stock that they're focused on. Generally awareness of that tends to be more minimal, which I guess makes sense given the incentive structure because it's inherently rather short term focused and short terms can even go out to say five years. In the majority of the time, we're in a period where commodities are relatively abundant and then there are decades, maybe two decades, of commodity abundance and then one decade of commodity scarcity in a CapEx cycle, and then another two decades of commodity abundance. That's kind of the pattern we've been on. As long as you're in one of those decades, it tends to be forgotten. For example, in the 1970s and the 2000s that was at the forefront, but in the '80s, the '90s, the 2010s, so far in the 2020s, at least somewhat, that's been less at the forefront. Obviously certain recent events, energy disruptions for Europe and things like that have somewhat brought into the forefront, but I think that until it's in a more sustained context, it's harder for people to internalize. It's very easy for people to say, "Well, that was a one-time thing, that was transitory, that was the shock. It's not a more structural thing." I generally still hold the view that it's a fairly small component. Over the past decade or so with the rising ESG movement, even then it was just quantified as a number. It was like a scorecard. It was like how to have the appearance of being green versus the actual underlying reality of being green? It's like how can we quantify this, how can we market this more so than how can we understand this or how can we actually do things in something that actually is more sustainable?

(00:07:03):

An example is just focusing entirely on one number. Like carbon, for example. How can we reduce this number or at least get this number off of our balance sheet, on someone else's balance sheet where it's not our problem versus soil quality, water quality, air quality, other types of different metrics. It's more about that gamification, that financialization and just kind of trying to put things into one or two numbers and then put that onto someone else's balance sheet. So no, I don't think it's been internalized yet by most participants.

Nate Hagens (00:07:37):

I agree with that. I don't know how much you know about my work and my podcast, but I agree with you. I'm looking at how the system works together and it's not just

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carbon and it's not just interest rates and it's not just inequality or energy or oil. It's how everything fits together. I think the market is both a narrow view versus a wide view and a short term view versus a long term view. With your couple decades and one decade, I would say we've just had two centuries of relative commodity abundance and cheapness, and we're headed into a century that the opposite is going to be generally the case. That's the story that I'm trying to unpack here.

(00:08:25):

This is not a financial podcast, but I have had Jeremy Grantham and Kirill Sokolov and Luke Gromen on because I firmly believe that sustainability and climate and what's happening in geopolitics and all those other things, we have this giant financial speed bump looming in the coming decade or so with the amount of debt that we've amassed. Debt is a claim on future money and money is a claim on energy and resources, and how the hell are we going to pay all that back? I don't think enough people in the environmental, sustainability, social justice space are looking at that roadblock in the future. I'm sure we're going to talk about that. Do you have any response to that?

Lyn Alden (00:09:26):

Yeah, I think there's often very different silos. On one hand you'll get a group like Just Stop Oil, and they're often very disconnected from what that means on society. You'll see people, their clothes are made out of oil, the paint they're using is made out of oil the transportation they use to get there is made out of oil, and they're doing some sort of protest, about "Just stop oil, just stop doing this", and they don't actually realize that that means an entirely different life cycle. It's very hard to support this many people. It's very hard to support anything like the current living conditions, let alone the people that are in developing countries that want to fully develop, that they want to reach a general level of, say, energy consumption or just master of their environment that is more prevalent in wealthy countries.

(00:10:14):

On the other hand, there's kind of just kind of status quo, like you said. Basically assume that the current thing just continues structurally and that it's not an issue and that it's not something to focus on. So I generally think that there's just so many silos out there, and I don't really take that into account together. A chart that I posted a while back, a lot of people I'm sure with this podcast are familiar with the long-term

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chart of global energy consumption where it's this big exponential thing and you can layer it to see all the different types of energy that went into it, so it's biomass and oil and natural gas and nuclear and renewables at the top, and I just put a little marker there that showed when my father was born, because my father was in his early 50s when I was born. He is a fairly older father and he's actually in the ...

(00:11:07):

The amount of progress we made just in his lifetime or the amount of things that have changed in his lifetime are huge, and yet you have this big exponential curve and this little marker that's actually kind of closer to the beginning of it and it's like that's literally when my dad was born. It's not that long ago is the point I was making, which is that in one or two human lifetimes, 200 years is two long human lifetimes, and our entire world has dramatically changed and the trajectory of that is, I think, something a lot of people take for granted. They don't realize how much of their current life cycle or their current life details are heavily based on the amount of energy they consume and the things that have only really materialized in the past maybe 50 years, 100 years, 200 years, depending on which thing you're focusing on, and it's actually a fairly recent and fairly fragile phenomenon.

Nate Hagens (00:12:07):

Well, we're drawing down the principle and our stories about it treat it as if it were interest, and we think somehow this will always be here. Let me give you the mic to fully unpack your current thesis. You recently wrote a book called Broken Money. Maybe you can give a short summary of that along with just expand on your current worldview in several minutes. The state of the world, according to Lyn, February 24.

Lyn Alden (00:12:41):

Sure. Broken Money, and a lot of the work I do is focused on the financial side, even though, like we mentioned, it ties into energy, it ties into other areas that are of interest. But basically kind of the main description of Broken Money is that it looks at money through the lens of technology. A lot of monetary history books focus on money through the lens of politics. What did this political leader do? Why did he do it? How did it affect this other nation? How did it affect this? What were all these kinds of decisions involved at the time? Whereas I look at it more from the lens of technology, and the reason is political things, political decisions affect things locally and

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temporarily. For example, a political leader can influence the direction of one country in a different direction than another country, whereas technological changes affect things globally and semi-permanently, at least as long as we have civilization.

(00:13:35):

For example, if you invent refrigeration, that transcends the local environment and it transcends time. As long as we maintain that status, refrigeration spreads everywhere, and that's different than a political decision that can come and go and weave around. I view money in that lens, which is how did different technological advancements permanently change how we interact with money or what we use as money and how did it change incentive structures? Some of those bring back some of those political decisions into it. How did technology change what decision points were even possible or how did they change what is likely to happen? That was kind of a key focus on the book and the short summary of it is that for the past several centuries, almost every friction in money was solved by centralization.

(00:14:34):

Moving gold around, for example, it's costly, it's slow, verifying it is expensive and challenging, and so instead you say, "Okay, that's a friction", and you rely on some sort of third party to basically hold the gold and it's easier to trade claims on that gold. But of course, you have to rely on that trusted third party and when trusted third parties failed in various regions or they got identified and connected together, we'd build a layer below them. So even other third parties, when they want to move gold around or move gold ownership around, they would have accounts at an even bigger third party and say, "Okay, well, our client wants to move gold, so they're shuffling our accounts around and we're telling you to shuffle your accounts around and you move this over time."

(00:15:25):

My favorite source in the book was *Money and the Mechanism of Exchange*. It's a book from 1875 that I cited in my recent book by William Stanley Jevons and he talked about the state of the financial system back then. About 150 years ago, he was talking about the financial system, and in some ways it was kind of like my book, but the 150-year-old version of it, which was he's exploring the technology of money in 1875, and he's talking about how all these paper instruments and the introduction of the telegraph, for example, the Cross Atlantic Telegraph cable was finished in 1866, and even though it was invented in the 1830s, it took decades to actually be placed across

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continents and across the oceans. It took until the early 19th century to go across the Pacific and kind of connect the rest of the world. But he was exploring how we have this system where information can now move super quickly and the underlying assets rarely ever have to move.

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This is where it's, I think, relevant for this kind of current discussion. On one hand, he's saying, "Look how efficient this is. This is so beautifully efficient that the gold rarely ever has to move, and all these claims can just trade on top of it." On the other hand, he's like, "Because it's so efficient, it's become levered 20 to one, and should 5% of people ever show up and want their gold back, the system doesn't have it. It's basically a giant game of musical chairs that can never stop." What we know from history, of course, is it did stop in World War I and all the gold pegs broke and all the inflation emerged, and that kind of system had to completely change again.

Nate Hagens (00:17:11):

Then it kind of stopped again 15 years later, right?

Lyn Alden (00:17:14):

Yeah. It never really even got completely fixed during that part and then it kind of got entirely reconstructed. It just shows that relying on centralization works until it doesn't. It was fascinating reading his descriptions back then, having the benefit of seeing what happened in the decades and centuries that came after that. One of the things that Broken Money explores is that even after that time, almost every friction in money was solved by greater and greater centralization and greater and greater detachment from what's happening at the underlying physical layer of things, and that in recent years, there's some degree of momentum to kind of shift that back to varying degrees.

(00:17:58):

For example, Bitcoin is something I explore that can, for example, allow transfers of value and have an underlying ledger that is not centrally controlled, that you have kind of a peer-to-peer updated ledger that's backed by energy in a way that has kind of rules-based scarcity or rules-based transactions associated with it. There's other things as well. For example, there's decentralized communication protocols. We've had kind of periods of greater and greater communication centralization, and now some of

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that can potentially be changed back and pushed in the other direction. A lot of what Broken Money focuses on is how technology over time created this really big gap between transaction speeds and settlement speeds, so anything that involved information could be greatly accelerated.

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Prior to the telegraph, even if you were transmitting just information or transactions to someone, it couldn't realistically go faster than foot, horses and ships, for example. Even if you were just updating a ledger, the ledger itself had to move to some other location in order to make that possible. Ever since we entered the telecom era, we've been in this period where transactions are way faster than settlements, and we've always used centralization for that gap, but now there's technology to make that less needed.

Nate Hagens (00:19:25):

Is Jevons paradox ultimately a monetary observation, a monetary phenomenon? I mean, I've always thought about it from the concept of the steam engine, "Oh my gosh, we're going to get more efficient, so we won't need as much coal", but actually we need a lot more coal because we scaled steam engines. But from a monetary technology perspective, if we were improving the efficiency of the monetary system, it meant that that would expand commerce around the world and have those claims on reality move faster and faster in the system?

Lyn Alden (00:19:59):

Yeah, Jevons had a number of different areas of focus, and so Jevons Paradox didn't come from this particular work, but obviously ties in in a certain way. It's the idea that when something becomes way more efficient, we end up using a lot more of it. So instead of our needs reducing to that, we fill the gap. A really good example I think is things like data storage, for example. When we reduce the cost of a megabyte of storage, instead of spending way less on storage, we instead use way, way more storage. We use thousands and millions and more megabytes. That's a general thing we've seen with energy. It's a general thing we've seen with computing.

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Even in blockchains, for example, obviously there's a very tight constraints associated with those systems, and generally the use case of it will fill whatever is presented,

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whatever is possible to fill, it finds a way to be filled because that's historically what we do. In fiat currency terms, it's another way of saying that any system that can be abused will be abused. For example, if a ledger is very flexible, over time it's very likely that the full flexibility of that ledger will be used. If, for example, it's a debase-able ledger, it almost certainly will be debased because it's possible to be debased. A lot of these things end up kind of tying together in that way.

Nate Hagens (00:21:31):

So how broken is our money system?

Lyn Alden (00:21:38):

I kind of separate that into two different areas. There's kind of the developed market answer and the developing market area. In developing markets, it's been acutely broken for a long period of time. The way to think about that is that there's 160 different currencies, roughly speaking, and each one is basically a currency monopoly, and they use a centralized ledger. If you happen to be born in one of these countries, which is where the majority of people are, your wages and your savings get devalued at a very rapid pace and you have a lot of frictions in terms of connecting with the rest of the world. For example, there's roughly 40 currencies in Africa, roughly 30 currencies in Latin America.

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We can imagine in the United States, if we had a currency for every state, all of the frictions that we'd have. Then further imagine not just in terms of payment frictions, but if you had a business in New Jersey and you took out debt in New York dollars and your cash flows are denominated in New Jersey and Pennsylvania dollars, and then there's some sort of exchange rates shift, now you have to take that all into account. You have all these additional overhead to worry about in your business because you're navigating all these different currencies. That's what a lot of businesses have to do globally and then those consumers in those countries have to deal with the fact that their local ledger's constantly getting debased.

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For example, I go to Egypt every year, and my family and friends there are dealing with the Egyptian pound and the debasement that it goes through. Every year, roughly speaking, the money supply grows by 20%, which means that everybody's kind

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of on a very fast treadmill to try to get 20% wage increases, how to not get your Egyptian pound savings devalued by 20%.

Nate Hagens (00:23:32):

In countries like that, does that result in a higher consumption profile of when you make money, you spend it right away on things as opposed to saving?

Lyn Alden (00:23:43):

Pretty much. It results in one is higher consumption, but two, it also results in kind of malinvestment of where you store your savings. For a lot of these types of countries, their equity markets are not as attractive as, say, US equity markets and so real estate tends to be the place that they store value. Of course, the risk in that is that you can over build real estate, you can build ghost cities, you can build tons of empty capacity. You're using resources mainly for the idea of saving because you associate real estate with saving, but then you think, "Okay, if I want to have a little bit of excess savings, if I have my own real estate needs met, and I don't particularly trust the stock market in my country for fairly good reasons, what else can I do if I want to save a little bit more?" It might be get a second property.

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If everybody does that, or if a big percentage of people do that, you end up with overbuilding empty properties or building too quickly and then having them sit idle for a long time until the population expands into them, and it's not the most efficient use of resources. China went through a similar thing, which is that there's a lot of interest in having second, third, fourth condos, for example, as a method of savings, especially with debt attached to it, and then you get a property bubble, you get high valuations, you get a lot of debt attached to that and some of that is largely because of people don't want to store in the currency. They want to store in something else. In Egypt you'll tend to see a lot of these empty properties because that's what people are using as their savings vehicle.

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You also see there'll be black markets in dollars, there will be gold, interest in gold and jewelry and things like that. It either comes in the form of not saving for the future and consuming or saving things that are maybe not the most optimal thing to save in, and that they actually have kind of a negative externality by people saving in them.

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Then the second part of the question is when we look at developed countries, I would say the problem is it's less acute than we see in developing countries, but it's kind of the same thing, and just the magnitude's turned down. For example, in the United States, our currency is debasing, but obviously not as quickly as you're seeing in other countries. And so, people are doing a similar thing. They're monetizing the S&P 500, they're monetizing real estate to varying degrees. They say, "I don't want to store too many dollars, I don't want to store it in these other things." But that does have some negative externalities to it.

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So, for example, if everybody stores their value in large cap stocks, those stocks get a monetization premium and then they can go out and issue more shares and they can go out and buy smaller companies or displace smaller companies, for example.

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Or for example, if we bid up the price of real estate and we buy second and third homes, it makes the cost of affording a home more challenging for someone who just wants the home for their shelter, that they actually want it for its utility purpose.

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And so, monetizing things of utility tends to have those negative consequences and that the main difference between developing countries and developed countries is mostly about the magnitude or kind of the obviousness and the acuteness of the problem.

Nate Hagens (00:27:02):

And a little bit, I think is the wealth and income inequality aspect as well. I think it was one of your charts I saw that the top 1% of wealth owners in the stock market owned over 50% of the stock market wealth, and the top 10% own 90%. So, if the Federal Reserve in our system is going to maximize stock market valuations, most of the population doesn't participate in that. And I don't know how that maps to Egypt or China or other places, but that is also an externality of how our system, our money system is 'broken'.

Lyn Alden (00:27:47):

Yeah, it's a really good point, and one of the ways I phrase it is that the current incentive structure basically makes people play a game of blackjack with the system,

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which is that in blackjack you want to get up to 21, but you don't want to go over. And in the current fiat system, there is a strong incentive to take on leverage, but not so much that you go over, that you blow up in a recession. So, kind of, the incentive structure is get close to source of money creation, take out leverage at low interest rates, short the currency, and buy scarcer assets with it. And then, what complicates it is it's a global game. So again, 160 different currencies.

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And so, if you're kind of near the source or near the top of the system, you have all these different levers you can pull. You can short this currency over here and buy real assets over there. And there's a lot of value to be gained from that arbitrage, which is for the most part, not really adding value, but it's kind of siphoning value off the top.

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And on the other hand, if you're farther from the source of money creation, if you're lower in that kind of money pyramid, and you're primarily trying to work for a living, you're saving in the currency that other people are shorting, and you're earning your wages in currency that other people are shorting.

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Even in a hard money system, obviously larger and safer entities are going to have lower costs of debt, and that's a strategic advantage. But the current system really amplifies that gap because one of the key sources of wealth creation has basically been to short fiat currencies in various ways and buy scarcer assets with them.

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Even the entire multi-decade private equity industry is larger, more connected entities with lower cost of financing being able to go out and accumulate and restructure smaller businesses. And so, I think that what this system does is kind of this global arbitrage just increases that gap because there's so much of it that is the financial side more so than just the real asset side.

Nate Hagens (00:29:56):

So, let's get into energy a bit. How do you think the global oil production decline rates and what's coming in coming decades will affect the leverage and the financial story that you just unpacked? In other words, how are the price of money and the price of energy linked in a leveraged fiat system?

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Lyn Alden (00:30:23):

So, partially where they're linked is that the money system itself is this structurally inflationary system. So, the number of money units keeps going up, the number of debt units keeps going up. And by its design it almost has to, that's kind of the structure of the system. It has those-

Nate Hagens (00:30:39):

For the last 50 years or so, right?

Lyn Alden (00:30:40):

Yeah.

Nate Hagens (00:30:40):

Before the 1960s, I think it was a coin flip whether it would go up or down. But since then, yes, every single year.

Lyn Alden (00:30:47):

Yeah, the way it's been structured. So, that obviously conflicts with a more finite resource base. And the way that shows up is that if you look at, say for example, annual money supply growth in the United States is something like 7% per year on average. Obviously, it was higher during the pandemic years. Lately, it's been in a period of contraction. But over a multi-decade period, going back to the 1960s, it's averaged about 7%.

Nate Hagens (00:31:16):

Is that just physical bills or is that the broader metrics?

Lyn Alden (00:31:21):

It's broad money supply. Our bank accounts, our physical bills, all the things that we count as money. That general number is going up by about 7% a year. In developing countries, it'll be generally higher. So, it'll be 10, 15, 20%, sometimes more depending on the country. And so, that's this structurally inflationary backdrop, but then it's partially offset by technological and energy deflation to varying degrees.

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So, for example, it's way easier to manufacture a computer of a certain set of specifications now than it was 5, 10, 20 years ago. And so, we've gotten better at manufacturing, plastic toys, anything that's industrialized, anything electronic based.

Nate Hagens (00:32:11):

But that deflationary pulse due to technology happened while energy and resource total availability was still increasing, and that may have an inflection point coming to a country near you soon.

Lyn Alden (00:32:28):

That's what I was going to tie it into. So basically, we've had this kind of multi-decade period where inflationary money supply mostly offset by deflationary technology gains, energy abundance, things like that.

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So for example, if you have money supply going up by 7% a year, let's say per capita money supply going up by 5% a year or 6% a year, but then you're getting 3 or 4% more productive every year, you're getting more energy, and you're also using that energy in more productive ways. Like a processor, for example, does more calculations per unit of energy than it did two years ago. That combination of more energy and then more energy productivity has been offsetting at least most of that inflationary pulse.

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And where energy ties into it is if we do get to a point where our energy growth slows down and/or reverses, or the other component, if we stop getting more productive with the energy, or our rate of energy productivity decreases, then we no longer have that offset.

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I think somewhat of a comparison is for the past 40 years in the United States, we had a rising debt as a percentage of GDP, but it was offset by 40 years of falling interest rates. And so, interest expense was not really a problem for 40 years. But what we're finding out in recent years is after you get down to zero rates, you start going sideways to up in terms of interest rates, and you still have that very high and

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climbing debt load, then suddenly you no longer have that offset, and interest expense is actually more of a problem.

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And so, if you carry that analogy over to what we just talked about, if you don't get these offsets that we've been getting for all this kind of ongoing money supply growth, debt growth, kind of just growth and paper assets in general, that's when you get more quality of life problems, more inflation problems, more problems with the way the system's design, and the assumptions that go into the design of that system.

Nate Hagens (00:34:30):

I'm going to get back to that, but let me timestamp this right now before I ask you the next question. It is 2:40 P.M. Central on Wednesday, February 21st. Around 20 minutes from now, NVIDIA is going to announce their quarterly earnings. As of right now, before that announcement, and you and I don't know what that's going to be, the value of NVIDIA, the corporation, is greater than the entire energy sector of the S&P 500. Can you opine on that for a second?

Lyn Alden (00:35:06):

So, I currently view the energy sector as undervalued. I think people fail to appreciate how critical that is. Even those processors obviously use a lot of energy, and they're going to use a lot more energy in the future. So, NVIDIA's future growth, the ability to grow into that valuation, that's premised on the idea that their revenues and their earnings are going to keep going up in the future. And all of that is ultimately energy-based.

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And so, one thing we've generally seen in history in the markets is that they go through these kind of disinflationary cycles and inflationary cycles.

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So, in disinflationary cycles, energy is fairly abundant, materials are fairly abundant. And so, as money supply grows, a lot of that value goes into financial assets. And so, the valuations get pumped pretty high and the cost of capital is fairly low. And then, what generally happens is our demand keeps going up, because prices are low, there's not a lot of new supply coming online. And eventually, we actually start to get pretty

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scarce in those raw materials. And then, we go through a decade or so of more scarcity, higher prices, that then facilitates a CapEx cycle. And then, all those valuations end up being overdone.

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So for example, in the 1960s, you had the Nifty Fifty, kind of these overvalued blue chip growth stocks, and they were doing very well fundamentally. They were the Disneys, they were the Coca-Colas, they were Xeroxes, they were these big growth industries that had great fundamentals, but they got bid up to 30, 40, 50, 60 times earnings. And then, when the United States and the rest of the world went into energy-material shortages in the '70s, obviously all these valuations were pressured, even as their fundamentals continued to do pretty well.

(00:36:51):

And then, we went through a period where all the energy names did well, the commodity names did well, these kind of more real assets, until we had sufficient CapEx oversupply, demand destruction from high prices in certain parts of the world. And then, we kind of entered this period again of inflating another disinflationary bubble. That went all the way up to the dot-com bubble. So, oil was cheap, commodities were cheap, all these things were kind of left for dead. Everybody was focused on dot-com names, and that of course unraveled.

(00:37:23):

And then, the decade after that, the 2000s, looked a lot like the '70s in the sense that material costs were going up. Oil went from \$20-something a barrel to \$140 a barrel. It kind of pressured all the valuations that were kind of bid up in the prior time.

(00:37:39):

And so, I think that we risk going through a similar thing, which is that we're very bid up in terms of technology valuations, which is not to say that some of the fundamentals won't continue to be good for another 10 plus years or so, but that the multiples we're placing on them are kind of assuming that energy is not a problem, that raw materials are not a problem, and should those become a problem, I think you have a very significant overweight. There's a lot of claims for the energy that actually exists.

Nate Hagens (00:38:08):

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Energy-materials not being a problem, also ecology not being a problem, geopolitics not being a problem. There's a lot of not being a problems priced into those valuations, because it's siloed, matching the past, and projecting it forward into the future by a lot of people by my analysis. So, let me move on to this topic. There's so many topics I want to ask you. Jeremy Grantham, I have a lot of respect for him because he's devoting a lot of his time and energy towards solving some of the environmental problems we face. He said something on my podcast that I pushed him on and he didn't respond. He doesn't seem to think that debt is a problem, and I know others share that belief. There's a lot of people that follow modern monetary theory, where actually think is a good description of how money comes into existence and why a sovereign nation won't go bankrupt as long as it can produce its own debt, except all of this debt actually is relative to a same biophysical energy, materials, and things. So, how big of a problem is debt? And just to add one more factoid, U.S. government debt, which gets a lot of focus on, is 34 trillion odd. But standardly, Druckenmiller recently pointed out that our total unfunded liabilities on Social Security, Medicare, these softer claims are upwards of 200 trillion. And even at 34 trillion, that's 100,000 per man, woman, and child in the U.S. So, how big a problem is debt from a energy-material perspective that you were just expanding on?

Lyn Alden (00:40:09):

So, I view this as a significant problem, and I think that a lot of people kind of took the wrong lessons from the last few decades. So, back in the late 1980s is when the famous debt clock went up. And then, in the early 1990s, Ross Perot ran the most successful independent presidential campaign in modern history, and it was based on the debt deficit. That was kind of the peak zeitgeist for especially the public debt being a problem.

Nate Hagens (00:40:37):

I think most people that would remember that are like, "Wow, it wasn't a problem. Look at how many cans we've kicked since then."

Lyn Alden (00:40:44):

Exactly. That's the point I was going to make, which is that a lot of that ended up being early, because what they did not necessarily see is the level of disinflationary offsets we'd have over the next 30 years.

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(00:40:56):

So for example, China opened up to the world, so you had Eastern labor connect with Western capital, and that enhances productivity. Then you had the fall of the Soviet Union, you had basically all those resources come to connect to Europe and connect to the rest of the world. And all these silos opened up. That was a very disinflationary kind of structural period.

(00:41:17):

And so, we had this rising debt, rising money supply, but a lot of these offsets. And also technology, automation, internet, things that just add a lot of productivity to our lives. So, both the physical reality and then the digital realities basically gave us 40 years of falling interest rates, which offset the rising debt to GDP.

(00:41:39):

And so, that ended up being early. And the lesson that I think a lot of people took from that was, "Debt doesn't matter. Look at all these people that were talking about the debt 30 years ago and nothing bad happened and they were just kind of crying wolf." And I think the problem is that the thing we should have taken away is that basically we underestimated how many offsets there are or what would happen over a given 30-year period. But it doesn't mean you can extrapolate that necessarily indefinitely in the future.

(00:42:09):

Now, there's debates around how far you could extrapolate that, so what is going to be the ecological and technological offsets of the next 10, 20 years, that's certainly debatable. But the longer you go out, you start running into certain limits.

(00:42:25):

And I think the most tangible example is just that the rising debt we've had has been offset by 40 years of falling interest rates. That's kind of the mathematical way to express it. And now, we're no longer in that period, and that's because we've entered some real world frictions. Our global supply chains are disrupted for any number of reasons. First was the pandemic and now it's war, and it's multiple reasons kind of coming together. Should we get energy supply disruptions, that would be yet another input into that. Should we get copper or other raw material disruptions, that's another factor that goes into it.

(00:43:00):

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And so, we no longer have that kind of accelerated period of globalization and kind of untapped capital that we're able to pull in. All of the people that were in China and in the Soviet Union for a period of time were basically human capital that was not being utilized anywhere near their full potential. And so, that was pent-up. And so, 30 years of that was able to kind of connect to the rest of the world, offset a lot of the debt. And I think it's the wrong assumption to say that the next 30 years are going to be like that.

(00:43:34):

We might still have obviously some offsets, AI and technology, but I don't think that the energy or the human aspect, I don't think we have a lot of those offsets going forward. And so, I think that, kind of like how people in the late '80s or early '90s were making wrong assumptions about the future, I think the pendulum has swung so far to the other direction that now people are saying, "Oh, it's not going to matter anytime soon, or maybe it's not going to matter at all." And I think that when we look back 30 years in the future, that's going to be the opinion that we kind of say, "Why did it matter?" Or, "What assumptions were they not having that they maybe should have had?" And so, I think a lot of people took the wrong lesson from the last 30 years.

Nate Hagens (00:44:20):

I agree with that. How do you think modern currencies are going to hold up in a, "We can print money, but we can't print energy or copper," era coming our way. Can the dollar maintain a global reserve currency status, and for how long? And if it doesn't, what comes after? What are your thoughts on that?

Lyn Alden (00:44:42):

So, I think we've seen a lot of emerging market currencies, because they have limited outside demand and they often have to finance themselves with other currencies like dollars or euros. When they can't print their liabilities, they face the real prospect of problems.

(00:44:59):

And the United States' currency, and to some extent other major currencies are kind of based on the premise of that the status quo is going to continue. So, in the 1970s when the United States went off the gold standard, there was... People that study that period or people that invested or lived through that period, in my case, it's obviously

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studying it from after the fact, but there was a really real concern that this was not going to work. But then, after they stabilized things, and we kind of went through 40 years, we've been in this period where fiat currencies, at least the big ones work because of all these offsets, all of these kind of major structural offsets that we have. And I think that if we do enter a multi-decade period where those offsets are less, or even worse case scenario, reversed, if instead of... You can kind of characterize it, "Do those offsets continue to slow down or reverse?" And that's what I think is-

Nate Hagens (00:46:01):

When you say offsets, is that akin to saying productivity improvements?

Lyn Alden (00:46:06):

Yes. Basically, that either you have more raw materials to work with, and/or you have the additional layer of you're able to put those to more productive use.

(00:46:17):

So for example, you have a computer that does 1,000 times as many calculations for the same amount of energy that a computer did several generations prior. Or you've made a refrigerator that can cool things for half the energy that it did 10 years ago, for example. All those different rates of productivity, some things we can make marginal improvements on. Other things, like electronics, we've made major improvements on. And in addition, we've increased the overall base amount, how much oil we pull out of the ground in a given year compared to 50 years ago.

(00:46:52):

So, fiat currencies are kind of based on the idea that both of those variables are going to keep going up indefinitely. And the problem I think is, one, we start to enter problems when that rate just slows down. Maybe it's still going up, but it's not going up at the rate that it used to. So, the offsets are shrinking. And then, two, of course, it would be more severe should one or both of those things reverse, if we no longer get more raw materials from a finite planet, or that the rate of productivity growth on those slows down in some way.

(00:47:27):

And one thing from an engineering perspective people kind of take for granted is they assume that technology is kind of linear, or at least that it's smooth, that every

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year kind of makes marginal improvements. Whereas technology in any one area tends to be more bumpy.

(00:47:44):

So, an example of that is for thousands of years humans wanted to fly. They made basically zero progress on doing that. Then they made some significant progress with hot air balloons and Zeppelins and things like that. But it really wasn't until you combined hydrocarbons and aluminum, and then you go from Wright brothers to people on the moon in one human lifetime.

(00:48:06):

But then, we kind of hit some slowdown, so that the amount of aerospace improvements in the past 50 years have been a lot smaller. In some cases, we've even gone back from what we were capable of doing 50 years ago, because technology is not this smooth thing. We can run into really, really hard limits, that the amount of energy or the amount of ingenuity to overcome them is so immense that we get stuck for a period of time.

(00:48:32):

And people, they've seen the past 50 years of electronics growth and other types of productivity growth, and they just extrapolate that for another 10, 20, 30, 50, 100, 200 years. Whereas in reality, we can hit certain slowdowns or certain ceilings, where either the raw materials themselves are the issue or the productivity growth hits one of those heterogeneous periods where we've kind of hit some limit and we either stall for a period of time until we unlock something else or unlock some other area, or we lack those offsets.

Nate Hagens (00:49:07):

And my concern for quite a while now, at least 15 years or around 15 years, is if we didn't have leverage and debt in the system, once we run into that wall that doesn't have any more offsets, as you say, then there would be a decline, a gradual decline in the physical size and complexity and scale of the economy.

(00:49:33):

However, every time in the last 20, 30 years that we run into an economic difficulty and there's a shortage, or price problems, or a recession, we want to bail people out because of the metabolism and the momentum of the system. And we do that by

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printing money or adding debt to the system. And so, the amount of leverage built into the system makes me fear a Wile E. Coyote sort of event when this biophysical phase shift rears its head.

(00:50:08):

So, let me get into a theme that you've been writing about for a while, and that is fiscal dominance. And it seems inevitable to me that we are going to have to borrow more and more money rather than tighten our belt and face austerity, and that seems a little bit endgame-ish to me in this financial regime. Could you define fiscal dominance and explain why it's important, and your views on it in the coming decade or so?

Lyn Alden (00:50:39):

So, fiscal dominance is basically a description of where the central banks' tools for controlling inflation are less effective because of what the fiscal authority's doing. So, if we think about what a central bank's primary tools are, it's interest rates and balance sheet size. And mostly what they're trying to do is encourage or discourage bank lending. Because in many decades, most new money supply growth, broad money supply growth is from bank lending.

(00:51:07):

So for example, the 1970s, we had higher average inflation. And that was in large part because we had higher than average credit creation, because we had the baby boomers beginning to enter their home buying years. So, the early baby boomers were born in the late 1940s, and by the early '70s they were entering their home buying years, their household formation years, as you had expanded credit usage at the same time as you had... Actually to the energy point, you had 100 years of conventional U.S. oil production that was going constantly up, start to flat line and then go down. So, we had a real world constraint combined with that credit creation.

(00:51:47):

And going back to this point, the Federal Reserve's main tools are about basically trying to slow down credit creation if inflation is too high. Or if they perceive a deflationary collapse of the system. Then they instead say, "Okay, how can we encourage lending to stop contracting and to start re-accelerating again?" So this idea, we'll cut interest rates. We'll do QE and things like that. The problem is that if you're in an environment where bank lending is the much smaller factor at money

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supply growth, and instead it's largely fiscal deficits that are determining the source of money and spending in the economy, then those monetary tools become less effective. So for example, the most extreme one is the 1940s. So you obviously had very high money supply growth, very high inflation, and that was not because banks were lending much. In fact, bank lending was very muted. It's because of World War II. It's because of all these monetized fiscal deficits going to fight the war, going towards industrial policy. When the GIs got home, you put them all through college or technical school and finance, all that kind of stuff, so a lot of it's domestic spending as well.

(00:53:01):

And that's just overriding pretty much whatever banks are doing. And so the Federal Reserve's tools for modulating the rate of bank lending are fairly irrelevant in that fiscally dominant environment. And so we're seeing a similar phenomenon in the 2020s, which is the deficits are so large, the fiscal deficits are so large, that they're a structurally larger impact on the economy, a more stimulatory and inflationary force than bank lending itself. And the Federal Reserve's tool is somewhat mixed there, because in the 1970s, public debt as a percentage of GDP was 30% or so, and most of the money supply growth was coming from bank lending. So if you raise rates super high, although on one hand you do make the fiscal deficit worse because you're paying more interest on your debt, the negative impact you do on bank lending is bigger, so you're slowing down bank lending at a faster rate than you're increasing fiscal deficits, and therefore tends to be a recessionary disinflationary force, which is what Paul Volcker and others intended.

(00:54:06):

But if you fast-forward to the current time and you have say 120% or more than the GDP and slower bank lending, if you raise rates to try to combat that inflation, it ends up being somewhat less effective because although on one hand you do slow down the rate of bank lending, the amount you increase the fiscal deficit through interest expense is physically larger. And so the Federal Reserve's tools become far more mixed or insufficient or sometimes even pro-inflationary and backfire to some degree. And that's how you describe fiscal dominance, which is that the Federal Reserve's tools don't necessarily do much or sometimes can exacerbate what's happening from the fiscal side, which is not at the Federal Reserve's control and not at the bank lending's control and not really at the public's control.

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Nate Hagens (00:54:59):

So could I summarize that and describe it a little bit differently as as we approach this biophysical point of reckoning, the Federal Reserve and other central banks are less and less relevant?

Lyn Alden (00:55:16):

So I think that there's overlapping themes there because, for example, when they went through it in the forties, it wasn't because the biophysical reality was met yet. It was largely that monetary and fiscal and debt phenomenon. If you go through that environment while you also run into biophysical realities, that'd be a very different environment. It'd arguably be a worse environment to go through because the way that they got out of that prior time was through that fairly young population and the fact that they still had a lot of runway left in terms of, say, energy extraction, energy usage, technological growth. And should you try to get out of a similar fiscal dominance, but you don't have a lot of the capability either because your human capital is different, so you have a much higher ratio of retirees to young people or working people.

(00:56:08):

Or, if you run into limits of how much energy you can get out of the ground in a given year or how much copper and other raw materials you're able to produce in a given year, then you could obviously have a much harder time getting out of that type of tailspin than you would if you didn't have those issues.

Nate Hagens (00:56:26):

Tough question. From a biophysical perspective, meaning that money is a technology that greases the economy globally and allows commerce, but money is spent on things that require energy and natural resources, from that perspective, isn't the Federal Reserve itself functioning as a highly leveraged hedge fund given the amount of paid in capital they have and how much bonds they have on their balance sheet relative to the biophysical story?

Lyn Alden (00:57:06):

Essentially, yeah. And as long as you have inflating money supplies against a backdrop of scarce resources in a finite world, you have that inherent mismatch.

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Whereas if instead you had a scarcer or more rules-based money system that kind of matched the more scarce or rules-based based natural system, you probably would have more equilibrium there. One of my friends, Jeff Booth, the way he likes to describe it is, and I think others have put it in a similar way, that if you have abundance and money, you have scarcity of other things. And if you have scarcity of money, you're more likely to have abundance of other things up to a point obviously, because if you end up monetizing other things, you end up using those in a way that makes their utility value less affordable for the people.

(00:58:03):

So if our money's weak, like we talked about before, we go out and buy extra properties and leave them empty. We go monetize the S&P 500. We go and just save our value of things that are not necessarily a void of having those negative externalities. But if you had a money system that matched more of the ecological system, you could arguably have more equilibrium there.

Nate Hagens (00:58:30):

So you have a popular newsletter, provide investment advice to clients. Most people watching financial podcasts care about making money now or in the next week or quarter based on market moves. If I relieved you, Lyn, of that pressure and asked you to forecast things for the US global economy, interest rates, the whole system, for 10 years from now without the noise of the intervening years, would that be easier to do? What would you opine the world looks like in the early 2030s?

Lyn Alden (00:59:10):

So there's a lot of obviously decision points that can affect that path. We don't know what's going to happen with certain geopolitical conflicts along the way that could drastically change the end state of where those head up. But I think one of my higher-conviction views is that within the next 10 years, energy is going to be a lot more of a concern than it is now. And so that right now, we're in one of those cycles where energy seems abundant and therefore we can bid up all these other financial assets very high. But that when we fast-forward and look back at this environment, I think it's highly likely that people are going to say, "Wasn't it crazy that a couple of tech stocks were valued more than the entire energy sector?" for example, or that

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people thought that they extrapolated certain things into the future and assumed certain trends that didn't necessarily materialize.

(01:00:03):

That would be my higher conviction view, that owning those things that are inexpensive and that people take for granted that they're going to continue to be as abundant or as inexpensive or as accessible as they are now in the future, both for the US economy and then obviously a lot of these markets are globally interconnected. And so I think that's likely going to be a theme. I'd be very surprised if we make it another decade without having another need for at least a big energy CapEx cycle to sustain what we currently have.

Nate Hagens (01:00:39):

I don't have clients, but you might think that the future is my client and I'm trying to educate and inspire humans around the world to play a role in what's coming. Just taking finance and making money off the table, how can we navigate what's coming in a more benign way than the default? Because the default to me is continuing every few years' economic problems that are papered over by more and more debt at the same time that energy is depleting and becoming less available or more costly or both. And there's a real explosive potential there where society doesn't make it through that bottleneck. So how can we take this discussion in a proactive way, not to make money, but to make better decisions as a culture on what's ahead? Do you have any thoughts on that?

Lyn Alden (01:01:46):

So I think part of it, obviously it starts from what you do in your own life before it goes up to the global level. So basically, in their own lives, people can determine where they want to live in the world, where they want to have balance with the people around them, the environment around them, and to focus their energies and their attention less on consumption and more on other types of things. When I first started writing online, even though I eventually started writing more and more about investments, I would write occasionally about personal finance and a lot of it was about minimalism. A lot of it was about decluttering. A lot of it was about not trying to keep up with the Joneses, not trying to just continue the trend of more and more energy consumption.

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And I think there's a mix where some people, they look at the global energy landscape and they don't realize how even just basic things require a lot of energy.

(01:02:51):

So for example, hospitals functioning, running water, electricity. Just basic things that we take for granted that in many parts of the world, or many parts of the world even just a few decades ago, were not really present. But then they have so much energy abundance and then their happiness doesn't really increase in line with that anymore because instead it's actually going back to Jevons Paradox. They have all this extra energy and they don't really know what to do with it, so they fill it up with other things that are not necessarily increasing their happiness. So I generally find that using money and resources to solve friction points in your life that actually make yourself happier is worth pursuing, but that the consumption pattern that we're going on now is obviously not long-term sustainable.

(01:03:42):

And the smoother way to get ahead of it is to not be shocked out of it, not to be going along that the whole way until you can't, but rather ahead of time say, "Is this ideal? Is this the happiest I could be? Is this the most sustainable I could be? Or should I try to focus on things that are less materially intensive, that I can get value out of things by human connections, by other things I can do, that are less reliant on those material aspects?"

Nate Hagens (01:04:12):

Simplifying first and beating the rush. So let me ask you this. Is there a certain inevitability to what's coming financially with the fiscal dominance and the inflation and some of the things you've discussed, a path dependence of sorts? And if so, do all these podcasts, and not mine per se, but there's a ton of financial podcasts and talk shows out there, do those podcasts that highlight you and Luke and Jeff Booth and others, do they just gradually converge on this biophysical reality that is looming and make it happen faster as people understand and connect these dots? Or can discussions like these actually alter the dynamics themselves with investors, decision-makers, policy makers, so that better outcomes arrive?

Lyn Alden (01:05:06):

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I, for the most part, look at things as relatively deterministic, which is that certain technologies lead to very, very high probability of certain outcomes occurring because they change the incentive structures, but not up to the point where I think it's completely deterministic, which is to say that obviously certain impacts can change the course of things. You obviously can see in history, certain countries can have a century of misery or a century of abundance based on what people did in a certain era and human decisions that were made and who they elected as leaders and what those leaders decided to do and then how people pushed back or didn't push back on those leaders. So there are long things and major things that can happen based on human decisions and based on having these discussions and having things spread, and everybody has the tools that are available to them.

(01:06:01):

The reason I wrote a book, for example, it's not the best ROI thing that someone can do with their time if they're running a business or they're working in finance. Writing a book is not going to be something you do for the ROI. It's something you do because you don't go into that unless you feel like you can in some tiny way shift the discussion or bring things to people's awareness that they might not be aware of, or slightly tweak the probability of something happening versus another thing. So I think we have to act as though we can change certain things or that we can shift the probabilities. But that I think that people on average don't really change until they have to.

Nate Hagens (01:06:48):

I agree.

Lyn Alden (01:06:49):

But that if you can help it, it's always softer if you can change ahead of time and front run the need to change.

Nate Hagens (01:06:57):

I'm really going to put you on the spot here. This was not on the outline I sent you, but you've looked at history, you understand the importance of energy and finance and debt. If there were no risk to life or limb or status, what would you do, Lyn Alden, if you ran the Federal Reserve of the United States to not just get us through the next

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crisis but maybe lay the groundwork for something longer-lasting and sustainable? Or a subset of that question is, avoiding the next crisis, the main and continual goal these days?

Lyn Alden (01:07:34):

So I think it is like a side step to the question, but the funny thing is I don't think the Federal Reserve is anywhere near the center of things that are going to happen in the future. I think that almost regardless of what they do, because of fiscal dominance, they're going to get shunted into doing things to support the fiscal situation. So for example, if the deficits are very large and the treasury market gets illiquid, the Federal Reserve really has no mandate other than to reliquify the market and get captured by the market. So I think-

Nate Hagens (01:08:07):

So like yield curve control?

Lyn Alden (01:08:09):

Something like that. Yeah, like how a Bank of Japan doesn't have a lot of options given the fiscal and demographic situation in Japan today. Now, there are certain periods in history where that could have been different, that the Federal Reserve, say for example, had more power to prevent things from materializing. But because they have materialized the way they have, I view that ship has sailed. So I think that one thing you can do is be transparent about it and explain the problem as you see it, but I think that they're still pretending that this is totally normal. This is how it's been the past several cycles. And so I think that transparency is a key thing.

(01:08:49):

Instead, what I choose to focus on is technology and information. And so for example, if someone said, "What is one of the more impactful things people could do to improve things for the next 10, 20 years?" I think that small modular nuclear reactors, things like that, basically advancing technology in certain directions more so than other directions, that's probably a much bigger impact than anything a central bank is going to do. And that is another step along the way to then figure out what we can do. One thing I try to avoid doing is shorting human ingenuity. So on average, human ingenuity tends to surprise to the upside, that things-

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Nate Hagens (01:09:39):

While energy is growing.

Lyn Alden (01:09:41):

Exactly. While energy is growing, but that even includes our ability to get more energy. So for example, people thought that we'd run into peak energy or peak oil before we did because they underestimated our ability to extract unconventional sources. And I think a mistake that people make, like the debt thing, is they say, "Okay, well, we did that before. It means we'll be able to do that forever." And I don't take that view. I don't think that we're always going to be able to ingenuity ourselves out of a situation. But I do think that over the next couple of decades, if cards are played right, there are ways to make energy systems more sustainable, get some of these dense sources of energy and have more time to realign things to be a little bit more economically sustainable and ecologically sustainable.

Nate Hagens (01:10:34):

I have so many more questions for you and I want to be respectful of your time, but one thing I definitely want to ask you is I know that you've been bullish on a certain monetary technology, Bitcoin, and at the core of the money versus energy discussion, Bitcoin is right there. Personally, I'm quite bullish on the price of Bitcoin because of fiscal dominance, because of central banks around the world are going to print money and treasuries are going to deficit spend and people are going to want to hang on to something that holds its value. But in not too long of a time span, what is the strongest case that you can make for Bitcoin? And then could you also steel man the opposite argument while you're at it?

Lyn Alden (01:11:26):

So I think the strongest case for Bitcoin is that it's the first credible way to decentralize money. So as we talked about before, we've had centuries where almost every monetary friction was solved by another layer of centralization. And what's interesting about Bitcoin is that now we have enough bandwidth and technology where you can run a ledger in a decentralized way and back it by a credible method that's not based on human decisions, that's instead tied to distributed code and ultimately tied to energy itself. And I think that's a really valuable thing. I think that it's a tool that can pierce all those different currency monopolies that exist and give

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people optionality to opt out of whatever local currency bubble they're in and have more options to bring their wealth with them globally, transact across borders, and have tools that are against debasement.

(01:12:22):

I think that's all valuable and I think that network effects tend to accumulate. So for example, Ethernet's been around for 50 years, USB's been around for 25 years, internet protocol's been around for however many decades, and these are going very strong because once you get to a critical mass, as long as you're in a pretty well-constructed design space, it's very hard for the network effect to be disrupted. And so I generally think that Bitcoin has reached that critical mass and that it exists in a fairly narrow design space where most attempts to make it better in some aspect, more programmable, higher throughput on the base layer, for example, most things that you could do to it make it worse in some other area, and that it exists in that kind of narrow design space that it already has the leading market cap, leading liquidity.

(01:13:15):

And so given the current trends, I think that it's likely to keep doing well, and that the energy side of it is a lot more optimistic than people think because it's optimized to soak up stranded energy. So people often view any sort of energy consumption as bad in and of itself, but having a particularly flexible source of energy consumption is useful because it can soak up wasted energy. So anybody that's familiar with how we produce and transport energy, we waste a lot of the energy that we produce. And it's because energy's not globally fungible. There's a cost to transport it and there's a friction of transporting it, and having an energy source that you can turn on or turn off in response to fluctuating supply and demand and ways to use the waste heat generated by the Bitcoin miners, I think over time we're already seeing this, but it's only when we fast-forward five, 10 years. I think that if the network continues to be successful, that's going to be more and more integrated into our energy systems.

(01:14:23):

The steel man against it I would say is that at the end of the day, Bitcoin is human-written code and it's purposely designed to be simple and robust, but it's not invulnerable to bugs or hacks and things like that. And so should there be something that disrupts the core operation of the network? And there have been near misses. In 2013, there was an unintended chain split. They fixed it by rolling back to the prior client. In 2018, there was an inflation bug that was fixed by the developers before

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anyone negatively exploited it. There are some of these things that while they might not be unrecoverable, they can damage confidence in the network enough to destabilize the bootstrapping network effect over time. So I would say any sort of bug or hack is a key risk vector. Having to navigate long arc of time, maybe quantum computing, there could be certain changes that have to be made to the code, for example, that could be a very vulnerable period.

(01:15:29):

And then three, any sort of, you have to be wary of the fact that the network could be centralized in some way, either through supply chain capture with the processes themselves or with where the mining hash rate is located. If the network ever does get centralized and captured and loses that permissionless aspect to it to be able to send without any sort of centralized permission, then a lot of the value proposition is lost. So I would remind people that, just like our finance at the end of the day is tied into raw materials and the real world and real ecology, Bitcoin functionality at the end of the day is code written by humans running in a distributed network and it has to work properly in order to provide the value that it has.

(01:16:17):

So any sort of threat that either destabilizes the number of tokens in the system or destabilizes the ability to freely send those around without any sort of centralized entity permission would invalidate the prior bullish case I made that network effect's escape velocity, that technology's good, that it's solving problems. That only continues to be the case should it not be disrupted in some way.

Nate Hagens (01:16:43):

There are so many questions I have here. I may have to ask you to come back maybe with Alex Gladstein or Jeff Booth and do a roundtable on Bitcoin and sustainability in the broader picture. Two follow-ups though to what you just said. In the coming decade with yield curve control and larger government deficits and fiscal dominance, as you say, are central bank digital currencies almost a foregone conclusion that those are going to come hand in hand in that environment?

Lyn Alden (01:17:16):

I think it'll depend on the jurisdiction. So for example, I certainly think they're coming in China. They're already there in China. An interesting case study has been Nigeria in

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my opinion, because over the past three years they've gone on a bit of a journey there, which is their central bank banned banks from sending money to crypto exchanges. It's not illegal to own it because they couldn't really enforce it anyway, but they can say, "Okay, banks can't send money to known crypto entities," so all the off-ramps are now more tightly controlled. They introduced the eNaira, a central bank digital currency, and for years they had very low adoption of the eNaira. And Nigeria by most measures, like chain analysis and others, show that it had among the highest crypto adoption rates in the world, so Bitcoin, stable coins, things like that, very prevalent in the country. And specifically that their peer-to-peer trading was very high, because that's how they got around all those bank blockages. And then the central bank and the government tried to say, "Okay, we're going to reduce cash in the economy to force people into mobile payments, force people more towards the eNaira." But they did it in a clumsy way, and then there were protests against it. And then in recent months, the central bank even backpedaled, and said, "Okay, instead of outright banning funds flowing to crypto exchanges, we're going to try to regulate this more." And it's one of those things that shows that just because the government wants to introduce a CBDC, in the country, in that case, 200 million people, it's competing with all these other alternatives. They can get privately issued stable coins, they can get Bitcoin, they can get physical currency in the market, including foreign currencies like dollars.

(01:19:02):

And so, it's not a foregone conclusion that just because they want to issue one, that it will be. Obviously a region like China has more resources at their disposal to try to make that happen. They're probably going to have a longer lifetime of making that work. But I think that in a number of jurisdictions, we'll see them, it's unclear what the adoption will be. And in some countries, like the United States, there might even be intra-government or legal challenges to these things forming. So for example, the government can get sued by another entity, saying, "That's unconstitutional," for example, or, "That's not within the law," or, "That's not allowed." Or you can have a very polarized congress or a lockup between what, say, the banking sector wants, because they are large donors to a lot of politicians versus what could potentially disrupt them from the government itself.

(01:20:04):

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If things seize up, in certain jurisdictions that are very polarized, then you might not get the CBDCs or might not get as complete of a CBDC as one might expect. A lot of people think that governments are monolithic entities, but especially outside of authoritarian ones, there's different opinions within government and different ways to challenge the government. And so I really don't view CBDCs as necessarily foregone conclusions. And to the extent that they are, to the extent that they're emerging, I think it's really important to have these open source alternatives, so that people have tools to go around them, opt out of them, because any kind of tool we can picture, say in the United States or in a certain country, just picture that same tool held by someone you don't like. Maybe it's a more authoritarian country, maybe it's the political leader that you don't like. You have to picture those tools in the hands of someone that you don't agree with and see how powerful they can be.

(01:21:04):

And so, I think we have to be mindful, I think in a good way, of the limits of just because they want something, doesn't mean they get it. And two, the importance of having alternatives, so that that continues to be the case. If stable coins and Bitcoin and things like that didn't exist, then maybe in Nigeria, the eNaira would've been a complete lock. But because those other things existed and because those peer-to-peer market places existed, and because those educational resources existed, people had ways to go around it.

Nate Hagens (01:21:40):

Okay. Let me ask you this, because I've always wanted to ask someone that knew what they were talking about this question. So, I understand the reasons why Bitcoin could go up substantially. I tell my friends and my family that I think there's a 50% chance Bitcoin goes to 300,000, 400,000 and a 50% chance it goes to zero. So, it's because of what governments are likely to do that I think Bitcoin probably goes up and goes up substantially. However, if that happens, which I expect it will, won't there be an absolutely gargantuan wealth and income inequality that results from that, where most people who don't own any crypto and then there's current whales and dolphins will effectively be trillionaires or de facto in today's dollars? Is there a way to circumvent that outcome, or what do I have wrong about that prediction?

Lyn Alden (01:22:42):

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Right, so if you go up to several hundred thousand dollars per coin, say in equivalent of today's dollars, you're looking at a market capitalization, it's in the many trillions, several trillions for the asset. And if you look at, for example, the rise of big tech over the past decade or 15 years, that's a similar level of growth you've seen if you add a bunch of those trillion or 2 trillion or \$3 trillion companies together, you can quickly get the high single digit trillions just from a handful of those big tech companies. And so you could phrase it as, the people that owned those certainly gained wealth compared to people that, for example, did not have tech in their portfolio, or that were invested in other country's stock markets. So I do think, yeah, there would be a shift from people that... There'd be a greater wealth appreciation, obviously, in people that own the asset versus don't, but that's in the context of a world that has over \$500 trillion in wealth. So if you look at-

Nate Hagens (01:23:44):

So Bitcoin right now today is about 1 trillion at 50-something thousand, so 300,000, it would be 6 trillion at that point.

Lyn Alden (01:23:53):

Yeah. And so for example, it used to be Credit Suisse, now it's UBS, that division does a global wealth report. So they look and see how much wealth is out there and estimates range from 500 trillion to a quadrillion, so a thousand trillion dollars of wealth when you include real estate, bonds, things like that. Now obviously we can get into a discussion about whether or not that's real wealth, like; how could that translate into ecological realities? But basically that's the total financial universe, somewhere north of 500 trillion. And so at 6 trillion, Bitcoin's a little over 1% of global wealth. And obviously if someone bought it and held from the beginning, they'd be quite wealthy.

(01:24:37):

One thing we tend to see, through these cycles, is that during major bull markets, you tend to see people that have been holding coins for a number of years sell their coins into that strength. If you bought Bitcoin at \$5 and it goes up to \$50, a lot of people sell a lot of their position, because they say, "Well now I can buy a house." Or if they bought it at \$100 and it goes up to 10,000, they sell out of it, or at least some of their positions.

Nate Hagens (01:25:03):

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I bought it at \$70 and sold it at \$50.

Lyn Alden (01:25:06):

Yeah, and that happens to a lot of people. They either buy high and then trim out of it when they think it's not going well, or they have the good problem. They say, "Oh, this thing tripled," and then they get out. And so the percentage of people that have generally held just for nonstop, for 10, 15 years has actually been fairly small.

Nate Hagens (01:25:24):

But you know my point, it's just another way to create massive wealth inequality, which is, I think, a fatal flaw to it, but I don't know how it's avoided. Let me ask you this, because you live in Egypt part of the year, are the percentage of people in countries like Egypt or Latin America that own crypto higher or lower than in the U.S.?

Lyn Alden (01:25:51):

So according to the most of the data we have, so for example, if you look at Chainalysis, and there's some controversy there, because they're the firm that also serves like law enforcement. When law enforcement wants to track things on chain, they'll go to like Chainalysis for example, but their data, they estimate; where's crypto being used? Or what types of crypto assets being used and for what purpose? Out of the top 20 countries on their crypto adoption index, 16 of those are developing countries. Now, the caveat is that's generally on a relative basis. So for example, a greater percentage of Nigerians use Bitcoin by most estimates than, for example, Americans. But, because there's so much wealth in America, the absolute dollar amount is still higher in wealthy countries. And then among developing countries, it's very heterogeneous. So for example, Nigeria is a hot spot where there's quite a bit of usage, whereas Egypt is a cold spot. There's not a lot of even stablecoin usage. You'll see a lot of people, they want physical dollars on the gray market, the black market, you don't see a lot of stablecoin usage. You don't see a lot of Bitcoin usage.

(01:27:15):

Part of it is they actually... In Egypt, it's technically illegal to have it. That's an old ruling. It's not really enforced significantly, but that's not really the underlying reason. It's more just for whatever reason, it's not really spread there in a way that it has spread in Argentina and Nigeria, El Salvador. There are certain hot spots where it has.

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And so you have that pretty significant heterogeneous mix. And China used to be at the forefront of Bitcoin. They had 70% or so of the mining was happening in China. And that was in large part, because one, they have access to cheap electronics and that's where they manufactured a lot of the chips, that's where they made a lot of the rigs, they could easily get repairs, it is a very good environment for that.

(01:28:04):

But two, because they built so much unused hydroelectric capacity, during the wet season, they'd have basically free electricity and then during the dry season, they'd use coal. And so that was a really significant part of the network for a long time and by extension, you have a good amount of the holders there as well. When China banned Bitcoin mining in 2021, they had previously banned it multiple times, it didn't really stick. If you ban Google or Twitter, you only have to do it once, but Bitcoin, they had to keep banning and keep trying. They eventually actually... It stuck a little bit. And so you had about half the network leave China, go elsewhere. It's still the second or third-biggest mining jurisdiction, but you had that diffusion of some of the machines and then some of the wealth to other parts of the world. So it's been this rotating center of where Bitcoin has the most critical mass.

Nate Hagens (01:29:02):

So I have so many more questions for you, but I think I better reserve those for a round two. But before I get to the final questions that I ask all my guests, let me ask you a personal question. What's your routine, Lyn? You sound like a library on these topics. Do you wake up and have coffee and consume news from around the world? Or how do you stay on top of all this stuff?

Lyn Alden (01:29:28):

That's a lot of what I do, yeah. Basically, I start with news consumption and also not just news, but just contacts. There's certain types of activities on social media, other types of activities on traditional journalism, other types of contacts in various industries to see what's happening. And then there's just independent research, check what's going on. For the macro environment, obviously I'm very reliant on public data that's available. Whereas for example, in the Bitcoin space, I'm active in the venture side. And so I talk to what founders, what developers are doing, what capital allocators are doing, what institutions are doing. So that tends to be more a mix of

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public available information and then just collecting information from what I know is happening in the industry.

(01:30:19):

And the other factors, I tend to work in parallel. So instead of working on one thing that I could get stuck on for a period of time, maybe it's interesting, maybe it's not, I tend to have three or four articles or subjects that I'm advancing on, and whatever grabs me that day, I'll advance that and make progress on that. And then eventually, if I'm stuck on something else, eventually something will hit me and I'll get unstuck on that thing I've been working on in parallel. So that parallel effort for having always three or four topics that I'm trying to advance on seems to be an optimal point for productivity on my end.

Nate Hagens (01:30:55):

I'm trying to do the opposite. I used to do it that way and I'm trying to focus on one thing at a time until it's done. So, a few more questions if you have a few minutes, Lyn?

Lyn Alden (01:31:04):

Sure.

Nate Hagens (01:31:05):

So you've thought about it and are working on the global macro situation as a career choice. Do you have any personal advice to listeners who might not have followed all the financial jargon of this conversation? But just broad brush, you see inflation and yield curve control and the Treasury and the government having a bigger role in maintaining our financial situation and there may be giant risks in the coming decade, what kind of advice do you have for listeners given this risk of economic upheaval in the coming decade or so?

Lyn Alden (01:31:51):

I think a preemptive shift towards disconnecting is useful. So we've had this multi-decade trend of more and more reliance on technology, more and more getting connected, sometimes for our benefit, sometimes to our detriment. And I think selectively disconnecting yourself from time to time and returning back to basics. A lot

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of people, they don't know their neighbors. They are always online. They aren't getting sun, they aren't getting fresh air, they aren't focusing on eating whole foods, they aren't getting exercise. And that seems super obvious, but it's what the majority of people, the loop that they're stuck in, including myself sometimes. I find myself just... When people say, "Okay, you've written a book, what do you want to do next year?" My answer is always, "I want to consolidate. I want less of the grind and more of the work-life balance, more of what location do I want to be in, what people do I want in my life? Am I getting sufficient exercise and good food and sunlight and nature and family connections and all that?"

(01:32:59):

That's what I'm trying to focus on. And I would recommend that other people... There's a time in your life maybe to grind really hard, when you're trying... Sometimes in order to be good at something, you have to go through a period where you get obsessed with it, and that can be healthy for a period of time. You sacrifice one thing, but you get to the other side and now you're in a different position, but it's not something you want to get stuck in forever. You want to be able to pull back. And then especially if we just run into more frictions globally, not being so reliant on technology and not being so caught up in things, while not being consciously aware of them, I think is really important. And always reminding yourself that you can pull back, you can pull back out of the digital world, at least partially, and pull back out of the grind and try to focus on what made people happy and healthy for thousands of years.

Nate Hagens (01:33:52):

Well, we just met, so you won't know that, but I fully agree with you on everything you just said. How would you change that advice for a young human listening to this podcast who's learning about limits on all these different things in their early 20s? Do you have any advice for young humans, young Americans?

Lyn Alden (01:34:13):

So I would say, kind of what I just said, that there might be a season where it makes sense to obsess yourself with something, but try to put limits on it ahead of time. Don't let yourself get so caught into it that years and decades later, you never really took a time to stop and smell the roses, is the main thing I would say, is that you can recognize that there's different seasons of life. Another thing is just that we've had,

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especially in the United States, decades of pushing down on any physical work and the things that have been rewarded has been tech, Wall Street, government or lobbying, anything in D.C., New York or California. That's the places that have been optimized, and any physical work has been de-emphasized. And I think the ironic thing with AI and things like that is that we might get a little bit of a pendulum shift.

(01:35:11):

And so if I was younger and entering what kind of career choices I want to go into, I think things that are more physical are worth emphasizing, especially if some of the things we talked about, the reality of the physical world versus the heavily financialized and technologicalized world come to a head, a lot of the paper stuff, the tech stuff, the financial stuff, a lot of that can be automated, a lot of that can run into issues, but the physical world is the physical world and having skills that allow you to navigate that are, I think, going to be economically important for a long time.

Nate Hagens (01:35:50):

What do you care most about in the world, Lyn?

Lyn Alden (01:35:54):

So a lot of things, but the way that I try to answer that question, I think it's what I can impact in any way. So for example, I care about cancer, but there's absolutely nothing... It's not my area. So what I tend to do is care about the things that I build up some degree of research on or interest in. So for me, it's money, energy, and the intersections between them, whereas there's other areas that I would say they're maybe just as important, but it's just that I have to draw a line somewhere and have a niche.

(01:36:32):

So for me, the things I tend to care about are energy security, financial freedom, the ability to have money, transact, move money across borders, have tools against financial repression in countries around the world. Those are the things that I feel, in some small way, either through capital allocations, or the written word, or the spoken word I can influence in some tiny way. Whereas there's other areas that I think might be just as important, but there's no impact I can have on them. And so for me it's that combination of what's important, but also what is worthwhile to spend your time and attention on.

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Nate Hagens (01:37:16):

If you could wave a magic wand and there was no personal recourse to your decision, can you suggest one thing that you might do to improve the future?

Lyn Alden (01:37:28):

I think it would be to improve knowledge of some of these decentralized or open source things that can get people out of their echo chambers and their capital controls and accelerate some of those trends, because I think that accelerating some of those trends can push back on other more unsustainable trends. Even simple things like, for example, in social media, people get locked into an algorithm and then that algorithm further pushes them into an echo chamber. And there's open source technologies like say Nostr for example, you have interconnected social media and you can choose your own client that you want to interact with this. So for example, imagine if Twitter and Facebook users could talk to each other, that they were built on an open protocol, Nostr is kind of like that, where you can have different clients that attach to it and you could choose your own algorithm, or choose not to have an algorithm, and have more visibility and transparency over your data. And I think that if that kind of thing, whether it's open source money or open source information, if that was more widely understood, more distributed, I think it could push back on some of these more other problematic trends we see in multiple different parts of society.

Nate Hagens (01:38:49):

I will have to check that out. I don't know about Nostr. This has been great. It was very nice to meet you. Usually I have a first umbrella overview of someone's work. If you were to come back in the future, is there one esoteric, specific topic that you are passionate about, that's relevant to the future that you would be willing to take a deep dive on?

Lyn Alden (01:39:17):

So for me it's anything open source, money related. I'm happy to go into details of how Bitcoin intersects with energy, how it enables certain energy that's not otherwise accessible, how it shifts how we use energy. I think that'd be a pretty fascinating topic. There's multiple niches I'd be happy to go into.

Nate Hagens (01:39:42):

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Awesome. So how do people find more about you and your work?

Lyn Alden (01:39:47):

So I'm at lynalden.com, on Twitter [@LynAldenContact](https://twitter.com/LynAldenContact) where they can check out "Broken Money." That's my recent book.

Nate Hagens (01:39:54):

Thanks so much for your time, Lyn. I really appreciate it.

Lyn Alden (01:39:57):

Thank you.

Nate Hagens (01:39:59):

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