

Flagship Seminar

**From Grey to Green:
Net Zero Transition Opportunities for India**

Centre for Social and Economic Progress (CSEP)

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Moderator

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Watch the event video here: https://www.youtube.com/watch?v=2C_iB_cUEI

The following is an edited and revised transcript from the event. It has been generated by human transcribers and may contain errors. Please check the corresponding video for the original version.

PROCEEDINGS

Rakesh Mohan:

Welcome to all the participants in this very important webinar. I'm Rakesh Mohan, president of the Centre for Social Economic Progress. And we are very delighted to have Rajat Gupta and other colleagues on this webinar. My role is just to welcome everyone and introduce Mr. Ahluwalia. He's really the one person in some sense, who doesn't need any introduction. Now, I won't follow that up by introducing him. The one introduction I can give is Mr. Montek Singh Ahluwalia is now Distinguished Fellow at CSEP. And you also see on your Zoom screen Mr. Anoop Singh, who's also a Distinguished Fellow at CSEP. So Montek, my job is done. Now, It's all yours.

Montek Singh Ahluwalia:

Thanks very much, Rakesh. Thank you for asking me to moderate this seminar. I look forward to it. We have a very, very distinguished presenter, main presenter Rajat Gupta, who heads McKinsey, and has extensive knowledge. I won't go into all the details, which has already been circulated to you. But he's in a pretty central position to present us the work that McKinsey has done and McKinsey have been doing quite a lot of work in this area. So Rajat, with that very brief introduction, let me request you to take over the screen and to make your presentation. Okay.

Rajat Gupta:

Thank you. Thank you very much Rakesh, Montek for the introduction. Really appreciate your invitation from CSEP. For this discussion, while the presentation comes up, I think Monica, you were going to put it up. So hopefully, it will come up. And let me introduce the topic, the basis for the research that I will be presenting and some of the high level messages that I would like you to take away from today's at least from my presentation today. I will be talking about two things: first is the economic implication of the net-zero transition globally, and in India; and second, on the ideas and implications, again, for industry, but particularly for opportunities for Indian industry.

The first part of the work comes from a recent McKinsey Global Institute report, which is exactly this: the net-zero transition, what will it cost and what it will bring. It's a piece of work that took us a year to do with very substantial amount of investment. I'm trying to understand some of these implications. And I'll caveat these appropriately as we come to them. These are not predictions. Most important caveat being most of these are not predictions, these are scenarios, and to be used as a tool for us to put the right sets of things in place to ensure the transition and adjustment. But the second part of what I will cover on ideas and implications for industry is coming from our client work my own client work in my leadership role leading co-leading sustainability for McKinsey globally. We are seeing some of these trends, when I talk about them.

The two main messages that I would like to leave behind. One is well known. I think that the transition itself is very significant. It is front loaded, if we are to get to this net-zero aspiration 1.5 degree pathway by 2050. It is front loaded. It is uneven across sectors and uneven across countries, we know that. But it's also rich with opportunities. And really the opportunity side is something that we don't talk about enough. From a corporate perspective for companies, the signals are already there. And the companies have to position themselves to win the transition. And they have the opportunity to play defense (sorry) to play offense, in addition to playing defense, which is essential. But there is an opportunity here and opportunity side of the equation which we don't talk about, perhaps enough. So maybe with that, let me get into the content.

My presentation itself if you go to the next page has two parts to it—first about the report itself and then the implications for corporations. So if you go to the next page, I think this everybody knows right so this is the one-point degree pathway requirement. The dashed line as far as carbon dioxide emissions in this case, this is demonstrated as energy related emissions and giga tons versus what is actually likely to happen. And we know that we know that commitments from countries, companies variously add up to two, two and a half degrees.

Different commentators have different or analysts have different things to say about it. We are far short there as far as commitments are concerned. But if you look at McKinsey's reference case, which is basically what we expect to happen, current policies and current signs of technology adoption that we're seeing are other elements of adoption that we're seeing. We're 90% away from a 1.5 degree bar. So this equation doesn't close, neither does it close on the commitment front, nor does it close on what we see as actualities on the ground. And some of the signs of that are visible in what's happened recently with the increasing coal use, as opposed to decreasing coal use. By the way, the trend was decreasing in parts of the last decade. If you go to the next page. So you know, there are nine requirements in three buckets that we believe as McKinsey and McKinsey Global Institute, the physical building blocks, economic adjustments, and social adjustments and the enabling mechanisms.

I think that if you put a temperature on each of these and how we are doing the physical building blocks, the world is not doing that badly, right, we've made a fair, fair, fair amount of advancements. There's a piece of work, for example, we did in Europe on, which said that pretty much all of the net-zero requirements of Europe could be met with current technologies. Of course, huge amount of innovation required to adopt those fully, but the technologies exists, and so on. So we're not doing that badly. Let's say we are in a 40 50, or 100. On the next two, we're probably at 10 to 20. The economic and societal adjustments and the enabling mechanisms, some of what we saw, for example, at COP 26, and hopefully with G 20, both in Indonesia and Egypt, that we will see more of some of these. And some of what we are beginning to see from citizens and consumers - the point number nine, here.

So today's discussion, our today's presentation is really around the economic and societal adjustments. It's about the capital reallocation, the demand shifts, and the compensating mechanisms, because there will be winners and losers. They send the poorest, the poorest nations, the poorest people in the poorer nations or even the rich nations will be perhaps the ones that will face the inflation that likely to come with this cost increases that are likely to come with this. And so mechanisms to make those adjustments. I think, like I said, they are at a 10 to 20 or 100 on that. I will talk about the economic shifts, demand capital allocation costs and jobs around this. And the six characteristics that you see in the light blue box is what I will use as the framing to describe this universal, it's significant, it's front loaded, it's uneven, it's exposed to risk, and it's rich with opportunity. So let's go to the next page. I'll cover each of these as we go along.

Universal, I think this page will not be a new news to anybody. If you take if you take the six or seven land use and energy use, energy generating energy sectors of the world, our industry, mobility, buildings, agriculture, forestry, in fact, all of them across the three different types of greenhouse gases have an important role to play. So this is universal, it is well known, all sectors have to contribute towards the net-zero journey. Even agriculture, which is perhaps the most difficult sector. It's actually not carbon dioxide that's the problem there. It's methane, and nitrous oxides. You go to the next page. Now, this is perhaps (if you just click to the to the full, show the full page in one go) this is perhaps the most important finding. And by the way different institutions that do this analysis have come up with somewhat similar numbers. I think the difference in these numbers here is because we've looked at all

not just the energy systems, but all of the systems, physical systems and physical assets that I showed on the previous page. And we've as much as possible taken an end to end view.

What you see here is that we will need to spend 9.2 trillion, this is a gross number, not an incremental number \$9.2 trillion a year. So 9 trillion, let's say a year for the next 30 years to hit the net-zero scenario. This spending is about three and a half trillion dollars more than the world is spending today. And the amount that's being spent today, which is about \$5.7 trillion. The three previous blocks the first three blocks here that some of that mean billion a trillion dollars of that will have to shift from low to high from high to low emission assets. Right. So four and a half trillion dollars of either increased spending, or reallocated centre spending. Now, this is relative to today. The baseline that I've described to you is the \$5.7 trillion, the black portion of the bar here relative to today, if you take this to compare this to future scenarios, which is the if you take the NGFS current policy scenario, the number is about \$8.3 trillion, right? So that scenario is \$8.2 trillion, even relative to that, to get to net-zero, we have to spend about a trillion dollars more per year, in this 30 year time frame.

If you go to the next page, this is the India view of the same number, we have to spend \$600 billion in these assets in total. It's two times two times as much as what we are spending today in these sets of assets. The reallocation is not that large, it's the incremental spending that has to come into place in a country like India. If you go to the next page, this actually gives you a lot more detail about India. So 2020 Spend, the NGFS current policy scenario for India, and the net-zero scenario for India. I'm working with a net-zero 2050 number, again, as a scenario, just to give us a sense of what it is. I do realize that India's commitment is now 2070. But just to work off something.

The number itself doesn't increase by that much, by about 15 17% relative to the current policy scenario. But the interesting thing is that even relative to the current policy scenario, if we were if we are to hit close to net-zero, if we are to give ourselves a bit of that room, if you are to ensure that not too many assets go stranded, if we continue on down the path that we are, the two interesting things here are that power block actually has to increase much more relative to the NGFS. And certainly relative to today's slot, power is in green power. That is much higher. And maybe there was one more block actually, the other interesting thing is that the other couple of blocks, which are buildings and agriculture remain pretty much the same.

Okay, if we go to the next page, again, this is the point about it being front loaded. This is now the global perspective. In total, the \$9.2 trillion that I described, is 7.5% of the world's GDP in this period in this next 30 year period. The interesting thing is that it goes up as a percentage of the world's GDP and then it goes down. So these assets have to come into place now, if we are to meet the top. If we meet, meet the aspiration.

You go to the next page and allow talk about the uneven dimensions of this particular focus on India. Hold for yourself the 8% odd number that I it was an odd number that I talked about for the world, 7.5% number that I talked to the world, this number for a country like India and other developing parts of the world, such as Sub Saharan Africa is actually 11%. So this is the part about the unjust piece of this transition, and why it's appropriate for India to take, take an aspiration, which is further out. And by the way, many of the commentators who are even here today have also made that comment right now it's lower cost for India to push it up by a certain amount. But if we were to hit a 2050, if we were if we were to have to hit 2050, we have to spend 11% of our GDP in these assets, which will be a substantial, almost 50% more than what we are spending today in these kinds of assets. And the interesting thing is the other extreme, which is China, Japan, and the US which have to spend somewhere between 4% and 6% of their GDP in this transition.

You go to the next page: 11. Here's another depiction of how it's uneven. On the complicated charts, I'll take a second to explain it. On the y axis, you have the transition exposure score, which is combination of jobs in the sectors which make me to change the most I'll come back and describe those in a minute. The proportion of GDP and the capital stock that lies in those sectors. And on the x axis, it's the richness of the country, the GDP per capita. And as you can see, the developing nations are on top left and there's a straight line it's a pretty significant correlation on who has to spend how much effort to get there. And you know, clearly two categories of countries the ones that either generate fossil fuels (in the previous page you saw some of those). Developing countries are the most exposed in this.

The other interesting angle is the colour of the bubbles here—the size of the bubbles corresponds to the size of nation in population terms. But the colour of the bubbles is interesting right. The blacker it is the darker it is, the more impacted we will be by the physical risks and we will have more and more climate refugees, if I might call them that. And you can again see the developing nations have the most, most impacted, the most to spend, the most transition to make at some level if they are to meet the 2050 goal. All the more reason why we need that extra time around this.

If you go to the next one next page, which is the sectoral view on the uneven nature of the transition. So 30% of the first GDP, the first four rows here are the most impacted. Again, complicated charts, let me explain it. On the rows here you see different sectors, fossil fuel producers of those products that produce carbon dioxide or nitrous oxides and so on. Emitters and coal operations, the conversion industries like steel and cement. The sectors that buy carbon embedded products, consumer or consumer companies construction might even include automotive and other steel, aluminum cement uses cement use, of course construction. And then 69% of the world's GDP, which has less exposure to the transition that has to occur. So 1/3 of the world's GDP, which is higher for countries like India and China has greater exposure to the climate change. And then on the x axis, on the horizontal, you see where they have more exposure, right. So the emitters and core operations have, of course, in their operations themselves significant exposure, the fossil fuel producers and the fossil fuel dependent product producers like automotive have product exposure, but they make some have electricity exposure and some other input exposure. So that's that x axis depending on where their emissions come from. And as you can see, the actions that have to come from these sectors or countries that dominate these sectors has to be different. So fossil fuel producing countries basically have to transform their foot portfolio. Saudi Arabia has to move from hydrogen, also well endowed renewable, so should be able to make that transition should they put their minds to it. And producers of automotive equipment machinery, which actually use the fossil fuel and generate carbon dioxide, have to also transition their portfolios, through products that will not will use more of electricity and green electricity.

Emitters and core operations power being the largest steel and cement, these have to transform again, rip out old assets, meaning coal based power generation, coal based steelmaking, and put in new assets in place. And then the users of inputs have to buy differently. In some ways, they have to take the consumer pressure, which has to then transmit to them. And then they have to apply pressure backwards, and be willing to pay for the transition. While they're, you know, eventually passing this on to their consumers. And of course, force and work with their suppliers to innovate and help them innovate. And perhaps even lowering the bar in some places, for example, does the steel that go into the car, when it's green, and to be coming from recycled sources does it need to have the same level of spec as it may have today. So they also have to transmit demand signals, as well as demand and spec shifts back to the customer back to their supplier base.

If you go to the next page, which then talks about the jobs impact well talked about and and let me also say So the summary here from our research 200 million person, a job increases when 80 mil \$5 million billion job decreases. Not much it's a wash. Now, that's not to say that individuals will not get back impacted. So this is going to be a huge human issue. Individuals could get impacted, sectors will get impacted. As you can see oil, gas and coal will lose 30 odd million jobs. And places like Eastern India, which are dependent on these sectors will suffer a significant impact. Yet, if you put this in a wider context, this is not that big a transition, partly because many of the sectors that have to transition that we're talking about are more capital intensive than job intensive. Just to put this in context just for India, the impact of digital on jobs in India is about 60 million jobs, retrain people, additional jobs that get created - 60 million, right. 100 million probably need to come off our farms in the same year, maybe even 150 million need to come off our farms. And we probably had in a relatively short timeframe, 15 odd years 100 million to our workforce. So the jobs challenge, I think is dwarfed. It's talked about a lot. It's dwarfed by other forces that will impact jobs. If you go to the next page. Let me move to one other element of uneven which is costs. Just look at the first bar in the second bar for policy maintenance T, for set a bar first row and the first.

So if you look at that, there's going to be inflation, okay? To increase, particularly in the short term, the costs have to increase to accommodate increased investment that has to go into the power sector, the steel sector and the cement sector, cement sector. And the range of cost increases that you see here are between 20 and 50%. So somebody has to pay for this. And if you take a country like India, if the cars or the scooters, or the homes are more expensive, by 40 45%, because a lot of the construction cost in India is not the finishing elements, but the core construction elements of steel and cement, then, particularly for the poor, what's the method of compensating them as we, as a country embark on grabbing the opportunities and serving the world on this transition.

If you go to the next page, then, many briefly it is exposed to risks, I will talk about one of these risks, which is the supply constraint and price volatility that we are likely to see. So I see this happening with my clients already. Those that are producing gray carbon, emitting carbon, and on the basis of that a producing motivator, are basically beginning to reconsider their investment, the demand in a country like India is still going to be there for gray steel, gray aluminum for some even gray power, my expectation, we're beginning to see shortages in that PLS for coal based plants are beginning to rise. And maybe by the middle of decade, the decade will be short for baseload power, right, but the investment may not come. Right. So we are going to see price increases for those commodities, we're going to see volatility, you're going to see potentially unrest.

And then on the other side of things, the demand signals for green products. And this is true, particularly in Europe, increasingly. So in Korea, Japan, possibly in the US, we're going to see the demand signals are already in place of green aluminium, green steel, green power, and exceed the supply of many of these sectors. The supply hasn't quite kept up. So we're going to see price increases, and I forget, time show some evidence for that. For example, maybe then, we'll talk about that, for example, for our recycled PET, recycled polypropylene, the scrap based product in effect, the prices of these products are trending up already. So we're going to see volatility, and we're going to see, we're going to see price increases for this.

If you go to the next page, then I'm going to say you know India will similarly see not only cost increases volatility, but also the potential if we do go down the path of 2050. If regulatory pushes of that nature come in some sectors, we're gonna see stranded assets. It just talks about coal assets, where \$12 billion of coal assets could go stranded. And by the way, real examples, we've just made the (unclear). Those assets are not going to run down in 10-15 years necessarily, and we may make the transition towards EVs in that timeframe. So, we are going to see stranded assets in many, many sectors as we make this

transition. Quite extreme, if we choose 2050. In some sectors, less extreme if the economic transition faster or in some other sectors.

If you go to the next chart, maybe you go to the next one. I think there is also an opportunity, I talked about the opportunity from the investment, but for a country like India, there is opportunity. The top part of this is the solar potential, we are pretty well endowed on that front. Amongst the lowest cost solar producers, solar energy producers in the world. Very high investments, third largest also. And wind, we see less opportunity for India. Consequently, for hydrogen, combined with highly skilled manpower, the ability to build big plants for less ability to do engineered products for less equipment for electrolysis, solar equipment, which we haven't done in the past. So I think these bunch of things point us to opportunities. If you look at materials on the next page, that too, has some opportunities on (unclear) on zinc. Zinc, we realized in the standing is one of the largest producers of zinc in the world. (Unclear) we haven't, but we should. So some of the commodities cobalt, copper, lithium, nickel, we are not as well endowed. These are the commodities of the future, but we are so we have to leverage these opportunities.

If you go to the next section, now, if you can skip through this and go to the next section. Let me talk a minute or two about the opportunity. I know I'm running out of time. So if you go to the next page. These are the areas this is this is a five-seven year view. This \$5 trillion of incremental addressable view for decarbonisation. Nothing unexpected. The biggest sectors are low carbon ability low carbon power, scrap circular products and packaging, waste management and water, low carbon agri chains, hydrogen potentially in the later part of the decade, some of the investments will happen now. Higher efficiency buildings less so in India, we don't consume we consume more electricity and less heating. Fuel, industrial decarbonisation again, the technology still have to settle here, as well as CCUS carbon markets. So these are the opportunity areas.

If you go to the next page, this is where companies have to focus. So this again, complicated for a little for 10 companies each, 10 with green (unclear), 10 with gray (unclear). This is the market to book ratios, right. So what is happening in the stock markets for these companies. Now the stock markets do have bubbles, I realize that but they're also often an indicator of what's coming in the future. The market to book for the green (unclear) companies and a lot of these are in the energy sector, where the transition technology the adoption, all of these are further ahead more mature is four and a half, while the average market to book for the energy producers or the converters, like a steel company or (unclear) Tata Steel is one and a half. It's 3x already. The markets are beginning to recognize that the demand for green products exceeds supply and so on. So, huge opportunity. Huge opportunity here.

If you go to the next page, this is one example, AkerSolutions or is a Scandinavian company. The role of the company or the work the company has been doing is renewables and field development or field development, (unclear) those kinds of things. If you look focus yourself on the right side of this chart, the black piece is the market cap of the core business that this company does. 27 billion Norwegian Kroner so this company of revenues comes from their core business. Very little about a billion Kroners comes from the new businesses which you see on top, the light blue in the dark and the royal blue, which is revenues that come from their services that they provide on the offshore wind and carbon capture side very little revenue. But as they have exposed these arms of their business says to the market, a larger amount of market cap to ExxonMobil by the tax being generated of the current mother company that was there. So this is again, I think, it envisages the future of a corporate perspective.

If you go on to the next page, so implications for Indian companies, what should Indian companies be doing? First and foremost, Indian companies ought to be liking the value creation new. There's upside for those that export for example, products to the to Europe, the carbon border adjustment

mechanism. The carbon price, almost 100 euros today actually gives us an opportunity to produce this and perhaps some products in a decarbonized manner here and to be able to occupy that market. So assess if you come at it from a value creation perspective, there's opportunities for Indian companies.

Second one, play offense, look for the downsides. What markets will you get shut out of what costs will you have to incur but also look for upsides. There are going to be pockets of opportunities. In addition to taking 50 Year 30 year targets the short term targets because without that companies won't your people won't move this is for companies. The adjacent part of playing offense is built adjacent green businesses to scrap based businesses. For example, can you import scrap convert low carbon create low carbon products realize premium? As I talked about on some of those products. There are premium premiums to be had for example, on green steel. The other 1/5 is the programmatic so lots of programs work in Indian companies not so little little things. What are they adding up? Are they adding up to your food target? And do you need programs behind this? Or are you stuck in the pilot?

Last point, this whole journey is going to be inherently, uncertain price volatility, demand volatility, regulatory uncertainty. And companies have to put strategies together that look around the corner that predictability the future and will have to take risks. So in some ways, you will have to put strategies in place which you can act on piece meal and trigger when you see some big external changes occur, demand signals occur. And in some cases, companies can those who have the ability can make bold bets behind this and we do hear some announcements from large companies in India around this. Let me bring that to a pause again the main message is being the transition is uneven. It's risky, it's rich with opportunities for companies they have to set I'm setting up when the transition and playoffs.

Montek Singh Ahluwalia:

Yeah, thank you very much. That was a really rich exposition of a report that does deserve to my mind, a much deeper study. So I can say that you certainly stimulated my interest in going into it more deeply. And I'm sure that's true for others. Now, the person who was going to comment was Vaibhav Chaturvedi. He has to leave rather early. So Vaibhav, first of all, thank you for agreeing to stay back. Vaibhav was a fellow at the CEEW, one of our leading think tanks working in Energy, Environment and Water. And he's been working on developing a modeling ecosystem, looking really at climate change energy interactions, and has been deeply involved in advising the government. So with that very brief introduction, let me ask Vaibhav to comment.

Vaibhav Chaturvedi:

Thank you, Mr. Ahluwalia. Very good evening to all the colleagues on the call. And thank you, Rajat, for this very stimulating very interesting and deep presentation. I look forward to understanding more of the report. So in terms of the points I want to make, the first point I think I want to make is about economics and economics, not in sense of the numbers. I will talk about economic narrative. And I think that is what I find most interesting about this particular report. But like we have been into the climate debate pretty long with at least over a decade now. Decarbonisation has always been about economic transformation. But you know, unfortunately, we have not managed to convince most of the economists in the country and abroad. Now what net zero does I think he does something very interesting. So net zero gives a lot of certainty to the decarbonisation debate. Earlier for India, decarbonisation simply means emission intensity only. That's a very different thing compared to a very hard certain target of net zero. And it is, what it is done is it is it is sort of pushed the mainstreaming of this economic plan around decarbonisation, which is, I think, a great step, because till now, it is a very marginal environmental climate debate. Now, it is shifting in a big way and the report I see, I think, a very important contribution. So that's my first point. The second point I want to make is now beyond

economics, there is also the political economy and businesses need to deal with the political economy challenges of transition.

As well, one big rather, you know, example of political economy, which aligns very well with the you know, business strategies and impact on competitiveness is about distribution sector reforms, essentially, pricing reforms in India. We have the cross subsidy that exists in Indian market. One of the big results that we see in our analysis also, and I'm sure all other analysis, whichever have looked at net zero is about deep electrification of the industrial sector. For example, I will talk about India only not about other economies. In India, the share of electricity and industrial energy is around 17-18%. The reason is very obvious, electricity is so expensive. And we know it is not it is only one part of the debate. There is this whole other sector of financial mess, and continuous bailouts that we throw at the distribution sector every five, six years or so. Somehow we have not managed to solve the problem. But this is fundamental, because time and again, it has also been highlighted that pricing reforms are also very important element for competitiveness of India's industrial sector. And in absence of the pricing reforms, electricity continues to stay expensive, neither we will be able to achieve the goal of the competitiveness or higher share of manufacturing, nor will you be able to decarbonize now this is only one example of the political economy. It should be the political economy challenge that companies have to deal with and somehow policymakers have to bite the bullet sooner than later, hopefully. And there's only one example. It could be the issue around coal dependent states, how will they react to any reform agenda? It could be about Indian railways, you know, most of the revenue of Indian railways is about focus around coal haulage, what will Indian railways do? How will it cross subsidize, you know, passenger traffic, which it does currently, based on freight sector revenue. Now, a lot of interesting issues around political fund, which I think need to be understood better. So that was the second point, Economics and Political Economy.

The third point I want to make is you know, when will India get space for fiscal reforms. We have been trying for so long now, and we try to address this when we talked about 2070 as the Net Zero target is something ambitious, still realistic and the argument when we gave, you know as many of the colleagues here on the call would know, we did you know four scenarios: 50, 60, 70, 80 for net zero. And we said 2070. The argument behind it was a pure economic argument. So, we simply started asking a question that when India becomes rich, even after attaining a rich and high income status, should India keep on asking for like 40-50 years for becoming a net zero economy? Now, the India's whole debate of all the whole positioning of climate policy is about development. Right. So, development cannot be compromised at any cost, and which is a very logical kind of position. So, if the question becomes if you're already rich, and if you're already a high income economy, then you already addressed the developmental concerns. So, then we do see many of the, you know, stakeholders, including high level officials, everybody agreeing to this larger point that when the country becomes rich, of course, we don't need another 50 years for actually net zero, then the question becomes, okay, what does rich mean? And when does India become? And in fact, a lot of what I'm seeing is already written on op-ed in some newspapers. I'm sure some colleagues might have already read this. So the question becomes what is rich and when does India become rich? So that is where the World Bank definition, you know, it says, any country that crosses around 12,500 US dollars per capita, I think in \$20 terms, it has officially become a rich income or high income economy. India currently is just is less than \$2,000, per capita, China is around \$10,000. So China is expected to officially enter the high income club somewhere around maybe 2028 or so. India is expected to enter around somewhere around 2055 or so, going by the growth expectations that even international estimates tell us. Now after 2055, you simply say, well, you will have you know, India will become a rich economy, which simply means we have a lot of fiscal space, to maybe address many complicated reforms, which we are not able to do, right now. For example, the distribution sector mess, which we are in currently,

right now, because we are not able to raise domestic prices, maybe that challenge will go away in 25-30 years from now from now, just because of you know, economic growth and the fiscal resources that come with it. And if 2055 is that kind of marker year, then maybe the economy does not need more than 50 years for becoming a net zero economy. It's a plain, very clean kind of economic argument. It simply says, you know, 2070, is you could think about 2070. And of course, if technology is permit, you should do earlier, you should always advance to net zero, because climate impact is very important. But the broad point I'm making this whole perspective of economics in the reform agenda, is also something very important. We have been highlighting it I think this report also does an excellent job of doing that. And finally, I want to say, what are the potential strategies? So after understanding of, let's say, economic narrative, political economy, the reform agenda, potential strategy, I think they do lie, they also engage in heavily with citizens as well as labour unions. I think engaging with labour unions is absolutely critical. Whenever we see some effort of distribution sector reforms, in any state, the first thing we hear about is a labour union strike. And the state kind of works two steps back. Now, unless you actually engage in a meaningful way, labour unions in the energy sector, and we're pretty big and powerful energy sector across the value chain, unless you are able to engage them in a meaningful way, it will be very difficult to create a, you know, to actually implement reforms. So that is one second is engagement with citizens. That is the second thing, I think that is also absolutely important. And we will need to accompany in a much more wider and meaningful way.

The third is about carbon pricing. I think the Bureau of Energy Efficiency has already kind of have a framework for an emission trading scheme. So India, I think, sooner or later is going to adopt an emission trading scheme. They have a plan it's already out on the white paper is already out there. Which simply means, the economy will have a carbon formal carbon pricing in some time, which will have very interesting implications. But that is also an important strategy and the government is already moving in that direction.

The final thing I want to say is that when we hear a lot about who benefit narratives, a co-benefit narrative is kind of I would say it's a darling narrative of everybody. Increasingly I am kind of getting disillusioned by this narrative. And because, you know, I don't think any manufacturer has done anything, or any electric vehicles are coming from the consumer side or the auto producer side because of this benefit narrative. Anybody has not done anything. It has been there in text. No progress has happened. I think a much more compelling narrative is about macro economic transformation. I think that is a much more compelling narrative. And that is what this report and many other efforts which are trying to make this compelling macroeconomic reality, which is about jobs, which is about economic growth, which is about exports, which is about border carbon adjustments, what is happening in Europe. Now, there is no you know, wishy washy co-benefit narrative. It is a hard mainstream macroeconomic narrative, which is going beyond full benefit narrative, which we all of us use so widely. So, that is the final point I want to make in terms of four strategies: engagement with labour unions + citizens, carbon pricing, and going beyond the co-benefit narratives, towards are much harder, front and centre macroeconomic narrative is what I will think, will really, you know, hopefully help us move in the direction of the net zero in a much more smoother way, because we want a smoother transition. We don't want any economic shocks in transition. So I hope that that is a direction in which you, thank you so much sorry for the background noise. I'm at the airport, but happy to hear from my colleagues. Thank you.

Montek Singh Ahluwalia:

Thank you very much, Vaibhav. Thank you very much for joining us. I know under high pressure. And we reflect you won't be able to hear Rajat's response to the points that you made. And I think one of our colleagues will be able to brief you on that, but very nice. The next speaker who's going to comment

on the presentation is Rahul Tongia who is the senior fellow at CSEP. Works in the area of Energy and Natural Resources sustainability group in the CSEP. Rahul is also an adjunct professor at Carnegie Mellon, and has been advising the government and various committees, etc, that relate to climate change. So just the right kind of background to comment on the McKinsey study. Rajat would you like to sorry? I mean, Rahul, are you? I can't see you. But you must be on one of those.

Rahul Tongia:

Thank you. And hopefully my slides are showing just I have three slides for these three points. Are they visible? So Rajat, thank you for the presentation. And I think the phrase that comes to mind is, every challenge is an opportunity if you pivot if you rework and the only lament to be slightly cynical. Well, hopefully, it's not the same thinking or group that got us into this mess is going to be the ones who save us. So maybe we do need new stakeholders to this. So I want to really talk about net zero, because you use the terminology in a manner that a lot of people may or may not quite get what that really means. And then talk a little bit about specifics of what we need to do or could do, and then what may or may not be missing in this discussion. So first is I mean, we have a paper, it's on our CSEP website where I talk about an alternative to net zero. Now, this doesn't mean that zero is going away. It's a good thing. But the question is, what could we do that's a little better. And what really matters is the cumulative emissions that any country or entity would be putting out. And so net zero doesn't tell us how much you're going to emit. It just tells you the date by which you're going to zero and the cumulative emissions is a very big deal. That's missing. The second important thing you alluded to is 2050 repeatedly. And this is a discussion that needs to happen. I mean, politically, it's already been settled, at least to some extent that some countries China-2060, India-2070, has been announced. Of course, they can always ratchet or accelerate. But at a design level, should we be expecting all countries to zero by 2050? And I think the obvious answer is no. And that fundamentally changes how we choose our infrastructure design going forward, what we really need is the high emitters, not just rich, there's a strong overlap, but China falls in the category of high emitters as well, just using 1990 onwards data if you ignore the historical emissions even before that, and so the obvious answer is they have to get to by 2035. That leaves a little carbon space and decision making different for developing and low emitting countries.

A second problem is the use of word net. And here there's a lot of ink spilled as well as debate on: are these accounting tricks, what's really going on? And unfortunately, in the short term, it is still financial, in a manner that's not even very accurate or fair. So for example, the physics isn't necessarily syncing with what the finance is saying. So CEO of Delta Airlines proudly mentions that he spent \$30 million and they are now net zero. If that were the true cost, and it were linear, that means \$24 billion is all it would take for the world to net zero. But we know that this is a voluntary market. And it's a lot of, you know, left and right balancing. And so if we use the analogy of your final may I put it with indulgences in history, they won't buy our way to heaven, they will just slow down or descent into hell. A more subtle point on these offsets is on the fact that they are unfair to countries like India, and to the poor, McKinsey 2007 estimated had very nice marginal abatement cost curves, the MEK curves, which many of us would be familiar with, which were essentially framing that says, to reduce emissions, different technologies, or different solutions have a cost. And it's more like a ladder. So there are different steps of different widths, or different total emissions. And obviously, there's an average cost. But each step, you have to start with the lowest rung. The problem is offsets mean that the rich don't take care of their high cost tail of emissions. And they buy or use the carbon space of others at a lower cost to avoid actually coming down to zero. And so that's a significant problem. And so when we studied this question of how much do you emit by a date of, say, 2050, in the paper on flattening the curve and cumulative emissions, we talked about, let's model net zero, and assume that each country continues

for a few years, or depending on where they are, as is, business as usual, and then takes 30 years to reach zero. So this was just a standardization, for lack of better data. I won't go into all the details. But the larger point on this graph is that if the high emissions countries want to stay within a 1.5 degree rise, as per a reasonable carbon budget prorated for them, then they don't have 30 years. So if they zero out by 2050, they're actually over emitting. And so the only way that that could work out is either the poor under emit, or we have to actually have extractive technologies, which is very, very expensive. So the issue that I worry about is, we're focusing on a compliance sort of world instead of the actual heavy hitting that needs to be done. Accounting shifts, and not real change.

This is IPCC'S newest report came out yesterday, or day before and it's already this slide I've just chopped off, it was a sort of contiguous slide to make it fit. And this shows the different segments like energy, land use, buildings, etc. and different subtopics. And how much potential there is for emissions reduction, at what cost. And so the costs for the blue are the best, they are less than zero. They're not just no regrets, they actually save you money. And most of the blue is now what I would call the new business as usual. So wind energy, solar energy. This dominates energy efficiency, like in buildings. These are no brainers, and we're doing them anyways. So the first catch is how we do our accounting. You have climate finance debates, where people are giving loans for solar power in developing countries and counting that is climate finance, that shouldn't be the way we do this accounting.

The larger problem is, of course, what happens when we run out of low hanging fruit that we want to tap. So there is an enormous premium, it's not just mid colours, it's over \$100. If you read the footnotes in the IPCC, they say we are probably under estimating the costs of those very expensive emissions reductions that are out there. And so there is a premium. So this gets me to the last point, which is the rich versus poor countries: who should be paying that premium. And it's the developed countries that need to be paying the premium to get rid of these expensive emissions to new technologies: green hydrogen cement changes. Developing countries should still have the space to do it as efficiently as possible, but limit the burden they have in the short run upon their economies.

The way forward I think in a place like India, like you mentioned, would be sectoral. So I think the power sector is definitely one that needs a lot more attention. Vaibhav talked about discoms. It's more than just discoms. We've done a lot of grid modeling granular for 2030. The good news is Hi RE is cost effective, even without storage, but batteries are not yet cost effective. It's a whole separate discussion on what that does or doesn't mean. But the larger point is, we should be thinking for developing countries like India. If we think about cumulative emissions, we should use COVID phrase, flatten the curve. This is two different areas of emissions over time, the blue is sort of more traditional, where it's a sharp rise and then a sharp fall. And instead, if countries could flatten the curve, they take longer to peak, they peak later, but lower and zero out lower, you actually have either the same or lower total emissions at a lower cost. But if the narrative is always zero, by 2050, you lose this opportunity for developing countries that they may need. And so that is something perhaps missing from the discourse.

Last two small points in your slides. You talked a little bit about stranded assets. I think, if we have a tail period of time left for developing countries, we shouldn't think of existing coal fleet as a stranded asset risk, because A there's enough time, B, they will be crowded out by cleaner solutions sooner more than later. And India's coal fleet is relatively young. Half its coal capacity came online, between FY11 and 16. South Africa, they're talking about this transition, bailout or support from the rest of the world. Their average coal plants or close to 30 years. US average age is 37 or 38 years. It's a very different story for countries with high growth in demand and needs. So if we talk about coal, I mean, the whole Glasgow, there was a lot of debate on terminology and semantics over coal, phase down, wind down, etc, phase out. But instead of focusing just on coal, or any technology, it's all technologies

that have to zero out at some point. And natural gas is something that developed world uses more of because they have it, not because they were trying to be much cleaner.

So we need to focus on the Pareto, which is let countries like India focus on getting rid of 80% of their emissions, instead of that residual 20. That early action that you talked about, is definitely something more that India needs. And the transition will have to be thought through. I quibble with one of your points on agriculture, at least in India, I don't see net job gains, because there's so many more people, you yourself said we need to get people out of agriculture. So I don't see the transition, actually doing it and the transition, it's not, it's a non transition risk. I can link to a paper I have on agriculture and jobs. It's far, far worse in the agricultural section. So for Indian companies just using your same sort of flow, I think they need to work with the government to get regulatory clarity. Don't rely on regulatory support, except for bootstrapping. But clarity can help. A lot of the costs isn't just about how cheap is your factory or a product, but our system level issues like in the power sector: infrastructure design, when you talk of grass gas, for example. It's not just the product, but the system. Focus on niches would be another suggestion, because as I like to remind my colleagues around the world, a niche in India is bigger than a country in Europe. And then in the power sector. Of course, Vaibhav talked about discount problems, we need to make the entire grid a lot more nimble, a lot smarter, and a lot more resilient. That's a 5-10 year journey, if not longer ahead of us. Thank you.

Montek Singh Ahluwalia:

Thanks. Thanks very much. Well, I'm sure the Rajat will pick up on some of those points. Let me get to our third discussant Swati D'souza from the International Energy Agency. She's the India lead analysts and coordinator in the whole area of energy transition, climate policy. So Swati, can I request you to make your comments please.

Swati D Souza:

Thank you, Dr. Ahluwalia. Rahul, can you not share screen? I want to share my screen? Sorry. Thank you. So I have to three very quick points to make one. I love the phrase "opportunity". Because I think we're going to need that and a lot more of the opportunity. You're seeing the shift in the industry in US and Europe, particularly in oil and gas, where the US oil and gas companies have not yet moved towards transition while European majors are actually moving towards transition. And that sort of is a lesson for India even in the EV space where you have a TATA Exxon coming out with an electric and you know Maruti commenting on the fact that the Indian market is still not ready for electric vehicles. So who moves? Who gets the first mover advantage is a big factor within the industry segment. So I love the word opportunity. But there are certain costs that come with this opportunity. And I'm just going to share my screen very quickly. In terms of the.... can everybody see my screen?

Yep. Could you make it

fullscreen perhaps?

Yeah, just one second. So, this is something that we did last year, where we try to look at all the coal consuming sectors, the major ones, which cover about 95% of the coal in the country, we try to look at the geographical spread, the number of people employed in the sector, and who are these people? What is the socio economic profile of these people? And if you see the screen, this is just a brief summarization. So when Rajat mentioned the point uneven, this is how uneven it's going to be for states in India. We all know that the Eastern and the South, and the central eastern states are going to be the most impacted, but how are they going to be the most impacted? This is slide number one.

Slide Number two, when we talk about transitions, and when we look at net zero transitions, we cannot run away from coal transitions. If we look at coal transitions, the conversation and the point that Weber mentioned right at the beginning, when he said we have to engage communities, we have to engage citizens, and we have to engage unions, because there is an entire coal economy that's over and beyond the formal sector jobs that are highly dependent on coal. So when we are looking at Net Zero trajectory, this portion becomes very, very critical.

The third part of it is: who are these people? What is the socio economic profile? We know the iron and steel industry is one of the biggest energy consumers as well as from an emissions perspective. But who are the people who are actually employed in this iron and steel industry? What is their education profile? Can they be transitioned? If yes, to what sectors can they be transitioned? If we need to think of net zero transitions? Can we think of net zero transitions from a labour perspective? The creation of jobs, I'm going to stop sharing.

The creation of jobs is important. Yes. But what kind of jobs are these going to be? Are these going to be a gig economy job? Are they going to be pensionable jobs? What is the quality of the jobs that we're talking about because we don't yet have an EV supply chain in the country. Most of our barring the top 10% in iron and steel, most of them are in the MSME sector, the auto industry, you do have major manufacturers, but they but a lot of this is assembly line, you have clusters with MSME enterprises who make these parts. Is transition for these industries a viable option. Because while we were making this report, I spoke to sponge iron manufacturers across the northern belt of the country about 40-50 sponge iron manufacturers to get a sense of what they think of the transition because most of the sponge iron in India is made from DRI which is which uses coking which uses non coking coal, they were unwilling to shift to natural gas forget any other technology natural gas, which is commercially viable, which exists in the country barring India, all other countries who produce DRI steel actually produce it from natural gas. They there was no movement from any of these guys. And why then if we look at the unevenness of the components related to transition, and then put that in the framework of opportunity, what do we get? We get that over the next 20 years, we are going to put up about 100 million tonnes of steel capacity in the country. Over the next 10 to 15 years, we are going to add to electric vehicles, over the next 10-15 years we are going to add to cement capacity in the country and I'm only talking about industry because this discussion pertains to the industry sector. So, when we look at it from an opportunity point of view, sometimes, from a capital perspective, we will not be we will not fall short for the large industries.

What about for the MSME industries? Do we have a separate financing mechanism for the MSME industries where credit is easier? Because a lot of them are margin plays at the end of the day, and they are the ones who need to make the shift. Without them making the shift, at least 40% of our industrial emissions is not going to go away anytime soon. So these are I think I'm going to stop over here. But these are, I think, some aspects that we need to take into account when we talk about industry transitioning.

My last point is going to be on labour. The fact of the matter is missing increasing contractualization of labor. And that may not be that bad thing because it reduces cost for the industry. And sort of also interplays with the with the full time employment definition that that comes from green jobs. But will this labor also get Social Security benefits going forward, we don't yet have a supply chain in place, whatever social security benefits exist, exist in the fossil fuel industry. So when we are looking at the opportunity, we look at the opportunity not just for industry, but to sort of transform the labour market in the country, because most of our labour is still informal. Look at it from transforming some amount, some amount of transformation in the education system. Because a lot of the people barely I think what, as per the labour force participation data about I think one or 2% are the only is only

number of people with a postgraduate degree. So a transition just doesn't mean one thing, it actually will see a transformation across different segments of the economy. I'm going to stop here.

Montek Singh Ahluwalia:

Thank you. Thank you very much. Swati, our last discussion is Indu Murthy from CSTEP in Bengaluru. She also works in the area of climate sustainability, climate, environment, etc. So Indu, would you like to make your comments now?

Indu Murthy:

Yeah, thank you, Dr. Ahluwalia. First and foremost, I would like to thank Rajat for making such a crisp presentation of such a wonderful report, quite a complex issue at the end of it. So to begin with, you know, I just wanted to kind of come in with the comment that, you know, I think the overall macroeconomic impact narrative is great to some extent, but then I think we, we really need to kind of move from a techno economic narrative to looking at, you know, the social and political issues related to it. Swati kind of alluded to it when we were talking about, you know, coal power, the eastern districts, eastern regions of India, so on and so forth. In fact, the recent very recent report of IPCC very clearly, even says that, you know, there are close linkages between mitigation adaptation and development pathways. So I think having a development narrative becomes extremely important, particularly in the case of India, where we are looking at, you know, trying to kind of meet the developmental goals of, you know, providing 24/7 electricity, clean water, clean cooking, fuel, maintaining food security, so on and so forth. So, it becomes extremely important to keep that perspective in mind. Maybe not a core benefit narrative, but definitely trying to look at what are the trade offs? How could we actually minimize the trade offs, that would become extremely important to look at. Mentioning trade offs, I also wanted to kind of bring in this the points that Rajat had talked about increase higher increase in the green power. Now, when you're looking at higher increase in the green power, obviously, we are looking at issues of competition for land and water. So are we there, again, we are competing with food production, if you are looking at ethanol, you know, sugar cane is the primary source. So obviously, it's a very water intensive crop. There again, we are looking at and wonderful thing that I saw in this particular report is the climate angle also that's been brought in into the narrative. But however, I think moving forward, it's important to realize that we are looking at a wetter and a warmer future, but again, the variability is going to be much larger. So probably you we are looking at areas where there are going to be largely scarcity of water. So bringing in issues of you know, competition for land and water in these issues, again, is a complex thing that we will have to deal with as we go forward. And of course, job shifts. It does seem like a you know, not a very large thing, but then skill development is at the heart of it. Unless we kind of bring in skill development, I don't think there is a possibility of looking into transitions into newer areas. And I definitely, you know, agree with Rahul saying that when it comes to agriculture, we are not looking at transition, that's a no go area as a design, emissions, yes, but then but beyond that we cannot look at people mass transition into different kinds of job skills. So that's not going to be happening at all. And, of course, at the end of it, I think we need to be cognizant of the fact that when we start looking at it from a macroeconomic perspective, it's it's great to some extent, but the distributional impacts of it is something that's very, very large. And so lower income households might end up paying much more than that, and talking about, you know, behavioral change or getting engagement with the community. Without meeting the development aspirations, I don't think we can actually even get into a conversation on, you know, getting people to buy in things that we are pushing for. So that's in a nutshell that I wanted to bring to the table around what's been discussed so far. Thank you.

Montek Singh Ahluwalia:

Thank you very much. That's a lot of very interesting points. Now, Rajat, I'm sure you made certain notes, and there are issues that I might want to bring up. But how would you like to, would you like to first sort of have a first go at responding to those comments that struck you is particularly important. I'm sure they're all important, but some would have struck you as, especially so and then we...

Rajat Gupta:

I am happy to do that. We may very, very briefly. So you can then also provide your comments.

I think, Vaibhav's comments, all three I quite agree with. I think the fact that net zero and if you just take India provides a bookend is extraordinary. And I think I hope that we will truly come up with an allied national plan, which we can of course, modify as we learn more and as technology develops, and adoption happens. But we will come up with a plan which will then provide us some degree of regulatory certainty. This thing about going to Bharat 6, and then very quickly going to zero ice vehicles - that kind of mistake is not something I mean, of course, if it happens, it happens, because technology moves much quicker or something else that happened, but it should not happen because of the lack of foresight. Right, it should not happen because the we did not think enough. Right? So I think that (unclear) point is absolutely right. It should force our mind, I hope we to debates of this nature and through work that the policymakers do with, with the thinkers like yourself, many of you here who I know work with policymakers, we actually create a national plan that's reasonably well aligned, which is also flexible and agile in its nature.

I think the second question on should India wait, or should India act? I think, frankly, in our own interest, we should we should act now. And I also agree that we should define co benefits differently, we should define it as real value creation for our nation 75-80% of what India will be in roads and steel plants and chemical plants, etc, etc, in 2050 has not been built today. 28 years ahead. So it's not been built today. So can we just as much as possible, put the right regulatory signals in place, put the right demand signals in place, watch the signal or use the signals that are coming from other parts of the world and just build right as much as possible. So I think that's to Vaibhav's comments. To Rahul's comments on alternative to net zero, you know, I think there is no alternative but to think about the alternative about the carbon space. Net zero concentrate our mind in one way. But we do have to look at the area under the curve. And, frankly, that's right. It's rich countries, but not only rich countries, but it's rich people like ourselves on this call, that we have to be the ones making the most sacrifices. And frankly, those sacrifices won't be large, right? If the impact on a car of green, a green car, green glass, green aluminium, green battery, green steel, the cost of a green car is 10% or 15% more, really. Right? if you account for it. And if it takes some technological advancements in place, it's not that much more. Of course, the richer one people use cars. But for some for a poor person for whom the house is the full structure, there isn't that much finishing and so on, you're probably talking about a 40% more expensive house, right or 30% more expensive food, which is a large part of their consumption basket. So I think this also kind of goes back to Indu, your point to say that there are going to be winners and losers and the poor are going to be the bigger losers. So we have to put mechanisms in place and use mechanisms that are already in place to be able to transfer or to take away the inflationary effects from the poor. The DBT is an extraordinary mechanism that's already in place in many sectors. Can we extend it to other sectors? So that the impact on the poor is much less even as we and the rich nations pay for some of this. But I think at the same time, I might say that, you know, while we can say developed countries will pay, we have to worry about our own nation. And, you know, whatever, we might say about FDI, and funds coming from elsewhere. And the end, it's 10 15% of the total investment we will make as a nation. So really, we have to be self reliant, and we have to do right for our country. And, and, and really expect to do things in the right way for our country. So look, we should just be atmanirbhar on this also, as much as we can. And we should make as much noise as, as

we can to make sure that the unevenness of this is recognized and the fact that this is not a problem we have created, except more recently, perhaps.

To the jobs, that argument that several of you have made I disagree. I fully agree with the human dimensions of this and the specific issues right, so me, when I have to repurpose myself from a digital operations person to think about sustainability back again, after 10 12 years of having left that topic behind, I have a lot of rescaling to do myself. It's not an easy journey for each individual that's impacted. It's not an easy journey. But if you take a macro view of it, there are so many bigger issues around the jobs, the job creation itself, right, we 100 200 million people coming into the workforce, the digitization, which will impact 50 million jobs in India, the fact that we have to pull 100 million people off our farms. I think there are much, much bigger fish to fry forces to worry about and to jobs. So that's just a quick response in some of the topics that y'all raised. But all in all, thank you very much, I think all pertinent topics, all important topics, all areas that we have to think about, and come up with a national agreement.

Montek Singh Ahluwalia:

Thank you. Thank you, Rajat. I think you make some very important points that, you know, particularly, I think it's generally recognized that managing the energy transition is going to require which what many people call a whole of the economy approach. It's not a partial equilibrium. You take one little sector and change something, you're really changing across the board virtually in all sectors and, and your presentation brings that out and outlines the various areas where changes are possible. And of course, you know, you I mean, the way it actually plays out over time. There is uncertainty, we'll know more about it later. But I certainly agree that since we have ourselves said we intend to do something, but it no longer in the world of saying that we cannot reduce emissions, because that will compromise development. And the main reason we've got out of that is the belief today that you have energy sources that don't generate emissions. So the question is, how fast can you transit. And as has been pointed out, I also don't agree that 2050 as a universal end date is actually, is not correct. Because if you look at it, it's highly inequitable. And if you had any sense of equity, in terms of area under the curve, you would come to the conclusion that the starting point of net zero for 2050, which the advanced countries are pushing on, is actually too loose for them. They ought to be moved much earlier to 2040 or something, also China. And quite honestly, if we adopt that approach, India to may need to move earlier, to net zero earlier than 2070. I think if people are willing to have the advanced countries move by 2040, we should certainly be willing to adjust. And as a matter of fact, their adjustment will solve a lot of the technology problems that will make it easier for us to adjust.

Now, I took a note of some of the questions that have come up, but now they're all kinds of varied, but one I think is particularly important, which many people will be thinking about. So let me pose that to you. One of the questions is that you mentioned that net zero cost for India would be 11% of GDP whereas for the rest of the world, the average is 7.5. And also because of (unclear) for the rest of the world. It's higher initially and then falls and averages 7.5. So the question was, what do those numbers look like for India? Now having said that, you know, to think that we can actually dish out 11% of GDP. I mean, is that credible? How would you respond to that? Remember, this is this is if 11% is viewed as additional. I mean, obviously, if all you're doing is restructuring, something that we're doing one way and now have to do it differently, that's not additional. So what is this 11%?

Rajat Gupta:

Let me first clarify that the 11% number is not additional. About half of that number is already today being spent. Okay. And so this is relative to today's baseline. And I don't have the number here. But

there is some additionality to this relative to the current policy scenario NGFS current policy scenario, I don't have the number here. But it certainly half of it is being spent today, let's just take that as a starting point. Again, I don't have the numbers on the steepness of the curve, the increase that will have to happen initially, initially reduced as a percentage of GDP. But if I had, if you put a gun to my head and asked me for a view, if we were to head towards the 2050 number, then that number will have to be steeper than for the rest of the world or for the average for the world. Because we are also in a growth mode. And we are putting capacities for power for steel for cement for many of these sectors in today. And many of the technologies for this are present, but not at the full potential cost or the lowest potential cost yet, because these technologies hydrogen based steelmaking as an example, CCUS for carbon dioxide, many of these technologies are somewhat further away from adoption. In some cases, some because of physical barriers, for example, we haven't explored for storage opportunities in India, that may that may exist, a carbon storage opportunity. So I might say, I might venture to say that it's probably the curve itself is steeper in its rise for India, if we were to stick to that 2050. The number which is also one of the reasons. And I fully agree with you that this target has to be if to meet the global target of 2050. The global of other nations developed nations plus possibly China have to advance it and leave a little bit of room but for countries like India, and as we move forward, India may surprise itself. It has surprise itself relative to its Paris commitments also.

Montek Singh Ahluwalia:

Well, you know, surprising yourself relative to Paris commitments, I don't think count for very much, because those were, I mean, the wonder was that they were commitments, they were quite ridiculously loose. If we surprise ourselves with the Glasgow commitments, that would be a very, very major achievement. I mean, currently we are running behind. And getting to those targets is going to be a bit of a strain. But that's that's fine. One, one question that comes up in this context, and that is that somebody raised this issue that, you know, I think you mentioned and others mentioned, the fact that the difference, there is unevenness of impact. And I think it was Swati, I think who talked about the interstate differences. You know, where coal is being produced, and iron and steel and so on. Now, you know, somebody has raised the question that are there lessons from other federation's and how do you get states on board? Do you have something you want to comment on? However, others managed it because everybody's got regional differences? We're not the only ones with regional differences. How do we do it?

Rajat Gupta:

Maybe we should open this up a little bit wider. I didn't fully understand the questions by state federalism. Is it industry federation's that we are talking about? Or is it No,

Montek Singh Ahluwallia:

No, no, no federal structures, I mean structure, basic proposition that if India makes the transition, is it going to impact different states differently. I mean, all the coal unemployment or that rather than loss of employment, will be concentrated in the central eastern states, the new employment in the solar plants will be in other states, that employment may actually be better quality. But the states that lose employment will have worries and there's gold royalty and so on. So I think the question was, in the specific area of climate change, are you aware from your studies or from McKinsey Institute how have other federal structures managed to overcome this problem?

Rajat Gupta:

I think the the idea that comes to my mind is why don't we have our own COP 26 as a nation, right with a set of directions which are top down and then at the same time states come up with their own national league or whatever state determined aspirations. We saw the city of Bombay come up with something Mumbai, right? Recently, but we haven't seen too many states move on this, right. So if we can have a dialogue of this nature, and you know, as things start adding up, yeah, that is fine. So that's a starting point for something like this. Others may have

Montek Singh Aluwalia:

A related issue that came up hasn't been posed very specifically by any of the in the chatbox. But it was clear from what you said, you mentioned at one time, that it's not just a problem of rich countries, the rich people in India, as you said, you and me, we have a very high consumption pattern that is very intensive in emissions. You know, obviously, the best way of handling that is carbon pricing. But I find there is no willingness on the part of almost any of the people who are concerned about this issue to support carbon pricing. In fact, the proposition that we should have carbon pricing, very often viewed as some kind of a foreign implant. And yet, you know, if you look at what's happening, and we are very reliant on petroleum, and petroleum products to generate revenues, we are hoping to phase these things out with growing electrification of vehicles and electric buses and trade, and even railway traction, we need to substitute something for this loss of revenues. And the best substitution really would be through some form of carbon pricing, which would actually put a huge burden on coal. That would, of course, raise the cost of coal based electricity, it would make renewables a lot more competitive, and it will generate revenues as the transition takes place. Well, I bet you if you at your next lecture in a university, if you say this, you will not receive any support on the grounds that this hurts the poor. So what is your How do you react to that?

Rajat Gupta:

My own reaction is that I think it's inevitable for us to have some form of carbon pricing. Even in a country like Indonesia, has put something in place: \$5 very small, it needs to be different.

Montek Singh Ahluwalia:

We did that too, by the way, very small. Just as the Paris commitments little ignore, what are de minimis moves in the right direction. I mean, we put 400 rupees or something per tonne of coal, whereas actually, we needed about 3000.

Rajat Gupta:

I think, I think the putting the mechanisms for carbon markets in place based on perhaps the PAT schemes that have already been implemented, we can build on those, I think, is an imperative. And at the same time as inflation hits for energy based products to be able to then compensate the real poor, right, which we have the mechanisms for, through the direct benefit transfers, and so on. I think this has to be the path forward. And in my view, again, as we think about the 27 people can all be it's 50 years now. But as we think about the bookend and as the debates that initiatives that have to be put in place, this is as to be a major initiative, I think it helps us as a nation. So I mean, I again, I come at it from a perspective of some of some of the companies that I converse with. They're companies who are very far thinking, and have basically put very aspirational targets for 2025 and for 2030. When you go inside them, they're going to lose money to meet those targets. But if there was a carbon, and these are all things in the right direction and reduce important energy, conserve important energy, it will reduce pollution, it will reduce carbon emissions, all sensible things to do, but they will have to spend

money. Their shareholders may not be allowed. Right. Now, if a carbon price was in place, some of these actions would become economic.

Montek Singh Ahluwalia:

Sure. Absolutely.

Rajat Gupta:

Right. And so the action would I absolutely agree with

Montek Singh Ahluwalia:

You see, the short while ago, the IMF staff produced a staff paper, in which they suggested a form of carbon pricing, which was progressive, depending on the level of development of the country. But they said that look, India should put in place a carbon pricing, which is \$25 per tonne, China should put in place \$50 per tonne, and the advanced countries should put in place \$75 per tonne. Now, personally, we should readily agree with this. And actually, we should agree to do it assuming that the West does it. And my guess is that they won't. So we won't even have to implement it in the short run. But I think we need to recognize that some of this is necessary, otherwise, we're just shooting in the dark. Well, now there was one other thing. Yeah. Somebody raised the question. It said that in this very useful paper, there's no discussion on investment in health infrastructure as a way of tackling climate change. You want to respond to that?

Rajat Gupta:

I don't understand. I mean, of course, these are linked, right. So if there are climate, refugees health is going to health is going to be a problem, for example, heat and the consequent impact on health. But I see these as more secondary, I don't see a direct link, because health to me is in the 69% of the world's GDP. This is where climate, they don't have that much role to play. At least directly, the role has to be played by the energy producers, the energy converters, or the energy the carbon buying product buying. And so to the, to the extent that hospitals need to be built greener, with less cement, or to the extent that pharmaceutical companies want to push should push to buy greener chemicals. Yes. But it's not. To me, it's not that titling.

Montek Singh Ahluwalia:

Okay, well, I My suspicion is that what they had in mind was that climate change is going to promote more kind of zoonotic transmission of diseases cetera. So maybe for adaptation, it increases the need to do a lot more on health, or which adds to that 11%, or even half of 11% that you talked about? It's quite a formidable bill. You know, and the problem really is we have lots of other such bills, independent of climate change. So adding it all up is quite difficult. I think we reached the time limit that was given. But I didn't

Rajat Gupta

Can I make one more comment, Montek?

MSA:

Yes, please.

RG:

So look, I think there was this question of MSME and large enterprises. If I might assert, and for somebody to really investigate, that I think this is a large company problem. It's not an MSME problem. Why do I say that? 40% of our emissions or thereabouts are power. That's a large company issue. And of course, you know, solutions may be small company, rooftop solar, etc. But the the where the emissions are being generated are in coal based power plants. Yes, of course, MSMEs may have captive power plants, or maybe using diesel generation. But these are this generation where they're short of power, but it's the large companies are able to supply enough. The grid is able to handle things. I think we MSMEs don't have to worry that much 25% of our emissions are in steel, cement refining, or thereabouts, right? Large companies, these are not small companies, there is a proportion of small companies also, but 80% of the production, more and more unlike in the 1990s, early 90s of the 80s comes from large companies. 10% is in transportation. Again, the producers of the transportation equipment are large companies. So I might assert that this is adding up to what is it 75% of the emissions. Is agriculture 8% water, waste about 8% of their bauxite, so there are others, which are more distributed. But to me this I mean, I'm just asserting this, it's a large company problem. Or it can it's a large company problem and solution. Unless saw an MSME solution that may be red herring.

Montek Singh Ahluwalia:

I thought actually the import of that question was that the MSMEs will become the recipients of some of the burdens associated with the transition. I mean, the most obvious case, for example, is that if you go from internal combustion engines to electric engines, then the number of components in an electric engine is minuscule. Whereas, we've got a huge components industry of MSMEs. So as a matter of fact, what we're really saying and telling them is that look, if we don't want any more, I see I see E vehicles sold after let's say, 2030, or 2035, which is quite reasonable. If we want to make an adjustment, then I think you don't have a business after 2035, maybe some in batteries and you know, rehabilitating batteries, etc. But otherwise, very large number of the automotive components industry will just disappear. And you know, the fact is, when we are making a transition, I mean, lots of businesses are going to disappear. And I think it's a mistake to think that we can plan for all this in advance to say, well, this is what's going to be the impact on this business and that business and the other business and this isn't what we're doing. I mean, nothing politics will take care of that as it evolves. That will be my answer. But but the real concern was, as we transit, will be somehow phased out MSMEs. My guess is we will.

Rajat Gupta:

Yeah, and by the way, new new ones will come up right because the investment magnitude is so large. Construction, for example, the capex deployment, huge opportunity. Right? Components, yes, fewer components for battery recycling. There are opportunities for small businesses and look, we've been through these transitions. The economic reform, which you led Montek right has led to amazing amount of transition in our economy in the physical production, and you know, I think that's what is going to happen, and it's all going to happen for the right.

Montek Singh Ahluwalia :

No, I agree with you. And I think we underestimate a system's ability to respond when it's shaken up. But of course, the concern, you said that we're really concerned about the poor, and creating a direct benefit type social safety net, directed at the really vulnerable, that's really the way to go. Well, anyway, thank you very much, unless there anybody else. Rakesh, do you want to pitch in with a question? We're kind of towards the end, but always room for you.

Rakesh Mohan:

I won't pitch into the question, but I can conclude the proceedings

Montek Singh Ahluwalia:

Allow me to invite you to conclude the proceeding, sneak in an observation in the middle of if you'd like.

Rakesh Mohan:

That I will do so first. First of all, thank you, that is first, of course, to Rajat Gupta from McKinsey. And I do have to make a disclosure, which is that I am a senior adviser to McKinsey Global Institute. So that's why I have sort of limited my participation in this, in terms of conflict of interest. However, thank you so much Rajat for that very thoughtful presentation when we say so. Of course, as in usual McKinsey style, the charts are too complex for anyone to absorb. So what people appreciate very much is if you can send us that presentation, which we can put on our website that's available to everyone. The one other thing I'm very happy about actually is that we had representatives: Vaibhav Chaturvedi from CEEW. Swati D Sousa from the IEA, Indu Murthy from CSTEP. And of course our own very own Rahul Tongia. I was about to say KL Rahul, but I guess he's not a cricketer yet. Rahul Tongia from CSEP. I'm very happy because, you know, the whole climate change issue is so complex, and so full of difficulties, both in thinking, science, and of course, an implementation of measures, that I think that it's terrific that each of our institutions is doing this work. And maybe we can communicate more with each other, so that we don't duplicate work within ourselves.

A few, a few substantive comments, one, just to say that at CSEP, we are working a lot with Rahul leading with energy transition, the impacts on different aspects of energy, like regulation, pricing and everything else. Second, one thing that wasn't mentioned, although it was mentioned passing is the fiscal impact that as you reduce the importance of fossil fuels, the amount of revenue that the government is getting from different fossil fuels: petrol, diesel, coal for that matter, and others, there is going to be a very significant fiscal impact. And we've already done some work on that. Third, one thing that was mentioned, Rajat is a financing of climate change. Now I can say both some negative as well as positive things. One, the 6% of GDP incremental, on a regular basis for at least 20 years or longer, is huge, absolutely huge. And in this context, I mentioned that some of us have been working on infrastructure investments since the mid 1990s, we have kind of come up with a number that really ought to be investing around 8% of GDP and infrastructure, all told, and we have had difficulty in really going beyond 5-6%, at the best of times. In the last 25 years. So this is a this is really a very, very big ask. And there are real issues with this. And also know where the financing will come from how much public how much private how much to taxes, carbon taxes, for that matter, how much international there are some macro issues also associated how many any computer could India can absorb from international transfers or investment in whichever way you look? I mean, so for example, one of the things that came out last couple of days, at the end of the fiscal year is that now the servicing of previous foreign FDI, that is dividends and so on, is now catching up with net FDI investment coming into the country. And so these things pile up that if you have a lot of foreign foreign investment, whether it's in debt or in equity, you then start to have to pay it at some point is not free. So I think those are very important issues, which which many of us will have to work with on the SMEs and employment, I think one issue that I've often talked about is that we in India, I think, have kind of gone wrong in thinking that SMEs generate employment and large industries don't and policies have, in some sense done that. So that it is correct that large industries do have low employment. But if you just compare with China, that if we have, I mean, we not have more than 12, 13, 14 million people employed in large scale manufacturing. China 100 million at its peak, assume that has come down to about 120 million at it's peak. I assume it has come down now. So I think that's an issue also that is of

interest that look, if we have the right policies, will large industries, particularly labour intensive type, actually, in fact, generate more employment than SMEs?

So that's really what, just on the positive side of the investment. Now, one thing that has happened is that at the peak in the late 2000s, that is 2007-08 or thereabout, total investment, gross domestic capital formation in the country hadn't really gone up to 30%. It's not down to I think, 30 to 33, or something like that, for what the current number. So on. That's it on the positive side, we've done it before. And it seems to me that again, if your policy is feasible, I think it's worth looking at some of these macro numbers, results I've also talked about.

So finally, it just remains for me to thank our staff, and the communications team: Trishna, Monica, and Malvika. Thank you so much for all the background work, we don't even see your faces. But with these things wouldn't happen without all the work that you do. Thank you very much. And thank you so much. I guess I'm not thank you Montek. So I should thank you, as our own very Distinguished fellow. And what we are lucky with which I haven't associated with him when he when he when we got him last early last year, was that he would do as to take as much interest in climate change as he is and he is really leading us in that sense, along with thank you one take for doing this.

Thank you.