



**2016 Halifax International Security Forum
Plenary 6 Transcript
Climate Security, Energy Security and the Politics of Slow-Moving Threats**

SPEAKERS:

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General Joseph Lengyel, Chief, United States National Guard Bureau

General Tom Middendorp, Chief of Defence, Armed Forces of the Netherlands

Dr. Masashi Nishihara, President, Research Institute for Peace and Security

Mr. Taylor Wilson, Nuclear Physicist, University of Nevada, Reno

MODERATOR:

Jeanne Meserve, Senior Fellow, Homeland Security Policy Institute, George Washington University

Jeanne Meserve: Another great film. As the panel sits down, let me introduce myself. I'm Jeanne Meserve with George Washington University Centre for Cyber and Homeland Security, and thanks for joining us this afternoon.

So 2014 was the warmest year ever recorded until 2015, which was warmer still. And now it looks like 2016 is going to blow away all previous records. The scientific consensus is that one of the factors involved is the burning of fossil fuels. And this climate change has a lot of security implications, among them the fact that a lot of military bases are located around coasts, and raising sea levels could impact them. There could be more severe weather events and droughts, and fires, and it's the military that will be asked to respond to those. And many people in the military and intelligence communities see climate change as a threat multiplier, something that's going to make food shortages and water shortages more severe, and that can fuel conflicts and spark mass migration. All of that related to security.

But of course climate change is not just related to the atmosphere. It also is related to politics, and we're going to talk about that too today with our very large and very distinguished panel. So let me introduce them if I possibly could.

Sitting right here is Senator Chris Coons. He's a Democrat from the state from the state of Delaware. Next to him is Ralf Fücks. He is President of the Heinrich Böll Foundation. Am I close there? He's been making fun of my German pronunciation.

Ralf Fücks: Well done.

Jeanne Meserve: General Joseph Lengyel, Chief of the U.S. National Guard Bureau. We have General Tom Middendorp, who is Chief of Defence for The Netherlands. We have Dr. Masashi Nishihara, who is President of the Research Institute for Peace and Security. And finally, we have on the end a young man who's going to make the rest of us look like a lot of underachievers, okay?

This is Taylor Wilson. Taylor, at the age of 14, built a nuclear reactor in his garage. I kid you not. He is now a full-fledged nuclear physicist. He runs a couple of laboratories, one of them at the University of Nevada in Reno.

Thank you all for being with us here today and very much appreciated.

Senator Coons, I have to start with you and talk about the political climate a little bit. The United States has just elected a man who says that climate change is a hoax perpetrated by the Chinese. He has said that he is going to boost coal and oil and gas production. He says he's going to reduce environmental regulation and in fact put a climate sceptic in charge of the transition at the Environmental Protection Agency. Does all this signal to you that the U.S. is going to abdicate its role as a leader in the fight against climate change?

Senator Chris Coons: Well, Jeanne, our recent election results do mean that there's going to be pretty significant political climate change in America. (Laughter.) But I'll just start at the outset, in addition to thanking our Canadian hosts and allies for convening and supporting this terrific summit, by saying that there's ongoing trends in energy consumption in the United States that presidential action won't affect. States like mine, Delaware, have taken significant actions to invest in renewable energy, to adopt renewable portfolio standards and to accelerate the deployment of lower carbon footprint technologies in their areas. Many cities have done the same, and frankly, the American private sector has led the way.

I'm from the lowest mean elevation state in the United States. So the state I represent is particularly concerned about climate change and sea rise. We have

other senators here who are from states that are major energy producers. So there's a wide range of views within our domestic political environment.

It is going to be a marked departure from President Obama and his administration's priority, and it's my hope that many of us who see climate change as a real threat and one that requires international multilateral action will find ways to continue to work together to strengthen America's energy security, energy production, but to also sustain our movement towards a lower carbon footprint future.

Jeanne Meserve: Ralf Fücks, let me turn to you, if I could. So one of the things that President-elect Trump has said is that he is going to ignore or walk away from the Paris Climate Accord. What will the impact of that be? Does it mean the end of the Accord or is there enough impetus behind this already that things will continue to move forward?

Ralf Fücks: I think the answer has at least three dimensions: an environmental one, a political one and an economical one. The environmental one, we have to be aware that the United States still is responsible for around about 16 percent of global CO2 emissions. So if the U.S. would turn a blind eye to climate change, it would be extremely difficult if any possible – to achieve the – or to keep global warming under the two-degree threshold, which probably is the critical point, the kind of global tipping point for self-enforcing then global warming.

Second, in political terms, the Paris Agreement is one of the very success stories of global multilateral cooperation. And if the United States would walk away from that agreement, that would be a blow to the global then political system, and it would especially, I guess, create a lot of conflict with China because China with the U.S. had been the decisive axes to hammer out the climate agreement last December, and China is serious with it, and it would bring the United States into a position of a kind of rogue state in the view of a lot of development countries which will suffer most from then global warming.

And finally, economically, I think if the U.S. would try to return to the old style fossil fuel then economy, it would lock them in in an old-fashioned then economy and it – I think it also would be self-defeating then in terms of then innovation and modernization of its economy.

Jeanne Meserve: Dr. Nishihara, let me throw this to you. If the U.S. does indeed step back from this leading role that it has taken, China, as we've just heard, become the preeminent force here. What does that mean in terms of power, in terms of prestige?

Dr. Masashi Nishihara: It both says it's power and prestige. I think the United States would be behind the Chinese. China would take advantage of the fact the U.S. do not be participating in it and that will put the China in a much better, more advantageous position in terms of publicity and so forth.

Jeanne Meserve: General Middendorp, let me turn to you. The Netherlands has had an experience with rising sea levels unlike any other nation. It was, what, 1953 when a storm and high tides combined and 1,800 people, I believe, lost their lives, more than that in fact. For The Netherlands, rising sea levels are a national security concern. Should they be a national security concern for every country?

Gen. Tom Middendorp: I think so, and we have learned that the hard way. And I fully agree with your introductory remark that climate change is a risk multiplier, both on the domestic level as well as on the international level. And in The Netherlands, while you might not be aware, you might know Netherlands for the good cheese and the friendly people, etc., but we are one of the most densely populated areas in the world. And half of that population lives below the sea level. If you land at our main airbase in Amsterdam, you are three and a half metres below sea level. So just releasing that, you can imagine the impact that the sea can have on our country. And in the '50s, we learned some hard lessons in there.

We are protected by dykes and dunes and with the spring tide, these dykes were broken and a complete province of The Netherlands was flooded, had to be evacuated. And it took us a year to enable the people to come back to the province, and it took us some more years before the land could be used again.

And my grandparents' generation made a very wise decision. They chose not to only fix the dykes, but they chose to invest in the future, to take this risk so serious that they wanted to build a delta work, as we call it, that would protect us for ages. And despite the economic backfall that we had after the Second World War, they invested major money in that. And I'm very glad that they did.

So you can imagine that the news this week that the temperature here in the North Pole is 20 degrees Celsius above normal level and that the ice coverage here in the Arctic is at the lowest record ever, you can imagine that that makes us concerned because it has a direct impact on sea levels. It has a direct impact on our security.

But I would say very briefly that it also has an impact on international security because as you said, rightfully said, the global warming also leads to droughts, and droughts lead to water shortage and to food shortage. And both happen most of the times in very fragile countries with governance that are hardly able to fulfill basic needs of their people, so it creates lots of social unrest, and with

that, it creates instability. With that, it creates conflicts, it creates a ground for extremism, and it creates migration flows.

Jeanne Meserve: General Lengyel, you already are feeling the effects of some of this, aren't they? Isn't the National Guard in more and more demand to respond to events that may be related to climate change?

Gen. Joseph Lengyel: Yes, Jeanne. I'd say, you know, it seems more and more frequently that all of the military is having to participate in consequence management for weather-related issues. Over the last 10 years or so, the National Guard has had about 300 incidents a year with about half a million man days where our soldiers and our airmen have to come to the aid to assist the local and state emergency response networks to happen. It's happening – floods, predominantly are the big ones, floods, wildfires. Even today, there are seven states with a thousand soldiers out helping local folks put out fires.

So 75 percent of the events happening are floods, fires, winter storms. You know, the high water mark probably goes back to our biggest emergency was Katrina, which you were – Hurricane Katrina where we had 50,000 soldiers just from the National Guard plus a bunch more from the active component that were required there to take care of similar land below water level tables that went on for quite some time.

Secretary General just mentioned that the international cooperation – we have – you know, we have relationships and partnerships with many countries, and much of what we do now with those countries is to help prepare search and rescue, share tactics, techniques, procedures, for doing that such that when bad things do happen, we're able to quickly and efficiently help the societies rebound and kind of increase their resiliency to respond from these things.

Jeanne Meserve: General Middendorp, militaries are making an effort to conserve their use of fossil fuels. I presume that yours is doing that, along with the U.S. military. Is this environmental, is this economic or is this strategic or all of the above?

Gen. Tom Middendorp: Well, it's – on the one hand, it's selfishness because it helps us. It helps us to reduce our logistical till. The more you can be independent in your energy that you create on the base, the less logistical supply you need. On the other hand, you are – bring a contribution to the climate, improving that.

Jeanne Meserve: Taylor —

Taylor Wilson: Yeah.

Jeanne Meserve: I want to tap into your expertise here.

Taylor Wilson: Yeah.

Jeanne Meserve: You believe that there's a way to do localized energy production that would in fact have great strategic benefit, correct?

Taylor Wilson: Absolutely.

Jeanne Meserve: Tell us a little about that.

Taylor Wilson: Well, I'm here to offer a little bit of optimism, and I think that —

Jeanne Meserve: Thank goodness for that.

Taylor Wilson: I'm lucky. That's the job I'm in. That's what science is all about. So yeah, climate change, the use of fossil fuels presumes a lot of risk, but also produces and offers a lot of opportunity in that the new energy economy that we're moving into has a tremendous amount of benefit. I mean if you think about it, one in five people on planet Earth right now that doesn't have access to electricity. You know, that's over a billion people that, you know, can't turn on the lights.

You know, and it's my opinion that probably within five years, at most 10 years, any point on planet Earth will have high-speed broadband internet access. So if you give them electricity, they now have access to just large libraries of information. That's how I built a nuclear reactor when I was 14. Without the internet, that wouldn't have been possible.

And in a way, you know, that one in five person on the planet, one in fifth person on the planet that doesn't have access to electricity shows you the limitations of our current energy infrastructure. In the developing world, for example, we're not going to be building in large quantities gigawatt scale power plants and national infrastructure and transmission lines and pipelines to fuel the planet, but we're lucky because the new energy economy, the new energy sources of the future, the ones that combat climate change don't need this infrastructure. They're distributed generation, smaller, typically not gigawatt scale, twos of megawatts or a hundred megawatts at most, and they don't need pipelines going to them, whether they're solar, whether they're wind, geothermal, at least with solar and wind backed with some sort of storage. And then the reactor technology that I've developed, these all modular reactors that don't need refuelling for the life of the reactor module, they need no supply stream to the reactor. For that reason, I think that, you know, this represents a huge opportunity.

You know, we can look at climate change, and we can look at this new energy economy as a threat or something that could impact our economy negatively, but if you look throughout history, transitioning to new energy sources has always jumpstarted the economy and created new economic booms. I mean that's what fossil fuels did, oil in the 20th century for America. It was responsibility for a manufacturing boom and great economic growth, and I think that's what the new energy economy can do.

Jeanne Meserve: Senator Coons, you've spent a lot of time in Africa, and I'm just wondering, part of the debate here today has been about the division between haves and have-nots. If we're able to provide energy in these sorts of ways to places where energy is not available now, does that help us deal with that larger issue?

Senator Chris Coons: It does. It significantly helps improve development, manufacturing, education, health care across a continent of 54 countries where a majority of people today don't have access to reliable electricity. And we do have new technologies that make it possible to deploy access to that energy without having to build very large, very expensive transportation distribution infrastructures that we have built in the advanced western world.

And I just want to emphasize Taylor's point that we have a huge opportunity here to innovate. The United States is becoming the world's preeminent energy superpower again. We've got enormous energy resources, but we also have new technologies that our private sector, in partnership with our national labs and innovators in nuclear and in renewables can make a lasting difference for the developing world and the developed world.

Taylor Wilson: Absolutely. I'll just add to that, you know, I think the story of America has always been to find problems typically through science but not be afraid of them, not say, "Oh, it doesn't exist," or "It's going to cripple our economy." You find the problems, and you address them head-on. You be bold and you say this is an issue, but we're going to solve it as a country. That's the story of America. And we risk becoming this pariah state. I mean the rest of the world gets that our climate is changing, that carbon dioxide and methane, when they're in the atmosphere, trap heat. The rest of the world gets that. And they also get the potential economic impact of this new industry.

And I'll just say one thing. If the United States can capture it, it's great. If we don't, China's waiting in the wings. China would love to become that new energy superpower.

Ralf Fücks: They are already. They are already. China is already the champion in renewable energies, in wind and solar. And it is going to become the champion in electromobility, in electrical cars.

Taylor Wilson: Yeah.

Ralf Fücks: And if the new administration in the U.S. will try to return to with a fossil fuel past, it will decouple from that green energy revolution which is already going on based on solar and wind. If nuclear will play any role in that, we'll see, but at the moment it's all about wind, solar and geothermal —

Jeanne Meserve: Well, let me put it back —

Ralf Fücks: — and geothermal due to the decline of cost. We are able to produce photovoltaic power now between three and four cents a kilowatt hour.

Jeanne Meserve: Let me push back just a little bit. The president-elect says what he's trying to do is bolster the U.S. economy by encouraging more coal and oil and gas production, and heck, we're in Canada, you know, another oil and gas producer. Isn't there an economic argument for it?

Ralf Fücks: If you look into the story the stock markets are telling, you had a massive devaluation of the assets of the coal and oil industries over the last years. That will then go on. We have seen peak coal already. Since 2015, global coal consumption is going down and that will then accelerate — it's not only about climate change, it's just about economics. You know, the competitiveness of the new energy world against the old one is already improving, so I would say nobody will be willing to put money on its own risk into the fossil fuel past.

Jeanne Meserve: Dr. Nishihara, I have to ask you about nuclear. Coming from Japan, having gone through Fukushima, what do you think the future of nuclear is?

Dr. Masashi Nishihara: It's in very much at risk today. We have well, from 48 to 52 nuclear power plants. Because of the 2011 earthquake, all shut down. Well, today, two have been reactivated, but it's a very small number. There is also a strong anti-nuclear power plant sentiment around the area or throughout the nation. It's very difficult for government to push this. However, government does — government policy is to push the idea of introducing nuclear power plants. In fact, we are also exporting nuclear power plants to other countries such as India.

Jeanne Meserve: Taylor, do you want to weigh in?

Taylor Wilson: Absolutely. So where I come from is hopefully that new generation of nuclear power. What I see is not an issue of safety or public perception. That exists, but nuclear power can be made very safe at the consequence of economics. It's very expensive to build nuclear power today, and that's the reason even though it exists as the largest, at least in the United

States, carbon-free electricity source, it's so expensive to build and there's so much risk on the part of investors because to make it safe, you're building two or three power plants in one, with all the backup systems, keep it cooled, you know, after the core has been shut down and everything like that.

So what I looked at nuclear power and tried to do was how can we bring it in to the 21st century? Well, the holy grail was nuclear fusion. That's what I did when I was 14, and that reactor doesn't break even, doesn't produce more power out than you put in. That's the holy grail of nuclear fusion, and we need to get there. Nuclear fusion, if we're going to exist —

Unidentified Male: Why?

Taylor Wilson: Well, if we're going to exist long into the future, even things like uranium run out. All these things are resource-limited, and for now, renewable sources, which are great and part of the mix, need to have backup. It's very hard to do load-sharing between wind and solar. Now if you have hydro, if you have geothermal, that provides that, but many places in the world don't.

So how do we make nuclear power — bring it into the 21st century. Fusion, we will achieve eventually, but even when we have a break-even reactor, it's at least a decade of material science and R&D and taking that from a design that's economically competitive to a power plant.

Jeanne Meserve: But you think these smaller modular plants are —

Taylor Wilson: Are a bridge —

Jeanne Meserve: — a shorter time —

Taylor Wilson: — are a bridge, absolutely. They're based on fission, so they're based on the current technology that is used in nuclear power plants.

Jeanne Meserve: So isn't there still a nuclear waste issue with them then?

Taylor Wilson: There is. So two things we had to address. One is safety and reliability of the plant, so designing a reactor that had no inclination to release radioactivity in the event of an accident. And second was the waste issue. Now we're not all the way there. That is fusion. Fusion has no long-lived radioactive waste, but the reactors I work to develop do two things. They reduce the volume of the waste tremendously—a very high burn-up and there's very little volume at the end of life of the reactors, but secondly, most importantly, you reduce the radio toxicity of the waste, how long it's radioactive because storing the waste isn't so much the issue, it's storing it for a very long time.

Jeanne Meserve: I know Ralf's dying to respond to you.

Taylor Wilson: Yeah.

Ralf Fücks: Yeah.

Jeanne Meserve: Do we have some questions from the audience here? I see one right over here. Let me trot over with a microphone.

Question: That's me.

Jeanne Meserve: That's you.

Question: Let me side with the proposition that Trump is right, China invented the climate change because China has occupied Tibet. After Antarctic, the Tibet has the largest size of the glaciers and stabilize the water tower for major portion of Asia. So if you just name top 10 rivers of Asia, industry which flows from Tibet to Kashmir to Pakistan, Sutlej River, Brahmaputra from Tibet to northeast to Bangladesh, Yangtze River, Yellow River, Mekong River of Vietnam and all the ASEAN countries, they all depend on rivers that start from Tibet.

But in the last 50 years, 50 percent of Tibetan glaciers have melted. According to NASA, by 2100, 80 percent of the remaining glaciers will melt and disappear. Now if that water tower of Asia disappear, 80 percent in 2100, that's a water crisis. In China, they have 90 percent of the world population, but only 11 percent of freshwater, which means 400 to 500 million Chinese are already deprived of freshwater. The situation in Bangladesh, India and Pakistan is worse.

Hence why China has invented the climate change because or the urbanization of Tibet has added to the increasing the temperature in Tibet and it's melting very fast and part of the reason is also the global warming. Hence, whatever the temperature increase the rest of the world, double the temperature increases in Tibet. Hence, the – when you talk about the increase in the temperature in 2014, '15, '16, including the heat wave in Europe and northeast of China, all because of the Tibetan glaciers melting very fast.

Jeanne Meserve: Anybody want to weigh in on that? No. Ralf.

Ralf Fücks: No, you have this kind of multiplier also in other than polar regions. For instance, the Arctic, if global warming will – goes up by two percent, you will see heating up in the Arctic between four and five percent. That of course will accelerate dramatically the meltdown of the Arctic ice shield.

Taylor Wilson: I'll just add more thing, which is along the lines of water. You look throughout history and there's always been a resource that drive civilization, right? I mean you go back very early, things like salt and ice and then coal. And then in the 20th century, it was really driven by oil, having this very dense liquid fuel, but I think moving in the 21st century, especially the first half, water becomes that resource that drives conflict, that drives civilizations. It's not that with climate change that necessarily there's going to be less precipitation, but civilization has built up around having access to large amounts of freshwater, whether it's for drinking or agriculture, anything else. That is one of the big risks of climate change is the water issue, and that, unfortunately, might drive conflict, but there are technologies like desalination. All it takes is energy to drive – you know, we're lucky, we have a lot of water on this planet, it's just not useable for drinking and agriculture.

Jeanne Meserve: We have a very large panel here and we only have an hour, so I'm going to ask all of you with questions to compress if you possibly can. You have the microphone right here. Go ahead.

Question: Yes. Michael Klare. And my question follows from your comments and the others, and it's on water. And it's about the water energy interface because you mentioned that water – water is for agriculture and drinking, but in this country, the majority of water is used for energy production to cool power plants, for refining, for fracking and all of the rest. And the notion that we're going to revive fossil fuels will require enormous amounts of water that we're increasingly not going to have. Worldwide, it's going to be 30 percent of world water is going to be used for energy. So how can we proceed in a time of climate change to develop energy when water will be increasingly scarce or contested?

Jeanne Meserve: General Middendorp, aren't you involved in a technology that is going to (crosstalk) water?

Gen. Tom Middendorp: Yeah, we are looking from a military perspective at the same issue, and I completely agree with my young colleague here that innovation can help us. There are a lot of technological developments going on that can help us solve these kind of problems. There are completely new filtering techniques and technologies that we are now testing in our missions in Mali, for instance, and that allow us to reuse 80 percent—80 percent—of the water that we use for showering, for food production, etc. And we can reuse that as drinking water. So these technologies can help us solve these kind of problems.

Jeanne Meserve: There was a question right here. And tell us your name and who you're with.

Question: Thank you very much. My name is Watanabe. I'm from Sasakawa Peace Foundation, Japan. And I have a question to the Senator Coons, you already touched about. No, in the previous sessions, we expressed some concern with President-elect Trump, but not only me, but many Japanese worried about more. It's the two different campaign in U.S. don't have some consensus, and especially the President Obama expanded the presidential power and signed the Paris Accord. And now the new administration come and take over the – another presidential power and reverse the course. That's somehow worrisome. So I'm very curious to hear your prospect and opinion. Thank you very much.

Senator Chris Coons: Well, the change as a result of our election is going to mean a big change in our national energy policy. He will be able to change the regulatory trajectory, the EPA and to have an impact on our compliance with the Paris Accords. Technically, it takes four years. He cannot just tear up the Paris Agreement on the first day. It was a treaty back in 1992 ratified that was essentially amended by the agreement. But just because he can't tear it up on the first day doesn't mean he can't simply ignore it.

There are positive trends, as I mentioned earlier, in energy efficiency in the United States where the private sector, the military, research institutions are significantly investing in energy efficiency, and I'll mention one that has enjoyed bipartisan support in the Congress. That's increasing what we call CAFE standards. That's an acronym for how fuel-efficient our cars are. That's already driven a reduction in total gasoline consumption in new model cars. There's other ways that I expect a sustained bipartisan investment in scientific research that can advance energy technologies. We may go back to a higher focus on coal or oil, for example, but it is exactly our national laboratories, our federally-funded laboratories that have developed cutting-edge energy production techniques like fracking.

So it's my hope that even if President-elect Trump changes to a more fossil focus, that there will be investment in how to make burning coal cleaner, for example.

Last, there's been a significant reduction in our CO2 emissions over the last decade, not because of the Obama administration's Clean Power Plant—it wasn't in place yet—but because of fuel switching. Fracking has produced a record amount of natural gas, and switching from coal to natural gas in the American economy happened less because of federal regulation and more because of abundant cheap gas. That will continue. And there are, as we've discussed in other panels today, there are national security reasons that we on a bipartisan basis should embrace the production and export of American energy. I can't think of anything that would strengthen our partnership with Ukraine and

help stabilize the Ukraine or our partnership with Japan and South Korea more than robust energy exports from the United States.

So there will be areas of sharp disagreement between Democrats, nearly all of whom see climate change as a major strategic threat we need to address, and Republicans, many of whom, nearly all of whom disagree, but we should be able to find areas of bipartisan agreement, whether it's CAFE standards, state or regional initiatives or investment in new technologies that can reduce our emissions, even while we have a robust all-of-the-above energy policy in the next administration.

Jeanne Meserve: Dr. Nishihara, energy efficiency had tremendous effects in Japan, didn't it?

Dr. Masashi Nishihara: Yes.

Jeanne Meserve: How much did you reduce consumption by? Some remarkable —

Dr. Masashi Nishihara: In areas, for example, car, the efficiency of the use of laboratory I think has been — probably we have exceeded the way the Americans have done. Japanese cars are selling better in the U.S. market than the American cars because of this efficiency of oil. So that's one example, and there are many — many other efforts to make it more efficient in that field. Recycling of water, as you have mentioned, that's also done. In other countries like Singapore they will use the toilet papers for — toilet waters into drinking waters. But excellent way of — excellent technology.

Jeanne Meserve: Ralf, did you want to get in?

Ralf Fücks: If I have it right, you shut down, after Fukushima, immediately 27 nuclear reactors. And like initially at the beginning there was a hike of then oil power production, but now it's mainly about efficiencies, so Japan was able to compensate the shutdown of this large number of reactors by gains in energy efficiency, and this is the second part, the flip side of the — of the coin. The one is moving towards renewable energies. The other one is then increasing energy efficiency in large leaps.

Jeanne Meserve: We have another question right here.

Question: Hi. Thanks. My name's Jackie O'Neill. I'm with Inclusive Security. We focus on women's inclusion and peace and security, and my question, I think primarily to you, Senator Coons, is drilling down on this — the topic of this session related to the politics of slow-moving threats, and I think part of the spirit of this session was intended to be about how do we get not just the

institutions that deal with these security threats, but also voters and the electorate to be engaged and making decisions based on strategic choices related to how different parties or different individuals will react to these types of threats, and I'm wondering if you could comment, and having gone through the political discourse in the last little while in the U.S., or others in Canada or your own countries, the extent to which electorates and voters are engaged on these as decision-making issues and how we can shift some type of conversation away perhaps from the daily – the daily tweet diet to something along these lines which actually do represent significantly more dramatic potential changes for all of us, but are much less covered in the media. Thanks.

Senator Chris Coons: Well, Jackie, that's a great question. I take some encouragement from the views of the average American under 30 as opposed to the average American over 30 on the environment and climate change and the importance of making investments to address this growing threat.

When climate change was first being discussed in American politics, I'll reference back to Al Gore who looked strikingly young in the video clip at the beginning of this session.

Jeanne Meserve: Didn't he?

Senator Chris Coons: It was really debated as something that was abstract, that was going to happen decades in the future and was really not present, although there are still, obviously, many climate change deniers in the American Congress, the broad run of younger Americans are convinced that this is happening and has an impact right now. And when we have our militaries and our private sector corporations and our scientists all saying this is a major problem, and we have to address it, it is inevitable that our politics will catch up to that. We have bipartisan groups. Senator Shaheen is here, a Democratic from New Hampshire. She partnered with a Republican, Rob Portman of Ohio, to move legislation on energy efficiency, something that really was able to win broader bipartisan support.

It has been harder than it should be. It has taken longer than it should. We are behind the curve, but I do think that the Paris Accords were a significant step forward, and I think part of the global celebration of those accords in social media, in classrooms, in campuses and in campaigns around the world is because of a focus on this longer term, slow-moving, but now accelerating big impact for our societies that's elevated by younger voters.

Jeanne Meserve: Right here.

Question: This is a comment and then I wanted people, particularly not from the United States, to react to it all. I'd certainly like Chris to react to it. So I teach at

a bunch of college campuses, and it really is extraordinary—and there's no other way to describe it—the grief of young people in this election. I think this is their Kent State and their Edmund Pettus Bridge in terms of getting them finally to understand that politics actually does matter.

My own thinking about this is—and this is of course all speculation because none of us know what we're talking about, including Donald Trump in terms of what may come out of his mouth next—my own thinking about this is if he abrogates the climate trail, the climate treaty, you will see young people in the street every day for four years, and Donald Trump will be transformed into a not-very-political Richard Nixon. I think it will be the coming of age of a new generation, and I think it will be the end of Donald Trump's working presidency.

I wanted to know if you could react to that, but I'd particularly like to know from the Europeans and the Japanese perspective if I'm correct in saying that this first global generation their – by far their top priority is climate change and if Trump attacks climate change, he's going to be seen as an attack on the future and an attack on our children.

Ralf Fücks: Yeah, absolutely.

Senator Chris Coons: I mean I do think our younger generation is strikingly more focussed on tolerance and inclusion and on climate change than the generation ahead. I think a lot of what drove the results of the election was a focus on employment, on growth and on opportunity. As Senator Sullivan has said before in a previous panel, we recovered from the '08 crisis, but more slowly than many of us would have hoped, and the lack of economic opportunity cost Democrats cities and countries in a whole series of states that previously reliably voted for our candidates for decades. I think there is a real gap between on college campuses and in high schools and among very young voters how they see climate change as a priority and those who are already in the workforce or have been in the workforce for decades, how they see jobs as a priority focus. And this – this changes across states.

When you're in a state that is a major energy producer, jobs and the jobs that come from fossil fuel production are your number one priority, and I can understand that. A significant amount of our young population does not live in the parts of our country that produce a lot of energy and is highly motivated by this.

I don't know if the consequences for abrogating the Paris Treaty will be as dire as you predict, but I do think it'll be a major focus of organizing, of communicating, and I do think it'll put the United States on the wrong side of history.

Ralf Fücks: No, the challenge is to bridge the environmental concerns of the younger ones with the economic concerns of blue-collar America. And that's the same in – and the same in Europe and the same –

Unidentified Male: Exactly.

Ralf Fücks: — same Europe and same in other places. And the interesting thing, if you look at Germany, is that we really turned around the narrative over the last 10 years from going green as a threat to the economy to going green as an opportunity to pick-start a new industrial revolution, a new green industrial revolution literally. Yeah, transforming energy technologies, the mobility, urban development, a huge range then of then areas.

And to make it more maybe specific, the most important industrial state in Germany, Baden-Württemberg, they have a green Prime Minister. How is that possible? This is the heartland of the German car industry and the German electrical industry. Because we now have more or less, I would say, a consensus that climate change has not only to be taken as environmental, as unchallenged, but to has be used for economic modernization. I think this is the way around.

And then of course you have these old industrial regions, the coal regions, Pennsylvania and so on and so forth. You have to offer them, I would say, long-term structural change. This is a matter of then policies.

Jeanne Meserve: General Middendorp, you want to weigh in?

Gen. Tom Middendorp: Well, if I look at my – the young generation in my country, there is an enormous commitment to – and a very high climate awareness amongst youngsters. And but I think the problem we are facing is that climate, the risk of climate change, is a kind of a slow mover, so and we have a lot of fast movers on our agendas that are very tempting to pay immediate attention to, and let's – okay, it's a slow mover, so we can take attention of that tomorrow or the day after, or the day after. So we tend to move that backwards. And I'm very glad, as I said in the beginning, that my grandparents' generation didn't move it backwards, but did invest in it, and we are now picking the fruits of that.

Jeanne Meserve: General —

Gen. Joseph Lengyel: I'd just mention too from a Department of Defence standpoint is there's been a change in philosophy for more than just President Obama's administration. This goes back a long time, since we've been talking about alternative fuels and various different kinds of abilities for our Air Force to use alternative fuels. And Senator Coons mentioned construction, modifying

current facilities and new facilities, putting in renewables and solar panels. It's been a big part of the culture, at least inside the Department of Defence, for – for quite some time. I don't know that that's going to change anytime soon.

Jeanne Meserve: Dr. Nishihara, what about the view from Japan?

Dr. Masashi Nishihara: Well, we also tried to develop technology to see any new kinds of power generation. For example, even waste – waste, garbage can be used for burning and to generate electricity. We are – in fact, that's becoming a business. We're exporting those garbage to China because this is – Chinese demands are to have their own generation of power.

Jeanne Meserve: And we have a question back here.

Question: My name is Tolu Ogunlesi from Nigeria. I think my question is for – for the HBS President. So Nigeria generates about, you know, 4,000 megawatts of electricity, which I think is what any sort of standard sized city in North America would probably, you know, depend on. So clearly, we need to do a lot more. South Africa is a third of our population, has about 40,000 megawatts, which is not enough, 10 times. So the way forward obviously involves exploiting as many sources of power as possible. We've got a lot of coal, and so coal is part of the energy – well, part of the energy mix. Now is there any – have you got any objection to a country like Nigeria, which accounts for a negligible fraction of carbon emissions, I think less than 0.5 percent, over the next few years deciding that the coal, for example, is going to be at the centre of our energy policy, considering the fact that we need, you know, all the power we can get to – you know, to develop?

Ralf Fücks: Yeah. Of course developing countries like Nigeria, they need to have some space also to expand their CO2 emissions, I would say, for maybe the next decade or so, but I would strongly recommend don't get trapped into the wrong direction. If you're looking to China, they built their industrialization, rapid industrialization on coal. What did they earn? Not only running away CO2 emissions, but horrific pollution, air pollution, contamination of soil, contamination of water. So coal comes with a price, not only with CO2 emissions, with environmental and health costs. And the opportunity to go along decentralized renewable energies, solar and wind, I think is much more favourable also for countries like Nigeria you will be much faster with what Chason (ph) said to provide then energy to the rural people with renewables than this coal.

Jeanne Meserve: Nigeria is also an oil-producing country, so let's talk a little bit about what happens to the countries that rely on that revenue if the world continues to shift away from oil. Senator Coons, you've spent time in Africa. What are your thoughts?

Senator Chris Coons: Well, Nigeria, to speak specifically to Nigeria, you know, is a large country with a very rapidly growing population, one of the largest oil producers not just on the continent, but in the world. And it is a significant negative impact on the economies of countries like Angola or Nigeria or Russia or Iran that have long relied on their oil exports. And that has security consequences. That has economic consequences that have security consequences.

Jeanne Meserve: So how do we make them —

Senator Chris Coons: My hope —

Jeanne Meserve: — help them with the shift?

Senator Chris Coons: My hope is that countries like Nigeria, which are early on in the development of their energy infrastructure, will pursue a whole range. You cannot today meet the energy needs of all of Nigeria with wind and solar. You also need grid scale storage and transmission. You also need either some combination of gas or nuclear. It is a very large, very populous country. To discourage the development of coal I think is in the global interest, but to understand the development — the very human and urgent development needs of a country like Nigeria I think would be reasonable for us to have some middle path for developing countries.

Ralf Fücks: But of course that demands the financial support, financial transfers from the rich countries to the poorer ones, and part of the Paris then Agreement —

Jeanne Meserve: Was a hundred billion dollars a year from the U.S.

Ralf Fücks: Yeah, the Global Climate Fund, one — yes.

Jeanne Meserve: And what happens if that money dries up?

Ralf Fücks: And now (crosstalk) speak to that.

Jeanne Meserve: So what's going to happen if that money's not available?

Senator Chris Coons: I think that significantly constrains the possibility of the developing world keeping to our global climate targets, and I'm not hopeful that our contributions will meet the Paris goals if the Trump administration continues in the — in the trajectory that they suggested — that he suggested in the campaign. So that is — the Global Climate Fund is, I think, one of the areas that will be significantly affected by the outcome of this election.

Jeanne Meserve: And could that collapse the accord?

Ralf Fücks: I hope not. If you're looking Marrakech, the follow-up summit just happening these days to Paris, there was really a lot of determination to go on.

Jeanne Meserve: And even talk about a carbon tariff against the U.S. And even talk of a carbon tariff being imposed against the U.S.

Ralf Fücks: Yeah. So it will create conflict if the U.S. will walk away from – from Paris. That will increase political turmoil, that's for sure.

Jeanne Meserve: Some other questions?

Ralf Fücks: Because other countries feel hostage, you know.

Jeanne Meserve: Anyone else raising their hand here? I guess we've wowed them. Here we go.

Question: My name is Koda. I'm the former Commander in Chief of the Japanese Fleet. And one thing which is not discussed here is the sinking islands. In the Pacific, there are 14 island nations, and depending on how we count, but at least four of them, basically their elevation is very low, so it's just a matter of time. Four nations, minimum, 60,000 people will lose their homeland soon. And one thing, it's very serious for the certain nation is so if that happens, minimum 60,000 refugees will happen and so far no country is willing to accept them. So of course the refugee in the Europe, Mediterranean is becoming a big issue, but at the same time, maybe 10 years from now another refugee issues in the Pacific. So this is kind of the hidden story or forgotten story generated by the destruction of the environment.

So I'm not asking the question because there is no remedy. This is the chronic diseases, so no remedy, but at least we have to know there is another problem, and we have to do something soon, if not. And also, this will generate another instability in the Pacific and indirectly maybe one neighbouring nation of Japan will take advantage of our irresponsible movement, so maybe destroy the power balance, but anyway, environment and the security and the power balance, that's interrelated. That's just I wanted to introduce the North American people and your NATO people that Pacific has another problem and similar thing may happen in Indian Ocean and Atlantic. So this is a global issue. Thank you.

Senator Chris Coons: Our delegation to the Paris Conference met with representatives from the Maldives, one of the island nations that will first disappear. And it's very difficult to look people right in the eyes who know that their nation is going away, that there's like no scenario in which their nation will survive. Ocean rise, as we talked about The Netherlands and Delaware, many

other places on Earth will face significant sea rise problems. We are at a point in human history where a majority of people live in urban areas for the first time, and 15 of the 20 mega cities—cities well over 10 million—are right on the water's edge and will face significant water incursion problems.

We're also seeing huge problems in our oceans—ocean temperatures rising, ocean acidification. The lobster, which is the symbol of this conference, it's good news for Halifax that they're all migrating north, but it's really bad news —

Jeanne Meserve: Bad news for Maine.

Senator Chris Coons: — for Maine and for New England. We are seeing enormous consequences for crops and for livestock and for wildlife as a result of climate change. We need to tackle this now.

Taylor Wilson: Yeah, and I'll just add to that because part of the session title is "The Politics of Slow Moving Threats," and that kind of ties into human psychology. You know, we're very good at addressing issues that are facing us right now, but issues that are bad or potentially even worse than what we're facing right now, if they're in the long term, we're worse at addressing. And I like to use the analogy, you know, people that live in Miami Dade County, for example, back in the States, overwhelmingly not only believe that climate change is happening, but it's a direct threat to their way of life. You know, they have so-called blue sky flooding days where water bubbles out of the storm drains and the streets flood and there's not a cloud in the sky. And while on the other hand if you ask someone in, say, Indiana if they believe climate change is happening or if it's a threat to their way of life, they're less likely to think so, but the people in Indiana will eventually feel the effects, that is the trends of climate change.

And tying it back into security, because this is a security conference, you know, the — the refugee crisis that will be created because, look, human society has built up around coasts. I mean that's — that is the history of human civilization is building up around coasts. And if those places flood—take Bangladesh, for example—there's potentially, you know, a billion people that could be driven from their homes because of rising ocean levels. That's a — that is a security issue.

The other thing I think that's important is we talked about Syria a lot this week. Well, Syria — the conflict in Syria had a lot of causes, but there's evidence to suggest one of those causes is drought, and that drought has been aggravated by rising global temperatures, and you know, it's — it is a direct security issue today. It will become more so in the future.

Jeanne Meserve: I want to ask the generals what kind of planning is taking place for these events and are you mapping potential spots where this sort of refugee exodus may take place?

Gen. Tom Middendorp: Well, on a national level, of course we are. We have all kinds of contingency plans dealing with potential floodings, and all the regions in The Netherlands have their disaster plans in place. And one big thing about these kinds of disasters is that the regular institutes are not able to deal with it because they – their – their dimensions are built upon local problems, solving local problems, but these problems are so big that it becomes multidimensional, but also very – it overreaches their capacities.

So on the domestic level, we have a lot of readiness arrangements for military forces to be in place within certain hours to support local authorities, but also on the international level, of course we – humanitarian aid and those kind of contingencies are worked out and we are ready to help where needed. Of course we are the only institute in the world that is able to move quickly and provide help quickly.

Jeanne Meserve: General Lengyel.

Gen. Joseph Lengyel: Same. I mean the Army Corps of Engineers knows exactly where the water's coming and where it's going and when it's going to get there and I don't think there's a big surprise about that. And we spend a lot of time thinking about how to help people deal with this stuff.

Jeanne Meserve: Senator, you've spent time in Africa, as I mentioned earlier. Some of the substances that we need to build alternative energy sources come from Africa. Is this a source of conflict or a potential source of conflict down the road?

Senator Chris Coons: So —

Jeanne Meserve: Is the supply chain (crosstalk) for getting this.

Senator Chris Coons: — just to be clear about sort of what you're talking about, lithium, some say, is sort of the new gold or oil. Cobalt and coltan are overwhelmingly sourced in countries that are conflict ridden. The Eastern Congo has become well known as a place where access to these absolutely vital minerals that are needed for high performing batteries or for our cell phones has been the source of a lot of the funding that has driven conflict. We have to do more to find sustainable broader sources of the mineral resources necessary for a new economy, for renewable energy production. There's always been conflict as a result of energy production and scarce resources, but we do have to be mindful about some of the particularly rare or even particularly toxic elements

and materials that go into renewable energy storage, production, distribution. And it has had a particularly negative impact on a number of largely ungoverned and conflict ridden countries in Africa.

Ralf Fücks: I would like to add two arguments. The first one, we need to establish serious environmental and social criteria for the import of these goods. And this is about a political framework for the markets. The other one is we must head forward to a zero waste economy, cradle to grave, an economy with full reuse of used materials. This is part of the answer and in the long run I think we have to move from minerals to biological then materials, using photosynthesis to then create new chemical stuff replacing minerals.

Jeanne Meserve: Taylor, I know you want to weigh in on this. It's also the end of our session, so I would like to also tap into you as the young person in the room, the next generation, one who's going to have to deal with this —

Taylor Wilson: Absolutely.

Jeanne Meserve: — and try and give us your optimistic outlook again.

Taylor Wilson: Yeah, absolutely. Well, and I'll say a little bit about the supply chain because — and that's important too, but I'm also optimistic about that. It already has started to cause conflict. I mean if you look at rare earth minerals, for example, the U.S. needs to make a big push for domestic rare earth production because China controls really the world's supply right now, but there is some optimism in this.

The thing about fossil fuels, for example, is they are — they are supply chain — they are resource supply intensive ways of producing power. You have to have a pipeline, whether you're burning natural gas or coal or oil, that has to be dug out of the ground, burned, and it can't be reused. That chemical energy that's locked up in the bonds of the material, that goes away when you combust it.

On the other hand, the mineral resources that go into the production of renewable energy technologies, whether it be cobalt, whether it be rare earth elements, lithium, these are recyclable materials. They're metals. And at the end of life, if you have the supply chain and the systems in place to do it, you recycle these materials and that's really beneficial.

So I'm very optimistic that this new energy economy will be of benefit to global security because you don't have to have that constant stream of material coming out of the ground and that's going to make us all a lot more, you know, I think safe and reliant more on our domestic resources than foreign resources.

Jeanne Meserve: Wonderful. We have to leave it there. Thank you to this very large, but very well-informed panel. And thank you to all of you. Appreciate it. (Applause.)

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