Emma Brush: Hello. Thanks for tuning in to Breakthrough Dialogues, the podcast for pragmatists and problem solvers brought to you by the Breakthrough Institute. I'm Emma Brush, Managing Editor of the *Breakthrough Journal*.

Alex Trembath: And I'm Alex Trembath, Communications Director at Breakthrough.

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Emma Brush: In this episode, we talked to Jon Symons, Senior Lecturer at Macquarie University in Australia. Jon is an expert on international environmental policies and norms. In his recent essay for the *Breakthrough Journal*, Jon asks whether the policy conversation over geoengineering is fundamentally unjust. As Jon will catch us up on, geoengineering is the process by which humans could deliberately alter the biosphere to slow global climate change. The consensus has been that such a direct and radial measure requires international consensus. But Jon argues that those norms were written by rich countries, who in the meantime had not upheld their pledges to reduce emissions. Since climate impacts will be concentrated upon poorer countries and populations, and since those populations are mostly not responsible for climate forcing emissions of the last several centuries, it makes at least some sense that poor countries be allowed to lead, not follow, on any geoengineering efforts.

Emma Brush: Jon, thanks for joining us.

Jon Symons: Thanks very much. Looking forward to it.

Emma Brush: We're thrilled to be talking to you about geoengineering today, as controversial a topic as any. We often talk about climate action as a global project and about geoengineering as a form of that action that requires global consensus. But after a generation of failing to accomplish really either of those things, is it time, you ask, for developing countries to start pushing these efforts, including geoengineering, in their own interests, on their own terms, regardless of what the developed world has to say? Jon, why don't you start us off by telling us a bit more about solar geoengineering itself.

Jon Symons: Okay, so I should begin by saying, maybe I'm not a scientist but I kind of try and understand what the various possibilities in this space are. And the idea of solar geoengineering is that by reflecting some of the sun's energy back into space — and it's a tiny percentage of the sun's energy — you could alter the energy balance of the earth in ways that might offset some of the impacts of climate

change. And we know that this works because there's been… Mount Pinatubo explosion back in the early 90s as the most famous example. But there have been a series of volcanic explosions where we've seen in the following year that the earth has cooled to quite a significant degree.

Jon Symons: Now often it hasn't cooled in a good way. It's been a change where the patterns is a result of that but we know that the basic idea of solar geoengineering works. The question is whether it's a good idea. If humanity were to intentionally commence solar geoengineering, we get to choose the way we did it, so we'd have a little bit more control over it. And there are a whole bunch of different ways that you might do it. The nicest of them are things that cities already do, like you image a Greek city painted white. That's about reflecting some of the sun's energy and cooling the local environment. Increased vegetation, or vegetation which has more reflective leaves. Nice ways of cooling local environments.

Jon Symons: Some people are more enthusiastic about various forms of cloud brightening. You basically make new clouds at sea or you might thin them, because some clouds warm the planet up and they act like blankets. Others are cooling. So you might tinker with clouds and that would produce fairly localized impacts on temperature. So a lot of people are more open to this kind of idea than they are with the Playing God idea, which is mostly what I was writing about in the article.

Jon Symons: And the Playing God idea is the idea of dispersing some kind of reflective particle into the stratosphere in order to alter temperature on a global basis. Now what we know about these techniques is from climate models. Firstly, the kind of models that are being tested and not necessarily the ways that solar geoengineering would actually be implemented. And secondly, it's only the output of models. So we don't know exactly what would happen.

Jon Symons: Our best predictions would probably be to bring the temperature and rainfall patterns in every major region of the earth back to something closer to preindustrial levels, then we just let the climate continue without solar geoengineering. However, solar geoengineering doesn't do anything about the problem of ocean certification. And also it would cool some areas more than it would cool other areas. So the mostly likely outcome is that the tropics would be cooled more than the poles would be.

Jon Symons: And then the next problem is that different countries are going to want different things. If you were China and you were optimizing your weather for, you know, you might chose different things for crop productivity or thermal comfort, you might chose a different level of solar geoengineering than would India. Firstly, different countries might go down different paths in terms of whether they like the idea of solar geoengineering. Some countries might say, "This is immoral. We are against it." While others might see advantages in it. And then even if countries decide, "Yeah, it's probably a good idea to go ahead with it." There are likely to be major disagreements as to precisely what set of

solar geoengineering techniques, what implementation they'd go ahead with. So that's kind of the potential for international disagreement.

Jon Symons: And then finally the big worry that people have is, will there be some kind of moral hazard involved in going down the solar geoengineering path? If people think, "Ah, we've solved the... well not solved, but we've dealt with the worst of the climate change problem with this techo-fix, does that mean that we can give up trying with mitigation?" Those are some of the big worries that people have about the technology.

Emma Brush: So you've been critical of a framework called the Oxford Principles. Can you tell us a little bit about that and how it relates to the particular type of solar geoengineering technology that you're most interested in?

Jon Symons: Okay, so although I've been critical of the Oxford Principles I actually think that the Oxford Principles are lovely. If you were to read the Oxford Principles, they're very short, they're only about 30 words long, and they express a set of really beautiful ideas. The solar geoengineering should be regulated as a global public good, so people who are affected should be able to participate in decision making. It should be fully disclosed rather than occurring in secret, that there should be independent assessments of the impacts and that they ought to be a governance framework before deployment.

Jon Symons: Now those ideas, it's hard to knock any of them. They sound just perfect. And just to explain where they come from, there's a group at Oxford University called the Oxford Geoengineering Program. They and a few other philosophers and scientists and the like from around the UK proposed the Oxford Principles. They were endorsed by the UK government and then they've been endorsed by subsequent meetings on climate intervention technologies. So they've got a very deep level of support in the international but predominately western solar geoengineering community and they express some really, I think, important values and principles.

Jon Symons: Once I knock them, I do whilst recognizing that they do a lot of good work. But the reason why I knock them is because they aspire to a perfect system in a sense. They aspire to a perfect response to solar geoengineering. And as much of the world, I think, can't aspire to a perfect response. The law in its majestic equality forbids the rich as well as the poor to sleep under bridges. And I think the Oxford Principles pretty much do the same thing. If you're applying a set of ethical principles to first world countries or two billionaires — and there have been rogue billionaires who've tried to implement a different form of solar geoengineering which is ocean fertilization. I think you can't go past the Oxford Principles for a set of standards that should apply to rich world efforts.

Jon Symons: But the problem is, if we look back through the history of climate negotiations, the rich world and the poor world have taken a very different response. In fact, not just climate negotiations but environmental negotiations more generally. The harsh reality of global inequality is that we still have around a billion people

living in dire poverty, around two billion people with virtually no electricity access at all, so the developing world, for them, development has always been a higher priority than environmental protection, not because they're against environmental protection but because they have a worse set of options. And they've always viewed international environmental negotiations as partly about making environmental progress and partly about trying to address the injustices and inequalities of the global system.

Jon Symons: And solar geoengineering where if we see over time a divider merge between rich world perspectives and poor world perspectives, I view it as an opportunity, even if it doesn't go ahead, the threat of solar geoengineering is an opportunity for the developing world. If developing world countries say to the first world, "You have repeatedly promised to reduce your greenhouse gas emissions. You repeatedly promised to compensate us for the impacts of climate change, which have overwhelmingly been caused by you, if you don't go ahead and pay the compensation that you promised, if you don't go ahead and reduce your greenhouse gas emissions, well, we are going to implement this imperfect but rough and ready techo-fix." Having that on the table could potentially empower developing countries.

Jon Symons: So the Oxford Principles — I think there's a sleight of hand involved. In that by saying, we must have an ideal global approach to measures that could reduce the impacts of climate change, that's applying quite a different government standard from the government standard which applies to the actual emission of greenhouse gases.

Emma Brush: Yes. That's an incredibly interesting framing. So rather than an alternative to development and mitigation or even in addition to it, solar geoengineering might actually just serve as an impetus to those developments in the developing world and kind of mitigation.

Jon Symons: Well, that's a possibility. One of the ideas that in fact you and Ted pushed me to, to develop more in the article, was that one of the problems with the international response to climate change is that it's such a long term problem. It plays only a very small part in the politics of most countries. And you know in the developing world you might say that makes perfect sense. Of course, people are going to want electricity, and good health services, good education, etc., that's going to be higher priority for people than is addressing climate change.

Jon Symons: In the rich world, it's because it doesn't seem pressing. So whether it's Republicans in the United States electing a climate denier as president, whether it's Germans deciding that it's more important to close down nuclear power than it is to reduce their greenhouse gas emissions. In the rich world, even our climate polices normally aren't about climate change. They're normally about other things. So one upside of solar geoengineering is that it would bring forward the kind of... it could make climate change more front of mind. If we're doing something on a global basis now that makes climate change real in people's minds, perhaps that might increase the salience of the issue.

Jon Symons: And then, the other thing I discuss in the essay, is this problem of termination risk. Now termination risk is the problem that once you start using stratospheric solar geoengineering to stabilize temperatures, if greenhouse gas emissions continue and atmospheric concentrations of carbon dioxide and other greenhouse gases continue to increase, then the gap between what the temperature would be without solar geoengineering and the temperature that we actually experience, would just grow and grow over time. And that means that if solar geoengineering were to cease at some point, you then suddenly have this runaway climate change effect. The warming which would have happened over however many decades solar geoengineering has been preceded, happens in just a few years.

Jon Symons: So you have this really sudden on rush of climatic change. And that's much more dangerous than gradual change because with gradual change is we have time to adapt to them. With very, very rapid change then it's not just humans but it's also with gradual changes, species might migrate from region to another region. With sudden changes they're very unlikely to be able to do that. And in human communities, it's the same thing. We can build more storm resistant buildings. We can develop new drought resistant crops, etc., when we're responding to gradual change, but rapid change is much harder, might overwhelm our society's capacity to respond.

Jon Symons: So for many people, that risk of termination shock is so scary that it means solar geoengineering should never commence. And that's a perfectly understandable point of view. But you might also view that as an upside in sense. That for us in the first world, climate change, we know that in the next 30, 40 years, even if you know we see more and more weird things happening in the climate, we in the first world are insulated from that with our wealth, by our social services, our health systems, etc., whereas in the developing world, you know, abhorrent levels of inequality and hardships created by that, are already growing worse as a result of climate change. And so the risk of termination shock might bring home the severity of climate change to powerful people in the west who, as things stand, are pretty complacent about climate change, and so it might actually motivate more aggressive mitigation. It might motivate our political systems to take the problem more seriously.

Alex Trembath: I want to zoom out and talk a little bit about where solar geoengineering fits in the history of environmentalism and technology change. In your essay for the *Breakthrough Journal* you mention the history by William Meyer who discusses something he calls environmental Prometheanism. Can you tell us what that is?

Jon Symons: Okay. So Prometheus is a character from Greek Mythology who I think stole fire from the Gods. I think Prometheus also has the capacity to regrow limbs. So that's kind of a cute side note, given that it's quite likely that FM 30/20 predictions might come true in the next few decades.

Jon Symons: Anyway, Prometheus is often, I think it was John Dryzek, who is kind of a political theorist, who described two approaches to the environment. One he

called Malthusian which comes from Thomas Malthus which is the idea, basically, there are limits to growth. And Malthus was himself a conservative figure who argued that because people and other populations always multiply past the... as we increase our numbers to exceed the number that can be supported by the available food supply, poverty and famine are always going to be with us. Whereas Prometheans used to describe the idea that human ingenuity means that there are not necessary limits to growth, that we're going to find smarter ways to improve human welfare while also taking care of the environment.

Jon Symons: Now William Meyer, his book's actually titled, *The Progressive Environmental Prometheans* and he's making a point which I find really fascinating and most of the book deals with the long history of progressive thought up until the 1960s and he traces in great detail how everyone, from the Marxist to the Fabians that Prometheanism which in his definition, I think is something like the ability to enhance our biophysical environment in order to improve human welfare, was for many centuries accepted by all sides of politics in the west. But it was particularly strongly held by Progressives. And he describes Progressives as those who want to reduce inequality.

Jon Symons: However, in the 1960s this flips and we have the emergence of a kind of rival idea, which is that it is unwise to intervene in the complex systems of nature. So the idea that intervening in complex systems has unintended consequences, Meyer argues and many others have made the same point, is itself a conservative idea. All kinds of conservatives have made this an essential part of their ideas. I'm Australian, and recently in Australia we've had a debate over marriage equality and the conservatives in this debate said, "When you make a change to an institution such as marriage, it might seem like a lovely thing providing equality etc., but there are always unintended consequences. And those unintended consequences are harmful and therefore we should be very cautious about intervening in complex systems."

Jon Symons: And this idea which has always been a conservative idea, gets promoted in the 1960s by two groups. One is environmentalists, who say that ecological systems are so complex that we must intervene in them only very, very cautiously, preferably never at all. And the environmental movement's rejection of biotechnologies such as genetic modification, probably much of its attitude to nuclear power links to this idea and certainly it's a knee-jerk reaction, it's resistance to any form of climate intervention, I think reflects that prohibition on intentional intervention in nature.

Jon Symons: I also make the point in the essay that the idea that interventions in complex systems are immoral or in fact moral is the right word, was also made and popularized by Hayek in the 1970s. And Hayek argues, basically, that the market is the complex system that we mustn't intervene in. And that sure, the market produces inequalities but we just have to accept those inequalities because intervening in complex systems is too dangerous. We need to be humble in the face of them. So there's this really weird similarity between the argument the

people like Naomi Klein makes and basically she says, "Intervening in the climate system is too dangerous. Sure, it produces climate changes, producing deep inequalities. But it's better that we accept those deep inequalities than it is to intervene in the climate system."

Jon Symons: So there's an odd parallel between the argument that Klein makes about solar geoengineering and the argument that Hayek makes about the economy. In that Klein says that, "The climate is a complex adaptive system that has emergent properties which simply cannot be predicted, and therefore even if the climate models say that we could benefit humanity in general through solar geoengineering, we mustn't do so."

Jon Symons: The parallel is with Hayek who says, "We mustn't interfere in the inequalities generated by the free market." And basically if you take the principle that you mustn't interfere in complex systems and you make that into an enviable principle then it's possible that you start accepting deeply regressive outcomes, that you start accepting the politics which simply accepts the deep inequalities produced by climate change as something that would be immoral to do something about.

Alex Trembath: So around the 1960s and 1970s, this new form of environmentalism emerges, which is much more versed to technology and to human intervention and into natural systems, and that gives rise to what has been called sustainable development, encapsulated in the UN report, Our Common Future, also known as the Brundtland Report in 1987, which is sort of a defining text of sustainable development, which has received a fair bit of criticism I think for proposing a new form of socio-economic development for poor countries even as rich countries are still enjoying the fruits of conventional development, which is based on agricultural intensification, industrialization, urbanization, increased energy consumption.

Alex Trembath: The Brundtland Report from the 80s famously says that a low-energy path is more favorable for future development and favors small-scale technologies, and it favors a different kind of economic growth than what benefited the rich world, United States, Japan, Europe, and that's been taken as hypocritical. You take a different approach to the Brundtland Report. Can you explain that?

Jon Symons: Sure. First thing, if we take a text like Rachel Carson's *Silent Spring*, that was essential to popularizing the idea that we should be careful about intervening in complex systems. Carson was a science journalist. Her work was, you know, people have quibbled with it, but broadly it was pretty rigorously scientific and she was taking aim at a set of ideas in American society which basically viewed all chemicals as great. You know, a new chemical, people hardly questioned whether it might have adverse consequences. Sure, she was central to introducing this new prohibition on intervention complex systems that I think has gone too far, but it was a really important corrective to a culture which had swayed too far in the other direction. Same with the limits to growth, you know

the Club of Rome Limits to Growth Report, from the same era, suddenly raises some important ideas.

Jon Symons: So I contextualize Brundtland in terms of the north-south debates that have been going on in the previous decades. Because western environmentalism emerges in the 1960s and 1970s at exactly the same period as the rush of decolonization is seeing the majority of people in the world enjoying self government, post colonial government for the first time. And I'm not trying to suggest that there's anything cynical or conspiratorial about this, but from the perspective of the developing world, it's kind of outrageous that finally they have thrown off the yoke of colonialism and then rich world environmentalists are saying to them, "You can't develop the way we did. There are limits to growth. You can't fell your forests. You can't rely on these high-energy sources that we have, etc." And so from the developing world's perspective, this why I say that the history of environmental negotiations have always been about more than the environment. They've also been about getting technological assistance and financial assistance, so that if the developing world's going to be involved in protecting the environment, they want the rich world to pay it.

Jon Symons: Now the Brundtland Report was in fact an effort to synthesize, to find common ground between the rich world perspective, which largely reflected environmental values and the developing world's perspective, which largely reflected... you might call them developmentalist values, were also in the same pew as the idea of the new international economic order which was a developing world effort to change the rules of global trade in order to create what they thought of as great adjusters.

Jon Symons: And again, the first world knocked back their idea but in the debates leading up to the Brundtland Report, we have this conflict between the developing world saying, "Give us development. Give us assistance." And the rich world saying, "There have to be limits to growth. You need to develop differently." The Brundtland Report was intended to produce an outcome that everyone could agree to. And there's a long history of people saying, "This phrase sustainable development is so ambiguous that everyone can find what they like in it." And you could probably say the same about the entire report.

Jon Symons: Basically, you go back and read the report and there is key ecomodernist ideas expressed there. The report says there are no absolute limits to growth. There are only limits imposed by the present state of technology. And that through technological innovation, we can allow continuing growth to occur. It also argues that accelerated growth is necessary in the developing world to enable humans to live better lives and also to protect the environment and the technologies are needed that produce social goods.

Jon Symons: So basically, it's calling for increased state investment in innovation, focused on providing public goods. To me, that's a simple statement of proto-ecomodernist. And interestingly it takes an unusual stance in that it's closer to that developmentalist perspective that was carved out by those who proposed that

new international economic order and by those in developing world who took on first world environmentalism during that period. And so people like Soumya Seran when he says, "Our poverty must not be your mitigation strategy." He's tapping into that long tradition of third world developmentalism.

Emma Brush: So despite that developmentalist bent, though, you're also a little critical of ecomodernists for being a little too credulous when it comes to nuclear's political feasibility. So there is an embrace of innovation and development alongside environmental goals, but perhaps nuclear is not a feasible global overall and for that reason ecomodernists should think a little bit more geoengineering.

Jon Symons: So if we think about the phrase, the Good Anthropocene... the Breakthrough Institute has been on the team that yes, we can anticipate a Good Anthropocene. Now, I don't know whether this is a strategic decision because certainly one of the arguments that ecomodernists propagated is that we need to believe in the possibility of progress in order for progress to occur. And I have a lot sympathy for that argument. So maybe we should all be strategically optimistic.

Jon Symons: However, the idea of a Good Anthropocene sounds tone deaf when considered from the perspective of the developing world. Sure, for people like me, sitting in first world Australia, I can look forward to a Good Anthropocene as, you know, climate conditions worsen, intensive farming is going to be able to keep up with the changing climate and it's going to continue to be able to supply first world people with adequate food. I'm fortunate enough to live in a country with excellent public health care.

Jon Symons: I have little reason to worry for provision of public health, the same kind of environmental catastrophes which would create havoc and you know, widespread loss of life in a developing country. I often compare, when floods strike countries such as Bangladesh, Pakistan, we see loss of many thousands of lives from infectious disease. When floods strike State of Queensland, it's happened a couple of years ago in Australia, maybe one or two people lose their lives in by drowning or something. But basically the entire community is protected by our wealth.

Jon Symons: So yes, we can look forward to a Good Anthropocene if we are part of the... perhaps its useful to think of the world in terms of Hans Rosling's division of seven billion people, where about one billion people get to fly in airplanes, about one more billion people have access to washing machines, and the bottom five billion don't have enough energy today, don't have sufficient wealth to access a washing machine. Now the site of the people for whom a washing machine is an aspiration, or to say to the bottom two billion people who are either malnourished or with precarious food security and little access to electricity, to say to those people, "You can look forward to a Good Anthropocene," is just fundamentally tone deaf.

Jon Symons: So going back to your point about nuclear power, sure, theoretically the only way that we might decarbonize at a pace that could avoid two degrees warming, would be if we replicated the pace of decarbonization that occurred in countries like Sweden and France during their nuclear roll out. That argument, it's factually accurate. No other country has decarbonized with sufficient, you know, the pace that would be commensurate with global decarbonization to avoid dangerous warming.

Jon Symons: But politically, that idea... I mean I don't think many ecomodernist would disagree with this, clearly, there's no country today that is rolling out nuclear or renewable energy or any other kind of low-carbon energy at a pace that is commensurate with that. We've already got sufficient emissions in the atmosphere that we've locked in one and a half degrees of warming according to some scientists such as James Hansen. In the longer term, we've already locked in two degrees of warming given that greenhouse gas emissions in 2017 were higher than in any previous year and they seem to be increasing at about one percent a year on average.

Jon Symons: The idea that we're going avoid dangerous warming through mitigation appears to be a delusional idea. Yeah, I guess I am critical of ecomodernism. It's predominately been concerned with mitigation action, and with first world concerns, and that makes perfect sense. You know Breakthrough Institute has predominately been focused on US politics. But the optimism which might have a good argument behind it, just sounds a bit wrong when you consider the harms that climate change is already doing, the harms that are already locked because even if we reduce greenhouse gas emission to nothing tomorrow, we haven't yet seen the warming that results from the emissions that are already in atmospheres. So we've probably got at least another degree or something of warming to go.

Jon Symons: So harms are locked in. They're very real and for me this opens up a set of questions about how we can live ethically in the Anthropocene. And I think that the only solution that makes sense to me is what I call global social democracy. In the past, there were debates of whether the hardship experience by people in developing world were a result of colonialism or not and some people would argue that you know, the rich world has a debt that needs to be repaid. And there are arguments on both side of that debate.

Jon Symons: In the context of climate change, there is no debate. There are hardships that are already being experienced and will be experienced by developing world people and the predominate cause of those hardships is the rich world. And it's not just today. Now two-thirds of greenhouse gas emissions come from the developing world. That's true. But the deep inequality in the developing world means that it no longer makes sense to divide the world just between the OECD and the poor world, now we need to think of divisions among people. So if we think of the inequality within China for example, there are plenty of people in China or India who are living first world lives and whose lifestyles are

responsible for the same level of greenhouse gas emissions that yours and mine might be.

Jon Symons: So there are inequalities within those countries as well and we need to think for people who experience an extreme weather event or which causes flooding the spread of typhoid or you have crop failure as a result of droughts which are largely consequence of climate change. People who are caught up but these kinds of tragedies are at the greatest risk of being pushed back down into poverty. And those people are only going to be able to achieve adaptation if they have basic social services such as health care, education, etc., which enable them to help themselves more or less.

Jon Symons: So I can't see how you can respond to climate change in a just way without basically globalizing the provision of social services and I know that I sound insane as I say that because you know, look at Obamacare. It's difficult for a country like the United States to even achieve a fair or a universal provision of social services domestically, let alone imagine that we need to do that globally. But from my perspective, that's the challenge of how we can live well in the Anthropocene. And Breakthrough and ecomodernists offer a better answer to that question than most others that I've seen, but it's still very far if you read the ecomodernist manifesto. It's still very far from taking these kinds of challenges seriously.

Emma Brush: Well, yeah, I'm glad that we have arrived at governance and global governance because I think that's the most striking and powerful part of your thinking, on the topic of geoengineering at least, but climate action more broadly. So many people have very legitimate concerns about geoengineering and many of which you talked on through this episode, but maybe the most significant is global governance and how globally providing social services might be difficult, globally governing solar geoengineering would be equally so.

Emma Brush: So many go to the extent that geoengineering would be ungovernable. How would you respond to them?

Jon Symons: So first up, they might be right. So I guess philosophically I don't want to pretend that there's a good solution and bad solution. We are dealing with climate change with different bundles of harm, different sets of challenges and needing to make choices between those different sets of challenges. So I don't mean to dismiss the argument that solar geoengineering is very likely ungovernable. In the essay I compare it to nuclear weapons. And I say some people argue that nuclear weapons might have made the world a safer place because they have reduced the likelihood of great power conflict. There's a lot of reasons to think that, that argument has merit.

Jon Symons: But many of us would still choose a world without nuclear weapons because of the horrific consequences... the horrific potential that they embody. So I'm not pretending that there are easy choices here. And the arguments for the unalterability of solar geoengineering are very strong. But I want us to also think

about the flip side. So in a sense this whole paper is arguing devil's advocate to some extent because there's been an early and I think much too easy consensus in most of the western kind of academic and philosophical debate over solar geoengineering, assuming that it's a bad thing. And I agree, it is a bad thing. But the question isn't, is solar geoengineering difficult to govern and a highly imperfect outcome, the question is, is the world we are creating through continued climate change... of course supporting mitigation at the fastest pace that we can. But we're still heading towards a world of continuing climate change. Is that world better or worse than the world where we also keep trying to mitigate but we also include solar geoengineering?

Jon Symons: Now the challenges around the governance of solar geoengineering, there are many of them. One is the disagreement among states, will be philosophical. Is it a fundamentally immoral act on us? And they will also be over what form of implementation you would choose. Now that might be that we're a coalition of countries to implement solar geoengineering without other's permission. That might be a cause of conflict. It might be that once you implemented solar geoengineering, let's imagine that the rains failed in a particular country soon afterwards and perhaps two countries... perhaps India and Pakistan. Perhaps India is a supporter of solar geoengineering and there is some terrible weather event in Pakistan. Pakistani public opinion now starts blaming India for having tampered with their weather. So these are the serious challenges, and I don't doubt that for one second.

Jon Symons: But let's think of the flip side. Were solar geoengineering to commence, you then begin a situation where countries would mobilize to try and shape solar geoengineering in ways that reflect their preferences. Sure, there's the risk of conflict, but it's much more likely that there would be negotiation, whether it would be successful or not is unclear. But once you start solar geoengineering, it would probably begin... so those who argue against it say, "The only kind of ethical solar geoengineering will be governed on a global basis in a democratic way."

Jon Symons: Since we don't have any kind of effective global democratic form, we shouldn't begin. Now the counter argument to that is, once you start solar geoengineering, that might, itself, become a thing that promotes democratization of the decision making mechanism. So there's plenty that could go wrong there. But there's also a reason to hope that an effort to control the global temperature might prompt new forms of collective deliberation and new forms of global governance that might make some of the other challenges, be they mitigating climate change or ensuring that everyone everywhere has adequate access to food, adequate to health care etc. They might also, become more possible as you see that deepening of cooperative global governance.

Jon Symons: Now obviously, this might be a complete fantasy but... well, perhaps when you're comparing imperfect options, it's important to think of the upsides and the downsides of all those imperfect options. So the reason why I've written a paper which is probably a bit too optimistic, a bit too kind of selling the upside

of solar geoengineering. It's because I don't want us to have a premature consensus which says, solar geoengineering is immoral simply because that reflects the interests of the rich world.

Jon Symons: I don't think we've got an answer on it yet and I don't think we're all going to agree on it. But what I wanted to keep open is our willingness to listen to developing world arguments whether they're for or against solar geoengineering because the impacts of climate and solar geoengineering are so different, on people in different parts of the world, then that difficult governance challenge the people have pointed to, that inevitable. There's no way around that difficult governance challenge.

Jon Symons: The only way that can resolve it with or without solar geoengineering is through political processes that reconcile the different interests, the different values of people in different parts of the world. And through climate change and through economic globalization more generally, we're headed towards that more integrated, that harder to govern global environment. And so I don't think solar geoengineering is the swing factor here. But keeping that conversation alive, is one thing that hopefully might produce a more just global response to climate change.

Emma Brush: Well, thank you Jon. Thank you for challenging us to think about these issues in new ways. As ecomodernists, we like to spend time with trade-offs certainly but we also like to spend some time on the upside. So our final question: what would be an example of progress that you see in the world today?

Jon Symons: One of the arguments I've been really impressed by Breakthrough making is that it's pointed out that we globally are making progress on food security and we're also making progress on international inequality. It's one of the perverse outcomes of the contemporary era that as national income inequality had been increasing, we've seen the rise of basically the middle class in countries like China, Vietnam, India, Indonesia, etc., you've seen the emergence of a kind of a global middle class whose income has been increasing. So the idea that everything is getting worse on a global basis when you look at food or the materials standards of living is simply a myth.

Jon Symons: And I'm really delighted by the way Breakthrough has pointed out that we are making advances. Particularly there's potential in the area of food productivity. To bring developing countries up to the same level of agricultural productivity that the rich world enjoys, well then there's plenty of spare capacity there for increased food production.

Jon Symons: Of course, many people make arguments against the green revolution on the basis that in some places it deepened inequality and this is, I guess, one of the challenges around the politics of innovation, that innovation tends to amplify whatever distribution already exists. So that in countries that had fairly equal distribution of land prior to the green revolution, everyone benefited from the green revolution. But where land was owned only by a rich few, then the green

revolution tended to deepen those inequalities which is why I think the Breakthrough Institute's arguments around the centrality of innovation as a response to all kinds of environmental and social challenges, needs constantly to be paired with attention to equality, and to who gets to access and control those innovations.

Jon Symons: When I'm not thinking about the environment and ecomodernism, the other thing I work on is the international response to sexual orientation and gender identity, gay rights, you might call it as a simpler form. Now here you could argue that there's been an enormous amount of progress. In that in countries such as the United States, most of Europe, most of South America, South Korea, Japan, Australia, etc., we've seen over some decades huge strides forward in the level of acceptance of sexual diversity. And so you could tell a story of progress there.

Jon Symons: But what worries me is that in fact there's also been an international reaction against this progress, particularly in poorer countries and countries which are influenced by Russia where Putin and the Orthodox church have made the defense of traditional values against people advocating for sexual rights, kind of central to their legitimating narrative, we're seeing actual reductions in the level of support for sexual diversity, sexual freedom. We're seeing countries introducing laws criminalizing homosexuality for the first time. And we're seeing countries cracking down on sexual minorities as a way to boost their popularity; countries like Egypt and recently Aceh in Indonesia and Chechnya as well have been striking examples of this.

Jon Symons: So in many areas it's possible to tell a story about progress but also there's often forms of reaction to that progress. And what's interesting about the countries where we're seeing reversal of tolerance around sexuality, is overwhelmingly poverty, and lack of democracy. The key predictors of whether... of acceptance of sexual diversity. Some people think that it's all about religion and you can tell some stories there. But many people argue that the Islamic world is more hostile than other parts of the world. It's not that Islamic countries are uniquely opposed to sexual diversity, it's that many Islamic countries are poor countries and when people are poor, then they lack democracy, and when they lack the conditions where people are able to make arguments for social progress of all kinds, then intolerant attitudes tend to deepen.

Jon Symons: So I think both of these stories point to the way in which progress is occurring but it's not inevitable. We need to keep fighting for inequality, for democratization, and as ecomodernists for state-backed innovation, targeting public goods. These things aren't inevitable. They're going to happen through social processes if they happen and we need to be engaged in the political fight to make sure that they do.

Emma Brush: Well, great. Thank you Jon. Thanks so much for taking the time to speak with us today.

Jon Symons: Thanks so much. It's been fun.

Emma Brush: Thanks for tuning in to this episode of Breakthrough Dialogus. If you liked what you heard, please tell your friends and subscribe on Apple Podcasts, Stitcher, Google Play, Overcast, or whatever your favorite app is. Until next time, I'm Emma Brush.

Alex Trembath: And I'm Alex Trembath.

Emma Brush: Thanks for tuning in.