Center for Strategic and International Studies

TRANSCRIPT

Event

"Biosolutions: The Future of Food with Danish Prime Minister Mette Frederiksen"

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FEATURING

Mette Frederiksen
Prime Minister of Denmark

Robert Bertram
Chief Scientist, Bureau for Resilience and Food Security, USAID

Nikolaj Veje
Director General, Danish Veterinary and Food Administration

Hans Ole Klingenberg
Vice President of Marketing Industrial Biosolutions, Novozymes

Marcella Szymanski
Deputy Director, Office of Agricultural Policy, U.S. Department of State

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Caitlin Welsh: In partnership with the Danish Embassy in Washington, I'm pleased to extend a warm welcome to CSIS for today's event, the keynote address from Her Excellency Madam Prime Minister Mette Frederiksen on biotechnology and the future of food. I'm Caitlin Welsh, director of the CSIS Global Food Security Program.

And today I'm also the responsible safety officer for our event. (Laughs.) In that spirit, before we begin, I want to make a few announcements and share some information about our building safety precautions. Overall, of course, we feel very secure in our building, but as a convener, we must prepare for any eventuality. So please take a moment to familiarize yourselves with our emergency exit pathways for this room, which are behind me to the right, and also behind you to the right in the back of the lobby. Should the need arise, please follow my instructions and move towards these exits.

One second announcement before we begin. Following today's keynote address, we will host a panel discussion and we'll welcome questions from the audience, in person and online. If you'd like to ask a question, please submit it at the "ask questions here" button on our website, and for those of you in the room, you can just scan the QR code. Maybe we don't have the QR code, so just go to the website and hit the "ask questions here" button on the webpage. We do encourage questions and we look forward to addressing them in a short while.

Without further ado, it's my sincere pleasure to introduce my friend and colleague J. Stephen Morrison, who is CSIS senior vice president and director of the CSIS Global Health Policy Center, to welcome you to CSIS for today's event. Thank you. (Applause.)

J. Stephen Morrison: Good morning. Congratulations to Caitlin and our colleagues Anita Kirschenbaum and Emma Dodd in organizing, really at rocket speed, this important program on biotech as a strategic tool for sustainable and sufficient agricultural systems. Through Caitlin's exceptional leadership, CSIS has built a creative, dynamic, highly impactful food security program.

I'm honored to be part of this program and delighted that her excellency, Madam Prime Minister Mette Frederiksen, is here with us to deliver the keynote address. I'll introduce her momentarily. I want to offer special thanks also to the Danish embassy, to newly arrived Ambassador Christina Markus Lassen, welcome. She's been here with us three weeks now. We're thrilled to have you here and look forward to working closely with you. And some of your staff have been very, very helpful in putting this together. Marie Jorgensen and Elizabeth Dempsey Becker in particular.

Before I introduce the prime minister, three quick points for why this session today is so important and timely. The first point is very obvious. Food security have moved to center stage as an urgent global geopolitical priority in the face of Russia's invasion of Ukraine. Witness U.N. Secretary-General Guterres' leadership in negotiating the grain export agreement. I'm sure we'll hear from the prime minister, who's fresh from New York, the degree to which this issue dominates conversations in New York at the U.N. General Assembly.

Russia's invasion continues to threaten destabilizing food insecurity shocks in Africa, the Middle East and elsewhere. It's added urgency to the question of how governments, international bodies, and the private sector are to partner to innovate technologically to mitigate this threat and bring about greater sustainability, stability, and equity over the long term. This is not just an issue based on what's happening in Ukraine, but Ukraine has brought it forward dramatically.

And food insecurity in Africa has risen to become a U.S. priority in this period. The U.S. has committed over $7 billion this year. It's a top item. It has been a top item in discussions with recent heads of state from South Africa and Somalia, who were here last week. It will figure prominently in the December Africa heads of state summit that President Biden will be hosting. One quick aside, we've done here at CSIS four episodes of a CSIS video series "Ukraine: The Human Price of War." The fifth episode is forthcoming soon. In that series, food insecurity has figured as a focal issue. And we're honored to have Caitlin on camera to speak to that issue.

The second point is that U.S. policy is moving forward over the long term on this issue. The White House issued on September 12th its executive order on advancing biotechnology and biomanufacturing innovation for a sustainable, safe, and secure bioeconomy. We'll hear more about that from the prime – from – in the – and the panel discussion has two very important personalities from officials from the administration who work these issues day and night.

Food insecurity and agricultural systems figure very prominently in that executive order. It makes clear – that order makes very clear the centrality of U.S. leadership in investing in R&D and pushing forward in data ecosystems, manufacturing capacity, risk management, equity and access, regulatory harmonization and, important for today's conversation, partnerships with likeminded innovators, like Denmark.

My third point, the U.S. partnership with Denmark is strong. It's exceptional. And it's very important. Denmark has exceptional

leadership here in Washington, and that partnership with the U.S. government and with think tanks like ours cuts across many sectors, including biotech, as we will hear about this morning. We've worked closely and fruitfully with the embassy on global health security matters, most importantly antimicrobial resistance. Denmark is a standout exemplar in its pandemic preparedness and response. And we look forward to deepening that cooperation.

Now, finally, to my real purpose in being here this morning, the honor of introducing her excellency Madam Prime Minister Mette Frederiksen. She has been – served as prime minister since June 27th, 2019. I think she is the longest-serving female head of state in the EU, is that correct? I think that's true. (Laughter.) I think that is true. (Laughter.) I think that's true. She's had a remarkable career. Prior service as party leader and deputy party leader of the social democratic party, as minister of justice, as minister of employment, and as a member of the Danish parliament.

One special note, she pursued a master's degree, successfully, at the University of Copenhagen in African studies, a very important issue and close to my heart. But also, I think it informs much of the sensibility that she brings to this topic here today. While leading her government, she has shown determined policy leadership. Among her many notable achievements, she put into place in October 2021 policies to reduce emissions in the agricultural sector by 55 to 65 percent by 2030 and committed Denmark to pursue a concrete plan to make Denmark a world leader in plant-based food and green proteins.

This is all part of a bigger enterprise of working the green transition, the global green transition. It's really quite remarkable.

She's joined this morning by Permanent Secretary of State Barbara Bertelsen, who I wish to welcome. I wish to also welcome Permanent Undersecretary of State Jean Ellermann-Kingombe and Ambassador of Denmark Christina Markus Lassen and State Secretary for Trade and Global Sustainability Lina Gandlose Hansen. It's a great delegation. It's a really terrific moment for CSIS to be here today.

So please join me in welcoming the prime minister. (Applause.)

Prime Minister Mette Frederiksen: Good morning, everyone. And actually it tells something about Europe. I mean, I have only been to office for a bit more than three years. And if I'm already one of the seniors – (laughter) – it shows some instability in the political system in Europe that we are not used to. Maybe we can meet one day to have a discussion about that. That is not why I have been invited here today.

It's a pleasure to be here. And when it comes to food supply, the world is truly challenged today. And you're absolutely right. I just came from New York yesterday, attending the General Assembly. I had the possibility to talk with General Secretary Guterres and some of our African colleagues, including the leader of the African Union. And I have to say to you that the question about food, food supplies and food insecurity is on the top of the agenda. And it is a serious crisis, especially in Africa. I am really, really worried about this.

And, of course, this is because of the brutal war in Ukraine, concretely now. But it is a structural problem that we are going to face in the coming month and years.

We all feel the devastating impact of climate change and extreme weather is a big challenge to farmers and production everywhere worldwide. In this situation we are all forced and we really have the obligation to reduce greenhouse-gas emissions, and we need to speed it up, all of us, including Denmark, even though we are one of the most ambitious countries on the green energy.

My government has set a clear goal, committing to reduce greenhouse-gas emissions by 70 percent in 2030. We will succeed in doing that, especially if we win the elections in the coming year. And I'm also glad to tell you that Danish farmers have set a target to be entirely climate-neutral in 2050.

To get there, we need to develop totally new ways of producing food. To put it very briefly, if we want to produce food for everyone, every single day in this world, we have to produce more with less – less water, less energy, and less resources. This is the only way forward – the only way forward.

And in this aspect – and this is where biotech comes into the picture. I don't think it is possible without technology and without you and without biotech. You have to offer us, the whole world, new and intelligent solutions. You have to make the production smarter and you have to show us to use less resources. We need it to develop new types of food to reduce waste.

And therefore, I am very much – I also very much welcome the new initiative by President Biden on biotech as an important sector in agriculture and food. It is important, and it is an important vision that can help us solve some of the challenges we show today – we face today. And U.S. – I mean, thank you for your leadership in security issues again. War is back on the European continent. And thank you

so much for bringing back the U.S. leadership also on the green agenda. The world really needs you.

As you all know here today, biotech has been a part of Danish business culture since the famous beer maker Carlsberg started 140 years ago. Since then, Denmark has become a hub for biotech companies in agriculture, food, and health, and we are very proud of our companies, very proud, and I'm very happy to see a lot of you here today.

But to discover and to develop the solutions of tomorrow we have, as governments, to support small and large businesses on their journey – on your journey. This is our responsibility as governments. We already have lessons learned from both the U.S. and Denmark. Sharing our experiences is key to be more secure in this era.

By combining our efforts we can unlock new and more sustainable ways of production, and the world's need it. This is the key to better food security and to better use of the world's resources. I hope that today will mark the beginning of an even stronger collaboration between U.S. and Denmark. Together, we should and we can ensure the future of food to the benefit of people all around the world.

So, once again, thank you for inviting me and good luck with your discussions today and, most of all, good luck with your work. We really need it.

Thank you. (Applause.)

Ms. Welsh: A sincere thank you to Her Excellency Madam Prime Minister Mette Frederiksen for this informative and inspiring and timely keynote address. So thank you. Thank you again for your important time, which you've so generously given to us.

I'm very pleased to be joined by an expert panel to discuss the use of biotechnology to address today's food security challenges, and our panel includes some new and old friends. Very happy to welcome you all to the stage. We have Rob Bertram, chief scientist with USAID's Bureau for Resilience and Food Security; Nikolaj Veje, director general

of the Danish Veterinary and Food Administration; Marcella Szymanski, deputy director of the Office of Agricultural Policy at the U.S. Department of State; and Hans Ole Klingenberg, who is the vice president of marketing and industrial biosolutions with Novozymes. So thank you all for joining me on stage.

We're going to be talking about a range of applications of advanced biotechnologies to addressing food security challenges in low and middle income countries, in high income countries like the United States and Denmark, and also leadership from the private sector, and we'll be focusing on technology as a solution.

As we've heard, both Steve Morrison and her excellency the prime minister, talk about, food security is among the greatest concerns that leaders are discussing worldwide right now due, first and foremost, to Russia's invasion of Ukraine and those impacts on food security around the world and preexisting concerns related to climate change, regional conflicts, and follow-on effects of the COVID-19 pandemic. Biotechnology can be part of the solution, which is what we're going to talk about.

So without further ado, very pleased to turn to Rob Bertram. Rob, let's focus on low and middle income countries, which are the countries that you think most about from your perch at USAID. I know from the work that you do and from our conversations that it's very important for USAID to emphasize technologies that require fewer inputs and also to have strong communication about the use of these technologies. Can you tell us about both of these things?

Robert Bertram: Yes indeed. I think everything we do has to be in a specific context, right, and so often when – in Feed the Future we're working with very impoverished smallholder farmers who don't have a lot of wealth, certainly, to invest, and limited land and labor.

So we need to think about opportunities to go in in a positive way that don't require a huge amount of additional effort. So a classic one that you're all familiar with is seed. With improved seeds, we can pack all kinds of things in there. We can pack better nutrition through biofortification. We can pack disease and pest resistance, drought tolerance – and I'll say more about that later, I'm sure. So, that's one.

A second thing, though, is around behavior, and so for example, just moving to line planting instead of just scattering, these are fundamental game-changers. Now, the goal is to help people make

some gains whereby they are then disposed to invest more. So, it's not that we want to keep them from using inputs, it's that we want to help them make the most of what they have.

The other piece you mentioned is information. That's also something where we have many opportunities to try to communicate about different practices, different approaches, and of course, we learn a lot

from our colleagues in health and nutrition, where social and behavior change communication is a fundamental. But then, think about extension – it is for us as well.

So starting where they are but with the goal towards getting somewhere else.

Ms. Welsh: Great. Thank you, Rob.

I'd like to talk about your success advancing resource use efficiency because I think this is particularly relevant in light of the impacts of Russia's war in Ukraine with reduced access to fertilizer and higher prices of fertilizers.

So, how are you helping farmers to adapt to that challenge through technology?

Dr. Bertram: OK. And I didn't plant this question, but I have a really nice answer for you.

We have a new tool – and our new administrator is very much behind this – that is going to help support better decision making by smallholders, particularly in Africa. Africa is the continent where the least amount of fertilizer is used, less than a tenth of what we would find in some of the –

Ms. Welsh: Pre-war.

Dr. Bertram: I'm sorry?

Ms. Welsh: Before the war.

Dr. Bertram: Before the war, already, exactly. And so, the key here with a high price and scarcity – a limited supply – the resource becomes more valuable.

So, with this tool – and this is something we co-invested in with the Gates Foundation and with our German colleagues and Ethiopian

national partners – we showed that taking digital maps that are available in the cloud, and then contextualizing them by the slope, the tilth of the soil, other factors, we can improve decision making in a way that reduces waste by up to 200 percent and increases fertilizer response, the value proposition, by 80 percent.

So, the goal here, Caitlin, is that even though fertilizer is more scarce and more expensive, we want to actually improve the value

proposition so that longer term Africa smallholders will see that as the better investment.

I won't take more time, but we could talk about water as well. That's another scarce resource.

Ms. Welsh: Certainly. Certainly. Absolutely.

Dr. Bertram: Well, and you know in a climate world – and I know we're going to get that – you know, water is key, and using it carefully is key.

So, we've all heard about things like drip irrigation. So, there are many tools that we can try to bring to smallholder communities. And I'm really pleased that we have an innovation lab led by Texas A&M University on small-scale irrigation systems, and they are taking a very comprehensive approach to understand what we can do to make that game-changing opportunity for smallholders.

I mean, just imagine going from one rainy season per year to being able to have more poultry, more goats, maybe vegetables in the dry season. This is a game-changer, and it's one that if we use the resource carefully, we can make happen.

Ms. Welsh: Rob mentioned Feed the Future Innovation Labs. These are about 70 universities across the United States and research institutes around the world that partner with USAID to advance our food security priorities. Rob came from a meeting with representatives of the innovation labs just this morning and, I believe, will be going back to that.

So, Rob, anything you'd like to share from what you're hearing in those conversations?

Dr. Bertram: Well, maybe to – again, to put us the time we're in, you know, this isn't our first food crisis this century, right? Two-thousand eight, we all woke up – collectively, the world woke up, and as a result of that, Rajiv Shah, our administrator at USAID at the time, established the Feed the Future Innovation Labs, and the beauty of these university-led programs is that they are entirely collaborative with partners in the countries where we work.

And half the money, at least, goes through to those partners. This is not just about funding work here. It's about taking resources. And it's not about teaching anybody anything; it's about diagnosing problems together and generating solutions together. And what happens when we do that? We build capacity. So this is as much about enabling

countries to solve – identify and solve their own problems and be connected to the global research system.

So there's so many exciting things we could talk about. I'll tell you one: heat tolerance in poultry. We've got a lab at the University of California Davis with partners in Iowa State and also in Tanzania and Ghana that have developed – using genomics, biotechnology – are being able to develop strains of locally adapted chickens that are more tolerant to heat. So that's just one. I'd be –

Ms. Welsh: Sure. Absolutely. Good.

Dr. Bertram: There are many, many, but –

Ms. Welsh: Good. I'll come back to pick your brain on a few others, but thank you for all those examples, Rob.

Dr. Bertram: Sure.

Ms. Welsh: Thanks again for being with us today.

Happy to turn right now to Nikolaj Veje. Nikolaj, thank you for joining us on stage, and would love to talk to you to build on your prime minister's remarks. Of course, you talked about totally new ways of producing food and producing more with less. That has been front and center for the administration that you – for the agency that you lead for the Danish Veterinary and Food Administration, through a strategy called – simply called Ingredients. Can you tell us a bit about what this strategy does?

Nikolaj Veje: Yeah. The strategy, it builds upon the recommendations coming from – actually from the sector itself and is really important. I don't have to, again, mention the possibilities in this sector. This is really a strong instrument and is a strength position in Denmark, this Ingredients sector. So the recommendations from the industry was it turned into a policy by the government, and one of the – one of the key issues there – we're a small country compared to the U.S., so we have to stand together – is how can we – how can we set up for us where we can work better together to find good solutions?

Ms. Welsh: Sure.

Mr. Veje: And so it's a really strong focus on promoting Ingredients, and of course still having focus, strong focus on consumers but also having a focus on the possibilities for business growth and, of course, at last, national economic growth.

Ms. Welsh: Sure. Sure. And through this Ingredients strategy, you've helped to create and promote a wide variety of very interesting technologies like using lactic acid to improve the flavor, to improve the shelf life of foods, helping use good bacteria to fight bad bacteria in some meat products and extending their shelf lives, very creative uses of alternative and advanced proteins, potato proteins, grass proteins, others. Can you give us some more examples of the work that you're promoting?

Mr. Veje: I think some of you have mentioned some of the most important ones, but we have a – when we want to eat more plant-based we are confronting the trouble that plants always or sometimes don't taste good. (Laughter.) So we have to work with the texture and the taste of plant-based products, so having additives, flavor and so on to make the consumers happy about the products they're eating is very important.

Ms. Welsh: Sure. Yeah, great. And I'd like to build on that, on your engagement with consumers because biotechnology can be met with resistance on the consumer side, so how do you balance these two priorities, creating advanced technologies and also considering consumer safety and communicating that well to your consumers?

Mr. Veje: And of course that would be even harder because of the big troubles we have to address using biosolutions, but actually, I don't see it as a balance. I think many of the industries here – of course they want a balance, but I think the best perspective is how can we make some sure choices where the security – where we say the products, they are still very safe? We cannot, to the consumer, say that we have to make a balance and the products will be a little less safe because we have to address some larger problems. I think the consumers – everywhere in the world but at least in Denmark where it is also a strength position – safe foods. The consumers, they're putting pressure for new products, plant-based products, but they expect and don't even think about products being safe, so we cannot say we are balancing these, but we have to be very precise when it's safe enough, and we need research to be more precise in that decision.

Ms. Welsh: Certainly. You talked about your administration serving as a one-stop shop for companies that want to work with you and want to – want your help developing their technologies. How do you work with other countries? Can you talk about the importance of cooperation with the United States?

Mr. Veje: I think, of course, one of the big potentials is that, as I said, we're a small country and you a big country. You are also, like us, world-leading on these fields. You have enormous business, enormous – many consumers. So if we could work together businesses, we could work together authorities, we could work together universities and other research institutions, we could use, I think, your scale and probably you can use some of the knowledge that we are especially strong in Denmark.

Ms. Welsh: Certainly. And I think that that's another topic for future conversations. So thank you – thank you for planting that seed.

Happy to turn now to my friend and colleague, Marcella Szymanski. Marcella, thanks for joining us on stage. I'd like to talk with you first about the executive order that President Biden's administration released just last week. I'll talk about – I'll refer to it as the executive order on the bio economy, but for those of us in the audience it's the Executive Order on Advancing Biotechnology and Biomanufacturing Innovation for a Sustainable, Safe, and Secure American Bioeconomy. That's the executive order, the EO. The State Department plays a very important role executing the imperatives of the EO. Can you talk to me about the State Department's role?

Marcella Szymanski: Yes. So the EO, as you said, was just September 12th. And before I mention the role, I just want to emphasize the importance. The bioeconomy, these are 2016 numbers. It is worth $950 billion for the U.S., 5 percent of our GDP. And so the executive order is really about transforming those discoveries in the bioeconomy into solutions. And the State Department in particular has a role – this is great, just following on my panelists – in finding ways to cooperate and collaborate with other countries on research and trainings. The other part of the bioeconomy I'll mention, it is a broad executive order, but it also has different pieces in place in getting a handle on the bioeconomy. Because it is broad and, as I said, those are 2016 numbers.

Ms. Welsh: Sure. Sure. Certainly, it's absolutely grown since then. And also, the executive order makes specific reference to the things that we're talking about today. It talks about using biotechnology for improving sustainability and land conservation, increasing food quantity and nutrition, increasing and protecting agricultural yields, and protecting against plant and animal pests and diseases, and cultivating alternative food sources. So there's a lot there, a lot for you to work with, and a lot for our partners to work with as well on this executive order.

Apart from the EO, can you talk to me about the State Department's other top priorities when it comes to ag biotechnology, particularly considering the challenges that we're facing today regarding Russia's war in Ukraine, climate change, COVID-19, all those things. So what are the department's other priorities?

Dr. Szymanski: I would say that there's a sharp, sharp focus now on food security, COVID, climate, and conflict. So in 2022, at the beginning of this year, we had 190 million people globally facing acute food insecurity, with Russia's – or, Putin's – unjust invasion of Ukraine that could rise by as much as 70 million – 70 million! And so in May of this year, the United States hosted an event at the U.N. that outlined a plan to moving forward. It's called the Roadmap on Global Food Security. Since then, we've had over 100 countries sign onto that. It has seven key areas to focus attention.

Increasing humanitarian assistance. Increasing ways to get that humanitarian assistance in kind donations, because that could be as much as half of the costs. And increase in work on fertilizer, getting fertilizer out there. Looking at barriers to trade, not putting on bans that are going to exacerbate the problem. Looking at solutions for climate, agriculture – a climate-smart agriculture, a great connection to the work USAID is doing. And there's work all around the world. And then, lastly, making sure we have accurate information on markets.

And so I also took the message from yesterday – we had a Global Food Security Summit with the EU, with the European Council, and with the African Union and Spain. And what I heard from President Macky Sall say directly is we need more innovation for Africa. We need more innovation. And there's a lot of technologies – and biotechnology is very broad, but certainly it's part of the solution.

Ms. Welsh: And a lot of technologies that are brand new, and also technologies that might be decades old that are still useful today. Can you talk to me about both of those?

Dr. Szymanski: Yeah. So, you know, I always think we've been working on biotechnology for decades, right. So there's your grandma's biotech. I call those the BT corns. Those are genetically engineered corn for insect resistance. And those are being employed to address fall armyworm around the world.

But then we have technologies that are truly amazing and transformative. And so when I think about the bioeconomy, you know, there's a whole sector here that is medical, is agriculture, and is industrial biotech; you know, ramping up proteins and vats with yeast.

But a great example – this is a pig – it's called the GalSafe pig – that has less, almost no amount of a sugar protein on the outside of its cell. Why is that important? Because people have allergies to meat or, more importantly, they can't use medical advances that come from that animal for heparin and blood thinners and organ donation. There's heat tolerance. Rob mentioned in chickens, but there's also heat tolerance in cattle. That's been enabled by genome editing.

And then, lastly – this is such a great example, because with climate change we need not to – besides not pushing carbon out, we've got to create sinks. There's work going on in Berkeley, Jennifer Doudna's lab. That's how can we create plants that have root systems that can be that sink for carbon?

Ms. Welsh: Thank you. Thanks. And we'll come back to you for some other – with some other questions about these things you mentioned.

Happy right now to turn to Hans Ole Klingenberg.

Hans, thank you for joining us.

Hans Ole Klingenberg: Thank you.

Ms. Welsh: Hans represents Novozymes. Novozymes is a company – it's a global company whose products are used and consumed by 4 (billion) to 5 billion people every day, and yet many people might not have heard of your company. So can you tell us about Novozymes?

Mr. Klingenberg: Yeah, sure. And thanks so much for having us here today. I think this is a really important conversation.

And, you know, to your point, it's true. We're a biotech company. We're an – we call leader in industrial biotechnology. And we – through the products and technology we work on, we do touch a lot of people. We don't go out in many cases directly to consumers, but we work with customers, partners, farmers. And so I have the unique perspective of actually sitting in the intersection of a division that works with the entire food chain.

So I work with biotech solutions that touch the farmer, which help drive higher yields on the field, help drive lower carbon footprint, help deliver biological solutions instead of chemical pesticides, all the way down the food chain to biotech solutions that enable more productive animal farming through animal feed solutions, all the way over to the

area of biotech solutions that can be formulated into foods, like dairy, baking, beverages.

And so when you count all that up, you actually end up touching 4 (billion) to 5 billion people.

Ms. Welsh: Every day.

Mr. Klingenberg: Yeah, every day.

Ms. Welsh: A lot of work that you do is focused on helping producers reduce their greenhouse-gas emissions and also adapt to the effects of climate change. Can you give us a sense of that work that you're doing?

Mr. Klingenberg: Yeah. So I would say Novozymes in general has chosen to align its strategic corporate goals with U.N. sustainability goals. So we went in very specifically to see where are the opportunities where we think we can deliver an impact. And we do that because we think that that is actually good business.

We see an opportunity where there needs to be a true transformation in the world in terms of how we look at our energy systems, how we look at our water systems, how we look at our food systems. That is where we were born as a company. And you can say we're privileged and fortunate that we work with biotechnology. So biobased solutions just happen to integrate really well with biology.

And maybe I'd put a little bit of a provocative premise out there, which is to say that we for decades have worked with chemistry. We've tried to engineer a lot of the synthetic solutions. And I think what you hear companies like Novozymes and the rest of the panel here saying is that biology can actually help solve some of the basic biological problems we have. We just need to evolve that industry to a much greater degree than we have.

Ms. Welsh: Can you tell us a bit about your work on advanced or alternative proteins

Mr. Klingenberg: Yeah. So that's, actually, one of the, you could say, latest things that we've thrown ourselves into. We've actually invested $300 million in the new facility in Blair, Nebraska, and that is now, you could say, biotechnology truly coming to fruition to enable an alternative protein or plant-based protein future.

And so for those of us who are sitting and thinking, you know, is this technology going to be relevant five years from now or 10 years from

now, I think, to Marcella's point, we have technologies that have been in motion for decades.

If you look at, for example, U.S. agricultural sector, they have advanced, from a productivity perspective, five full productivity improvements since 1930 to 2020 on 20 percent less land, and we've now said, well, we want to throw ourselves at the question of how we develop more stable and more secure food systems where we go in and say, we're not going to replace animals but we need an alternative to animal farming that is way less intensive when it comes to land use, water use, and we see alternative protein as being that opportunity where we, basically, can ferment or brew some of the components that will be critical to food systems in the future, and that's what that investment represents.

Ms. Welsh: What will be some of Novozymes' other contributions to the executive order that we've been discussing?

Mr. Klingenberg: So we do touch quite a lot of areas, and I'm responsible for a business that covers agriculture, energy, partway into the food systems as well. I'll just mention one example, which is the ethanol industry in the U.S., which, perhaps, for me, serves as a bit of a case story for how successful biotechnology can be in scaling a climate-forward solution.

So that's an industry that started a few decades ago. Today, it's responsible for more than 60,000 jobs here in the U.S. – direct jobs – more than a quarter million indirect jobs. It, basically, replaces 10 percent of the gasoline that you have in your cars today and immediately delivers a 50 percent reduction in climate greenhouse gases.

And if I were to take some of the numbers on what we do today and we just had a thought experiment and I said, well, I will take our solutions and I'll apply it to every cornfield in the U.S., I'll take our solutions and apply it to every chicken that's fed in the U.S., if you had mobilized what we have today across the entire U.S. in that perspective, that would have reduced CO2 emissions to the level of 19 million cars. And just to put that in perspective, there are about 60 million EVs on the road today.

So I think the premise that we would bring to the table is that we're actually quite optimistic. We have a lot of solutions, but we do need to be open to a conversation about how will we deploy those solutions, of course, in a safe manner.

Ms. Welsh: Great. Thank you, and we might have some questions from our audience along those lines.

But, first, I want to see, Rob, if you have any comments based on what you've heard from the other panelists today.

Dr. Bertram: I do. One thing that I – you know, you asked about acceptability, and we talk about biology and I totally agree with Hans' points that we are moving from an energy-intensive chemical paradigm to one that is more biologically based.

What I would like to add there is that's really solar. I mean, biology in agriculture is a function of solar. So this is clean and it's climate friendly. And so I hope, as we go forward facing the climate crisis that we're in that we can really find a way, and I really – I took very much your point, Nikolaj, about this isn't about tradeoffs, right. It's not about, well, we're going to take some more risk to do it this way.

It's not. It's just cleaner, safer, cheaper, better. And so, hopefully, we are going to, through events like this but also the mass media, find ways to show the benefits. There's so many things.

I think, Marcella, you mentioned pest-resistant corn in the United States. That and herbicide tolerance, that ended our crisis of soil erosion in this country. We were losing tons of soil on every acre every year. That stopped that by going to no till.

The soil is much more – much richer now in organic matter, in earthworms, in life. And so being able to see some of these technologies, which, on the face of them, I think they don't relate well for people. But to see them in context and what they mean in terms of 20 percent less land and – it can be quite compelling.

Now, in the developing world I think, just to add one more point on this, there's tremendous opportunity that's, as yet, unexplored. Many countries are benefitting from fall armyworm resistance, that Marcella mentioned, but many are not. And those smallholder farmers are left to buy expensive and dangerous pesticides.

So our approach on this is twofold. One is to work with partner countries to identify solutions that they want, that they prioritize, on the one hand, and do collaborative research. And on the other hand, much of that's involving the private sector. And then on the other hand, pair that with building the biosafety regulatory capacity for environmental and food safety. So it's about enabling their choice,

their leadership, and hopefully in a way that leads to best decisions for them.

Ms. Welsh: Absolutely. I will turn in a moment to questions from the audience, but right now I want to pose one question to panelists. We're talking right now very optimistically about the potential of biosolutions to address the challenges that we all know very well. Technology is necessary but not sufficient to addressing these challenges. So I want to ask you each, what else do we need? Apart from these technologies that we've been so well describing, what else is needed? And I want to talk a little bit about the regulatory environment. Marcella, do you mind making a comment, or perhaps Nikolaj?

Dr. Szymanski: Yeah, sure. I'll jump in. Yeah, it's not sufficient because we've had the technology for a long time. And so I think it's about choice. So you have powerful tools. You have to choose to use them. And you have to opt in to use them. And there's this saying always that science tells us we can do something, society says whether we should. So biotechnology has had a lot of information. And that's why I always think it's – we're not talking about my grandma's biotech, but I like that too. (Laughter.)

So countries that want it, we're going to have a long tale of food insecurity. I mean, this is what people are saying even if problems are solved now with Russia and Ukraine, we're going to have a problem for years. And so if you're going to have a problem for years, we're dealing with immediate humanitarian but we're also dealing long term. If we're dealing long term, you have to make choices now as governments. That means you have to have conversations with your citizens to move forward. So, yeah.

Ms. Welsh: Yeah. Thank you. Yeah, so it's not the silver bullet. It's not the magic wand, but it is necessary.

Dr. Szymanski: It's not the silver bullet, yeah.

Ms. Welsh: But it is necessary. Nikolaj, any comments there?

Mr. Veje: I think it's important. I said earlier that, of course, we are facing very serious challenges, but we're not a dramatic situation. Sometimes you could think that we are in a very dramatic situation, and we have to find new solutions to everything. But we have solutions that we can use. And of course, we have to look at ourselves and the regulatory framework because when I said that we cannot have a trade-off, of course we still have to optimize our framework. And we know that it is perceived as rigid sometimes. And we have to be, as I said, more

precise. And we have to confront an EU regulation, which takes time. Very time consuming to change EU regulation. So we have to – when we are finding solutions in the private sector, we have to work with optimal regulatory framework, which can support ideas coming into business.

Ms. Welsh: Certainly. Certainly. Hans.

Mr. Klingenberg: Yeah, so I'll just add two things. What matters for us as a private industry? Certainty on outlook. And I think if you look at some of the policies that are now coming into play on the energy side, the Inflation Reduction Act as an example, you are really providing certainty for an industry, either through subsidy or taxation, that gives you a pathway to commercialize. So certainty I think is a big piece. So uncertainty is one of the things that we struggle most with when it comes to the biotech environment.

And then I'd say to Marcella's point, the second point, is regulatory environment. Just to give you one example, it takes about seven to eight years to get a biological replacement for a pesticide – for a chemical pesticide approved in Europe. And yet, we're dealing with a protein, it's a natural, degradable compound that already exists in nature. And we have to spend the same seven to eight years to prove, you know, safety. And I think that's a hurdle.

And one just extreme case there, if you look at golden rice, which has been around for a long time, right? I mean, that was developed in the '80s, introduced a very simple vitamin into rice which could potentially cure millions of people from blindness. And it's not until 2020 that that product first got commercialized. That's 40 years after discovery, really because of perception, in my mind. That's an issue.

Ms. Welsh: Yeah. Thank you. I would love to turn to questions from the audience right now. And I understand my colleague Steve Morrison might have a comment or a question for our panelists.

Dr. Morrison: Do you have a mic?

Ms. Welsh: We have a mic. Yes, in the back. (Laughs.) Thank you, Steve.

Dr. Morrison: Thank you, all. One comment and one question. I would hope that this moment in time is one that the Ukraine crisis results in greater energy financing and prioritization to Feed the Future. I mean, this has been – there's been a need to do more and better, and I do hope that one of the silver linings of this crisis is that we do see that program getting greater visibility and salience and prioritization.

I also hope that the executive order, which is to lead to an implementation plan within a hundred days – or something along those lines – that we see some very concrete creative proposals in this area coming out of that, and I'd appreciate your remarks on that.

The question is about the disinformation and misinformation now surrounding the food insecurity agenda, driven by Russia in this context. We are seeing that battle fought out over biosecurity and U.S. DOD biosecurity programs and false allegations, but we're also sort of a contest diplomatically that involves a lot of disinformation and misinformation and conspiracy thinking emanating from Russia and some of its partners against our responses in this area to try and alleviate it. And how are we dealing with that?

That question is really directed principally to our two USG representatives here, but it's something that has much broader application, and I'm hoping our Danish guests can comment as well.

Thank you so much.

Ms. Welsh: Great. Thank you, Steve. Rob? Marcella?

Dr. Bertram: Well, I'll mention – thanks, Steve, for the comment also. The narrative coming out of Russia in places like Africa is that the sanctions are causing the shortages, the scarcity, the high prices, rather than the war, and of course, we have distinct carve-outs in policy for food and fertilizer. They're not covered by the sanctions.

So, I think there has been a contest going on to try to tell people why they are suffering, and there's countries that are really suffering – those are heavily dependent on wheat imports.

I just heard a fun fact the other day. The greatest – the city that consumes the most baguettes worldwide is Kinshasa on a daily basis. So, you know, when wheat prices go up, people feel it, and so, we have to be out there.

What I'd like – and I'd maybe turn to Marcella here – but I think the State Department has seized this opportunity – particularly with the appointment of Special Envoy Fowler and also, I think, strong leadership – but it's coming from our administrator as well.

But I know that Feed the Future was always envisioned as development and diplomacy. Well, the diplomacy is back. That's what I would say, and I'm very glad that's the case.

Dr. Szymanski: Absolutely. Absolutely, at the highest level, diplomacy is back on food security and Feed the Future.

On Russia disinformation, yes, clearly. Go look up a study by Iowa State University. The author is Dorian (sic; Dorius). They're economists – but it clearly shows that around 2016, Russia was ramping up a campaign just to divide – but biotech was one of those issues they identified in their study.

So, what do you do? Well, one thing you do do is – through Feed the Future, through other ways – help – and USAID has done an enormous amount of work in Africa with African countries on getting a regulatory environment in place and working in capacity.

So, you have then countries making the choice themselves, and once people get a taste of what it can do there's – so for my grandma's biotech, over half the famers around the world are in developing countries. Why? Because it must be working for them. They're getting something for it.

So, my point is, give it to the people to craft and the countries and they will, and then, you know, they're standing up also against misinformation. But it is clearly out there. It switches depending on where it's needed.

Ms. Welsh: Yeah, thank you. Thanks for that important question, Steve. This is yet another front where we're fighting the disinformation campaign from Russia, but thank you for that question.

I welcome questions from other members of our audience, and in particular – and if you have a question – yes, thank you – raise your hand. I'd like to hear in particular from the Nature Conservancy and also from reps from Christian Hansen, who I understand are in the audience, but others as well, so. And when you ask a question, please state your name and your affiliation. So thank you.

Q: Well, I'm from Leda. Klaus Hippen, Novo Nordisk Foundation.

Basically we have, like, a decade to transform our food system on a global scale. The way we have sort of – changes has happened in the past has been slow and gradual and so on. We don't have – that is – it's not going to work this time. So how do you see that – a minor adjustment in regulations and so on, not going to do it. We need

something drastic. How do you see we can create that pull and that push at the same time?

Ms. Welsh: Great. Thank you. Thank you.

Actually, I want to take a few questions right now. So let's go to the Nature Conservancy and see if we have another one. So go ahead.

Q: Hi. Jack Bobo, Director of Global Food and Water Policy at the Nature Conservancy.

I'm interested in this question of the biosolutions and also how it relates to conservation and how that intersects with food and agriculture, because agriculture in many ways is the single biggest driver of deforestation and biodiversity loss and all of these challenges. But, of course, it's completely critical for our survival every day. What's the role of biosolutions in helping to balance those two things of feeding people and protecting the natural environment?

Ms. Welsh: Great. Thanks for both of those questions. One was about speeding up the timeframe of developing and applying these technologies, I believe. And the other one was about balancing needs of meeting food and nutrition needs of a population, and also protecting our environment. So would anyone like to take those questions – one of those questions? Go ahead.

Mr. Klingenberg: I'll actually maybe try to combine the two –

Ms. Welsh: OK. (Laughs.)

Mr. Klingenberg: – in my answer, because I think there are some interesting perspectives here. And I'll start with your question, Jack, which is that I think the consumer today plays a much bigger role when we think about the transition we're going to be going through than anything I've seen.

And I'll pose a provocative thought experiment again. So if we said we're going to eat 10 percent less meat, everyone across the globe eats 10 percent less meat – that's three days a month that you're going to pick where you don't eat meat – you could return an area the size of all of Europe's agricultural land either back to nature or back to some other purpose, whether it's to produce more food.

That is a massive impact, going back to Klaus's question, about what we can do here and now to actually transform our food systems, right. And the answer for me then lies in saying, well, clearly if we're not

going to eat meat, what are we going to eat instead? Well, we'll be eating more plant-based foods. And I would say, luckily, we're in a world where consumers are automatically beginning a stronger pull.

If you go into an American supermarket today, you'll find that the category of plant-based milks, for example, has exploded and taken a huge share of the market. And so I think we have to latch on to those types of movements and actually enable the industry to say there's a signal that we can capture and use to then instill biotechnology to drive those types of changes, while at the same time achieving conservancy, because I totally buy the idea which also Rob brought up that there is not a tradeoff here. This is a moment in time to actually seize an opportunity to improve systems that were not working well to begin with.

Ms. Welsh: Thank you. Thanks

Dr. Bertram: I guess I might add that we have global challenges, but we have local contexts, and hence local solutions. So what we're going to do in a place like maybe Brazil – not we, but what we would like to see happen in a place like Brazil or Indonesia is going to look very different from what we might want to see happen in Mali or Malawi, where people hardly ever eat meat or dairy.

And so I think keeping this mind – I mean, already, if we look at Africa, I think it's 1 or 2 percent of global emissions, and almost none from the agricultural sector. So, you know, for us it's about bending the curve, a future that has lower emissions intensity but meets the poverty reduction, nutrition, food security goals.

Now, the nice part of this is if we look at the other end of that spectrum, by investing in these environmentally friendly initiatives –

and I want to mention one other technology. There's a company called Pivot Bio here in the United States that has taken naturally occurring soil microbes that can fix nitrogen out of the air. Normally, they stop once they have enough. But they just overrode – using gene editing – overrode that feedback loop. So those continue fixing nitrogen. So that is a – that is a no-energy way of providing fertilizer. Now, this is still in its nascent stages, but it's being used. And it's being brought to African and other regions.

So these kinds of science and knowledge-based solutions are also the answer to the rainforests disappearing. And there are many, many, of course, policy issues and complex societal issues that countries like

Brazil, or Indonesia, or others face. But we have a great story to tell. It's just not the same everywhere.

Ms. Welsh: Certainly. Yeah. Thanks for bringing that up. It's a very important point.

Other questions from the audience? I think I saw one here and would welcome another one if anyone else has questions. Thank you.

Q: Thank you very much. I am Jesper Pederson. I work for Christian Hansen in Denmark.

We read the executive order from last week. We were very impressed. And one of our first reactions was, wow, this never could have been written in Brussels. No offense. I'm European. (Laughter.) But it is very fascinating to see this executive order on biotechnology and biomanufacturing being rolled out by the U.S. national security adviser, the director of the National Economic Council. Very, very strong perspective. But it – and it also includes the idea of working with allies on advancing the goals and objectives.

But my question would be, how do we – how should we as Europeans and Americans together think about the division of labor? What can Europe bring to the table? What can the U.S. bring to the table in order to meet these goals and objectives that we agree on, all of us?

Ms. Welsh: Thank you. Excellent question. I'd like to actually turn to Marcella, because, Marcella, I know that you've been involved in conversations with our Danish colleagues.

Dr. Szymanski: Yeah. So I think one of the places that always comes easily is when you get science and scientists together. And so that's one area, that research component, which is already ongoing. The work or the conversations we've been having with the Danish embassy are on exploring and looking directly on the possibilities, you know, of the innovation. These are just preliminary. But and that's a different conversation than exactly the bioeconomy, but now can be part of it.

So, you know, I always think and am always amazed at how much more we can go forward just by starting the conversation. So the common point, trainings, research, we just have to begin where we can. The fact that we're getting ships out of Ukraine through the U.N. is amazing to me. And that all started with a conversation.

Ms. Welsh: Yeah. Great. Thanks, Marcella. Anyone else? OK, good.

I will ask a final question of each of you, and I will go in reverse order. We'll start with Hans and go down to – go back to Rob. But as we've heard, leaders are meeting right now in New York. Yesterday there was a food security summit cohosted by the United States, African Union, European Union, and others. Today's there's a high-level event addressing the impacts of the war on malnutrition among children around the world. Leaders are talking about the issues that we are talking about here.

If you could give them a message having to do with the advanced technology that we've been speaking about, what would that message? So what's your message for leaders? We'll start with Hans.

Mr. Klingenberg: What's my message? I think – I would hope that we would be able to say that – actually, I'm quite optimistic. And it's sometimes a little bit difficult to be optimistic when you open your browser in the morning or you read your newspaper, and there's just another story about conflict or climate or COVID, or something like that. But I actually think, to some of the points that have been made today, through human ingenuity, whether just through very practical mechanisms like Rob has described, or through your grandma's biotechnology, or through the next generation of technology, we have so many tools in our hands.

I think what we need to start fundamentally saying is: What's the problem we need to solve? And it is a massive problem, when we think about how many people we need to feed by 2050. OK, how do we get legitimate access for biotechnology to actually be part of that solution? Because I still think there's a lot of skepticism, misinformation, concern which I don't think is actually legitimate concern, to be honest. And we need to address that, in my mind.

Ms. Welsh: Thank you. Thank you for that. Marcella.

Dr. Szymanski: Yeah. So if we're going to make it work, it has to be through partners and allies. So keep the focus. But the need is so great now. The emphasis is on just getting that humanitarian aid out there. And I hope as we move forward we continue to think of this long tail, we stay together, keep the focus. It would be my message: Keep the focus.

Ms. Welsh: Thank you. Thanks, Marcella.

Nikolaj?

Mr. Veje: I think that, of course, focus on the research and the cooperation between countries about research for the longer term. But also – (inaudible) – with me, and I agree that I'm getting optimistic by just being here that – all of the solutions being presented and also the potential in the very slow plans, historical, is something we can use and try to make some improvements ahead of us.

So if we can work together across countries, but especially in the countries' research institutions, authorities, businesses, and find these practical solutions within the framework. And at the same time working with the framework, I think that the focus should be then some kind of political commitment to increase the speed and also looking at the regulatory framework.

Ms. Welsh: Great. Thank you. Thank you, Nikolaj.

Rob?

Dr. Bertram: I just want to pick up on one point from Nikolaj to say how grateful I am that Administrator Samantha Power at USAID is very much focused on those longer-term solutions. Even though we have a tremendous humanitarian challenge right now, she's not taking her eye off that other prize.

But what I would – my message to global leaders would be that we need to think about our environmental and biodiversity goals, our food and agriculture and nutrition goals, and our climate change approaches and solutions in one lens. They are inextricably bound. Success in one will be accompanied by success in the other. Failure in one will mean failure in the other.

So I'm hoping for a new consensus. And, finally, I get optimistic when I listen to colleagues and the discussion you're leading. I hope that – you know, the 2008 food crisis put new energy into the – our human objectives around ending

hunger and poverty, and we have, of course, the Sustainable Development Goals. I hope we can reinvigorate the idea that we can do this, that we can – if we make the right decisions and the right investments that we can generate the solutions that are going to achieve solutions and outcomes that we're all hoping for.

Ms. Welsh: Thank you. Thank you so much.

I know that our event is available online. We'll be – it'll continue to be available. So, perhaps, there is a way for these messages to get to leaders who are – who continue to meet in New York.

So, with that, I'd like to thank each of our panelists – Rob Bertram, Nikolaj Veje, Marcella Szymanski, and Hans Ole Klingenberg – for making time to join us today; thank Her Excellency Madam Prime Minister Mette Frederiksen for her keynote address this morning; the Royal Danish Embassy in Washington for your partnership with – for today's event; the CSIS Global Food Security Program; the External Relations team; and the Global Health Policy Center; and all others who helped to make today's event possible.

This concludes our event. Again, thank you for joining us and please follow us on Twitter at @CSIS Food.

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