Dwarkesh Podcast #80 - Daniel Yergin – Oil Explains the Entire 20th Century

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Dwarkesh Patel
Today I have the pleasure to chat with Daniel Yergin. He is literally the world's leading authority on energy. His book, The Prize, won the Pulitzer Prize. It's about the entire history of oil. His most recent book is The New Map: Energy, Climate, and the Clash of Nations. Welcome to the podcast, Dr. Yergin.

Daniel Yergin
Glad to be with you.

Dwarkesh Patel
Here's my first book question. A book like The Prize is literally a history of the entire 20th century, right? Because everything that's happened in the last 150 years involves oil. How does one begin to write a book like that?

Daniel Yergin
You begin by not realizing what you're doing. I agreed to do that book and I said I'd do it in two years. It took me seven. The story just became so compelling and it became woven in with the history of the 20th century.

The funny thing was that some years before that, a publisher had flown up from New York to see me when I was teaching at Harvard. She said she had a very interesting idea for a book. I said, "What?" She said, "a history of the 20th century." I said, "That's an interesting idea." I thought to myself that it's rather broad and that actually the century wasn't over yet at that point. But somehow that was in the DNA of the book. As I told the story, it really was not the history of the 20th century, but a history of the 20th century.

Dwarkesh Patel
I've found that there are a lot of books which are nominally about one subject, but the author just feels a need to say, "If you really want to understand my topic, you have to understand basically everything else in the world." I think of a couple of biographies especially. If you read Caro's biography of LBJ or Kotkin's of Stalin, it is a history of the entire period in their country's history when this is happening.

I wonder if this was the case for you. Did you actually just want to write about oil and you just had to write about what's happening in the Middle East, what's happening in Asia? Or no, you set out to write about World War II and World War I and everything?

Daniel Yergin
Geopolitics, narrative, storytelling, those are things that are very much in my interest. My first book had actually been a narrative history of the origins of the Soviet-American Cold War. So I brought that perspective to it.

As I was writing The Prize, I didn't intend to do all of that. But with the discoveries, one thing led to another. I would be amazed and think, “This is an incredible story and no one knows it.” In my mind, I did not do a detailed outline, but the pieces came together in this larger narrative that located oil in this larger context of the 20th century. It made clear how central oil was as a way to understand the 20th century.

Dwarkesh Patel
We'll get to The New Map and the contemporary issues around energy later on. First I want to just begin with the beginning of the history of oil. There’s one thing you notice not only in the early stories of oil with people like Drake and Rockefeller, but also even with very modern ones like the frackers like Mitchell and so forth. You have these incredibly risk-taking and strong personalities who have been the dominant characters in the oil industry. I wonder if there's a specific reason that oil attracts this kind of personality.

Daniel Yergin
Those are the ones who are successful. It takes a lot of willpower and perseverance. Clearly Rockefeller had an idea of what to do and how. But he was also creating a new kind of business organization as he's doing it, and a new kind of industry at the same time that he was doing it. We jump ahead to this guy, George Mitchell, who's more responsible than anybody else for the shale revolution that has transformed the current position of the United States in the world. He kept at it for 18 years when people told him, “You're wasting your money, you're wasting your time.” He said, “Well it's my money and I'll waste it.” But one of the things that comes through in the book is the power of willpower.

Dwarkesh Patel
One thing that really struck me is how fast things kick off. In 1859, Colonel Drake hits the first oil well in Pennsylvania. In less than a decade, you have many oil boom towns and oil busts and Standard Oil is formed. Millions of barrels of crude are being pumped out every year. I don't know if there's been any deployment like that since. What was it like?

Daniel Yergin
When I think about what we saw with the oil industry, then what we saw with the automobile industry in the 1920s, it’s kind of like what we saw with the internet at the beginning of the 21st century. Another example that always struck me is the movie industry. At one point, you have guys who are showing these silent movies in vaudeville houses for five cents. 15 years later, they're living in mansions on Long Island and have chauffeurs.

It is striking to see these businesses that come from nowhere and then they just take off and gravitate and develop so quickly when people grab hold in 10 to 15 years. I was writing something comparing the energy position of the United States in the eighties and today. It's a while back certainly, but there was no tech. Nobody talked about tech. It didn't exist. Now we talk about Big Tech, the way people talked about Big Oil.

Dwarkesh Patel
The analogy of the internet is interesting. With the internet in the 90s, you have this big Internet bubble, the dot-com bubble, and a lot of people lose money. But they were fundamentally investing in something that actually was a real technology and actually did transform the world.

In many cases through energy you have investors who go broke, but... Fracking is a particularly good example of this. They've changed the geopolitical situation in the United States, but they've been so right that they've eaten away at each other's profits.

Daniel Yergin
You saw that in the 19th century. That was one thing when I was writing about the beginning of the 20th century and the end of the 19th century. It's far away and yet it felt contemporary because you saw a very similar pattern. You saw booms and busts. You saw trees that were going to grow to heaven and then fell apart. And then those people who came in either had resilience or picked things up and carried them forward.

Dwarkesh Patel
In the beginning of the oil industry—when it was just kerosene and used for lighting—why was oil so centralizing? Why was it the case that Standard Oil and Rockefeller controlled so much?

Daniel Yergin
People think of John D. Rockefeller and Standard Oil and they go: gasoline. It had nothing to do with gasoline. John D. Rockefeller was a lighting merchant. What they did is that they rolled back the darkness with kerosene, with lighting. Before that, the number one source of lighting was candles and whaling. The whaling industry was delivering lighting. For the first 30 or 40 years of the oil industry it was a lighting business. Then came along this other guy named Thomas Edison. Suddenly you have electric lights and you say, "That's going to be the end of the oil business." But by the way, over here is Henry Ford and others. You're creating this whole new market in the 20th century for gasoline. In the 19th century gasoline was a waste product. It went for like three cents a gallon.

Dwarkesh Patel
One of the things I learned from The Prize, I didn't appreciate before. Before the car was invented, when Edison invented the light bulb, people were saying Standard Oil would go bankrupt because the light bulb was invented.

Daniel Yergin
John D. Rockefeller became the richest man in the United States as a merchant of lighting, not as a merchant of mobility.

Dwarkesh Patel
In some of the earlier chapters, you mention that Rockefeller was especially interested in controlling the refining business, not the land owning and drilling. A lot of the producer surplus went into refining. Why did the economics shape up such that the producer surplus went to refining?

Daniel Yergin
Because that was the control of the market. That was the access to the market. The producers needed John D. Rockefeller. There were a few other people but Rockefeller controlled about 90% of the business. He would either give you a good sweating—drive down prices and force you out of business—or force you to sell to him or amalgamate with him.

Dwarkesh Patel
What can we learn about management today from Rockefeller and the way Standard Oil was run?

Daniel Yergin
It was the discipline of the business. He created a very disciplined business. They went out to two decimal points. That was before computers or calculators. It was rigorous attention to detail but at scale. It was also boldness and being able to see where you needed to go next and then implement it.

Dwarkesh Patel
What did they do with the non-kerosene parts of crude oil in the early history of the business?

Daniel Yergin
It was really a waste product. There wasn't much to do with it because it was all about lighting. Today of course, oil is in everything. It's in your furniture, your COVID vaccine. It's everywhere.

Dwarkesh Patel
Was the antitrust case against Standard Oil unwarranted? Reading The Prize, I'm thinking these guys were doing a ton of great stuff. As their name implies, they were standardizing oil, logistics, transportation, refining. And their market share was going down. The price of crude was going down. In retrospect, was the antitrust a mistake?

Daniel Yergin
A mistake, I don't know. It is the most famous antitrust case in history and reflected the times because you had these big trusts. Was it a mistake? I don't know. It broke up these companies and created more independent companies. It provided more room for

innovation and for people to develop. It probably led to a stronger industry. Of course the other thing that happened as a result of the breakup of Standard Oil was that these individual parts got valued in the marketplace. Lo and behold, as a result of that John D. Rockefeller as a shareholder actually became three times as rich.

Dwarkesh Patel
There were also scientists who came up with a new way of refining gas, right?

Daniel Yergin
Exactly. Because things weren't centralized, there was more room for entrepreneurship, experimentation, research, and for people to solve problems that other people said couldn't be solved.

Dwarkesh Patel
Going back to management, one thing that stunned me is that the people who ran Standard Oil were initially competing against him. Why did he only recruit the people who were hard-nosed enough to compete against him?

Daniel Yergin
He respected his competitors, particularly the hardy ones. Those were the players who said, "Okay, rather than fight you, I'm going to get on board this ship." He brought them in and they all prospered as a result. They gave up and said, “We’re not going to fight you. We’re going to join you.”

Dwarkesh Patel
Why was Rockefeller so hated in his time?

Daniel Yergin
He became the very epitome of the monopolist. A famous woman journalist, Ida Tarbell, wrote a book about the Standard Oil trust. She said it was a great company, but it always played with loaded dice. He was the very embodiment of it. You had this trust-busting president, Theodore Roosevelt, and this was the most obvious trust.

Also, like gasoline today, it was the one thing everybody bought. You and I don’t go out and buy steel. But unless you have an electric car, you go to a gasoline station and fill it up. This was the same thing. This was the omnipresent product. Rockefeller's idea was to get scale, drive down the price, and expand the market. But it was a monopoly and we have antitrust laws. There was also suspicion that it wasn't only economic monopoly, but about the political muscle that came with it.

Dwarkesh Patel
The thing I'm curious about is, it seems like they really messed up the PR, right? Theodore Roosevelt ran for the presidency on busting. If you mess up the PR so badly that the guy who becomes president runs on breaking up your company, maybe it would have been intrinsically unpopular but it feels like the PR could have been better.

Daniel Yergin
"Why does anybody need to know about our private business?" was his notion. "We're a private business. It's nobody's business." Today, you would have a PR advisor tell him that's not really the right stance to take, but at that time... It probably also came from the arrogance of having created this huge company, running a global company from an office on 26 Broadway. You did have a sense of power.

Dwarkesh Patel
Another thing is that he retires early —

Daniel Yergin
Let me mention this. I do know that one of his guys who was running the company went to see Theodore Roosevelt and brought him copies of Roosevelt's books, especially bound in leather, thinking he could win over Roosevelt. Didn't do any good.

Dwarkesh Patel
How come?

Daniel Yergin
Because with Roosevelt, Teddy was the trust buster.

Dwarkesh Patel
Let's go to World War I and World War II. A couple months ago, I interviewed the biographer of Churchill, Andrew Roberts. As you discuss in your book, he discusses that Churchill was this sort of technological visionary and how that's a side of him that isn't talked about often. Maybe talk a little bit about what Churchill did and how he saw the power of oil.

Daniel Yergin
Churchill was the First Lord of the Admiralty. All the naval ships at that time ran on coal, which means you had to have people on board shoveling coal. It took a long time to get the coal on board. If you switched to oil, the ships would be faster. They wouldn't need to take the same time. They wouldn't need to carry the same people.

So he made the decision—obviously others like Admiral Jackie Fisher were pushing him—to convert the Royal Navy to oil. People were saying this is treacherous because we'll depend upon oil from far away, from Persia, rather than Welsh coal. He said, "This is the prize of the

venture." That's where I got my title from. Originally it was going to be called “The Prize of the Venture" because that's what he said. Then I just made it The Prize.

During World War I, he promoted another military development. I'm forgetting what it was called initially, but it eventually became known as the tank. He really did constantly push technology. Why? I don't know. He was not educated like that. He was educated in the classic sense. That's why he wrote so well. But he understood technology and that you had to constantly push for advantage.

Dwarkesh Patel
World War II is just who can produce the most amount of things. But World War I is especially interesting as a technological war because in the span of four or five years, you go from battlefields with horses to literally the tank being invented during this time. You go from hundreds to thousands of trucks, cars, and planes.

Daniel Yergin
It's extraordinary. In 1912, the head of the Italian military said planes were interesting, but of no use in war. The war did begin with cavalry charges. The German military position was based upon the railroad and inflexible. Suddenly you had trucks, motorcycles, tanks, airplanes. A war that began with cavalry ended up with tanks and airplanes and trucks. World War I, in my reading and writing of The Prize, is what really established oil as a strategic commodity. The person who became Britain's Foreign Secretary said that the Allies floated to victory on a sea of oil.

Dwarkesh Patel
Even the Germans said, “We would have won the war if it wasn't for the tank,” or the trucks or something like that, right?

Daniel Yergin
Exactly. What the Allies had was mobility that the Germans didn't have.

Dwarkesh Patel
There’s one thing I worry about with regards to today. If you had a sort of World War III-type conflict, it seems like there's an overhang of new technologies. Before World War I, there's a sort of overhang where we could develop planes and war tanks and so forth if we wanted to. With drones and other sorts of robots today, it feels like if you did have a World War III today it would be fought with very different weapons by the end than at the beginning.

Daniel Yergin
People say that the Spanish Civil War in the second half of the 1930s was the dress rehearsal for World War II, where a lot of technologies and techniques of warfare were developed. Sadly if you look at Ukraine today, you see that's happening now. On the one

hand it's advanced technologies, information technologies, cyber warfare, and drones in a way that hadn't been conceived before. Hobby drones have become agents of war. Obviously, there's automation of the battlefield. But it's also a World War II battle in that there's been tank battles. It's a World War I one in that it's called positional warfare, trench warfare. So you have a whole century of warfare there, but it is certainly the beta test for new technologies.

Dwarkesh Patel
Let's go forward to World War II. Why wasn't Hitler able to produce more synthetic fuel? Because it seems like he could have won if he had more synthetic fuel.

Daniel Yergin
You would have needed to get to a scale that they could never get to. Synthetic fuel meant making oil out of coal using a chemical process. The other thing is that the Allies bombed the plants as well. When I wrote The Prize, I intended to write one chapter on World War II. I ended up writing five because it was just so amazing. World War II was not an oil war, but there was an oil war within World War II.

When Hitler invaded Russia, he was not only going for Moscow, he was also going for the oil fields of Baku. When the Japanese bombed Pearl Harbor, Admiral Nimitz, who was the naval commander, said if they'd come back a third time and hit the oil tanks, World War II in the Pacific would have taken another two years. General Rommel in North Africa runs out of oil. He writes his wife, "Shortage of oil, it's enough to make one weep." General Patton's lunge in 1944 for Germany is held back by oil. The US is going after the oil lines that are supplying the Japanese, attacking them to basically drain the oil out of the Japanese war machine.

There's one big thing that was a real eye-opener for me. People have heard of kamikaze pilots who would fly their planes into aircraft carriers. One big reason they were doing that was to save fuel so they wouldn't have to fly back.

Dwarkesh Patel
I don't know if "instigated" is the right word, but the Pacific War was instigated because the Japanese needed more oil because of the war in Manchuria. But precisely because of that war, we'd put an embargo on oil.

Daniel Yergin
The US put an embargo on them. One of the Japanese admirals said, "Without the oil, our fleet will become scarecrows."

Dwarkesh Patel
World War I is when people realized that oil is a strategic resource, but in World War II it's really crucial. I'm curious about when different parts of the world realized how crucial oil is as a strategic resource. Was it after World War I, after World War II?

Daniel Yergin
After World War I, it clearly was on the agenda in a way that it hadn't been before. You had governments much more engaged in supporting US companies. By the way, the US was so dominant as a producer. Remember that six out of seven barrels of oil that were used by the Allies during World War II came from the United States. But after World War I, you had these fears of running out. That was one reason the US government supported American companies beginning to go into the Middle East, because governments recognized you needed oil.

Dwarkesh Patel
After World War II, in the big picture you have the dominant allied powers. They're trying to figure out what to do with the rest of the world, and they realize oil is such an important resource. Fast forward 30 years after that, you're in a position where you've lost a ton of leverage against the OPEC countries and you're not in a position to control the supply of oil. How did that happen?

Daniel Yergin
The US had been this huge supplier, but after World War II we had economic growth, highway systems, and suburbs. Oil demand is going way up, and we outran production. The US becomes an importer of oil in 1946, '47, '48. But it's modest amounts. Then as we go into the late 60s, you have this global economic boom. Japan is suddenly a vibrant economy. Europe has recovered, a vibrant economy. Oil demand is shooting up really rapidly. The markets that were quite amply supplied become very tight. In the United States, people didn't realize that we were becoming the world's largest importer of oil. They just weren't paying attention to that. It was thought there are only limits to what we can do as a country anyway.

When we finally get to the crisis, the famous oil crisis of 1973—which probably opened the modern age of energy—what's going on at the same time? There's this political crisis in the United States called Watergate. The front page of the newspaper is not about tight oil supplies. It's all about what Richard Nixon did in terms of subverting the election and the political process. There was just inattention and that's one of the risks. I think a lot about energy security as an issue. It tends to fall off the table until it hits you in the face.

Dwarkesh Patel
When did we realize that there was just a ton of oil in the Middle East?

Daniel Yergin
It was after World War II. People had begun to know it, but during World War I a famous geologist named Everette DeGolyer did a trip to the Middle East on behalf of the U.S. government. He came back and said the center of gravity of world oil is shifting to the Middle East. No one knew how much or anything, but they knew it was a strategic resource. By the way, they didn't want it to fall into the hands of the Russians. That was a concern. Most people don't know that the first post-war crisis with the Soviet Union was actually over Iran, with the Soviet Union making a grab for a part of Iran.

After World War II, there was this real sense that you've got to secure oil supply because it's such a strategic resource. The Middle East suddenly becomes much more important as a source than anybody thought about. The only place producing oil in the Middle East before then was Persia, Iran. Oil was discovered in 1938 in Kuwait and Saudi Arabia and then got bottled up until after World War II.

Dwarkesh Patel
When I read in The Prize about what happens after World War II in the Middle East, it's about 200 pages of how initially, the Western companies make these deals with exporting countries. First, it's just incredibly favorable towards the Western companies. But then the exporting countries are like, "No, we got to do the 50/50 split." Then they do the 50/50 split.

Then just over a couple of decades, what happens is that they just keep asking for more and more concessions: "We want 55%, 60%." These are the exporting countries I'm talking about. They formed the cartel, OPEC, in 1960. But even before that, they have leverage over these Western companies, in the sense that they can say, "If you don't agree, we'll just nationalize you."

Daniel Yergin
I had a mentor, an economist named Raymond Vernon, who came up with this term, the obsolescing bargain. Let's say Dwarkesh Oil invests in such and such a country. You put $2 billion in there and it's great and everybody's very happy. Governments change or times change. People forget the risk that you took to do it. They say, "We want a different deal." That just happens again and again. It happens with all natural resources, with oil, with minerals. It was also the end of colonialism. Countries were becoming independent. Today, if a company makes a deal with a country to go develop oil, the country gets 80% of the profit.

Dwarkesh Patel
So if you're one of these western companies, what should you have done? Let's say it's 1950. You know that over time they have obviously the monopoly on violence, so they can nationalize you if they want. What should you have done so that you can basically prevent the outcome that kind of universally happens? If you were in charge of it...

Daniel Yergin
You would obviously work really hard on government relations. But the countries are generally poor. They say, “We just want our share of it. It's our resource.” Over time, as a company, you have access to the market. You have the refineries. You have the tankers. It isn't like they can just take it over. It takes time to train your population to develop your indigenous oil people who can run it. But if you look back on it, I think you just say that there was an inevitability to it, which also had to do with the consolidation of nation states.

Dwarkesh Patel
Why didn't the US government—or the UK government or so on—do more to be like, "OK, you guys are companies. You guys can't negotiate that hard. But we really care about making sure that America has a lot of oil.

Daniel Yergin
I think the government did back them up. Remember the British owned a big share of British Petroleum, now BP, until the late 1980s. The British government was in there, but then you had the nationalization of what was then called Anglo-Persian, Anglo-Iranian oil, which became BP. I think it was inevitable. The governments did try and support, but there were limits to what they could do. The question of access and of maintaining the supplies, then and now, remains crucial. You have the US Navy today trying to push back on the Houthis in Yemen, who are attacking oil tankers.

Dwarkesh Patel
Thinking purely from the perspective of the companies, if you were in charge of one of the majors, would you have refused to train domestic workers in the expedition?

Daniel Yergin
No, I think that was part of your way of trying to embed yourself there, to bring them in so that you were not this isolated island.
If you look at Venezuela, they nationalized their oil operations. But by that point, they had people who were very well trained at running refineries, at drilling, and at finding oil. They still carried some of that DNA with them in their operations for quite a number of years, until the complete nationalization and Chávez came to power.

Dwarkesh Patel
Was the continuation of antitrust in oil after World War II a mistake? Often when I'm reading your book, what happens is that oil producing countries can negotiate together, obviously after OPEC they're literally a cartel, but then these different Western companies can't.

Daniel Yergin
In 1973, the US government finally did give an antitrust waiver to the companies to try and have a united front in the negotiations. But remember, it got all tied up with geopolitics. It

got tied up with Arab-Israeli wars and so forth. It wasn't just about oil. There were other things going on and you had the use of what was called the “oil weapon”.

Dwarkesh Patel
Let's talk about the oil crisis in 1973. One thing I was surprised to learn is that the supply of oil didn't actually go down that much. Global supply declined by 15% or something. Why did it have such a huge effect?

Daniel Yergin
It was completely unprecedented, unexpected. It created a panic. It was also right towards the final months of the Nixon administration. So it got all tangled up. Then we had the system of price controls and allocation controls, which made it much harder for the market to adapt. One of the lessons to me from The Prize is actually enabling markets to adjust. Because when governments try to control them and make decisions and allocate—and some states want to do that today—it accentuates shortages and disruptions and price spikes. The tendency is to want to control them.

There was just far less knowledge about the market, where supplies were. There was no coordination. Now there's much greater knowledge and transparency. You had what were called integrated companies. The same company that produced the oil in the Middle East, put it on their tankers and sent it to their refineries in the US or Europe, to their gas stations. That system is gone. When you see the names of the big oil companies on a gas station—if you're not driving an electric car—and you pull in, odds are that it's not owned by that company. It's a franchise.

Dwarkesh Patel
I see. That's another thing I was confused about. I wasn't sure how, before spot and futures exchanges for oil, this happens after the oil crisis in the late seventies and eighties. I didn't really understand how oil is getting priced and how different countries are able to have such a... Traditionally, the price is set by supply and demand.

Daniel Yergin
OPEC was setting prices, but then the market responds. Demand goes down. In fact, that's exactly what OPEC did with its prices. It created incredible incentive to bring on new supplies and to be more efficient and undercut. It ended up undercutting its own price. Here’s one of the things I really carried away from The Prize. There are hundreds of really interesting characters in the book, but the two most important characters, one is named Supply and one is named Demand. That's something that you've got to keep in mind with all the other drama that goes on.

Dwarkesh Patel
The interesting thing from the book is that oil did seem to be, at least until very recently, pretty different in that with other sorts of commodities you have strong elasticities of supply. If lithium gets more expensive, you'll figure out substitutes for lithium and it's not that big a deal.

Daniel Yergin
Or find more lithium.

Dwarkesh Patel
Yeah. Whereas, at least during the oil crises, it really felt like the entire world economy was just on hold.

Daniel Yergin
That goes back to the centrality of oil as a strategic commodity. Japan had basically just switched its economy from coal to oil. Europe was switching from coal to oil. It was just such a high dependence. Markets did eventually respond. You had a price collapse in 1986, which was the result of that. In the early 1980s, people were saying, "Oh, the price of oil is going to go to $200 or $300 a barrel," what it would be in today's dollars. It collapsed. So markets do respond. It just took longer for that to happen.

Dwarkesh Patel
Let's say you were in charge of one of these OPEC countries in 1973. You realize that you have a tremendous amount of leverage in the short term on the world economy because everything's at a standstill. Over the long run, substitutes will be developed or more oil will come online and so forth. But you have this unique moment of leverage where people really need your oil. What would you have done? Would you have said "Give me a seat on the UN Security Council and I'll open up the gushers"?

Daniel Yergin
I think these countries did assert their political power. Certainly it was a very different Iran, but the Shah of Iran until he got sick and fell, was asserting, "We're players in the world economy." Saudi Arabia had been a country that people didn't think much about in the US. Suddenly Saudi Arabia became really important. You had this huge flow of money that went into these economies, what were called petrodollars. That made them a whole other source of influence.

In the book I talk about Richard Nixon's vice president, Spiro Agnew, who had to quit. He actually resigned because he was corrupt and even had people paying for his groceries. A couple of years later, he shows up in Saudi Arabia trying to do business as a consultant. People went there. That's where the money is. Today, if you're a private equity fund, for many of them their number one place to go to raise money is not necessarily the pension

funds of various states in the US. These private equity funds or venture capital funds are going to the Gulf countries again because that's where the money is.

Dwarkesh Patel
Does this happen with you? You're the world's expert on energy. I'm sure your expertise is worth a lot to them.

Daniel Yergin
I certainly speak in that part of the world. Sometimes I joke that the best thing about the energy business, if you're a curious person, is that it's global. In some ways it's the worst thing because it involves so much travel and so much jet lag. But I certainly will spend time there. Of course, for me it's a constant process of learning. You have to show up to get the perspectives and understand what's in people's minds.

Dwarkesh Patel
Of the oil producing countries that got a tremendous gush of revenues in the 70s because the price of oil jumped up so high, which of them used it best? Because if you look at a bunch of them... Obviously the Soviet Union didn't do enough to make sure it didn't fall when oil prices collapsed. Iran and Iraq use the money to go to war. Saudi Arabia uses it on welfare.

Daniel Yergin
The country that has done the best was not a big player then, the United Arab Emirates and Abu Dhabi. They built a sovereign wealth fund that's probably worth a trillion dollars. They diversified their economy. A couple of years ago when I looked at it, more than half their GDP was no longer oil. That's what Saudi Arabia is trying to do today to diversify their economies, and make them not just dependent upon the price of oil. Because you don't know where technology is and where the markets are going to be.

The Shah of Iran, who fell from power in 1979, used to say that he wanted to save the oil for his grandchildren. Now the grandchildren are in charge in many of those countries.

Dwarkesh Patel
Not his grandchildren.

Daniel Yergin
Yeah, not his. His grandchildren are somewhere else. That’s right. But on the Arab side of the Gulf, they're focused on continuing that revenue stream, but needing oil in order to diversify their economies away from oil. Russia is still, at the end of the day, heavily dependent upon oil and gas. It distorts their economy.

Dwarkesh Patel
The Middle East obviously today has a lot of crazy ideas. A lot of the worst sort of political and religious pathologies in the world exist there. Is it just a coincidence that this is where the oil happened to be? Or did the oil in some way enable or exacerbate this radical tendency?

Daniel Yergin
That's a very good question. I don't have a good answer to that. There's oil, but there's also religion. There's also the Arab-Israeli conflict. There's Iran, which is really in some ways a neo-colonial power in the Middle East. If you look at its proxies, it has probably 250,000 troops in other countries who belong to various militias and so forth. It's interesting. Sometimes when I'm in the Arab Gulf countries, they don't refer to Iran. They refer to the Persians, in the sense that Persia wants to dominate the Middle East as it did in centuries past.

Dwarkesh Patel
They're imagining Xerxes' armies. Yeah. We were talking about sovereign wealth funds. I think this is a very interesting aspect of the modern world. some of the biggest investment vehicles in the world are the offshoots of oil proceeds over the last decades.

Daniel Yergin
If you look at Norway, or if you look at the Middle East, they are offshoots of oil. Singapore's, of course, is the offshoot of hard work.

Dwarkesh Patel
Let's say you are in charge of an oil producing country's sovereign wealth fund. It's a trillion dollars or something, which per capita is actually not that much. If you're Saudi Arabia, you've got a trillion dollar sovereign wealth fund. The population is 30-40 million people. Per capita, it's like $20-30,000. It's not that much per capita. Also, you know that the majority of your GDP is not going to be sustainable over the long run. You're in charge of it. What do you do tomorrow? Is it important that you use that money domestically? Or would you just put it to work globally?

Daniel Yergin
It's very interesting in Saudi Arabia. It's a question whether you use that money as a national development bank, which is one thing. It's quite another thing to use it as a basically global diversification investment vehicle. In Saudi Arabia, what's called the PIF, the Public Investment Fund, is doing both. In Abu Dhabi they've differentiated the roles of these different funds. As to what is a global fund, the argument is the same argument that you would get from a financial advisor in the US which is: diversify.

Dwarkesh Patel
If you're just purely thinking of it as an investment vehicle, then maybe the rates of return aren't that high domestically.

Daniel Yergin
Yeah but you do want to diversify your economy. You want to bring in investment. There's also another critical need: you need to create jobs. The oil industry is a capital intensive business. It's not a labor intensive business. You need to bring in other kinds of industries as well. If you look at your population, maybe 60 percent of your population roughly is under the age of 30, something like that. So you have a real job creation need.

Dwarkesh Patel
Oil famously makes rich countries richer and poor countries poorer when they discover it. Let's say you're a country that just discovered oil today, but it's got a really low GDP per capita. Maybe you're already advising such countries. If you were advising them, what is it that you tell them to do to avoid getting Dutch disease themselves?

Daniel Yergin
So we need to explain the Dutch disease, which means that you create an inflationary economy and make businesses uncompetitive. That's the heart of the Dutch disease. Of course, that concept was invented for the Dutch. It happened when the Netherlands became a big producer of natural gas. So it is a cautionary tale. You want to, as they say, sterilize some of the money that comes in. You put it into a sovereign wealth fund, invest it overseas. Then you want to put money into education and health and those basic human needs. You want to turn financial capital into human capital.

Dwarkesh Patel
Why is it so hard to set up a stable oil rentier state? Theoretically it seems, you've got trillions of dollars of wealth right under your feet...

Daniel Yergin
Some have, some have not...

Dwarkesh Patel
But if you look at the examples, so many just go off kilter. You have Iran, Venezuela, Libya, and so forth. Very few of them are stable, "We have a ton of money," Saudi Arabia-type states.

Daniel Yergin
If you have that huge inflow of money, it really can create a lot of distortions. Look back at the events that led to the overthrow of the Shah of Iran. Things don't happen for one reason or another. He probably had cancer for two years and was losing it. He also had been so

arrogant that he alienated people and he had his secret police and so forth. Then this pell-mell rush of overspending created inflation and dislocated the economy. It's a good question for study, to look at on a comparative basis what worked and didn't work.

It isn't just oil and it isn't just money. There are other things that are involved as well. Clearly there was a huge religious reaction, led by the Ayatollah Khomeini against modernization, against the role of women. The Shah was saying women should get educated and play major roles in their economy. That was not something that the very conservative clerics could stand. It isn't just about oil or just about money. It's part of a larger mix.

Dwarkesh Patel
Why is Aramco so much better run than other basically nationalized oil companies?

Daniel Yergin
There are others that are well run, but Aramco is a very well run company. As you described before, they rather smoothly did their transition and retained their people who are highly trained. If you go to Aramco, you meet people who have PhDs from MIT or Stanford or University of Texas. They have a very well trained global workforce and a very high standard. They drew initially upon the cultures of the companies that were eventually nationalized out of the business, but the people were trained.

Dwarkesh Patel
I'm curious if there are any stories you can share. I imagine since you wrote The Prize, world leaders are inviting you to meet them and give advice. I don't know how many stories you can tell from these conversations. Is there someone who's really struck you as having their head on straight on these issues? You've been all around the world. I'm just curious if you have some crazy stories.

Daniel Yergin
One is in The New Map and you and I have talked about it. It's the meeting with Prime Minister Modi in India. India was really at a crucial point whether to get out of the Permit Raj, where government really tightly controlled the economy. I discussed this in a book you probably don't know I did called The Commanding Heights.

I describe a scene in the book where he brought his senior advisors together to argue about whether you allow market forces to work or not. It was a very heated discussion and then I just remember his remarks: "We need new thinking." Those simple words have pointed to how India has become so much of a bigger force in the world economy today, as opposed to being a sort of enclosed and closed economy.

Dwarkesh Patel
So in 1973 you have the oil crisis. Before that, if you look at the sort –

Daniel Yergin
We're back to 1973, I thought we were already in 2024.

Dwarkesh Patel
Yeah we're moving around. If you look at the rates of economic growth or rates of total factor productivity growth before that date, it's pretty high for a long time. It's 2% total factor productivity growth before the 1970s. Afterwards it's like less than 1 percent in the US. How much of that is tied to the energy crisis, or was that just a coincidence?

Daniel Yergin
I don't have expertise on that. But I know people like Ben Bernanke, the former head of the Fed, have actually studied that crisis and why that slowdown occurred. The US went from being on a very strong growth trajectory to what at that time was the deepest recession since the Great Depression. Of course, we've had deeper recessions since then. It took a decade to dig out of that hole.

Dwarkesh Patel
But then the rates of economic growth didn't go back to...

Daniel Yergin
Also with the US, as your economy becomes bigger you don't grow at the same rate. You're growing off a much larger base.

Dwarkesh Patel
Here's one of the things in Silicon Valley that techno-optimistic people really talk about. What if you had ridiculously cheap energy because of solar and other things? Would the economy just explode because the economy is bottlenecked by the price of energy? Would it not be a big deal because there are other bottlenecks?

Daniel Yergin
We'll come to it in terms of AI and electricity. I need to reflect on that. But it doesn't seem to me that the cost of energy is a general constraint on the economy. It is probably somewhat of a constraint in California because it has the most expensive energy in the country. But that's because of state regulation. Big Tech wasn't born in 1973. It's much more recently that it's happened. Like the oil industry, it's happened pretty quickly actually in this space of time.

When you have price spikes, when you have disruptions, that's when you see the cost and those risks are there. Although when you get into a presidential election, the incumbents always worry about the price of gasoline. It's so sensitive, because people pay it. It's the one price you pay all the time and you see it. I need to think about it more, but I don't think it's a huge constraint.

Nuclear energy way back in the 1950s was supposed to be so cheap that you wouldn't meter it. "Too cheap to meter" was the phrase. Now there's fusion, which seemed to be 50 years away. It's now maybe 10 years away. Technology will change things. Electricity may be a constraint on the growth of AI in the near and medium term, but that's a very specific problem.

Dwarkesh Patel
There's been different projections made about how much energy will be required for AI. The big thing is they need these big training runs, and they keep getting bigger and bigger over time.

Daniel Yergin
There's one projection that 10% of US electricity by 2030, which is half a decade away, will be going to data centers. It's about 4% today. What a change it's been in the last year and a half in terms of thinking about data centers, AI, and electricity. It wasn't on the agenda a year and a half ago. I remember I was at a conference with electric power utility CEOs about a year ago. They were talking about growth, being surprised by it. Then we have our conference in Houston in March. By then people had woken up to the fact that you're talking about going from 4% of US electricity to 10%. US electricity hasn't grown very much over the last 10 years. It's grown at 0.35% a year. Now you're looking at maybe 2% annual growth or more. That adds up very quickly. I was very struck. I did a discussion with Bill Gates at our CERAWeek conference in March. He said we used to talk about data centers as 20,000 CPUs. Now we talk about them as 300 megawatt data centers.

The sense is that you have electric cars and energy transition demand. Then you're bringing back chip manufacturers and smart manufacturing to the US. That's electricity demand. Then you have AI and data centers. Suddenly this industry that had been very flat is now looking at growth. How you are going to meet the growth is very much on the agenda right now. Data centers are looking at where they can position themselves so that we have access to the electricity that they need: reliable 24-hour electricity. Now there's energy security in terms of oil and gas. Actually it's also energy security in terms of electricity. There's your potential constraint on economic activity.

Some will say the answer to that is innovation. Chips will become less electricity dependent or data centers will operate differently. So the demand will not grow as much. There are those who say that will happen, but it hasn't happened yet. Others are saying, “How are we going to meet that demand?” AI is going to demand a lot more electricity than we had thought about a year or a year and a half ago.

Dwarkesh Patel
It's potentially even worse than the 10% number implies, because it's not widely distributed like households would be. In many cases, they have to be one gigawatt to one specific campus or location.

Daniel Yergin
Right. You look at developing data centers. They'll take all of the electricity generated by a nuclear power plant. If they do that, that means you've taken that baseload nuclear power off the grid. There's a scramble to understand this. Then there are the issues that we have in our country, which is that you can't get things permitted. It takes so long. You have supply chain problems. You have a workforce that has aged out. It's said that to be a fully-trained lineman, you need seven years. You can see that this area of electricity, pardon me for saying it, is hot.

Dwarkesh Patel
The thing I find wild when I'm reading The Prize is just how much economic development is ultimately contingent on the laws of physics. Suppose that fossilization happened in a different way and then oil didn't form. Let's say coal didn't form either. Then it's hard to imagine how society goes from like water wheels to solar power.

Daniel Yergin
That's right. What you really realize is that hydrocarbons have been the fuel, the engine really, of economic development. People would still be in sailboats. They would still spend six weeks crossing the Atlantic. It would take weeks to go from one place to another. That's a very interesting question, to imagine our world without them.

Dwarkesh Patel
It's also interesting that the tech trees play such that just when you need more runway, you get the next energy transition and then you get a little more runway. It's just weird that it's... or maybe we would have gotten it anyway.

Daniel Yergin
You were going to run out of whales. I love that this professor at Yale, kind of a consultant, did this experiment. He needed some extra money and he did some studies that showed that actually this stuff called rock oil, you could turn it into a lighting fuel fluid. I love the risk taking of it. But it's hard to imagine... we wouldn't be where we are. We wouldn't have the world. Today, it wouldn't be a world of eight billion people were it not for it. Obviously, there's going to be change. I'd say right now, the incentives for innovation are there. That's why we may see a runway of what's going to come, but it may really come from the side.

Dwarkesh Patel
And something else that the kerosene is the fact that oil for the first 50 years is used for only lighting. Another thing that's interesting about that is people are asking now about these AI models. You can literally get a million tokens, like many books length of content, out of these models for 15 cents. This is one question people are asking. Let's say you did a hundred billion dollars worth of tokens, what does that look like? What does an industrial scale use of intelligence look like?

With crude oil in the beginning you're producing a certain amount, but you had a glut because you're only using it for lighting. You then discover this industrial scale use of this technology, which is obviously motorized transportation. That's one question you can have for AI. Currently what we're using these models for is research and chat and whatever. That's like the kerosene. What would the equivalent of billions of vehicles look like for AI?

Daniel Yergin
That's a question that I'd like to ask you. It is a sense that we are at the beginning of something new. I remember a political leader in Central Asia saying, "AI is going to be the true source of power in the future."

Dwarkesh Patel
How mad are the frackers that they basically solved America's main geopolitical problem, but they were so successful that they've competed away their profits?

Daniel Yergin
That was a period up till about 2017, when it was growth for growth's sake. Then basically the financial community said, "Hey guys, the party's over. I'm not going to reward you for growth. I'm going to reward you for sending money back on my investment." So in a sense, shale is almost a mature industry. I think people don't understand how transformative it's been. The US was the world's largest importer of oil. We were only producing 5 million barrels a day of oil in 2008. Now we're more than 13.2 million barrels a day. The US is energy independent. People thought it was a big joke. It could never be energy independent. Every president said, "We want energy independence." Late night comedians could make fun of it. Actually, it's happened and it's had huge economic significance. Back in like 2008, the US was spending something like $400 billion a year to import oil. Now we basically spend nothing to import oil.

It's been geopolitically very significant. That's been a learning experience for the Biden administration. It turns out that if it wasn't for shale gas made into what's called LNG, liquefied natural gas, shipped to Europe, Putin could well have shattered the coalition supporting Ukraine by using the energy weapon with, not oil, but gas. Suddenly you had European politicians coming to the US to try and secure supplies of LNG because they were

so worried about it. It really is a revolution that is playing out today. China imports 75% of its oil. It wishes it was in our position.

Dwarkesh Patel
We're energy independent, but how far are we from a scenario where our allies, most notably Japan, are also energy independent?

Daniel Yergin
Very, very, very far.

Dwarkesh Patel
But including our exports?

Daniel Yergin
That's why when the Japanese prime minister was here for a state visit a few months ago, they were expressing great alarm about future LNG exports. For them, being able to import energy from the US is very critical to their energy security. Where else are they going to get their LNG? They'll get some from the Middle East, some from Australia, but they'll be pushed back to getting it from Vladimir Putin. For them, US energy exports, US shale, has become part of their energy security.

I never thought of it quite that way, but if you think about what the Japanese are saying, that's really what their message is. I did an event with the Japanese prime minister in the springtime. That came through very clearly. For them, US exports are part of the security relationship. US LNG is now part of the arsenal of NATO. It's really different. We're talking about the geopolitical significance of US shale.

No one would be happier to see a ban on US shale production than Vladimir Putin. I have firsthand sense of that. In 2013, before he annexed Crimea, I was at this conference, which was his version of a global economic conference. They said I could ask the first question. It was going to be something we were talking about before, overdependence on oil and gas revenues. I mentioned the word “shale” and he erupted and said, “It's barbaric, it's terrible.” He got really angry in front of 3000 people. It's rather uncomfortable in that position.

I realized there were two reasons. One, he was worried about shale gas competing with Russian gas. Two, he saw that the shale revolution would augment the position and influence of the US because the US would no longer be energy dependent. He was very prescient. He was right about both of them. When he invaded Crimea, I don’t think he never imagined that if he cut off the gas to Europe, that Europe could survive. Europe survived.

Dwarkesh Patel
The Prize especially, but all your books are narratively driven. You have a detailed understanding of people and events and so forth compared to somebody who's just like, "Here's how many barrels are produced in year X. Here's how many barrels are produced in year Y." When you're in these conversations, or you're trying to think about the future of energy, do you feel like you really need to know how Drake was thinking about the drill well and...?

Daniel Yergin
Yeah in one way, I see myself as a storyteller. I like narrative. I think that's the best way to communicate. I like writing about people and not just about abstractions. It's funny. When I was writing The Prize or writing these books, I almost see it like a movie when I'm writing. I see what's happening and that makes it more vivid for me.

I also think that there are more and more things you're competing with if you're a writer. You're competing with TikTok, YouTube and everything

Dwarkesh Patel
Podcasts.

Daniel Yergin
Podcasts. So you've got to draw people in and people love stories. I started writing when I was a child. My father had an old typewriter. He'd been a newspaper reporter and I would hunt and peck and just write stories. In high school, I was student body president but I was also editor of the literary magazine. When I was an undergraduate at Yale, I started a magazine called The New Journal which was narrative journalism. I learned a lot of my writing doing that. I learned a lot of my writing writing magazine articles, how to tell a story. I really love shaping a story. I love finding a character. I love finding the great quote that just illuminates everything you're trying to do. I love not boring people.

Dwarkesh Patel
When you were writing The Prize, it's a seven-year process. There's the endurance, but there's also the sense that you have to have faith that at the end of this–

Daniel Yergin
You're making a deal with yourself. You're making a deal that what you write in year four, you're not going to totally rewrite in year seven because otherwise you'll never get it done. The odd thing is I started a business the same year I started The Prize. I was living entrepreneurship. People, when they go back and write history, they know the outcome. So sometimes they think everybody had all the information, all the time, and knew the outcome. Of course, you never have all the information. You certainly don't have all the time. You surely don't know the outcome.

That sense of contingency, which is such a part of human history, I tried to capture. That is one of the things that made The Prize, The New Map, and The Quest distinctive. The Quest, the middle book, was a question. Where the hell did the modern solar and wind industry come from anyway? It's entrepreneurs. I have been an entrepreneur, I have a feeling for it. You're an entrepreneur in terms of what you're doing with podcasts. You sort of invent it as you go along. I tried to capture that. At the same time, I love writing narrative.

Dwarkesh Patel
Here's something I'm curious about. Let's say you meet another analyst who doesn't have a vivid sense of narrative history, but just knows the facts and figures. What is it that they're missing? What kinds of understanding do they often lack when you talk to them?

Daniel Yergin
I will have great respect for them. I also love reading the monthly energy review from the Department of Energy, which is only statistics, or the Statistical Energy Review. I love it. But what you may miss is the contingency: the human agency, the decisions that went onto things, the right decisions that were made, the mistakes and the things that you missed or were wrong about. It's the texture. There is a tendency to think that things are inevitable, but you know that the world can change from one day to the next. That's what happened on December 7th, 1941, September 1, 1939. It could happen any day in the Middle East right now. You could go from one day to the next and it's a different world.

Dwarkesh Patel
Just reading it, you can tell. It's hard to understand many of the things if you don't have an understanding of other things. Arab nationalism forced the Saudis to support the embargo. Why did Egypt launch an attack? Because they wanted a ceasefire to be in a different place, but they actually wanted to end the war... There's so many different things like that.

Daniel Yergin
That's right. You don't understand why these things happened. You just look at the numbers, but why did it happen? Part of it is, through narrative explaining why it happened.

Dwarkesh Patel
Let's talk about solar and renewables. With oil, you have a commodity which is a flow. You can cut it off and you can turn it back on again. It gives the person who's producing it a lot of leverage. Whereas with wind and solar, if you're the people producing it, it's just a capital stock. How does that change the geopolitical situation and the kind of leverage that the producer might have?

Daniel Yergin
It's a question of scale. What I carried away, the basic premise of energy security goes back to Churchill. He said that safety lies in variety and variety alone, diversification. Wind and solar give you diversification. Electric vehicles diversify your fleet. Those are all there.

For China, wind and solar, electric cars, is very much a strategic issue because they see the vulnerability of importing 75% of their oil, much of it coming through the South China Sea. They know the story of what happened with World War II with Japan. For them, the shift to electric cars is less about air pollution and more about energy security. It's also about knowing that they couldn't compete in the global market with gasoline powered cars, but they can with electric cars. Those are the strategic things.

Wind and solar give you a more diversified system. Until you have batteries that can really deliver the storage, you have the intermittency problem. You take California today. People think wind and solar is advanced. It's true. They are 25% of electric generation in California, but 43% of electric generation comes from natural gas. And that gets back to the data centers. You're going to need to bolster your electricity power system. How much can you do with batteries and how much can you do with natural gas?

Wind and solar are also stories about entrepreneurship. In The Quest I asked myself, where did the wind and solar industries come from? The solar industry came from two émigrés who had left Europe, one of whom had driven his car out of Hungary in the 1956 revolution. In 1969, he's a chemist working for the US government. He and his partner decided to go in the solar business. That became the first solar company. They started in 1973. With the wind business, I like to say the modern wind business is the result of the marriage between California tax credits and the sturdy Danish agricultural industry. It was driven by tax credits, but they needed to find wind power machines that could stand up when the wind blew in the Tehachapi Pass.

It took about 30 years for both those industries to become competitive. It only happened around 2010 that they actually became competitive. Now, of course, they're very competitive but then guess what? Now,they're all tied up. Renewables are also now tied up in geopolitics and, in what I call The New Map, the movement to the great power competition. The US just put 100% tariffs on Chinese electric cars, 25% tariffs on Chinese storage batteries. We recently had this bill, the Inflation Reduction Act. It's huge, a trillion dollars the Treasury estimates when it's done. It's about climate and renewables, but it's also about competing with China.

Dwarkesh Patel
Speaking of solar deployment, I think solar deployment is on an annualized $500 billion budget. That's the yearly amount that we're investing in deploying it. Is there anything—when you look through the history of The Prize or the history of

energy—comparable to this scale of deployment? Maybe initially, you could say electrification? Or is this just an unprecedented scale?

Daniel Yergin
I'd have to think about it. It's happening fast. As I say, these guys started the solar business in 1973. It's now taken off. It's also interesting that what really gave the boost to the solar industry is German feed-in tariffs, which provided the incentive for the Chinese to dominate. Because they dominate the business.

Right now, wind is about 10% of US electricity. Solar is about 3.5%, but solar is going to grow. It certainly will grow very fast. I just heard this when I was at this utility commissioner's conference. There's real tension between states and localities. The states want to push it, but localities don't want solar or don't want wind.

Dwarkesh Patel
We're in Nantucket and I saw a couple signs around like, "No More Wind."

Daniel Yergin
They just had a thing where one of the blades of one of the big wind turbines fell off and washed up on the beach. That has now created some really huge consternation and suddenly reopened the discussion.

You need supply chains. Wind and solar are a little bit different, of course. If you want to start a new offshore wind project in the US, you can order your cables but you won't get them until 2029 or 2030 because of the supply chain issues. Solar is different. But of course, solar is so dominated by China.

Dwarkesh Patel
Oil companies are investing a lot in renewables. Is there a bunch of skill transfer here that actually means that these oil companies will be really good at deploying solar or something?

Daniel Yergin
There's a difference among some companies. Some companies say yes. They look at offshore wind and say, "We're in the offshore oil business, we can do offshore wind." You see that in Europe where Equinor, which is the Norwegian company, or BP, or Shell, or Total, are big in offshore wind. They say, "We have skills in that." Solar's a little different.

Exxon is now going into mining lithium, thinking that they can use skills that they use for that. But the US major companies say basically, "We do molecules, we don't do electrons." That's where the difference is. The European companies say, "We can do all of it." The Americans say, "We have no comparative advantage in electrons." But there's a lot of interest in hydrogen because that's another molecule and to a degree, hydrogen can

substitute for natural gas for instance. That's where a lot of investment is happening but it's very early. Again, sometimes people forget about the energy business. Its scale is so big as to what the requirements are.

Dwarkesh Patel
Yeah, but also it's surprisingly small. It's a fraction of GDP. Oil is 3% of GDP. Obviously the entire world depends on it, but you wouldn't see that in the GDP numbers.

Daniel Yergin
It used to be a much bigger share of the stock market, Dow Jones. It's also a smaller share. It's still the strategic commodity, but there are a lot of other things that go into it. Now, if you look at what the Department of Commerce uses, there are different categories of jobs. Altogether, they'll say that there are about 12 million people in the US whose jobs are connected to the oil and gas industry.

Dwarkesh Patel
I'm curious about how you imagine the demand elasticity for oil changing in the future. In the past, you're not going to stop going to work because oil is 10% more expensive, right? With the Arab oil embargo, prices went up like 300% even though supply only went down 15%. But now, if oil goes up in price, you can Zoom or video conference or something. With fracking also you can increase supply if you want to. Because of these new flexibilities we have, is there going to be a lot more elasticity in demand?

And also, maybe the main thing with AI and compute is that you have this sort of thing where you can just dump arbitrary amounts of energy into this and it gets better. Currently there's nothing where if you just keep dumping more energy into it, there's a huge elasticity of demand.

Daniel Yergin
I think you would know with the podcasts you've done how AI is really gonna change everything. That is the expectation now, that it's gonna change everything including energy. Then you have $6 billion of venture capital money that has gone into fusion. There's a lot there that can change. My own view is that the energy transition is not going to happen because of price. It's going to happen because of policy and technology. I think that's what's driving it. I have the view that people have had too simple notions of how the energy transition will work.

That's one of the things in The New Map. If people read one part of it, read the section on energy transition. It tells you that what we're talking about today is not anything like any other energy transition. Every other energy transition we've had has been energy addition. Oil discovered in 1859 overtakes coal. Coal is the world's number one energy source in the

1960s. Last year, the world used more coal than it's ever used, three times as much as the 1960s. Now the idea is, can you change everything literally in 25 years?

Some of that thinking was developed during COVID, when demand went down and price collapsed. Part of it is people worrying about energy security. I was just reading last week the budget message from the finance minister in India. She talked about energy security and how they have to maintain economic growth. It's very important to do that and energy security as well as energy transition. So it's a different balance. There's a difference between the North and South. Then there's the constraints on minerals because as you make an energy transition, what people talk about, it's more mineral intensive. An electric car uses two and a half times more copper than a conventional car.

We did the study and said, "Okay, let's take the 2050 goals. And if you want to achieve them, copper supply has to double by about 2035." What's the chance of doing that? It takes 20 years to open a new mine in the US. We just did a study. It takes 29 years to open a new mine. Changing a $109 trillion world economy... it's going to change. You said the development of solar is going to be really important. But things are not going to move in a straight line. We are in an energy transition, but it's going to be a longer one. Here we are, as you mentioned, in Nantucket, which was a key part of the energy transition because it was a source of lighting in the 19th century from whaling.

Dwarkesh Patel
It was like in the first chapter of Moby Dick.

Daniel Yergin
Exactly and then it came to an end. It came to an end because of the electric light. Things are not going to stand still. The most important thing are the technologies that you can see coming or the ones that come from left field like fracking or grasping what AI is going to mean for how our economies work. But I think you made a very important point and that was the discovery in COVID. You don't have to travel, you can do it by electrons.

Dwarkesh Patel
Here's one of the final questions I wanted to ask you. If somebody were to write a definitive history for another subject that's not energy—you don't have to personally write it, you can just delegate it to somebody else to do it and they'll do a good job—is there a topic which you feel could make for another thousand-page fascinating history of the world?

Daniel Yergin
My father had worked at Warner Brothers for a time. I was always interested in the movie and entertainment business and how that developed. A big epic story of that. I just think that's so interesting. One of the things that is fun when you're writing this is when you have these oversized personalities. There may be obnoxious people whom you would hate to

meet in person, but are very interesting to write about. So you look for an industry... Here's something nobody's ever thought about: the history of the internet. No, I'm just joking.

Dwarkesh Patel
But I don't know if somebody has written a modern, definitive history of the internet.

Daniel Yergin
The one thing I've learned from doing these books is the 3x rule. However hard you think it's going to be, it's going to be at least three times as hard to do. I started off with really unrealistic expectations on The Prize, but I think the thing that kept me going was just how great the stories are and how important the stories were.

Dwarkesh Patel
I've heard this from multiple historians who have written similar definitive books about their subject. I think Caro said, "I'm going to write this over the summer and then we'll use the book deal to go on vacation afterwards." I interviewed Richard Rhodes, the author of The Making of the Atomic Bomb. It's a similar story there, obviously it took longer.

Daniel Yergin
I used the advance for The Prize to actually capitalize the company we started, which created an incentive to finish The Prize.

Dwarkesh Patel
You were doing the business in the day and then writing at night?

Daniel Yergin
Writing at night, writing at weekends, vacations, filling up our car with books, and just immersing in it. I did not have a master plan. I really should have. It would have saved a lot of time probably. I would just immerse myself in something and get it all in my head. My mother was a painter and I would watch her sketch. That's the image I have is that I sketch it out and then I fill it out and work on it. Like a lot of people, I love to edit and polish. I love going over it and just making a sentence better and then saying how to make it better. With The Prize, one of the things is that I read the whole book aloud to myself to test every sentence. Does every sentence have resilience? Does it sing? For me, that's a source of pleasure to do that.

Dwarkesh Patel
Did you know while you were writing it that it would become this definitive history?

Daniel Yergin
No. We had this apartment overlooking the Charles River in Cambridge. I'd look out there at 2 a.m. in the morning and think, "What's going to happen?" I think those around me despaired a little bit. This could end up a veil of tears. But it turned out. And then the book

was basically five years late, brilliantly timed. People said they have a great sense of timing. I said I was five years late. But I did have a sense that I needed to get it done. That something, that some crisis was going to come. I had a sense of that and that drove me. Otherwise there's this danger that you just keep working on it.

Dwarkesh Patel
Okay, I think that's an excellent place to close. Thank you so much for coming on the podcast. This is wonderful.

Daniel Yergin
It's great to have this conversation. It gave me a lot to think about too. So, thank you.