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P R O C E E D I N G S

MR. VICTOR: Welcome everyone. My name is David Victor. I'm a professor of innovation and public policy at UC San Diego and a nonresident senior fellow at the Brookings institution. It's my pleasure to welcome everyone at this event on clean energy investments in emerging and developing countries.

It's hard to imagine a more important topic. Decarbonization is a capital and intensive activity. It's really about investment. Essentially, all the expected growth and emissions, greenhouse gases is likely to come from the emerging and developing countries at least on current trajectories right now. Yet last year we saw a decline in clean energy investment in those countries.

And so, figuring that problem out, how to attract capital especially private capital into this domain is essentially important.

We have a terrific line up for you today. We're going to hear from Fatih Birol, who is executive director of the International Energy Agency. An icon in the study of energy policy and modeling of energy policy issues. He's been in IEA for a long time. He was at OPEC before that.

Other honors in his name includes since 2013, he's been an honorary life member of the Galatasaray Football Club. A very important football club in Istanbul.

And Fatih is going to talk with us today about results from an IEA report that came out about two weeks ago, just under two weeks ago, about clean energy investment in emerging and developing countries. IEA has really helped the tune in this area. And so, it's really our pleasure to have Fatih with us. But he's going to make some brief opening remarks. I'm going to have a discussion with him and then we're going to go to a panel discussion after that and I'll introduce the panelist then. But right now, Fatih, the floor is yours.

MR. BIROL: Thank you very much, David. First of all for organizing this meeting, and to all the colleagues who are with us today. And I am very much looking forward to hear the comments and suggestions for our future world.

David, we have met, in fact, in the last three months, three reports which I call a (speaking Indian). And these are not by chance so three reports. One of them is at the center is the how a road map to net zero. Work up to 1.5. What needs to happen in the global energy sector to break the

global emissions to next year to 2050? So this we published on the 18th of May and there's a lot of things to talk about that report what needs to be done and when and what are the implications.

But in addition to this support, we have two other reports which were also impactful. One of them was to look at the critical minerals. Where are we today? Where are we going tomorrow? Because this report shows that if we go to a net zero world, the demand for certain critical minerals will increase from seven to 15 times compared to now and 2050. What are those? Lithium, platinum, cobalt, copper.

Many of them and their eligibility and the geopolitical implications are an issue in case they are not available at the price which is affordable. In case, they are inadequacy issues which are not addressed, they may slow down the clean energy transition. So we make this report and we came up with some suggestions which you will see in a few months of time some of the governments around the world will take some necessary measure step there.

And the third report of the trilogy, next year a report, the critical ministry report and third one is the one we discuss today. This is financing clean energy transition in emerging and developing economics. My colleagues, Mike Waldron and Kim with the with the big team put together this report with the support from working together with World Bank and the World Economic Forum. And I am thankful to our advisory both here. Several distinguished economists around the world including you, David. Thank you very much for your suggestions. We make this support.

So why did we make this report? For the following reason. When I look at the world today, if you exclude China, two-thirds of the global population in this emerging and developing world. This is number one. Number two, in the next two indicates more than 90 percent of the emissions will come from these countries. Yet, only one-fifth of the clean energy investments go there.

But this is a big, big, big problem. And this a major alarm bell, I believe. If we are not able to mobilize clean energy investment in those countries, we will see continuation of emissions growth, which means, in turn, what will be in the United States or in Europe or I don't know, other countries, global effect will be very limited.

And as such for me and David, if I can summarize with one line, it's a major fault line in our fight against climate change, the lack of investment there.

Just to give you the order of magnitude. Today the clean energy investments in those countries are about 150 billion years stellar according to our numbers. In order to have a net zero world, these investments need to increase by a factor of seven, about one trillion. From under 50 billion today to one trillion so that the world can reach this climate target.

Is it possible? I don't know. But when we look at the global capital there is no shortage of global capital whether or not money will make the clean energy investment projects in the emerging and developing world is the question. I believe money capital will meet the clean energy projects in North America, in Europe with some difficulties. But in those countries, it will happen or not? I do not know and we hope that it will happen. It is the reason we make this report.

In the report, we look at more than 50 studies one by one. In Vietnam, India, Bangladesh, in Columbia from solar projects to efficiency appreciation to green solar. What are the difficulties for these projects to see the light of the day?

What kind of challenges and what kind of lessons we can learn so that governments put the right policy framework down? This is the one, of in my view, two major conditions to go from 150 to one trillion.

The other one is that the -- there is a need in my view, an urgent need for the international financial institutions take the mobilizing clean energy investments in emerging world is that it is such a priority and the countries in the both of this international financial institutions give this mandate to those financial institutions.

The problem is, David, most of those projects upfront they require a lot of -- the cost of capital is very high in the upfront, but then afterwards the operating costs are later achieved sometimes close to zero. But compared to North American and Europe, in many of those countries, the cost of capital is much higher. Now, according to our numbers, but up to seven times higher than the investment economist. There is a need for a such catalyst role for those financial institutions to play.

In my view, in addition to this -- and I will get to historical emissions as well, I believe the advanced economists have a moral responsibility to support the emerging countries to clean energy transmissions.

Let me finish by saying here that we all talk about the race to zero. It's extremely true.

And in my view, race is not between the countries but against time. And we should acknowledge that some countries start this race in front of the others. Advanced economies start in front of the others and the emerging countries come behind.

And the nature of the problem, and you know this better than me, David. Unless all the countries cross the finish line, nobody wins the race. So this is important that the race is only won if we all finish the race. And in that respect, I believe financing clean energy investment in the emerging world is a top priority. And as such, even the current numbers today, it is a fourth line in our fight against climate change. And I stop here, David.

MR. VICTOR: Very well. Thank you very much. We're going to hear more about the report in detail from your colleague, Mike Waldron, in a little bit.

But I just want to just take a few minutes and ask you a couple of high-level strategic questions because you've had this strategic view of the whole industry for quite a while. It seems like the number seven is a theme that runs through the report.

We need roughly seven times increase in investment in clean energy for emerging and developing countries. And your report is not focused on China. It puts China aside for that. And the cost of capital are up to seven greater.

So one of the things the report does is lay out whole bunch of different policies that need to be done, adopted internally and externally and so on. A lot of moving parts.

What in your view are the one or two things that really matter the most in terms of unlocking this capital that's sitting out there ready to flow into the places where it needs to flow?

MR. BIROL: Yeah. David, today I talk with some colleagues in South Africa. And I gave them a number, which, in fact, is really striking or heartbreaking, whatever you say. And the colleagues were in London, in the U.K. they were talking from there.

Now, in Sub-Saharan Africa, by far the continent, in which case the highest amount of solar. In Sub-Saharan Africa, the entire solar encompasses five gigawatts, and in the U.K. it is three times, 15 gigawatts. I mean you will all agree with me that even, Rachel, who is English, that the Sub-Saharan Africa, there is more sun in the U.K. I think that is more undisputable.

And you have 600 million people in Sub-Saharan Africa who don't have access to it.

Why? What can we do? What is our report? I see two things. One, there are good examples, for example, in India, in Ghana, in Vietnam how to -- what kind of simple straightforward investment framework to be put together. And we are working with some of those countries to provide investor friendly regulatory framework. This is one thing.

But the second, and I am very keen on this and I will repeat it again and again. I believe international financial institutions can play a critical role here. The catalyst role that we need allowed in order to do some of the projects there. And we hear from some of them from time to time how important the clean energy investments are, but I think we should approach it from a more systematic way.

And I believe those governments, especially those from the advanced governments, will sit in the boards of international financial institutions should give a strategic mandate to those countries to put the clean energy, mobilizing clean energy investment as a strategic priority. For me, if I have to pick up one thing, this is what I would pick up.

MR. VICTOR: Sorry. I want to try and get in two more questions before to go to Mike Waldron and talk about the report.

The first one, one of the ideas is there needs to be a strategy framework for investment. And that really is an internal policy reform in a lot of countries.

One of the questions we got in advance of this meeting was from Peter Waters of the International Standard Development and he asked, how should we think about the role of state-owned enterprises in this? Are they usually in the way? Usually crucial because they can make longer term investment risk? Are you seeing any patterns there? Or is it all over the map?

MR. BIROL: I think there are mixed ideas. There's a mixed picture that in some countries SOEs can play a very positive role to benefit if they are well managed and if the government provides a clear policy and clear target.

Given their relative deep pockets and able to look at the long-term issues, having a long-term vision, they can play a good policy for there. But in some countries, we see some of them are loss makers, historical loss makers for a bunch of reasons and it depends on the country. It depends on the governments I should say.

MR. VICTOR: Yeah. Last question for me before we go to the panel. Which is about

complements and conflicts. When people in the West talk about the energy transition, they really seem to mainly mean decarbonization with a lot of other goals.

And then one of the things do in the report is analyze the impact of all this on electrification, on clean cooking. Where do you see these goals as complements? And where do you see them as potentially in conflict with each other?

So take for example, clean cooking. A lot of people are excited about using LPG actually for clean cooking. Is there a way for us to think about this? Or is it mainly, we're going to see all these goals achieved at the same time?

MR. BIROL: There are two hallmarks of it. One is the electricity and the second one is clean cooking. For electric access, I think a big chunk of the new power plants can be run by clean electricity sources.

It can be solar, wind, hydropower, in my view, and others. There's a big chunk of what I should say, we are coming up with a major report on hydropower. It's very, very important, by the way but I didn't get the numbers.

So this is electricity. When it comes to clean cooking, of course, there are many clean cooking options here including sustainable bioenergy. But I believe if there is an LPG to use going from the wood stoves to IBG, I will be all for it for at least a temporary solution because the climate change is important, but the health of the women and children who are suffering from the various diseases from the charcoal from wood is also very important.

And once again, it's actually not all the countries are in the same basket. The Sub-Saharan African country, European country, I cannot put them in the same basket. So yes, for IPG in that context for me.

MR. VICTOR: Just very quickly before we go to the next set. It seems like on the one hand, the number of reports and the ambition is going up almost every year.

Now, we're looking at net zero with all these studies. And yet, when we look at the real world, the ambition of policy is not -- and in some sense even as we talk more about climate, the gap between what we're writing reports about and what's happening seems to be getting bigger. Is that helpful?

MR. BIROL: So, I would say that in more than reports. The government commitments are -- I mean, this year there's a report of two things.

The number of commitments for net zero and the increase of global emissions. Both of them are in the records. And this year, according to our numbers, global emission increase is the second largest in the history. And so, are the number of commitments for net zero.

But there is a big growing gap between regulatory and what is happening. But I should tell you that after we publish this trilogy, what I see in the real life from the companies, investors, the civil society, it is an incredible momentum. And the momentum is not only in terms of political popular momentum, but also on the ground in terms of the investments increasing money in innovation. And I think we are in a positive pattern now, and I am really optimistic.

They ask me, can we reach 1.5? It is so difficult. Yes, it is extremely difficult. It is a (inaudible), but we do everything we can to reach 1.5. If we can't reach 1.5, if we reach 1.6, it is much better than three degrees Celsius. So there, I think we should take the 1.5 as our target.

Do everything what we can and is the reason as I told you, David, I am very surprised when our reports come. Our normal, how do I say, counter partners are energy companies and energy ministries. We are dealing much more in just three weeks with investors, big investors, private investors, institution investors and the passion funds.

All civil society treasuries. We normally talk with the energy ministries, but we are talking more with their treasuries. And there is a great momentum thanks to the work of many colleagues there also join into this meeting today with you, David. And I am really optimistic despite this year's two record which are going in the opposite directions.

MR. VICTOR: Well, thank you very much for those remarks and your point of optimism. And crucially that we're seeing signs of reality because finance ministers are involved and capital is involved.

So, Fatih Birol, thank you very much. We're going to see you again later in the panel discussion but right now I want to bring in our panel beginning with Mike Waldron, your colleague at the IEA who is head of the energy investment unit. That's the unit of IEA that did this report focusing in on energy investment issues in emerging and developing countries.

Prior to being in IEA, Mike, among other things was at Lehman Brothers and on Wall Street so he knows the world of capital very well. And then our panel, I'm going to introduce the panel right now before Mike makes a few remarks about the IEA report.

On our panel, we have Rachel Kyte who is the 14th dean of the Fletcher School at Tufts University. A graduate of Tufts University. Previously was the CEO of sustainable energy for all which is an arm of the U.N. She's been doing terrific work on energy services for the least developed populations.

We have Steven Rothstein with us who is the founding managing director of the Ceres Accelerator for Sustainable Capital Markets. Ceres is a terrific institution. A great friend of Brookings I could say. Very helpful to us as we did our work on the capital markets and the impact of climate change on the capital markets.

He's been doing a lot of work on how changes in regulatory policy could affect in the flow of capital and has a previous Ceres long career on energy. A variety of energy issues including as one of the founders of Citizens Energy Corporation which provides energy services to many populations in need.

We also have two of my colleagues at Brookings, David Dollar, a senior fellow at the Thornton Center, an expert on China. Prior to coming to Brookings was at the World Bank for many years and a whole series of postings throughout Asia notably and China. And from 2009 to 2013, was the U.S. Treasury economic and financial envoy to China.

And Samantha Gross who is the fellow and director of energy security in the Climate Initiative at the Brookings Institution. And among many other things prior to coming to Brookings was at the Department of Energy doing very important work on U.S. collaboration overseas including China and Director of integrated research at IHS CERA, very important. Think tank working on issues within energy.

First, I want to give the floor to my Mike Waldron. He's going to say a few words about the report, a little more detailed report and then I'm going to bring the panelist to talk about that. So right now, Mike, the floor is yours.

MR. WALDRON: Thank you very much, David. Let me just pull up the presentation really quickly here. Okay. I hope this is visible to everybody.

So in the next ten minutes, I just wanted to build upon the executive director's opening remarks and illustrate and unpack some of the main messages of the report.

So first, I'd like to cover what exactly needed in terms of the investments then to look at the types of finance that are going to be critical for financing clean energy transitions in these economies and discuss a bit the priorities and cases that illustrate how to attract this capital in practice.

So it's worth keeping in mind at the outset that the geographical scope of this report when we're talking about emerging and developing economies, we're broadly talking about the economies in Latin America, the Middle East, Africa. Developing and emerging Asia. But we're not talking including China as part of this. So I know David noted that upfront, but for those of you who just happen to be joining now, it's a good reminder in terms of the numbers.

So building off of several years of effort by the IEA in tracking investments around the world as part of our world energy investment reports, we have a pretty good sense of where the projects and the financial flows, they characterize the energy investment landscape.

And what we've seen over the past five or so years is that clean energy investments in emerging and developing economies has been stuck at around \$150 billion. They declined by a percent in 2020. We expect only a slight rebound in 2021.

The red dot there will show you the share of clean energy and total energy investment and you can see this has been going up a bit. But I would say, it's been going up more because of the weakness that we've seen in investment in fossil fuels and other parts outside of clean energy rather than particular strength in clean energy investment.

When we're looking at what's needed in the decade ahead, this points to a massive surge in clean energy investment that would be needed to put emissions on a different course. So to put the world on track to reach net zero emissions by 2050, annual capital spending on clean energy technologies and this includes a very big role for clean power technologies.

So renewable power including solar and wind, hydropower, but it also includes a very big role for investments and use in terms of energy efficiency and buildings and industry in terms of the spending on electrification of transport through electric vehicles and other sort of consumer level spending that needs to take place.

And also, we see a small but growing role for investments in harder to abate sectors. So looking at the world of low carbon fuels and transitions for energy intensive and emission intensive

industries.

Putting it all together, clean energy investments over the next decade, we'd need to total over two-thirds of the total investments. And this is a far cry from where we are today, which is only around one-quarter over the past five years. So a massive increase would be needed to put these economies on track.

Now, when we're looking about how all this can be financed, what we've done in this report rather uniquely we start to analysis and project the sources of finances, the primary sources of finance. So these are the finance which is being used in the energy projects themselves and look at them over four different parameters.

So we've looked at what type of finance is needed by type of provider, by type of instrument, the origin of the finance and also by financing structure.

And in this slide right here, we're looking at -- we're focusing on two of these parameters. So the first parameter is looking at the role of the provider. So this is the role of public versus private sources of finance. And compared with advanced economies, we see an emerging and developing economies that today's energy investments rely rather heavily on public sources of finance. So this is the light green portion to the right on the chart.

Even though this is still smaller than 50 percent, it's a much higher share than in advanced economies. And this reflects some of the traditional challenges in attracting private capital on the role of standalone enterprises in dominating certain sectors such as fuels.

We also look at the role of debt and equity and we also find that energy investments in these economies are more funded by higher cost equities than debt so this contributes to a higher cost of capital overall. But when we're looking at the clean energy investments.

And again, going back to this slide I showed just before. This very high stacked column of over \$1 trillion, we find that -- and this is illustrated by the dot here on these charts that sources of finance need to shift in order to be able to manifest these investments.

So debt finance becomes more important as energy becomes more capital intensive and dependent on financing models with long-term cash flows and savings that support the bank eligibility of projects. A low-cost debt also becomes particularly important.

And then on the top, we note that over 70 percent of the clean energy investments would need to come from private sources. So this runs the gamut from private developers to commercial banks to increased role of institutional investors. And this very much characterizes the landscape particularly in renewables and energy efficiency.

Despite these shifts, we still see an important role for public sources of finance, notably state-owned enterprises. They still remain very important in terms of infrastructure investment, notably electricity networks. Equity risk capital still remains very important as well particularly to fund new technologies and projects at early stages of development.

And amid all this even though we do see a larger role for private finance, what is really important is having that catalytic effect of public finance institutions to provide blended capital at the right time and in the right place to attract private investment. In areas with hard to mitigate risks so certain sectors or in markets or sectors that earlier stages of readiness for finance.

So what is all the financing in terms of the sources of finance? What does it mean for the evolving energy system picture? So the finance matches up pretty well with the way the capital structure of the energy system is evolving. And this, in turn, has an impact on the affordability of the transition.

So the affordability of the transition starts to rely more on capital and it starts to rely more on the cost of capital. And we observe that as emerging and developing economies invest more in clean energy such as wind, solar PV, electric vehicles as well as the enabling infrastructure for all these technologies, the energy system becomes more capital intensive. So it becomes more reliant on technologies which have higher upfront costs where financing plays a greater role in the overall cost of the transition.

But this shift towards a more capital-intensive energy system is particularly challenging in geographies where capital has been constrained. And we'll get to this in the next slide actually. But this slide, what it shows is it shows how this picture starts to play out in the power sector in IEA climate driven scenarios.

So overall, looking ahead over the next decade, power supply costs rise by about half in emerging and developing economies. But if you're looking at the charts on the right and you're looking at that share of the sort of dark green and the light green portion, you're going to see that a greater share of

the overall costs of the power sector start to go towards increased investment in capital recover for renewables and electricity networks in particular.

And at the same time, even the total cost are going up and even though the operating costs are also going up, you're seeing a relatively smaller share of those operating costs in the total costs. And an analysis we did in the report and it's not shown here on the slide.

But we took the power sector and the NU sector together. So looking at industry transport and buildings plus power. And we looked at the total cost of transition. And when you tally up the increase in investments, the increase financing cost, but then you net off some of the operational savings. You see that the total cost of transition is only around five percent higher than under the current development pathway under today's policy setting.

So the cost of the transition is actually quite manageable, but it's really securing that upfront capital which is the very difficult part. And which is partly why we wrote this book.

So this right here will show you on a very kind of indicative basis some of the difficulties in securing capital in different parts of the world. The difficulties in securing it but also the costs associated with that.

So globally, and I'm sure all the panelist would agree with this. Global capital is rather abundant right now. There's a good financial conditions that are accommodative in many parts of the world and interest rates are rather low. And capital is abundant in places in of particularly advanced economies. But we see there's a big difference in the cost around the world.

And over the past few years, the economy wide financing costs have broadly come down as government bond yields have come down, equity market risk premiums have also come down in a number of economies around the world, both advanced economies and emerging market and developing economies.

But looking at this picture and what this picture shows you is basically the base rates. So it shows you the government bond yields plus the market risk premiums. So this is kind of the starting point for the cost of capital, not necessarily a specific cost of capital that you would find for a given project, which is determined by some of the risks associated with a particular project or that particular energy sector.

And what we find is that up to seven times more expensive in some of the emerging and developing economies is the cost of capital. When you're looking at more risky markets or even looking at more risky segments within a market. So for example, looking at small to medium sized enterprises, the cost of capital can be much higher than the seven times we show here.

This just gives you kind of an indicative economy wide difference between the advanced economies and the emerging economies. And this picture is not getting better even though that we've seen the cost of capital broadly come down and we see that domestic savings continue to be unevenly distributed across regions due to the COVID-19 pandemic.

Death burdens are on the rise in the number of emerging and developing economies. When we look at over 90 percent of the investment needs that we put out in this report for emerging and developing economy, over 90 percent are occurring in economies with underdeveloped banking systems and capital markets when we're looking at the global average.

So this is a persistent challenge and it points to a relatively high bar for investments and access and debt finance in meeting equity return hurdle rates before even getting to the energy sector. So this is kind of the starting conditions.

This also means that good energy policy reforms and targeted financial mechanisms are really critical to start to overcome this starting imbalance.

And in my final slide, I'm just going to point out, you know, the hows. So how we can actually make this happen. How we can actually start to attract capital at scale to these economies in the sectors that are needed for clean energy transitions.

So as the Executive Director pointed out, we have around 50 case studies and examples in the book where we're talking about how this is done pragmatically. In the executive summary of the book, we set out 20 priority actions. And these priority actions are kind of grouped into four buckets which I'm going to briefly show here and give a few examples.

The first bucket of this is really recognizing that an international catalyst is needed to reach clean energy investment in emerging and developing economies. It's about giving a strong strategic mandate to international public finance institutions. It's about boosting and improving the delivery of international climate finance with targeted use of blended finance to help mobilize additional

private capital.

But both the international community and the emerging and developing economies need to address a number of other issues, and some of these are crosscutting. Some of these are sector specific to help to get investments moving.

And just to briefly give you a sample of these that we have in the book. When you're thinking about some of the crosscutting investment issues that affect all projects, we looked at cases and examples of how to make it easier to prepare clean energy projects with financing facilities and things called One Stop Shops as in Morocco and India.

We looked at the financial performance in utilities and how do you enhance those because they play a crucial part in all sorts of transactions that are electricity related both in supply and demand. And we looked at case studies in Columbia and Kenya on that.

Pushing to the third bucket right here on clean power and efficiency. We looked at how to harness investor readiness to back renewable power with competitive procurement frameworks in Argentina and Brazil. We looked at ways to embed efficiency in all new buildings and appliances. Analyzing some of the programs in Mexico and South Africa. And we also looked at ways to promote more electrified and efficient mobility as in Thailand and Uganda.

And then last, this sort of getting to grips with the toughest tasks. This points to how do you finance transitions in the fuel supply sector and emission intensive sectors? This involves recasting the development model of oil and gas producer economies as well as laying the groundwork for the scale up of low emission fuels and emission intensive industries.

And there we looked at a number of cases ranging from Egypt to the Bangladesh to Singapore. To looking at the cement industry worldwide on how to do this.

And of course, there's a number of other cases in the book ranging from boosting electricity access in cooking to boosting investment in smart grids and addressing the emissions of existing coal power assets.

So the last Segway I'll leave you with is that the investment opportunity is actually huge in these economies despite some of the upfront challenges with the cost of capital. This opportunity has to do with the creation of new jobs associated with clean energy investments and some of the related

activities.

But it's also important as we're looking at this transition to make sure that governments to make sure this clean energy transition centered and inclusive because it also involves the transition away from some existing industries in fossil fuels which heretofore have been a big source of employment in a number of these economies.

So with that I'll turn it back to you, David.

MR. VICTOR: Great. Well, thank you very much, Mike. And I want to bring in the rest of panel right now. And that's a big list on my slide. Four buckets, a lot of stuff in every bucket. Maybe I want to start with a question to Rachel Kyte and Steve Rothstein.

About the first bucket to you, Rachel, which is about international support. We just had the G7 meeting come and go. There are new pledges. Not really planned but a pledge to have a plan for more investment finance partly in reaction to what's happening with the Belt and Road Initiative financed by China.

And I'm curious just as someone who has watched this area and has been in the center of this area for a long time, Rachel, what do you see coming out in terms of new international frameworks that could really help address the problem at the scale that Mike and Fatih talked about which is a 7X increase in investment for clean energy finance?

MS. KYTE: Yeah, thank you, David. It's good to be here today. And it's good to welcome IEA into this space, you know, based on their analytics of what actually has to happen in the transition and what needs to happen on the finance.

And I think there's nothing to argue about really. On the slides that have been presented, but I think the important question is why is it not happened? Because the investment returns really are there and the need is urgent.

And I would, you know, we're on a panel so we're not going -- I don't think any of us really disagree, but just to, you know, to keep the conversation lively. I mean, you know, I'm not sure that the MDBs need a strategic mandate. They have that. It's called the Paris Agreement.

I think the question is why is public finance not being used aggressively enough? And what is going to happen now that will be different to meet the delta between where we are and where we

need to be as so well described by IEA colleagues?

And so, I think there is a couple of paragraphs of sort of warm milk in the EG7 communique, but they're important. One is that the actual MDBs have to do a lot better with what we've already got. I'll come to that. And then the second is the MDBs have to explain if they were to get more what they would do with more resources, more capital.

So first off, there's an extraordinary amount of public money sitting in binational pockets and in the multinational banks and in different pockets within the different multinational banks that could be used much more effectively. And this means answering the questions about why the MDBs don't leverage private sector finance better than they do at the moment?

They've been under pressure to do this for a good couple of decades and have had really fairly poor results. I think, you know, whether you look at IBID, IDO, when you look at even IFC. You know, but there are ways in which the MDBs have leveraged very effectively. And I was also glad to see in the G7 communique that finally more funding is going to flow into the climate investment funds, for example, where there is a very good track record of leveraging at least one to seven, one to ten.

So the question is, you know, what do they need to do with their existing rules? And what do shareholders need to do to be good shareholders? To allow more risk to be taken? Different risk to be taken? Risk to be taken in a different way? How should the treasury operations move? What should they be doing in these new country plans a part of the climate plan and climate strategies? We waiting to see the detail of that out of the bank.

And then for the IFC and for the private sector-oriented parts of the multinational development banks, you know, if we're going to go to scale then they have to be able to originate an extraordinary pipeline of projects which then needs to be moved off their balance sheets onto the balance sheets of the private sector.

I think expecting Goldman Sachs and others to start walking around, you know, the Sahel looking for renewable energy projects to invest in isn't going to happen any time soon.

So how do we originate and distribute? And how do we use the balance sheets of the MDBs and the development finance bilateral IDFC members in effective ways? So these are all questions that I think have to be answered.

And I think there is going to be political pressure on the MDBs to be able to show how they can do more with what they've already got before they get more capital. And I think the western shareholders are clearly lined up to give them more capital, but they're going to want to see an aggression that hasn't been there up to now.

And then I think there are real questions about how developing countries access the capital markets for debt at a reasonable price? At the moment, I think the Economic Commission on Africa has spoken the most compelling about this, but that's going to have to happen. And then I think there's also going to be a need for domestic resources to just do dispense on the energy transition.

So for many countries, especially those countries with the biggest energy access gaps, there's very little indigenous capital going into the opportunities behind best group returns in sort of the energy access space in these countries.

So I could say many more things, but I'll let my fellow panelist jump in. But I think the question is if we've had low interest rate environments for a very long time, the MDBs have had a mandate for a time. There's a sense of urgency now. There is a sense of being in this race to zero and I agree with Fatih. It's not, you know, it's a race against time. Everybody has to cross the line.

What's going to have to change in the instruction from shareholders, and what will have to change in the way the current rules that are used by the MDBs and the current constraints that they that's going to have to change if the MDBs are going to unleash public investment. And then a wave of leverage to private investment into the transition quickly.

MR. VICTOR: Great. Thank you very much. So what I want to do is put the inverse of this very same topic to Steven Rothstein.

Rachel laid out the argument in effect that the Multilateral Development Bank, the MDBs have had the mandate for a long time and there's more capital ready to go. And I want to bring David Dollar later on for the same point including China's role in all this.

But first, I want to talk with you Steve about the role of the private capital markets because it seems like it's a huge amount of capital now looking for returns, but also looking for returns. And in various ways is environment, social, governance, ESG related returns. Isn't this an ideal opportunity for them? Or is this being seen by the capital markets as a harsh because the risks are so

gray? And the currency risks and the governance risks and all this kind of goes on and on and on.

MR. ROTHSTEIN: Yeah. So I think, you know, as H.O. Mencken said, for every complex question, there's a simple answer that's always wrong. So there is no one, but providing first is the complexities of loaning or developing in emerging countries clearly exists. Then add on top of it, the uncertainty of the regulatory structure is true.

And on some of these technologies that are proven, no question. And some of them are newer. So there are all those risks. And there is a -- I can give you kind of the glass half full and the glass half empty part of it.

The glass half full is in the last year Ceres and lots of other partners around the world have worked with investors and there are \$37 trillion of investors. Investors who have said, they want their capital to be net zero by 2050. They're going to set short-term goals by 2030 and there's a lot of work being done.

The three largest in the U.S. have all signed onto this. BlackRock, Vanguard and Stay Through. So there's a lot of capital that will be moving in this area. The six largest banks have also said that they will be doing the same kinds of things. So there's a lot of great effort.

There's also regulatory pressure, some that's starting and some that's going to move on. And we'll talk more about the regulatory stuff in a minute.

The glass half empty is if you look at since Paris, banks have loaned \$2.7 trillion more. Of the 35 largest banks, \$2.7 trillion more than they had before Paris. So even in the last several years in Paris, the capital hasn't moved as quickly. While there's been a growth, every bank has an EST fund and there is more funds going into solar and wind and the cost of those have gone, depending on the technology from 70 and 90 percent. So there's a lot of great news, but there's also other news.

And some people describe this in the bank is, you know, if you're on diet, you talk about the salad you eat. You forget to mention about the ice cream you had for dessert. So there's still a lot of these areas. So there is great ambition. There is a lot of great work happening. It has accelerated in the last year, but we are still at ground zero.

And just following up on what Executor Director just said. You know, climate is one of those areas, David, you know this so well that if you win slowly, we all lose. And so, we all have to move

faster. Private capital is enormous capital available but the investors and the banks have to now take their initial statements and make them into concrete, science-based 2030 plan and use those in a way to invest both here and around the world.

MR. VICTOR: Great. Thank you very much. I want to bring in David Dollar next and then Samantha.

And, David, I want to pick up on a theme Rachel brought in front of us, which is the Western developmental banks already have a date. And at the same time, the Chinese government and China's data firms through the development initiative have been doing a huge amount of investment in some sense there's like an arms race underway right now that's triggering more investment from the West.

And so, I'm just curious as someone whose been in one of the multi-development banks, the World Bank, and also studies China, two related questions. One of them is do you agree with Rachel's characterization that the mandate is already there? And in some sense, this is folks that just need to get on with it? And how do you see the Belt and Road, the BRI Initiative and the kind of arms race of financing that's been triggered by that?

Is that basically in the end going to be very helpful to mobilizing more of this international capital or is it getting in the way?

MR. DOLLAR: Thank you very much, David. So I very much agree with Rachel's point that the multilateral development banks already have this mandate. You know, they've had it for a long time. I retired more than 10 years ago and, you know, we were deeply involved in this 15, 20 years ago.

So it is a question of just getting on with it. And I do think one important issue is the World Bank in particular and the other multilateral banks, they continue to be bureaucratic, you know, difficult to deal with. They have lots of complicated regulations. You know, I ran the largest infrastructure program in the World Bank, which was the China portfolio. And, you know, we just had hundreds and hundreds of pages of regulations.

And so, I think frankly a lot of developing countries really don't like doing big infrastructure projects with the existing multilateral banks. You know, on the other hand, China can move very quickly and that has both, you know, pros and cons. I think some competition between the

traditional funding sources and the Chinese. I think that that's potentially a healthy thing. A lot of developing countries welcome that.

Quite a bit of research shows that the Belt and Road Initiative is demand driven. And so, one of the important issues are what do developing countries want? Developing countries make a strong push to set and meet ambitious commitments on carbon reduction then they're going to be demanding from China, you know, hydro, for example.

China is a major financier of hydro. China is a major financier of solar, but China is also a major financier of coal fired plants because countries with coal reserves are asking Chinese to finance these. So, you know, I think one thing we have to do is get developing countries, you know, on board with the commitments and understanding how important this is for them.

And then I also think we can -- where I do think the development banks, the traditional donors are good is in technical assistance. You know, as you know the access of periodic sources to the grid is complicated. It's not a simple thing to develop a solar industry where you don't have a solar industry.

So we could imagine the complementarity between these different financing sources where the World Bank provides technical assistance, you know, to help develop renewable, you know, technologies. And some of that will end up being financed by China and that's fine as long as that's actually getting done.

So I think it's, you know, useful to have this G7 talk about, you know, sources of financing and ramping up and development banks taking this seriously. But I don't think we should see this as anti-China initiative. I think that will be self-defeating and not particularly welcomed in most of the developing world.

MR. VICTOR: Quickly a quick follow up on this. Rachel mentioned these concrete studies, country programs that are now designed to create more strategic view of what can and should happen inside individual countries.

We've seen other earlier efforts around multilateral developments assistance, for example, in the ozone layer where there were country studies were a very, very crucial role.

Are you optimistic that that kind of initiative is exactly what's needed to get the Western

and MDBs to be playing a more strategic and complementary role? Or is the jury out on that perspective?

MR. DOLLAR: No, I think that can be very useful. That's another good example of what the multilateral banks do well, you know, which is country studies and sector studies. And so, kind of mapping out what this energy sector in Pakistan will have to look like or Indonesia.

I mean let's face it. Most of the emissions come from a small number of big countries. So if you just take the developing countries that are in the G20, you know, that's a big share of growing emissions right there. And so, you should be able to trace out what the energy sector is going to look like. And, you know, that could be very useful in galvanizing public opinion and political momentum.

MR. VICTOR: Yeah. Let me go to you next, Rachel. I'm sorry, Samantha. You've been in Germany for the last half year or so. I think you're in Mexico today. Global traveler world on Zoom.

I'm curious. It seems like there's a tension in any discussion of global organization between what the leaders want to do, which tend to be wealthier countries who are willing to spend gazillion dollars on various things and the need for this to be a global -- everyone needs to cross the finish line to use Fatih's metaphor.

How are you seeing the balance of effort between inside Europe? The efforts to control emissions in Europe versus putting more money into international finance, helping the MDBs steer in a more effective way along the lines of what Rachel was talking about. Is the balance of effort out of whack? Are these international issues a much bigger deal in Europe than they are here in the United States? Help us understand that.

MS. GROSS: Thank you, David. Most of the people that I spoke to when I was in Germany were really focused on getting their own house in order. And I think that's because they've put forward their news goal.

They're working on what they're calling the Fit for 55 program, which is putting in place the policies that will allow them to achieve their Paris goal, which is a 55 percent reduction by 2030 on greenhouse gas emissions.

And so, what I heard mostly was a real focus on what's going on at home. But something I also heard that I haven't heard the other panelist talk about that I think Europe is doing is that they're

working on reducing the cost of capital by helping countries establish policies that make that policy risk smaller.

If you think about why the cost of capital is so high in many of these countries. Policy risk is an important aspect of that. And so, I see Europeans reaching out. I see quite a bit of work with China, which I know isn't included in the study, but other countries as well helping establish carbon markets, helping them think about how to put in place enabling policy to enable clean energy investment.

And so, that's something that can reduce the cost of capital and reduce the risk of these investments. As others have said, there's tons of money out there that's looking for high returns with interest rates and the cost of capital very low here in the wealthy world. And so, reducing policy risk is something that can enable investments in other countries.

And we certainly seen what can happen when that policy risk takes place. I'm sitting here in Mexico today and that's an area where policy risk has been really important with the change in the presidency here. We've seen a real just complete drying up of the environment for clean energy investments because of a change in policy.

And so, that's an area where I see the Europeans reaching out and doing a lot of good work to actually reduce one of those risks to make clean energy investment more possible and also more profitable.

MR. VICTOR: Let me come back to you, Mike. I'll pick you up on a very important point that Samantha has made about policy risk because it seems like this maybe a little bit abstract as a question, but a little abstraction is the name of the game as a university professor.

I'm curious. It seems like on the one hand, the report is full of examples of all kinds of policy reforms that are needed especially internal to countries. And on the other hand, the more that things change, the greater the risks often and, therefore, the greater the cost of capital. And you have some very powerful calculations showing that even modest changes in the cost of capital of 1,500, 200 basis points can have this huge impact on the overall cost of decarbonization.

So I'm curious as to how we should think about what are the right models for doing all of that policy reform, yet taking seriously the idea that if investors see a lot of policy change, they're going to see policy risk and that's an (inaudible)?

MR. WALDRON: Yeah. So just to kind of put in context a bit and kind of stepping back and looking at the overall investment opportunity while taking the cost of capital into account. So I think it's worth keeping in mind that in a lot of the emerging and developing economies some of the emission reductions opportunities we see are the most affordable in the world so they are quite cost effective.

Before you get to the cost of the capital costs or the costs of the projects and the technologies, et cetera. In some markets these are among the lowest in the world. So in India is a very good example.

So looking at it from an overall investment opportunity from kind of an affordability or from a competitiveness standpoint, there are a lot of really good opportunities there even though you do see this differential in cost of capital. And this differential can be prohibitive in the sense that it's not just about implementing the project economies. It can be binary in the sense that you can't even get financing for these projects in certain markets to begin with.

And we looked at cost of capital through a number of different lenses in the report. And the slide I showed you is just looking at kind of the starting point. So the market wide cost of capital before you get to the energy sector.

And then we've also looked at how do you look at that kind of risk bring up for a certain sector? So as Samantha was saying that things associated with policy risk, we looked at that, for example, in solar PV.

And we also looked at a number of sensitives and how project economies evolve with changing cost of capital ranging from projects in green buildings to carbon capture, utilization and storage to the ownership of electric vehicles.

And so, it is an issue of the differentials between the different markets, between the advanced and the emerging and developing economies, but it is also this issue of different segments within those markets. So access to finance for a smaller scale investments for new technologies is always going to be more constrained than for the more mature technologies.

So all of this kind of upfront barriers puts more onus on combining, A, some enhanced role for catalytic finance particularly from the international community. And, B, some sort of good policy reforms which can also be supported by the international community as well.

And we've seen investment ramp up in certain clean energy technologies in markets which could be challenging on their own to invest in when the right frameworks are put in place. I mean the examples of sort of when are always the easiest or are always the sort of the most ready in countries like Vietnam or even in countries like Egypt or in Pakistan where they've started to set transparent auction frameworks around bankable contracts when they've been able to kind of use blended finance from both national finance sources and international public finance sources.

And even though these markets can still be difficult to do business in just putting place those sort of high DOS frameworks around these technologies have been major ways to attract capital. So this is a success story and the challenge is to be able to scale these frameworks both within those economies and then to bring them to new economies.

And then you also have the issue of some of the sectors which are less mature or less developed. Efficiency technologies are mature from a technology standpoint, but often times the business model is challenging and the access to consumer finance projects are challenging. And so, they're having a better role out of policies to support, for example, building standards and green loan programs for mortgages and efficiency upgrades.

It is important when you're looking at new technologies. You're going to have to have governments step in often times and take those first risks for first-of-a-kind projects or public financial institutions to come in and bear a lot of that risk for financing these on concessional terms just to get those projects going. And these are things like CCUS or hydrogen which we don't see much of right now in the business models. They aren't viable right now in these economies, but would expect to play a big role over the next decade.

And it's just worth keeping mind that despite all these challenges in terms of attracting and the cost of finance, the growth opportunities are there for investors. These are also some of the faster growing economies in terms of economic growth and demand over the next decade.

And so, putting that onus on better energy policy reforms, building capacity at the local levels to develop projects and supporting this with catalytic finance from the international system can be a way to kind of scale these and move these things forward all at once.

MR. VICTOR: Let me ask you. We've got 10 minutes left and I want to make sure we

have time for a few more questions and I want to go first to Rachel.

Mike laid out a whole bunch of innovations that has occurred around, you know, options for renewal power. A lot of things that are about decarbonization. I'm curious given your previous job as running Sustainable Energy for All (SEforALL), whether you see the same degree of innovation around clean cooking and electrification? Or in some sense those missions are lagging behind the attention to the decarbonization of emissions and should we be worried about that?

MS. KYTE: No. I think it depends on where you stand, right? So if you're sitting in, you know, a major city, town in an emerging market, you don't have reliable, affordable clean energy, let alone for all.

And so, you're worried about the cost capital. You're worried about the indigenization of working capital debt. You're worried about the debts and breath of your own capital markets. You're worried about going to the international markets. You're worried about the bond markets. Then you're worried about the incumbency and the inertia.

You've probably got a utility which is not solvent and maybe weakly managed. You've got, you know, the international gas companies and their lobbyists walking through the door because they're not making money in the global North anymore.

You've got politicians who remember how energy used to be done. And now, you're saying it's going to be decentralized, decarbonized and digitalized. This is a whole new world. And you've got MDBs giving you different advice depending on who you call on any given day.

And then you've got bilateral Western aid coming in and sort of, you know, having 40,000 angels dancing on the head of a pin with lots of sort of perfect and maybe not enough of the good and then you've got China. And then you're going to have India.

And so, I think you have to look at this from the bottom up. And you have to look at tackling the inertia in the incumbency which mean that you can't have the imagination that we can have green hydrogen market offshore in Africa. The inertia and the incumbency which are going to stop you imagining that you can actually have Chinese and Asian off takers for large scale renewable energy projects in Africa.

So the Africa actually because it has an abundance basically free energy if you get it

right. Could not only electrify itself but could actually be the, you know, the power generator for the aluminum of the future. The new steel of the future, et cetera. So we're going to have to think big and think different.

And then, you know, on the developed world side, I think if we projectize access to energy for all, we'll never get there. I am the chair of the Rolandin (phonetic) Green Fund and let me tell you that, you know, these kinds of domestic green funds and development banks are on the rise.

And the whole purpose of them is that they check every box. They're well administered. They're well governed. They are good enough to get access to the green climate fund and every other possibly international mechanism, and they have plans. They relate to the nationally determined contributions which are Paris compliant.

So in that case, you should be putting development money into those funds and letting then those funds be used against the domestic priorities. But let me tell what still happens is you have a set of domestic priorities in the case of Uganda, they have a very clear road map about how they're going to get clean cooking for everybody. And you still have to deal with a Western donor that's like, well, no, we really want to see this kind of safeguard on this kind of policy.

You know, and therefore, we're going to have to have money put in a separate pot of money where it can't be contaminated with somebody else's money because we couldn't possibly fund LPG in a city or town and that.

So if we're going to projectize this then come back in 2040 and David Dollar and I we're saying the same thing, right? So I think we have to sort of let the urgency sort of wash its way through the development finance industry.

I'm optimistic. There is extraordinary innovation out there. Sebastian Kind at Green Map is putting a sort of policy recipe kit in a box given what he did in Argentina when Argentina put their auctions out. So there's plenty of people who know a little bit about how this can be done.

But I think we're going to have to organize the technical assistance differently as well as the capital from MDBs. So there's technical capacity around the world, but is it deployed in a way that can really be useful? I think that's pretty room for innovation there as well.

MR. VICTOR: Let me ask since you said you and David Dollar had been saying the

same thing 2040. I want to get David Dollar on the record to see whether he says the same thing in 2040.

In particular, Rachel laid out -- and I need to think big. We have a lot of frameworks there and yet when we go to implementation, we're mucking it up.

The money that's pledged through the G7 most recently maybe adds up to \$100 billion, but nothing like the trillion, trillion and a half, that's needed for Mike's analysis and so on. So what happens if we continue to kind of bump along and projectize everything. Projectize with everything or whatever the verb is.

Do we just don't deliver? Does the Chinese program get bigger? How should we think about that geopolitical, David?

MR. DOLLAR: Well, I think the Chinese program pulled back a little bit in the last few years. You know, partly because there have been failures and obviously the pandemic had a big effect.

But I don't expect the Chinese program in long term to be diminished. I think it's going to be on the rise now and the rationale thing is for us to be coordinating with that and trying to help developing countries get the most out of it.

I think we don't look serious, you know, when we talk about a \$100 billion initiative given the scale of the problem. There does seem there's a reasonable chance, David, that we'll, you know, kind of muddle around for a while. And then it will become increasingly clear that we're not going to be meeting key targets.

You know, I would like to think that, you know, as various climate disasters unfold that that does effect politics and that we will eventually wake up. But it does, you know, come back to the point made in the initial presentation that there seems to be divergence between commitments, general vague rhetorical commitments, and then what's actually happening in terms of investment and carbon emissions.

MR. VICTOR: Yeah. You know, I'm shocked because it's never happened in any other politics (inaudible).

Let me ask, Steve, about net zero. I really anticipated your earlier comments about how the private markets are seeing risk even as you have so much money flowing into BSG.

And I'm curious as to whether ironically all the focus on net zero might be getting in the way of some of the things that Mike and Fatih have been talking about. In part because so many of these economies still have coal in their economies and still are going to have coal in the foreseeable future, other fossil fuel for the foreseeable future.

And so, net zero seems kind of like a fantasy. Whereas, what we really care about is deep reductions in emissions and whether it's actually zero or not maybe getting in the way. And I'm just curious as to whether you're seeing any evidence of that kind of weariness by investors about getting involved in the emerging of economies and so on precisely because they don't know what's going to happen to their overall net zero pledges? Or is that a smoke screen?

MR. ROTHSTEIN: I think there are a few things. First is one of the sectors, and it's small in the context, but important is philanthropy.

Just today Ikea and Rockefeller announced today a billion-dollar fund. And they've specifically said, again, small numbers compared to the issue, but it's going to be catalytic and risk capital. So that's important just to keep that in mind.

In terms of net zero, absolutely. I mean we can't allow these products to continue with fossil fuel, particularly coal, and then let people plant trees. I mean I've already seen plans that, you know, we would plant trees the size of Brazil seven times over, speaking of the word number seven.

And we just did a recent report on natural cinnib solutions where basically the offsets have to only be used in the last resort. The first thing we have to do and the second thing and the third thing, it's like the real estate, location, location, location. And this is reduction, reduction, reduction, and then only later using offsets. So the net has to be a smaller end not larger.

The other thing to think about is bank regulations. I mean, you know, that there's some work in Europe already and we're working hard in the U.S. on this to try to affect the cost of capital with stress testing scenario analysis then would make the cost of capital or fossil fuels a lot higher and the cost for renewables a lot lower as part of this.

MR. VICTOR: Okay. That's really helpful. I'm curious. We're just about out of time here. But I want to get back to you, Samantha, about the future and particularly the role of European policy initiative because Europeans quite frankly have been the leaders in this area.

So I'm curious as to whether as you see more attention to the international trade effects or national investment effects from European policy. We're about to see an ordered carbon adjustment plan elements that have already leaked, a bunch of other things.

Do you see the future of European policy and therefore put pressure on American policy to include more of these international investment kinds of questions? Or do you think that as these countries get more serious about decarbonization, they are going to continue basically look inward at their own house?

MS. GROSS: I think that you do see European policy pushing reductions abroad particularly through trade policy. The carbon border adjustment mechanism will be difficult to implement, but on the other hand, it is primarily designed to protect European industry. But at the same time, it gives Europe a mechanism through which to help industries in other countries to carbonize. And I think this is a way that Europe could use its own policy to reach out and help other countries decarbonize their own industries.

I also completely agree that the European banking initiative will help. You see what they call the taxonomy in Europe that's focused on deciding what investments are green and what investments are not. And so, as European banks look to fulfill their customer's demands, government demands for greener investments and they turn to this taxonomy. I think that will really help European commercial banks and other commercial investors understand what investments are green and to encourage more of them.

The one sort of slight cloud to this silver lining is going back to something that Rachel said about, you don't want perfect to be the enemy of the good. And I think that's my bigger concern with European policy is that there's so much focus on green perfection that we perhaps may miss out on the good. And miss out on things like LPG and cooking because it's a fossil fuel and that sort of thing.

So I'm really excited about a lot of the things that Europe is doing but one real challenge to their policies are unlike the sort of get it done policy that we have here in the United States. We like all solutions. Europe is more focused on the perfect solution and I hope that that doesn't cloud their approach to investments abroad. Where get it done is really what needs to happen.

MR. VICTOR: Yeah, that's very good advice. It seems to me that, you know, trade

measures are going to be part of this story. But the more, just to pick up on something that really began with Fatih's earlier comments. The more we see this in the trends of investment policy and the factors that condition where the capital flows, the more serious we will be about this.

And we didn't have a chance to talk very much today about electricity, but I just want to underscore something that's new in the IEA report is that they're running energy models with much greater detail around investment and how factors affect the cost of capital and the allocation of equity and debt.

And therefore, ultimately what kinds of projects are developed. And really the rubber meets the road around electricity. Electricity is the center. It's not the only story but electricity is a key part of this.

Well, I hope everyone will join me in thanking both on our panel, but Mike Waldron, Steve Rothstein and David Dollar and Samantha Gross. And also, for his earlier remarks, Fatih Birol and all team in IEA. It was a really terrific discussion. Thank you all very much.

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