Sguardi sul Futuro

Una conversazione sul cambiamento climatico e il raggiungimento di NZE

Sergio Vergalli intervista Robert Mendelsohn

Sergio Vergalli
Okay. So we are here today for our fourth interview about our Lisa Summer series of interviews. What is it called as called Free Thoughts on the Future. Today we are here with Professor Robert Mendelsohn from Yale University. It is among a long list of his books, and the paper is a Britain visa handbook on climate change and agriculture and so today's we start with obvious questions.

So I start with our first question. That is the following. Do you think it is possible to pursue the net zero emission target by 2050?

Robert Mendelsohn
I believe it's technically possible to do that. That is, if if the world wanted to spend a vast amount of resources on it, they definitely could achieve that. I don't think it's actually possible. And the reason I don't think it's actually possible is we don't have any kind of government structure to coordinate government activities across the world. So there's the political economy.

Part of it is broken, totally broken. The European Union is the only collection countries that have organised themselves in a coordinated way to address climate change. The rest of the world is is doing various different things close to doing nothing. And that that absence of having a political mechanism that actually can achieve this, I think, makes this impossible to do.

So that's one reason why it can't be done. I think the other reason that it can't be done is that it's incredibly expensive. And I don't think there's a willingness to pay for anything close to what it's going to take to actually do net zero by 2050. I think that the war with with Russia, that has given us just a brief glimpse of what it would be like to have really high energy prices.

And it's pretty clear that that you're seeing conflict all over the world about facing these really high energy prices. People are very upset about it. So I'm guessing that at the moment, if any kind of political institution said, look, this is the way we like things to be, that that the people that elected them will quickly loathe it so that there's just no taste to spend this kind of money on climate change.

Now, that doesn't mean we can't do anything about climate change. It just means that trying to do everything by 2050 is probably just too expensive. And the other thing is that doing it by 2050 versus stretching it out is, which is most what all the economic models are suggesting. That is, mitigation is important, we should start it, but it's something that we should be stressed out in the the date of getting to net zero might be 2100 or it might be 2150 if you stretch it out that the costs of it goes down dramatically a by an order of magnitude.

So there's a serious question about whether this is even the right idea. Even if you had the political institutions in place, it's not obvious that that we even should be trying to do this. The idea of doing climate mitigation, we we agree, ought to be done. But whether it has to be done this fast, this is just an invent it quick crisis.

It's not something that the scientific community necessarily agrees with this. There's nothing the science says that climate change is harmful. The science does not say it's so harmful that you could spend any amount of money on it. There's a big there's a limit to how harmful climate change is. Most of the things about climate change that are really scary are really far in the future, and it's just too soon to be spending vast amounts of money to try to go to net zero.

It's not too soon to start mitigation, but it's it's too soon to pretend. This is a crisis that requires all our resources is just not that important. So it's a matter of trying to get climate change in the right perspective. And I think there's many people that don't want to do anything at all about it and other people that want to do way too much.

And that is a balance between those where we could actually start doing some mitigation, not too expensive. It could start slowing down our emissions and yet still allow the global economy to proceed almost untouched. That that there is a nice balance there that this this program trying to get down to 2050. It does not strike.

Sergio Vergalli
Okay so is so it's it's a very complex situation in order to manage this and so yes yeah it's all but we so I understand it's too expensive in some cases. So there is a way waiting. So we have to wait. In some cases, someone is waiting. In other cases that we understand better. Also, that probably could be in the future.

So is that the problem among all the possible obstacles between IRA and Saudis, which could be the predominant in one case there, and so which could be also a possible solution. So which could be a point in which I can start in order to solve in order to push a visa with a big economy, in order to to face the problem related to climate change due to all the things that they said to.

Robert Mendelsohn
Well, I'm agreeing that now is the time to push it. The time to push is when we first realised climate change was a serious problem. That was 1990. So we've gone by 30 years and done virtually nothing. I mean, the European Union has done something but very little in terms of actually reducing emissions. The rest of the world did nothing.

So we have dropped the ball as far as mitigation is concerned. We have not done enough. So I'm definitely saying we ought to do a lot more mitigation than we historically done. We ought to start making progress on reducing emissions. But what we really want to pick off is what's the low cost emission with low cost mitigation options?

What are the things that we can do that aren't that expensive per tonne of carbon? Getting rid of and let's get those done because if we can target the low cost things, the things the European Union was targeting when it had a $20 emissions tax for carbon price that was targeting low cost mitigating mitigation, there's low cost mitigation opportunities across the entire world, and it's a travesty that we're not doing them because those things are something that we could do without having a huge sacrifice.

The whole world could agree to do low cost mitigation, and to the extent that there are some very, very poor countries, least developed countries that need a little assistance, we would be happy to give that assistance. It's not that much money involved. So the argument I'm trying to make is it's a travesty that we have not done low cost mitigation.

And that's the thing that's been a mistake, that the reason we're not doing low cost mitigation is some people don't want to do anything that benefits the planet. They just want to do whatever it benefits themselves. So this is our former President Trump would be a perfect example is this I don't care about that. I only care about myself.

So why should I spend any money? So that's one part of our problem is that there are some people who are basically selfish. They don't want to do anything for anyone but themselves. But the other part of the problem, curiously enough, is environmentalists and environmentalists have been so eager to solve this problem overnight that they have said, I don't want to do any low cost mitigation.

That stuff's not important. It doesn't stop the problem overnight. And so between the environmentalists, who are the people that care the most about the environment and the people who care the least about the environment, we've got a super majority that doesn't do anything. And that to me is the super tragedy of our current approach to climate change. It's that we have not looked for a moderate approach.

We've not looked for something that is not that expensive, that works. It's cheap enough that most people will agree to do it, that you get a majority of the world to say, Yeah, I could avoid that. If that's going to help save the world, I'm going to pay for that. There are these moderate approaches which are basically the solutions that all the economic models are kind of suggesting we ought to follow.

That would get us to net zero, but it doesn't get us to net zero tomorrow. It gets us to net zero very gradually. And what those models all suggest is you do all the low cost mitigation you can find. And then gradually over time, we'll start to pick off some of the middle cost mitigation and in the future, we'll get the super expensive mitigation done.

And what that gives us, it gives us a lot of time to make adjustments. We can go go after the low cost first. We get it done without destroying the economy, without costing, without energy, costing five times what it historically cost. We can do that without causing a great deal of pain right away. And as we get ourselves better organised, as we get more R&D completed, we can start to attack some of these more expensive technologies, try to see if we can find cheaper alternatives to what we've done, to what we know now.

And as we find better alternatives, invest in more of them and gradually unfold this program not tomorrow, but gradually from 2052, 2100. Do more and more. Pick off more and more of the more expensive mitigation technologies. Make them better and better. Find new things we never even heard of and used the time to do to do this slowly.

And what that time is giving us is time to find out, to get ourselves organised. First of all, because we're not organised right now as a globe, it gives us time to get organised, but it will

also give us time to find lower cost ways of doing the same thing that we only have high cost alternatives to now.

An also gives us time to gradually wean ourselves away from fossil fuels so we can use up the rest of the oil and natural gas, which is probably going to just take us another 50, 70 years. We'll go through all that, how we want to leave most of the coal in the ground, never use it. And then we can we can gradually build new technologies that can replace fossil fuels over this time period.

So it's giving us a chance to, instead of tearing down perfectly well-functioning power plants well before they're finished, it's giving us a chance to go through their entire lifetimes. And when it's time to replace them, replace them with something much better than what they have now. And that time is valuable to us. And to do 2050 is our target date to get make this entire transition doesn't give us any time to make this adjustment.

And so it turns out to be unnecessarily expensive. So this whole idea that we've got to rush this thing through and do this overnight just doesn't make any sense. It's making this much more expensive than it has to be. It's giving us no time to coordinate across ourselves, and it's giving us no time to take advantage of R&D.

So my idea is, yes, net zero is the right idea. They don't abandon that. But there's no reason to think that 2050 is somehow a critical deadline. It's not critical if we slid that to 2100, the cost goes way down from sliding to 2150. The costs are even lower and we want to take advantage of that extra time to do this in a way that is not as.

And then I think it is, no question, we'll get to net zero.

Sergio Vergalli
So I'm okay, but if it's true in the States, so they gradually process in order to reduce so to announce these mitigation measures. So another important word that is inside the environmental economics is adaptation. So adaptation because in the meantime we are trying to reduce CO2 emissions to control the increase of temperature and so on. Unfortunately, climate change is ongoing and only up in this move process as is increasing, which is your social share, your fault about adaptation, which are where the action which we are required to take into consideration also if is more important than mitigation versus adaptation in some cases or both, or because that €1, you have to invest the one you're in one direction or another one that you have to choose between you have to choose.

Robert Mendelsohn
Yes. Right. So so my idea is you want to find you want to look at mitigation and adaptation to tools you have available. And you want to find the least cost way through. So right now, it makes sense to be spending more money on mitigation because right now the climate hasn't changed very much. So there's not much to adapt to the adaptations we have to make a really small, but as climate change progresses, we'll have to make more adaptations.

So the future should have much more adaptations to it than the past. Right now, what we don't do, what we aren't doing is mitigation. So if you ask me where to put the euros today, I'd put most of the euros into mitigation. But over time, that's going to shift as as adaptation becomes a much more pressing thing to do.

You should start to spend more money on the adaptation. So I look at this as we don't want to be biassed towards one or the other. They both are important tools. We need them both as part of our arsenal. And as far as adaptations are concerned, one of the things that's beautiful about orientation is a lot of adaptation we're going to do because it's in our own self-interest with mitigation.

It's not really in your self-interest to mitigate. It's in the global self-interest to mitigate. But it's none of your personal self-interest. But with adaptation, it's actually in your personal self-interest. To add to that, if you move from living in northern Italy, in the in the Dolomites, and you suddenly find yourself in Sicily, you want to adapt to the fact that that's a lot hotter environment you're going to change.

You ought to change your behaviour to adapt to that much warmer climate. So the idea is if you had to move to go to Sicily, there would be all sorts of things that you want to do to adapt to being in that world replace because it's in your own self-interest. So that's true as a household, you know, if you're a runner, for example, you know, if you're in the Dolomites, you might want to run only at 1:00 in the afternoon when it's warm.

But if you're in the Sicily's sea world, you get a warming run at one of the afternoon, super hot. Then you're going to run either in the morning or you're going to run in the evening. You'll adjust your behaviour to fit the climate you're in. So that's true about individuals. It's true about households in terms of buying air conditioning.

You might not need the air conditioning if you're the Dolomites, you would definitely need it if you're in Sicily. But it's also true about birds, farms, when you want to adapt. Farmers, for example, you can grow different crops in the far north, then you will in the south of Italy. That's true. Even more so when you look at all of Europe.
You're in Scandinavia. You only have a few months to grow crops. You've got to grow something that's fast and it's done quick. Whereas in Sicily you might have you have many months in which you could actually grow things you could actually take advantage of that long growing season. There's going to be adaptations like that that are always already obvious when you're talking about being a farmer in one place versus a farmer in another.

These are obvious to us as we move through time. But as things get warmer, we're going to want to make adjustments. Farmers will want to make adjustments. Households will make adjustments, industries will want to make adjustments. These adaptations are in their own interest. So unlike mitigation policy, which requires this huge global coordination, a lot of adaptation is going to be done privately and it's going to be done no matter whether it's a policy or not, because it's in everyone's interest to do.

Some adaptations will require public government assistance. For example, if we want to adapt to sea level rise, you're not going to really want to say, Oh, well, I'm going to build a

wall around my house and that'll protect me of four walls. You know, every quarter it's a lot better just by one wall across the coastline that holds the sea back.

That requires government coordination because there's no way that you can get individuals along the coast to agree with each other. Oh, should it be two metres? No, 2.1 metres. 1.9 metres. You know, there's just no way they can coordinate that. But the government plans to do that. So they're going to be some examples like that where the nature of the adaptation changing ecosystems, allowing ecosystems to adjust over time. These are things that the government has to be there to coordinate and these are things that are needed as much as mitigation is needed to make things work better in the future.

So I'm very enthusiastic about adaptation. That's actually what drew me into climate change in the first place. I was trying to understand well, if climate gradually changes over a century, how will we change? How will this impact us? What will we do differently? And adaptation was one of the most obvious things that we will do different. But it's really complicated because you have a dynamic thing that's moving over time.

It's it's different for every different person. If you're in southern Italy, it's one thing for northern Italy, it's another your Scandinavia. It's completely different now. Sometimes it's going to be trying to avoid a severe harm. Sometimes it's going to be pretty modest because you're you're kind of doing something that isn't going to be affected much by climate. And sometimes there's a new opportunity.

England is suddenly growing wine. Why are they going wine? Because it's warmer. They can't. They couldn't be for. So sometimes it's going to be a matter of seizing new opportunities. So adaptation is going to be very different across the entire landscape, which makes it complicated. And adaptation is going to change constantly as it continues to warm and as precipitation patterns change.

So I'm guessing that a lot of adaptation is going to be reactive. It isn't going to be that, oh, wow, in 2050. I see. The model says it's going to be 22.4 degrees warmer here and it's going to rain a little more. I'm going to plan for that. Now, it might not be quite that simple, partly because the models don't know every thing that's actually going to happen in 2050.

That's just a prediction, partly because there's going to be a lot of variability. So precipitation is going to increase in some places and decrease in others. Temperatures are going to warm. But how much the warm that probably will vary a lot of space. So a lot of adaptations going to have to be reactive. It's going to have to say, well, what's happened the last ten years, I'm not I don't care what happened 50 years ago.

I want to know what's happening last ten years. So I can make a good guess what's going to happen tomorrow. And what people will do is gradually adjust to the fact that what's happened over the last ten years is not the same things, what happened to the ramparts and they will make these adaptations. So I'm very enthusiastic about adaptation.

I look at it as it doesn't have the same political economy problems that mitigation is because a lot of the things that the government has to do, our local government is not global

coordination. It's mostly just trying to figure out how to do something together as a community. And so a lot of the things are going to be much easier to do than mitigation.

And it's just a question of reacting as they see things change, people making different policies that are better in this new environment. So it's nothing new for economists. We love change. We think change is wonderful. If things didn't change, if economies didn't grow, we may be feel like we're not doing our jobs. We're used to change. But a lot of other scientists, you know, natural science aren't so used to it.

The changes that happened in many natural sciences are so slow they don't do it. The world is changing. And so they can imagine a world where lots of things are going to be different. That's actually a world that economists are very familiar with. We knew the world was going to be different in the future, even if there wasn't climate change.

So this is just one more thing that's going to make it different. The idea that we should be open to changing and adapting as it changes is not something that's new, but it may be new in some areas. The idea that some things like how to protect nature requires now dynamics, whereas before it was a static view. You just build a wall around natural things in its space, but now it's going to be a dynamic thing.

O Nature has to change from looking like one thing to looking like something different. It's now something that's moving that's going to require us to rethink a lot of things, but it's not beyond our ability. I think that that that's one of the things about adaptation. It's actually not going to be as hard as people think because it's going to happen slowly and you're going to get lots of cues along the way of what's the best way to adapt.

You don't have to plan for that. You don't have to plan for the 2100 World Today. You need to plan for the next decade today. And that's going to be true every decade. So in 2030, they need to plan for 2040, 2040, plan for 2050. And that's a lot of the way adaptation board for so I'm enthusiastic about imitation.

I think it's got to be there, but it's not a panacea, you know, it's not a reason not to mitigate it is a reason why we don't have to mitigate. As if our heads you cut off the adaptation means we actually have to we don't have to get this done by 2050. We can do this gradually, but we need to start now.

Sergio Vergalli
Yeah, yeah, yeah. Okay. About the change you said about also so gradually. So this decade. Okay. So the last question is about our current events. Okay. Yes, current in terms of the last crisis where we arrived after we called in 19 crises, Russia and Ukraine were today de facto a lot off our production system. So in some cases we discovered some are related to this bottleneck effect on supply and then the supply system unrelated to the supply chain system.

So we just can't we we've this new war that is related to our change of a structure of supply systems. So we decided to to reduce the length of the supply chain because in order to

reduce those uncertainty, because if I if I both buy all my inputs from my only one counter in this case that I depend strongly on, this can be discounted.

So I strongly depended on this. We discovered we saw during COVID 19 in this supply chain bottleneck related to the production of some inputs, the bottleneck related to food production. And also in this this our dependance with respect to the Russia gas in Italy especially, but also the Europa. So we have this problem related to a structure of the and also related to the raw inputs in general.

So looking at that, which is very energy transition, one of the most important thing that we have spoken about is is that the technology. Technology depends strongly on raw materials. So which could be the problem related to this geopolitical risk. And also this problem related to the concentration of some inputs in some different countries with respect to the energy transition, it again, we we are cruising starting to get to a net zero emission.

So bids are to impose a target to arrive to its target. But the if only political risk is so big, it is difficult to to reach to a problem to sorry to reach the target. And it also is not so easy to to obtain of energy transition in our target which is your thought about. So this problem rate materials, supply chain bottlenecks and so on.

Robert Mendelsohn
That's a huge question. So what are the things that is faster but coal is is that it was a shock and we didn't we didn't prepare for it in advance, but it was a severe shock. We're talking about lots of loss of life very quickly. So one of things that's impressive about coal is just how quickly we react.

So it's really obvious if you have an action, an important acute problem, you should treat it as a crisis and you should give it a lot of attention and give it a lot of resources. And one of things that we've we've seen is that by doing that, we were actually able to overcome COVID very quickly. I mean, you might say, oh, well, it took us years, but yeah, but that that was inventing vaccines that historically took 5 to 10 years to create.

So relative to to what we knew how to do before, that was a crash program. And we we achieved it as a as a world, as a globe. We've achieved it. And so one of the that that's gives you is well, that's a great example, that if we do have a crisis, we in fact will mobilise ourselves and get organised and tackle climate change in some ways is also a crisis, but it's not quite the same it has that isn't as immediate.

So the idea that we should treat it like a crisis is using the wrong tool. A crisis means you need to do it now and you don't have time to wait. The climate changes is something which you actually do have time. It gives you lots of time to actually solve that. And so you don't want to do it with a crisis mode.

Partly what you what you we already know is that the early attempts to try to build renewable energy invested a lot of capital into techniques, technologies that actually were pretty inefficient. Our early solar panels were not very good. Our early windmills were not very

good. If we had invested, you know, trillions of dollars just making war, we would have wasted a lot of that money because those technologies weren't ready.

But if we can gradually improve our technologies over time and invest in them slowly, it turns out that, yes, for something which is not a crisis is a much better way to go, because instead of investing super large amounts of money in bad early technology, what you're doing is gradual investing money in technology as it evolves. So that's that's my lesson from COVID.

Yes, we can cope with crises in the world's capable of it. But coal is very different from climate change that the Russian invasion and the subsequent increase in prices of energy is also somewhat complicated because on the one hand, you could say Russia caused all this, but actually it's it's a bunch of other responses, reactions to Russia's invasion that have actually caused energy prices to go up.

It's it's the European response to say, well, we're not going to buy your energy anymore. That that meant there was an immediate crisis in Europe. Where are they going to get their energy if they turns out the other members of OPEC said, well, we'll provide it to you then. There's no reason why the energy prices needed to go up as much as they have, because that you could have gotten this additional supply from OPEC's and it wouldn't have been a problem.

It's only because OPEC has decided to say, hey, while the world's chaos, I think I could make some money on this. And so I'm going to keep oil prices really high. And I'm the beauty of this is nobody even notices we're doing it. We're going to blame it on the Russians. But actually the reason the price so is strictly because OPEC's not reacting to this temporary crisis.

By providing a temporary supply, they're doing just the opposite. They're making almost no reaction to it. And that's causing prices to go through the roof. So that's, again, a more complicated response. And one of the things that is going to be true, you know, your point that they're going to be scarce resources, that the question is why are there scarce resources?

Is it because the path run is necessarily one where those resources are scarce? Or are we doing how we we creating a path which is creating scarcity? Are we going too fast in certain directions, using up some resources too quickly? And therefore, those resources are becoming very, very expensive to have in the short term. I think in the long run, there's really no problem with having an energy transition away from fossil fuels.

But if we create something like like trying to get rid of all fossil fuels too quickly, we don't have a substitute for that in one hand. And that's going to create an unnatural scarcity, and that's going to be unnaturally painful. So I think this is a miniature lesson for us. The current crisis is a miniature lesson about how not to do climate change.

We can do climate change in a way that is going to be very, very painful by rushing and creating artificial scarcity, by saying we're going to make moves too quickly before we're really ready to adapt, ready to find other ways of coping with them. If we move too fast,

yeah, it's going to be very painful. But if we move slower, it's going to be much, much less painful, much easier.

And so it's it's a lesson that when we design our climate policies to be gentle, not to push too hard and make this unnecessarily expensive, to give ourselves breathing space so that we can actually just get this job done over the longer course.

Sergio Vergalli
Even if you have time. I have another question. I have a couple of other questions. So one is financial system. So I'm thinking about this problem. So I try to to figure out a problem related to this. So in this day set, we have a severe problem is the relationship between financial system volatility and the mitigation action, which we have to take into account in order to know, to control, to to fight with climate change.

So the climate change is a smooth process. So I need to try my best that we have a forecast, a strategy along from flying forecast and also a smooth strike strategy on investment. Now I have to maintain investment and also to push some up firms in order to invest this direction of maintaining a certain direction. What I'm looking at these days is, wait, given that the Ukraine crisis, we discovered that huge change in oil prices, gas prices has completely changed also, which are the investment of firms.

So when the end times are changing our strategy today because they are thinking about, okay, we decided before in order to restart that we especially in Italy and those in Europe, we have a recovery plan in bidirectional green system, but we have to pay attention, not wait for us sometimes in order to say, to verify what could happen to we are waiting for the end of the Ukraine war because we are waiting for more reduction of our gas prices.

This is why at the moment our cost in order to our production now is three weeks one point. The second point that is related to the financial system rather than the so every time there is a crisis and unfortunately in the last year the crisis became faster and also the frequencies increase the now if I speak after 2007 we are now in the first in Europe is the first crisis every time reaction of the system that is money supply we are increasing the supply of money is creating an increase of financial system and also businesses.

Financial as you see became a huge if you compare the value of a stock market today of a Dow Jones today's is higher than the value of 2007, even if we are we're speaking about in 2007. We are we're in a bubble. So that period was a bubble today, which is maybe the situation today probably was a my point of view is completely pushed by an increase of money due to this reaction monetary system.

So we point it the second point is related to okay they stand with very set too much money in the in the in the world strived to reduce this also because they have to control the inflation central bank European Central Bank and the Federal Reserve now are increasing the interest rate we reduce money supply so could create another effect on the on a possible recession also pushed by this combination in my point of view.

So a combination of recession and inflation driven by the input of of firms. So combining these elements, unfortunately, again, the climate change problem is postponed to uh, into the future. Okay. Even if could be a short run, but that so. Well, financial. Yes, it could. Yes or not. Yes.

Robert Mendelsohn
Yes it is financial system. I, i, i, i think the attempts by the financial system to get engaged indirectly in climate policy have been wasteful. To put it to put it bluntly, I think it's it's it's it's it's not a fine enough tool to actually address the problem of climate change that the whole purpose of having monetary policy, fiscal policy is general stimulus for the economy at large.

The problem with climate change is very specific of trying to shift away from fossil fuels, these broad techniques of trying to stimulate the economy or slow it down are not very effective at getting us to shift towards or away from fossil fuels. They they they're clumsy tools for that purpose. You want environmental protection agencies levying prices on carbon, focusing on the carbon part of the economy and using a much finer scalpel to to actually re chisel what the economy should look like.

If you want to deal with climate change, you're trying to do this by just hammering the entire economy up and hammering it down is not going to give you very good results. So in general, asking the the people that are responsible for maintaining the integrity of the economy to try to deal with climate change is is giving them a task for which they have no tools.

And so they what they've done to date has been ineffective and in many cases just counterproductive. So my sense is that you want them to keep the economy afloat. You want them to make sure that money is going into investment, that everything is working properly, but you don't want them civically saying, Oh, now we're going to do a climate change policy.

On top of that, you want to make that specifically the task of an Environmental Protection Agency whose job is study emissions and and have something that's focused on emissions, because doing this indirectly by making the economy go up and down, this is a very clumsy tool. It's just the wrong tool for this purpose. So my sense is we want to keep them out of this because they're not going to do it.

They don't know what they're doing and they're not going to be they don't have tools to target this problem. That's my general idea. But, you know, one of the things that you should look at this last crisis is, is this little experiment with being cheated out of out of natural gas supplies that that's actually just a little bit of a taste of what trying to get to 2050 is going to taste like because this is temporary.

But if you try to get to 2050, that's it tastes never going to go away. That's going to become permanent part of your life. And one of the questions is how many people would vote for that? How many people would say, Oh, yeah, this is great, I'd be delighted to have this continue indefinitely to do to fight climate change fast.

It's just there's just no taste for it. I think that's what you'll find and that that there's no taste for it. There's going to be I know you can find people will say that's fine with me. But if just 80% of the world's population say no way I can do this, this is way too costly. You got you have to find a better way for me.

I will willing to do something. But this you're asking way too much. So I think this is actually a fun little exposure to what actually this 2050 policy would actually look like if we actually adopted it. It's it's going to be costly and we're all going to pay a price. We're going to feel it. And I suspect I suspect most of us don't want to do it.

So sort thinking to the future also of imaginary to to arrive to a future is very interesting. So yes I am thinking about so during your talk I was thinking about one of the typical question we have in the end is that which could be that you're ready only for the future. So we could be, for example, our world in 20 years, in 25 years, 30 years.

So we should be for the future. Now is one of the idea we have also some question about this is not my idea but this idea of I'm in research in themis so the idea of which could be rewarded when we are without as we're sorry all the jobs will be done by robo, which is the role of humans.

So looking at the future, we are better. So we would be a sunny world that we've polluted water, which could be the role of my point of view. Now to these also thinking about the which could be the role of fusion, the nucleus. So if you look at the future, if we will able I don't know, I'm not sure because I, I know what I'm able to read on on the newspaper on the some scientific source so American about the nuclear fusion.

If we were able to obtain this I don't know where some forecasts are in 2050 probably we what could change because the fusion is that start from water and also simple is the fusion of the two atoms we don't need. We said while we have not geopolitical structures so probably some water probably with water will change the water will change the direction.

Water I don't know is that I am thinking about of this problem are related to a future.

Yeah this the idea that there might be a magic bullet is always a charming possibility. If we can have some kind of low cost, perfectly clean energy source so that we don't have to rely on on all the fossil fuels we've got, they're cheaper than fossil fuels, then yeah, it's going to be very easy to to go to net zero it once that exists, it's possible that that will come in the form of a single technology.

But I'm guessing that what's more likely is it's going to be a myriad of improvements in energy technologies and that it's not going to be one thing that everybody points to say, Oh, thank goodness we have this now. It's going to be a whole series of inventions that give us better access to cleaner energy. And I think that's what is likely and that it will be part of that 2050 or 21 safety net zero.

The idea is that that we will gradually use lots of all the available tools we've got to harness energy. I think I'm pretty optimistic. That is not beyond our reach because we already have many things that we can do already that we only just got the tip of the iceberg. Geothermal

stuff, nuclear just the traditional nuclear without without going to it all the way to fission fusion.

There's a bunch of technologies that as they gradually improve and get better, we could rely on much more. And I'm guessing it's that myriad of things that it's going to be that what the future will look like and the future will be cleaner. You know, as we get more and more income, we're not going to have more things to buy.

I mean, how many more things can we buy at some point? You know, in my house, if you buy if you bring something into that house, something has to leave. You know, there's just a limit how much stuff we can put in there. You know, it's not we're not going to need more things. And so we're going to want to buy other services.

And one of them will be a cleaner environment and more nature. So I'm guessing the the the future that we've got in the long run is a future where we're using less land for agriculture, we have much more natural land and we have a cleaner world that the pollution levels are much lower than they are today and that we might even live a little bit longer than we already do. Whether that's a blessing or not, I'm not quite sure, but I have a feeling that will be part of the future as well. But I think it actually not just we will live longer, will live longer health.

Sergio Vergalli
Yeah. Yeah.

Robert Mendelsohn
It's not just invalids in a bed somewhere, but good actually running around is 80. Right. So we'll we'll have more opportunities to do that in the future. And basically there will be more resources. And one of the things that's amazing about the 20th century was the despite the fact that the world's population kind of grew from 1 billion to towards zero six, the fact is that people's incomes rose dramatically.

Yeah. So that today just the average person on the planet now lives like what a king is to live like in the old days. I mean, it's just a dramatic improvement in quality of life. So, you know, wonderful things have happened over the last century. There's no reason to believe that that will continue. So I'm pretty optimistic about the future.

I think we have some bumps right now that we need to get over. But part of this is is not overreacting because because if you overreact, you create your own bumps. Bumps aren't needed. There's this smooth past and you're intentionally not choosing it. We should we should try to work on that, because I think there's some moderate things that can be done about many, many issues.

We need to make progress, which is stop trying to solve the world being perfect and just make it better. And I think we will be a lot better off be the.

Sergio Vergalli

Yeah. Good point of use to meet both of you is there is a right manner in order also to to closer is where I was seen as a I thank you very much again so your your time is very precious for us so for for me for so for the audience in general.