

The Great Simplification

Nate Hagens (00:00:02):

I'd like to welcome to the program a talking chicken. Actually, the guest's name is Doomberg, who is an anonymous energy finance professional, part of a team of analysts that created a Substack, which is one of the most widely read financial Substacks with experience in heavy industry, private equity, and the hard sciences. Doomberg, in their writing and speaking, try to highlight the fundamentals that are missing from today's economy, energy, and policy decisions. And today was just a fantastic wide-ranging conversation. We disagreed on some topics, we agreed on many, and these are the type of conversations that I learn from and it gives me hope that so many different demographics of humanity are weighing in on our collective predicament. I hope you learn from this, and please welcome the talking chicken icon, Doomberg. Doomberg, welcome to the show.

Doomberg (00:01:54):

Hey, great to be here, a true honor and looking forward to a fantastic discussion.

Nate Hagens (00:02:00):

I'm sure you've heard tons of talking chicken jokes to start your podcast. I will just comment by around this time every day I actually do talk to chickens, my real chickens, they don't talk back, at least not in English. This is not completely departed from my normal routine. You run a Substack and a financial analysis outlet, and your team at Doomberg is known for what you call early pattern recognition, and you've been credited with a lot of accurate predictions of global trends. You're also quite open about your philosophy, which is macro analysis through an energy lens, starting there and then building from there. Do you think including an energy perspective as the basis of your analysis is a large factor contributing to the success you've had so far? I don't know how much you know about my work, but a buzzword that I use is our culture is energy blind. I think honestly Wall Street is generally energy blind. Why don't you think more analysts start with this sort of framework? What are your thoughts on that?

Doomberg (00:03:21):

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I think for the vast majority of analysts employed today, they grew up in an era of energy abundance and didn't have to think about it. When energy is abundant and cheap and readily available like we saw for the better part of the last 20 years, thanks in no small part to the shale revolution, you don't have to think about energy. You could think about value add downstream. Manufacturing and energy is just another commodity that you can source. What we learned in the post-COVID era is a lesson that everybody should know, which is when energy is short, energy is all that matters. We begin all of our macro analysis with that fundamental question. Is the world producing an abundant amount of energy relative to the standard of living that it is currently enjoying and wishes to grow or is it producing a shortage of primary energy?

(00:04:08):

Those are two vastly different worlds. Again, to the marginal analyst on Wall Street, they grew up in an era where interest rates were always decreasing, international labor was always readily accessible, and energy inputs were forever cheap. We believe that something changed dramatically in the aftermath of the COVID pandemic and our reaction to it. We're in a new era where interest rates are real again, labor is expensive again, and energy is expensive again. That world requires a different set of analysis. Leveraging our industrial background in the energy commodity space and recognizing that the media, as you have alluded to in your question, has completely failed our society in properly contextualizing the challenges that we have in the energy space. That is in fact the inefficiency in the market that we have been able to occupy and we're frankly forever grateful to the media for leaving that space open to us.

Nate Hagens (00:05:12):

It's not only the media, it's also Econ 101 and our academic institutions because we have a belief and a feeling that if we run out of energy or anything, we can just create more money or have technology to substitute for that. I think on Wall Street, they view a dollar worth of energy inputs as a dollar worth of crayons or vitamins or coffee when we need energy for everything else in the global supply chain and global economy.

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Doomberg (00:05:47):

Including the crayons and the coffee.

Nate Hagens (00:05:49):

Exactly.

Doomberg (00:05:50):

Because those are just solid or liquid manifestations of energy. We view the world energy first and we view currencies as overlaying energy transactions in a way that tries to make those transactions more efficient. Modern economics as taught in academia has it backwards. They view currencies as the dominant force and energy inputs as reacting to those currencies when we believe it is the reverse. That is made plainly clear during times of energy shortages like we saw in Europe last winter heading into this year. For most of the time, for a lot of the time, the academic thinking around energy and currencies and international trade works quite well. It only fails and breaks down when the true orientation of what matters most is made apparent because of course without energy you can't have life, without energy you can't have right angles, without energy you can't have order, and without order, you can't have a standard of living. When energy is short and it has to be rationed, then energy moves to its rightful place. It never leaves that place. It's just the mirage of it leaving that place happens when you have technological breakthroughs like we saw with horizontal drilling in the shale patch.

Nate Hagens (00:07:15):

The way I like to think about it, I don't know where you live, but I'm in upper Wisconsin and the winters are very cold here. And thinking about the world and energy terms is like looking in a snowstorm at several cars ahead of you in a traffic jam and looking at money is just the brake lights right in front of you. So maybe that's why your newsletter so far has been successful. Building on the comment you just had, how did the Ukraine, Russia, NATO situation change the landscape on energy and what is the situation energy wise, global supply chain wise in Ukraine today?

Doomberg (00:08:03):

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The first and most important thing to consider is that the Russia, Ukraine, NATO situation would not have devolved into a hot conflict had it not been for Europe's energy policy blunders, which gave, in the eyes of Putin, very strong cards for him to play on the geopolitical stage. Vladimir Putin has actually a very strong history in commodities trading and understands the energy and commodity world quite well viscerally through direct experience. We believe he foolishly overplayed his hand. There's no question that the preemptive surrender of European energy policy to Vladimir Putin led Putin to believe that he could get away with the gambit that he then subsequently tried to pull off. That's the-

Nate Hagens (00:08:51):

What were the blunders?

Doomberg (00:08:54):

A complete banning on domestic production of natural gas and becoming fully dependent on pipeline natural gas into Europe from Russia, over-reliance on intermittent renewables and therefore destabilizing their grid, Germany preemptively shutting down their nuclear power plants in Belgium at least for a while following suit. These were all activities that gave huge amounts of leverage to Vladimir Putin, which he then overplayed. In fact, it's only because the winter of '22-'23 in Western Europe was unseasonably warm that the citizens of Western Europe were thankfully able to escape the worst consequences of their prior energy policy blunders. Now of course, once the war in Ukraine broke out, we have long argued consistently from the very beginning that the sanctions policy on the West was designed to fail and couldn't succeed and that the policies were born out of an utter ignorance of how actual commodity markets work in the industrial setting, which is something I'm happy to get into. The original sin was getting our energy policy so wrong that Putin felt emboldened enough that he would roll across the borders in Ukraine and provoke the ire of NATO in the first place.

(00:10:10):

If he did not have such geopolitical leverage because of his stranglehold on the European energy inputs, we suspect that he would have never had the audacity to do so in the first place. We wouldn't be here if it weren't for the original policy blunders of

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Germany in particular and Western Europe in general that allowed Putin to mistakenly believe that he could take advantage of the situation.

Nate Hagens (00:10:37):

Linking these first two questions, I called the Russian incursion into Ukraine a biophysical phase shift moment because all of a sudden the world might become less energy blind and we look at industrialized countries like Germany that import a lot of energy to make products, but Russia accounts not for the production but for the viability of around 22% of the world oil exports, 24% of the world's natural gas exports that are available for purchase. The ultimate power resides in those countries that have ready access to energy. It was a power shift that has been reverberating around the world and you can print more money, you can print more euros, but you can't print more energy, you can only extract it faster. Do you see this as a phase shift towards a multipolar world because of what's happened that has implications for currencies and everything? Or is this going to just run its course and then we go back to normal?

Doomberg (00:11:51):

First of all, I wholeheartedly agree and endorse your analysis. As a percent of the float, as we might say in the equity markets, Russia plays a hugely disproportionate role. As we know, because energy is life, the price elasticity of demand for fundamental primary energy inputs is radically inelastic, which is why of course that the sanctions were never going to work because we had attempted to sanction his volume and everybody in the commodity space knows that he would more than make it up on price. Imagine a world where we were able to cut Vladimir Putin's exports of oil, let's just say to keep it simple in half, I can assure you that the price of oil would more than double and he would more than make up for the loss of volume with price, which is how commodity markets work.

(00:12:45):

In lieu of trying to sanction his volume, we argued from the very beginning that the West needed to do what we did before the first Gulf War, which is to both up our own production and travel the world seeking increased production from every major oil producer that was on our side so that we could flood the world with the commodities, drive the price radically lower. That is the way that you crush somebody's revenue in

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the commodity sector. You do it with price, not by trying to restrict their volume. This fundamental lack of understanding, which has since I think been understood and begun to be overturned, was the reason why Putin was able to fund his war machine at the levels that he was able to for as long as he did in our view. The irony is, of course, by pointing this out, we were accused of being Putin puppets when in reality we're just giving you the better playbook to achieve the stated objective, which is to starve his war machine of revenue.

Nate Hagens (00:13:44):

There's huge propaganda on both sides, and I have some friends that are quite connected to knowing what's going on, and I don't want to get into this on this conversation, but it was eyeopening to me to see how little I really know by following the conventional news. That was humbling to me. I try to pay attention to what's going on in the world. But on this topic, do you think there's a case to be made for continuing US, NATO, Europe involvement in this war? Are we just ultimately wasting energy and resources that could be used elsewhere and at what risk?

Doomberg (00:14:23):

That's a tough question and a, I would say, a political minefield in today's discourse. True.

Nate Hagens (00:14:29):

That's true. You can say pass.

Doomberg (00:14:33):

No, I have strong views as the parent of draft eligible children. I'm pro-peace. I'm old enough to remember when that was considered a liberal position. Somehow this has now been recast as a alt conservative, far right position to assume that perhaps getting entangled in a hot conflict with a nuclear superpower is something that we ought to do with a bit more caution and why we are simultaneously seeking to perhaps embark on a similar path with the Chinese gives me trouble. I would be the first to say that my bar to leap over for committing US blood and treasure to foreign

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geopolitical conflicts would've a lot more to do with what's actually happening directly to the United States. But that's just our view.

(00:15:29):

It's not something that we would typically write about and not something that we have a particular expertise in other than I would say that you can count the Doomberg team as decidedly in the pro-peace camp. It is unfortunate that negotiations didn't work and that they broke down and that Putin decided that he had enough leverage to roll over the border. We make no particularly strong stand either way, but we are reflecting on the possibility of a thermonuclear war. We'd rather not have one.

Nate Hagens (00:16:02):

Yeah, I don't use the words pro-peace, I prefer to say I'm pro-complex life because I think the broader complexity of the situation, there is that risk, and I think that risk of destroying everything is got to be more seriously thought out. Getting back to the energy aspect, a year ago now, everyone was worried about the winter of '22-'23, which as you point out turned out to be unseasonably mild, but now the pipelines are still not there. Yes, there's been some new Qatar and other imports and USLNG, but what are people thinking? What are you thinking about the winter of '23-'24? Is this going to create another spike, a massive spike we had last year and natural gas prices? Are people in Europe prepared for this now or what's going on there?

Doomberg (00:17:04):

Great question. I would say that we are at peak complacency now, which is a very dangerous place to be. Europe got lucky last year, thankfully. We warned in a piece that we wrote in late December when it was clear that the worst case scenario, tail risks of an unseasonably cold winter coinciding with a lack of natural gas storage, that those risks have been abated. We warned from the beginning that it would be very dangerous for European leaders to confuse good luck with good strategy, and we're seeing evidence of that today. Natural gas in Europe is trading at multi-year lows. Everybody assumes because last winter was no big deal, this winter will be no big deal. Germany went ahead and shut down its last three perfectly operational nuclear power plants. Beyond that, there's this little El Niño weather phenomenon. If you do a

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little research, it turns out that one of the highly correlated consequences of a strong El Niño is a tough winter in Western Europe.

(00:18:14):

Let's hope that's not the case. But when you have peak complacency, with the potential for the weather gods not smiling on you in the way they did last year, but in fact perhaps being a little bit colder than average, you have the setup for a bit of trouble ahead. This is something we're watching very closely. When we first started writing about natural gas in Europe, it hadn't yet taken off of course, and then when it did take off, we looked like geniuses. Then when prices collapsed because the weather got mild, some people on Twitter were making fun of us for being alarmists. We were the first to say we wanted to be alarmists. You should never put yourself in a position where you're rolling the dice on the weather for the health and wellbeing of your citizenry. Just because the dice turned up in your favor doesn't mean it was a good expected value risk for you to take for your citizenship.

(00:19:10):

We are seeing peak complacency today. The warnings of last year are being brushed aside as unnecessary alarmism. If El Niño and the weather pattern continues, we could see a situation where peak complacency coincides with peak emergency and Germany has three less nuclear power plants with which to rely upon to get through this winter. In all scenarios, Germany will be burning an enormous amount of coal to keep its grid up and therefore basically renege on their climate commitments and all the hard work that their previous decades of investments in wind and solar have done.

Nate Hagens (00:19:56):

I am pro-renewable, but I'm anti the argument that renewables can just plug and play for fossil fuels and continue a 19 terawatt global metabolism. I think a lot of times we just say, "Oh, this type of energy is bad because of the pollution." And so we get rid of it without looking at the longer term implications, which this is happening to Germany now because of this reliance on external natural gas, massive buildup of renewables, paradoxically, they are actually having to go to more fossil fuels now and their energy security is at risk. We could talk about this winter and speculate, but what is the path for the next decade for Germany and Europe? We can assume that those pipelines

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are not going to be rebuilt or turned back on. They either have to get gas from other places or have massive batteries or hydro or nuclear or heaven forbid, use less. Use less, as you know given your energy focus, means less GDP, less complexity, less standard of living, what's the 5 to 10 year outlook in Doomberg's view?

Doomberg (00:21:22):

It all depends on politics. We put out a piece this morning called cheat codes that characterized Ontario's rejuvenation with physics and how they went from passing their version of the Inflation Reduction Act back in 2009 called the Green Energy Act, and they wasted some \$60 billion on solar and wind and other intermittent renewables. On a per capita basis, that's roughly the equivalent of the US wasting a trillion. But in the intervening years, a political revolt occurred, the ruling global party that foisted upon its populace this Green Energy Act was voted out in a historic landslide. They went from the dominant political party in the province to not even gaining enough seats in the legislative assembly to qualify as an official party. The new progressive conservative premier, Doug Ford, and by the way, to many US listeners, progressive conservative might sound like an oxymoron but such is the nature of politics in Canada, they have embarked on a journey of a reconciliation with nuclear power.

(00:22:29):

Just this week in July, a whole series of announcements about refurbishments and new large builds and small modular reactor builds and refurbishments coming in well ahead of schedule and under budget because they have the workforce and the culture around nuclear energy. Ontario stands as the example of what Germany should have done and could still do. So long as there is a political change in Germany right now, the Green Party in Germany as the fulcrum political force, i.e. the minority party in a minority government, they have disproportionate power. They are plunging in the polls and what the media would characterize as far right parties are ascending in the polls, which is the natural consequence of populism that occurs when you rob people of their standard of living. A political change in Germany, our good friend Mark Nelson just put out a report today that claims eight of the nuclear reactors in Germany that have been shut down could be restarted with modest investment over a reasonable amount of time.

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(00:23:31):

If enough pain is felt by enough people that a political landslide occurs like that did in Ontario, then there is hope. The optionality to return to sanity exists. The plants haven't been destroyed or broken in a way that couldn't be repaired. The prospects are real. Our hope, and one of the reasons why we write the things we do, is that we can perhaps in our own small way help such populations and such political leaders forego the need to feel the pain before they reconcile themselves with the fundamental laws of physics. Nothing about the physics of energy changed in Ontario. The only thing that changed in Ontario was the politics. As we said in the social preview to the piece that we published this morning, Ontario's a decade ahead of the US as it pertains to its energy policy. Let's just skip the in-between. Why do we have to go through the grift and the mismanagement and the waste and the pain and the economic contraction to only end up at the obvious answer that we could begin with.

Nate Hagens (00:24:37):

I'm going to get to nuclear in a second, but let's drill down on this broader theme. Do you think with the advent of what's happened with COVID, the Russian-Ukraine war, global supply chain disruptions, et cetera, that there's a focus shift away from climate, maybe not in the media, but in the people working on the ground around low carbon to energy security, and is that a blip or are we going to be more focused on that as the years go by?

Doomberg (00:25:17):

We do believe that lamenting climate change is truly a luxury of the rich. If you lament it too much for too long, you will no longer be rich. As we've seen in Ontario and as we suspect we'll see in Germany and so on. We know for sure that the developing world is going to completely ignore climate change going forward. They watched what Germany did, i.e. retreating to the coal mines with the speed and efficiency of the evacuation of Dunkirk at the first sign of energy trouble and are now ignoring what they say because what you do versus what you say is what matters. We have a thesis, we call it Doomberg's Postulate, that every molecule of oil, natural gas, and coal that is produced will be

(00:26:04):

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burned by somebody somewhere. And local restrictions on such consumption only reorient who the privileged few are that get to do so. And so this is the vector. This is where we're going. Energy is life. All humans everywhere want a higher standard of living, and therefore excess energy production will be consumed by somebody somewhere. And this is just the model. So any pound of coal saved in the UK is going to get burned in Indonesia or in China. Pick your favorite. It's a globally fungible commodity. It's cheap to ship around the world. So, yeah.

Nate Hagens (00:26:39):

The upshot is we're eventually all going to be poor and lamenting about climate change.

Doomberg (00:26:46):

Until political upheaval occurs and order is restored, yeah.

Nate Hagens (00:26:50):

That's consistent, unfortunately, with my view. I think the super organism, which is the outsourcing of our decisions to the market, combined with Jevons paradox, and combined with the biological maximum power principle, we will access as much energy as is possible per unit time. So I kind of agree with you on that.

Doomberg (00:27:17):

Your reference to Jevons paradox is a very important one. By the way, we've written about this. This is an absolute fundamental truism of humanity. So I couldn't agree with you more.

Nate Hagens (00:27:28):

Well, let me ask you kind of an advanced question that I've yet to explore myself, but I've thought about it on my bike rides. So Jevons paradox on the up slope of economic growth in the world means that if we get more efficient, we're going to use more energy ultimately because the savings get extrapolated through the world. But is the converse true, that if the world and when the world eventually starts to shrink from an

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economic growth standpoint, doesn't efficiency then become really important because then it will save energy as we're in energy descent?

Doomberg (00:28:10):

So, great question. The way that we would look at that scenario is the Earth is not a closed system. So the Earth is bombarded every day with orders of magnitude more energy than we could ever hope to harness a need. And so while there may be temporary dislocations where because of a global energy shortage, a shortage of primary energy, those who do comparatively better are the ones that are most able to more efficiently convert what limited energy resources are available to them into life nourishing order, fighting the forces of entropy, the arrow of time that the vector is in the direction of ever higher and more because we are swamped with vastly more primary energy directly from the sun than we could ever hope to harness and use. And this is why, by the way, that we are far less skeptical about solar than we are, say about wind because it's always worth it to have some allocation of your technological and industrial investment towards harnessing the power of the sun.

(00:29:20):

Because the day where we've truly cracked that nut, we have made a significant step change in all of humanity's standard of living. And so the whole strongest counter argument to the Malthusian population explosion mindset of the sixties and seventies that formed such an intellectual foundation of the modern environmental movement is this belief that we are a closed system, and that humans aren't sufficiently innovative enough to learn how to harness from the sun, everything we can eat, and then some. And we've proven time and time again that we are. And so in the longer sort of arc that you and I might measure, Jevons paradox is dominant. And for those that aren't familiar with Jevons paradox, as Nate articulated, throughout history, anytime we've created an invention that allows us to harvest energy more efficiently, we never harvest the exact same amount of energy more cheaply.

(00:30:21):

We always harvest as much energy as we can, leveraging that efficiency to generate more and more standard of living, enhancing primary energy inputs into our society. And the classic example is the invention of the steam engine, which made mining of coal far easier. We didn't just buy the same amount of coal for a fraction of the price,

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the amount of coal that we burned exploded as it became easier and easier to access it because these engines were used to pump floods out of coal deposits and to create machines that could do the digging and the transporting for us. And it relieved human labor from the task of generating this primary energy. And therefore, the industrial revolution was born.

Nate Hagens (00:31:02):

So from a sustainability perspective, if someone is listening to this program and their main concern is about climate or the environment, Jevons paradox is not a welcome concept because it means that technology alone, and inventions, is not going to diminish humanity's metabolism.

Doomberg (00:31:25):

Correct. Although to those listening who are so concerned, we would argue that the finite amount of resources we have to deploy against this "problem" is far better spent on reacting to actual issues that arise from it, as opposed to trying to prevent changes in a classically non-linear system from occurring in the first place. What do I mean by that? Either we're going to have significant challenges because of carbon emissions by humanity's economic activity, or we're not. In a scenario where we're not, we save all that money. And in the scenario where such negative consequences materialize, proactively reacting to them in a way that is as pro-human as possible is by far the best ROI on such investments. And then layer it on top of that, even if we just take it as an axiom that we should emit far less carbon, there's no way to do that without destroying the standard of living average on the planet without going through nuclear power, which is why we're such advocates of nuclear.

(00:32:24):

Whether or not you believe global warming or climate change or climate volatility is real or not, in no scenario can this many humans thrive in the absence of a vast renaissance and nuclear power or continued burning of fossil fuels.

Nate Hagens (00:32:41):

Let me ask you this, given human history, and given the eventual decline in fossil energy, availability and quality, how can we, Mr. Doomberg, avoid big energy wars?

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And we could argue that we're in one already at the early stages. How is humanity going to be able to avoid a war over resources in coming decades?

Doomberg (00:33:12):

Well, every war is in fact an energy war. If for no other reason, then wars are nothing more than the concentrated deployment of destructive energy onto your opponent's battlefield. And in fact, Daniel Yergin's great book, *The Prize*, of course recast much of global conflict through the lens of energy, and it's a total must read for anybody interested in the energy space. If we live in a world where we do not produce a sufficient amount of primary energy to support the population levels that currently exist, the population levels of the world must decline. And one of the ways that such a population decline could occur is through a very destructive war, famine, war, pick your favorite. If there's going to be billions less people on the planet, they have to leave somehow. And this is, of course, why we are pro energy and anti-war. Confronted with a lack of energy per person, we'd rather try to create more energy than have less people.

(00:34:10):

And when we say Malthusians, what we mean is the people who would prefer to have less people on the planet. And they exist, they're very influential, and they form much of the intellectual framework of the modern environmental movement. In their eyes, the planet can't support as many people as it has. And the answer isn't, "Let's get more innovative about it. Let's figure out how to harness more energy from the sun, from nuclear, better efficiency with fossil fuels." Their answer is less people. They never say it quite like that and they would never run on it as a campaign platform, but that's what they mean. And the more we call them out on it, and the more we put that choice towards the people, we have no doubt which side most people would choose. We like to say to the Malthusians who are anti-nuclear and anti-fossil fuels, you first. Knock yourself out. Somebody will consume your portion of the fossil fuels that you are willing to forego in the name of the planet.

Nate Hagens (00:35:08):

It is a really dicey minefield, those topics. I have a lot of friends who are ecological economists in the degrowth movement, and I think degrowth makes sense from an

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environmental perspective, but I think it's naive, both on human behavior and on the biophysical systems energy situation. Because if we were to voluntarily, in some sort of authoritarian planned way, shrink our economies, we would immediately boost the risk of nuclear war or energy wars and violence, et cetera. My view is we are headed for post growth economies and that we have to prepare for that. Degrowth is maybe what we should do, and post-growth is what we're going to have to do. And that's my work in a different vein than yours, is how to change the initial conditions of these future moments to have people educated on how systems interrelate, the importance of energy, et cetera. So I don't know if you have any response to what I just said.

Doomberg (00:36:25):

Lots of thoughts. So again, much like the Earth is not a closed system, the privileged West is not a closed system, and there's something like five to six billion of people that live in what we would call the Global South or the developing, or emerging economies, or the non-aligned countries, whatever label you want to put on them. Any growth that we forego is going to be correctly, ethically, greedily, lapped up by those economies, back to my original point. So there's a moral case for saying that those in Western Europe and in the US and Canada, New Zealand, Australia, Japan, Korea, live such an exorbitant lifestyle compared to the other five billion, six billion that perhaps we should forego some of those luxuries so that they can step up, but under no scenario where our savings won't be spent by somebody else.

(00:37:21):

And so don't kid yourself into thinking that degrowth in Germany is going to affect the climate. It's just not. Every ton of coal, barrel of oil, BTU of natural gas unburned in Europe is going to get burned in Pakistan, India, Malaysia, China pick your favorite. And so degrowth only really happens vis-a-vis carbon emissions/climate change/ecological impact if we, through dictatorial means, prohibit the production of primary energy. And once you do that, and then it's clear that the net effect is a bunch of dead people. And I think it's actually dishonest to pretend there's a path where our degrowth, A, matters to the climate, or B, doesn't kill a lot of people. And as long as you're comfortable killing a lot of people in the name of Gaia, then that's fine, but at least be honest about it, and run on that platform and see how far you get.

(00:38:18):

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And no culture is going to spontaneously agree to that, which is why we have said on the path from abundance to starvation as riot, and we're already beginning to see populist movements in Germany and other countries that are undergoing substantial deindustrialization. But nobody's going to tell Indonesia, except under the force of a gun, that they should stop mining coal and that they shouldn't burn the coal that they've mined. And any coal that the UK doesn't burn going to get burned by Pakistan who got burned, pardon the pun, by becoming overly reliant on liquified natural gas. And when Germany scrambled to get every BTU of energy that it could around the globe, regardless of cost, carbon footprint, or impact on the developing world, the developing world watched and learned a very tough lesson. And we wrote a piece to this effect called the Streisand Effect, where by rushing too far too fast into renewables, Germany and Western Europe has had the opposite effect on the production and consumption of coal.

(00:39:20):

We're going to set a record this year. We'll set a record next year. I predict and would confidently bet an enormous sum of money with anybody in the degrowth movement that in the year 2040, we will burn a measurably more oil, natural gas and coal than we're burning today, period. We just will, unless there is a catastrophic energy war, like you talked about, where billions of people die and so on.

Nate Hagens (00:39:41):

I don't have a lot of money to bet you, but I will bet that we will not burn more oil in 2040 than today. But unfortunately, I think we might burn more coal and natural gas, but that's a different conversation.

Doomberg (00:40:00):

I'll send you Thomas Gold's book, the Deep Hot Biosphere.

Nate Hagens (00:40:06):

Well, okay. So now that we're on that topic, what are your thoughts on peak oil and the fact that without the Permian, we would've... Well, 2018 October is the current all liquids peak in the world. And without the Permian, the rest of the world is declining ex-Permian. So you think by 2040, we'll be producing more oil than today?

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Doomberg (00:40:29):

Yeah, I would take the over, for sure, because ultimately very small shortages trigger huge price spikes, which then trigger technological development. There's an enormous amount of technology development underway. Just recently, ExxonMobil claimed to have developed techniques that would allow them to double the amount of oil they could extract from the shale patch. We'll see how real that is and whether it manifests in reality, and whether it spreads beyond Exxon. I note that they're on a bit of an acquisition spree now, if you do have such technology in the back pocket, then it becomes pretty synergistic to acquire properties and technologies of others that you can deploy such technologies through. There is vast swaths of the world that have ruled out fracking, for example, that could easily open up to such technologies if the world needed it, and at the right price, the world would need it. I think that the peak oil movement perpetually underestimates the pace of innovation in the commodity sector.

(00:41:27):

Now look, I'm biased. I grew up in that sector. I led technology teams. I worked in all manner of energy and alternative energy projects, managed hundreds and hundreds of PhDs in my career. I've seen the level of technical sophistication in such companies. I would be personally perhaps biased. I would be hesitant to bet against the intuition and innovation potential of humanity, especially in regards to something as important as primary energy.

Nate Hagens (00:41:56):

But isn't most of the technology with the conventional and shale oil effectively just creating a larger straw, and maybe getting a few more molecules under the discovering them, but we're basically that much closer to the slurping sound with a larger straw?

Doomberg (00:42:18):

Again, so these things come in cycles, right? We run out of the capacity to produce oil with existing technology. We end up in a commodity shortage, the price of oil spikes, the industry over produces, over invests, and then we get a glut, and so on. There's no reason why that many of the shale deposits, for example in Europe haven't been

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exploited, except for political reasons. So I would say if we don't produce more oil by 2040, it won't be because we can't. It'll be because we have created a political environment where we have proactively chosen not to. That's my personal view. And in fact, of course, we have an enormous amount of natural gas in the world and fish traps and various techniques to create liquids from natural gas. With the right motivation and the right economics. We're not going to be short carbon atoms in a useful form anytime soon is our view. We would fade peak oil.

Nate Hagens (00:43:24):

I agree about the molecules and the atoms, but Fisher Trough and other technologies have a cost where we use more of the energy and materials to create the technology, leaving less for the rest of society. So to me, peak oil has never been about running out of oil. It's been running out of enough affordable oil at scale to continue economic growth. So I think you're right that we could easily produce 80 million barrels a day at a much higher price, or 60 million barrels a day at a much, much, or at an intermediate price. But to produce a hundred million dollars a barrel a day at \$60 is unlikely. So there's a cost to society that increases over time.

Doomberg (00:44:15):

Sure. So let's frame it in sort of the technical terminology, which is your energy return on energy invested. And there's a compelling argument to be made that in the fossil fuel sector, the easiest fields, the easiest deposits, the easiest coal deposits have been mined and developed, and that the marginal where supply meets demand production is getting less and less attractive from an energy return on energy invested perspective. This is why we're pronuclear. The energy return on energy investment for nuclear is shocking. The energy payback period for a nuclear facility is something like six weeks. And so you can imagine a world where we fulfill more and more of our primary energy needs, using nuclear power. One of the things we've written about, for example, is the untapped potential for small modular reactors to abate the carbon emissions that we currently create through the production of industrial grade steam, which is almost entirely done through co-generation facilities where natural gas is burned to produce both electricity and heat.

(00:45:17):

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Heat is a major input into our economy. In fact, industrial grade steam accounts for more carbon emissions than the combined total of our passenger vehicle and aviation emissions. And yet almost nobody talks about industrial grade steam, and everyone is focused on electric vehicles, right? Well, you can imagine, because of a couple of interesting attributes about SMR technology, two of which are they can produce relatively high grade steam, not quite as good as fossil fuels, but good enough for a lot of applications, and simultaneously because they're small and modular, your sort of radius of concern for housing such a facility is far smaller than a traditional large nuclear power plant that you can imagine a suite of SMRs being deployed in preexisting industrial brownfield sites, protected by security that already exists at such sensitive facilities where you don't really have to worry about reactors melting down or nuclear waste issues and things like that. And then you save your fossil fuels for things like refined products, gasoline, diesel, jet fuel, petrochemicals and so on, such that the supply of relatively high energy return on energy invested fossil fuels meets our demands while nuclear power substitutes.

Nate Hagens (00:46:29):

One of my short list of cautions or critiques on nuclear power, and renewables in this case, is that only around 20% of our global energy use is electric, and nuclear today produces electricity. If we add in steam, what does that bring it to as a percentage of global energy services?

Doomberg (00:46:54):

So it's a great question, by the way. And I would say that if you built enough nuclear... Again, so we try to look at the world through the energy lens, right? And so if the energy payback period is six weeks as opposed to three years for solar and five years for wind, or pick your favorite number, you can begin to systematically displace far more of your energy needs with nuclear far quicker. Because don't forget, the purification of solar grade polysilicon is among the more energy intense industrial processes known to humankind, and that energy has to be paid upfront just in the same way that you would do an NPV calculation for a financial model. So there is a world, for example, where you could build up nuclear, produce hydrogen, and burn it in your cars. The hydrogen combustion engine is a very simple slight modification to the

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existing automotive fleet that is readily doable today, far superior, in our view, to say, for example, fuel cells because you don't have to worry about precious metals and all of those things.

(00:47:53):

You just burn the hydrogen in your car, you produce water, and off you go. These technologies exist. And so it's a political choice not to do nuclear. So what part of that 80% of the non electricity pie could nuclear address? Far more than we would fall off the energy cliff because of peak fossil fuel slash lower energy return on energy invested coal, oil and gas facilities in our view. So industrial grade steam, 10%. That's obviously, what, 12.5% of that 80%, because none of it is... Well, it does produce electricity, so I'm not quite sure what the partition would be. But you can imagine transportation. You can imagine running cargo ships on it. But again, nuclear powered hydrogen, in a scenario where nuclear was cheap, it was systematized, we were comfortable with it, the supply chain was worked out. The energy density of nuclear makes the engineer's job infinitely simpler no matter what the task.

(00:48:58):

If energy were free, we could make polyethylene from CO₂, right? It is just a matter of what the cost of primary energy is on the front end. In theory, you could electrify a lot, and a lot of that could be met with nuclear, which is why people foolishly believe they can meet it with intermittent renewables like wind and solar, but the same set of heat pumps and electric vehicles and plug in hybrid vehicles and steam generating co-generation facilities could easily be met with nuclear power with no technical inventions really needed.

Nate Hagens (00:49:32):

I don't know a lot about...

Doomberg (00:49:34):

Doesn't mean it's going to happen. I'm just giving you the theoretical.

Nate Hagens (00:49:36):

Yeah. Yeah. I don't know a lot about small modular reactors. Like in a state where I live in Minnesota, Wisconsin, there are several nuclear plants. A lot of my electricity

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comes from a nuclear plant by Prairie Island. How many more times number of actual nuclear power plants would there be in the SMR scenario? Hundreds of times more or...

Doomberg (00:50:08):

Well, SMR is a bit of a bad brand, a bad sort of label. You can have 10 small reactors in one unit and call it a big power plant.

Nate Hagens (00:50:20):

Okay.

Doomberg (00:50:22):

The thing that's interesting about SMRs is that you could do one of them in an industrial setting. One of the reasons why people like SMRs is because it spreads out the risk of a major meltdown, has a limited impact, and the new technologies are basically impossible to have such meltdowns anyway. But nevertheless, the environmentalists have tricked us all into believing that we need fifteen-nines of redundancy when thirteen-nines would do. But SMRs do provide the potential for radically changing the industrial side. Again, we focus a lot on the grid. The grid, of course, serves both residential and industrial, but we focus a lot on transportation, which is electric vehicles and so on.

(00:51:07):

But there's a vast array of carbon emission abatement potential that nuclear power could provide. And in fact, there's the famous McKinsey cost curve from back more than a decade ago, which shows, for example, how much HVAC, for example. Just achieving thermal comfort for humans is an input into our carbon emissions. You can imagine running the vast majority of that on electricity using nuclear power. There's lots of constraints. You'd need far more transformers and a far better grid, and so on than we have today. But theoretically, I think that we could certainly, with very reasonable amounts of money invested, in a very short period of time, with the right political support, abate far more than the sort of peak oil cliff that would be presented

(00:52:02):

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using nuclear, then I suspect that that's what we'll eventually have to do because I do believe situations like Ontario are the rule not the exception. When a population has had enough, political revolt happens and physics is consulted once again.

Nate Hagens (00:52:20):

My biggest concern about nuclear, there's lots that I have, but you know a lot more about it than I do. My biggest concern is this, scaling nuclear power assumes an indefinite continuation of civilization complexity and the ability to have surplus energy to solve problems, et cetera. Even if it's 100 years from now or 120 years from now, if there's suddenly a civilization breakpoint and we have 450 or 1,450 nuclear plants that all run out of diesel for their generators as backup, that could be a really disastrous situation. What do you think about that scenario?

Doomberg (00:53:08):

So we're actually researching a piece on this exact topic, so thank you for asking and we did not discuss it in advance. The piece is tentatively titled Frame of Reference. We'll see if it remains. When you add up all of the nuclear weapons we've tested, bombs we've actually dropped both during conflict in World War II, and then during all manner of practice and development runs, the vast amount of radiation that we have emitted into the atmosphere dwarfs what the worst case scenario risk would be in the scenario that you describe in our view. It takes a shockingly small amount of uranium to power these reactors, and one of the reasons why the propaganda around the anti-nuclear movement has been so effective is because they have been creatively and effectively been able to confuse people into assuming that civilian nuclear power is on par with military nuclear power, which are two vastly different things.

(00:54:13):

In existing nuclear reactors today, the minimum amount of fuel needed to run for the decades that they intend to is used on hand. The Earth would do just fine in a world where we suddenly disappeared and systems were left to erode and decay, and in fact, many of the new designs, of course, are designed to automatically shut down in the absence of human intervention, which is one of the design criteria that the NRC has imposed upon the approval of new designs. And so in the world of trade-offs, what happens in a world where we're all vaporized sort of Star Trek style, it's kind of a

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Pascal's wager situation anyway because we won't be around to see it, but the Earth would do just fine. There's massive amounts of uranium deposits in Africa that are totally radioactive today. We dropped bombs on Japan. Japan is fine when you go visit it today. The Earth heals and however many nuclear power plants we have in the world where we get vaporized overnight, the Earth will be just fine on the other side of that trade, in our view.

Nate Hagens (00:55:24):

So I understand the political threshold on changing the nuclear percentage in the mix, but given what's happening with Russia and Ukraine and the European Central Bank, and I'm about to ask you about debt and currencies, are we running out of time and what is the lead time needed to really meaningfully scale SMRs or other nuclear plants either in the United States or globally? Isn't there a very long lead time necessary?

Doomberg (00:56:00):

That's a great, great question. So in 1970, around 1970, Canada, a population of what, 15 million back then, set about the task of bringing on one gigawatt of nuclear power every year for 20 years using standardized, can-do reactive designs, and they did it. 50 years ago. It only takes a long time now because we have chosen to allow it to take a long time. The environmental movement, to its credit, has done an incredibly effective job of infiltrating various global regulatory bodies, starting nuisance lawsuits, doing everything in their power to impede, delay, and/or cancel every nuclear power project that's been proposed. And the longer they drag it out, the less attractive it is for new money to come in and so new money hasn't come in. These are all political choices.

(00:56:52):

If Canada could build a new world scale, totally efficient, 90 plus percent capacity factor nuclear power plant once a year every year for 20 years, 50 years ago, we can't do that today. Of course we could do that today. The environmental movement has done everything in its power to make nuclear slow and expensive, and then they turn around and say, "We shouldn't do nuclear because it's slow and expensive." Credit to them. They have won that propaganda war quite convincingly. In fact as we'll close

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Frame of Reference, at least in my head as it's going to be written now, the single greatest barrier to meaningfully decarbonizing our economy without crashing people's standard of living is for the nuclear industry to fight back in the propaganda war. These were all choices. If the US government decided to eliminate the red tape, standardize a set of nuclear reactor designs, build a homegrown workforce and supply chain to do that project Manhattan style, we could do it. It wouldn't take long. We choose not to. It's a luxury of the rich.

Nate Hagens (00:57:56):

There's so many things that are luxury of the rich that all come ultimately from energy privilege, which we take for granted. You and I having this conversation is a privilege of the rich. A luxury of the rich.

Doomberg (00:58:08):

Of course, yeah.

Nate Hagens (00:58:09):

In many ways, yeah. So shifting to another topic that your team writes about and I have followed quite closely is the concept of debt. So your team has mentioned that a debt jubilee is ultimately inevitable at some point in the future, not so near future or near future. Can you unpack why you think this is and what this debt jubilee will mean for global currencies and markets, et cetera?

Doomberg (00:58:41):

Our view is that we are assuming debts that are literally impossible to repay. And so-

Nate Hagens (00:58:47):

Because they have to be paid back with energy?

Doomberg (00:58:52):

Correct, so either they have to be hyperinflated away, which is a soft form of default, or we actually have to default on those debts. And we have been able, when I say we, I mean the United States in particular, but the G7 countries in general have been able

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to kick the can down the road predominantly because of the US dollar hegemony and its role as both a reserve currency and a reserve asset in the form of treasuries. And there's utility that extends beyond our shepherding of the solvency of our country that has allowed us to pretend like we're solvent for far longer than perhaps even we would've believed say 15 or 20 years ago.

(00:59:35):

But we're now crossing a very interesting point in time. In the name of fighting inflation, of course, the Fed has raised rates aggressively and for the very first time, the federal expenditures towards interest payments is greater than that of the Department of Defense if you can believe it. We will cross a trillion dollars in interest payments alone. And because of the sanctioning of the Russian reserves, the marginal buyer of US treasuries, i.e., foreign central banks is perhaps looking at the money goodness of such investments with perhaps a more wary eye.

Nate Hagens (01:00:15):

If it could happen to them, it could happen to me.

Doomberg (01:00:17):

Five, 6% interest rates. Of course, this is something we write about with the debanking scandals that are unfolding. Of course, both of us could be debanked tomorrow and we would have very little recourse. Same phenomenon occurs at the national level. We debanked Russia. Whatever your thoughts are. It's funny, nobody talks about it in this way. The US defaulted on its obligations. The Europeans defaulted on their obligations. I'm surprised that some enterprising hedge fund didn't buy some credit default swaps and try to sue to enforce the fact that a fault occurred. We had an obligation to repay Russia when those treasuries came due and we just arbitrarily decided we weren't. That's fine. It may be justified. We may think it's great policy. We may think it's brilliant policy. We defaulted on US treasuries, pure and simple, and so we will eventually have to default on debt that can't be paid back.

(01:01:12):

And so the debt jubilee is kind of like a singularity. The laws of physics break down. It's very difficult to see what's on the other side of that and really probably impossible to predict. We suspect that the path of political expediency would dictate that we

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would go down the inflationary route, that we would print our way out of this and that we would never default nominally, and that everyone would have plenty of time and forewarning that this was occurring so that the rich people could position themselves accordingly, whether or not our societies could withstand such a dislocation that comes from inflation because all you have to do is read that the Weimar Republic tellings to understand just how destructive it is, especially for everybody from upper middle class on down. That periods of elevated inflation, the damage it imparts is really, really staggering, except for, everyone except for the ultra rich who have access to leverage so that they can port their wealth from one side to the other of that singularity.

Nate Hagens (01:02:16):

I find it in Congress that you think by 2040 we will have more coal, oil and natural gas, but between now and then we will have a debt jubilee because we're defaulting on our obligations because we have too many financial claims on a finite biophysical reality. Can you merge those two views somehow?

Doomberg (01:02:39):

Yeah. One is a global view and the other is limited to the three billion people in the West that have squandered the currencies and the privileges that have been granted to them. And so yes, the combination of the nine or 10 billion people that we'll have by 2040 will burn more coal, oil and gas. And also we will probably have to have a new economic system for that to occur. I don't think they are incongruent with each other. So one was a sort of an integral, and the other is zooming in on a particular subset of the humans on the planet.

Nate Hagens (01:03:14):

You were a smart chicken. I hadn't thought about it that way...

Doomberg (01:03:21):

Yeah, but this is all I do for a living. And so I think about it a lot, you know?

Nate Hagens (01:03:29):

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But I could argue that from an energy is life perspective, that the United States, despite our flaws and our extravagance and the default with Russia that you just mentioned and all kinds of other issues.

Doomberg (01:03:48):

Sure.

Nate Hagens (01:03:48):

We still produce 90% of our own energy.

Doomberg (01:03:52):

Oh, look-

Nate Hagens (01:03:52):

Whereas Europe and Japan-

Doomberg (01:03:54):

... if you drew a box around NAFTA, yeah, yeah. A hundred percent.

Nate Hagens (01:03:58):

I think those other countries from this vantage point on debt versus continued viability of their economic system, we are not the first shoe to fall there.

Doomberg (01:04:12):

Oh, 1000%. I couldn't agree with you more violently. And in fact, if you drew a line around Mexico, Canada, and the US, you have more than all you need for massive food, energy, fertilizer, minerals, technology, demographics, you name it. And that I believe means that we will eventually get our act together. And on the other side of that debt jubilee, which will be a moment in time, don't forget when the Weimar hyperinflated, it wasn't forever, until Germany was a far stronger, a more robust economy to the point where we could fund a war machine that nearly put the West on its knees two decades later.

(01:04:57):

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Japan, after the war, we nuked them. Look at the power of the third largest economy in the world, second for a very long time. But just to put some numbers around it, we wrote a piece back in early mid-June called Got Milk, where we talked about Jevons Paradox and Ireland's crazy desire to cull its cattle and we showed a chart of energy use and economy size of the G7 and then the seven most populous countries not in the G7 because the US is, I think, the third or fourth largest population in the world, but the seven biggest countries in the developing world, China, Brazil, Indonesia, India, Pakistan, Bangladesh and Nigeria. And we mentioned in the piece that they use a fraction of kilowatt hours per capita that we do. And if they just increase their energy use by 10%, that would be 30 times the total energy use of Ireland.

(01:05:55):

And so what Ireland does with its cows is utterly irrelevant to the global scenario analysis that we have to think about come 2040. And in fact, just to give you some numbers, if the US is roughly at 80 kilowatt hours per capita, 8,000 kilowatt hours per capita, the bottom five countries, Indonesia, India, Pakistan, Bangladesh and Nigeria are something like 5,000. So they need to go up by a factor of what? That's 16. A factor of 16, not 16% to just reach parity with the US standard of living. And all of those people, all five billion of them or 3.9 billion in just these seven countries want that. And who are we to tell them that they can't? And so when you ask me, will we be burning more oil, gas and coal in 2040? I'm thinking of those 3.9 billion people who are hardly burning any and that the ones that are over burning and leveraging their privileged position in supply chains and/or with currencies would probably have to pass through a debt jubilee to see the other side of that as well.

(01:07:05):

They can't pay it back, right? I mean they just can't pay it back. Where's it coming from? The scary part, Nate, is that we've made promises not in dollar terms, but in services. That's the scary part actually. It's hard to inflate away the service aspects of the promises that we've made, but that's a whole other discussion.

Nate Hagens (01:07:23):

What do you mean? Like pensions and things like that?

Doomberg (01:07:27):

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Healthcare, Medicaid.

Nate Hagens (01:07:29):

Right, right.

Doomberg (01:07:29):

These are services that we've bought, we've promised people, and those are not inflatable. You can't just inflate that away. You have to cut those, and that's when you have real societal revolt.

Nate Hagens (01:07:41):

So what does this look like a debt jubilee in the next 10 years or so in the United States? What does that look like for the average person?

Doomberg (01:07:48):

Boy, deep question. Hard to predict. It probably involves, well, I think the debt jubilee won't be an event, I think it'll be a process as we inflate it away. I don't know. It is truly a singularity. It's very, very difficult to model and harder to get right, but that which can't go on forever usually doesn't, right? And so when we are at the point where the US total budget under Reagan was a trillion and now we're spending a trillion on interest.

Nate Hagens (01:08:24):

Yeah.

Doomberg (01:08:25):

It's a trillion. Not the debt, the interest on the debt that we've racked up is a trillion.

Nate Hagens (01:08:31):

Yeah.

Doomberg (01:08:31):

That's going to get monetized.

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Nate Hagens (01:08:34):

So we could assume we're going to have, if we've lived beyond our means for 50 years, we're going to have to take a pay cut as a country?

Doomberg (01:08:46):

Or we're going to default on our obligations and we're going to default on our foreign obligations and export the haircut. And what does that mean? I don't know. Luckily, as you mentioned, this region is largely self-sufficient, but when it comes time to choose between the domestic and the foreign holders of our debt, we suspect that they will be partitioned into separate camps for political expediency if nothing else.

Nate Hagens (01:09:14):

Yeah, I could imagine that scenario. So linking energy and finance to this debt jubilee concept, I agree with you. I think the default path as in the most likely path, not the currency default path, the most likely path is we will try to inflate it away and then people want to protect themselves because holding dollars in the bank will be worth less and less every year. So they want to buy things like gold or land or Bitcoin or cryptocurrencies or anything that could protect themselves. So there's, I think, governments are anticipating that, I think, and planning central bank digital currencies to preempt this move. Is this a way for central governments to exert more control over the markets? And I know you've written a little bit about central bank digital currencies. Can you give Doomberg's view on that and maybe Bitcoin, et cetera?

Doomberg (01:10:22):

Sure. Great question. And it's a bit of an aside since we've read so much of the history of hyperinflationary environments. It is an interesting thing to be sitting here today with the official government statistics saying inflation is coming under control. My personal real life experience of that being inconsistent with those numbers. And then we're seeing in the stock market today, incredible froth. And if you read, I think it's called *The End of Money* during the Weimar times, one of the early indicators of the sort of pre-hyperinflationary phases was this amazing and historic and really unrecognizable desire on the part of participants in the market to trade the Deutsche

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Mark for virtually anything, a claim on future earnings of a company. Pick your favorite. And that was in a way the market getting ahead of what was coming. And one wonders, as we sit here and watch Nvidia surpass a trillion dollar market cap based on what I believe is nothing but AI hype and various other echoes of the stocks era post COVID continued to beat away whether the market isn't telling us something. (01:11:31):

I haven't validated this factoid myself, but I've seen enough times that I believe it's true. I'd have to go back and check but it turns out I believe that the US stock market bottomed the day of the Midway Battle, and even though nobody in the US knew the true outcome of that battle until years after the war, the stock market knew and the US stock market began an incredible ascent from that bottom on the very day that the Battle of Midway occurred. The markets have a funny way of predicting the future, and we don't look at the current bout of speculative fever in the absence of the sort of concept around the debt jubilee inflation and so on. And so to your question about central bank digital currencies, we are violently opposed to them of course, because we do believe that that would be the last messages of personal privacy and freedom ripped away from us irreversibly. Once the government has line of sight into absolutely everything that you do transaction wise, they have the political power to abuse it, as we are seeing already. It's irresistible to not punish your enemies if you have such power over them, even if temporarily political leaders do not have the foresight to imagine a world where their enemies gain control and then rebound onto them what they're currently doing. And so central bank digital currencies will be introduced for a variety of reasons. We don't doubt that it'll be a crisis. The way they'll do it is we will have the next COVID lockdown induced or otherwise, and they'll say there's \$10,000 for everybody, but they have to sign up at fedcoin.com and basically it'll be voluntary in the beginning and then the next thing you know won't be able to buy groceries unless you're going to be spending Fedcoin. That's how it's going to happen. We suspect that we're fighting a losing battle, but the ability to control how and where and on what people spend their money is of course an incredibly powerful tool that will be used to kick the can down the road because they could toggle the velocity of money as they see fit for political expediency but that comes at a cost of personal freedom for sure.

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Nate Hagens (01:13:34):

That's plausible to me. Building on that a little bit, when I have new guests that I've never met and I know their last name, then at this point of the interview, I kind of start to call them by their first name, but your first name would be Mr. Doomberg so it's an awkward situation for me, but in any case-

Doomberg (01:14:02):

You can just call me Doomi.

Nate Hagens (01:14:03):

Doomi, okay. Is the trilemma that we're facing with lower energy quality, with consuming beyond our means so we have this huge debt load with some of the environmental ecosystems, supply chain pressures, with all the different polarization, et cetera, whether it's a left word or a right word, we don't have to get into that, but it seems like we have a risk and heading towards a more authoritarian system, and how can we have a system of governance that potentially could solve or at least alleviate some of the challenges coming in the next 20 years because I just don't see our government, whether Republican or Democrat is, in its current system, able to handle some of the challenges we face. What are your thoughts on that?

Doomberg (01:15:01):

First of all, I think they're the same party.

Nate Hagens (01:15:04):

How so?

Doomberg (01:15:05):

I think that many of the quote unquote "disagree." I think it's a uni party, Washington DC blob where nobody within the sort of DC nexus, the wealthiest counties in the country all surround Washington DC which ought to be a bit of an eyebrow raiser, especially given the way in which the country was founded. I think that much of the "disagreement between the parties" is made for TV to keep people distracted as the treasure and wealth of the country is plundered by our unethical leadership. I think

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we're in a very bad spot politically in the US, very dangerous time politically in the US and so I wouldn't really draw a distinction between the two. I will say there was one potential saving grace, which our friend Luke Gromen talks about over at Forest for the Trees, and we kind of alluded to here, but I want to say it specifically is an energy miracle could bail us out of a lot of this because ultimately currencies are just manifestations of our energy policy.

(01:15:56):

And we believe that miracle could just be a renaissance with nuclear power but pick your favorite. Imagine if you think fusion or some other breakthrough technology magically arrives and we can suddenly produce an enormous amount of energy with very little investment, then a lot of these problems go away and you can avoid a debt jubilee. And so this is why of course we're so pro-nuclear because the jubilee will be triggered by this sort of lowering of our energy return on energy investment, which is a policy choice today because we are focusing on low return, intermittent renewables, and foregoing high return nuclear energy. Those policy choices could be reversed. But this is one of the big points of advocacy for us. And if we did enough of that soon enough, you could imagine that we wouldn't have to either self default or hard default on our future obligations because we would be producing excess life in the form of excess energy.

(01:16:50):

Whether or not the political stars align in time is a different question. One that we are probably we share your pessimism on, but the plausibility of it is totally real. And if we had a truly global crisis where we unite at aliens are coming and we have to unite as a human race Independence Day style with Will Smith, it could be done. There's no unartificial constraints, like all the constraints are artificial. We could do that today. We're too dumb to do it yet, but we still could.

Nate Hagens (01:17:23):

So your team has come up with an area of four issues, four areas that a nation could focus on to improve energy security while also reducing carbon emissions. Could you unpack the vision that the Doomberg team has on that?

Doomberg (01:17:42):

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Yeah, we wrote a piece early on called, I think it was A Sensible Strategy for US Energy or something to that effect. So this is predominantly US focused. It's where we live. It's where most of our subscribers are, so apologies to your global listeners, but it's probably applicable to most countries. The four-part Doomberg plan would be a Renaissance with nuclear quite obviously,

(01:18:03):

that goes without saying. We would proactively replace coal with natural gas to the extent that we could. The US is blessed with an enormous bounty of natural gas and that prices far below the energy equivalent price of oil today, vast supplies of nuclear energy could be brought online given the bounty that we have in the US. There's no reason why that we should be burning as much coal domestically as we do. I'll give you an amazing stat. If you sum up the amount of natural gas that the US either flares in the field because it doesn't have the pipeline infrastructure to move it out of the field while it's producing oil or exports to its LNG facilities, that's roughly the energy equivalent of the amount of coal that we burn every year.

(01:18:46):

So just at the very highest back of the envelope swag, McKinsey interview question analysis, we could replace all of our coal today with natural gas, which would substantially cut our carbon emissions. We would build a domestic solar supply chain. We have seeded that market unnecessarily to China for a variety of reasons, which we have written about but don't need to get into here. And then we would pivot from full battery electric to plug-in hybrids because battery materials are the limiting constraint as we try to electrify our electrical sector. Management 101 dictates that if you have a hard constraint, you should manage to it.

Nate Hagens (01:19:23):

I read this morning that a full electric vehicle, like a Tesla, especially with the extra range battery that that battery has the lithium and other rare Earth metals that would be enough for 30 hybrids like Priuses or plug-in hybrids. Is that true or is that in the ballpark?

Doomberg (01:19:46):

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That's true. It's in the ballpark. So let's put some numbers around it, which is why we write about it so passionately. So if your limited objective is as follows, we want to abate as much gasoline burned in the transportation sector. Forget about where the electricity comes from and all that other stuff. Let's just focus on the narrow question. We burned this much gasoline today in internal combustion engines in passenger vehicles, and we would like to burn less of it. We have a finite amount of battery materials. What do we do with those battery materials? Let's do the numbers. Let's take an 80-kilowatt-hour battery pack that you might find in a sort of standard Model S or souped-up Model Y. Let's assume for round numbers it's 80 kilowatt-hours, and I drive that car exclusively. We have abated 100% of the gasoline use of one driver with that 80 kilowatt-hours, okay?

(01:20:42):

Now, let's imagine we split that battery packet to four and we make four plug-in hybrid electric vehicles where the first 40 miles are pure electric. And then if you drive more than 40 miles before getting to another charger, your gasoline engine kicks in and two or four of those kilowatt-hours are used to convert your car into a Prius, say like a Chevy Volt architecture or pick your favorite plug-in hybrid. And let's just put a round number on it. Let's imagine that you could abate 80% of your gasoline burning with that one 20 kilowatt-hour battery and you do that four times. Most people don't drive more than 40 miles in a day. So 95% is probably a safer estimate, but let's just go round, 80. 80% of your gasoline use is abated with 20 kilowatt-hours. Spread that over four, four times 80 is 320.

(01:21:31):

Last I checked, 320 is bigger than 100. So we are abating 3.2 drivers worth of gasoline for the same amount of battery that it would take to abate one person's in a full BEV. Now, going even further. A hybrid Prius has, depending on the model in a year, somewhere between two and four kilowatt-hour battery pack. It's still predominantly internal combustion engine, but that small battery allows you to double your fuel efficiency. Now, paradox aside, let's just assume that we can get 20 people debating half of their gasoline use because you've doubled their fuel efficiency. You see where the numbers add up. And so if battery materials are the limiting constraint. Now, if they weren't, knock yourself out, bill all BEVs, but they are. It takes an enormous

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amount of fossil fuels to mine the nickel, the copper, the cobalt, the lithium in order to do that, and nobody knows where it's going to come from.

(01:22:34):

And so given the narrowly defined problem, it is just undeniable that hybrids are better than plug-in hybrids. Plug-in hybrids are better than BEVs, and Toyota's wisdom in this way is being punished by the market today. Of course, there is no automotive company that has done more to minimize gasoline consumption of their individual drivers. Now, whether somebody else doesn't eventually burn it because it's made cheap Jevons paradox and all that other stuff, different question. But if your objective is to get the least amount of gasoline consumed with a fixed amount of battery materials, distributing more of those batteries to more vehicles is just mathematically the undeniable answer.

Nate Hagens (01:23:16):

So that's very plausible to me. But it requires a systemic understanding of not only energy and climate and human behavior, but materials and supply chains and other things. Can we have a systemic policy with energy and in economy in the way on some of the topics we've been discussing here today? And as a broader question, how do you see US energy policy going in the next 10, 20, 20 years as the default? It just seems like we're playing whack-a-mole with blinders on as the default.

Doomberg (01:24:02):

It's a great question because there's an answer that says you're asking me whether central planning can ever work, right? And so on the flip side, it can work better in some circumstances than others. And the piece we put out today called Cheat Codes, the thrust of that piece is Ontario's 10 years ahead of us, they failed and rebuilt and are now reconciling with physics. Let's just skip the in-between. And so when you ask me about the political situation in the US in the next 10 to 15 years, my answer is it depends on how much pain we inflict on the population between now and then. And whether or not a true political revolt occurs as people are forced to choose between starvation and riot. And they will always choose riot on the path to starvation, right? Political or physical. And the voters of Ontario write it in 2018.

(01:24:53):

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They swept out the ruling liberal party because of the Green Energy Act, and they brought in the Ford administration. And Doug Ford and his team have done a magical job of recognizing the laws of physics and having a nuclear renaissance that is showing the world that you can have a completely green grid. Now, if Ontario electrifies, they will actually abate their carbon emissions because the vast majority of the electricity today comes from nuclear and hydroelectric. And all of the growth that they're projecting for now will eventually come from nuclear if the plan's announced in the past two weeks manifest.

(01:25:29):

By the way, the Volkswagen just announced they're going to build a giant battery plant in Ontario. And so you could see the circularity of that economy beginning to rise. We would be the first to want to drive a hydrogen combustion engine or a plug-in hybrid vehicle with hydrogen even tapped into a nuclear power plant. I'd live a mile away from a nuclear power plant, I'm not afraid of them. I would be secure knowing that the power is never going to go out and we don't have to worry about such things. We will eventually get there, or we will muddle along because we've not yet experienced enough pain.

Nate Hagens (01:26:00):

Speaking about the pain, we've mentioned the possibility of energy war, of a debt jubilee of different problems. Is there a middle ground for our future between Bloomberg and Doomberg per se?

Doomberg (01:26:22):

Yeah, we have been a bit pessimistic today. And I would say that at our core, Doomberg is actually, it's a bit of an inside joke. We actually are pretty optimistic people. We would bet on humanity. We do believe that once we exhaust all of the dumb ideas, we, like Ontario, like Japan is doing now, we'll eventually end up back at the good ones. By raising these issues, our hope is that we are perceived as alarmists, but we do make change. And so in the long term, the reason why I would confidently bet that we'll be burning more energy fossil fuels, et cetera in 2040s, because I do think the human endeavor, you can't suffocate it. And so we would be long-term bullish, short-term bearish on political expediency.

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Nate Hagens (01:27:07):

We also mentioned on this call several times the environmental movement, which is itself a diverse movement because I am an environmentalist, I care deeply about the natural world. So you have not shied away from any tough questions on this conversation so far. So let me ask you this. You mentioned that you have draft age children and that you're worried about the nuclear war potential being drafted in the war, but your children also will be in their 40s by the year 2040. Are you worried about the natural world and the decline of insects, animal populations, ocean acidification, warmer temperatures, and the ecosystem fabric of our world for your children? Or is that something outside of your scope?

Doomberg (01:28:04):

No, of course I'm concerned about my children and their children. And I would partition the potential negative externalities that you just described between pollution and climate, and we would be violently opposed to pollution in all of its forms. And we are all for globally enforced strict mandates on pollution controls. I think the state of today's oceans is a true scandal that needs to be addressed. I think that, for example, we have experienced that the Chinese are more than willing to pollute in order to gain monopoly market share in what they consider to be strategic industries. And I don't know how we enforce that globally.

(01:28:44):

I totally get that the Earth and nature are a key input into our economy, and we do not want to decapitalize that flippantly, inefficiently or wastefully. And so am I worried about the future generation's innovative capacity to respond to the consequences of climate change that are derived from the burning of fossil fuels? I'm not all that worried about that. I am worried about irreparable pollution damage and destructions to natural ecosystems that are irreplaceable. And I would partition those two. And by the way, a standard trick of propaganda is to conflate them, is to assume that you can't, for example, capture the carbon at a fossil fuel plant and sequester it, for example. But I would distinguish between pollution and climate.

Nate Hagens (01:29:40):

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In my work, I talk about two different types of environmental impacts. The metabolism of the global system, which is the byproducts of the energy we burn, which are climate and ocean. And then everything else, which is pollution in your case and headed into a world with lower EROI and tougher fiscal situations. If we globally regulate pollution, if we internalize the costs that are currently externalized, that will be another financial burden on financially strapped nations. So there's that.

Doomberg (01:30:21):

Yeah, there's no question that we are decapitalizing in a way, the hidden costs of the damage that were being done or not born by the people that doing damage and-

Nate Hagens (01:30:30):

I've never heard that word before. Decapitalizing, what does that mean?

Doomberg (01:30:33):

So you have a capital stock as a company, and in order to maintain a viable enterprise, you have to spend a certain amount of maintenance capital to upkeep the factory and perhaps expand here and there. A standard trick of private equity is to buy something and just run it into the ground to monetize the existing facility. Run it longer than it should, run it harder than it should, only fix stuff when it breaks, never do preventative maintenance and so on, and so on, and so on. And in a way, that is the mental model that we use for how China behaves in many of the industries that it has successfully monopolized. Most famously when we were in it, the solar industry. They leveraged dirty coal slave labor and very, very poor local pollution controls in order to make artificially cheap solar panels and flooded the world with them.

(01:31:16):

And all of these so-called planet carrying companies that have great expos at the COP meetings are the first to stick a unreasonable request for proposal in interface when the Chinese were trying to take market share. And I could name the companies, but I won't. Hey, I know that they've stolen your intellectual property and they're polluting their own local environment in order to give us these panels at this price, that's for the courts to figure out. If you can't meet that price, you lose the business. And guess what? We lost the business, and the West lost its solar supply chain. China

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controls 95% plus of the key steps in the solar supply chain because they decapitalized, they destroyed their environment in order to do so. And so, I don't know how you fix that. But by decapitalization we mean, as you say, the social costs are not included in the price.

Nate Hagens (01:32:02):

And we could have a solar industry in the US, it would just cost more than the current solar panels because of our cost of labor and other things. But it's energy security, it's local and regional supply chains, it's more jobs, et cetera.

Doomberg (01:32:18):

It's tight environmental controls too. I mean, again, the same thing, like part of the costs that are avoided is addressing the pollution. I competed in many industries. When your competitors' idea of a water treatment plant is a pipeline to the river and you operate in a western-based company with ethics and sustainability departments and obligations to your permitting regulators that you wouldn't engage in such behavior, it's impossible for you to compete on price. And when the companies who are buying from you have the hypocrisy to claim through their greenwashing and their pamphlets and their booths at various environmental conferences that they care about the planet.

(01:32:57):

And then the moment something comes in 25 cents a pound cheaper when in fact it costs you 25 cents to clean up the water you're discharging, it doesn't take a genius to understand what's going on. And that happens. That's reality. That's the reality I live and that's reality that I experience as a professional. And that's the prism through which we do many of our writing.

Nate Hagens (01:33:17):

This has actually been fascinating and I have a lot more to ask you, but maybe we'll have to have a second conversation at some point. I have some standard questions that I ask all my guests but let me ask you this. In speaking as a talking chicken or any other anonymous icon, is that a future trend, do you think, in the media? Because I wonder what you can say more on a podcast than I can say because people know my

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name and everything. We don't know who you are. And obviously your words are cogent and well-thought-out, but you have a little bit more of a social license than I do because you're just a talking chicken. What do you think about that?

Doomberg (01:34:06):

Yes. So we are a talking chicken and anonymous predominantly for brand. We did it in the beginning for a variety of reasons that when we blew up, we have observed that when other anonymous people de-anonymize, it destroys the brand intrigue. And given the value of the brand and the success we've had, we are hesitant to do so. There are hundreds of people on Wall Street who know who we are. Substack knows who we are. We've passed anti-money laundering, know your customer at our banks-

Nate Hagens (01:34:34):

I didn't know that.

Doomberg (01:34:34):

... and Stryk knows who we are. It's mostly just brand. There is undoubtedly a small part of that that says it's much harder to cancel a set of ideas than a person, which is an ugly aspect of our discourse, and we certainly benefit from that. It's not the primary driver. We do have to watch what we say mostly because we try to be polite and live a civilized life, but also, we have thousands of paying subscribers. And if we said the wrong thing, many of them might revolt and cancel, which is the market's way of correcting discourse that we respect. We care deeply about what our paying subscribers say. And so this is an important thing to us. But also, we just believe in fundamental decency, which is why we can discuss provocative things without being polarizing, which is one of our brand ambitions.

Nate Hagens (01:35:21):

Well, thank you for that. But this question then goes beyond Doomberg and your brand. But just broadly, I think we're headed for a world where there are so many polarized single-issue silo, fanatical people on all political stripes that if you say something that's complex and nuanced, there's a knee-jerk reaction and we can't have civil discourse without mudslinging and worse. I mean, part of me would love to be this

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social educator the way I'm trying to do now without my name at risk, so that I can have a wide variety of discussions without the recourse of social canceling because we're headed into a very, very difficult social and economic environment the next decade. And so, I worry that the truth can't ever really be spoken publicly because it's too dangerous and off-putting to certain parts of the population.

Doomberg (01:36:29):

So there's a bunch of trends converging that support our decision to stay anonymous. Some negative, like you just described others positive. There are two megatrends on the positive side. So first of all, I agree with you completely. I concur with that analysis. It is a concern of ours. It isn't the driving force as to why we choose to identify as a green chicken in the modern vernacular, but there are two other forces. One, everyone's going online, and you can have a proactively different persona online than you choose to have in your personal lives. Sometimes for the better, sometimes for the worse. For example, many of the people who troll us on Twitter and social media would never say such things to you at the grocery store because there's a certain level of decency and interaction with a human that is removed when you're interacting with people on the Internet.

(01:37:15):

That's another reason why. There are, of course, enough jobs who transcend the Internet, find out who you are and show up on your property and that's bad. I'd like to avoid that. But there's another more positive trend as well, which is this megatrend of content created and consumed by humans for humans as a natural revolt to the perfection of tasks by computers. And I'll give you a hopeful story. One that we believe puts us in the proper swimming lane with a strong current behind us, and we caught a wave with Doomberg when we started because of the COVID lockdowns and take chess. Computers have perfected the game of chess. The most prolific genius chess players in the world. You have Magnus Carlsen's, Hikaru Nakamura's, pick your favorites. They could play a computer 100 times and never even get a draw today. That's how far ahead computers are for humans.

(01:38:20):

The content wrapper around the human-to-human competition in chess has exploded in popularity. It's off the charts. People love the human drama. The time controls are

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tight, the moves are faster, blunders are more common. The drama, the soap opera, the personalities, the human competition, the human endeavor. When a human plays incredibly well, that's far more impressive to other humans than when a computer plays perfectly. And you just have to go on YouTube and search for Hikaru Nakamura's channel. He has 2 million subscribers on YouTube. He just plays chess. He streams, they cut up nice videos, people comment on his games. Then when he goes to participate in tournaments and other people are providing that content wrapper around it. As computers take over more and more of the daily grind of eking out a living, we humans want to be around, read about, interact with, become part of another human's team.

(01:39:23):

And one of the reasons we've been successful is because we have built a strong audience that's loyal, that believes in our credibility that we would never risk. We have an intellectually consistent ideological framework through which we write. We try not to be partisan. We do not shy away from being ideological, and we exist to delight our human ideal customers, and we see more and more of that. That's a trend that blew up with COVID. As computers take over more of the hard work, it's not the whole work from home, all of this other stuff. People are seeking other humans, the visceral entertainment, the love, the hate, the drama, the affection, the arguments, the debating, all the things you're talking about. That's actually what it means to be human. And as computers perfect more and more of what we do, the desire for that real human interface only grows. And that's why despite the fact that computers have dominated the chess world intellectually, the content around it has exploded like you wouldn't believe. And it's the same thing for pick your favorite activity.

Nate Hagens (01:40:29):

It would be hard for artificial intelligence, even in advanced version in the future to be able to replicate the conversation that you and I just had.

Doomberg (01:40:39):

Even if it could, people would still rather listen to us. People would rather listen to us because that's the exact point of the chess story. Yes, ChatGBT in two to three years will be able to consume all of the Doomberg articles and create one in my voice. I

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don't doubt that. People won't want to read it. They'll want to know that the person behind the Doomberg green chicken wrote the piece and was edited by his editor in chief in the way that it was back in the day, which is why people by the millions tuned in for the World Chess Championship, even though a computer could obliterate everybody who was trying to qualify for it.

Nate Hagens (01:41:16):

It's the unexpected reward-

Doomberg (01:41:18):

The yearning for humanity.

Nate Hagens (01:41:19):

... which is a very human thing. Yeah.

Doomberg (01:41:21):

It's what makes us human, and we are deeply bullish that which is a great way to end it, I suppose.

Nate Hagens (01:41:28):

Super. Well, very nice to meet you and to be continued. Thank you for your work and dispelling energy blindness.

Doomberg (01:41:41):

I enjoyed every second of it, and I will come back on the moment you think that the time is right because we could go for an hour on any of the things that we discussed in deep detail. And I would love nothing more than to do so. So, thank you for the wonderful discussion. There's nothing better than having a challenging intellectual discourse with a great mind like yours, and I really did enjoy every minute of it.

Nate Hagens (01:42:03):

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