Speaker 1:

Okay, so we've got one more great panel coming up. I'm just going to introduce my wonderful colleague, Jennifer Ouellette, Ars' senior science and culture writer, and I will take my exit.

Jennifer Ouellette:

Welcome to the last panel of the day. After this, we all get to go out and have fun at a reception and get to know each other a little bit more. Thank you for being here and sharing this event with us. This panel is called Elevating Ethical Climate Solutions. For generations, community's advancement has come at the expense of our planet's ecosystems. So today we're going to be discussing viable solutions to this existential threat, but we're going to do it in the context of the intersections of climate change with science, politics and social inequality. And we've assembled some great panelists with great depth of expertise. So I'm not going to waste any more time. Let's welcome our panelists.

Jennifer Ouellette:

First up, Dr. Sally Benson is an internationally recognized energy expert serving as deputy director for energy and chief strategist for the energy transition at The White House Office of Science and Technology Policy. She comes to OSTP from Stanford university where she is the precourt family professor of energy resources engineering in the School of Earth, Energy and Environmental Sciences. Welcome Sally.

Sally Benson:

Thank you.

Jennifer Ouellette:

Next, Dr. Michael Mann is distinguished professor of atmospheric science at Penn State. This fall he'll become presidential distinguished professor in the Department of Earth and Environmental Science at the University of Pennsylvania and the inaugural director of the Penn Center for Science Sustainability and The Media. He has authored five books most recently, The New Climate War, which came out this week in Paperdeck. So you should all go out and buy a copy. That's your plug. Welcome Michael.

Michael Mann:

You'll get your check.

Jennifer Ouellette:

Last but not least. Dr. John Timmer is Ars Technica science editor, where he helps lead Ars coverage on climate change, development of renewable energy and the policy shaping our world. Prior to joining Ars Technica, he researched genetics and developmental biology for over a decade. Welcome.

Jennifer Ouellette:

Oh, thank you. So today's discussion takes place as Ken Fisher noted earlier this morning, after the release of the latest IPCC report, and it gave us some good news and some bad news. The good news, there are clear signs of progress. There's growth of clean energy, and it's been accelerating. That's fantastic. The bad news, we are at the peak of the so-called emission curve and emissions really have to start declining now, as Ken said, or quoting the IPC chairman, it's now or never. We really have to act now. So I want to start with what you each think about the conclusions of this latest report, its

implications and what you think we probably need to do in light of it. And we're going to start with John to give a general overview. We'll dig deeper into the specifics of this as the conversation progresses.

John Timmer:

Eric Berger used the metaphor of Star Wars for his last topic. And I think here the right film metaphor is everything, everywhere all at once. We've waited long enough tax seriously that we have to do everything possible as quickly as possible. And that ranges from boosting the manufacturing of renewable and efficient tech. It includes securing the raw materials to do all that manufacturing. It means setting policies that encourage it and things like the largest land war in Europe and a pandemic can't be used as excuses not to do that at this point.

Michael Mann:

Yeah. So when I talk about the climate challenge, I like to emphasize two words that I think have to go together, urgency and agency. And both of these words are communicated by the latest IPCC report. The urgency is obvious. We have 10 years in which to reduce global carbon emissions by 50%. That's a massive amount. If we are to avert what can truly be characterized as a catastrophic planetary warming of one and a half celsius, three degrees fahrenheit. That's the urgency. The fact that we are seeing the impacts of climate change now playing out in real time in the form of unprecedented, extreme weather events and all of that is reported in the latest IPCC report.

Michael Mann:

But the sort of third report that was published recently as the sequence, as part of the sequence of three reports, working group one on the basic science, working group two on the impacts, working group three on the solutions. The working group three report makes very clear that there is still time and there are still pathways. And by the way, we don't need a miracle, Bill Gates if you're listening. We have the technology to solve this problem now. What we need is the political will to actually do it.

Sally Benson:

So offering my perspective, I'm a energy geek. And so I'll talk about some of the technical things we need to do. So number one, we need to get to net zero electricity and as soon as we possibly can. Number two, all those things that can be electrified, we need to do quickly so we can take advantage of all that clean electricity. So I'll just give you an example. So let's just look at the US right now. So we need about 250 million electric vehicles to have everyone have an electric vehicle. We need about 140 million electric heaters and stoves and hot water heaters and so forth. We need around 100 million electrical boxes for each home. We need about 275 million charging stations to take advantage of all that clean electricity. And if we do all those things, we will have gone a long way, but we haven't gotten away there yet.

Sally Benson:

Then we need to think about what people sometimes call to as the hard to decarbonize sectors. So we need to think about industry and we need to think about things like cement. We need to think about steel, ammonia. Even making solar panels, there are emissions associated with those. We need to think about heavy duty trucking. We need to think about airlines and shipping and there we need to find solutions. And I wouldn't disagree with Professor Mann that there are solutions, but they're not cost competitive today with the alternative, which makes it difficult for companies to invest in them.

Sally Benson:

So we really need to develop hydrogen as a solution. We need more lower cost carbon neutral fuels. We need carbon capture and storage on facilities that there's no other option for dealing with. So those are some of the hard things that we need to do, but mostly we need to get on with what we can do today. And there's a tremendous amount that we can do today that will take us far down that curve to getting to those 50% emission reductions that you just heard about.

Jennifer Ouellette:

Excellent. So on a related subject, the World Meteorological Organization prompted some alarming headlines earlier this week. It concluded that there is roughly a 50/50 chance that we're going to hit that critical threshold of 1.5 degrees celsius by 2026, which I mean is not that far away. So Mike, you actually had some choice words on Twitter about this. You called the statement deeply misleading and an example of what you've termed climate doomism. And I'm hoping you could kind of address that and maybe explain why it's not necessarily a succeed or fail binary scenario.

Michael Mann:

You mean I engage in a hot take on Twitter?

Jennifer Ouellette:

Yes, yes. You're famous for it.

Michael Mann:

That is so unlike me. That is so unlike me. Yeah. If you want to see my basic response to the latest WMO report, you can read my blog from a year ago to the previous WMO report, www.michaelmann.net. A year ago, the WMO came out with a very similar report and I don't have any problem with the science that they're reporting. It was the framing, particularly that played to this sort of media narrative that we've crossed the one and a half degrees celsius threshold decades earlier than we thought. That's not true. And the problem is that there was a false conflation between when the trend line, and that's what we're concerned about, when the trend line crosses one and a half degrees celsius. The long term steady warming crosses one and a half degrees celsius. That's where we start to commit to even more massive melting of the ice sheets, even greater amounts of sea level rise.

Michael Mann:

And so that's what we're really talking about when we talk about avoiding one and a half degree celsius warming, and there is still a budget of carbon left to burn. It's not a big budget. As we said, we've got to bring carbon emissions down by 50% within this decade and down to zero by mid-century if we are to remain within that budget, but there is still a budget left to keep warming below that level. And the problem here is that they were equating sort of the year to year fluctuation. Some years are warmer than others because of a big El Nino event. Some years are cooler than others because of a big volcanic eruption.

Michael Mann:

As Neil Degrasse Tyson, very nicely illustrated in an episode of his remake of the classic Sagan television series, Cosmos, it's like you're an owner with their dog walking along the beach and the dog is walking side to side and sniffing things and moving around. If you want to understand their trajectory, you watch

the man, not the dog. Where is he or where is she leading? And so it's the same thing with the climate. Those year to year fluctuations, if we cross one and a half degrees celsius which we will inevitably do soon, because the trend line is increasing, that doesn't commit us to all of those dangerous, long term impacts. It's when the trend line crosses one and a half degrees celsius.

Michael Mann:

And I felt like the report didn't properly distinguish between those two scenarios in a way that inevitably led to some breathless media coverage that feeds what I think is an unhelpful narrative of doomism and despair. This idea that it's too late to act, which ironically is one of the great threats right now to meaningful climate action. It's an argument that I make in the new climate war that doomism has actually been weaponized in some cases by critics, by polluters, because they realize that it potentially leads us down the same path of disengagement as outright denial and we have to be aware of that.

Jennifer Ouellette:

Sally, you want to add something to that?

Sally Benson:

Yeah. Whether we're at 1.2 today or 1.5, I mean, I think the news that these are impending realities should just motivate us to act even more. And it's very frustrating to me to hear like, "Well, it's too late. So we give up." It would be if your kid comes home and they say, "Oh gosh, you know, I got to C in my math class this year. And oh, game over. I'm just not even going to try anymore." You'd never do that. You'd say, "No, no, you just have to try way harder." And I think that's what should motivate us is this frightening news should get us all acting more quickly.

Michael Mann:

I couldn't agree more with Dr. Benson. And if I can just very briefly sort of weigh in with another analogy. I like to use the analogy of a highway. It's possible we will miss the 1.5 degree celsius exit. That doesn't mean we sail hundreds of miles down the highway to the 3, 4, 5 degree exit. It means we get off at the next possible exit. And whether that's 1.6 or 1.7, this isn't a cliff that we go off at one and a half degrees celsius. It's much more like a minefield that we are walking out onto, and we want to stop that forward lurch because we encounter ever more danger the further we go down that highway.

Sally Benson:

Can I just add one quick... I mean, so I love that analogy. We're going down the highway, we pass the thing we want. So the role of technology is to make sure that there are lots of off ramps and you don't have to go very far over 1.5 before there's an off ramp you can take. So I think that's an important thing to consider.

Jennifer Ouellette:

Excellent. John, you want to-

John Timmer:

I have little to add to that. So if you want to move on, that's fine.

Jennifer Ouellette:

Yeah. This is obviously a conversation so all of you should feel free to jump in as you see fit. So I want to actually talk a minute about the actual topic of this panel, which is ethical climate change solutions. I'd like each of you to tell me how you define an ethical solution to climate change and why it's important that we are ethical in our approach.

John Timmer:

I'll start since I didn't chime in last time. One of the things we have to recognize is that fossil fuels kill people, burning them kills people through the pollution it creates. And because of the way society is structured, the people most affected by that, the sites where the freeways run, the sites where the power plants are, are low income neighborhoods. So anything we do to get ourselves off fossil fuels is necessarily equitable. It is improving society by taking the burden of death and the medical expenses off the lowest income.

John Timmer:

Beyond that, the challenges become that new technology is expensive and people who own homes and have high incomes can easily put solar panels on them, put induction stoves in there and things like that. People at low income are renting places. There are multifamily dwellings. You can't put panels on. They're at the mercy of their landlords for getting things like efficient appliances and such. And how we manage to get the financial incentives to take care that they have all the access to the best efficient technology as everyone else is solving that, is solving the equitable aspects of this.

Michael Mann:

Yeah. Building on what John just said. There is this quandary that those who have the least resilience in the face of the impacts of climate change that we're already seeing play out and are in environments where pollution is greatest, where their health impacts from the extraction and refining of fossil fuels, those who had the least role in creating this problem in the first place are the ones who are bearing the worst impacts at this point. And that's true domestically here, when we look at sort of urban locations in the United States and low income populations, but it's also true globally, the global south, the developing world. If you look at some of the worst floods and storm impacts that have cost hundreds of thousands of lives in places like Africa, we're seeing these devastating consequences that are felt by those again, who have the least wealth and the least ability to deal with these impacts.

Michael Mann:

And one of the, if you look at the Glasgow Climate Summit COP26 late last year, there was some feeling of disappointment on the part of many climate advocates that we didn't get quite as much as we would've liked to have seen. We did get something. We actually did get commitments that if they are met, we'll actually for the first time keep warming below two degrees celsius. There was an article in nature just weeks ago about that. So that's real progress. We were headed towards something closer to four degrees celsius before Paris. Of course, it's a big if. Those countries have to meet those commitments. They can't just talk the talk, they have to walk the walk. But one of the places where the agreement broke down a bit at the very end was when India came in at the very last minute, some of you will have read about this and really almost in violation of parliamentary procedure complained about the language of phasing out fossil fuels.

Michael Mann:

They wanted a change to phasing down, the sort of weaker language. And there was a lot of criticism of India for that action. But the way I view it, this was sort of a protest by India representing other developing countries saying that if the developing world, sorry, if the industrial world, here in the United States, we've had access to two centuries of cheap fossil fuel energy to build our economy. And if we're not willing to provide the resources, the financing, for example, to India and other developing countries, and we haven't yet met our commitments when it comes to financing, if we can't help them skip past this fossil fuel stage, provide them the resources to develop clean energy infrastructure, leapfrog past the fossil fuel stage, not make the same mistake that we made.

Michael Mann:

If we're not willing to do everything we can to make it worthwhile for them to skip that stage, then these discussions are going to break down as they did at COP26. So that remains a really important aspect of these global negotiations. Those of us who contributed the most pollution and the United States is still the leader in terms of the amount of pollution that we have put in the atmosphere, the amount of carbon pollution we put in the atmosphere far more than China cumulatively. If we're not willing to do everything we can to lead and to provide resources to these other countries, then that leaves them with the argument, well, why should we? Why shouldn't we be entitled to the same economic advantage that you had?

Sally Benson:

Okay. Yeah. I want to go back and touch on one of the themes we've already heard about and then add a second dimension. So the first is affordability of energy just in the beginning. So 25% of the people in the United States have a hard time paying their home energy bills. So that's home heating, that's home electricity, and so forth. And if you look at low income communities, it's particularly acute where 60% of the people, more than 10% of their income goes just to keep the lights on and to keep their houses warm and keep them cool. So as we think about going into the energy transition, it's going to be absolutely crucial that we keep those prices low for clean energy. And what we know is that the cheapest kind of renewable energy is utility scale wind and solar.

Sally Benson:

In other words, having a really clean grid. And as we make our grid cleaner, we've made a huge amount of progress, but as we make our grid cleaner, we need to make sure we're not making it more and more expensive. So we have to find for every region of the country, what's the cheapest way to get there. And what studies have shown is the best, cheapest systems are where you have a mix of wind and hydro and solar. And then in addition to that, some kind of power, clean power that you can turn on and off. So when the wind isn't blowing and the sun's not shining or your batteries run out, that it can keep that system stable. So the electricity system really likes a diversity of sources. So going forward, we need to be very cognizant of that issue.

Sally Benson:

A second really important issue has to do with energy communities. There are many communities across the United States where you've been mining coal, or you've been refining petroleum, or you are well drillers and field operators. And people who live in these communities have worked hard and for a long time provided reliable, relatively inexpensive energy to the United States. But the time for that has changed. And what we now know is that people don't like to leave their communities. Family is really important. So history has shown that even when this industry goes away, you end up with really poor

communities left behind. So the Biden administration has really done a lot of work to prioritize these communities, as well as communities that have borne a disproportionate burden from exposure to environmental pollution, which again are often low income and communities of color.

Sally Benson:

So what's fantastic is there are new programs that there's the Justice 40 program that basically says that 40% of the investment of the infrastructure law needs to go into these communities to rebuild them. And in addition to that, there's a prioritization for these energy communities to have priority as we start to implement some of these advanced technologies like hydrogen production hubs or large scale energy storage. And I think this is a really critical issue, otherwise, a lot of people are going to be left behind in the transition.

Jennifer Ouellette:

You want to add something?

Michael Mann:

Just a quick follow up. Yeah. I mean, Sally represents OSTP, The White House, the Biden administration, which has really been doing in my view, a wonderful job in trying to favor this necessary, clean energy transition, but you can't do it through executive actions alone. You need legislation to codify these policies. If we are to meet that commitment of lowering our carbon emissions by 50% within the decade, which the Biden administration has promised to the world we are going to do, we can only do that if we codify that in legislation that can pass Congress. And right now, as many of you know, that legislation is stuck. There aren't even 50 democratic votes and it needs to clear a filibuster. And if we can't pass something like the Build Back Better Bill with those climate provisions that it contains intact, subsidies for renewable energy, a clean energy standard things that'll actually make that happen.

Michael Mann:

If we can't pass that, then the United States can't meet its obligations to the world. If we don't meet our obligations to the world, how do we expect them to come along and join us? And so all of that I suppose is to emphasize as if it weren't already obvious that these midterm elections are going to be critical. Are we going to have a Senate that is in a position perhaps for a workaround when it comes to the filibuster and to pass the sort of legislation that will codify the remarkable efforts that Biden administration is making to move us forward here?

Sally Benson:

Can I just add a little bit so that... I mean, we've gone through periods where there have been more emphasis at the federal level and more emphasis at the state level, and certainly we need to encourage all the state level action as well. But also private sector actors who have gotten really serious about net zero, and we see this in some sectors of the economy. And we need to do what we can do to support those efforts as well. And one of the things that came out of Glasgow was the early movers coalition that John Kerry, the special assistant created that program and is trying to connect them so that they can accelerate each other's action.

Jennifer Ouellette:

So I want to actually talk a little bit about something that you just said about when we scale up, we need a clean energy grid. We have all these different technologies. We have the tools, we have the knowledge, we're working on the will, but there still are some serious challenges to really like go fully renewable. You mentioned that some of these technologies might be better for certain regions than others. They're not necessarily consistent. You need some kind of storage capability so it's reliable. There are materials issues. Some of the materials are actually quite rare and quite expensive. I want to talk a little bit about how possible solutions to those kinds of very pragmatic problems.

Sally Benson:

Would you like me to you to start?

Jennifer Ouellette:

I would like you to start.

Sally Benson:

Okay. All right. Yes. So basically there are certain things in our economy that need a fuel that we don't know how to operate with electricity. And so the question is how do you create a carbon neutral fuel? And one possibility that people are quite excited about is hydrogen. You can produce hydrogen from renewable electricity, through electrolysis. That's quite expensive today. You can also produce hydrogen through steam methane reforming of natural gas. And if you capture the carbon, you can significantly reduce the emissions of those processes. So the department of energy has an eight billion effort now to advance those technologies. They're going to be engaging communities and industry across the United States to push that threshold or to push that frontier. Another important issue is how do we, for things like airplanes and ships and so forth, how do we deal with that?

Sally Benson:

And there are a number of pathways. One is you can make biofuels, sustainable aviation fuel, SAF is what they're called. And that's certainly one pathway though there are challenges with biofuels because of land source emissions and so forth, but there are other options too. It's possible to take carbon dioxide captured from the air together with hydrogen and then electricity, clean electricity and you can actually synthesize hydrocarbon fuels, but they're carbon neutral. They don't have any fossil fuels in them. That's another technology that it's exciting, but a lot of technological challenges, but there are startup companies. I think you can buy like completely carbon neutral glasses now, or lenses. It's the lens part of it.

Sally Benson:

So there's a lot of really amazing innovation. Just one more thing. So a lot of the new processes that we're relying on though, have a whole different set of minerals. Fossil fuels, we used oil and gas from the ground, but if we want to make an electrolyzer, we're going to need a different set of chemicals. And right now the United States has very limited capacity to create these or to get these materials other than buying them from very limited sources. So one of the things that a very big initiative is a supply chain initiative. So to look at the critical materials that we need for magnets, for batteries, for solar panels and so forth, and make sure that we have supply, stable supply chains here in the United States. So that's another important frontier to break.

Jennifer Ouellette:

How about you, Michael?

Michael Mann:

Yeah, no, I would build on what Dr. Benson has said here. Sometimes the pessimist will point to aviation, for example, certain sectors, these difficult to decarbonize sectors and say, "How can we do this? Look, we don't yet have batteries that can fly planes." Aviation is responsible for about 3% of carbon emissions. So yeah, we do need to decarbonize every sector of the economy, and there're going to be some sectors that are more challenging than others. But if we decarbonize 97% of our economy, we'd be in pretty good shape. And so let's not allow again, the perfect to be the enemy of the good, this idea that because we can't decarbonize everything right now, that we somehow don't have the technology to get much of the way there. And there is an existing body of research that suggests with existing technology, no new technology, just existing technology and the right economic incentives, we can lower carbon emissions by 50% within this decade.

Michael Mann:

And it will get easier because there will be technological advances. Another point that Dr. Benson makes here is that there are times when the wind isn't blowing, the sun isn't shining. You need that base load. And the more diverse a grid that you have, the more, the easier it is to sort of deal with this so-called intermittency problem. And it isn't just batteries and batteries have come a long way and they're going to come even longer. But you've also got green hydrogen I think is an interesting idea.

Michael Mann:

I think there's a possible storage option there that we should be looking at. This is not to be distinguished from blue hydrogen, which is really an excuse just for continuing to mine natural gas. Green hydrogen is when we do have an excess, when we've got more wind or sun than we can use at the time, we want to store that and maybe hydrogen in some cases as a way to do that. You've got pumped hydro, you've got lots of energy storage options. You've got an increasingly diverse grid. We've got the tools to get most of the way there now. We just need policies to incentivize it.

John Timmer:

One of the things that we tend to emphasize there's times when the sun doesn't shine and you can't rely on solar, but we are under emphasizing the fact that we're building so much solar and it is so cheap now that regularly in the spring and fall, California asks solar producers to just pump the electrons into the ground because they are overproducing what the grid actually needs. And as they continue to build out their renewable supplies, that's going to become increasingly common. And that is going to change the economics of using energy to do other things over time, where you can rely on this every day of the spring and fall. And I don't think we've really come to terms with what that might mean in terms of other technologies we can adopt.

Jennifer Ouellette:

Excellent. We have gone 40 seconds over, but that's okay.

John Timmer:

Sorry.

Jennifer Ouellette:

Thank you, Sally, Mike and John. Please thank our panelists for taking time to be with us here today. Take your cups.

John Timmer:

I think we're supposed to head that way.