

Episode 126 : Mark Mills

Speaker 1 ([00:04](#)):

Welcome to the Bill Walton Show, featuring conversations with leaders, entrepreneurs, artists, and thinkers. Fresh perspectives on money, culture, politics, and human flourishing. Interesting people, interesting things.

Bill Walton ([00:25](#)):

Welcome to the Bill Walton Show. I'm Bill Walton. It seems like there's an ever-increasing number of people who have super strong opinions about science, technology, the environment, energy issues, on and on. Keystone Pipeline, blackout in Texas, artificial intelligence, green energy, trade with China, lost manufacturing jobs. The problem is that most people, including me, don't have the background or knowledge to reach good answers, and so we're left with these policy issues pretty much a mess with no real clear path forward.

Bill Walton ([01:01](#)):

Joining me to sort some of these out is a very smart man. Mark Mills, a senior fellow at the Manhattan Institute, refocuses on science, technology, energy, and future manufacturing technologies. His books include Digital Cathedrals, Work in the Age of Robots, and the Bottomless Well. He's also a strategic partner in a venture fund focused on software startups in energy. Mark, delighted you're here.

Mark Mills ([01:28](#)):

Good to be here.

Bill Walton ([01:29](#)):

I sort of gave short shift to your resume. You're at Manhattan Institute where they can find your resume, goes on for three pages. What an incredible list of achievements in the areas we want to talk about.

Mark Mills ([01:39](#)):

It shows you I never figured out anything useful to do. I just kept trying different things.

Bill Walton ([01:44](#)):

You're like me. You probably get bored easily. Let's start with something I think gets us into a lot of these topics. Let's talk about the blackout in Texas.

Mark Mills ([01:54](#)):

Yeah. It's epic. The great Texas blackout will go down in history as an example, we hope, but this green spinning has started the finger-pointing. Disasters all have the same characteristic after they occur. A lot of finger-pointing. Eventually the forensics. This is an easy one. What it tells us, two things. One is electricity matters. What a shock. Nothing works in society without energy. Electricity is the ascendant energy form of a modern society.

Mark Mills ([02:26](#)):

Computers, lights. Everyone knows that when it's gone. It also tell us something about tinkering with the grid. What caused, what triggered the domino...

Bill Walton ([02:38](#)):

What happened? Texas is cruising along, the temperature drops far below anything that they're used to.

Mark Mills ([02:45](#)):

Gets cold.

Bill Walton ([02:45](#)):

What happened?

Mark Mills ([02:48](#)):

The short answer is the wind farms lost output, which is a euphemism for saying they got cold, the wind went away, and so they stopped producing electricity, and they were the trigger for the domino. A lot of other things happened. In every disaster, there's always a trigger, and there's never one thing after the trigger. There's a domino effect, but the trigger was a loss of wind power. Texas has more wind farms, more wind turbines than any state of the union.

Mark Mills ([03:17](#)):

It gets something close to 25% of their electricity each year on average-

Bill Walton ([03:22](#)):

25?

Mark Mills ([03:23](#)):

From wind.

Bill Walton ([03:24](#)):

Isn't the national average something like 3?

Mark Mills ([03:27](#)):

The national average for wind is about 8%.

Bill Walton ([03:29](#)):

8%, okay.

Mark Mills ([03:30](#)):

It's a significant share of its electricity on average. Electric grids have a unique characteristic. You produce the energy when you need it, unlike any other commodity in history. Every other commodity, we typically store weeks to months worth of supply because supply chains have a habit of breaking. Weather, human events. That's why we do that for water, oil, for grain. We've been doing that since Egyptian times. Storage matters.

Mark Mills ([04:00](#)):

You can't store electricity at society scales no matter what people claim or say silly things about. When electricity goes away from source A, you need a source B that you can call on.

Bill Walton ([04:13](#)):

The electrical grid is one of the marvels of the 20th century.

Mark Mills ([04:16](#)):

Absolutely. Yeah. That's what kept me-

Bill Walton ([04:18](#)):

But Texas had a separate electrical grid, separate from the rest of the country.

Mark Mills ([04:21](#)):

Well, let's be clear. There's no electric grid. There are electric grids. There's no single grid in the United States. The so-called ERCOT grid, which is the Texas region, is geographically big enough to be its own grid. There are political reasons they wanted to do that. It's lightly connected to adjacent grids, but it is its own grid, which is fine. It's big. The National Academy of Sciences in the turn of the century, Y2K, the famous Y2K, did a analysis of what were the most important inventions of the 20th century?

Mark Mills ([04:55](#)):

They listed 100. Number one was electricity, electric grids. The ability to produce that much energy, that reliably, and that inexpensively is one of the greatest achievements of the history of the human race.

Bill Walton ([05:11](#)):

In Texas, the wind mills stopped turning, the electricity turned off. Didn't they have backup systems to take the place? No.

Mark Mills ([05:20](#)):

Well, sure. What you do is you call on what's available. In electricity, you have what's called dispatchable power. It's complicated. It's available when I need it, not when nature decides it might it available to us, so they called on backup. You need it quickly. Coal-fire power plants, which Texas still has a lot of, can increase their output, but it takes hours. If you want to get something quickly, you call in gas turbines, which they did.

Mark Mills ([05:48](#)):

The gas capacity ramped up rapidly and enormously. Tripled. Phenomenal increase. Then some of the gas turbines tripped off because some of them had a shortage of gas supply. Some of what we'll find out was caused by the fact that they have compressors that were driven by electricity, so not a good idea if you have an electricity problem.

Bill Walton ([06:07](#)):

Isn't that a little circular?

Mark Mills ([06:10](#)):

You'd think. We can begin the finger-pointing by looking at environmental pressures to stop using engine-driven compressors to move gas in pipes and replace them with electric-driven compressors. Well, the nice thing about the engine-driven compressors is they run when there's no electricity. The trip caused other plants to be called on. Some of those tripped off because when you get instabilities in the grid, you get all kinds of funny...

Mark Mills ([06:38](#)):

Think of it as sloshing of water. If you carried a pan of water, you try to carry a shallow pan of water, you get a sloshing mode. Electricity does that on grids. Very hard to manage.

Bill Walton ([06:48](#)):

You've done a lot of work on... I think most people, this is the reason I opened the way I did, have this illusion that if you put up these wind mills, it's all going to be free and costless, and we'll be green, and there's then endless amount of wind when we know there's not when it gets that cold. There's nobody that... You've written extensively on what it costs to put together a wind mill, and what the manufacturing requirements are, and how much you got to dig out of the Earth to make a wind mill.

Bill Walton ([07:17](#)):

The energy cost as I understand it in making a wind mill are greatest than the wind mill products when you put it in place.

Mark Mills ([07:24](#)):

Not the energy cost. The material cost.

Bill Walton ([07:25](#)):

Material cost. Okay.

Mark Mills ([07:28](#)):

Let's start with a simple definition.

Bill Walton ([07:31](#)):

Let's start with, I was an accounting major, but never really went in. Let's do basics.

Mark Mills ([07:37](#)):

The nice thing about energy is it's just like money. First of all, it's fungible. You should always follow the crumbs back to who's making money, and where does it come from? This first is a nomenclature problem. We have this thing called renewable energy. There's no such thing. Let's just start with the fact that energy is free, whether it's oil, gas, coal, wind, or sun. We didn't make it. It's there. We could be theological about how it got there, or you could be cosmological, figure out where it came from, but it's just there.

Mark Mills ([08:09](#)):

Energy, to access it in a useful form for human beings, we have to have a machine to convert the energy into something useful. You have two costs. You have to have access to land where the energy is abundant. Always costs money, because somebody owns the land, a government or a private sector. Then you have to build machines to convert the energy from its native, raw form into something useful to us. That means you have to dig stuff out of the Earth, convert it into a machine, and run a machine.

Mark Mills ([08:35](#)):

All machines wear out. It just happens, like all humans wear out. That means there is no such thing as renewable energy machine. They all wear out. The thing you care about is how much stuff do I have to dig out of the ground to make a machine to produce a unit of energy? With the so-called renewables they need to dig out, on average, ten times... If you put it in accounting terms, that would be not 100%, not 1000%, but 10000% more materials per unit of energy delivered to society to make a machine that uses wind and solar rather...

Mark Mills ([09:09](#)):

And water, by the way, rather than burning hydrocarbons like oil, gas, and coal.

Bill Walton ([09:15](#)):

Isn't most of that dug in China? Aren't we importing an awful lot of raw material, or all the parts that go into wind mills?

Mark Mills ([09:24](#)):

The critical stuff, we import. 90% of solar panels are imported in America. The critical minerals that solar panels are made from... A solar panel's made from glass. The glass, the sand, you use natural gas to turn the sand into glass. That's a huge quantity. Solar arrays and wind turbines use steel, they use concrete. These are common materials. The critical parts, the so-called energy minerals, cobalt, selenium, and neodymium, praseodymium, these magical-sounding elements from the periodic table, we're not eager to mine them in America.

Mark Mills ([09:56](#)):

Not only are they mined elsewhere like Russia and South Africa, but most of the refining, which is critical to convert the raw mineral into useful metal, is done in China.

Bill Walton ([10:07](#)):

I threw out a jumble of issues to start with, but this gets into our supply chain dependence on China. We've seen with the pandemic the need for drugs. All of a sudden people woke up and said... You know Rosemary Gibson. She's done a lot of work on the fact most of our pharmaceuticals are manufacturing in China, subcontracted to India in some cases. The energy industry is in the same mode with China as pharmaceuticals?

Mark Mills ([10:34](#)):

The green energy is.

Bill Walton ([10:35](#)):

Green energy. Okay.

Mark Mills ([10:37](#)):

The green shift, we can summarize it in easiest possible way. The United States is essentially fully independent in its energy production and consumption. We're a slight net exporter of energy, but when you cut all energy forms, we're just independent. We produce all the oil and gas we need. We export some, we import some. When it comes to green machines, because it depends now instead of on liquids and gases like oil and natural gas, it depends on solid minerals like cobalt and neodymium, and hardware.

Mark Mills ([11:10](#)):

Those things we are dependent in imports. As I said, 90% of solar panels are imported, and 80% of all the critical components of wind turbines are imported. A lot of the imports are from China. Some of them are from our friends like Canada and Australia, but our friends are happy to sell us the stuff we're not willing to produce ourselves.

Bill Walton ([11:32](#)):

Why does this sound like it's not a good idea? Is it just me? What am I missing here? Seems to me that we achieved energy independence under Trump because we let people drill in places they weren't allowed to drill before, and also fracking was stepped up in other ways to extract fossil fuels. Is that the short answer?

Mark Mills ([11:54](#)):

Trump accelerated it. That's no question. It began pre-Obama, and it actually took off, ironically, in the Obama administration. You remember that famous debate when Romney and Obama were debating over who was responsible for the boom in US oil and gas production, and Obama took credit for it? It was really quite an epic moment in energy and political history. Of course, he gets credit for half of [crosstalk 00:12:20].

Bill Walton ([12:20](#)):

He was taking credit for the Trump economy three years into it.

Mark Mills ([12:23](#)):

He took credit for it ahead of it happening. Maybe he was a seer. You put your finger on it. Is this a bad idea? It's a really, really bad idea. We are going to switch America's energy from domestic production to imports. We're going to switch America's energy from liquids and gases which are easy to move and cheap to extract to energy minerals, which are hard to move and energy-intensive to extract.

Mark Mills ([12:48](#)):

We're going to switch from a small footprint on the planet to a huge footprint on the planet because the land area required per unit of energy when it's green compared to hydrocarbons, it goes up tenfold. All bad.

Bill Walton ([13:00](#)):

You're watching the Bill Walton Show. I'm here with Mark Mills, a fellow at the Manhattan Institute. We're talking about the electrical grid, and green energy, and whether it's really a good idea or not. Mark, what do you mean about the footprint? What does that... ?

Mark Mills ([13:17](#)):

If you've ever seen a wind farm... You've probably seen them.

Bill Walton ([13:20](#)):

They're terrible.

Mark Mills ([13:21](#)):

Kind of hard to avoid.

Bill Walton ([13:23](#)):

If you like birds, and I do...

Mark Mills ([13:25](#)):

I like birds. I like big machines, I confess it. When I see huge wind farm going to the horizon-

Bill Walton ([13:30](#)):

Big, noisy machines.

Mark Mills ([13:32](#)):

Yeah. It's good. It's kind of nice. In terms of footprint, if you see a wind farm going to the horizon with all these turbines, each the size of the Washington Monument, it takes up a lot of land to do that. You could replace that entire wind farm with a couple of buildings that are roughly the size of, I don't know, a small strip mall in a rural village containing natural gas turbines with buried gas pipes.

Mark Mills ([14:00](#)):

That small footprint replaces that entire landscape that's going to the horizon because of the high energy densities of natural gas and the machines that make the electricity. The thing that's seductive about the green stuff, the so-called clean tech stuff, is that people think it's free because it's just there. I pointed out it's total category error, misnomer. It's not free. It's expensive. You have to build machines.

Mark Mills ([14:26](#)):

They think it's somehow like unobtainium. It doesn't do anything bad for the environment. If you count the mining, first, that has an environmental impact by virtue of the fact that it's mining. Secondary, we use oil to mine. We use big machines. The global mining industry uses as much oil as the global aviation industry did before the great lockdowns of 2020, so there's oil use there. Then when you finish using the machines, because they get used up, they're garbage.

Mark Mills ([14:54](#)):

You have massive quantities of waste. The International Energy Agency calculates that the quantity of non-recyclable solar waste, the stuff from solar panels when they're worn out, by the year 2040, 2050 will be greater than the quantity of plastic waste in the world today. For those who are environmentalists who worry about plastic waste, now we're adding actually toxic material, because the metals and the glass are toxic metals.

Mark Mills ([15:23](#)):

You want to be careful where you bury them. That quantity is bigger... There's no... This illusion, there's some kind of simple magic replacement is an illusion. It's magical thinking.

Bill Walton ([15:39](#)):

How does somebody supposedly smart like Larry Fink, who runs Blackrock, who's now imposing an environmental agenda on all the major corporations... ? He's a very smart man.

Mark Mills ([15:55](#)):

He's rich and smart, which means that's how they go together.

Bill Walton ([15:59](#)):

It helps. It's mystifying to me that as I read your material, I listen to you describe the enormous cost of so-called green energy, how anybody can hold that in their mind while also conducting an otherwise rational life? It is magical thinking. I should have put religion on your list of...

Mark Mills ([16:20](#)):

We can talk about that another time. That's an even... You said people had strong opinions about things.

Bill Walton ([16:27](#)):

You've done a lot of research, and yet you're surrounded by all this.

Mark Mills ([16:31](#)):

The religion of... Well, it's a carbon religion. I try not to delve in the psychology of why people believe things they believe.

Bill Walton ([16:40](#)):

That's fair.

Mark Mills ([16:40](#)):

I would say that there are people who believe things for what amount to religious reasons. This becomes an ethos, a way of thinking about the world. There are some people who believe things because they really haven't done the homework. They don't know what they're talking about. They think they do. There are some people who believe things because they have an agenda. I don't either discount or dislike agendas.

Mark Mills ([17:04](#)):

Everybody has some kind of agenda. The goal to hit to a... This ESG ethos, the environmental, sustainability, and governance ethos, which has been converted into a climate ethos, is very powerful. What people don't... I'll give you a fact that's something that Larry Fink might know, but I'll bet didn't know. He may know it now. I don't know. In the real world if we have an electric car, which he presumably would want to provide incentives for because they don't emit anything when they're running.

Mark Mills ([17:37](#)):

Yes, they emit stuff from the power plant, but let's just stipulate the power plant might in fact be a wind turbine that doesn't emit anything when it's running. You have a low carbon way of driving. It takes energy to make the batteries. A battery in an electric car weighs 1,000 pounds. You have to mine, extract, and process something like 500,000 pounds of materials to make one battery that weighs 1,000 pounds. The battery chemicals in the batteries are typically made in Asia on coal-fired grids.

Mark Mills ([18:07](#)):

When that battery arrives in America, or its materials show up in a battery made in America, and driven on our grids, even if our grid gives you zero carbon electricity, you're working off a carbon debt that was incurred in China or in the mine sites that could take years or never be repaid. That is a simple reality that is simply not accounted for in all the [inaudible 00:18:32].

Bill Walton ([18:32](#)):

China has already got an egregious record on this. What we would be doing is exporting our problem to them, and they would be worse.

Mark Mills ([18:44](#)):

I will dispute the worse or not worse since I'm not a carbon-phobe. I'm not worried about carbon dioxide.

Bill Walton ([18:50](#)):

Isn't carbon what we breathe? Carbon dioxide is essential to human-

Mark Mills ([18:53](#)):

We exhale carbon dioxide and plants eat it. It's a nutrient. Setting aside the climate argument, let's just say you don't have to debate climate change to know that if your goal is to change the energy system, you have to be honest about where energy is being used. You're right, if you buy a product that's made somewhere else, you've exported the pollution, if you like, associated with the product. The only country that's been honest about this, God bless them, the French had a study done to figure out how much of their citizenry's carbon footprint is associated with stuff they buy made elsewhere.

Mark Mills ([19:30](#)):

They discovered, and this is the country that, remember, almost all their electricity comes from nuclear power plants, which emit nothing. They burn nothing. They discovered it doubles that country's carbon footprint. Doubles it. Doesn't just increase it. It doubles it. We could do the same thing, but it doesn't mean that the energy isn't used. It's just used elsewhere where we have no control over it. We prefer to buy cheap stuff, and lo and behold all over the world people are still building coal-fired power plants because they're cheap.

Bill Walton ([20:04](#)):

We've been talking about batteries. The defenders of clean energy are now saying, "Well, the batteries would be a solution for the problem in Texas." They're pushing grid-scale batteries, and I'm reading what you've written. You say, "What would be required for the Texas grid to handle predictable occurrences of several days without wind or sunlight?" The answer is... I'll read you what you wrote.

"The quantity of batteries needed equals a decade's worth of the entire world product at a cost well north of \$400 billion."

Mark Mills ([20:42](#)):

Yeah, just money. \$400 billion, just for Texas to run its grid for-

Bill Walton ([20:47](#)):

There's congress. That is a drop in the bucket.

Mark Mills ([20:49](#)):

For a day or two. Let's put it in a more... That seems so theoretical. That's such a big number. Here's what we do know. Texas builds big things. They have the biggest wind farms. They have big branches. I love Texas. They're already embarking on building the world's biggest battery storage farm for its grid. It'll get built, I'm sure, in the next... They finish the next year or so. If we look at that, and I think it's about \$200 million facility, give or take.

Mark Mills ([21:18](#)):

All right, \$200 million. What does that get you in Texas? It buys about 30 seconds worth of storage of electricity from just Texas' wind farms. 30 seconds. Not three days. On a grid, 30 seconds is useful, by the way, because when you want to manage these dynamic flows, you need 30 seconds worth of injection power. It's kind of like, you think of a hybrid car. Hybrid car stops at a stop sign, and it starts again.

Mark Mills ([21:52](#)):

30 seconds. This is the world's biggest battery farm, and that's just for Texas. Just its wind. Not its whole grid, by the way. I'm just talking about storing the electricity produced by the Texas wind farms on the world's biggest battery farm, which they're building. We should build more battery farms. True. We just had a report. It's been in the news if you're a technorati, and you read this geeky stuff.

Mark Mills ([22:19](#)):

Last year in the United States, we had the biggest expansion in grid-scale storage. It was, I forget, 200% higher than the last five years combined. All the United States grid batteries that were added last year, which is a huge increase over anything we've added in the last decade, all of them combined would store... Just drum roll, eight to ten seconds worth of US electricity supply. That's it. That's where we are now.

Mark Mills ([22:48](#)):

They have plans to increase that 100-fold. Great. That gets you... You can do the math here. It gets you to minutes, a half hour. When you have lights go out, if you're on on-demand power because there's, let's say, a whole day where the continent of the United States has no wind and no sun, it's cloudy all day, and no wind. Does that ever happen? Yeah, we actually have data on this. There's NOAA data goes back decades and decades.

Mark Mills ([23:17](#)):

We have many occurrences over the decades when, for several days, there's no sun over the entire continent of the United States, cloudy, and no wind. The whole continent be calmed. This would be really inconvenient if the grid were run on wind and sun.

Bill Walton ([23:33](#)):

You're watching the Bill Walton Show. This is a Bill Walton stun talking to Mark Mills about Manhattan Institute, about energy policy, and the magical thinking involved in using batteries to store energy. Mark, you mentioned the N-word. Nuclear.

Mark Mills ([23:54](#)):

Yeah. Love nukes. Who doesn't love nukes? If you're a physicist, who doesn't love a nuke?

Bill Walton ([24:01](#)):

I struggle with this, because, okay, you don't like fossil fuels. Fine. We've talked about wind and solar, the enormous hidden cost-

Mark Mills ([24:10](#)):

Hidden materials cost.

Bill Walton ([24:12](#)):

Hidden materials cost that nobody is willing to talk about. We talked about the battery piece of this thing. Nuclear, it's been around since, what '56, 1956 when the UK built their first plant?

Mark Mills ([24:27](#)):

First commercial plant.

Bill Walton ([24:28](#)):

They built an enormous nuclear plant. France now gets, what, 70, 80% of its-

Mark Mills ([24:33](#)):

90%.

Bill Walton ([24:34](#)):

90% of its energy from nuclear. We haven't had an incident except for the couple notables ones that movies are made about. It's a safe technology by all accounts, and yet... Talk about how nuclear could... If nuclear had been in place in Texas, what would that cost, and what would that look like?

Mark Mills ([24:57](#)):

First, let's just stipulate if only a fraction of the Texas wind farms had been built, just a fraction, if what they built instead was more nukes, or coal plants, or natural gas turbines, but let's use the nuclear plants, they'd never have been a great Texas blackout. It would only have taken a fraction of those to have been not episodic power, but rather firm power, always running. Nuclear energy is an interesting problem.

Mark Mills ([25:25](#)):

There's been no phenomenological change in how we can produce energy over most of human history, with just two exceptions. They're very similar and kind of interesting. We burn stuff to make energy and electricity. We capture things that move, wind, water. You can run on a treadmill and make electricity. Energy comes from those sort of chemical and mechanical things. Photovoltaic effect, which Einstein got the Nobel Prize for.

Mark Mills ([25:55](#)):

It's what he got the Nobel, not for relatively, but for photovoltaic effect. Is the phenomenology of-

Bill Walton ([26:00](#)):

The photo what effect?

Mark Mills ([26:01](#)):

Photovoltaic or photoelectric effect. Solar cells. Converting photons directly into electricity. Kind of magical. It really is. The problem with it is not that it's not magical. It's magical. It's that the sun's not there all the time. In outer space, it's great. Sun's always there if you're relatively close to the sun. If you go too far from the sun, like satellites going to Jupiter, you don't use solar panels. You use nukes. Nuclear generators because the sun is too weak.

Mark Mills ([26:25](#)):

The other phenomenology of course is nuclear fission, which is literally magical. You want magical energy, we're actually doing something that violates... Well, scientists thought it was impossible, which is you convert matter to energy. That's what that's doing, converts... It is probably the single most difficult form of energy to make into cheap, easy power. I think probably it's reasonable to say we're on the cusp of the kind of engineering that make that possible.

Mark Mills ([26:53](#)):

It will be the biggest and most important change in how we make electricity in history. It will take time. Decades, not years, but the environmental community is at best split on it. Most of them oppose nuclear power. I recently testified before a house committee. We talked about this issue, as well. It came up. The administration's witness essentially stated, and I'm not being unfair in saying this, that nuclear power is not on their agenda as a climate solution, which is scientifically shocking if you worry about carbon dioxide.

Bill Walton ([27:32](#)):

Mm-hmm (affirmative). We're talking about a next-generation micro-reactor.

Mark Mills ([27:36](#)):

Smaller reactors.

Bill Walton ([27:37](#)):

Smaller reactors.

Mark Mills ([27:38](#)):

Micro by virtue of compared to how big reactors are today. You need big ones, too. Think of it in aviation terms. Jumbo jets have a purpose, but their purpose tends to occupy 10 to 15% of the total air miles. Most air miles are on smaller, more agile, more flexible equipment that, because in just an economic sense, you can't fly the giant machine where the little machine's going in need. This is true in electricity.

Bill Walton ([28:08](#)):

Most of the carrier's fleets have gone to the smaller ones because of that in the case of airplanes. Does that technology exist? Is that something that we should be wishing towards?

Mark Mills ([28:19](#)):

Sure.

Bill Walton ([28:19](#)):

Is that R&D?

Mark Mills ([28:21](#)):

We're well past R&D. There's very interesting designs, probably a dozen impressive designs. Look, electricity is about a third of the US' energy supply. It's about 20% of the world's. If you convert all electric supply to nukes, which won't happen. You'll always have mixed sources, just like there's a lot of ways... It would be like saying all transportation will be in helicopters. You have cars and trucks and airplanes and boats.

Mark Mills ([28:48](#)):

In energy world, it's the same kind of diversity. Set that aside. It's not going to be all energy. It's going to be a significant impact as the world needs more electricity. It takes not a week or a year to go from a great new design, which there are probably a dozen, to commercial scaling. It takes years.

Bill Walton ([29:12](#)):

Let me switch gears a little bit towards something we talked about earlier, which is our dependence on China for various aspects of our energy and other things related. Do we have a strategic... I've done several shows on China. I am concerned they've got really global ambition to be many, many things. They see themselves as the kingdom, and they've got a hundred years of humiliation they've got to make up for. I've done some shows on China.

Bill Walton ([29:46](#)):

You should see my chat board on YouTube. They're all on there, and they don't much like us. At least they don't like me. Let's talk about the supply chain as it relates to energy and China.

Mark Mills ([30:01](#)):

China's interesting for a lot of reasons. Let's just stipulate that... I was in maybe, I think more than a dozen cities in China from the coastal areas, the obvious places to inland and western China. The Chinese people, I like. I met a lot of engineers.

Bill Walton ([30:25](#)):

I agree. Let me stipulate, it's not the Chinese, it's the Chinese Communist Party.

Mark Mills ([30:29](#)):

Exactly. We're on the same page.

Bill Walton ([30:31](#)):

The issue is not with the Chinese people.

Mark Mills ([30:33](#)):

They're great people, and they're innovative, and they're bright. Why should we be surprised?

Bill Walton ([30:37](#)):

Right. Right, right, right.

Mark Mills ([30:39](#)):

The Chinese government is very smart. They are the world's largest oil importers. They're world's largest natural gas importers.

Bill Walton ([30:47](#)):

Importers?

Mark Mills ([30:47](#)):

Importers. They import coal, oil, and natural gas. They're a fast-growing economy. They're one of the fastest growing big economies in the world. They need lots of energy. They're the world's biggest coal burners in the world. They also have the biggest wind farms in the world, but most of their electricity is coal-fired. They're two thirds coal-fired. We're about 20% coal-fired. They're not going to stop burning coal, and they're not going to stop importing coal, or importing oil, or importing gas.

Mark Mills ([31:11](#)):

What are they doing? Well, they're selling us all our solar panels. They're selling us parts for wind turbines. They're selling us components for making magnets that are in our electric cars.

Bill Walton ([31:22](#)):

Do they eat their own cooking? Are they using solar and wind?

Mark Mills ([31:26](#)):

Sure, but for a tiny share of their electric.

Bill Walton ([31:28](#)):

Okay. They're not reliant on it. They're not Texas.

Mark Mills ([31:31](#)):

No, they're not Texas.

Bill Walton ([31:33](#)):

They're smarter than Texas.

Mark Mills ([31:34](#)):

Apparently. Look, there's two big questions. One is, are we dependent on China? Yes, for certain things, and particularly the so-called rare earth minerals, which are mis-named. People don't know what that word was created for.

Bill Walton ([31:49](#)):

I know the word. I don't know what it means.

Mark Mills ([31:52](#)):

There's elements like neodymium, praseodymium, dysprosium. There's a part of the period table that's full of these odd, science fictiony named elements. They have rare properties. They make magnets incredibly powerful and temperature-resistant, for example. They let you make lasers. They let you make cell phones. All through the magic properties are... The rare properties are in those elements, but they're common.

Mark Mills ([32:16](#)):

We used to mine most of the world's rare earths and export them to the world in the '90s, up to the 1990s. We chased our miners out of this country by virtue of our environmental regulations. Who does most of the rare earth mining? China. More critically, if you mine a rare earth somewhere else in the world and you want to refine it, which is very difficult chemically to do, that's done in China. They made a choice to do that strategically because they knew how important that was in the supply chains.

Mark Mills ([32:46](#)):

It is the strategic tool for them against the outside world as powerful as the tool we might use in the soft power kind of, real politik of Kissinger, that we would use the oil and gas. They have a counter play. That's not an accident. It's not an accident at all. The critical minerals we need to make solar panels, the minerals, they supply. The critical minerals we would use in semiconductors to make your smart phone work, they supply.

Mark Mills ([33:16](#)):

We make the chips. We're the dominant chip designer on the planet. America. We're no longer the dominant manufacturer, the single largest manufacturer. We're not longer the dominant manufacturer. China's dependent on imports for their semiconductors, but the semiconductor world is dependent on imports from China of critical minerals. This is not an accident. It's a brilliant strategy because it's a strategy you can implement faster than making semiconductors or making aircraft.

Mark Mills ([33:43](#)):

You make the critical minerals for it and get us dependent on that.

Bill Walton ([33:47](#)):

You've written extensively on industrial policy, and I don't want to go into all aspects of that. With regard to China, it seems like... I had a show that I titled China's Ruled by Engineers, America's Ruled by Lawyers.

Mark Mills ([34:01](#)):

Yeah, pretty true.

Bill Walton ([34:02](#)):

What could go wrong?

Mark Mills ([34:04](#)):

That's pretty true.

Bill Walton ([34:05](#)):

Engineers are thinking long-term and strategically laying the groundwork for the future. Who in our government is thinking about this the way you're thinking about it? Should we be responding to this strategically as a country?

Mark Mills ([34:23](#)):

Well, some people are. Mostly they're in the agencies. They're senior... I don't mean this in a pejorative term, senior bureaucrats as opposed to political actors.

Bill Walton ([34:34](#)):

You could call them career government.

Mark Mills ([34:36](#)):

Yeah, career government. Look, there's a lot of smart people in government. They know these. I'm telling you, we've had studies done by every administration going back to 1930 about critical mineral dependencies. This is not a new issue. Most administrations, including this one, the Trump administration, the Obama administration, the Bush administration, the Clinton administration have issued manifestos, studies, or executive orders about the import dependencies on critical minerals.

Mark Mills ([35:05](#)):

It's not a new subject. For the Defense Department, the quantities they need, they can make up for it by buying stockpiles, because their quantities are low enough. Societies don't buy stockpiles of these things. We need to have reliable suppliers and partners. Nothing wrong with imports as long as you have some resilience, different options. For a lot of these things, we don't have options. We have China.

Mark Mills ([35:28](#)):

When it comes to oil, China has an option that we don't have with respect to critical energy minerals. They can buy oil from us, and gas-

Bill Walton ([35:35](#)):

Or then go to the Middle East. Yeah.

Mark Mills ([35:37](#)):

Middle East, they can buy from Russia, they can buy from Africa, which of course is the strategy.

Bill Walton ([35:44](#)):

What's your advice about what we should do about our energy dependence on China or related?

Mark Mills ([35:53](#)):

I wrote a paper on this, maybe unsurprisingly. I ended with a facetious piece of advice, but I'm serious about it. Since all green tech machines, batteries, electric motors for electric cars, wind turbines all require critical minerals, for every dollar of subsidy that our layers on using more of these green machines, we should require a pound extra of those minerals to be mined in America. That's easy to say, but to have that happen requires... We need to become in a regulatory and environmental sense friendly to mining again.

Mark Mills ([36:32](#)):

Our new secretary of energy, Secretary Granholm, recently said last week that this administration is going to support in some fashion, and I'll do a direct quote, because I'm not sure what the words mean, "Sustainable mining for green minerals." I'll confess to being a little snarky by tweeting that saying that, "So if we call drilling sustainable-"

Bill Walton ([36:54](#)):

Let me get that whole phrase. Sustainable mining for green minerals.

Mark Mills ([36:56](#)):

Sustainable mining for green minerals. Green energy minerals. I want to know if that definition is elastic enough that we can support sustainable drilling for natural gas and oil in America. I think I know the answer. The point is, you said is anybody aware of it? Yes, obviously. You wouldn't say something that loaded at the secretary of energy that we might have to increase US mining to not be dependent on the Congo and China of cobalt for batteries, for example.

Bill Walton ([37:36](#)):

Mark, thank you. You haven't made me feel more optimistic, but you have made me want to have you come back because I'm thinking about the things we didn't get to talk about what I wanted to, artificial intelligence. I wanted to talk about the information technology infrastructure and the data fields that exist out there, and the fact that if you look at the future of a country, we've also got a... We've falsely defined manufacturing to say we're losing it, yet you make a great point about how services are intermingled with that, and it's not as bleak as it looks.

Bill Walton ([38:12](#)):

The next show we're going to do an optimistic dig into those areas.

Mark Mills ([38:19](#)):

Can I end on a positive note?

Bill Walton ([38:20](#)):

I would love that.

Mark Mills ([38:22](#)):

It relates to China. I'm negative on green energy because it's a, to use the... There's a chimera. It's magical thinking that somehow that... The whole idea of innovation being wrapped up into energy technology is embarrassing and sad and dispiriting. Innovation isn't coming there. There is innovation there. The revolutions that are coming are in computing, and information, and artificial intelligence, and robotics, and automation.

Mark Mills ([38:53](#)):

They're revolutions that are exciting, and job creating, and productivity creating. The question you would ask is, who's doing it? We are.

Bill Walton ([38:59](#)):

We are.

Mark Mills ([39:00](#)):

80% of the innovators are in America. The data centers are in America. The new AI companies are in America. Here's the China fact that's interesting. China knows that, and China knows something else. That in about 25 to 30 years, which is meaningful in the long cycles of planners, the productive part of the economy, those 15 to 60, those are the most productive people. Just arithmetically. That age cohort will be younger in America than it will be in China.

Mark Mills ([39:28](#)):

We'll be a younger country. There will be a country where its population is shrinking and older. We'll be a country that'll be a younger and growing... We will still be above the negative growth that China was... A negative growth rate-

Bill Walton ([39:44](#)):

Because of the One Child Policy.

Mark Mills ([39:45](#)):

Because of the One Child Policy, and we will have fomented a new era of technology companies that will look like the Amazons of the future that will grow in the next 20 years, because the digitalization of our economy that's happened so far, that we're both happy about and not happy about, that's only touched 20% of our economy. It's touched the, I'll call it the easy stuff.

Mark Mills ([40:10](#)):

We've digitalized information. News, entertainment, finance, transactions. Digitalizing the atoms part of the economy, where we make stuff, move stuff, energize stuff, it's really hard. That starts now. We're leading it. That kind of productivity change portends the biggest economic growth the world's seen in a century. We are literally at the beginning of a Roaring '20s. In fact, my new book is called the Roaring 2020s precisely because of that.

Bill Walton ([40:40](#)):

Well, that's a topic for our next get-together. That's fantastic. The final words for today's show, anyway. Mark Mills, senior fellow at Manhattan Institute. Thanks for joining, and thank you for joining. Come back again on our next, I hope fascinating discuss. Thanks. I hope you enjoyed the conversation. Want more? Click the subscribe button or head over to TheBillWaltonShow.com to choose from over 100 episodes.

Bill Walton ([41:10](#)):

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