

Flagship Seminar Series

**The Next Stop – Natural Gas and India’s Journey to
A Clean Energy Future.**

Centre for Social and Economic Progress (CSEP)

New Delhi

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CSEP Research Foundation

6, Dr Jose P Rizal Marg, Chanakyapuri, New Delhi 110021, India

Ph: 011 2415 7600

CSEP Research Foundation

Regd. Off: Second floor, 6, Dr Jose P Rizal Marg
Chanakyapuri, New Delhi 110 021 India
T: +91 11 2415 7600 E: info@csep.org W: www.csep.org

The book was launched by our Guests of Honour:

Shri Dharmendra Pradhan – Honourable Minister of Education and Skill Development & Entrepreneurship, Government of India.

Shri Hardeep Puri – Honourable Minister for Petroleum & Natural Gas, Government of India.

Panellists:

Vijay Kelkar – Former Petroleum Secretary; former Finance Secretary and former Chairman of the 13th Finance Commission of India

Dev Sanyal – Executive Vice President, Gas and Low Carbon Energy, of BP plc.

Daniel Yergin – Author of Pulitzer-winning The Prize; Founder, IHS Cambridge Energy Research Associates and Vice Chairman, IHS Markit

Moderator:

Vikram Singh Mehta – Chairman and Distinguished Fellow, CSEP and Editor, The Next Stop

You can order the book here:

<https://amzn.to/3rQ52Ss>

Watch the event video here:

<https://www.youtube.com/watch?v=fDrtmWQbaZU>

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

Vikram Singh Mehta: Hello, everyone and welcome to our flagship seminar on the launch of *The Next Stop*. I am Vikram Singh Mehta, the Chairman of the Centre for Social and Economic Progress, CSEP. I'm also the editor of the book, *The Next Stop - Natural Gas and India's Journey Towards a Cleaner Energy Future*. I welcome you all to the launch of this book; it is a somewhat belated launch, but it is a highly welcome one. I am particularly honoured today and delighted to welcome the honourable ministers, Dharmendra Pradhan and Hardeep Puri. The honourable Minister of Education and Skill Development and Entrepreneurship, Shri Dharmendra Pradhan was, until a few days back, the longest serving minister of petroleum and natural gas in India, if I'm right. He may not know this, but he actually encouraged me to work on this book. He, I hope will recollect that I went to see him to tell him about the idea of producing this book on natural gas. And my argument to him in his office was that, whilst a lot has been written on aspects of the subject, there were few, if any compendiums, that addressed the entirety of the natural gas value chain – from exploration and production in the upstream, to transport and demand in the mid and downstream, to ancillary issues related to international markets; pricing, taxation, regulatory and legal affairs.

The honourable minister encouraged me to proceed and even hinted that such a compendium would have been useful to him in the early days of his tenure as Minister of Petroleum. This book has been almost two years in the making. My purpose was threefold: One, to provide through chapters written by domain experts, an in-depth analysis of the different segments of the gas value chain. Two, to enable the reader to look at the natural gas sector through an integrated holistic prism. And three, to lay down a policy roadmap for increasing the share of natural gas in the consumption basket of fossil fuels. I will not presume to judge the Minister Pradhan's reaction to the book; whether he thinks I have achieved my objective or not. But obviously, as the longest serving minister of petroleum ever, and as someone who has overseen major initiatives of change, I would welcome his approbation. But I will say that his encouragement drove me to complete this project as a matter of priority. And I am extremely grateful to him today for giving me this opportunity to publicly acknowledge his support and encouragement, and of course, for his dynamic leadership, all these years of a sector with which I have been intimately involved in for the bulk of my working career. Thank you, sir, for taking the time off to grace this occasion.

Centre for Social and Economic Progress, CSEP and I, owe the honourable Minister of Housing and Urban Affairs, and more recently, also, the Minister for Petroleum and Natural Gas, Ambassador Hardeep Puri, our deepest and grateful thanks. As all of you know, he was entrusted with this portfolio of petroleum and natural gas only recently. He graciously gave me time to meet with him a few days after he took charge. I presented him a copy of the book, and I invited him to join the honourable minister Pradhan to launch this book. He readily agreed, and I cannot thank him enough for the honour he does CSEP and me in particular. Minister Puri and I discussed in brief, the significance of India's journey towards a clean energy future and the steps that needed to be taken to reach that destination. As many of you know, the Minister has considerable experience of energy systems in transition. He was at one time, India's ambassador to Brazil. And he was then witness, to the possibilities for cleaning, transportation fuels, petrol and diesel through blending with ethanol. Later, he was our ambassador to the UN in New York. And during that tenure, he was the president of the UN Security Council. During this period, he was at the forefront of multilateralism, and in that context, I dare say, privy to the many conversations that were taking place in the international forum around the world about the energy transition. I was therefore delighted when he accepted my invitation to launch the book. Thank you, sir. CSEP and I are honoured for your gracious presence here today.

The panellists today are individuals of distinction in the field of energy and much else. For those involved in this subject, they need no introduction. But I would be out of line if I did not express my personal gratitude to each of them. I will say, with no qualification, that I owe my involvement with the Indian petroleum sector to Dr. Vijay Kelkar. I returned to India in 1984 to join the public sector, and then the ministry of petroleum because of him. He has been my guide and mentor ever since. He may not be pleased with the product, but I am certainly grateful to him for all that he has done. He is also a very close friend. Dr. Kelkar's contribution to public service is extraordinarily broad-based. As petroleum secretary, finance secretary, chairman of the finance commission, and much more. The government recognized his contribution by conferring the second-highest civilian honour of Padma Vibhushan. He honoured me by writing the Foreword to the book. I thank you, Vijay, for your friendship, for your support and above all, for your guidance.

Dan Yergin is an institution in the Indian energy industry. There are few, if any people around who have brought this somewhat arcane subject to the mass public. His book, *The Prize*, was a Pulitzer Prize winning bestseller. He has written several other bestsellers, including most recently, *The New Map, Energy, Climate and the Clash of Nations*. We at CSEP were privileged to be able to organize a flagship seminar around this book late last year with Dan as the keynote speaker. Dan is well known to the Indian petroleum sector. His firm, Cambridge Energy Research Associates, which he founded, holds a weeklong event in India every year. It is the most widely attended event in the country's energy calendar. The Honourable Prime Minister was chief guest last year. Dan is currently also the vice chairman of IHS market. Thank you, Dan, for once again being part of a CSEP event.

Dev Sanyal is a son-of-the-soil success story in the petroleum industry. He is a member of the group executive committee and the executive vice president, Gas and Low Carbon Energy of British Petroleum. He has been with BP and has worked with them in a variety of roles across the world. But his formative years were in Darjeeling. Dev and I have more in common than just our association with a large integrated energy multinational. We did our graduate work from the same Institute, The Fletcher School of Law and Diplomacy. And we are both today, members of its board of trustees. This book owes much to BP. As I have acknowledged in the book itself, BP, along with Mitsubishi Corporation and the Australian Government contributed financially to this project.

First of all, in Brookings, India, which is what we were when the book was commenced, and now, more recently as CSEP, we are grateful that these donors have respected fully, our institutions' core values of unencumbered independence. Thank you, Dev also, for your support, and for being with us today. As I've alluded the genesis of the book, lies in the conviction that as India transits from a predominantly fossil-fuel-based energy system, to one built on the pillars of decarbonisation, and renewables, natural gas should be the bridge fuel. The title, "Next Stop", is an illusion to the reality that India cannot simply leapfrog from where we are today; an economy that is built predominantly around fossil fuels, to where we wish to be; a social and economic system that provides secure, affordable, accessible and clean energy to everyone. We can only get there, step by step.

The next step in this journey should be the doubling of the market share of natural gas in the energy consumption basket. That has to be our next milestone. To get there, the government has to take specific policy steps. These flow from an analysis of the historical evolution of the International Gas Market and the developments that have shaped its contemporary contours, the growth of the Indian gas market and an understanding of the reasons why natural gas has failed to secure its potential market share, and the specific policy recommendations that flow from these two. I do not have time to go into the details of the policy recommendations that have been listed in the book, other than to say that these policy recommendations covered the spectrum of the gas value chain. In particular, they

cover the measures required to increase the intensity of domestic exploration and the harnessing of our indigenous gas reserves.

They cover measures to leverage our market strength to secure the best terms for the import of LNG, to accelerate investment and pipeline infrastructure and import facilities, to create the most optimal and efficient gas industry structure, to streamline the relations between the Central government and the State government, especially with regards to infrastructural development, to create an optimal pricing, taxation and regulatory system that is focused on incentivizing new investment and accelerating the usage of gas as a fuel and feedstock across different consumer segments. And perhaps most crucially, to build a holistic and integrated decision-making institution. Many of these recommendations have been made before. Notwithstanding, my hope is that decision makers will see value add in a book that pulls all of the suggestions made before into one seamless policy roadmap. My final comments in these opening remarks are to thank the contributors.

This book would not have been possible without their positive support. I would have liked to have thanked them individually in the presence of the honourable ministers and the panellists, but I do not have the time. I would like them to know, however, that CSEP and I, are most grateful to them for the time they spent in discussions with me, the patients they showed as my colleagues and I requested frequent alterations and edits, and for their final contribution, especially towards the creation of an integrated policy roadmap. I do hope that they are also happy with the final product. Thank you all very much, and may I now request everyone to perhaps move towards the photo opportunity to formally launch this book by holding up the book that we all have. And those that don't have it, perhaps they could hold up the PDF, which poor Dan does not have. But anyway, thank you very much everyone for this opportunity to launch this book. I'm most grateful. All right. So now, if I may, request the honourable minister, Dharmendra Pradhan, to give his keynote address.

Shri Dharmendra Pradhan: Thank you, Vikram shri. Shri Hardeep Singh Puri, Honourable Minister of Petroleum and Natural Gas and Housing and Urban Affairs. I want to again congratulate, Shri Puri on his new portfolio and wish him more success. Dr. Daniel Yergin, renowned author, who has been my pillar of support and has made an invaluable contribution in expanding my understanding of the global energy sector. Padma Vibhushan, Dr. Vijay Kelkar, one of my mentors in the field of public policy. Mr. Dev Sanyal, my dear friend, Vikram Mehta Ji, for whom I have highest regards and whose views in the energy sector I follow closely. Illustrious authors and who have contributed to the book, media friends, ladies and gentlemen.

As I will say, let me offer my heartiest congratulations to Vikram Mehta on the launch of his book, *The Next Stop -Natural Gas and India's Journey to Clean Energy Future*. I remember the day Vikram Ji, had come to my office with his idea about this new book on gas. It is wonderful to see the seed of his labour come to fruition. I'm sure the book will carry forward the ongoing debates around natural gas and global energy transition. In 2014, when the people of this country gave a decisive and historic mandate to Honourable Prime Minister, Shri Narendra Modi, he entrusted me with the task of spearheading the Ministry of Petroleum and Natural Gas. The brief was clear. First the government aims for 'Sabhka Sath Sabhka Vikas Sabhka Vishvas' and second was to ensure enabling, tangible changes for the last person standing in the queue, which was inspired by **[indistinct- 16:32]**.

When I look back, the last seven years of our government bears testimony of Modi jis grit and commitment to build an edifice that sutures the gaps that enhance human development indices, including the important component of access and availability of energy. With two clear visions given by my leader, I made my maiden entry as an administrator to the second floor of Shastri Bhavan. I was greeted by a few friends from the media, whose first question to me was, "When will you take a

decision on gas pricing?” This question followed me like a shadow for the next few months. I wondered if gas pricing was the single most important issue awaiting my decision. Perhaps not.

The petroleum industry over the past years has become a lager. India has been pushing through tough challenges to produce more oil and gas from its domestic fields and investors, both Indian and foreign, were complaining about the absence of an investment-friendly environment. To add to those, were our witnesses that had the government fighting with oil companies. The next few days, when I interacted with my colleagues in the ministry, a state of turmoil came into the forefront. The hydrocarbon sector needed life support and the people were craving for answers. For me, gas was not only that which is drilled out of the ground, but more pertinently, it means the cooking fuel at my home.

I grew up in the Eastern State of Odisha, with vivid memories of long queues of people standing with their empty LPG cylinders through the day, hoping that a truck with new cylinders would arrive. Sometimes, it did, but many times, the wait was futile. I hear my mother talking about disruptive supply of cooking fuel, waiting for a refill for more than a month. Often saw the teary red eyes of the women who coughed and struggled to cook on a conventional Chula. During the rains, the moist firewood would make lighting impossible. Till a few years back, getting a US visa was easier than getting a new LPG connection. With a vision of one today from Prime Minister Narendra Modi, the country needed the blue flame or LPG revolution. It was a big challenge, on one hand, the poorest were not procuring access to the LPG, while on the other, the well to-do were availing subsidy for LPG. To overcome the challenge, technology became our tool.

On the 1st January 2015, a transfer of subsidy directly to the bank accounts of the intended beneficiaries went pan- India. The result was evident and immediate. Millions of bogus connections were weeded out. Pahal entered the Guinness Book of World Record for being the largest direct benefit transfer scheme. The government's policy is not to deny subsidy to the general population, but to reduce wastage and unauthorized use of the subsidy. The biggest gesture of encouragement came to us from the citizens where one crore LPG subscriber voluntarily gave up their cooking gas subsidy after an appeal by Prime Minister Modi. I thank each one of those individuals. The past of May 2016, Prime Minister Modi unveiled the Pradhan Mantri Ujjwala Yojana, targeting to offer LPG connection to 80 million below poverty line families till 2019. Pradhan Mantri Ujjwala Yojana became a social moment in the country, and 80 million new LPG connections were given in a short span of three years.

Clean, safe and environment-friendly cooking gas distribution saw the fastest growth in at least, the last couple of decades in our country. This was unprecedented. The blue flame revolution had unleashed a movement for women's empowerment. The success of LPG brought significant benefits to the lives of common citizen in the form of health of women and children, economic empowerment, and a cleaner environment. Prime Minister Modi had given us the task of ensuring energy justice for all. The answer to this was by enhancing domestic production, making energy affordable, promoting energy efficiency and conservation, demanding substitution and promoting biofuels and renewable energy. And we had to put in place transparent and investor-friendly policies to excel on these parameters.

In the past, my stint at the petroleum industry, we endeavour to bring in a slew of reforms such as, price deregulation, subsidy rationalization, reduction of gas pricing, marketing and pricing fitting for the EMP sectors, promotion of alternate fuels, ethanol blending program, biodiesel, and compressed biogas, [indistinct- 21:53] single licensing policy, revenue sharing, discover small phase, national data repository, [indistinct- 22:01], standards and so forth. These reforms have started bearing fruits. Natural gas production has started picking up, new oil production will also be announced in the coming

year. Owing to these reforms, our gas production is estimated to peak in the next year or two. Also, CBG which earlier functioned as a decentralized model can now be paid to the main CBG network. All these reports have offered the clarity and consistency to investors on their proposed investments and enhanced ease of living to the citizens of India.

Natural gas is an important low-carbon pathway that will enable energy transition in India. Through technological advancement, hydrogen blends with compressed natural gas for use as transportation fuel as well as an industrial input to refineries. Our government is working on pilot projects on blue hydrogen, hydrogen CNG mix, green hydrogen. We also plan on Liquefied Natural Gas, LNG, fuelling stations along the 6000-kilometre-long golden quadrilateral highways that would encourage 1000s of truckers to switch to cleaner fuel from diesel. Seven years have gone by, but it still feels like yesterday. Whatever we have achieved in these years, our eyes have always been set on infrastructural development, manufacturing, technological advancement, skill development and financial inclusion. But the bigger chasing thirst and optimism which could lead the nation to greater heights of success.

My job was to ensure and strike a balance between access to clean, affordable and reliable energy and to make India a more attractive welcoming destination for investment in the hydrocarbon sector. While also pursuing the Green Path to the progress, I'm confident that my successor and my dear friend, Hardeep Singh Puri Ji, will take the oil and natural gas portfolio to greater heights. In my new assignment in the education and skill development sector, I look forward to creating synergies between my experience in the energy sector and education and skill development. I congratulate Vikram Ji, and all the authors once again. Thank you, friends.

Vikram Singh Mehta: Thank you very much for those remarks. I'm really grateful to you. I now request the honourable Minister for Petroleum and Natural Gas and also, the Minister for Housing and Urban Affairs to deliver his keynote address.

Shri Hardeep Puri: Thank you very much, Vikram Ji. Let me start by paying my respects to my very distinguished predecessor, the longest serving Minister for Petroleum and Natural Gas, a very senior leader of the party, and someone to whose affection, I have a strong claim. And I was at an event yesterday, when the senior management of the Ministry of Petroleum and Natural Gas and the related public sector units were meeting. We met to bid farewell to the honourable minister, as he takes on higher responsibilities. And I had, on that occasion, a chance to speak about the kind of progress that this sector has registered. But let me on this occasion, just say that I am both a little overwhelmed by being appointed to this ministry. Overwhelmed, because I was busy elsewhere, I'm still busy with the other portfolio. But I think it's great education for me, and therefore, when Mr. Mehta came to see me the other day, and he said that he had put together a book, and now, I've in the interest of full disclosure, I must also say that when I saw Dr. Kelkar's Foreword, which said that, "This is an encyclopaedic anthology of everything you wanted to know about gas, but were afraid to ask".

Here is a newly inducted, completely green, I don't mean green in the energy sense, complete novice, having been assigned here. And I said, "Well, very good". He very kindly gave me a copy of the book. I have read the executive summary, which is about 38 pages or so, and I must say that I've tried to soak in every word in there as part of my basic education. So, thank you very much, Mr. Mehta, for including me in this, for doing this and you know, Pradhan Ji used words like drawing on your experience, you providing mentorship, please do the same to me. But I want to, now, in the interest of full disclosure, say that when you describe Dr. Vijay Kelkar as guide and mentor, and then you went on to say that Dr. Kelkar may not be entirely pleased with the end product, which means, you. All I can tell you is, so what? I mean, whether he's pleased or not, he's stuck with me as well. I mean, not many people know that he has been my guide and mentor also. But you know, Dr. Kelkar has a splendid, very distinguished

career, but I was able to work with him in a totally different setting. This was at the United Nations in Geneva, where he was heading what was then, I think, called, The Division for Manufacturers.

Subsequently, many years later, when Dr. Kelkar left, I think Lakshmi, that's my better half, joined and then, it was called Trading Goods and Services Division. But I have a claim to Dr. Kelkar's affection as well, but I can tell you one thing. I watched his work as the Chief Economic Adviser in the government. He was first in the commerce ministry. I remember that fateful ministerial meeting – now, I can see Dr. Kelkar laughing. That fateful meeting in 1982, ministerial meeting, where the issue was whether the issue of trade and services should be brought within the ambit of the General Agreement on Tariffs and Trade. And we had a minister who was sartorially very elegant, and I was a note taker, I was a junior most first secretary in the room, and the honourable minister accompanied by Dr. Vijay Kelkar and Shri P L Das, then India's ambassador to the United Nations to the GATT, General Agreement on Tariffs and Trade.

We were the Indian delegation and the honourable United States Trade Representative was, I hope this is not misunderstood, a very impressive cowboy-like figure, called Bill Brock. So, you know, diplomacy is the art of using the margin of persuasion. I must tell you another story on that, but in a minute. So, we sat down and the US Trade Representative had been informed that the Indian side, and this was India under Indira Gandhi, please remember, 1982, and we had very tough negotiators. And I think Dr. Kelkar found himself between a rock and a, you know, whatever the English expression is. So, I was watching his body language. Mr. Brock, the US Trade Representative asked, “And, Mr. Minister, what is India's view on trade and services?”

So, our minister, faithfully reading from a bureaucrat's brief, and maybe putting a spin on it, turned around and said, “Mr. Ambassador, Ambassador Brock, trade and services is non-negotiable”. At which point, Mr. Brock got up and said, “In which case, I don't see why I should be wasting your time and mine” and walked out. And me, the note taker who had to produce the minutes of the meeting – But look at what is interesting. The 1982 ministerial meeting produced a decision, which the American ambassador later described to me, he said, “You know, we came asking for trade and services and the guide, and you gave us a working party on basketball”. It says countries with an interest in trade and services, will carry out studies and exchange information amongst themselves. That's what we did, but look at what happened to services later. What is your sectoral listing? Which are the services and all those who are the demanders of services on the other side, discovered they were not competitive and Civil Aviation, Service Transport, the word changes.

What I found most remarkable about this book you have put together, Mr. Mehta, forgive me, I think it's fantastic in terms of encapsulating the issues which are there. But I'm going to take issue with one or two things. You have looked at, and I think you say somewhere, that and I took notes, that this gas, the relevance and growing importance of gas, at least, is traceable to some of these Sustainable Development Goals. And I think the ones you mentioned are three, seven, nine, and 13. Now, anyone listening to Pradhan Ji's very comprehensive and very well-crafted keynote address, will say that what the government of Prime Minister Modi has done, is to take these energies issues, and extend them in terms of the local Indian reality, you know, Ujjwala, for instance, eight core gas connection, and the series of things. I'm not going to go into those because I think they were comprehensively covered Pradhan Ji, but I, on my spot, will just share with you, two or three things which I think stand out.

I personally believe, and look, where am I coming from? I was assigned to be India's Permanent Representative to the United Nations in New York when we were finishing with the Millennium Development Goals, the MDGs. And I used to say then, that the MDGs succeeded, because a “large developing country” called China, succeeded in lifting hundreds of millions of people out of poverty

with a little bit of help from us, India, Nigeria and other countries. But when we came to the negotiation on the SDGs, we followed a different model. Why? Because the MDGs in terms of conceptual design, and in terms of architecture, were produced in the think tank of the West, the OECD.

So, one of the first things I did was, as Ambassador along with likeminded group of countries, saying, let us invert the SDGs. Let the demand for the SDGs come from the bottom, from the civil society, from the NGO. That is why you have the kind of SDGs that you have here; affordable and clean energy, ensure access to affordable, reliable, sustainable and modern energy for all. That, I think, is the Indian story. I went as the ambassador, to Brazil, I was immediately impressed with the fact that on any given day, you could drive your car to a petrol bank, and depending on the internal sale price of petrol or ethanol, you could decide how much your Flexi-fuel engine you would like to fill with ethanol, laden-sugar based or with petrol. When Mr. Sharapova was the minister, and I'm not saying this is a criticism, I'm talking about that era, I'm talking about the year of the law, 2006. We wanted to have 5% ethanol mixing in 15 of our states, why did it not move forward? Because we were not able then, to get the ethanol.

One of the first things I was going to, as I was telling Pradhan Ji last night and earlier, I'm amazed at the manner in which we are going about getting that 20% mix. And you want to get it there. I mean, I meet representatives of state governments that come because parliament is in session, MPs come, each one of them is saying, 'hume apne district mein ethanol chahiye' (we want ethanol in our districts). It is catching on exactly the way the Prime Minister's other flagship programs have been implemented. That's one. Secondly, India, I think is a sui-generous case. India is very different of any other country. If you look at India's total energy requirement, and China's for instance, and you don't consider for a minute, highly industrialized countries like Japan, Korea, and the others, India stands out. Why does it stand out? Because our developmental challenges mean that at a low per-capita, and the trajectory we are going, I mean, 34,000 kilometres of pipeline, already what, 18,000, we're going to get there. What we are doing in terms of gas expansion, I am fascinated by your argument on how this is the transitional link going forward.

Thirdly, but since I'm saying such nice things about your book, may I pick on one or two in your recommendation section. Not intended as a criticism, just to say, I'm not sure that this section on page four and five, where you talk about institutional shortcoming, it says here, "The transition to a new energy system could take even longer because first, the existing grid infrastructure is not robust enough..." okay, "...to absorb and manage the intermittency of electric" all that. "And finally, the institutional mechanisms for driving the shift are not in place". Firstly, I respectfully submit that this formulation may be based on a not entirely adequate appreciation of what's going on. I have in the last 10 days, and Pradhan Ji can bear me out, have had at least, four occasions when the Honourable Prime Minister has told some of us, "Listen, you guys, you got this, you got this. Sit down".

Last night at the farewell dinner which was organized for Pradhan Ji, one of the things he was saying, I have to sit with you R K Sigh and other people you have listed here. And finally, you bring in Niti Aayog, I think we can take care of Amitabh Khan, I think it's manageable. But basically, your point about an institutional mechanism which brings these ministers in, perfectly well-taken point, but all I want to say, there is hope and there is movement in that direction. Look, I was not intending to make any substantive point, but since we are a thing, Lakshmi and I joined the Indian Foreign Service, and you know who welcomed us there? Somebody whom we greatly admired, Ambassador Jagat Singh Mehta who was our foreign secretary, somebody I greatly admired, and he was a mentor to so many of us. And Vikram, I don't want to sound pontificating, because you're so much younger, I think, but I would say that yours is also a career that I have watched with great interest, both from the civil service,

academia, and I think one of my first book was perhaps, launched in Delhi, in an institute which was differently named, which you headed then, if I remember correctly. But heartiest congratulations.

Thank you very much for offering to hold my hand, if I may be allowed to say that, as I take baby steps. I already have a very good and assured mentor in Pradhan Ji, and I was waiting to touch base with Dr. Kelkar. I think he will also have to spare some time. But I enjoyed working with him so much that I can tell you we once had a Chinese colleague of ours, I think his name was Tank. I think he was with us in the UN, and then he went and joined the WTO. So, Dr. Kelkar is always thinking ahead. He wanted us to write a paper on the potential of China-India trade. Now, please remember, this was many years ago, this was in 1990, 91, Dr. Kelkar will be able to remind me when I left to come back as a young [crosstalk].

Vijay Kelkar: '92, '93.

Shri Hardeep Puri: '92, '93. And what were we concerned with? That the total worth of India-China trade could be raised to billion dollars. And with Dr. Kelkar's forward thinking, we actually put it down, and look where we've gotten. We've gone from there to what? We're looking at figures of 80, 100 billion dollars of turnover, of course, I'm not going to comment on the nature of the, you know, in whose way our trade is waiting for. But Dr. Kelkar has always been in the forefront of that cerebral work at the cutting-edge, where he is able to anticipate, and I think the energy sector is particularly one where both the secretary petroleum and other areas, and then of course pricing, and I need to have a separate discussion with them. But thank you all very much for including me here, and I think, in a sense, this helps me in collecting my thoughts and I'm delighted to touch base with the other experts. And I hope they will indulge me if I reach out to them independently to seek their advice. Thank you very much, Mr. Mehta.

Vikram Singh Mehta: Thank you very much. I mean, we're kind of overwhelmed by your free-flowing, anecdotal, and really, somewhat, deep insights into not just your experience, but also, your commentary on the book. I appreciate the fact that you've made some effort to go through it. And we will certainly reflect on all that you said. But I really do thank you, both of you, Honourable Minister Pradhan and Honourable Minister Puri for being part of this launch. It's a huge expression of support for think tanks, CSEP, and for me personally, and I again, want to just say that this is something I'm very grateful for.

I'm going to now turn to our panellists. And first, I'm going to request Vijay, actually, Vijay, you are recognized by everyone in this room, or if I may say, virtual room to be a guide, mentor, expert, everyone turns to you for your thoughts. And so, in the context of this book, and in the context of looking to accelerate the usage of gas in our country, I know that you have been somewhat disappointed in the way that the gas industry has evolved in India and in the foreword itself, you have identified several steps that the Indian decision makers should take to perhaps, reach the objective of doubling the share of gas in our energy basket. May I ask you just to elaborate on your concerns and perhaps, identify some of the recommendations that you would offer the minister, Hardeep Puri.

Vijay Kelkar: Thank you, Vikram. Honourable Minister, Pradhan, Honourable Minister, Hardeep Puri. My very dear friend, Daniel Yergin, then, our colleague, a fellow panellist, Dev Sanyal. And of course, Vikram, first, I have to thank you for your very generous remarks. But I have a suspicion the reason you probably asked me to read this book was you probably in recent time, realized that my knowledge is a bit dated, and I should upgrade my knowledge. I'm very grateful to go through this book; it's really comprehensive. I really meant it when I wrote that it is a circular breeding for Indian context. So, thanks

for putting together, you got the best minds in the field, and with your leadership, this will be long time, this will resonate in India's Energy Policy.

On gas, if you allow me, I'll just quickly summarize a five-point program which I suggested in my foreword, and I just add one more, because there's one point I missed, and it is probably going to get to the greatest series now in the coming years. The first point was, I think minister Pradhan had already mentioned, and I think minister Puri also alluded to it, is really a pricing issue. I mean, that's the key. I mean, prices play a very important role both in production side and supply side. Unless we decontrol prices, I think we'll always have problems with the supply side. But second, part on pricing, here I think something I want to emphasize is the advantage of both of the ministers here. Please, help the sector by including natural gas in GST. I think you will give us tremendous Phillip to the natural gas industry. If you bring in natural gas in the present GST.

Now, GST is bigger than five years old, everybody is asking for a review. I did a good time to quickly bring in, at least, the natural gas, even the entire petroleum sector in the GST value chain, because that will give the Phillip to this industry. The second point of course, is a very interesting point, in my view, were not good enough, is find ways – I don't have right now, the ready solutions, but find a way of expanding microgrids. Because future of energy sector goes to decentralization and resistance, and these micro grids are going to become a very, very sort of, important role. So, start thinking about this, what policies in social mechanism we can generate, **[indistinct- 47:18]**. But how can it sort of, promote and expand this micro grids and how private sector can play important role?

Third point is, with all due respect to Minister Pradhan, I hope you will not misunderstand me. But I think I'm genuinely convinced both for reasons of logic, theory and my role experience the last five years, we had to move away from a revolutionary model for exploration. That is, I think, does offer adequate incentives, the producers and we're good to find. We will not be able to attract really good quality investors. If you have that model, because I don't want to preach about this point, we can have a separate discussion.

And final point which I did mention in my foreword, I think, is the benefit of presence of Minister Puri that India has enormously **[indistinct- 48:22]** by now leveraging subsea pipelines from the Gulf areas to India. We had gases and all other flexible fuel, no doubt about that. But if we're going to have large imports of gas and if we want security, long term security, subsea pipeline now, is really within the domain of possibilities in terms of technology. So, this is one area in which I will request the Minister Puri to probably think about it, because that gives you both security and transition very fast; very quick transition to this blue gas. And last point is that, though I didn't adequately emphasize, which I mentioned is that, gas will play a very, very important role in India's ambition and targets about Climate Change Paris Commitments.

So, gas is in new stages, new imports, a new vendor, I think, as they like to use all this talent which he has in abundance, both in terms of diplomacy, and getting this natural gas right to the top of domestic policy debate and policy initiatives. So, with this, I take your leave. Once again, I want to thank the both ministers, Shri Hardeep Puri and Darmendra Pradan for the very generous remarks. I remember how much I learned from Hardeep; I did remember you. You were sort of my major teacher when I came up in Geneva, I believe to take along, everybody. But I think we can pursue that to South-Virginia some other day. But once again, welcome the minister for petroleum, Hardeep. I think you absolutely should able to take the torch further from where Mr. Pradhan left it, and to the new levels. And Mr. Pradhan, I wish you best luck. I wish you the very best in your new challenging portfolio of education. Thank you.

Vikram Singh Mehta: Thank you, Vijay. Just one quick follow up question, and I was just wondering what your views were on the structure of the gas industry in India.

Vijay Kelkar: One a base of course, [indistinct- 50:53]. You cannot have a monopoly carrier having a downstream interest because they don't get fairness. If Minister Puri just call for what are the current GAIL contracts with their consumers, he'll immediately see how unfair they are because of this GAIL being a producer and has their own interest in downstream sector. So, one is unbundling of GAIL and second is, massive investment in pipeline in anticipation of demand and create this daily national grid as rapidly as possible. And further, unbundling is very important, much greater infusion of private capital in creating this infrastructure for carrying gas, because that's going to be the key determinant of how fast we can move to this new transition towards Paris' goals.

Vikram Singh Mehta: Thanks for that, Vijay. Dan, if I might just turn to you, you have in your new book, *The New Map Energy, Climate and the Clash of Nations*, describe a new cartography of the geopolitics of gas. Could you perhaps give us a sense of that new map in so far as the international gas market is concerned, the new cartography of the international gas market? And how do you think India should locate itself on this new map for gas?

Daniel Yergin: Thank you very much, Vikram and honourable minister, Hardeep Puri, honourable minister Pradhan. Obviously, Vikram, Vijay and Dev, I'm very glad to be part of this program. And first, Vikram, I want to just congratulate you on this book. I think you've discovered, as we all discovered, that any book that you decide to undertake is at least, three times as hard to do as you thought it was going to be. But you have a great group of authors in this book who, in addition to Dr. Kelkar, you have Martin Houston writing about the global gas market, is just the right person. The thoroughness of the book, I was very impressed that you even have the name of the original LNG carrier from 1959, the Methane Pioneer in the book. And I certainly appreciate the opportunity to launch the new map at CSEP, which plays such an important role for India and such an important role globally as a centre of thought. I do just want to say a word about honourable minister Pradhan.

As he said, it seems just like yesterday when he and I met and I was able to say for an event yesterday, that I've seen many energy ministers around the world, but few have had the impact that he's had, including on natural gas; implementing the new thinking that the Prime Minister called for when we all met in about 2016. And I've been very pleased to be on his Think Tank. Honourable minister Hardeep Puri, you bring great international experience, including, as you say, what you observed in Brazil, what you observed what's possible with technology, and your understanding of how all this fits into international relations. Because one of the themes of the new map is that, energy and geopolitics are totally intertwined, and you bring a very important perspective.

I think, everybody, I'm in the same boat as everybody else; I too am a student of Vijay Kelkar. And then devoted to him, I've learned so much, turned to him for wisdom and perspective in times of turmoil. And so, it's a pleasure to be on this program with him. And I think just to know Dev Sanyal, he's a person who's out there implementing this every day on the forefront of bringing markets and new technology and policy together and playing a very important role from his position of BP. So, let me answer your questions and put them in context. I think honourable minister Hardeep Puri made this point in his remarks. There's no reason that India should be dictated to by other countries as to what to do. There's not a single energy transition. India's position is very different than others, and India has 1.3 billion people. And so, for India, it's a series of energy transitions. It's not a single transition. And small European countries that are wealthy, that have much higher carbon footprints, should not be dictating to India what to do and how to adapt to the changing world.

Secondly, I think very important, and this ties into LNG, is India's voice. India did not really have a significant voice in energy affairs a decade ago. It now has a very significant voice – Minister Pradhan has been at the forefront reflecting the honourable Prime Minister's goal, and honourable minister Hardeep Puri is very uniquely positioned to make sure that India's voice and the impact of its voice is felt. And by the way, that was absolutely significant in this whole dustup about oil prices over the last year and a half. India is a major player, and its voice has to be heard and taken seriously and not subsumed under what other countries want. On the role of natural gas, your question, basically, and I think Martin Houston outlined it in the book. But we've gone from a very structured LNG market to an increasingly global commodity market in LNG.

The entry of the United States is very significant in that contributing to what the US will now be one of the three major LNG exporters. And it's a global market, and it's one in which India has become integrated, and will help to meet the goals that India has in terms of energy and climate. And I think that market is going to continue to develop. Now, we have Russia becoming a major LNG player. We would have said the big three of LNG would be Australia, Qatar and the United States. Now, I think it looks like the big four because Russia is going to be a player as well from its Arctic position. I think that it also is significant because natural gas is so important for India in meeting urban pollution goals. And the honourable minister Hardeep Puri, very interestingly brings petroleum and natural gas together with Housing and Urban Affairs. And India's a rapidly urbanizing country, and addressing urban pollution is so important. And bringing the petroleum and natural gas together, is a very key way of addressing that.

Just two other things to mention; the oil and gas industry itself has opportunities to use renewables and its own operation for scope one and two. And what the honourable minister Hardeep Puri referred to Brazil, I think, and we're in our work in IHS market, looking very carefully at this. And I think Dev is, as well, is, the next generation of biofuels, or maybe it's the next generations; plural, because they're going to be different ways to bring biofuels, and India already has a start. But what worked in Brazil would not necessarily in itself, be what will work in India, but the principle of understanding what you can do with biofuels, bioenergy is obviously something that will be very important for meeting the multiple goals and meeting India's multiple energy transitions, which is the reality that the country faces. So, with that, let me just say, it's terrific to be able to join in launching a book that will be very influential, and as Vijay says, really brings the whole world of natural gas together for India and for the world.

Vikram Singh Mehta: Thank you very much, Dan. Dev, may I now just turn to you please. British Petroleum is, I think now, the largest international petroleum company in India. It has even recently brought into production, its gas finds offshore, the Krishna Godavari basin. The question that I wanted to ask you, or the comment that I wanted to make, and I would be interested in your reflection on it, is that in light of the IEA recommendation against further exploration in oil and gas and British Petroleum's own approach to cut oil and gas production by 40% by 2030, what sort of advice might you give, if you are so bold, to our honourable minister on reconciling our objective, or India's objective of harnessing its domestic hydrocarbon reserves, and at the same time, staying on the trajectory of low carbon growth.

Dev Sanyal: Thank you, Vikram. And it's a great honour and privilege to be here today and to share a panel with distinguished colleagues. Honourable minister Pradhan, honourable minister Puri, Dr. Kelkar Ji, and of course, Dr. Yergin. It's a great honour not only to participate in today's event, but also, to give some reflections based on our practical experience in India and of course, around the world. Let me firstly take the opportunity to congratulate the honourable minister Pradhan, on his new portfolio. It is critical to our nation's success; education and skills and entrepreneurship. I want to also

recognize his very successful period as a Minister for Petroleum and Natural Gas, as the longest serving minister in India's history, and of course, as a transmittal minister during this period. I'd also like to congratulate Minister Puri on his expanded portfolio.

I believe honourable minister Puri, both you and Vikram and I both spent time in St. Stephen's College in New Delhi. You are a Distinguished lecturer. Vikram was a brilliant student, and I was a laggard while I was there. So, we have at least, that element in common. But there's another element we have in common. I've spent a lot of my time in Brazil in my career, and I'm very proud that BP has built up the world's second largest bioenergy company headquartered in Brazil, called BP Bungay, which we set up in 2019. We very much look forward to working with you and colleagues in the ministry to build on our very successful relationship and partnership over many years.

Of course, to seek new opportunities in the evolving chapter of India's energy story that Dan alluded to. And speaking of chapters, again, Vikram a big congratulations to you for stewarding this, I think, similar work on the gas industry in India. And of course, you offer great insights about the future energy needs of India, which has a very far-reaching resonance to the rest of the world. And I say that not to just flatter everybody, but because all the future energy growth in the world comes from the non-OECD countries. And India is of course, leading in this respect, as Dan rightly points out in his latest book; nowhere is that growth more important than in India. And it's India's prosperity that we'll see the primary energy consumption more than double by 2050 according to our latest Energy Outlook, and natural gas will play a critical role in India's energy transition, replacing coal as a cleaner fuel for electricity as well as transmission.

In fact, we believe national gas consumption could grow six times by 2050 on today's levels, from around 50 BCM of gas today to 330 DCM based on a rapid transition scenario. And that's important because as Vikram says in the book, India can't leapfrog to renewables; it is actually a transition, and that's the operative word. It's a transition. And that's why the case for natural gas as a medium, and actually longer-term fuel, is compelling. And it's compelling in my mind for three reasons; as a displacement fuel for coal in emerging economies, particularly in India and other parts of Asia; as a reliable source of energy to address intermittency of renewables; and increasingly, as a low carbon energy source when combined with carbon capture use and storage, and as a feedstock for blue hydrogen. And of course, BP is actively engaged across the energy value chain, we are building out our gas businesses moving forward, focused on resilience, focused on being the most efficient price-setter. And I think, in any scenario, gas will play a very big role in the energy transition.

The nature of it will change; initially, it will be a source of energy, and over time, it will be a source of the production for blue hydrogen, which we think from 2050 onwards, will become increasingly something like 10 to 15% of the energy mix. And this is very important, this nature of transition that is occurring, which is very different from telephony, where one day, we've got a fixed-line phone, next day, we have a mobile phone. This transition needs a lubricant, and gas we believe, is one of the key lubricants in this arena. And BP, as I said, is focused on gas business, we're also growing our renewable energy business. Actually, we're growing to 50 gigawatts by the turn of the decade. And we're also growing our blue hydrogen business and our green hydrogen business. So, we are actually actively leaned forward in this energy transition. So, you know, while gas has a huge role to play in India's growth story, and indeed, in the global energy story, I think there are four enablers if I may suggest, that will be very important for India as we lead, I think, in this next phase of the energy story as one of the largest demand centres for energy. It's what I call the four I's.

The first I, is Increasing Gas Production. And, as you will know, BP as partner reliance, have given this much needed boost from the start of the R series last year and satellites early this year; two months

ahead of schedule, India's KGD six-block. This is the second trial developments, which together, is expected to meet around 25% of domestic gas production. And again, while we are reducing over time our oil and gas production, the reality, of course, is the idea of focusing on the most efficient basins to deliver effectively the most resilient gas production. The second I, is Integrating Fields to offer clean, reliable and affordable energy. And by this, I mean offering a blend of fields of natural gas and renewables in partnership, will actually help meet the growing demand for cleaner forms of energy and will support our nation's low carbon emissions.

The third I, is Incentivizing Markets; less red-tape, more red carpet, as the honourable Prime Minister Modi put it. It is important that the above ground conditions can actually accelerate the momentum in energy production, and domestic energy production. And I think over the course of minister Pradhan's tenure, there has been great progress in this respect. I really would like to thank him and compliment the government for the suite of reforms that has accelerated the incentivization narrative for markets. And the fourth I, is the sharing Infrastructure, which Dr. Kelkar referred to, which is, I think, very important to make sure that we can connect in the most efficient way, the markets to the molecules. I think, for this to occur, there needs to be competitive pricing, it needs to be affordable, and it needs to be very, very efficient. And so, those are the four I's.

And if you'll forgive me, I'll add actually, in the spirit of the moment, a fifth I which I think is a very India-specific I, which is Ingenuity. I think India has a tremendous intellectual capital, which I think really can transform the world of energy globally in the way that IT sector has done so. This is going to become increasingly more important as we think about being the next most efficient price-setter, as we think about efficiency, I think India can actually lead the world in that respect as well. So, with that, thank you very much for this tremendous piece of work, Vikram, and it's a great honour and privilege to represent my company in this event. Thank you.

Vikram Singh Mehta: Thank you very much, Dev. May I, perhaps, pick up on one of the questions or issues that the honourable minister raised, and put it to discussion with you, Vijay, and perhaps, also with the minister. And that is to do with the institutions of decision making. And the minister very correctly, actually pointed out the fact that there is now momentum to integrate decision making, that different ministries are talking to each other. But I want to just maybe, act as a devil's advocate and put this question to you, Vijay, given your very wide experience. Today in India, we do not have any one individual responsible for energy. We have different cabinet ministers responsible for aspects of energy, but we don't have any one person other than if I may, say, the Prime Minister of India who has responsibility for energy. To what extent do you think our approach to, and I'll be specific now, to gas in this case, not energy? To what extent has our fragmented and siloed approach to gas being a reason for the slow pace of growth of gas in our country?

Vijay Kelkar: Vikram, I listened to you, and I also heard what minister Puri said about this initiative. You know, it just occurred to me and I'm just now responding, which means it's sort of triggered by what both of you said. Given the Indian context, one way of doing this resolution of different perspective in a political level, is to probably do the instrument of what is called government partners; in this context, empowered group of ministers. An empowered group of ministers is one instrument by which I've seen various governments, NDA 1, NDA 2, UPA 1, UPA 2. They have from time-to-time, used that tool very effectively. So, maybe minister Puri can reflect or think about whether we can have an empowered group of ministers just on gas, because gas is really **[indistinct- 1:11:44]**, because I do believe that there is going to be also, a lot of rules or action by state governments in this gas area.

So, empowered group of ministers, we can also then invite and interact wherever necessary, with the state governments. But that's one instrument we'll bring in that needs heft, which is required for

natural gas decisions. And maybe it can be chaired by the PM himself, or if they want, in some sense, the only other agency which looks at government in an integrated manner is the Ministry of Finance. So, maybe Minister of Finance could be chairperson of the empowered group of ministers, just on natural gas. They could probably exploit this.

Vikram Singh Mehta: Minister Puri, sir.

Shri Hardeep Puri: I wanted to just come in very briefly. I try to choose my words very carefully because I try to suggest that what you have written about, empirically, yes, there is no one Minister for energy. Fair enough. But today, the dynamic of decision making in the Modi government, and anyone who was even a nodding acquaintance will know that the minister and what you Vikram did describe as the embedded bureaucracy there under. That is only one part. All decision making here is through empowered groups, all of it. Believe me, in the crisis of the second wave of the pandemic, we had an empowered group of secretaries which was dealing with oxygen, we had a GLM on health, which I was a member, and we had people dealing with pharma to make sure that we were placing orders on vaccine manufacturers, etc. I don't think given the integration that there is in those empowered groups, and at the cabinet secretary level, the next one thing, and we have ministers meeting, I mean, any issue which is you, these are first preceded by the concerned ministers talking, only then you go to the cabinet.

So, all that is there. But I think you are got your pulse on the future. That is what I was trying to say in what Dr. Kelkar also, I was trying to pay him a compliment, that that is the shape of things to come. I think the natural evolution from the current different ministries dealing with different parts of the energy matrix will result maybe in the near future, because there's a tendency of combining ministries. So, it is something which is likely and on the horizon. Another point, because I was trying to wrap up, the Sustainable Development Goals will succeed, I think, including on energy because India will succeed. I think India needs to succeed for the Sustainable Development Goals to go forward. But the point I was making is, because of the sui-generous nature of the Indian challenge, I personally think that along with three, seven, nine, 13, you should add five, because, you know, the dignity of the girl child – I mean, when you move from traditional cooking mediums, to your one cylinder, you know, this one cylinder is a roaring success, but we have to take it from that one and now three to seven.

So, you will see in the coming months, our movement in that direction. Our energy is very much. I mean, the fact that you've got to increase your output, Atmanirbhartha and all that. But on this particular aspect also, I think, I mean, one of your experts very kindly referred to me being urban, how can you have nots SDG 11, included in that inclusive city? I mean, there's no way we can deal with our 100 smart cities or 500, 100 cities, unless you have pipe gas coming to all those and you have the last mile connectivity. That was a limited point. Thank you.

Vikram Singh Mehta: Thank you, thank you. Just if I may, pick up on the issue of sustainability, Dan. Carbon capture and sequestration, the hydrogen, the upgradation of our grid infrastructure to absorb intermittent molecules, these are all going to require technology and finance. Do you have any silver bullets on how India might address this issue in brief?

Daniel Yergin: Well, I think it's Dev's fifth I, Ingenuity. I mean, I think it's the brain power of India. I mean, certainly, when this Think Tank that Dev and I are on for the ministry, much talk about how you tie the IITs into energy innovation. I mean, there's no question that a lot of technology, a lot of innovation is going to be required. Even John Kerry has said that half the equipment that you need, doesn't exist. That's why also, by the way, you know, as I said in The New Map, we're now in the 312th year of the energy transition. It's hard to see how you're going to have a complete energy transition in

28 years. But I think also, a second thing would be collaboration and partnerships, the kind Dev has talked about with international companies who have the same incentive. You did mention the IEA new scenario. I think it's worth noting that it's very confusing. Is it a scenario? Is it a forecast? Is it a plan? Why did it leave out all of these different things?

For instance, I don't see how you achieve these goals without significant carbon capture. It has to be part of it. And it's also very puzzling, because two months earlier, the IEA had been talking about the need for new exploration. So, I think, for many countries, I hear this from many countries, are asking the question, "How can the IEA changed so much?" And I think that goes back to what we were talking before, that different voices have to be heard, India's voice has to be heard in this. But on the technology question, that is a big agenda. We have, in The New Map, I have a chapter about what we think are the major technology opportunities. Tomorrow, I'm participating in a conference on Enhanced Geothermal. There's a lot out there, and the incentives are there. I think Dev has a good sense of that, too. I think right now, at least, hydrogen is hot as a topic and to harness it, but the markets really aren't there yet. But this time, it seems that there are higher hopes for hydrogen than in the past. But I think Dev could pick up on that.

Vikram Singh Mehta: Yeah, Dev, I mean, I was going to actually request you to pick up on that, but with perhaps, specific reference to the issue of skills, there is a question actually, in the Q&A, about the skill-gap facing our industry. So, you talked about ingenuity, and I just ask you, in your experience in India, are you actually realizing the full potential of India's ingenuity? Do you feel that the Indian industry, not just BP, may well end up facing a skill-gap that will prevent it from realizing its full potential for full technological and commercial potential?

Dev Sanyal: Vikram, I think I'll just put personal terms firstly, and I'll give a more broad answer. When I joined BP as a senior most Indian in BP, and I mean, the senior most Indian all the way through to the time I joined the Executive Board of BP 12 years ago. And that may seem like an extraordinary thing, but today, when you look around BP, you see so many Indians, you see so many people from around the world, who are holding very senior positions. And I think the truth of the matter is, people like you and me, we're lucky, we were the very early vanguard of globalization that's kind of happened. And I think that's going to continue to happen at pace, because when I look at some of the new energy developments that are taking place, it does require a very different mindset, it requires a certain sort of, can-do attitude that I think India has got frankly, an abundance of.

So, I think, there is a sort of, massive reality in the build out of the energy system if you look at the next 30 years, which is, if you base it on a thesis of what you know today, you will fail. You almost had to have a thesis of the future; what's going to happen to technology. When I look at our solar business, which by the way in the course of last, we started three years ago, we are now the Europe's largest solar company. You know, we have developed that business based on a thesis of the future. When we started off, if you think of it, if you visualize production costs at that point in time forever, this would come down by 82% in the last decade, before we had the business which has grown dramatically in the last six [indistinct- 1:22:17], improvement in turbine efficiency.

So, I think there's a skills-dimension, there's also technology-dimension, that is very important as we build out these businesses. Everything is going to change. Today is the slowest day of the rest of our lives. You know, that's the reality. With digitalization, with technology improvements. And I think the winners will be those companies, those institutions, those governments that can actually serve, look at the future, build a thesis and build an enabling infrastructure to get after it. And the final point I would just make is, capital. You know, BP is very proud of our partners with NIIF, the National Infrastructural Investment Fund in India, where you set up a billion-dollar fund to basically invest in

low carbon, clean energy growth. And we are actually the fund manager of that, we also put principal capital in it, and we're attracting new investors into this fund.

I think capital markets will search for ideas where they can see growth, and they can see more profitable flows. And I think the combination of building effectively a business where you can combine the capital alongside the intellectual capital, alongside the policy incentives with technology is, I think, the sort of, perfect mix that we need as we move forward. So, I think, in all those dimensions, and I'm not being biased here, or speaking to a willing crowd, I really do believe India has got a lot to offer. And that's what we're doing with BP, is business in India, and that sort of, has to be exported to around the world. And we'll see more of that. I've no doubt about it. That's not a cyclical phenomenon; it's a secular shift.

Vikram Singh Mehta: Well, thank you. Thank you very much, Dev. We are now at the final stage of this discussion. And I'm going to turn to the president of CSEP, my colleague, Dr. Rakesh Mohan, to deliver some concluding remarks. Rakesh, are you there?

Rakesh Mohan: Thank you. Thank you very much, Vikram. Let me first say that CSEP, that the Centre for Social and Economic Progress has been concentrating a lot of its work in the whole energy area. Just as Minister Puri said a couple of times, and if not more in his remarks, that India is very special in this issue, because the next decade is really going to be perhaps, the most challenging one for us, in terms of the whole energy area. That is, we have a special challenge, because not only do we need to comply with all the Paris agreements and further on climate change, but at the same time, meet the expanding demand for energy on an affordable basis for the foreseeable future. So, it is going to be the most challenging decade for energy policy overall, covering electricity, coal, gas, petroleum, etc.

In our small way from CSEP, we already did a relatively comprehensive book on coal last year, now, on gas, and we're working intensively electricity, power sector as a whole. And I'm now throwing a challenge to my colleagues that I hope we can come out with a book on electricity within a year and a half from now, resulting from all the work that we're doing. So, having said that, let me first thank Minister Pradhan for really being so gracious to launch this book, despite changing his portfolio last week. And also, I must say that having had such a distinguished record as petroleum minister, now he has even more challenging portfolio on education. And it is really education and health, where if I may say so, our country has failed in the last 70 years, and so, if he can perform in the same way as is on the petroleum, that will be the biggest service to the country ever for our growth.

Similarly, let me thank Ambassador Minister Puri. I had the privilege of being received by you when you were ambassador to Brazil, when I was representing India in the G20 meeting there a long time ago. So, I'm so glad that you're heading now both the Housing and Urban Development, as well as Petroleum, and look forward to further engagement with you. Thank you very much, again for being so gracious to spend so much time with us, despite just being the second week of your being in this particular portfolio. Vijay, as always, old friend, co-conspirator, policymaker, etc. Always a pleasure to see you. Of course, you seem to have a new appearance now, which we haven't seen for a long time, and hope that we can keep engaging you in CSEP, along with your other myriad of activities that you're always engaged in. As always, of course, you're very insightful, and very succinct, as you always are.

Thank you, Professor Yergin, for your second appearance on CSEP, and I hope that we will continue to be able to engage you in our activities as we go along, particularly in the energy sector. And Mr. Sanyal, thank you once again, for taking the time as being in charge of BP, to be with us for this. And finally, Vikram, you're responsible for all this, having compiled this amazing book in such a short period of time with so many authors, and thank you. And I should also, of course, thank all the authors on the

behalf of CSEP. So, I do hope that once this wretched COVID ends, I hope it does end one of these days, that we can actually see each other in person at our offices in CSEP. Thank you all.

Vikram Singh Mehta: Thank you very much, everyone. Thank you, Rakesh. And God bless, and thank you. Thank you, sir.