



ADB report on Asia in the global transition to net zero

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Laveesh Bhandari:

Good afternoon. It is really great to have all of you here. It is a great privilege for CSEP to host ADB and the work that they have been doing on Net Zero. It is really a great privilege to have such a distinguished panel here with us today. This area of Net Zero is something that I must say ADB is very brave at presenting at this time and especially to come here and do that. The G20 headquarters are right in front. So, you may not be able to go back. As a consequence, this is going to be a fairly long talk. It goes on for about an hour and 40 minutes and then we have the Q&A and of course, the discussant's comments. I would like to introduce to you our panelists first and I would like to request the authors and the panelists to join me here on the stage. Indu Murthy heads climate environment and sustainability at CSEP. She has worked as a consultant scientist at the Indian Institute of Science, Bangalore. She is also an expert with the UNFCCC roster of experts in India for the GHG inventory and is a member of the REDD+ cell constituted by the government of Karnataka. Her areas of interest include climate change vulnerability, land-based mitigation and adaptation and resilience building, and climate-proofing development to climate change. Dr. Sudipto Mundle is the chairman of the board of the Center for Development Studies in India. He also serves in varying capacities as a board member and expert of several other organizations including the Indian School of Public Policy, NIPFP, and NCAER. He was a member of the 14th Finance Commission and the erstwhile monetary policy advisory committee of the Reserve Bank of India. And the chairperson of the National Statistical Commission. May I request Dr. Mundle to be here? We are going to be soon be joined by Mr. Montek Ahluwalia who is a distinguished fellow at CSEP. Has been a notable figure in the Indian economic reforms from the years early 1980s onwards. For the past few years, he has been working extensively on environment and climate change issues. He has previously served as the deputy chairman of the Planning Commission of India, as the finance secretary in the Ministry of Finance, and as the first director of the independent evaluation office of the IMF. He has written extensively on various aspects of development economics. And is a recipient of the Padma Vibhushan. So, he is slightly delayed. So, he just called and said he will be here in a couple of minutes. I will now also introduce our presenters of the report. Lei Lei Song, he is currently the director of the economic analysis and operation support division of the economic research and development impact department of the Asian Development Bank. We would later like you to also explain to us what all of these entities do. Thank you. He leads a team of more than 20 economists supporting ADB operations and conducting research and development issues in Asia and the Pacific. I hope all of those 20 are going to work on climate issues from now on. Since 2007 when he joined the ADB he has served in the office of the regional economic integration as a senior advisor to the president of ADB and as the regional economic advisor for South Asia based in New Delhi. Manisha Pradhananga is an economist at the Economic Research and Development Impact Department of the Asian Development Bank. Her research focuses on energy and climate change issues. Prior to the ADB, she was the assistant professor of economics at Knox College. And she has a Ph.D. in economics from the University of Massachusetts, Amherst, and a bachelor's degree from Mount Holyoke, USA. So, without further ado may I request Dr Song to now present the report. Thank you.

Lei Lei Song:

Thank you very much Laveesh. It is a great honor and a privilege to be here. Because as Laveesh said I was based in our ADB office here just next to here. Actually, we are neighbors. When I was here, that is before the pandemic I stayed over through the pandemic period. I left New Delhi on Diwali 2021. So, I was also in lockdown for one and a half years. I didn't go anywhere except Agra to see the Taj Mahal in April 2021. It was amazing because nobody was there. They told me usually 60,000 people visit and that day only 600. So, I went through the whole period, I came here very often actually. Although it was not called CSEP at that time. I remembered the last seminar I joined, I sat somewhere there. It was Martin Wolf's talk on his book. I think he got that book only recently. But at that time, he already finished some sort of draft. Then he came here to present. So, I believe that was very late 2019, if not early 2020. It was still Brookings India at that time. So, I came here really often and it is great to see so many familiar faces, Jacob, and Rajesh, whom I knew actually from CII. When you moved here, I came here to see you. And Eshani. Our former colleague, now in EIU. ___ and I have swapped positions. He joined here to take my position, a nice position, nice office, facing a British school, but I went back to Manilla to lead a division of economic analysis and operational support in the research department. Laveesh, you mentioned why we got this economic research and development impact department. So, ADB actually moved into a so-called new operating model we call it, just on the 1st of July. About a little more than two months ago. And we have the so-called four shifts now, I can't remember what four shifts. One shift, a major one is climate change. ADB wants to be a climate bank of Asia and the Pacific. And one shift is the private sector development shift. We would like to work with the private sector, to mobilize private sector funding for development for climate change. One shift if is the so-called sector shift. We put all the sector people together under one roof headed by Indian Ramesh Subramaniam. Then another shift is the way of working. We try to work as one ADB team. So, we shall see, it is just a start. And then they emphasize this structure change should be conducive for maximizing development impact. The multinational development banks usually focus on pushing the money out of the door. So, we just pushing, just trying to lend as much as possible. But this is only your financing numbers and outputs. But then how about the outcomes or the impact of that money? Then we want to maximize development impact. Then when they design the structure change, then the senior management was thinking about which department should carry such a mandate. So, luckily, they said the research department should be the best place to maximize the development impact of ADB. Then somehow in various features of this new operating model, senior management thought we should renew the role of economists. Somehow the role of economists was losing a little bit. The specialists, engineers, gender specialists, and social sector development specialists, took a lot of function roles. But then economists somehow on the backstage. But now they would like to strengthen the role of the economists then to help maximize the impact. So, this for Laveesh's question to me. Now let's get into this report. We have a team of economists working on this report. Our research department, regrettably actually, the ADB research department did not do much research on climate change. We only published a report in 2015. Then afterwards we didn't have much reports of research on climate change. Then since late last year, we start to mobilize our resources. Then we produce our first major report on climate change, particularly on mitigation. So, this is Asia in the

global transition to net zero. We released it in late April. Then we just came to India because India as we know you are already playing a significant and major role in global transition. And we would like to listen to your views, your feedback, and how ADB and other multilateral development banks can work with the Indian government, the private sector, and other stakeholders to achieve what we would like to achieve, to make the planet more sustainable. So, Manisha will be presenting the report. And she was one of the co-authors of the report. So, I just turn the floor to Manisha. Thank you very much.

Manisha Pradhananga:

It is great to be here and such a full house. That is amazing. Thank you so much for hosting us, but also for putting together such an illustrious panel. We would like to hear more from the panel. And learn from all of you. As Lei Lei mentioned we published this report. This is an ADB flagship report. We publish it twice a year. This April 1 from 2023, the thematic report is in Asia in the global transition to net zero published in late April. So, overall, this report examines what a net zero world would mean for developing Asia under different climate policy scenarios. We look at key transformations in the energy sector and in land use and the socio-economic consequences of the transition. We have disaggregated results for India. So, that is what I will be focusing on today. Overall, the report is divided into four main sections. The first section looks at Asia's stake in the global climate crisis, examining the region's climate vulnerabilities. But also, the implications of its development trajectory on global emissions. In the second section we set up the modelling framework and we analyze how major emitting sectors in the region would evolve under different emissions pathways. The third section looks at the potential socio-economic consequences of net zero transition. We look at policy costs of mitigation, look at benefits from averted climate damage, and also co-benefits from better air quality. We also look at labor market outcomes and also implications for equity. The last section we offer policy recommendations based on our findings to ensure that the transition is efficient and equitable.

First section. Overall, we know that developing Asia will face large losses if climate change is not addressed. Geographic features along with socioeconomic conditions of the region expose much of the population to climate-related risks and stresses. In this chart, you see that under IPCC's high emission scenario, the region stands to lose almost a quarter of its GDP by 2100. Losses are especially high for India at 35% of GDP by 2100 with large expected losses in agriculture. So, historically emissions from developing Asia were low. And even now per capital emissions are still below the global average and just a fraction of emissions from advanced economies. So, this is what you see on the left chart. However, emissions from the region have been growing faster than the global average, and developing Asia's share of global GH emissions doubled from just 22% in 1990 to 44% in 2019. At the same time developing Asia's carbon intensity is high. It is about 41% higher than the global average and double that of North America and the EU. A high carbon intensity of GDP amplifies the effect of economic growth on emissions. We also know that a billion people in the region still live under 3\$ a day and electricity quality and access are still a constraint with an estimated 940 million people experiencing frequent interruptions and about 350 million without adequate supply. So, developing Asia's growth trajectory will have important implications on achieving global climate goals. Fortunately, climate change is increasingly recognized as important by the countries in the world and also in the region. All Paris Agreement parties from the region have submitted nationally determined contributions or NDCs and 19 developing Asian

countries have announced net zero pledges which represents about 80% of the region's emissions.

Moving on to the second section where we set up the framework for our modelling. So, we use the world-induced technical change hybrid or WITCH model. It is the third most used integrated assessment model in the IPCC Working Group 3-6 assessment report. It has a detailed energy sector and is linked with a land use model. In addition, it accounts for technical change via learning by doing and learning by research. So, integrated assessment models or IAMs have provided a bulk of evidence relied on by IPCC working group 3. Due to their prominent role, they have received widespread attention but also criticism. We think at ADB that IAMs will continue to play an important role in climate policy as few alternatives exist that can provide a comprehensive and internally consistent interaction of a complex social, economic, technical, and physical system. However, we do have to be careful on how we interpret results from IAMs. They are not meant to be prescriptive roadmaps for countries but are best used to understand potential trade-offs and feedback effects of different mitigation strategies that may not be obvious if you just look at isolated sectors. So, in the report, we model five core scenarios that we think embody key policy choices for climate change. These include scenarios based on current policies. That is the first one. And NDCs that is the second one. And then we include NDCs plus net zero pledges so that we call this uncoordinated net zero. In addition to these three which are based on the Paris Agreement goals we also model two optimal global net zero scenarios. The last two, are global net zero and an accelerated global net zero. These include international coordination with international carbon markets. So, global net zero basically follows NDCs until 2030, then there is a coordinated global effort to stay within the carbon budget to achieve Paris Agreement goals. Whereas the accelerated global net zero we don't wait until NDCs, we start action immediately. So, that is the difference between the two. This is the global model. But we have disaggregated results for major emitting countries in the region and also sub-regions. So, we have disaggregated results for the PRC, the People's Republic of China, India, and Indonesia. And then we have results for sub-regions that you can see on this slide.

So, moving on to some of the results, so these charts here show the global CO₂ and GH emissions pathways for the five climate scenarios that I just described. So, current policies are the grey ones on top. So, we expect a mean warming of about 3 degrees by the end of the century under the current policies which decreases to about 2.4 degrees under NDCs. This is consistent with the broad recognition that current NDCs are not sufficient to achieve Paris Agreement goals. If we include net zero pledges this takes us closer to Paris Agreement goals with two degrees of mean warming and that is the red line. But given the uncertain probability of staying within two degrees, this does not technically achieve the well below 2 degrees definition of the Paris Agreement. So, global net zero and accelerated global net zero the yellow and the green lines, are implemented under stringent carbon budgets in the model and these are the only scenarios that are consistent with Paris Agreement goals. These lead to a mean warming of 1.7 degrees by the end of the century with a higher than 6 or 7% probability of staying within 2 degrees. These charts show CO₂ and GHG emission pathways for India for the five scenarios that I mentioned earlier. What I would like to point out is that under uncoordinated net zero, this requires a sharp reduction in emissions after meeting NDCs in 2030. This is due to a lack of global coordination on climate action. So, the burden to reduce emissions falls on countries that have net zero pledges including India. We see similar

patterns for Indonesia and also for the PRC. Whereas the global net zero scenarios the green and the yellow line, these assume international coordination and a global carbon market. So, this market mechanism allows mitigation to be allocated based on abatement costs. So, efficiency-wise these are kind of the more optimal models. So, this would then require less ambitious mitigation from India. These charts here show the main sources of mitigation under accelerated global net zero, so that's the last scenario. The first one is for developing Asia and the second one is for India. So, overall energy efficiency is the most important source of mitigation reduction before 2040 followed by mitigation from agriculture and land use. Change in the energy mix through a transition to cleaner sources will be critical by midcentury as scaling up of renewables will take some time. Whereas emerging and costly technologies such as carbon capture and storage, that is the grey part in the chart will only play an important role after 2050. Okay, so, looking at the land use sector, under an accelerated global net zero scenario, forest cover in developing Asia will increase from about 26% to about 30% of land cover by 2050. The land area devoted to growing food crops decreases by about 36 million hectares while 39 million hectares of land will be used to grow energy crops by 2050. Similar trends are observed in India where forest cover increases from less than a quarter to about 34% by 2070 while crop land decreases from close to 30% to less than a quarter. Energy crops will account for about 8% of land cover by 2070. About energy sector accounts to about three-fourths of emissions in developing Asia and also in India. So, as the largest source of emissions energy sector will undergo a rapid transformation. So, here we contrast current policies and accelerated global net zero, the primary energy mix. So, under the current policies, the total primary energy mix in India is projected to almost double by 2070 while as you can see from the accelerated global net zero the growth will slow down a bit. Under the current policies, the share of coal will decrease to about 10% by 2070 while under net zero it declines to less than 5%. Non-fossil fuel sources will provide close to 40% of primary energy supply by 2070 with solar and wind energy account for about a third of primary energy supply. Zooming in on the electricity sector, energy generation, electricity generation will undergo faster decarbonization than overall energy. So, even under current policies coal will provide less than 10% of electricity generation by 2070 in India whereas under accelerated global net zero coal is virtually absent from that energy mix or the electricity mix by 2050. Wind and solar power will provide about 85% of power by 2070. Overall, you can see from the chart that electricity demand is higher under accelerated net zero than under current policies. This is because the electrification of end users will accelerate under accelerated global net zero, for example, transport electrification. So, this chart shows the electrification of transport services. This is found to proceed at a faster pace in developing Asia than in the rest of the world. You can see from the chart that currently India is lagging behind in the electrification of transport, but it is expected to catch up quickly such that electricity will account for about half of the total energy used in road transport by 2070. These charts exclude two and three-wheelers where much of the action is in developing Asia, so that is a shortcoming. So, looking at investments, the energy transition will require an increase in total investments in power supply. Average annual investments in just power supply need to increase from about 400 billion in 2021 to about 625 billion under accelerated global net zero. About 300 billion of this investment will just be for... (unclear question from panel). Renewable sources of energy about 300 billion will be in transmission and distribution and storage to facilitate the increase in power from renewables. Overall, we find that the region

will require investments, annual investments of about 1.5 to 3% of GDP on just power supply. With India at about 2.6% of GDP.

So, moving on to the third section, the socio-economic consequences of the transition. So, this transformation encompasses a profound set of changes across sectors, activities, and consumption patterns with different economic and social outcomes. So, in this section, we examine some of these consequences. We focus primarily on three things. The policy costs of mitigation, the benefits from avoided climate impacts, and the co-benefits from cleaner air. We also do some analysis look at jobs, effects on employment, and also equity. So, looking at mitigation costs, overall, we find that mitigation costs are quite low for developing Asia. So, they will be about 0.8% of GDP in 2030, also 0.8% in 2050, and about 1.4% in 2070. This is under accelerated global net zero. Some regions within developing Asia have much higher costs. This includes caucuses in central Asia because they are fossil fuel exporters. So, they see higher costs whereas fossil fuel importers and countries that start from a low level of per capita emissions see lower costs. Zooming on in India, the overall cost of pursuing global net zero is about half a percent of GDP overall. There are some differences but about ½%. Again, this is for accelerated global net zero. If we look at the uncoordinated net zero which is pursuing this discontinuous and rapid decarbonization going from NDCs to net zero in 2070, this would mean higher costs. So, you can see this from the orange bar around the second chart there. Uncoordinated net zero has the highest cost among all scenarios. This is about 10% of the GDP of India in 2070. So, looking at some of the components of those mitigation costs, overall sub-regions in developing Asia other than caucuses in central Asia will see increasing imports of fossil fuel under current policies. And as you can see this is also true for India. Under accelerated global net zero fossil fuel imports declined dramatically. So, in 2050 fossil fuel imports for India reduced by 36% under accelerated global net zero compared to current policies. Developing Asia will have both major carbon exporters and carbon importers. If the world were to gradually transition to equal per-capita emissions quotas. Throughout much of the century, India and the rest of South Asia were leading exporters of offsets or allowances whereas primary purchasers were wealthy OECD countries and the People's Republic of China. So, looking at air quality benefits decarbonization generates important co-benefits beyond climate benefits. One principle one is air quality. So, fossil fuel generation... energy generates a range of air pollutants that are damaging both to human health and also natural ecosystems. In 2019 one in nine deaths overall worldwide was caused by fine particulate matter or PM 2.5 and ozone air pollution. Six of the ten cities with the highest pollution-weighted PM 2.5 exposure globally are in the region. This includes Delhi and Kolkata which are routinely ranked among the most polluted in the world. Under accelerated net zero 346,000 premature deaths could be avoided annually by 2030 in the region from air pollution. This includes about 160,000 deaths in India. So, this chart here puts together the costs and benefits of climate action. The green parts are the policy costs that I described earlier. The orange part is the benefits from averted climate damages which takes some time to come in. The blue is the air quality benefits that are realized more quickly. So, overall, the net present value of co-benefits and benefits are 5 times policy costs in developing Asia under accelerated global net zero. In India, these benefits are 11 times the cost. In terms of employment, all regions in developing Asia will see an increase in energy sector employment under ambitious decarbonization compared to current policies, accelerated global net zero creates 1.5 million additional jobs. In India that is about 60000 additional jobs. About 1.4 million jobs in the coal sector will be lost in Asia by 2050. While over 2.9 million jobs are

created mostly for solar PVs and wind generation. Now, looking at some of the equity implications of net zero. Under accelerated global net zero we find that food prices increase by almost 25% by mid-century. Overall household food and energy expenditure is expected to increase. As poor households spend higher shares of their income on food and energy, this effect will be distributional regressive. Unless of course, appropriate policies are introduced to mitigate this. So, in this chart, we look at food and energy consumption data at the _ level from India and the PRC. And we find that lower-income households are much more affected by climate policy-induced price changes than higher-income households. This is if we assume that carbon revenues are simply recycled into government coffers to reduce the general taxation burden with no redistribution. But if we look at more progressive policies such as a simple climate dividend of equal per capita transfers to households the distribution effects are much more progressive. So, we just wanted to show one policy example of how we could mitigate some of the regressive elements of mitigation action.

Moving on to the final section of the report which looks at policy I won't spend too much time on this. But basically, based on the modeling findings we offer policy recommendations within three mutually reinforcing pillars. The first pillar looks at reforming prices. It focuses on actions to price carbon emissions to remove negative carbon prices arising from subsidies and market distortion. So, this includes fossil fuel subsidies. The second pillar facilitating low-carbon responses focuses on policies that reduce barriers to decarbonization. So, we look at different environmental regulations and subsidies to offset fossil fuel subsidies, establish demand for clean technologies and investments in knowledge goods, and also leverage private investment. In the third and final pillar, we look at fairness. It looks at how we can achieve a more equitable international distribution of costs and policies to shield lower income and vulnerable from the cost of climate action. This includes carbon revenue sharing which I discussed earlier. But also facilitating labor market transitions, and investing in public services for vulnerable sectors. And we really stress that, though carbon growth must be just to succeed, decarbonization policies may lead to political backlash and reversals when effects are regressive or they are not accompanied by measures to ensure that the vulnerable are insulated from shocks. So, we really stress this in the third section, the low carbon growth must be just. So, that is my last slide. So, there is much more detail in the report. I hope you can or you would go to our website and download it. It is free. And we would love to hear from you. I am going to pass over to Sabah now. She is going to talk a little bit about what we want to do in the future.

Sabah S Abdullah:

Thank you. It is a privilege to be here. Thank you, Manisha, for introducing the mitigation part of the report. The next part of my slides is basically, we are emphasizing on adaptation and resilience. So, I am flipping the coin. And saying the importance of adaptation for our work in terms of research, but also application. So, what do I mean by that? I will set a brief background on adaptational resilience what we know about adaptation, and where we are. We know that climate change has pushed and will push a lot of people into extreme poverty by 2030. Again, these numbers we didn't model or we didn't show in this report but it is something we are thinking about in the future. And any feedback we get today from the panel members discussants and the audience will be important to us. But the most important thing is

thinking through about these hazards. We are already seeing that. We are seeing extreme temperatures, we are seeing frequent droughts. We are seeing forest fires not only in India. All over the world, we are seeing this. So, the question with that regard is saying what are we doing about it? We can see that the government for instance in terms of public expenditure greening the corridors within cities like Delhi making it much cooler. We see the climate-proofing of our structures to avoid flood risk. It is already happening and so even in terms of forest fires, we are seeing there is a lot going on in forest management to try and not anticipate but prepare ourselves for those adaptation costs that are coming with climate change at the present time. Then what do we need to think through? We need to think through this transformation. Not only of human systems but also the natural systems and how not only is it about incremental adaptation but this transformational as process of two different systems, the human and natural systems. So, that is very important with a budget constraint. So, governments cannot fully take hold of adaptation costs alone. So, we have to think about where is that investment coming from. I think, with that relevance, we have to think about the intersectionality of different capital, natural capital, human capital in terms of jobs, and social capital in terms of resilience, we need social capital in that manner and also financial aspects of it. And so, with regard to financing, I will just speak of MDB. A lot is being done locally here with CPI in terms of looking at different sources of financing, but with the MDBs there is almost if I were to break it down for you, we see that almost mitigation takes a huge of the pie. And so, adaptation has been very small in terms of financing. And one of the reasons that we are seeing is because of methodologies. I will go through what we are envisioning and researching and hearing your inputs will be important. Finally, I want to say that ADB has been very bold and has been out there giving a number which is 100 billion of what we want to commit on climate financing. Again, we see that adaptation, is not new, I am repeating again, 34 billion is what we have done so far. But we want to do more. In fact, UNIP has produced an adaptation financing report that shows by 2030 we need 300 billion in adaptation financing. So, what are we doing? In terms of adaptation, we tag projects very seriously that have adaptation and resilience components and we are using a methodology that has been harmonized within all the MDBs. So, that way we are able to evaluate these climate risks, and vulnerability risks and think through about this transformational adaptation and collecting indicators that are outcomes from those projects but also thinking through about this climate financing. So, what are we interested in in terms of research and future work, we are interested in first identifying the national subnational sector, priorities, and needs on adaptation including budget. Also, we would like to explore some three key research areas and I am happy to hear more from some of you if you have any other insights. But what is important for us is thinking through that project granularity of what we are doing to the national level and global level of what we are facing. And so, for instance, looking at the different sectors, how do we define adaptation? This is not new because it gets confusing what is adaptation and what are we doing as business as usual. And so it is important for us to address the risks of the climate, for the different sectors even for the distinct context. What do I mean by distinct context? We are all heterogeneous in terms of states in terms of countries and it is not a cookie-cutter approach that one adaptation could work in this city may work in another one. So, we are cognizant of those nuances in terms of the differences. So, in methodological, this is a challenge. I have to say in research are we not only talking about project-level cost-benefit analysis but also about the macro-level aspects of the top-down approach in terms of integrated assessment models. That is what I mean by IAMs there. So,

trying to bridge up that scaling effect from the bottom up to the top down and understanding adaptation would be important in knowing those costs of adaptation. So, with regards to the last point, this is important as well, seeing the role of the private sector because for instance in the case of India, 94% of adaptation cost has been handled by the government. So, the question is can they do it all? No. so, we have to think of innovative financing that can be taken up not only by the government but also by the private sector. We have seen it already. Green bonds are coming, sustainability-linked bonds. What more can we do in adapting to climate change at the present time? That is it. Thank you so much for listening.

Laveesh Bhandari:

May I now request Dr. Indu Murthy to present her remarks?

Indu K Murthy:

Thank you Laveesh first and foremost for inviting me to be part of this panel and extremely commendable work I must say and as Laveesh mentioned right in the beginning, quite a bold thing to come. But at the same time, I think it is kind of quite timely also because at a time when individual countries are looking at net zero and trying to see how to achieve it, here comes a study that is trying to say that yes, individual countries have to do their bit, but at the same time if there is regional coordination, there is a way to solve the problem in a much better manner. Which is a win-win in many ways. Not in all the ways. So, that way I think it is extremely commendable that you people have set out to try and look at the problem from that particular lens. Which kind of leads us into the path when... COP is just around the corner. Is there a way that countries could get together and start negotiating on those? Because we have been talking about taking more responsibilities than what we had signed up for with so little finance coming in. So, I am going to just take this moment to talk about just two of the things that your report discusses. One on the land use which is close to my heart. Yes, you are talking about crop food production going down. From an Indian perspective, I think that is not realistic. It doesn't seem like it is ever going to happen, because we still have to produce more to feed the population. Our per capita food availability, we still are lower than what is actually needed. So, given the goals of feeding more mouths that are going to be there, it doesn't seem like it might happen. But when we look at it from a modeling perspective it does give a water scenario. Which is fine to look at it is not an issue. Now the other thing is also with respect to the land itself, I mean, you just have one resource but there are competing demands. Renewable energy, forestry, and then of course, food production is something that cannot be compromised. But over and above this is the problem of water itself. Under a climate change scenario water, it is going to be too much in some places, and too less in some other places. So, given that emerging problem, it really seems quite difficult to foresee a place where you are looking at more tree cover coming up. Because we have an NDC goal, right? But where are we? There is no clarity on that in the first place. Secondly, we did come up with an agroforestry policy in 2015 if I remember right. But then, however, when you look at the progress that's been made it is not as much as people thought that's going to be there. So, given that and given the way the tree cover is emerging, of course, there is this Nagar van yojana, which is urban forestry schemes that are being promoted and a whole bunch of things that are happening, so, of course, you don't need to look at the forest as per the tenurial rights

aspects. But then if you look beyond what is classified as forest, maybe there is a scope. I always argue that in a place of agriculture, yes food production cannot be compromised. But we also have almost 50% of agriculture in India being rainfed. And a lot of it is increasingly being left fallow. So, is there a way to transform those lands which is beneficial to the farmer also because there is some income that goes in there? But at the same time, it is also beneficial from an adaptation perspective because it is very clear that perennial tree crops are a good adaptation strategy. So, that is one way to look at the problem. The other is with respect to the transport electrification piece that the report discusses at length. It does talk about multiple options that could be put in there. Biofuel is definitely one of the cases. There again the problem of land versus water emerges. There is competition. So, the ethanol mandate right now is going pretty well. There are also discussions around whether should it be increased and, whether is it really realistic to do that. Secondly, the thing is do we have enough vehicles that can actually run with ethanol, the blending itself? So, probably the design changes that need to happen, what would it mean, what would it cost, that is something people would need to start looking at very seriously. That's also important to look at. Of course, moving on to the adaptation piece, that Sabah presented, I think the biggest challenge when you are looking at adaptation is the challenge of attribution itself. We say climate adaptation, but we all know for a fact that a lot of it is a cumulative effect of environmental damage that has happened over many decades. And now climate change is exacerbating the problem. Now the minute you start trying to put numbers to this there are a lot of questions that start emerging and then you are kind of left nowhere. But at the same time, it's really important to kind of look at the problem fairly in a granular manner. So, as you rightly pointed out, there are geographical variabilities, and there are sectoral variabilities that need to be looked into. Also, this entire discussion is around incremental versus transformational. A lot of us when you think of transformation it seems like, okay, people are going to be in a better-off situation. But is it really so? Because we have people and livelihoods attached to these climate-sensitive sectors they have jobs that have certain skill sets that they build those livelihood systems. Now when a system is transformed, so, what does that mean for the people who are in there? So, I think these are important pertinent questions that need to be looked into because it does not just impact the ecosystem, it also impacts the dependent livelihoods up there. Lastly, with respect to the indicators that you brought in, I think, that is where probably we should start working. Because I think with adaptation communication beginning to happen in 2024, countries are beginning to talk about indicators. Countries are beginning to find ways of actually quantifying what's happening, not necessarily just in climate projects, climate dedicated projects but even in developmental programs. Because there is a multitude of co-benefits that emerge particularly when they are land and water-based activities that are implemented. So, given that I think that would be a good entry point when we start looking at how you look at the metrics for adaptation itself before going into how you quantify, how you put a value to what happens up there. Thank you.

Laveesh Bhandari:

Thank you. I am going to ask all the panelists to go first. Dr Mundle, may I ask you to go next?

Sudipto Mundle:

Let me join Indu Murthy in congratulating you. I think this is a really excellent report. And very timely of course. I certainly learned a lot from it. Also, what I particularly liked about it, is two things. A- lot of the narratives on this whole subject are about how bad things are. And you start with that. And your point of departure is really to look at how to find adaptation and mitigation solutions. But more important than that I like the fact that you kind of distributed it in a dynamic sense between the early harvest and the later period. First 15 years or so to 2040. Because again, much of the discussion even on what is to be done and what is being done is all about technology. But you make the point that in these first 15 years while that is going on, I mean the huge reduction in the cost of generating solar power and so on, that the real action is going to be in two different areas namely improving efficiency and land use which she was just talking about. And later on, when there is enough scale for all the new technology and then that would take over from 2040, 2050 or so. I like that, the first time I have seen it being done in this way. So, I just have a few comments. First of all, in these scenarios that you have got, the business as usual, NDC effort, etc. including this accelerated global net zero, this is banal to say, but it is a global problem, it's not an Asia problem. I recognize that your mandate is to deal with Asia and your report deals with Asia, but also using this global model and some way it would be useful to know what the assumptions you are making to plug in the Asian territory for the actionable measures on the Asian part. Because you do have different scenarios. Now in those scenarios what is happening in the rest of the world? It would be good to know that. What is being assumed about action being taken in the rest of the world? My second comment is about this first period when most of the action is going to take place, I mean you are going to see in terms of improving efficiency in energy use and in land use. What would be useful to know I think there has not been too much discussion before on what are the actionable policy measures and how you actually get there. What are the regulatory incentives interventions of governments you also talked about behavioral change which is one of the most difficult things to happen. How do you see that happening? Is there a road map you have in mind on how to get there? And secondly, when it comes to change in land use in Asia, three countries matter. It is Indonesia, China, and India. There's been this huge deforestation in India, I didn't realize the scale of this till I saw your report. Now, how are you going to reverse that and have reforestation in those areas? Need some very powerful policy instruments to make that work. But there is also a lot of forestations to happen especially in China but also in India. In fact, I think, the actual amount of area in China that has to be forested is larger than in Indonesia. Now what is this land at present? Is it government land or... do you know what is happening there? Is it just barren land? It is good to know that and again what are the actionable measures to make it happen. And finally coming to India and as you just mentioned, it is a very sensitive shift, land out of crop food grains in particular to producing crops for ethanol production or for forestation and so on. This is a) politically a very touchy issue. And secondly, it is also nice to know what again are the policy leverages and levers that you have in mind that this could use? Apart from the fact that you know withdrawing subsidy and so on that you talked about. Subsidizing fuels, hydrocarbon fuels, and so on. One thing, you do mention here is about the rise in food prices. Now to me, that is an intermediate step. What is happening to actual food consumption is what you need to know. And towards the end, you talk about it being fair and so on a little. That is, I must say pardon my saying this, bit of motherhood statement you always say in all policy recommendations. I'm being very frank. But the point is what can you actually do? You mention a thing like for instance universal basic income. Now, I personally love that idea and

so on, but I really don't think there is much appetite for it. I think there will be very few people even in this room who think that it's a good idea. Now, finally coming to financing. That is the part that I thought was most interesting. If I have it right, you are saying that what we need to mobilize in terms of additional resources, and now only about Asia is about 700 billion dollars per year. But I also find that we are already spending about 300 billion dollars a year on mitigating technology... investments in mitigating technology. You're really talking about a relatively small sum of a few hundred billion dollars per year for a huge region like Asia. It doesn't seem like a huge amount. Particularly given the fact that you already have these thematic bonds, green bonds, and climate bonds, they all go under various names. Now, those bonds today are growing. I mean the market for this is growing at about a trillion dollars a year. But most of it is not coming through emerging markets. It is going to developed countries and so on. But about 100 billion are already coming to emerging markets. Not all in Asia but in emerging markets as a whole. The point I am trying to make... and by the way these bonds are at the moment selling at a premium. So, in other words, there is a huge appetite for it. The number is something dramatic like 350 trillion eventually. Not today. My point is that there is a real practical opportunity here to generate enough financing, not from governments, not from the MDBs, but from the private sector provided you give them incentive to award the necessary risks because coming to an emerging market means there are additional risks that you take on. You need to incentivize them to do that. That is where I think the MDBs can play a very important role. Many numbers that I have seen are the only additional amount that MDBs can mobilize. The additional amount is about a trillion dollars a year. Now the Larry Summers and N K Singh committees are looking into this and so on. But a relatively modest amount I think if it is used to provide insurance and so on, could get this extra one or two hundred million dollars, private sector money to come into climate bonds and things like that in this region which would meet the asking amount. Let me stop there. Thank you very much, really good report.

Laveesh Bhandari:

May I ask you Mr. Ahluwalia now?

Montek Singh Ahluwalia:

Thank you very much Laveesh. I know it is going to sound a bit kind of routine if I say I want to join Indu and Sudipto in praising the report. But I really do want to. I haven't read the whole report. I just looked at the summary. It seems to me to meet an important need, particularly in India. Because the larger numbers are floating around in many studies I don't think that this report necessarily dramatically alters the perception. But for India, because it has India-specific numbers it is of special interest. I think it is very nicely done. I will read it more carefully and if you agree to send some detailed comments. One of the problems when you are a panelist is not clear what the purpose of a panelist is. Am I supposed to identify three or four subjects and ask you questions in the belief that that is really what the audience would be most interested in? Because that is one style of operating. The other is that really do not use this as an opportunity to extract from your responses but use it as an opportunity to tell the audience what I think is interesting in the report. So, I am really going to just do that. So, don't feel compelled to answer any of these questions. What I would like is later on if leave your email address I will send you detailed questions, I would be very grateful if you

answer them. I am quite happy if Laveesh wants to circulate those answers to everybody. I think the big issue here, we are only going to solve this problem if there is going to be a massive structural change. That comes out in some of those charts that you have here. Particularly on the structure of energy and so on. I was a bit puzzled by the way that you seem to rely, you seem to believe that while we are going to phase out coal which is good, you seem to think that petroleum is still going to be around. Somewhat more than I would have thought. That is one of the detailed things I will send you a question on. One or two points. One is I think the point that both Sudipto and Indu made on food. I don't think the report says that you are going to reduce food production. It just says you are going to reduce the area devoted to crops. And that reduction by the end of the century is approximately 8% of the present area. Now on any reasonable calculation, Indian productivity is 50% lower than what it should be. What I would urge everybody here is to look at those numbers and it is an important issue. If you interpret those numbers to mean, that in order to solve the climate change problem, we must get all the Indians to eat less, I mean we are dead. We are literally dead. So, I don't read this that way at all. Now you may ask legitimately how... these are the details, how are we going to get that 100% increase? Well, the truth in productivity, is that for the last 15 years, we have been talking about this. It is not fair to ask the ADB how are we going to do what for the last 15 years agro-economists have been saying we should do. It does mean though that many of the traditional things that we have worried about need to be brought up front in the political debate. Of course, agriculture is the worst area to try to do that. I mean the surest way of losing an election is to raise a serious issue on agriculture. If anyone here is intending to stand for election, I would seriously advise that you don't do it. But someone somewhere has got to do this. Now the present position I have often said, many of our states follow policies that are very difficult to understand. Now for example, if you let me just choose Punjab as the state I originally came from, I am really a Delhi guy. But let me use Punjab and Haryana is not very different. If you were to look at Punjab's agricultural policy today and you asked yourself, what do you think is the global goal that this policy is meant to achieve? Global meaning not global, long term for Punjab. I think the only objective that you could rationally say is to convert the state into a desert in 20 years. That is what the policy is supposed to do. The funny thing is what I am saying is not new by the way. Virtually everybody who has written on this subject has talked about it. So, we have to ask ourselves if handling climate change requires us to answer these questions which are not actually new questions. They have been there. We need to work out how are these questions going to come to the surface. I mean, I am not answering how to do that. But that is just one example. Second, which is a little easier I think, you talk about prices, that is very correct. The international community rightly has gone on and on about getting rid of fossil fuel subsidies etc. It is Economics 101. It doesn't require much discussion. But the interesting thing is that in all the COP discussions you find a huge demand that you must reduce explicit subsidies. Virtually no demand that we should get rid of implicit subsidies. Now, the biggest price distortion in fossil fuels is not the implicit subsidies. I think the IMF has just produced a paper that says that the total implicit plus explicit subsidy on fuel... implicit means compared to what the price should be if you were to internalize the social cost and explicit is just the kind of market subsidy that is being paid. So, against a market subsidy, this is a global average of about 1.2% or something like that, the implicit subsidy by not pricing the fuel properly is about 5.8% of GDP. I mean, it is almost 4 ½ times the fuel subsidy that we think of explicitly. So, when we talk about pricing that is my real question. I assume you are not talking about just getting rid of fuel subsidies. I

mean, they will be difficult enough to do. But you are really talking about, you should be talking about, or maybe you are, you should be talking about how do we get rid of a price distortion where the price and this is most true of coal, it is also in India by the way petroleum price is not excessively subsidized. Because our petroleum price is what it is, the existing taxes would actually absorb even a 100\$ per ton tax on petroleum products. But on coal that is a big disaster. But on the emission side, it is coal that's a big problem. I mean, 70% of our electricity comes from coal. And that price is massively distorted. Now, on the one hand, we are saying rightly and this thing brings it out more, that we have to shift the energy sector from dependence on coal to renewable energy. Wonderful. I think you see that in the projection, the coal virtually disappears presumably other things step in. Now, you know what is happening at the moment is that there is no desire to introduce carbon pricing on coal. There is on the other hand a desire to push other better fuels through some kind of fiat. Discoms must buy 25% of this fuel and later on 45% or whatever. That is basically telling discoms that look, please ruin your financial system, and your internal financing thoroughly because basically you just have to buy this stuff. And there is coal which is very cheap and we are not doing anything about it. And somehow you don't do that. Now, to my mind, it is a no-brainer. For an economist for any large structural change you want, you have to ask yourself the question – are relative price changes going to support that structural change? And I think what we need to do in order to do what Sudipto said, try and get down to what are instruments that we should use which highlight what are these things. And I think one of the obvious things is having a carbon tax. Now, it is very interesting the way that the Western countries who are solidly battling to save the world by wanting to get sentences on the abolition of explicit subsidies into the COP communique, not that that matters. These communiqués are only signals. Nobody is talking about carbon taxation. So, it is a complete sort of unbalanced intellectual focus. By the way, their implicit taxation is not as bad as ours. But it is big. The US for example has no explicit subsidy at all, but it has about 3 to 4% implicit subsidy. No reference to that. I am not making this as a debating point. But I am just saying that if we are serious about identifying the structural changes that we are talking about here, then we should really ask the question, are these changes going to be achieved through, if you like a license permit type of approach? We have an in-between approach which is now coming which is the cap and trade. The EU for example doesn't have an explicit carbon tax, but they have an emissions trading system. And furthermore, they are saying that – look, if you don't have it, we are going to clobber your exports with duties. So, we are also thinking of having it. And we need to think about what should that be. Because if we do do that that can be either more market oriented or less market oriented. So, I think what we need to ask ourselves is how do we do this? One other or two other points. One, if you are going to switch to renewables the bottom line about renewables is intermittency. If you are going to handle intermittency by whatever pumped hydro storage or by batteries the cost goes up. So, this assumption that renewables are cheap is no longer true if you have to bear the cost of battery storage. Now maybe the cost will go down over time. But at the moment it is quite large. So, the question is what are we going to do in terms of the structure of the market? Are we going to continue with the present system where... this is part of our constitution... the distribution is a state subject? One needs to think what are the corrective steps needed and to what extent would they be acceptable consistent with the constitutional position. The general approach is that the general interpretation of people is that there should be cooperation between the center and the states which means the center should bail out the states, and the distribution system

every five years which is what we have been doing for the last 20 years. With the kind of structural change that we are talking about, that is really not going to be possible. One last comment and that is I am very suspicious of the phrase innovative financing. The truth of the matter is as I think Sudipto rightly pointed out, innovative financing characterizes a possibly irrational behavior on the part of the savers who are buying the bonds. Saying, I don't want all this money. I don't want that much money, I will do with a little less if it is a green bond. That is very good. But let's be clear about it. How much less? 50 basis points. I don't believe that humankind's desire to be goodwill exceeds 50 basis points. Now, the problem we have is that developing countries say listen, these guys borrow at 3% or 4, maybe they are borrowing at a little bit more now, 3 to 4%, we have to borrow at 15. The difference between the 3-4 and 15 is actually current country currency risk and currency risk is actually country risk. There is currency risk because you don't believe that the country is going to be capable of managing itself macroeconomically not to be subject to currency risk. I am not aware of any innovative mechanism that will deal with this risk directly. Now a lot of people say that and I say too, that I think MDBs should... that's the World Bank, ADB, others... can help by providing risk guarantees, etc. You know what, under their mandate, the risk guarantee must be priced. So, the idea that we are going to offer a risk guarantee without a price doesn't seem to and will not fly. Finally, of course, on climate change, I think there was some reference, you made the reference, to the Larry Summers, NK Singh report, which is shortly to be considered by the G20 and they have mentioned all these big numbers and so on. We will find out what happens to them. Since this is an ADB session and you are all interested in the ADB, one of the interesting things that we need to think about is whether would it be a good idea for MDBs, both the World Bank and the ADB to actually use whatever leveraging power they have in their balance sheets, for let's say or talk about for India, to provide financing that will actually bring in more private investment into climate change issues. This by the way is a controversial point because any number of people particularly NGOs are worried about micro financing, this, that, all good things, their view is that all that should continue. And the MDB capital should be increased to three times four times or ten times so that they can provide this money. Frankly, the only practical thing that can happen is if the MDBs were to say that look, this is the big elephant in the room. And for the next 10 years, we are going to use all the financing power that we have, not just to lend to these sectors, that is the traditional old-fashioned approach. We are going to do this in order to use our money to bring in private sector activity in these areas. To do that the conditionality associated with it would be very much connected with the reduction of sector risk etc. which would become a policy thing. Which would become immediately highly controversial. In the sense that domestically people will say look, why is the ADB doing this? Because traditionally they used to come and give some nice loans without putting in all these conditionalities. The point is that unless they do it, I don't think they will have any impact on country risk. Because that thing is determined by many other factors which are not going to be changed. So, these are just thoughts for the audience, not necessarily directed at you. But you can give me your view. Certainly, if you think I was speaking rubbish, you let me know privately. But, thanks very much.

Laveesh Bhandari:

Thank you.

Lei Lei Song:

So, let me respond briefly, and then I will turn to Manisha and Sabah to give a detailed comment. Thank you so much for the distinguished panelists. Sudipto Indu and Montek for your fascinating comments and feedback. So, actually, we do this dissemination report, another purpose is to try to get feedback, and get your views, and ideas. Because ADB is going to, our research department is tasked to release our flagship climate report next year at COP 29. So, we are still thinking about what issues we need to touch on, and what update we need to look at and then that would be the first from MDB a climate report. Regional report. So, we are still in the process of general brainstorming, and generating ideas and we take this objective coming here and try to listen to your ideas. So, all the ideas I listened to here are really relevant. Montek, you give us a really good idea about all these issues. So, just let me touch probably on two points. Because very detailed I think we may need to get back to you in detail. We will give you an email address and send us more questions which we will take possibly to our new climate report. But here I just respond in general. We didn't put this in the report but internally when we prepared this report, we discussed a lot internally and then we always have such an issue about the tradeoff between development and climate change. Although people including our ADB, our president, and vice presidents, always say actually now a development and climate action, there is no trade-off. They complemented each other. But in the long term, it is true. Because if you don't address climate change then in the long term the planet probably be... no such ecosystems when human beings couldn't live there. So, no development. But in the short term to medium term, this medium term might be quite long. You don't know, several decades. Then you do have a tradeoff. You put some money more on climate action which you basically internalize those externalities which all the damages in the long run. Then you try to put all these costs, the current generation needs to shoulder those costs. Which you wouldn't see the benefits. Because future generations would see the benefits. Because it wouldn't die so much. If you look at all these integrated assessment models, I would say there are more than 85% of the damage actually came from the deaths. Prevent the death. That is the damage coming from the carbon emissions towards 2100. So, we need to shoulder this burden, the current generation, maybe the future one, two, or three maybe generations. Then we need to shoulder those burdens. And probably we enjoyed too much of this free carbon emissions to the surface, to the atmosphere and then now we need to tackle it. Then we need to shoulder this. So, this is really the cost. This means everyone on the earth probably needs to pay a price, a higher price, and for developed countries that have a higher living standard, naturally and legitimately, reasonably, they should have to shoulder more. But then developing countries we are still in a lower level of development then shoulder less. Because we haven't emitted so much in the past. So, this burden-sharing is also an issue. So, I think this tradeoff is an issue. And developed countries should share more burdens than support developing countries to tackle climate change. The second is about this innovative financing. I think you picked it up really nicely. And ADB also pushes out certain financing models. In Southeast Asia, we really push out a model we call the energy transition mechanism. Which actually in my word is financial engineering because we don't introduce any carbon tax, or carbon pricing, in order to internalize externality. We just try to utilize the spreads between the donor funds and funds from the ADB where there are the commercial funds that require the returns on the commercial funding. Then use that as spreads to compensate those owners of the core assets. Then to let them close down the coal assets then to let the coal power plants to retire earlier. But with the global interest rates rising that spread

actually becomes smaller and smaller. So, the financial engineering becomes an issue. And when we brought this ETM to India, I think Indian authorities basically said no. We wouldn't do this ETM. There is no such a financial engineering. And even though ADB is probably also in the process of our optimizing our balance sheet, it is possible after this optimization, you took certain parameters, you take a little bit more risk, then ADB financing, annual financing can be pushed maybe 30% more or even 40% more. Based on the current lending scale. But even with such a scale if we increase... last year we pushed the money out 22 billion. So, it is possible to go to 30 billion per year. But unfortunately... yeah, this is our experience with talking to our developing member countries. Many of them told us if we would like to do climate change, mitigation, and even adaptation, then you need to provide concessional financing. 1%, 2%, not your OCI lending. Just the market rate plus 50 basis points. That is too expensive. Why, because of all those mitigations, adaptation projects couldn't generate such financial cash flows to make the project bankable or viable without carbon pricing, without those internalizing externalities. So, there could be a situation if MDBs really ramp up their financing capabilities. But then we have difficulties to find projects to finance. Because developing countries may not want to borrow, too expensive for the developing countries to take those climate actions to do those climate action projects. Ok. So let me stop here. I might give you a lot of gloomy views. But let my colleague address some details.

Manisha Pradhananga:

Thank you, Lei Lei. Thank you so much for your comments. Very, very useful. I will try to pull some of them together and answer them. On the issue of land use and cropland. So, the model basically shows a 5% reduction. It is not large, if you have productivity growths perhaps you won't have fewer crops but just the land used for crops. When we were starting this study, we chose the 'WITCH' model. The one that I explained earlier. And one of the reasons was because this integrated assessment model actually has a land use model. And for us that was critical. Because agriculture is such an important sector in developing Asia and also forestry is very important. So, actually among the IAMs which has a strength that it has, this land use, this ___ model that we have. Now is it perfect, of course, not. No model can be perfect and again this is a global model. There is a tradeoff between a global model and how much detail you can get into versus a national model and the details that you can get into that. At the end I think when we look at the IAM model, that is why I had this whole qualifier at the beginning of my presentation, they are useful for certain things, but they shouldn't be taken literally as this is the pathway that you should follow, right? I think they are important to be used as a tool to understand tradeoffs. And what this model is doing is basically optimizing by cost. So, it will show you a higher forest cover because that is the cheapest way to do it. It is not going to take into the political considerations, land rights issues, and market rigidities, that the economists consider. So, it is similar for coal also. You have these drops in coal generation, will that actually happen? Well, it depends, when you have a power purchase agreement that has a 30-year term, perhaps without ETMs one of the innovations of ADB, perhaps you won't go to that 5% or 0% generation. So, I think you have to take these results with a grain of salt. Does it actually reflect what's going on outside, is it actually possible, to integrate all of these political and market rigidities? So, that's one. I think we could have done a better job in showing more results outside of developing Asia. We just showed the results of

developing Asia. Perhaps we should have an annex online just to show what the results look like for the other... rest of the world. In terms of policy, so, this is really hard for a regional report to come up with policy recommendations is very hard because policy recommendation has to be context-specific, country-specific. So, we have a whole section on policy. But we have tried to kind of bunch them together in these three pillars to see what are the kind of some of the best practices, what has worked. So, of course, as economists we think that correcting market failure of course, that's the most important, pricing carbon, removing subsidies, distortions, all of that first. But what are governments actually using today, different other regulations, subsidies, so we talk about that. For example, in energy efficiency, we talk about labeling, we talk about efficiency standards, building codes, vehicle emission standards, etc. that countries have been using. And can further strengthen. In land use issues, we talk a little bit about land rights, again a very touchy subject. But we also talk about distortions in land concessions, this is especially true for Southeast Asia, Indonesia, and Southeast Asia that promote deforestation. So, we talk about some specific examples, but again this is a regional report. So, it is really difficult to come up with country-level kind of context-specific examples. The renewable and intermittency. So, these models do assume about cost reductions in solar, wind, offshore, and storage. So, they do include transmission, distribution, networks, battery storage, and all of that. Of course, these are all assumptions. And you kind of look at past historical trends and the future of what we are projecting them. It is very hard to come up with these projections, right? Each model has their own strengths and weaknesses. Some models are optimistic about a particular technology, others in others. So, I think if you put them all together, IAM models, five or six models together, and kind of look at the results, that would make much more sense than just looking at one specific model. And that is where the scientific community is going. If you look at journal articles on IAM models. They usually compare it's kind of inter-comparison projects, five or six different IAM models, and then they give you a range. So, you don't take one model too seriously. You have a range of options. I think that is one way to use these models. I think that's it. Sabah.

Laveesh Bhandari:

We do have a Q&A session so.

Sabah S Abdullah:

I just want to respond to both questions about innovative financing. I agree with Lei Lei with regard to concessional and blended finance. That's where most of the MDBs are stepping in as well. but also mobilizing the private sector. There are projects in the private sector where jointly ADB and the World Bank have been into those projects. So, this is a great space where we could look into it in terms of research as well. With regard to Indu's points with the metrics and indicators. Yes, I agree with you that a sort of consortium or ways of identifying these adaptation outcomes and resilience outcomes are very important, that are measurable and quantifiable. With regards to the livelihood, totally agree with you. With that dependency on the natural system or natural assets. And so, systems are changing and there is a time lag that needs to be accounted for. I think I pretty much answered the key questions with regard to reducing the risks for the private sector in coming into the space. That is something we are

really interested in as Lei Lei pointed out. ADB would like to move forward with more private-sector involvement. Thank you.

Laveesh Bhandari:

Thank you. We are going to take a few questions. And then run it by the panel. Can I start with the person in the back?

Audience (Sunil Mahapatra):

I would like to be the voice of the private sector. I would like to introduce myself and my company first. I am from Biofics Private Limited which is pretty much a start-up which is funded by Prime Minister Modi's vision. We work in the compressed biogas sector. We generate compressed biogas from agriculture waste and municipal solid waste. You name any organic waste. We are also the only company in India which is making bio-fertilizers and not simple fertilizers. I will come to the question. The thing is we are also making green hydrogen from your dustbin waste. We have the capability as the only company in India. Yet, we are struggling for finance. This is when each of my projects can generate hydrogen of more than 40% and struggle for finance. These green bonds and these things are... we are having no access to this. We are working with municipal commissioners, USBs, and state governments. The mechanism with the MDBs and trickling down to the private sector is still that railroad to us is not very clear. So, what I really appreciate is that Sabah was saying how we can partner with the private sector. We would want to understand how that can actually be done. And if not, we will be happy to brainstorm with you to find some solutions to that.

Laveesh Bhandari:

Great, thank you. Very well put. Please keep the questions and interventions brief. Yeah. Daljit.

Audience (Daljit Singh):

My questions for Sabah. And Sabah, first I am so glad to hear you talking about adaptation. Because adaptation has really got a short shift in all this talk about the energy transition. One of the things I was thinking about as you think of future work, on one hand, it is good to be able to isolate funds for adaptation. But there are also things where there is real synergy between mitigation and adaptation. Just a couple of examples. One is energy-efficient housing for low-income folks. Especially new housing because our current housing is... when the temperature hits 50 degrees the slums are going to become like ovens. When you talk about the sort of energy-efficient housing that becomes... it also makes it easier to live. So, it is both an adaptation and mitigation. Similarly, transportation. I think public transportation would become much more attractive if we pay attention to micro transport which serves as last mile transport. Because then if you had better there'd be less exposure to the elements and so on. So, these are some ideas.

Laveesh Bhandari:

Thanks, Daljit. Shekar.

Audience (Rajashekar Devguptapu):

Thank you. Let me compliment the ADB team on an excellent report. Well done and looking forward very much to the other major report you promised, the climate report so to speak. Three points very quickly. Two on finance and one on the scale that even India faces. To me, fickle finance is probably the biggest climate threat that we face today. Montek, You, and Utkarsh have some numbers from Amar's paper where we are looking at a 1.3 billion increase over the 2019 levels of which a significant amount has to come from domestic sources and then from international finance and then finally a large chunk from the private sector. There is no pathway currently whether it is through the private sector lab at the World Bank or through other means where we are able to actually get that. So, I think that's a fundamental issue that you really have to think about. And I hope in that climate report this is up front and center. That fickle finance thinking about where this will come from will lead to, creative purposeful, and effective action on climate change. The third point here I can merge my two. India has a target of 550 gigawatts of renewables by 2030. This means... India had a record capacity installation last year. If you run through the numbers that means that all the way for the next 7 years, you'd have to do three times as much every year to be able to get there. This effectively means that if you take a larger solar park in India, we have to build a new one every week till 2030. And then in 2030, India will still be using the same amount of coal that it is using today. So, it isn't just energy transition, its energy addition and managing the two is I think a far more complex problem than sometimes is made out. So, I hope very much that the report will actually confront these issues.

Laveesh Bhandari:

Thank you. We will just take these three first. Then go to the next round.

Manisha Pradhananga:

I think most of them were for Sabah.

Lei Lei Song:

Yeah, private sector we can connect you to our private sector arm because they do want to get those projects to be linked to the private sector. And try to see how to help. So, we can link you to our private sector arm. Then Shekar's point of view on scale and financing. I agree with you. And then I think actually we read some reports by CEEW __. You give quite a realistic assessment of whether India could achieve 550 gigawatts scale. So, I leave there and I think you can say a little. Do you want to respond?

Sabah S Abdullah:

I think with the private sector as highlighted by Lei Lei, this is something we would want to increase uptake. And there is no doubt, just looking at the adaptation side and also mitigation there has to be a synergy so to speak. Both of them, adaptation and mitigation. I wouldn't have a detailed response, may I say that just because this is a forum I am taking the questions seriously and the feedback and what ideas we have in mind. But for sure the role of the

private sector is very important because the public sector, the government cannot do it alone. There is a need for halfway. One extreme is 100% private sector, and the other extreme is 100% public sector. It is not possible. So, there has to be incentives as well, to de-risk anything for the private sector. Especially in fragile or conflict areas. This is where it is even more needed in terms of where the governments cannot do more. I think in that regard I can just say this is a very important agenda in meeting all these costs to carbon, meeting the cost of climate change, whether it is mitigation or adaptation. So, I've heard your responses and your inputs, and definitely we are looking into it. Thank you so much.

Laveesh Bhandari:

We will take these four questions.

Audience (Deepak):

I am Deepak here. My question to Lei Lei and Manisha, very specifically is about the long-term strategies. So, have you looked at the long-term strategies in this particular report in terms of the across Asia and different countries to what extent they are overlapping or they are different or they are diverging? Thank you.

Audience (Mariam Koruth):

Thank you everyone. My question is actually about the labor market impact. In the graph you showed that there will be job losses in the coal sector which are more blue-collar jobs. And the job creation will actually be in the white-collar sector. So, how do you think India will bridge that gap especially when these coal jobs are in the eastern part of India in the most tribal area, very difficult to actually politically as well as economically very difficult to access?

Audience (Shishir Gupta):

Thanks. Since this is a regional report I am just wondering if are there some examples, successful examples which India can learn from. One of the challenges that Mr. Ahluwalia talked about, is the political economy challenges. Are there some solutions that other countries have gone in, for those types of problems in the region where we could learn from them? Thanks.

Audience (Aditya Raghwa – CII):

I am Aditya from CII. We also did the B20 this year. So, there is a lot of interaction with the private sector, especially on some of these issues. I am just sort of sharing some of these questions that came up. The key thing I would agree with from the private sector investment, bringing in investments into this space is as pointed out currency risk. So, currency risk is combined with... one of the things it was identified is the project preparation cost itself to get a good bankable project out, especially on the technical requirements for some of the proposals is also a significant sum of overall project cost. Private companies often also don't house the technical expertise within their organizations. So, this then creates I think perhaps

an opportunity and maybe you could think about it. Does that make sense that perhaps ADB or some of the MDBs plus the government step in to do this part? I think the last point that I have is we need the developed or advanced economies to start funding more into developing economies. Particularly in Asia. This is I guess for everyone on the panel as well. Do you think there is room in article 6.2, now that you are looking at ITMO (internationally transferred mitigation outcomes) transfer, can you use that as a mechanism where guaranteed finance comes into developing nations? But then obviously that would be I guess a bilateral agreement where we would have to put the emissions reductions into their NDCs.

Laveesh Bhandari:

We will do one more round after this.

Manisha Pradhananga:

These are tough. The first question I didn't completely understand. The long-term strategies. Are you referring to this under the Paris Agreement or in general? So, we did look at some of the LTSs. But many countries don't have LTSs in place. So, we say that countries have net zero pledges or NDCs but it is still lacking LTSs. But we don't really go into detail and look at them. Labor market yes, so, the people who will lose jobs in the coal market are not the same people who will gain jobs in the solar and wind of course. The skills required are different, they are in different locations. Yes, we understand this. So, this is why in the policy recommendation section, again we don't get into the details and they are not India-specific. But we highlight training, unemployment benefits, and safety nets so that the labor transition happens smoothly. We emphasize this, but again it is not specific to India. We don't go into where the jobs are lost in India. But I think this is one area where we would like to work more in the future. ITMO. Yeah, I don't know. This again is new, very new. The way we model it in the report is, that we go from a grandfather system to a kind of per capita emission system. This is a very specific way of modeling. Partly because this is easier to model because really, we don't know what the Paris Agreement will look like in the future and whether it's actually... too complex to model. So, this is one way that we've modeled it and we think this kind of puts efficiency and equity together. It's a kind of balanced approach. We are not saying that this is where the future will go or this is where international negotiations will go in the future. But this is from an economic standpoint. Because it's balancing equity and efficiency. It is one way and really for us as modelers, it is the only way perhaps and you can criticize, whether is it realistic because all of the costs are based on this carbon offset carbon market. That is a big assumption so, you have to really take that, the results in that perspective that we are modeling offsets in a very specific way. The international carbon markets in a very specific way.

Laveesh Bhandari:

Any regional experiences for India?

Lei Lei Song:

Let me take this. I think because we only started our research program on climate change, so, next year's report I think we aim to collect some experience from the region. We are starting

to try to build up a database, policy database. You have already seen some databases about climate policies on certain NGOs or think tank websites. They are not so complete. So, we trying to do those foundational work. Then try to see how countries deal with some specific issues and sector policies. So, we are doing that work. Hopefully, you can read more from us including LTS. We try to compare all these different countries, and their approaches to LTS. And in terms of project appropriation cost, we are not supporting the Indian government. There is a policy-based lending development policy credit in terms of the World Bank. So, try to help India build up certain... I don't know what's the name now. We are something like industrial or SME promotion centers across states. In various states at district levels. Then set up some advisory services to help the private sector, particularly SMEs. So, I think for climate change basically you are still private sector SMEs, then you need those help, advice, incubation all these issues to improve the business environment.

Laveesh Bhandari:

Does anyone from the panel want to comment on any of this? Ok. Srikanth and then second and third. And Dr ___. I will take four more questions. And that will be the last round. Go ahead.

Audience (Srikanth Gupta):

I am Srikanth Gupta. I am a professor at the Delhi School of Economics. So, the WITCH model that you used to model this, also has an adaptation module. So, as you know if you endogenize that adaptation, you will reduce the convexity of the damage function. Basically, this relationship between temperature and economic output will be moderated by the adaptation. So, but in the report, probably I am the only person in the room with the report here, is that I haven't seen you modeling adaptation and that is where Sabah's point comes in that if you're going to and also what Daljit said. So, a slightly different twist on that is that this is a very politically incorrect word to use. But I will use it because I can't think of another analogy that adaptation is almost like the stepchild of mitigation. And the point is that unless you endogenize adaptation, you are not really going to be getting the right picture. So, it is not a critique but I think in your follow up you should explicitly use either the WITCH model or Nordhaus's at Dice model to bring in the adaptation story so that you can then get a much richer idea of what's happening. In fact, we are in our country doing the opposite if we are going to put ourselves in harm's way by building things in the mountains where we shouldn't be and they saying oh, well, there is climate change and all these damages. So, in a sense, there is almost a moral hazard here. I think that's a kind of a general point I want to make and since Montek is here I can't resist this temptation. But you know we had a governance structure for climate change. The national action plan on climate change, we had the Prime Minister's Council on Climate Change, which hasn't met for the last 7 years. I think in our country in addition to all these things that we're talking about, I mean this is not for you guys, but I think for people in this room we really have to understand that this is a very top-down PMO-driven way of focusing on mitigation without a supra body. I was talking to Shyam Saran the other day about governance. I think we are really not going to be able to deliver. But that of course, has not much to do with your report. Thanks very much.

Laveesh Bhandari:

Thank you.

Audience:

There are three quick observations. If MDBs like you, I know this is not a research department thing, but if you could support countries to develop the adaptation plan, I understand India still doesn't have an adaptation plan. So, that is something ADB could consider. The second point is in the presentation I found India's utilization of hydrogen to be less even in the future, right? I thought India was trying to have mega-scale hydrogen. So, maybe you could do that. The third is on the carbon tax, I think somewhere maybe in your climate report you can comment on how to bite that bullet. I know many developing countries are not going to do that. Yeah, that's all.

Audience (Surender Singh):

Hello everyone, my name is Surendra Singh. I'm a carbon auditor. Greenhouse gas emission accountant and everything. Thank you, so much for everyone and CSEP to invite. I always look forward because the question-answer session is so long. So, thank you so much. Other people can't, for some reason they don't do it. Two questions. Just one actually. Mr. Song. You shared in the report that the carbon markets can be integrated into the national policy rather better. My question is if you've been able to take a look at how credible these carbon markets, these market-based instruments actually are and if these carbon credits generated through other private sectors, if they are any worth, I mean if they are worth the paper they are printed on? Second, the question is if Mr Ahluwalia would be kind enough to please share two other topics on which not to run elections and lose for sure.

Laveesh Bhandari:

Is there anyone else?

Audience (Rajesh Chadha):

Thank you, Lei Lei. Very good report. Actually, I scanned through it before I came. I just wanted to raise one challenge that the renewable energies and declining costs in the future would depend on, which is the subject that I am currently working on, the critical minerals partnership. Critical minerals security, and resilience are the backbone of renewable energy whether it is solar or wind. I think some attention to that and I am being a little India specific but in general within Asia like G7 has built that critical mineral security partnership that India has been able to join. But there should be an Asian critical mineral security partnership which should be looked at very carefully. Thank you.

Laveesh Bhandari:

Thank you.

Audience:

Thanks, Laveesh. Mr. Lei Lei, just a request. When you do your next report instead of only this focus on what we member states should do please do write what you think we should ask you to do. Let me say something to you. In Asia and India included, we are frankly beyond that 100 billion business. We have no choice but to bridge this macroeconomic gap if I may say so, money is available of plenty in the developed world. Not available where you need it. And the reason is a simple word. We won't use these economic jargon. It is the hedging costs. They are tremendous. My friend here mentioned he has no access. He is possibly a small player. Larger players have access but the costs are tremendous. What can you do about it? May I request that Dr. Ahluwalia put it in his email or not please try and answer that. Thank you.

Audience:

Just wanted to pick up on Rajesh's point about critical minerals. I am not sure ADB is empowered to do this. But China is the big elephant in the room. 75% of the processing and production facilities are in China. And so, given the trade tensions, given the fragmentation that we are seeing in the international trade environment, this is going to be one of the biggest constraints again. So, I hope that ADB can somehow address this.

Laveesh Bhandari:

I am going to request you to respond. And then I am going to ask the panelists to give their comments.

Lei Lei Song:

Thank you so much for this feedback. Definitely from the ADB side definitely we need to do as much as possible. As Shekar mentioned, critical minerals probably couldn't do too much. But actually, I think the panelist at the beginning raised this point. Because COP at the global level is probably quite difficult to do, collaboration, and cooperation, like WTO, couldn't do it. Then without WTO, all these FTAs blow up so much. Then you got this so-called noodle ball or spaghetti ball effect. Actually, there is a possibility for climate change, it's possible to have certain regional collaboration and cooperation. So, for certain groups of countries, it's possible to trade carbon. It's possible. I don't know how it works. But it's possible. A group of countries in different development stages, then trade carbon. Then utilise the trade. Then it might be easier to have this regional collaboration agreement. I don't know. But certainly, it should be easier than global scale. All these nice points, I think I will ask Manisha to answer.

Manisha Pradhananga:

Thank you. This is great. I am not sure I'll be able to answer all the questions. But let me try to answer at least a few. So, yes. Adaptation, actually Sabah and I were talking about this and that's something that we want to do for future work. We were actually reading a paper that talks about exactly this. So, point well taken. Thank you. Hydrogen, actually the charts that I showed you here, don't show hydrogen because hydrogen is a carrier. So, it doesn't show up in the primary energy mix. But I can look up, what the results are showing if you are interested, I can send you the results. I think your third question was about carbon prices. Yeah. Economists keep preaching. No one listens to us. But the point that we make in this report is that for the scale of transition we need it's almost impossible to do without pricing emissions. You may use subsidies, renewable subsidies, regulations, or a mixed approach of policy tools, but it's not clear that that can really achieve net zero. One and second, it will be very, very expensive. So, the cheapest way to do it is actually fixing the market failure and price emissions. That doesn't mean that people will listen to us of course. And so, then we talk about these other policy tools. We also in the policy section talk about how this is a politically difficult thing and especially taxes, carbon taxes are quite difficult. And it's more difficult in the context of higher inequality. So, in societies where you have higher equality, there is much more resistance towards these taxes. And you can understand why because we see that regressive distributional impact. So, then one of the things is okay, you can kind of think about the distribution impacts and then include policies to target vulnerable communities. So, we talk about per capita dividends that you can recycle into it. I think if there is political will you can do it now. The question is, is there political will or not? Critical minerals. I am not going to... we just have a few sentences in there about how this is an issue but we don't really get into the details. That's it. Thank you.

Laveesh Bhandari:

Thank you. I have also a couple of questions shared by people watching on digital. But one of them has been answered. The other one is to India focus. So, I am going to skip both of them. Dr. Mundle, do you have any remarks?

Sudipto Mundle:

I just want to underline what I said earlier. One of the most encouraging things I saw in this report is about the financing gap in emerging markets especially in Asia. If I have read it correctly, we are talking about a gap between what is already being done and what is required to be done of something like 200 to 300 billion dollars, not trillions per year. That is quite modest compared to the size of these thematic bonds that I mentioned, green bonds renewable bonds, and so on which are of a much larger scale. But there is this problem of getting them to de-risk it for them to come to emerging markets, especially in Asia. And that is where I think the MDBs can play a very critical role. Especially if the ADB private sector window and the private sector arm of the World Bank, can get together to put together products which can leverage, which can leverage this private sector money. And I think it's doable, what this

report says. I take away from this is it's quite doable if they carefully thought out the products. And that's it.

Indu K Murthy:

In the climate report, I am going to be acting like one of the audiences like the wish list, something that I would want to put out here is, on the behavioral choices, you know because be it dietary choices, be it transport choices, that plays a larger role. And also, with respect to the... there is a mention of urban policies in your report. So, I think developmental choices, urban developmental choices. For example, urban compaction versus sprawl. That will have a bearing on a lot of things. So, I think some indication of what that entails, what are the feedbacks, what are the synergies, because it kind of cuts across multiple sectors. So, I think bringing in that inter-connectedness would be a challenge, but it's imperative for everyone to understand that there are feedback loops everywhere and we should stop looking at things in silos. Even when you are talking just about mitigation. But then more important is like some in the audience already put out, the synergy between mitigation and adaptation. Because your development is going to be derailed even if you don't consider adaptation here. So, I think that's the key message that I would be looking forward to seeing in your forthcoming report. Thank you.

Montek Singh Ahluwalia:

Well, other than repeating what I said earlier that I really enjoyed the report let me make two suggestions. One, there are a lot of discussions on the climate report. I am sure that'll be very exciting. I wonder whether it's at all possible to circulate a draft of it for discussion. Quite honestly, we are dealing with subjects which are going to extend over 50, 70 years. Virtually any government if you were to extract from it the following proposition, you don't have to do anything for the next five years. But after that, you have to do these things. We will be quite relaxed about it. Otherwise, anybody will have and governments will have their own view. I think this is a subject that deserves to be discussed in draft form. The ADB, the president, even the chief economists can distance themselves from the draft and say that look we've got a whole bunch of bright people and we've asked them to produce a draft report. But we want to subject it to technical scrutiny. Thereafter you, the management will of course make it into an ADB report. But I think you will get a much better sense of what the issues are and maybe you will have a way of somehow handling it within the normal constraints. So that's my first suggestion. The second is a slightly frivolous remark. Because I couldn't help noticing that lots of people talk. People talked about silver bullets and biting the bullet. This is one of the interesting things because the original concept of a silver bullet is something you shoot. You don't have to bite it. The problem here is there's no single silver bullet. There are any number of silver bullets and you have to bite each one. So, combining the two gives a sense of why it's such a difficult job. Thank you.

Laveesh Bhandari:

So, with that, do you have a response or would you...

Lei Lei Song:

I think we would take Montek's final comments really seriously. Actually, I discussed with ___, I think we have some ideas to discuss the draft with stakeholders, although you can define what stakeholders mean. But I think, yeah. I believe we will come back to this

Laveesh Bhandari:

Great, excellent. So, we look forward to the next draft report. So, thank you, everyone. There are refreshments outside. I must thank the panelists, the ADB team and I must thank our coms team and our engagement team for having put this amazing session together. Thank you.