Center for Strategic and International Studies

Online Event

# "Accelerating U.S. Energy Innovation"

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FEATURING:
**David Turk**
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*U.S. Department of Energy*

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Niko Tsafos: Hello, everyone. My name is Nikos Tsafos. I'm the interim director and a senior fellow with the Energy Security and Climate Change Program here at the Center for Strategic and International Studies. And I am so thrilled that we're able to welcome back David Turk, the deputy secretary for the Department of Energy, welcoming back to CSIS to talk about how to accelerate innovation in the energy system.

You know, there is one reason we wanted to invite the deputy to come here, and that is there's so much stuff coming out of this administration, and out of the department in particular, so many initiatives, so many programs. And so we thought who better to come and explain to us the administration's thinking more broadly on energy innovation, but also, of course, the department's central role in making that innovation happen.

David Turk came to the Department of Energy—or came back, I should say, to the Department of Energy from a long career in government in various capacities. He was most recently the deputy executive director of the International Energy Agency in Paris. And so, I'm really looking forward to also being able to talk to him about the international dimensions of energy innovation.

So he and I are going to talk, but please do go on our website and submit your questions. My team is going to pass these on to me, and so I'll do my best to integrate those into the conversation.

So let's get started. Let me start really at the top. The Department of Energy has always had the central role in innovation in this country. And so one of the things that we have been trying to grapple with is in an administration that has made climate change a central pillar of strategy, one of the top priorities, in what ways has the department's role changed and in what ways is the department doing some of the same things that it has always been doing? How should we be thinking about DOE's role in the context of this administration's priorities?

David Turk: Well, first, Nikos, let me thank you for inviting me to participate in this incredibly interesting subject, impactful subject, hugely important subject. And it's great to be back, at least virtually, at CSIS. And this is my first event with you all since becoming deputy secretary of energy here in the U.S., although I've participated, as you said, in many, many events with CSIS over the years. And thanks to you and all your colleagues for the excellent work and leadership that CSIS is working in, day in and day out, and I know, through this virtual time period as well, day in and day out.

So let me frame up what we're doing in this way. And in some ways, we're doing things that we've done before at the department, and the department has a long record of working and pushing certainly on the innovation levers with our national labs, our 17 national labs, our Office of Science, ARPA-E, all the other programs that we've had.

But this is a new era. This is a new era. There's an urgency on the pace and scale of what we need to be doing at the Department of Energy that all of us face.

The other thing, just to put it on the table at the outset, there are sometimes discussions and debates about whether you need to do deployment or you need to do innovation. And given the goals that President Biden has put on the table, certainly given by the science on the climate-change side, but we've got to work on affordability, we've got to work on market opportunities and job opportunities, career opportunities, sustainability, all the kinds of things that you get focusing on deployment and innovation.

We've got to work on it again. We've got to do both. We've got to do both of those parts of the equation. And it's not just a binary deployment or innovation. It's a spectrum. It's a spectrum. It's a complicated set of levers, a complicated set of policies, funding streams, tools that you can bring to the table.

So what we're trying to do at the department is build up our range of tools on the deployment side for sure. That's where a lot of the discussion is going on right now in Congress on the American Jobs Plan that the president proposed, which is a historic level of investment, including in the Department of Energy, to make sure we've got a full range of tools, we've got big tools, we've got effective tools, especially on the deployment side. But there's a lot of innovation funding in the American Jobs Plan and pending in Congress right now as well.

And then we've got to push innovation. I think, on the innovation side of things, we've got net-zero commitments now from the U.S. government, from state governments, from local governments, from the private sector as well, and we need to push our innovation levers. We've got a lot of innovation levers at the department. We've had those for years. We've got the labs. We've got funding streams. We've got different programs.

But we need to work those, especially on those key technologies that we're going to need to get us to where we need to go in the 2050 time period. So in some ways, we're doing similar things. We're doing it faster at bigger scale and really trying to deploy a full range of tools that the department needs to with partnership with states, with locals, with the private sector.

Mr. Tsafos: No, I appreciate that perspective. That's really helpful, and I have a number of questions where we're going to talk about specific technologies that I wanted to get the administration and your thinking of that.

But before I do that, I wanted to sort of step back and talk about a couple of the broader themes that we're seeing out of this administration and get some of your perspectives on that. The first is manufacturing. I mean, quite clearly, the president is focused on manufacturing. He's talked about, you know, why should you build things in Beijing and not in Pittsburgh. There is a long effort to sort of reverse the decline in manufacturing and deindustrialization that has taken over the last 40 years.

There was one thing in the supply chain review on the advanced batteries that DOE led that talk about ensuring that innovations that are developed with public money have a manufacturing in the U.S. sort of component attached to them. And so, I'd be very interested to hear your thoughts on, you know, we've had this "invent here, build over there" problem for years, and you know, we talk about solar PV, and we can talk about other technologies. You know, what is the strategy and the thinking on connecting that innovation part not just with deployment in general, but with deployment combined with manufacturing in the U.S.? You talked about, obviously, jobs, and the president always says, when I think about climate, I think about jobs. How do you think about the implementation elements of that strategy?

Mr. Turk: Well, thanks, Nikos, and this is an incredibly important question and area of focus, and I like the way you framed it. We've got to think about and have a conscious purposeful strategy from the basic science to the innovation all the way through to make sure that we're capturing the jobs, we're capturing the community revitalization, to make sure that we're doing everything that we possibly can, thinking about all of those—all of those links in the chain.

We couldn't be more lucky to have a secretary in Secretary Granholm, who's lived and breathed this, certainly, from her time as governor and throughout her career. So this is an area that she has met with workers who are being laid off. She knows this inside and out. She's been working on this inside and out. And so it's terrific to be working for someone who's such a champion to make sure that we're focused on those jobs, those communities, that manufacturing piece.

And the solar PV example is a good one where we've done a lot of the innovation. We did a lot of the innovation in our labs and the work in the U.S. context. But we didn't have a purposeful strategy. We didn't think about the full supply chain as much as we should have thought about it and had a

strategy for making sure that we capture those jobs, we have those jobs, we get the benefit from all of that innovation going on.

So we need to be thinking about these supply chains. This is where the president's early executive orders, all the work that we're doing from the Department of Energy side on batteries, is laying that foundation, that groundwork, that evidentiary base so that we can have the muscles and the muscle memory to be doing this on an ongoing basis, again, in partnership. This takes a lot of partnership with states and locals, with entrepreneurs, with businesses, with investors, and thinking of this in a—again, in a coherent kind of way.

One data point for what we're up against and the challenges we're up against, because there are some real challenges, so just looking at batteries, the statistic I have in front of me here is China has over 75 percent of global battery cell fabrication capacity right now. Seventy-five percent China has. The U.S. has less than 10 percent right now.

China is the only country right now with control over every tier of the supply chain for critical minerals, including lithium. They have 80 percent of the raw material-refining capacity right now. The U.S. has virtually none.

So that's just one data point and one important area on the battery side and lithium in particular. So we've got to think about that entire supply chain, again, have a purposeful strategy, working with all the tools that we've got in our toolbelt and an awful lot of discussion with state and locals, discussion at the economic revitalization opportunities, trying to figure out what the place-based strategy is with this community or that community, what technologies of the future, what opportunities of the future make more sense here, make more sense there, make more sense there, so we can map this all out in an effective, coherent kind of way for all of our citizens' benefits going forward, so we capture these huge market opportunities in this new energy economy.

One practical thing we've done is we're requiring all innovations, all the work that we're doing with taxpayer dollars through the DOE, and that's a lot of money, as you know, billions and billions every year, Nikos, requiring that the awardees substantially manufacture those products that we the taxpayers have provided the funding to innovate, to manufacture those in the U.S. So that is one tangible expression and tool in our toolbelt to make sure that we're capturing more of the benefits from these innovations.

Mr. Tsafos: Thank you. Thank you. Really appreciate that and it's definitely great to see a number of the ideas that are sort of floating around to focus on manufacturing, and I think it's something that we are spending a lot of our time here at CSIS thinking about.

You mentioned economic revitalization, so I wanted to sort of spend a few minutes to talk about, you know, the Justice40 Initiative, right, this, really, effort from the top of trying to purposely channel money to underserved communities, and so I wanted to get your thinking on, you know, how is that process going? How are you thinking about it? You know, I think there is—you mentioned, you know, place-based strategy. I think, you know, the record on that is sort of mixed to maybe not so good, if you were to look at this over a long period of time, but it is also work that is urgent, like it has to happen; we have to be thinking about it. And we've seen quite a few initiatives out of DOE of talking about awarding money to projects that are targeting specific parts of the country or specific communities, so we are seeing some of that already show up.

So I was wondering if you could tell us a little bit more generally how you're approaching this, this Justice40 sort of mandate and push and maybe some of the challenges that we may encounter in being able to implement this in full.

Mr. Turk: Well, I don't—I hope it's not missed upon anybody just how much of a top priority this is for this administration. President Biden, Vice President Harris, other top leadership, certainly Secretary Granholm at DOE, have spoken very passionately and eloquently about the importance. But this isn't one of those just talk kind of thing. Right? Like, as you were just saying, Nikos, there have been attempts in the past. What we're trying to do is approach this with the seriousness that it requires, day in and day out, bringing incredible talent onboard. We've done that at DOE, and Shalanda, who's leading our equity and diversity office to make sure that we've got top talent who's been working on these issues for decades who have ideas of how to do this, where we've got examples of how it's been done before. It's not easy. This is going to take a sustained effort day in and day out. It's going to require a sustained effort at the top of our different departments who have equities here, and every department has equities here. Right? This has to be an all-of-U.S.-government approach, and it has to, just with any other important issue, work with state and locals, work with the private sector and have a purposeful, aggressive strategy on this. And that's exactly what we're trying to do.

So one data point, one example of that is this effort that we're doing with coal and powerplant communities, looking at those communities that have been responsible to give the U.S. the energy, to give the U.S. the power that has driven our economy for so many years, and look at those communities, in particular, at what is their future in this clean energy economy, to make sure that we've got strategies in place, that we're connecting the dots between developers and entrepreneurs and the business opportunities with those particular communities and what they can bring to the table. So we've

got this group. I just spoke with the head of this group, Brian Anderson, who's also the head of our National Energy Technology Laboratory out of West Virginia, who's leading this effort. We've identified 25 priority regions where we're going to really focus and hone in, looking at all the data, doing this in a rigorous way across Appalachia, looking in the Ohio River Valley, looking out west, other areas that, you know, we should be targeting this. And we've identified so far $30 billion in existing federal funding that these communities can access for infrastructure, for upgrades, environmental remediation, and union job creation. So we're not just talking the talk on this; we're walking the walk. We look forward to people holding us accountable here.

This is a big deal. This is important. This is something that has to be done. And frankly, we don't get to where we need to get to in terms of the transformation unless do we do this community-based, this place-based, looking at all of our communities—including the communities that both have been responsible for getting to where we are in terms of our energy capabilities, and also those communities who've been disadvantaged for any number of reasons, and make sure we have a conscious strategy so that everybody has the benefits going forward in this clean energy revolution.

Mr. Tsafos: Thank you for that. I really appreciate it. I mean, this has also been a big focus at CSIS for the past year and a half. Of course, we had the secretary come and speak about the idea of a just transition at CSIS back in April, around the leaders' summit. So it's something that we are spending a lot of our time thinking about. And as you say, it has to be done well and we have to—we have to innovative in how we think about this challenge. But it's necessary work. So thank you for that.

Let me switch to talk a little bit about some of the specific technologies. And let me start with hydrogen. The department announced the first Energy Earthshot. And so when I put the word on Microsoft Word, it told me that that's not a word. And I said, no, no, it is, or at least it's going to be a word, right, because we're going to be using it.

So tell us more broadly what the idea of the Earthshot is. Like, why do we need sort of an additional initiative? Or what should we read when something becomes an Earthshot versus a broader target? So maybe begin there. But also, of course, the target itself was very bold, was to reduce the cost of clean hydrogen by 80 percent in the span of a decade or so. So you know, maybe give us a little bit of the idea of the Earthshot and what kind of resource, and focus, and intensity we might expect from this kind of initiative. But then specifically, how does it apply to the question of hydrogen?

Mr. Turk: Well, thanks. Thanks, Nikos. And we hope that Websters, or whoever's doing this, will now have Earthshots in their dictionary—or, their virtual dictionary. And maybe it'll even be the word of the year, as they do sometimes, right? What's the new word of the year that is impactful. And that's certainly the scale of what we're—what we're trying to do here.

So the origin of the Earthshot piece, and I'm happy to get into the hydrogen, which is the first of the—first of the Earthshots that we've launched already, and we've got some others coming up, including in a couple weeks. We'll launch one on long-duration storage, which will be a big, big deal. Equally ambitious and aggressive in terms of what we're trying to do. So maybe two parts of the origin here. One is, we've had some good examples at the department in the past of when we have programs that look across the full tools that we have on the innovation spectrum at the department.

So we've got our national lab work, our Office of Science. We've got ARPA-E doing very impactful, early-stage, cutting-edge effort. And then we've got our applied offices, our offices like our renewables and Energy Efficiency Office, and different levers that they have as well. Yeah, we've had examples – SunShot is a prime example – where we wanted to focus all of those offices on the hard costs, on the soft costs. Look at an issue comprehensively and try to drive down those costs wherever we could in a—again, a purposeful, organized, coherent kind of way, with milestones to hold ourselves accountable, but also do it in a very aggressive, very ambitious way.

These Earthshots are not just reducing costs 5 percent, 10 percent. These are reducing costs 80 percent, 90 percent. Really pushing our incredibly smart lab folks, our university colleagues, others to really step up to the table. Just like JFK did back in the moonshot days, really challenging our technology, our scientists, our entrepreneurs to really step up, roll up the sleeves, and work. So we've had some good examples. SunShot, again, for those who are not familiar with it can Google it and find out a little bit of the history there where we've had incredible success, really reducing the price of PV in particular and reducing those soft costs as well in a coherent kind of way.

At the same time, what we're also seeing is net-zero commitments to 2050, in line with what the science tells us we need to avoid the worst consequences of climate change, and realizing 2050 is only 29 years away. That is—for those of us who are a little older, like yourself and myself, 29 years used to seem like a long time, but it's not that long a period of time certainly to decarbonize our entire economy, when we're talking about electricity and transport and buildings, to get to that net zero.

And the thought behind the Earthshots is let's do the analysis. We've got an awful lot of smart people here at the Department of Energy and our national labs. Let's figure out what are those key technologies that we need to have

available at those price points we need to have them available at in order to make sure we've got decarbonization solutions that are affordable, that are secure, that have the sustainability to them, in order to get to that net-zero-by-2050 time period. And we can't wait. We can't wait five years to do that concentrated innovative work for all of the sectors. We've got to do it now.

And so what we're going to do through this Earthshots program is have somewhere in the range of six to 10 Earthshots. We don't want too many. We want to focus this. We want to have this on the key technologies that we need to have in the future. And then, with each of those technologies – hydrogen is the first one that we've launched—take a look at where the hydrogen price points are right now, and where do we need to get those hydrogen price points to?

Now, electrolysis is something we've got to do a lot of work. Electrolysis is so-called green hydrogen, using renewables to produce hydrogen fuel in a clean way. We've still got a lot of work to do on those price points. And that's where the hydrogen Earthshot target is to reduce that price point significantly.

Now, on hydrogen we have blue hydrogen as well, where you can do natural gas and CCUS that you can prime the pump, so to speak, on this clean-energy, clean-hydrogen economy, going forward. So we've asked our teams on the hydrogen side is let's work together. Let's have a coherent plan on hydrogen over the next decade period of time to drive down those costs, to challenge all our scientists to look at those technologies, look at the ways we can reduce those costs, so that we can have the full range of technologies that we need to get to net zero. It's basically as simple as that.

So long-duration storage will be the second of the Earthshots that we launch, Secretary Granholm will launch in a couple of weeks' period of time. That is another key technology that can really unleash and make sure that we can take advantage of the full potential of all these renewables coming into our electricity system. And we'll have other Earthshots that we will launch over the coming months, again, something in the range of six to 10.

This will not just be DOE smart people telling everybody else what to do. This will be a participatory exercise. We're asking our national labs right now to work with us to identify what those other Earthshots will be, and certainly encourage others. CSIS, I know, has some incredible capabilities; love to hear your thoughts on what the other Earthshots we could focus on, and certainly anyone else—everyone else who's watching us today.

Mr. Tsafos: Well, thank you for that. And thank you for articulating that strategic thinking. I mean, one of the things that we have put repeatedly in reports that we've written is this idea of trying to make some calculated big bets on

technologies, right. And so I think this idea of, as you say, like, you don't want 20 or 30 or 40 because you're not really focused on anything, but you also can't have one or two Americas. And it's a big enough country that we can, I think, afford, you know, six or eight or 10. And so really appreciate that.

Let me continue on the theme of technologies. And let me switch gears a little bit to offshore wind. This was maybe, I think, the first sort of big target that the administration put out there on a specific technology to deploy 30 gigawatts of offshore wind by 2030. We are now roughly at the 40 megawatts. So, you know, when you think about the scale of where you are versus where you need to be, you know, there's a big gap there.

But it's also—you know, when I look at how the United States and this administration is thinking about technologies, you know, offshore wind really stands out to me, because there's kind of like a federal target. There is state-level action. There is clearly buy-in from the private sector. There's focus on ports and workforce development and supply chains. There's a permitting push at BOEM.

So would love to hear your thoughts on, you know, when the department comes out and says, you know, we are going to play our part in meeting this target. And obviously, it's not – you know, DOE alone cannot do this, obviously. But, you know, how are you thinking about your participation and helping to meet that very ambitious target, in an area where unfortunately the U.S. has been a little bit behind when we look at offshore wind and we look at what's happening in, you know, especially northwest Europe or northern Europe, or even China. You know, the U.S. has been a little bit slower, even though it had tremendous resources, in terms of offshore wind.

Mr. Turk: Let me – before answering the wind question, just to go back on the broader innovation question, Nikos. And I know I feel this responsibility – I think others of us here at the Department of Energy and our national labs feel this responsibility as well. One of the things I did coming on board as the deputy secretary is have individual one-on-one conversations with all 17 of our national lab directors. And two things came clear, just emphasizing more in my head. One was responsibility of the U.S. as an innovator for the world. We've got world-class facilities, we've got world-class capabilities, and most importantly, incredibly, incredibly smart, passionate, dedicated people working day in and day out.

There's no one else who can do innovation like the U.S. around the world. And if there are solutions on hydrogen, long-duration storage, all these other key technologies, I think there's a real responsibility for us to make sure we're doing everything we can not only for U.S. citizens but, frankly, for the world. And there's a lot of innovation that needs to take place—take place along those lines. So that's why we're trying to be coherent. That's why we're

trying to work with others in this innovation space, because we've got the crown jewels. And we need to take advantage of that, and we need to make sure. And our lab directors wanted to be pushed. Our lab folks wanted to be pushed.

I think this generation—I know you have a lot of incredibly talented folks you work with, younger generations at CSIS – they want to be pushed, right? They want to say: Here's a crazy goal, into the future on hydrogen or long-duration storage. We got to reduce costs 90 percent. Like, let's roll up our sleeves, get down to it, think about new materials, think about new ways of doing kinds of things. So that's kind of the ethos of where we're coming from with these Earthshots in particular, to make sure that we're stepping up to this historic window of challenge and opportunity.

Offshore wind is another incredibly—the potential is huge on offshore wind. You sort of implied that and explicitly stated that, Nikos, in your question. When I was with the IEA, the International Energy Agency, we did a study on offshore wind. I guess it was about a year and a half, two years ago now. And there was this statistic in there—when I read the executive summary, I had to go to the team and say: Is this actually right? And the statistic was I think it's something like 15 or 18 times. The offshore wind potential—and not even crazy offshore wind potential, but that that's most economically accessible around the world—is 15 to 18 times, just offshore wind, of the current electricity use.

So we've got a huge, huge resource there just waiting to be tapped. And it's offshore wind, so it tends to be—the capacity factor is higher than onshore wind, right? You've got more wind blowing more consistently in the offshore context. So we've got this huge resource – 15 times, 18 times the amount of existing electricity that the world uses along those lines. Some parts of the world are ahead of others on offshore wind. You mentioned, whether it's Denmark, or Germany, Northern Europe, there are a few other pockets that have really put the emphasis, put the focus, and figured out some models. Our colleagues in the U.K. have done some incredible work on offshore wind and moving the envelope on that side.

So this is where this 30 gigawatt target comes in. And all the work that's gone into that and will go into that is to make sure we're doing what we can with our levers at the Department of Energy side of things, working in partnership with the Department of Interior, with all of the other departments who have equities and need to be part of the solution here. Whether it's on the permitting side, whether it's on the siding side, whether it's on the technology side, whether it's on the transmission side – something that we're focused a lot, trying to figure out what do we need as a transmission backbone for those new offshore wind capabilities? Whether it's pushing the envelope on floating offshore, so that we can have floating

offshore, especially on our West Coast, which tends to be deeper than some other places on the East Coast and in the Gulf. So I think there's huge potential in this offshore wind place. And we're stepping up in the U.S. context to really try to push the envelope on that front.

Mr. Tsafos: Thank you. I do remember reading that offshore report from the IEA. And I think it is just mindboggling to think about how much – how much potential there is just so near, especially population centers, right, that we can have capacity near where a lot of people live.

One more technology question for you, on solar. The administration came out with an ambitious to cut the cost of solar in half by 2030. And I think there's a couple things that I would love to hear you articulate. One, I think there was—I mean, I don't think there's anyone who doesn't want things to be cheaper. But there was a little bit of a—you know, this is already one of the cheapest sources of energy that we have. You know, do we really need to make another push? I think there was a little bit—a little bit of that that came out of the discourse—if you can call Twitter discourse. You know, that's a debatable point.

But there was also—one of the things that I found interesting was there was an element of technology diversification in that DOE strategy, right? There was an element of let's talk about thin film, let's talk about concentrated solar power, let's talk about, you know, perovskite. Let's talk about essentially trying to think about essentially trying to think about advancing different technologies for solar. And I think, you know, we spend a lot of our time at CSIS, obviously, thinking about intersections between energy and geopolitics.

And over the last, I think, few months we've been just staring and grappling with this immense challenge of, you know, the polysilicon coming out of China that both highlights, I think, the immense vulnerability and dependence on China for these supply chains, but also the reality that, you know, just because something is low carbon it doesn't mean that it's not going to have some of the same problems that we witnessed in hydrocarbons, right? So there is that sense of technology diversification could really be an important parameter as we think about the solar industry.

So maybe if you can tackle both the overarching sort of strategy in the context where—in the context of solar being very competitive today, but also the broader strategy on technology-specific diversification in the solar sector.

Mr. Turk: So first point to make, I think, Nikos, is we have made a lot of progress in solar. It's been incredible to see the progress that we've made in solar. And this is a lot of work that our labs did for many, many years, and frankly

decades of years. It's been a lot of policy efforts, tax incentives in the U.S. context, other countries with their schemes, different manufacturers, entrepreneurs. A lot of progress—a lot of progress has been made on the solar side.

But we're in a race. We're in a race here that we need to keep pushing the envelope on costs—not just the hard costs, but the soft costs as well. And that's something that we'll continue to focus on, just like I was saying with SunShot. Continue to focus on that to get down to the new goal of 2 cents per kilowatt hour by 2030—by 2030 time period. We've had a solar revolution. We need to do even more. The scale of what we need to be doing in the U.S. and countries around the world in order to get us to the clean electricity by 2035—that's 14 years from now. Fourteen years from now solar, wind, other technologies are going to be needing to do even more.

And as you look at whether it's the IEA analysis or EIA analysis, or any other analysis, the scale of what's necessary in the U.S. context, in the Indian context, and the China context, and the African context—and, again, we need to have—certainly from a climate change perspective, we need to have a range of technologies applicable to a variety of climates, to a variety of different requirements around the world for us to be successful.

So again, calling back to my IEA colleagues, solar—Dr. Fatih Birol declared as the new king of electricity last year because of the cost reductions, because of what's being—going on. But we need to do more. We need to drive that down even more. We've—just the task in front of us to get to net zero is such a mammoth undertaking in a relatively short amount of time that we just need to keep pushing all of our levers going forward.

We also need to focus on the grid flexibility part of it, to make sure we have grids that are resilient, that have the ability to absorb solar and wind at higher percentages. We need the storage. We need the long-duration storage in particular, which is why we're pushing the envelope on that side. And thank you for picking up on the nuance in our solar target as well, Nikos. We've got to be thinking about a full range of technologies, and what goes into those—what goes into those technologies, right, from a supply-chain perspective.

There's ways to recycle materials. There's ways to reduce the amount of material and getting still the same benefits from an electricity perspective. There's different chemistries that may have less of a security challenge in terms of where those underlying materials are located or processed right now.

So we've got to be thinking about that part when we're focused on innovation, as well. We've got to be thinking holistically. Where are the

supply chains? Where are they coming from? What are the materials required for these kinds of—these kinds of efforts?

Electric vehicles are another example. Hopefully, maybe we'll get into that with some questions from our audience. Electric vehicles require I think it's about six times the amount of critical minerals than an average internal combustion engine. So we've got to have a strategy for those—a strategy from an innovation perspective, but also from a supply-chain perspective. So we just need to be thinking about all those—all those pieces and taking them into account.

Mr. Tsafos: Well, thank you for bringing that up because that was actually my next question, vehicles, and we've also gotten a lot of questions from the audience. And by the way, please keep sending them. I'm seeing them as we're speaking and trying to—trying to integrate them in.

And so I wanted to maybe ask two questions on electric vehicles. One is really to try to go back to that initial conversation we were having about manufacturing. I mean, one of the centerpieces of the administration's strategy is the Advanced Technology Vehicles Manufacturing Program that, you know, still has a lot of loan authority under it. So, you know, one of the things that I have always grappled with this program is it seems that it wasn't really taken up fully kind of like a decade ago when it was available. And so, you know, how can we assure that this is a program that really, you know, meets the automakers' needs? And I think in particular as we also try—I think very rightfully from an administration perspective try to ensure that the people that take the loans, you know, have high wages and the right to unionize for workers, how do—how do we meet those goals but also make sure that the $17 billion—I believe is the number that's out there—still gets taken up?

And then the second thing on electric vehicles, you know, one of the questions we got from the audience was that whole sort of integration with the grid, right, and the vehicles acting as either a backup—I mean, we see—we've seen Ford sort of market the F-150 as kind of like a home backup, sort of the alternative to the diesel generator. So, you know, how are we thinking about that integration, right, of the vehicle fleet with the grid?

Mr. Turk: So first off, on the loan program—the vehicle piece of it as you mentioned, but the broader loan program. So the big news there – and hopefully, we've got some entrepreneurs and business representatives joining us today, Nikos – the message we'd like to send and we've been trying to send is consistently and proactively reaching out: The loan program's open for business. So this is a huge, huge tool in our toolbelt. We've had some incredible successes in the past. Tesla's the one that everyone points to, where we were able to provide a loan very early on to Tesla that was critical for its early stages.

They've now repaid the loan. The taxpayers have made some money on that—on that particular equation. And the taxpayer actually—if you look at the loan program's history overall, we've actually made money on the loan program over its entire history, which is something that is overlooked sometimes.

We had three applications total come in to the loan program in 2020. Under Jigar Shah's leadership—and hopefully, many in our audience know Jigar Shah either personally or listening to him on the Energy Gang podcast, which is one of my favorite podcasts along with CSIS's podcasts as well, Nikos, which – you all do a terrific job with your podcasts as well – we've gone from three applications total in all of 2020 to for the month in May we have three applications per week.

So this is due to, A, getting the message out there that we're eager, we're looking to use the loan program in ways to help businesses across the country really get up and running in aggressive ways. And Jigar and the team have done a lot of proactive outreach, including on the vehicle side – battery manufacturers and others—to make sure that people know about this. We're making it an efficient tool. We're making this a part of the financing solution to, again, get to scale and pace as quickly as we—as quickly as we possibly can on that front.

On the EV and grid side of things, absolutely right. So we've got an increasing amount of electric vehicles each year being sold in the U.S., but we've got to get the number way, way up. This is part of a very conscious strategy.

You referenced the F-150 and the president visiting and driving the new electric F-150. This is a conscious strategy. We're going big on electric vehicles, Secretary Granholm, Secretary Buttigieg. The proposal that the president put on the table in the American Jobs Plan is incredibly aggressive and ambitious on the electric vehicle side of things, the incentives for consumers to buy electric vehicles, the charging infrastructure to make sure that we have that charging not only across the country but also in communities—again, to your earlier point—to make sure everyone can afford and charge their electric vehicle as well. So—and we've got to have the grids. Just as the questioner mentioned, we've got to have the grids that are capable and are planning ahead for those kinds of capabilities, these mobile storage devices where we can do some smart charging and charge those vehicles at certain points in the day and night, to match up with the renewables capability, to really make sure that we're using this grid flexibility in a smart, more coherent fashion. We're doing an awful lot of work on that in the Department of Energy on the National Lab side as well.

Mr. Tsafos: Thank you. Really appreciate that.

I wanted to maybe switch gears a little bit, talk about the international side of things, and, if we have time, I want to come back because there are more technologies that people are asking for. People have asked about thermal and (vast ?) nuclear, and so I think we could run the clock just going technology by technology. But I did want to spend a few minutes, as you said, the responsibility of the United States on the international stage as an innovator, and so we have seen, both around the leaders summit but also at the G7 and elsewhere, just a huge amount of emphasis on reengaging with the world on innovation and on energy diplomacy. And of course, I would be remiss if I didn't at some point also ask you a few thoughts about the IEA and energy security, especially where we are today looking at sort of especially the grids coming under enormous pressure, you know, a few months ago from cold weather and now from heat.

But before we go there, maybe just stepping back a little bit and describing the thinking on international-engagement innovation; obviously, Mission Innovation is something that you know incredibly well, very passionate about it. So maybe we can start there, if that would be a fair categorization of the more sort of overarching of initiatives. But I do want to talk about some of the other specific ones as well, like, you know, the Net-Zero Producers Forum and the G7 sort of industrial decarbonization agenda and the power sector. But maybe let's start with the broad philosophy and sort of maybe Mission Innovation and then we maybe can talk about others.

Mr. Turk: Well, thanks for your kind words on my efforts on Mission Innovation. And a number of folks had a chance to do a session with Secretary Moniz yesterday on CCUS, given EFI's terrific new report on CCUS that I encourage everyone to take a look at. It's incredibly well done and very actionable. And we were reminiscing a little bit on those days of getting Mission Innovation up and running and getting 20 countries within a very short period of time to commit to double their R&D budgets and to really push the clean energy innovation envelope, and it was great to get that up and running. And now the U.S. is really pushing again in the Mission Innovation context to make sure that everyone's stepping up and really pushing their innovation agenda on the clean energy front, to the point where Secretary Granholm has agreed to chair the next Mission Innovation ministerial meeting in 2022 time period so that we can help lead and make sure it's an effective effort going forward.

More broadly, on the international front, it may be useful to think about this in sort of two buckets that we need to really focus on: one is—and Secretary Kerry has been doing tireless work around the world, literally around the world, in the way he has been doing when he was secretary of State and, even before that, for decades, trying to get commitments, trying to get political commitments. Right? We have an incredible number and diversity of net-zero commitments, not just from governments but from the private sector, from companies, from investors, incredibly exciting to have so many

commitments in that 2050 time period or that mid-century time period. That is not something we had on the table even just a few short years ago. And Secretary Kerry, of course, focused on that 2030 time period, the nationally determined contribution period, of which everyone heard President Biden announce what the U.S. is going to do, the 50 to 52 percent reductions by 2030 for our own greenhouse-gas footprint in the U.S. context.

That's one part of the equation. Get those commitments. We still have some work to do. Secretary Kerry is flying around. We need to get some additional ambition, frankly, from some countries around the world. China, first and foremost, is the country that really, really needs to step up in that 2030 time period. And hopefully our Chinese colleagues will do that, given that they're 30 percent of global emissions right now. And there's an awful lot more that they can be doing.

The second part of the architecture is great to have the 2050 commitments, great to have the 2030 commitments, but we've got a lot of work to do now. We've got to do the kind of work now on deployment, on innovation, now to allow us to be able to get to those 2030 commitments, to make them even more ambitious over time, and to get us to 2050 as well.

So from the Department of Energy perspective, we're focused on a range of bilateral mechanisms, multilateral mechanisms, to implement now, to really focus on what we're doing in the real world to have all of these technologies cheaper, to have all of these technologies take off in the way that we need to, across sectors, across key areas.

And frankly, I think our international architecture is a little bit more developed in terms of the Paris agreement, the NDCs, the 2030 commitments, a little less coherent, a little less focused on the big plays on that implementation space. So implementation, implementation, implementation. We just need to focus with an urgency with our international partners. And that's where we'll be focused from the Department of Energy side of things.

Mr. Tsafos: Well, thank you for that. I really appreciate it. You know, I was having a conversation recently, trying to describe the administration's strategy on the international front. And this was a weird analogy for someone who grew up in Greece, but I said it was a little bit like American football, but it's not going to be a 40-yard, you know, pass that leads to the touchdown. It's more yard by yard. Get whatever you can from wherever you can get it. Get a near-term commitment. Get yard by yard. And that is going to be how you advance the ball down the line. So, you know, really appreciate that effort on trying to convert that big-picture political alignment into near-term targets.

Let me talk about one of those specific areas that I think was super interesting to come out of the leaders' summit, which was the Net-Zero Producers Forum that we saw the U.S. announce with Canada, Norway, Saudi Arabia, and Qatar. You know, it's—I think the question of engaging producers seems just so important, right. I mean, if we're going to have an orderly transition, the countries that are the largest sort of hydrocarbon producers, you know, have to have a say, but also have to be sort of buying into the transition strategy.

So maybe a few words, if we could, from you on sort of the thinking about that group. And, you know, what are you hoping to accomplish out of it?

Mr. Turk: Well, thanks for picking up on that, Nikos. I don't think this net producer – zero-net – Net-Zero Producers Forum has gotten as much attention, frankly, as it deserves. And we're putting a lot of focus on it. And I think what we see is this is a decision point for countries that have historically been big producers on the fossil-fuel side of things and companies that have been big producers on the fossil-fuel side of things.

And we're seeing different countries and different companies react differently. Some companies and some countries are looking at the phenomenal logistics capabilities, the human talent that they've been built up, and thinking about how that can be repurposed for offshore wind, to give you an example, right, where a lot of the skills, a lot of the technical capability, a lot of the logistics capability, can be repurposed in ways for the technologies, technologies of the future.

And this is a decision point. Do you pivot in a sustainable way to make sure that you've got a good base of GDP, you've got a good base going into the future so you're not just thinking what's your revenue streams for the next year or the next two years or the next five years? You're thinking what are your revenue streams in a diversified way for the next 20 years, the next 30 years, the next 40 years.

I know political leadership and CEO leadership sometimes has a challenge thinking beyond their next election cycle, beyond their next. But that's what we're trying to do in this Net-Zero Producers Forum is look at the reality of what we need to do to get us to that net-zero 2050 time period, mid-century time period. And what can we all be doing to repurpose thoughtfully, aggressively, to seize those economic opportunities? The $23 trillion of economic opportunity that's on the low end predicted of what we'll be needing in this clean energy space. So we'll be having the meetings, government to government. And we'll be working with the corporate sector as well.

And I think this is one of the big tests of whether we're going to be successful or not, is can we get enough of these producer countries—producer companies to pivot, to change, to really see the advantages. So instead of producing just oil and gas, you know, thinking about producing hydrogen – whether blue hydrogen or green hydrogen. Trying to have the markets established, trying to develop these incredibly exciting opportunities, again, for their populations—looking at it from the country level—for their populations' future—generational future.

Mr. Tsafos: Absolutely, and it's such important work. And I know that we have been spending so much of our time thinking about, you know, how do you get people that are today just so embedded into the hydrocarbon economy to see for themselves a future in change, rather than sort of resist it or think that they have no role to play in that.

We only have a few minutes to go. And judging by the number of questions that keep coming in, we definitely need to have you back. So maybe I can end on a question about energy security.

And you know, obviously, your last role was at the International Energy Agency, an organization that was founded to promote energy security. We have seen in this country the huge stress—especially on the electric power system—from extreme weather, whether on the cold side or the hot side today. We've had, obviously, the attack on the Colonial Pipeline remind us, as if we ever needed reminding, of the ever-present threat of cybersecurity. You know, how are you thinking about that energy security agenda, both on the domestic front but also from an international governance front? And where do we need to go in order to make sure that we don't, in this transition, sort of ignore or neglect that core element of energy security? Because we know for sure that people are not going to really be with us if they can't rely on being able to turn on the lights and get their houses heated or keep their houses cool in the summer.

Mr. Turk: Well, I think the examples you used in your question just highlight exactly the point that I'm going to make here, Nikos, in that we've got to think of energy security in an evolving way going into the future, and we also have to think of it holistically.

We've got to think of reliability, right? Everybody wants to have the power when they need the power. Our friends and relatives who are living in the Portland area—I've got a brother and his family who is living in the Portland area—they want to have power when they need it, when the temperatures are crazy high like they've been this week.

They want to have affordability. Everybody wants affordability, right, rightfully so in terms of, again, continuing to push the cost down.

So we've got to be thinking about energy security, including cybersecurity. I spent an awful lot of time on the Colonial Pipeline, as others of us—Secretary Granholm, others of us here did on the DOE side of things.

We need to be thinking about extreme weather and wildfires. President Biden had an event just yesterday on wildfires with eight governors—eight Western governors, some utility CEOs. Secretary Granholm participated from the U.S. Department of Energy side. We've got to think about that security and what near-term things we can do on the wildfires issue, and then microgrids and reliability and undergrounding and other kinds of things that we can help going forward on that side of things.

Again, for a lot of that extreme weather we've got to get our mitigation on the climate side, right? We've got to avoid those consequences going forward. Otherwise, we're going to get in this kind of just vicious cycle of more extreme weather, more extreme hurricanes, more wildfires because we've got additional global warming, additional climate change. So we've got to have the mitigation plan there, as well.

And then the other piece on the energy security, which we already talked about, is critical minerals and supply chains. And so we're having some very good conversations with our Australian colleagues, our Canadian colleagues, our Japanese colleagues, our European colleagues, others on the supply-chain issue. And thinking about those supply chains very much is energy security now, but again thinking into the future of how much more of these materials we'll be needing into the future and making sure we have diversified, reliable supply chains in the U.S. and with our key allies around the world.

Mr. Tsafos: Well, Mr. Deputy Secretary, I'm just so grateful that you decided to spend this last hour with us. I know I've learned a ton. And as I said—the questions keep coming, by the way. We could keep going, but sadly you have things to do as well, and so we'll have to meet again at some point in the future to talk about these issues. But I just wanted to say on behalf of our team and CSIS, we're just so grateful for the work that you're doing and for the time that you have spent with us to share some of the administration's thinking. So thank you so much for being here.

Mr. Turk: Well, thanks, Nikos. And I am equally grateful, and I know my other colleagues here at the department are equally grateful for all the terrific work you're doing and your colleagues are doing. And certainly, thank everyone for joining us today.

And I have no doubt that two things are true. One is it's people who are going to make the difference if we're successful in this energy transformation, whether it's deployment or innovation and all the levers that we have.

And then, secondly, there's an awful lot of partnership that we need to have. Public sector, private sector, entrepreneurs, visionary leaders, foundations, NGOs, we've got to work in partnership to all push ourselves and be smart and coherent in terms of our strategy. We don't have time to waste here. We've got to roll up the sleeves and get to work together.

So thank you for everything that CSIS does.

Mr. Tsafos: Thank you. I appreciate that.

Thank you for tuning in.

Mr. Turk: Great. Thanks, everybody.

(END)