III. Resist the Green New Deal

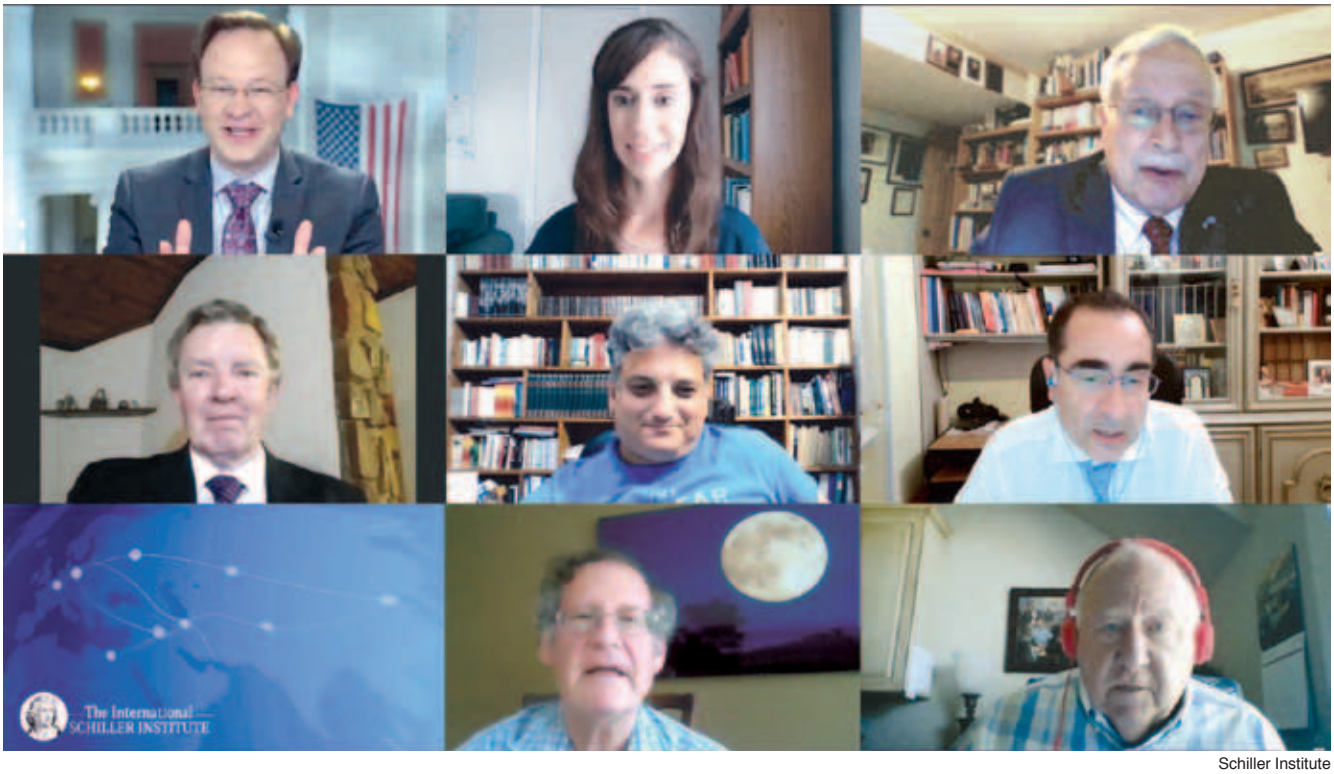
DISCUSSION SESSION
Schiller Institute Conference, June 26-27, 2021

Panel 2: 'The Real Science Behind Climate Change: Why the World Needs Many More Terawatts of Energy'

This is an edited transcript of the discussion period following Panel 2: "The Real Science Behind Climate Change: Why the World Needs Many More Terawatts of Energy," of the Schiller Institute's June 26-27 conference, "For the Common Good of All People, Not Rules Benefiting the Few." Participating were panel moderator Jason Ross and conference speakers Dr. Bennett Greenspan, Dr. Vincenzo Romanello, Prof. Nicola Scafetta, Dr. Kelvin Kemm, Paul Driessen, Richard McPherson, and Megan Dobrodt. The Discussion concluded with a short video clip of Lyndon LaRouche. Subheads have been added.

The Infrastructure for Nuclear Medicine

Jason Ross: Dr. Greenspan, regarding the production that's required to use nuclear medicine, you brought up the molecule of the century, 18- fluorodeoxyglucose, which doesn't sound like it's on shelves everywhere; lutetium-177-PSMA, some type of gallium, iodine, actinium; these are things used for medical diagnosis and treatments. How hard is it to make these molecules? Do you need a nuclear reactor on hand to produce them? Are these available to all countries? What kind of infrastructure is needed to be able to practice nuclear medicine?



Schiller Institute

Panel 2 discussants, from left to right. Top row: Jason Ross, Megan Dobrodt, Paul Driessen. Middle row: Dr. Kelvin Kemm, Dr. Vincenzo Romanello, Prof. Nicola Scafetta. Bottom row: Dr. Bennett Greenspan, Richard McPherson.

Dr. Bennett Greenspan: That's a very good question. Many of these compounds are made in central pharmacies and shipped to hospitals for use. Iodine-131 comes from a reactor, and that's easy to make. It's shipped to us at our hospital and our nuclear medicine department receives it, and gets it ready for the patient so it can be administered. Some of the others are made in central pharmacies and shipped to hospitals. Many of these compounds come either from reactors or from cyclotrons, and then they're shipped to central pharmacies for further compounding or development so that they can be made into ready pharmaceuticals that are safe and effective for patients.

Ross: At the end of your discussion, you talked about precision medicine, and having more precisely tailored molecules for different conditions. Do you see this as something where you would be actually producing compounds on demand, made for a specific patient? Is it that specific? Or, is this the kind of thing, where maybe you'd have a larger stock of things on the shelf?

Dr. Greenspan: I think we are going to be developing ready pharmaceuticals more specifically for specific patients in the future. That's some time off, but one size doesn't fit all anymore, due to clonal variations in tumors and so on. I have discussed the patient who didn't respond to lutetium-177-PSMA, but did respond to actinium-225-PSMA. We may be able to have a variety of agents available, so that patients can benefit from therapies like that. So, I think that is in the future. And we'll have to take into account both symmetry and genomics, I believe, to accomplish this. It's not right around the corner, but I think it's in the near future.

Atoms for Peace

Ross: Dr. Romanello, I'd like you to say something about your creation of Atoms for Peace: why you created this institution, what you hope to achieve with it, and why you think it's necessary?

Dr. Romanello: I will say three things about it which should be interesting:

The first, is that we would have rights, according to Italian law, to some public financing, public money, but we refuse any public money. This is the first thing. We are very proud of it.

The second, is that despite the fact that we are not specialists in climate sciences, we wrote in our organizational statutes that we refuse to exploit in any way the climate change argument, to promote our discussion. It would be very easy for us, to say, "Ah, look, IPCC and all the media, and all the so-called mainstream scientists are saying that we have climate change due to fossil fuels, so use nuclear energy." We have always refused to use this argument because we think that the first thing you have to do, is tell the truth, to be absolutely scientifically sound.

The third thing that I would like to say about our way of working is, in our documents, in our videos, we always say, "We don't expect you to believe us, because we can understand it can be shocking to know the reality, but reserve the same treatment for the others, who say the opposite. And check what you are told. Because this is the only way you can learn something new."

Cycles in the Ever-Changing Climate

Ross: The next two questions go to Dr. Kemm and Prof. Scafetta:

Bob asks: "Various speakers have referred to the Milankovitch Cycles as an important cause of climate change. Could you please briefly explain what those cycles are? Also, would anyone like to comment on the research of Henrik Svensmark, or Nir Shaviv, on the galactic cycles and processes responsible for climate change?"

Manuel asks: "The experts in this presentation have shown us, in a very graphic demonstration, why no one should pay any attention to what the IPCC people tell us. How is it that France is moving ahead with building the ITER fusion reactor, even though France has joined the Paris Accord on climate change? Are these a contradiction?"

Prof. Nicola Scafetta: The Milankovitch cycles are many cycles; there are changes in the changes in the orbit of the Earth. The Earth's orbital eccentricity can change, the declination of the axis can change a little bit—the inclination of the axis—and so on. But those are very long cycles. Those Milankovitch cycles are 100,000 years, 41, 000 years, 21,000, and 26,000 years. So, those are very, very long cycles, compared to what is important for us.

To understand climate change that we are talking about, which is climate change during the last few hundred years, we need to talk about much shorter cycles.

So, the Milankovitch cycles don't really matter for these short cycles. The short cycles are mostly due to the Sun, as we have discussed earlier, and possibly to other astronomical factors. We are talking about 1,000-year cycles, few-hundred-year cycles, 60-year cycles, 20-year cycles, 10-year cycles and so on. These are all astronomical cycles.

And the theory of cosmic rays: If there is a change in solar activity, it changes its luminosity. But the Sun is not just light. The Sun has also a very strong magnetic field, and this magnetic field varies with the solar activity. The magnetic field interacts with everything that is electric. And also with cosmic rays, which are particles that come from the deep galaxy. When the Sun is very, very strong, when its activity is strong, cosmic rays are deflected by the magnetic field of the Sun. When the Sun is weak, the cosmic rays can enter into the Solar System and reach Earth more easily. And when they reach Earth, they can produce clouds, essentially. And then the clouds will change the climate. The formula would be: changes in the cloudiness of the Earth depend on the strength of the Sun.

Defects in the Climate Models

All these are missing in the climate models. So, this is one of the several mechanisms that are missing in the climate models. But there is not just cosmic ray action. There may be other astronomical forces, so, for example, there is interplanetary dust that can fall on Earth, and the dust is brought close to the Earth by gravitational forces of planets, for example, which are also cyclical. And there are a lot of things that are not really known.

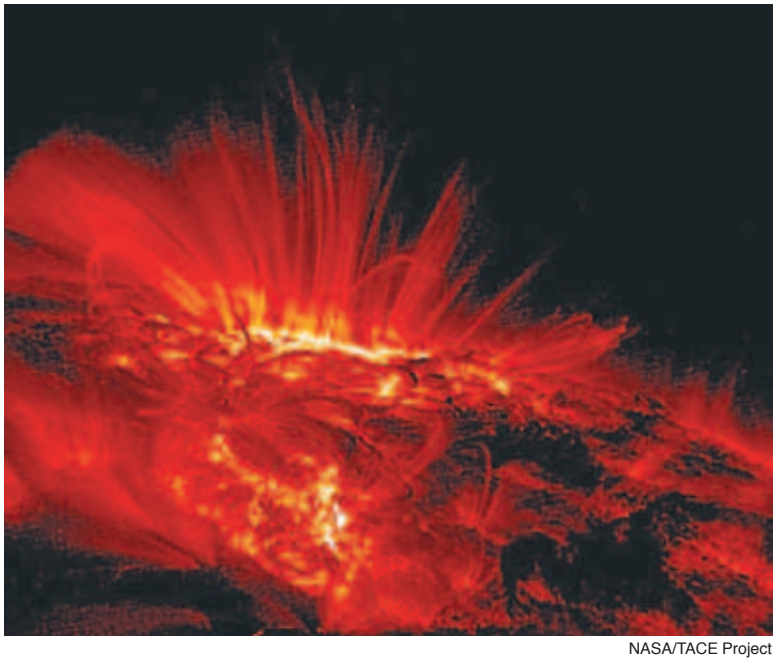
What is known, what has been proven, is that the climate system is characterized by a lot of cycles; all these cycles are astronomical cycles. So, we need to look at [systems in] space to understand climate change. That is the main issue.

I repeat, the models don't have anything on this, and do not reproduce any natural cycles, which means they don't understand climate change, at all.

Regarding the last question about nuclear fusion in France, of course there is the hope that we are able to develop this technology, but right now it's very—I don't think that it's possible. Perhaps in the next 50 years it may be possible. But of course, we need to invest in that form of energy. Right now, we have other mechanisms, like normal, traditional nuclear energy that is sufficiently developed so we can use it. But the other form of energy, we hope that we can reach the nuclear fusion and to use nuclear fusion, because that will solve all energetic problems that we have. We need to start.

Solar Radiation's Effect on Earth's Climate

Ross: Dr. Kemm, I want to also pose one additional question that came in. From Samuel: "You said that atmospheric CO_2 went up from .03% to .04%. What if it continues to increase over the next 600 years? Will there be any negative consequences? Will the positive consequences continue?"



NASA/TACE Project

Solar magnetic field activity and galactic cosmic rays have a far greater effect on Earth's climate than anthropogenic CO_2. Shown: sunspot eruption imaged in ultraviolet light, April 10, 2011.

Dr. Kelvin Kemm: First, I'd like to mention, the Sun has been comprehensively covered now by the gentleman who just spoke before me. But the influence of the Sun on the Earth, and therefore the probability that it's responsible for any global warming we see, is far, far more likely than any anthropogenic carbon dioxide. Now, often when one says, "the Sun," the antagonists say, "Oh, it can't possibly be the Sun, because the heat coming from the Sun varies so little that it couldn't do that."

It's not the heat from the Sun that is the issue, it's the

magnetic field around the Earth, which is affected by magnetic charged particles coming from the Sun. All of the time, the Sun shoots off what's known as the solar wind, and it's just tons of particles pouring out from the Sun in all directions. As they come to the Earth, they impinge on the Earth. The Earth has, of course, a magnetic field, something like a bar magnet, and it comes down to the ground, so to speak, at the North Pole, and down to the ground at the South Pole: And that's what gives rise to the famous Northern Lights, and the Southern Lights that you see in the Antarctic. When these charged particles strike the upper atmosphere and go through the magnetic field, some of them are driven downwards, and they create those Northern Lights and the Southern Lights. So that's when you can see this happening.

Now, as the magnetic field of the Earth interacts with these charged particles coming past, its ability to screen the Earth alters. There are other charged particles, cosmic rays, coming in from all the other stars in the universe as well. As the magnetic field of the Earth strengthens, it causes less of these rays to penetrate, and when it's weaker it allows more. And that varies the amount of cloud cover that you get on Earth, which then holds heat in, or stops heat coming in, because the clouds are in the way.

To put it simply, I'm trying to say in very simplistic language what is going on, because there's this big misunderstanding of so many of the public that it's the *heat* of the Sun that we're talking about, and it *isn't*. It's the magnetic field that varies the amount of cosmic rays coming in which in turn alter the cloud cover.

A simple way of watching the activity of the Sun is to count the sunspots on the Sun. This has been done for hundreds of years. In fact, from about the middle of the 1700s, it was done very informally, but sunspot counts go back a long time before that, can be tracked back in history to ancient Chinese records, and there's some in Mayan culture in South America and so on. So, you'll find that the sunspot activity can be very much correlated with the Medieval Warm Period, the Roman Warm Period, the Minoan Warming, and then little ice ages, so on. We know that when the sunspots vary, the magnetic field of the Sun is varying, we see a result on Earth which leads global warming or global cooling, and that correlation is far, far stronger than any correlation of human-produced, anthropogenic global warming.

A Rising CO_2 Level Greens the Earth, It Doesn't Kill It

As far as CO_2 rising from 0.03% to 0.04%: Enthusiasts who push the [anthropogenic] CO_2 arguments say, "When there's more CO_2 in the atmosphere, it just holds more heat, like putting more and more blankets on, or something." It doesn't work like that. There's a *saturation* that occurs, and in fact a good paper was produced on this by Prof. Will Happer and Prof. Guus Berkhout that we heard from earlier. If you just double the amount of CO_2, you don't get doubling the amount of warming. It's much more complicated. Because as the heat photons, the rays of light, go up, they strike the atoms of the carbon dioxide molecules. The CO_2 molecule is like a stick that wobbles like this.... And you cannot just argue that the more CO_2 you have, the more warming you've got. It's far more complicated than that, as the gentleman who spoke before me indicated. This is why it's so simplistic when people just say, "The science is settled," and Al Gore and people like that say, "The science is settled." It *isn't* settled!

But if one wants to see what is most likely from a scientific point of view to be the cause, it's the variation of the magnetic fields of the Sun.

Now, if we also mention the Milankovitch cycles as well, they're astronomical. The Moon goes around the Earth, and the Earth goes around the Sun; everybody knows that. But many people don't realize that the Sun's also moving through the Milky Way galaxy, and so it's moving, obviously, on a much longer timescale than the Earth going around the Sun. But as it moves, there are variations induced by the stars and so on in the galaxy. The galaxy's got spiral arms, and so depending on where the Sun is on its pathway, which takes many millions of years, you get these various cycles that can constructively interact with each other, or destructively interact with each other, and those can give rise, for example, to major ice ages and that type of thing.

All of this is terribly, terribly complicated. And so, anybody who believes that the science is settled, and that it's terribly simple, you've just got to stop burning coal, it's very simplistic and it's just plain and simply not true. And I don't think that the CO_2 is a problem at all. In fact, as one of the speakers earlier said, if anything, the planet is CO_2 deprived: We've seen a distinct greening of the planet that's been taking place over the last number of years as the CO_2 has gone up, and probably we can double the CO_2, triple the CO_2, without any

trouble, and the benefits would be better crop yields, more greenery around the Earth, but certainly not global warming. There might be some minor contribution, but the big one is almost certainly the Sun.

The Wages of a Transition to an All-Electric World, Powered by 'Renewable' Energy

Ross: To Paul Driessen, Sébastien from France asks about how do you envision the transition of the petrochemical side of the fossil fuel equation? So, claims that we're going to decarbonize, what about petrochemicals? Anna asks about electric cars. She says, the electric car may not pollute, but what about the power that goes into it, and what about producing the car?

Paul Driessen: Let's start with electric cars:

First, you have to make them, and that means a tremendous amount of mining for all kinds of metals and minerals in larger quantities and different types of metals and minerals than we used before, so that means far more mining on top of everything we've got to do for the wind turbines and solar panels and backup power batteries.

Then, if we're going to have all these electric vehicles, we have to have that many more wind turbines and solar panels and backup batteries to power them up; we need to have much bigger charging systems, not just 110 volts here in the United States, and not even 220 volts, but a much improved transmission and operating system in our homes and our communities in order to fast-charge these vehicles, so that they can be charged up in 30 minutes or an hour, instead of many hours. The batteries when they go bad can't really be recycled at this time. They get thrown in the trash. I think the manufacturers of the batteries and the vehicles need to take responsibility for those and take them back and find a way to recycle them.

It becomes very complicated on many, many levels; also very expensive on many levels, far more than people are willing to pay. Some interesting surveys done in the United States and elsewhere over the last couple of years, even among people who say they're concerned about climate change and want to do something about it, indicate that what the average family is willing to pay ranges somewhere between $10 and $25, maybe $50 a month or a year.

And yet, when you look at what's coming out of Britain in terms of projections for replacing all that equipment I talked about in my talk, all their heating and insulation, their lighting equipment, their hot water heaters, and so forth—running it all on electricity, doing heat pumps instead of gas furnaces, for example—you're talking about $10-, $20-, $30,000 per family, per household. So, the cost to families and businesses is going to be astronomical, and I don't think anybody is prepared for something like that.

Ross: When you actually ask them, people say "No," when they have the chance.

I want to get a comment from Richard McPherson, a retired U.S. Navy nuclear engineering officer. He was a U.S. representative to the International Atomic Energy Agency on a six-nation panel following the Chernobyl accident.

Do you have any question for the panel, or reflection on what you've heard?

Richard McPherson: First, a reflection on this panel: I'd love to have Paul Driessen's speech, because he said what I say all the time.

The facts are not heard. The facts are lost in the noise. In 1975, when I was still on active duty, I joined the San Diego section of the American Nuclear Society: One of the things I've learned since then, is facts don't matter to everyone else. And that's really sad. And what I've heard today is a lot of facts, and the facts need to be heard.

There was a statement made that "we need seven terawatts of power." Well, seven terawatts of power is about seven thousand 1,000 MW nuclear power plants which will cost us in excess of $20 trillion. I'm involved with a group right now, worldwide, for which we know of $38 trillion that's looking to go into mostly energy projects, and the good energy projects are not there for a whole variety of reasons.

This whole thing with the IPCC: I became involved in it when I was still at the International Atomic Energy Agency. They came to us from New York and asked for information from the International Atomic Energy Agency. The International Atomic Energy Agency had good data on the environment. Our work was titled "Nuclear Fuel Cycle Facilities: The Environment and Public Opinion." To us, who made up that six-nation group, nuclear fuel cycle facilities was easy; the environment was easy.

What we spent 50% of our time on was learning about public opinion. And public opinion is what has not been addressed, that I'm aware of, since 1975, to

educate the public about nuclear power, about energy, about the environment. And yet, we've given up all that space to the anti-nuclear people, and the bottom line is the anti-nuclear people are promoted and paid for by communists. The reason we don't have the energy security, and economic security that we could have today, after President Eisenhower's speech, is simply because the communists don't want us to have it.

Global Humanitarian Resources

I think that this panel, this group, this presentation should be heard by everybody in the world. This is the single most informative group or international panel that I've ever listened to. I applaud you all, and I'd like to continue to help as I can. I moved to Idaho in 2015 to retire and learn how to fish. It took 'em three months to find me. In December of 2016, I finally said, "OK, they're not going to give up, so I'm going to do what I've always wanted to do, because I'm not looking for a job, I'm not looking for promotion." So, I formed a company called Global Humanitarian Resources, Inc.

Global Humanitarian Resources, Inc. is very simple: We're looking for individual solutions under the nexus of agriculture, water, energy, that will never see the light of day for a whole variety of reasons; but by combining them with other solutions, we can create executable solutions that take agriculture, water, and energy and work together, and that's what the world needs. And the environmental consequences come with that. The environmental consequences are better. Everything I've heard about, the complaints about CO_2, global warming, etc., they're all bogus—I know that, I know hundreds of researchers, good researchers that have been involved in this process for many years. I believe all of you. But what we've got to do is, we've got to somehow educate those other folks.

One of the things that came to me in 2018, while we were working with soils and water, was, I was introduced to Dr. Paul Marotta. Well, I never knew Dr. Paul Marotta, even though he designed nuclear power plants in upstate New York for the U.S. Navy. Paul was bored, because the Navy didn't have any new nuclear power plants to design. He went out on his own. He knew what the country needed for security, so he has designed something called the molten salt nuclear battery, which will be a reality in a couple of years.

We combined his technology with what we were doing, what we called combined heat and power for greenhouses, and with a man up in Montana who started life as a farmer, grew up as a farmer; had a great life in business and was very successful. He knew that the answer was in soils. He started working on soils so that we could grow crops faster, we can reduce the need for insecticides, pesticides, herbicides, all those other -cides that I can't pronounce. That's why I'm a nuclear guy, because I can't pronounce all those other words.

I've watched George in the last three years take a plant that was in the best soil that he had, he got two feet. Last year he got the same plant in the same period of time, three months, to grow nine feet.

So, we know that the answers are available, and the answers are available in all of these countries where you talk about 30-some countries that people need food and water. It is available with the technology we have today, right here in the United States, between Idaho and Montana, and it's not that expensive.

We can go, take these technologies to other countries; we can help them get the water, we can help them grow the food to feed them, and there's no excuse why we're not doing it. Thank you.

The Paradox of the Great Oxygenation Event

Ross: Here's two questions for you, Megan. One is about the great oxygenation catastrophe, or the great oxygenation event, where I guess it seems like from what you described, cyanobacteria performed a mass genocide and killed most of the life on the Earth, which sounds like a terrible fascist plot to me. That's pretty brutal, if that's actually what happened. I'm wondering if you could say how that's a good thing, if it's good, or what that tells us about the biosphere.

And a question from New York: "Alexander Hamilton, in his paper 'On the Subject of Manufactures' said that the division of labor would increase as technology became more advanced. This would require population growth. It seems that in a healthy economy, losing people could have bad economic consequences, as opposed to increasing consumption. Is there a good rate of population increase?"

So, the cyanobacteria versus population growth, do these contradict? Does this say something about economy? Pull it all together, please.

Megan Dobrodt: I have to answer them separately, instead of combined. In terms of the great oxygenation event, I think it's a great paradox! You look back through the geological record, and there are, I think five

great extinctions. The great oxygenation event is the biggest, and most destructive of them. I think it points to a certain irony; it's really fun. Yes, these cyanobacteria pumped out this toxin, which even they couldn't abide, and it wiped out most living things.

But there's a process of evolution of the system of the biosphere as a whole, which is above any particular species, and this is an important thing that Vernadsky really brought to light, which is a direction of growth, in an anti-entropic direction. And so, the catastrophe of the moment seemed to yield a new system of creatures which had a higher potential than the dominant creatures that existed before this mass extinction. And that's also true if you look at the K-T extinction, which I pointed out with some of those charts.

I really think it's a delightful aspect of the evolutionary process. There is an unfolding process of the development of life, which isn't just the sum of its parts. And we're the only species that's able to consciously reflect on that, and then consider what is our role in that.

And then, in terms of population growth, and the fact that Hamilton observed that with a developing economy and further and further division of labor you need more people: Yes, you need more people. There's not a number you can give to the right rate of population growth.

If you study Lyndon LaRouche's discoveries in the science of physical economy, what he concluded is that the important thing is a system of inequalities, where the particular finite number is not what's important, but the trajectory. Is the rate of the rate of increase growing? Is the rate at which your economic profit—and he didn't mean monetary profit, he meant what he called "free energy" profit, that could be reinvested to grow—is the rate of the growth of profit growing? And if that's growing, then naturally there will be a growth in the population, and that's the measurement of a healthy economy. So, you want to look at this rate.

And I think the thing that always alarms people, at first, because of the brainwashing we've all had to endure, is the idea of unchecked, unending population growth. "But there has to be a limit somewhere, right?" Says who? I've never seen any evidence for that.

Man's Limits to Growth Are Political, Our Creativity Is Unlimited

Driessen: Let me jump in just a little bit from the perspective of someone who's been to Israel multiple times. You wouldn't think a desert area like Israel, the Arava Valley, the Negev, and so forth, which receive about one-fourth the water in a year that Phoenix, Arizona, the greater Arizona/New Mexico area, does in the United States.

You wouldn't think such an area could support so many people. But the Israeli drip irrigation technologies, and many other technologies, the greenhouses and so forth, that they've put into place in those areas, provide almost half of the food crops, the vegetables and fruits of Israel at this point. They're exporting well out of the Valley, way into Israel and into Europe. It's an example of how an area that is most inhospitable to humanity and to animals, can still become tremendously fertile, with the right application of the stuff in between the walls of our head, our cranium: Human ingenuity, innovation is incredible.

CC/Borisshin

Drip irrigation technology today provides almost half of the food crops of Israel

There's nothing in that perspective that limits the population, but it does say we can put a lot of people into small areas, and create the energy we need, the food we need, water from the sea. The desalination plants in Israel provide 80% of all the drinking water, and by the end of this year it'll probably be more like 85% of all the water they drink there.

The limits to growth there, are really within the po-

litical realm and the realm of our own creativity. If we circumscribe the amount of energy or water we're allowing people to have, that has an impact on populations, on people's ability to improve their lives and living standards, their health and wellbeing. But if we get the politicians and the radical alarmists out of there, the ones who are trying to scare people all the time about climate change, and what have you, the limits to our own abilities are very expansive.

We can do a lot more than we think we can. We just need to have the opportunity to debate fully and very robustly, and not have our discussion points "cancel cultured," thrown out of the universities, out of the big tech, out of the regular media. We need to have these debates and discussions, over climate change, over water availability, over our ability to provide the energy that we need, and not destroy the planet in the name of saving it, by blanketing our planet with wind turbines, solar panels, and mines.

Small Modular Reactors and an Electrical Grid

Dr. Kemm: I would like to comment on nuclear power plants, nuclear reactors. When one hears about nuclear reactors, you often have people saying, "They're far too expensive." And they're thinking about large-scale power stations which have been the norm for many years. But there's a huge number of different reactors being developed right now: The nuclear power stations that last 20-30 years or so are typically a couple of reactors that add up to 2,000 MW. They need water cooling, and are often built on the coastlines, so we can use the ocean for water cooling.

But now, there's another group of reactors being developed called "small modular reactors," and instead of them being, say, a 1,000-1,500 MW reactor, they're a 100 MW reactor. Also, with the larger conventional reactors, you find they only need to be refueled ever one and a half years, so you switch it off for a refueling period. With the new, small modular reactors you don't have to turn them off for refueling; you just keep adding either fuel balls into it, or there's the liquid one we heard about earlier, as well.

So, there's these, that are 100, 200 MW and so on; there's even micro reactors now being developed, 10 MW and smaller than 10 MW, and various other nuclear ways of producing power. For example, the *Perseverance* rover which is now driving around on the surface of Mars, it's nuclear powered.

But I just want to link that, also, to the concept of an electricity grid. For many countries, you don't need an electricity grid if you have some small reactors. When electricity was first started in a place like New York and London and so on—and incidentally, New York was the second city in the world to get electric street lighting; the first was the diamond-mining town in South Africa called Kimberley. In those days, when they started with electricity, there wasn't a national grid. Somebody started producing electricity somewhere, and distributed a few blocks, and then a few more blocks, and so on, and it grew incrementally.

NASA/JPL-Caltech

NASA's Perseverance *rover operating on the surface of Mars is nuclear powered.*

We find now, often when people refer to the very large African countries, that are very poorly electrified, they say, "You've got to have this grid first." You don't. You can, with the new concept now, have these small modular reactors and you can put them wherever you want the power. There's two basic categories of them: There's water-cooled ones, but there's also gas-cooled ones. South Africa has the most southerly nuclear power station in the world called Koeberg, down by Cape Town, and it supplies power from the bottom up.

Virtually all of South Africa's coal is in the northeast; I'm sitting in Pretoria right now, but the distance

between me and Cape Town where the nuclear reactor is, is the same distance as Rome to London. They're conceptually completely different from any European countries. You can't go to some of these African countries that are very under-electrified and say, "Build an entire national grid, to put wind turbines and solar panels and whatever in there," before you can electrify the country. A far quicker way is to get a small modular reactor that's gas-cooled.

South Africa recognized this, and in the 1990s started to develop a small modular reactor, probably the most advanced development in the world at the time The team grew to a size of 2,000 people, and it was then put on ice for a while because of anti-nuclear sentiment, and the 2008 financial crash in the U.S., and so on. That was called the Pebble Bed Modular Reactor, PBMR.

Afterwards, when a lot of the people had dispersed and gone into other jobs, another group started developing a modified version of PBMR, called the HTMR-100, a 100 MW reactor; some of that team is still working in Pretoria today, developing that concept. It's a much-faster-to-construct reactor, cheaper-to-construct reactor. Ideally, you need something like a HTMR-100 in many places around the world with a radial grid around it that only needs to be 10-20 km wide. It can serve one industrial area; it can serve one town. As time goes by, you can link a number of these grids up, to incrementally improve the size of the national grid, but it's not a necessity to have a massive national grid before you put something into it.

Of course, the smaller reactors are far cheaper and far easier to put in place, because these small modular reactors can be largely built indoors in a factory environment, and the components can be taken out, like a Lego set, and put together onsite.

So, the assumption that a country has to be very wealthy and have huge sophistication technologically and so on before it can go nuclear is just false. Already, there's about a dozen African countries, over and above South Africa, that have indicated to the International Atomic Energy Agency that they intend following a nuclear future, because they realize that some of the other solutions—wind, solar, hydrogen, batteries—just are not going to make the grade for them. So, nuclear is available for everybody at various different scales.

Ross: There are several follow-up questions. Zikhele asks—and this is for Dr. Kemm: "South Africa was a leader in small modular reactors, with its 160 MWe PBMR that was shelved in 2010, and with TRISO fuel manufacturing. What advice would you give South Africa about its pebble bed modular reactor program?"

NuScale Power

A cross-section of NuScale's design of a reactor building, containing multiple small nuclear reactor modules.

From Carlo in Italy: "I'd like the nuclear scientists on the panel to stress the ability of nuclear fission to provide humanity with clean energy for millennia, especially by means of the fast breeder reactors."

From Miguel, in Spain: "Today it's not possible to store energy on a large scale. This is a great problem in physics. The solution is to make energy through continuous production, natural gas, carbon thermal power plants, nuclear plants. If we use renewable energies, with production that's discontinuous, we won't have energy for all."

Advantages of the Great Energy Density of Nuclear Fuel

Dr. Romanello: Let me start with one simple example. A pellet of uranium oxide weighing 7 grams can produce the energy that can provide the heat or electric energy of an average U.S. citizen or European for one year. That 7-gram pellet costs around $10. Well, this is

the present technology of the present reactors. To obtain 1 kg of this fuel, we use 10 kg of natural uranium, and of this fuel, after getting rid of 9 kg and using only 1 kg out of 10 kg, we burn only 5% of this pellet. This means 5% of 10%. If we use the whole amount of the uranium that we extract from mines, we could multiply the energy resources, the amount of fissile material by a factor of 200. Which means, we could use nuclear energy, not for one or two centuries, but for millennia.

This is the importance of fourth-generation technology research. Some of these reactors are being built around the world, but of course some R&D is necessary, but this is much easier and faster than fusion. I'm not saying that we don't have to make research on fusion, I'm simply saying that it would be fundamental from my point of view, to use fission technology as a bridge technology toward fusion.

This [showing it] is a pellet of a fast reactor. This much smaller pellet can provide the same amount of energy as the 7-gram pellet I just showed you, even though it's hard to see. It can produce the energy of 3 barrels of oil, or 1 ton of coal, speaking about the concentration of energy. And this [showing a marble-sized spherical pellet], just to be clear, would be the amount of vitrified waste produced in one year by each of us, using only nuclear energy.

So, we are using today a technology which was exploited for nuclear submarines, and it was very useful for them, but of course, it's not the best thing to do for exploiting the resources. On the other hand, we know that there will be a spectacular increase in energy demand in the next years, especially starting in the next half of this century. It was mentioned that we will need 7,000 new reactors. Well, this is a possibility, but you also need to fabricate the manufacturing fuel plants, reprocessing plants, transport, and to exploit efficiently the research, otherwise you can step into a black hole somehow.

Speaking about the small modular reactors: There is this trend today to develop many designs—there are many, and they are interesting, of course, because you can reduce the upfront costs, of course. In some areas they are very good, of course, when you don't have big net which can transport energy, but let's consider, however, that the small modular reactors can be not that convenient from the price point of view, from the cost of energy point of view. They are very effective in small countries, in developing countries and remote islands, yes. But not necessarily everywhere. In some other places, big plants are a better choice.

Politicians Crave Certainty, Scientists Pursue the Unknown

Ross: Professor Scafetta, let me turn to you for some of the other climate questions. One person wrote in, saying: "Listening to the speaker from Switzerland [Emanuel Höhener], on the voting result and his explanation on the subject about the CO_2 referendum, I can imagine very well that politicians, not only in Switzerland, do not understand at all what they are doing to their countries in the name of climate."

In another question, somebody asks: "In your field of climate science, given the amount of disagreement, what kind of response do you get from your ideas?" So, if you present your ideas at a climate conference of climate scientists, what happens?

Scafetta: Well, that is a very interesting question. Regarding the first question, how the politicians react to these changes? Let me say, it's very difficult to answer this question, because politicians reason in a way very different from scientists. A politician would like to have *certainties,* he would like everything to be clear, everything is certain, so they can make a decision. Scientists instead look for uncertainties, so they put the emphasis on what is *not known.* So that is the way scientists act, we look for what we do not know, and we try to find the answer to new things. And this makes it very difficult to talk with politicians, because they would like to have an answer, on everything.

Right now, the simplest answer to climate change is given by the climate models. The models tell us that CO_2 is the main driver of climate change, and so on, so that is the simplest answer.

What the politician should understand is that the models need to agree with the data. They need to reconstruct climate change that was observed in the past—and unfortunately the models fail in doing this. Therefore, the models are useless for predicting future climate change, or interpreting correctly the climate change during the last 100 years. But this is very difficult for politicians to accept, because then other interests come in. Also, we know that there is a huge amount of financial interest behind this topic: A lot of people have invested a huge amount of money and of course, these

people would not like to lose money, and therefore, they influence politics.

Regarding how the scientists behave: This is very difficult to answer, too. Here in Italy, we had many, many scientists who signed the letter where we informed the politicians that things were not clear at all. We had hundreds of scientists from several universities who had signed such a letter. So many, many scientists agreed with what I say, that science is complex, that science is not settled on this topic, and we need to be very careful about what we are doing.

But the politicians don't want to listen to complex topics. So, it's a difficulty, and we need to find a way to communicate with politicians better, because if they don't listen, or if they just listen to some very naive interpretation about climate change which is the one given by the climate models, then we will end up in big problems.

As I showed in my talk, China is not doing much, and that is also because there the scientists don't say that climate change is so dangerous. The same thing in Russia. Russian scientists don't say that there is this climate "emergency." In Europe, in United States, there is some pushing.

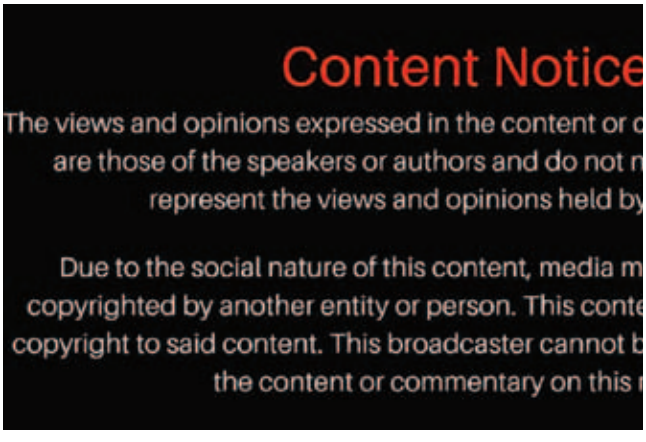
Another issue regarding politics and science, is that in Europe, and also in the United States, it seems there is also political interference on what scientists can do. For example, we know that most science in Europe and the United States is paid by the government, so it's possible that many scientists just receive money to say what the government would like to hear, to sustain some politics they have. But this is not the way how science should act, and climate—the data show that we are talking about a very complex issue, and so we need to be very, very careful about this.

Ross: What you brought up about chasing money, or the need to get grant money, and therefore saying things that are going to be received well by the people with all the money, in the case of the government, or in the case of—you know, the huge amount of money that's flowing into green things overall, where the Bank of England says we have to put the money, and BlackRock says we have to study climate impacts to measure the value of financial instruments.

I was just thinking about how on the lower level, you get something as small as say, YouTube, putting up warning messages, like, "Uh-oh, here's a scientist saying something that YouTube has decided is wrong, therefore you shouldn't be allowed to hear it, or you should be ashamed of yourself, and we'll tell you that this is very bad because a video website should obviously be able to tell scientists what they may and may not discuss!" I mean, it's like creating a sense where you don't even try to figure out what's true; you start to become used to this idea of just, you're told—you're told.

Roberto from Italy asks Megan: "I ask if you envision a growth of population in the universe, coming back to a conception of jobs contracts, directly under a big public, or private program, like the New Deal, or the work of Enrico Mattei? Or, do you imagine that the development of population within the universe where almost all current and future members of the world's population must make a job by themselves, the cult of the 'self-made man,'" which Roberto thinks would lead to no more future other than being the new homeless.

Another question, from Samuel: "Doesn't the world need more *responsible* people? Because even if our numbers are not a threat, our irresponsibility could be threatening."



YouTube acts as Big Brother when it censures content.

The Biogenic Migration of Atoms by Technology

Dobrodt: I want to reference something I said in passing in my presentation, which is Vladimir Vernadsky's conception of the biogenic migration of atoms by technology. Remember, this is where living forms aren't transforming the chemistry of the planet by passing material through their bodies, but actually moving it, changing it. Animals do this in a very limited way:

Beavers build dams, earthworms turn up the soil, and so forth, but this is really what we as humans do. One of the important aspects of that—what Vernadsky points to as the substrate of the noösphere—is that it's not just the individual mind, it's also the social organization of man. We change our behavior and we organize society to carry certain things out.

One of the very important technological breakthroughs in that domain was the discovery of a republican form of government. And one of the beautiful manifestations of that was what Franklin Roosevelt organized in the United States to get this nation out of the Great Depression, and his intention that after the war, there would be no more colonialism, and we would work with other nations, show them what we did in the United States, how we did it, and move into an era of great, big projects as an incredible social effort of humanity.

That may a kind of long-winded way of saying it—yes, I'm going to keep calling it technology—that this, developed in terms of the American Republic, and in our ability to organize efforts among mankind that no individual can carry out on his or her own, absolutely will have to be the mode of existence of human progress for many, many centuries to come. I can't predict thousands of years into the future what will be developed, but I think we can say that with certainty at least for the next several centuries.

In terms of needing more "responsible" people, the way I'll answer that is, again, referring back to something I brought up, which we discussed earlier, which is these great extinctions. In the biosphere, there is anti-entropic perpetual progress of the biosphere. But not of individual species. Individual species within that will go extinct. All living matter, or forms of living matter at some point will go extinct as they are outmoded by the biosphere's rate of progress.

Human beings are different. We don't evolve biologically. What goes extinct with man, hopefully is not "us" in a nuclear war, but in the best scenario what goes extinct are outmoded ideas. We lay to rest and leave behind us unworthy, or outmoded, or, in some cases, evil ideas. And if you want to make a responsible human species, you should leave behind oligarchism forever.

The Real and the Ideological

Ross: A couple of more questions that have come in. Elliott says: "Could you comment on the process in Italy about the debates or webinars on climate change, and the purpose of the letter to the nuclear energy institute that Dr. Kemm and Dr. Shanahan have worked on? Why are these developments, why are these debates taking place now?"

Prof. Scafetta: It is very important that people learn how science really works, and that people realize that climate science is very complex. It's not settled at all. People should understand why it's not settled: Because the climate models are not able to reproduce the climate of the past, therefore, we cannot trust this modelling interpreting the climate change that we have observed during the last 100 years. To understand this is not very difficult. Often people who look at it, can realize it. So, it is not really difficult.

My hope is that people will realize these things more and more, will realize that we are in a time where, in my opinion, there is an ideological push to many things in Europe and the United States. I hope that people realize that this pushing exists only in Europe and the United States. In the other parts of the world, the things are quite different.

First, we need to understand the difference between what is real and what is ideology; that is perhaps the most important thing. There is too much ideology on this topic. When we hear these things from the TV, from the media, from politicians, we are hearing not about science but about ideology. I think people should learn how to listen to scientists and listen to what they really do, to learn how to listen to the debate that happened in the scientific circles, to learn what is the debate in the scientific journals. There are a lot of websites on the internet that help people to understand, in part, these debates.

I just invite people to learn more about this topic, so they can eventually convince or force the politicians to make the right choices for everybody. That is my last invitation.

In Italy we are doing something, we are doing some in Europe, we are doing some in the United States, many people are doing many things, like yourself. I am optimistic about this, but I think it will be a long fight.

Humanity: Our Most Valuable Resource

Ross: Thank you for being with us, today. Dr. Romanello, your concluding thoughts?

Dr. Romanello: I certainly understood one thing that is obvious for many of us, probably, but it's non-

sense for others: The plain fact is that the biggest resource that we have in this world is not uranium mines, iron mines or aluminum mines, but it's humanity, it's people. It's their ability to make smart networking, peaceful sharing of ideas and producing new technologies: This is by far the best, most reliable, and most solid energy resource, food resource and water resource that we have. The sooner we understand it, the better it is.

Dr. Kemm: I think a significant problem which has to be addressed, now, is how to talk to the public. What we've found over the last number of years, is that the technology of the news media and of publications in general has gone ahead dramatically. During the Vietnam War, the video footage that came out of the Vietnam War was still on film. They had to film it, race to the airport with a can, put it on an airplane, take it all the way back to the U.S., have it processed, and so on.

Now, you can stand somewhere with a cell phone and you can video something, and it can be on world news moments later. So that what is happening is that information is being given to the public very, very rapidly, and often in a way that hasn't been interpreted correctly. Unfortunately, a lot of science sounds as if it's easy, so there are far too many people that feel that if they just know some little bit about science, then A+B=C, and then they know what's going on. It's far more complicated than that.

Earlier, I mentioned cardiologists, for example. You'd never find a group of people in a pub, just having a discussion on how to do a heart transplant. But there are people in a pub who will just have a discussion on how to produce electricity, or that nuclear is bad, or something like that.

So, one of the issues is, how do we get more scientists to talk to the public? And how do we also get the people that are producing the news media, whether it's television, or whether it's magazines, whether it's internet, and so on, to actually go and talk to scientists and try and interpret the truth. Otherwise, we have enthusiastic people in the public, who think they're doing something good, and going out and they're spreading wrong stories; the politicians then want to be where the popular opinion is, so they repeat the wrong stories, because they feel it will gain them the most votes.

That's where the snag is at the moment: There's a mismatch between the scientists who actually know what's going on, and the picture that's generated in the worldwide media that gets people's attention. So, many people have got the wrong ideas, and they don't know that. They're just doing it from a good heart. Of course, there's also people who are deliberately trying to manipulate it, who feed incorrect information. But by far, the majority of people are well-meaning, honest, decent people, who've just got the wrong end of the stick. And that's a big snag at the moment.

Dobrodt: I'm very happy and excited with this panel today. I think we should be sure to get it out far and wide, continue the discussion. I'll just put a call out to everyone watching, to organize with us. I think everyone on this panel, is in their way, making tremendous efforts to—I was going to say, "correct the mistakes," but they're not really mistakes, are they—to crush these lies that are really threatening human progress and human existence.

Ross: I'd like to give the final word of our panel, here, to Lyndon LaRouche, to some brief remarks. Megan, you had talked about some things that should go extinct, like oligarchism; maybe like the anaerobic creatures that existed before the great oxygenation event. Here Mr. LaRouche is speaking on June 27, 2007 to a group of young people interested in his ideas and in his runs for the presidency of the United States.

See Your Identity as a Mission To Secure Humanity's Survival

Lyndon LaRouche: And it's in *that* part of our life, in our determination to express *that*—into a future which exists beyond our death: *That*, is the meaning of human life....

And the problem that you have, in your generation: You are young adults, where an older adult generation has failed, existentially. There may be individuals in the older generation who have not failed, but the generation as a whole, especially the white-collar generation has failed. They've failed catastrophically.

Your job, because you are receptive to these ideas of principle, to the notion of the individual as immortal, an immortal personality, despite the death of the mortal body, is *your* destiny, and your responsibility to guide the changes which must occur in society, if society itself is to survive. And therefore, your generation has a unique historical role, in the existence of mankind as a whole.

And to understand this in yourself, and to see your identity as so situated, is my mission for you.