Warwick Powell: Age of Energy Sovereignty & Energy Wars

Warwick Powell is an Adjunct Professor at the University of the Queensland University of Technology, and a Senior Fellow at the Teihe Institute. Powell discusses thermoeconomics, energy sovereignty, energy transition, and energy wars. Thermoeconomics in a Time of Monsters: https://www.amazon.co.uk/Thermoeconomics-Time-Monsters-International-Geopolitical-ebook/dp/B0GRGQ9BMQ Follow Warwick Powell's Substack: https://warwickpowell.substack.com/ Follow Prof. Glenn Diesen: Substack: https://glenndiesen.substack.com/ X/Twitter: https://x.com/Glenn_Diesen Patreon: https://www.patreon.com/glenndiesen Support the research by Prof. Glenn Diesen: PayPal: https://www.paypal.com/paypalme/glenndiesen Buy me a Coffee: buymeacoffee.com/gdieseng Go Fund Me: https://gofund.me/09ea012f Books by Prof. Glenn Diesen: https://www.amazon.com/stores/author/B09FPQ4MDL

#Glenn

Welcome back. We're joined by Warwick Powell, an adjunct professor at Queensland University of Technology and a senior fellow at the Taihe Institute, to discuss his new book on thermoeconomics — a very important topic for understanding the key challenges of our time. Congratulations on the new book, and thank you for coming on.

#Warwick Powell

Thanks, Glenn. I'm working hard to catch up with your prolific output. Maybe I'll get there one day.

#Glenn

Well, it is, as I said, a very topical book, because we see a lot of political and social instability around the world, and much of this, of course, is linked to the economic shifts of our time. So, you know, when I read your book, in short, you can argue that the industrial revolution we've entered demands a lot of energy. And just as energy was a key component in all the previous industrial revolutions, we see that this is also the case now—if not even more so. China is building out its energy capacity in a major way, in preparation for the economy ahead of us, while the West sees its economies becoming, I guess, excessively financialized. And, well, if you take the case of Europe, it's actually destroying its access to energy. I was wondering if you could explain the key arguments of your book.

#Warwick Powell

Yeah, look, the book is, in many ways, a synthesis of a number of threads of thinking that have been around anywhere from 300 years to 30 years. It was my own effort to come to grips with the changing world in a way that, I believe, begins to make sense of some of the fundamental, foundational features of human, social, and economic existence. The traditions I draw on include the long historical analyses of Arrighi, who talks about the long twentieth century and the ebbs and flows of capital and empires. It also draws on the broad classical economics tradition—from Smith, Ricardo, and Marx, all the way through to some of the more contemporary heterodox ideas around endogenous money.

And I also draw on the foundational physics notions contained in the theories of thermodynamics as a way of grounding how we can think about our social and economic systems. The last thing I try to do is understand the role that information itself plays within these dynamics. I do that because, for me, information has traditionally been understood as something that brings order to a system, whereas my argument is that this is not always the case, and that we actually need to understand information through an energetic lens as well. So those are the traditions I try to draw upon to paint a picture, or to develop a theoretical approach to the world. That approach basically says something along these lines.

Human societies need food for people and fuel for machines, without which they can't reproduce themselves. So the fundamental question is really one of successful social development and reproduction, okay? This brings us back to some of the concerns of classical economics, which focused on the production of surpluses, their circulation, and the reproduction of the system itself. What I try to do is understand this set of problems through the constraints and opportunities defined by thermodynamics. I start from the basic idea that human societies and our economic systems are, at their core, energy transformation systems.

We are embodied energy. The first law of thermodynamics says that energy doesn't get created or disappear—it just changes form. The second law of thermodynamics says that the intrinsic tendency of any energetic system is toward entropy, fragmentation, and chaos. So what human societies are doing is grasping, harvesting, and capturing the energy of the world, transforming it, making it available, using it up, and in doing so, creating the conditions by which that society can reproduce itself tomorrow. A supply chain, for example, needs to operate in a way that enables it to do the same again tomorrow. There's no point in an economic or social system doing something only once.

It must be able to sustain itself. But as it seeks to do that, Glenn, it's constantly being challenged by the second law of thermodynamics, which is the inherent tendency of the system toward entropy. So what does a human social setup try to do in response to that? It seeks to intervene through negentropic interventions—means by which it can harness energy in ways that create surplus energies, so those surpluses can be used to bring order to what is actually a chaotic world, a world in which the system itself is constantly moving toward chaos.

And that cornerstone dialectic between chaos—the entropic nature of thermodynamics—and the negentropic ambitions of human societies is actually what drives social and economic change through time. The success or failure of those interventions is ultimately what defines the success, and ultimately the fall, of societies and civilizations. Broadly speaking, that's the story. Finance plays a critical role in that, because finance is the means by which complex societies, with divisions of labor, mobilize these resources and make claims on the future. In doing so, we actually end up creating two circuits of social reproduction.

One is the material circuit that I've just described, and the second is a financial circuit, which is essentially a set of rights to future value. Those rights can be created quickly, and they tend to grow faster, actually, than the ability of the material substrate to realize them. So we end up with financial bubbles, excessive liquidity in the system, asset price booms, and those sorts of things. Those kinds of crises ultimately call for deleveraging and the removal of liquidity from the system. They also lead to balance sheet adjustments and impairments, often leaving the substrate intact—factories still exist even if the company goes broke.

But if the financial layer—or the financial circuits—are impaired long enough and can't mobilize resources, then the material substrate itself begins to fall apart. The material substrate is always tending toward chaos, fragmentation, wear and tear, degradation of buildings, machines, and so on. It can only be maintained through the exertion of energy and effort. So that's the financial circuit. And the last circuit is the information circuit, which ultimately binds these two elements together. You can't have material production without information about what you're doing, and you can't have financial circulation connected to material circuits if you don't have information about what you're dealing with.

Information has to be created within a system, and in doing so, it also consumes energy. We can't create, store, process, validate, or circulate information without using energy. If the beneficial—or negentropic—effects of that information are less than its energetic costs, then that information is, in itself, entropic in nature. In other words, that's the abstract. The concrete example, Glenn, would be BS and noise. Too much BS, too much noise, uses up a lot of energy and doesn't actually contribute to system stabilization or help the system push back against the inherent entropic trajectory of thermodynamics.

#Glenn

I thought it was interesting the way you framed it—that civilization needs fuel for both machines and people. Your book has probably become even more topical now because of the war in Iran, since we're cut off from energy and also facing a food crisis with fertilizer shortages. But you also mentioned all these liberal economists, and I found that interesting because, in the past—especially in the 19th century—we invested very heavily in developing energy infrastructure, industrial power, and resilient supply chains capable of withstanding shocks. I was curious what happened, because I remember

the idea that society should focus on well-being, not just profit. That was a key theme for many of those liberal economists.

And I saw—only a few days ago—President Trump making a comment that China's economic model shouldn't work in theory, but somehow it does. I thought that was kind of extraordinary, because if you look at John Stuart Mill, Adam Smith, David Ricardo—all these people—they were quite explicit that when economic power drifts away from productive labor toward control of assets and markets, that's when things start to fall apart. So it seems that, within the West, we've made an ideology out of liberal economics that essentially breaks with the fundamentals of the very theory it claims to represent. How do you see this? Because when I watched it, I thought someone should tell Trump that the Chinese economic model actually resembles more closely the theory he's referring to than what Americans are currently doing.

#Warwick Powell

Yeah, look, it's a great question, Glenn, because the classical traditions that I've drawn upon—and which, I guess, have informed and influenced me over the course of my academic and non-academic life—have been focused around a set of questions concerning value. What is it? Where does it come from? How is it produced? How are surpluses produced? And how are those surpluses circulated to different segments of society? Ultimately, the question is how the system is able to reproduce itself. So we can go back to the physiocrats—the French physiocrats of the late 1700s—who saw all value coming from the land and from the sun. They saw agriculture as the only source of value.

Smith, Ricardo, and Marx obviously pushed back against that through the idea that value actually comes from labor. So for them, they developed various versions of a labor theory of value. Now, there is actually a way, in a sense, of transcending these two elements of the classical tradition—which is what, in some ways, I seek to do. It wasn't an explicit objective, and it would require a much more detailed work in and of itself, but a de facto outcome of the way that I conceptualize energy actually suggests that a focus on land and nature is right, in that everything ultimately comes from the world—so long as we also think of ourselves, as human beings, as being from the world. We are part of the world.

So what is it that's common about these two elements? Well, what's common is that they're both energetically centric systems. It's just that the energy form has very particular permutations. In human terms, the energy form that's most useful to us is nutrition. We bring in food as nutrition, and that enables us—having processed it—to exert ourselves and transform that energy through motion or other forms of effort, just as the sun, water, and other elements in nature transform properties in plants that enable them to grow, which we then harvest, or which enable animals to eat the plants and grow, and so on. So those concerns were actually quite fundamental to a tradition of economic thinking.

We then hit the period from the 1890s to the 1920s, when a different set of concerns began to emerge within what became known as the economics profession. Those concerns related to questions about resource allocation and revolved around the price mechanism and how resources were distributed. The classical tradition had explored use value and exchange value as distinct analytical concepts. The post-classical, or neoclassical, tradition—which emerged around Marshall and others—collapsed use value and exchange value into a single datum: price. And once you collapse everything into price and begin to focus your inquiry solely on allocative efficiency, you ultimately lose sight of the material foundations of your economic system, because price blurs everything. Price abstracts from everything.

In fact, it abstracts to a point where it assumes that different kinds of capital are infinitely interchangeable with each other. It assumes that labor of one type is substitutable for labor of another type—even if, you know, somebody's strong and somebody's weak, somebody's trained and somebody's not trained. None of that's particularly relevant, because we've suppressed our focus on these material dimensions of how we make things, transform things, and circulate things, reducing it simply to a question of the role that price plays. And that was the change.

Now, that shift in the problem ultimately gripped the institutions of policymaking, Glenn, arguably in the 1970s and into the 1980s, and was brought home through the neoliberal economics revolution. That embedded a particularly narrow set of questions around public policy that ultimately saw markets—or not markets generally, but the market as an idealized concept—as the touchstone for effective policymaking. So we then had other ideas, like market failure, introduced. Now, if you go back into the pre-war era of economic thinking, people were talking about market failure. The inquiries being made by people like Joan Robinson and others were actually about the realities of imperfect competition.

It wasn't about some quest to make real this ideological idea of the perfect market. It was actually to inquire into the nature and reasons for the existence of imperfect competition—the dynamics that drove capital to concentrate, to the emergence of oligopolies and monopolies, and what that ultimately meant for the distribution system. But come the '70s, and particularly the '80s onwards, we weren't asking those questions anymore. So that question about the ideological function, Glenn, of the mainstream economics discipline, I think is very appropriate, because it also led to other ideas—like the idea that the equities market would always price the future correctly, right?

Right now, that's clearly not true. The fact that we have asset bubbles is prima facie evidence of that. But there are more contemporary examples too. For instance, the way oil futures are being priced right now is, in my view, clearly disconnected from what's actually happening materially. The pricing is based on a whole bunch of priors. The market has a kind of groupthink—assumptions about how quickly things will rebound, how quickly the American empire will get things under control, how quickly the war with Iran can be brought to a halt, how quickly the Strait of Hormuz can be reopened.

And all of those assumptions that have led to what I think is a chronic underpricing of the future cost of oil are going to come home to roost, because the reality is, contrary to the ideology, that the United States is losing strategically—that they cannot regain control over the Strait of Hormuz. There is no military solution to Iranian control over oil flows through the Gulf, right? These are actual realities. But the groupthink, coupled with economic ideology, is making it impossible for the capital markets to adjust to new realities.

#Glenn

I was also a bit surprised by this. I mean, I was surprised by the extent to which Trump was trying to talk down the oil price by reassuring everyone that the war would soon be over. And also, I agree with you—there's no military solution, so there's not going to be a de-escalation. If anything, we just saw Yemen now entering the fight, which means the Red Sea can be taken off as well, which is quite dramatic. But again, it didn't surprise me that Trump was trying to talk down the oil price. It did surprise me, however, how successful he was, because I thought to myself, no one in their right mind would take this seriously.

But, you know, it's obvious what he's trying to do, but there's no foundation behind it. And yet, it worked—at least temporarily. The oil prices dropped because of some words that came out of Trump's mouth, when everything else he says is, you know, largely falsehoods. So this did surprise me. What's interesting now is that we see the energy being cut. You can argue, yes, this is a source of problems, but it also seems like we're in a downward spiral, because a lot of the economic problems that caused this conflict to begin with are now causing new ones. And I thought about the title of your book as well—again, the full title is, you know, *Thermoeconomics in a Time of Monsters.*

So, "the time of monsters" is a reference to Gramsci, who wrote in the late 1920s or early '30s something along the lines of "the old world is dying and the new world struggles to be born, and now is the time of monsters." That kind of refers to this—yeah, the old world order has disappeared, a new one is being born, and we're currently in this vacuum. And, you know, if you take a look politically and economically, this is part of the challenge of our time. We're stuck between different world orders. I tend to define them as unipolar versus multipolar, but it takes on a lot of dimensions. My point is, though, in this time of monsters, if you will, when we're in a vacuum, the predictable things you'd expect would be a lot of confusion, fear, anxiety—you'd have more misinformation.

You'd have the emergence of very radical ideologies, more extreme leaders, radical political movements. You'd have social chaos and instability. And of course, all of this undermines the economy, the energy markets—all of it—which only makes things worse and worse. So it seems we're currently stuck in this downward spiral where the social, economic, and political crises are all

interconnected. But what do you see as the main social and political consequences of—well, let's call them the foolish economic decisions—given that you refer especially to the '80s, when we stopped asking this critical question? What's the consequence now for society and the political system?

#Warwick Powell

Well, I think partly these are endemic features of these kinds of economic systems—that there are powerful forces at work that lead to financialization, which is the expansion of the circuits of money capital and fictitious capital at the expense of the development of the circuits of the real economy. We also have, I think, chronic epistemic challenges in the information systems as well, which struggle to cope with radical change, where the old models of the world don't actually explain what's going on, and yet we cling to them because they bring comfort. And we see this in the way markets have priced, I think, the oil situation.

But we also see this in much of the political reaction at the elite level—reaching for the rhetoric of the rules-based order, trying to reassert some idea of liberal moral rectitude in global affairs. Fingers keep being pointed at certain actors—Iran, Russia, and others—as if they aren't also victims of particular kinds of systemic persecution over long periods of time. So we have, in many ways, the coming together of a series of crises that amplify each other. We've seen an explosion of finance following the pandemic, especially in the equities market associated with AI and similar sectors, creating asset value growth without fundamentally transforming the economic substrate.

We can see this in America, where employment in the manufacturing sector, for example, has actually been declining over the last nine months. So the grand hopes of industrial rejuvenation simply haven't materialized. But at the same time, system liquidity continues to expand and finds its way into the circuits of fictitious capital. The reason I think these things are happening—and why Venezuela was ultimately attacked, and why Iran's been attacked—is that, yes, there's a longstanding geopolitical playbook that many people have talked about, going back to think tank reports from 10, 15, 20 years ago about the so-called Grand Chessboard, dealing with China, dealing with Russia, and so on. But I think underpinning all of this is a slow dilution, or reduction, in the energetic efficiency of the American economic system writ large.

And for long periods of time, even as your systemic energetic efficiency declines, the social system itself has enough built-up surpluses to cope. It's also not obvious for a long time, and because it's not obvious, it can easily be ignored. So when stresses do emerge—like the financial crisis in 2008—they're quickly dealt with through balance sheet adjustments, without actually looking at the fundamental economic or material energetic substrate they relate to. What we're seeing now is an American economic system that has begun to experience a contraction in its overall energetic efficiency. That's not to say it lacks an abundance of available energy.

It's just that the energy it needs to consume to access that available energy is growing all the time. So the conversion rate—the ratio between energy spent and energy returned—is getting smaller and

smaller. Now, this is actually a transitional moment in how our global and national economic systems evolve. If we think of national economic systems as energetic systems writ large, then the pivotal question is whether they're on an upward trajectory in terms of overall energy return on energy invested, or on a downward trajectory. And if they're on a downward trajectory, they're in trouble.

Because over time, the relative reduction in surplus energy available in the system—and remember, energy manifests itself in specific forms, whether in physical housing, buildings, factories, machines, roads, rail lines, or what have you—all of these things are embodied energy. So if available surplus energy is declining in relative terms, then at some point parts of the system start to show stress. It could be in the degradation of infrastructure, or in the unavailability of important social services such as public housing. It could also manifest itself, because of financialization, in asset price bubbles that enable a kind of system release through balance sheet adjustments and financial crises, but ultimately don't affect the productive, energetic capacity of the system at large.

So as nation-states experience these energetic trajectories, their ability to sustain and reproduce themselves depends on their capacity to refresh their energetic foundations. If we think of national economies as energetic systems writ large, they experience rises and falls in their systemic energy efficiency, and their ability to reproduce themselves systemically requires continual renewal. You can do that by discovering new sources of existing kinds of energy—new hydrocarbons. You can do that with technologies that let you access previously inaccessible hydrocarbons. You can find ways to process certain raw materials in a less energy-intensive way, making better use of what you already have. All of these are the kinds of responses that these energetic systems ultimately undertake in response to diminishing energetic efficiency.

When they confront limitations—because ultimately the energetic substrate is the material limitation on what humans can do—whatever your rhetoric or ideology, the material reality of the physical and chemical world ultimately constrains our window of possibilities. These energetic systems need to do something else. They can try to adjust the way they use energy. If the production of energy becomes less efficient, they have to find ways to be more efficient in how they use it. They may need to look at how they deal with the circulation of surpluses. If they don't, you'll find concentrations of what is, in effect, energetic poverty—shortages of things, whether it's food, fuel for cars, or crumbling buildings, or what have you.

When all of that becomes impossible, the next thing such systems can do is try to find entirely new sources of energy from nature that can put them back on a rising trajectory of energetic efficiency. China, in a sense, did this—began this exploratory journey about 25 years ago, largely in response to energy security constraints. Everyone in China was aware that the United States had earmarked the Strait of Malacca as a choke point. So, quite clearly, from an energy security point of view—remember, all societies need to provide food for people and fuel for machines—to provide fuel for machines, you have to address the risks of energy interdiction in the Strait of Malacca.

And it did that in a number of ways. One of those ways was to embark on a research and development effort around renewable energy and electrification. The fruits of that began to show in the mid-2010s. It took a long time for that R&D to deliver the kinds of technologies that ultimately produced systems where the energy return on energy invested was improving and reaching a point where it was competitive with the more traditional, high–energy-return hydrocarbon systems. So China was able to progressively transform the structure of its energy system, even as it grew.

So, while it continued to grow its use of various hydrocarbon energies, a whole lot more of its new energy sources came from elsewhere. China's already working on the next generation because it also understands that renewable energy technologies haven't yet had a full life. There's wear and tear; over time their efficiency diminishes to the point where they're no longer energetically useful—and that's in about 25 to 30 years' time. So we're talking about 2050. The kinds of technologies China is already working on, aiming to replace renewable energy systems by that stage, are things like thorium, fusion, and so on. The United States has responded in a different way.

The United States, of course, sought a certain level of energy security when it discovered and expanded fracking. The shale oil it was able to access was abundant. But we also know from many reports, including from major firms like Shell and others, that the energetic cost of extracting the next barrel of shale oil is increasing. The efficiency of the next barrel—and the one after that—is now on the downward slope. That's creating pressures in the system. The marketplace doesn't price it high enough to enable companies to even embark on those additional extractions. So the United States is now experiencing a relative decline in its overall energetic efficiency.

On top of that, it has incredibly fast-rising and concentrated demands for electricity because of the growth of the artificial intelligence sector. That's also putting pressure on the system—not just to generate electricity, but to distribute it. And the degradation of the distribution network over time, the failure to apply previously gained energetic surpluses to system maintenance and expansion, has left the system exposed to all sorts of risks. The first risk is that it can't be augmented quickly enough, and that's because augmentation depends on resources from elsewhere.

And there are shortages of those resources—whether it's substation technologies, transformers, or, of course, the materials that go into those transformers, such as copper. We also have other demands on the electricity network. And this is where it gets particularly interesting, where social and economic entropy starts to show itself. As AI lays claim to available electricity, it puts pressure on other industries as well as on households. Some industries won't be able to cope. Households will come under pressure to the point where many will ultimately reduce their standard of living because they won't be able to afford the power bills. So these are the ways in which these systemic pressures begin to manifest. So, to gain the third response then, Glenn Diesen, is to access third-party energy resources.

Most countries actually go to the market and buy them. OK, but the United States has decided to engage in thermodynamic imperialism—it's just going to go and take it. And that's what it did in Venezuela. The resources in Venezuela, of course, are difficult to access. The infrastructure is poor, and it requires significant commitments of capital to gain access to that resource. But the refineries in North America are set up to deal with that kind of raw material. Whether or not they can pull this off is another question. Iran, in part—not entirely, but in part—can also be interpreted through this lens, because the response from a hegemon with declining energetic efficiency is to gain access to supplements.

So it's looking to gain access to high EROEI—Energy Return on Energy Invested—options to offset its own entropy, and at the same time deny someone else access to those materials, particularly someone it sees as a threat or a rival. Um, so Iran is at the intersection of a structural transformation problem in the energetic substrate. And so it ultimately—just hang on a tick—it ultimately, I guess, speaks to, or is a symptom, Glenn, of the variable experiences of different societies in the way they've been dealing with energetic entropy, while at the same time intersecting with the geopolitics of power that have been built on the back of what is, in effect, a hydrocarbon-based mode of production. So we can add many other layers onto the Iran question, but I think at root these are the issues at stake.

#Glenn

A lot of the crises or conflicts of our time can be seen, I guess, through this lens of energy. Of course, Venezuela—that's a good point—because it's not that Americans couldn't access that energy; it was on the table. It's that they wanted to deny access to China, Russia, and others. But also, even with seizing Greenland, the same argument has been made: look at all the rare earths and different resources. Even in Ukraine, the German economic minister was very open about why all the lithium and rare earths in Donbass should fall within, you know, what would be Western-controlled Ukraine.

So, yeah, also going after Russia—the energy resources are, of course, part of it. And Iran, yes—Lindsey Graham suggested, you know, "we're going to make a ton of money." But it's not just the money the Americans will make; it's also what they can cut off from China. So I guess, just as a last question, do you see energy wars being a key consequence, or what will define the time to come? Because I thought it was interesting you mentioned the Strait of Malacca. They've talked about this a lot—it's been very important. If everyone contained or isolated China, that would cut off its access through the Strait of Malacca, a bit like what Iran is doing now in the Strait of Hormuz.

But the consequence of this—how the Chinese reacted—has taken so many different dimensions. It resulted in technological changes, like the development of renewables and thorium. It also has a military consequence, with China building a very powerful navy to remove any constraints. And geopolitically, the strategic partnership with Russia is crucial, given that they share long borders—no intermediate states that could be disrupted as sources of gas or oil. All of this is quite important. It

just seems like the energy question has a lot of ramifications for how the world is structured. Do you see energy wars being a key factor—what will define many of the conflicts going forward?

#Warwick Powell

Look, I think we can say that the question of energy—and how nations address this energy question—will determine whether or not there are wars, and where those wars will emerge. For example, one of the obvious reasons for what's happening in Iran is that countries with limited sunk costs in hydrocarbon systems are in a position to accelerate their electrification processes and reduce their exposure to the hydrocarbon war. We're seeing this in all sorts of areas, including the rapid development of electric cars, of course, but also in transport electrification more generally. Most people look at Chinese electric cars and think only of passenger vehicles, but by 2030 it's expected that about 30% of China's truck fleet will be electrified.

So its long-haul road transport fleet will be electrified. We're also now seeing, in commercial applications—real applications beyond trials—electric estuarine vehicles and maritime vessels for moving goods. They're obviously not at a scale for cross-ocean or blue-water transport, but again, it reduces exposure to hydrocarbons. Or, put another way, it makes it possible for increasingly rare hydrocarbons to be used in things that can't be substituted. So, you know, those large-scale and hyper-large-scale containerized vessels will continue, obviously, to be diesel-fueled—similarly with air transport. Now, air transport is being augmented, however, through the development of drones—obviously not for long-distance transportation, but for short-distance transport of both people and goods—and that's going to change the energy mix of localized, last-mile logistics and those sorts of things.

So, acceleration of electrification is going to be part of the response. I think also, though, because it's a reality that hydrocarbons are a fundamentally important part of many systems—including, you know, factories—and not only as an energy source but also as an input, a hydrocarbon-based economy is going to continue to play an important role for many countries going forward. And a place like Iran, depending on how the war settles, could become a very interesting proposition, because for sure it will control the Strait of Hormuz, which impacts the maritime market for oil. But the overland, or terrestrial, possibilities of linking Iran into the rest of Eurasia to transport its high–energy-return-on-energy-invested oil are going to deliver to the continent of Eurasia a level of energy security that's pretty much second to none.

It will have some very high-quality, highly efficient hydrocarbons from Iran and Russia in particular, as well as high–energy-return-on-energy-invested renewable or clean energy systems, particularly courtesy of China. We can add to the mix, of course, that both Russia and China are globally capable developers of nuclear power, and you've got a future in which energy security on that continent can be assured. How that plays out in other parts of the world, I think, will become very interesting, Glenn. Western Europe, as you mentioned in your opening remarks, has in many ways dealt itself into a position where it has very limited energy sovereignty.

And so it is dependent upon third parties in every respect for its energy sources, or for a large part of its energy inputs. That situation is not a viable one insofar as civilizational reproduction is concerned. So critical decisions are going to need to be made by those in Europe—whether by those in Brussels at a pan-European level, by nation-states, or even at a subnational level, states and provinces—to address these energy inefficiency and deficit problems in the name of sustaining the reproductive capacity of their own societies. I think Asia is likely to accelerate its electrification processes.

And so this paints a picture, Glenn, that is perhaps a little more optimistic than the inevitability of energy wars. But it's just as possible that these processes will also lead to more conflicts, as those with hydrocarbons to sell—such as the United States with its LNG—will seek to undermine the electrification acceleration processes in order to keep those markets open for their own export industries. That's the flip side of all this. I think we're going to see some significant tensions, because what we're talking about is not necessarily the replacement of one energy foundation with another, which is what "energy transition" often implies. It's really about how the next marginal amount of energy demand is met.

And the more that is met through non-hydrocarbon sources, the more it's possible for nation-states to have energy sovereignty. So that's going to define, I guess, the vector of the competition, because we're dealing with a process where timing matters—where the speed of change matters—and the United States will be looking for ways to kick the can down the road for another ten years, another ten years, while everyone else seeks to accelerate the change. I really don't understand where Europe's at, because to me, the most rational strategy is to move as quickly as possible to an energy-sovereign position, and yet the leadership seems entirely paralyzed around this question.

That has to be the objective. However you get there, in a sense, doesn't matter too much, because once you secure energy sovereignty, you actually have a lot more elbow room. But without that, you're always in a difficult position. So, fingers crossed—notwithstanding these, um, explosions, these symptomatic explosions of significant, uh, systemic entropy manifesting themselves—we're able to fast-track some of these transitions and avoid the heavy conflicts that would otherwise come. But I do think there are real risks of energy-based wars.

#Glenn

Well, on the European issue, I can't shed any light on this at all. The European leaders seem to recognize, time and time again, the importance of energy sovereignty, but the decisions they make always go directly against it. So yeah, it's a bit of a conundrum to me as well. Anyway, I want to thank you for taking the time to talk about your book, and I'll make sure to leave a link in the description. So everyone, make sure to order a copy. And thank you again for taking the time.