

Session 1 : Decarbonization in the Maritime sector

Shri D.P. Dash: We have planned it by transitioning to electrification, electrifying the entire life, then greening the supply chain. I also find here the similar way the port sector is also trying to do twofold - one is for the static installations, that is the ports. Another one, the moving vessels. With this, let's explore what is going to be the next part.

We cannot forget about what is happening to the world when you discuss any particular thing in any green conference. Let's look at the kind of emission. What is killing us is 53 gigatons of CO₂ equivalent to greenhouse gas emissions, out of which 37 gigatons are carbon dioxide. And that is happening, you know, increasing day by day, year by year.

And as a result, the surface temperature has risen to 1.19°, and the average air temperature has gone to 1.45° above the pre-industrial arena. We had an objective, and sector-wise it is the energy sector which contributes to the maximum, 73%. And the transport sector is around 16.2%, and our subject of interest, the marine sector, is around 2.3% of the carbon emissions. It's a global picture of 2023, the declared data.

And what has happened is over various years we have been keeping a target to reduce the greenhouse gas emission by 45% by 2030 - that is where we're looking at a pathway called 1.5°. And for the last 10 years, from 2015 to 2025, this curve is not bending down, the emissions are not coming down. When you look at this graph, even the pledges or the various pledges of COP26 can get us to 41.9 gigatons, instead of 26.6 gigatons by 2030. That's where we find that there is an urgent need.

This is the maritime emission over the last 7–8 years, and though the percentage remains steady, gradually there is an increase in the greenhouse gas emission as well as carbon dioxide emission.

How the consumption of the various types of fuels - what we see in the maritime sector is, you can see the green fuels are still a daydream for us. We are getting into some cleaner fuels, but green fuels are yet to come. And in this graph one studies, one can say, when we'll transition to the real green fuel - that's a big question before everyone, before the entire maritime sector.

The emissions, as I put it, not only the carbon emissions but also the other emissions are also indicating that we are not really in a good phase. Only one thing has happened is HFO has been substituted with VLSFO to maintain the sulfur kind of, you know, strategy limits which has been set.

The people are finding interest in the LNG vehicles. The ships or the vessels are being converted into LNG. Whether really LNG is the solution for the future, that's a question which comes, but it is still something - it is associated with something called methane escape. There are types of vehicles

where the percentage is around 3.5%, and methane has a very high global warming potential - almost around 80 times that of carbon dioxide.

Now when you look at the phases of the ship, where do we really contribute right now? These are the four phases: berthing, anchoring, maneuvering, and cruise. Cruise will anyway have to happen. But in the berthing and in the anchoring we can always see there is a golden opportunity for us to really work as a port to see how we can minimize these two emissions to contribute less to global warming. That's where on-time arrival and good facilities really reduce the berthing time.

Now when you look at the maritime sector navigating the net-zero horizon, it's almost 1 billion tons of carbon emission. The percentage already remains the same. Unprecedented projected growth versus call for reduction in the absolute emission.

Global sea trade has risen from 8 billion tons in 2008 to 13 - estimates by 2025 and 17 billion by 2035. At the same time, there is a demand to reduce. 90% of the global trade is by the maritime sector. 98% of the vehicles use marine grade oils. Just 2% are other alternate fuels.

However, there is some good news. Ports are expanding their green infrastructure, with 195 ports offering LNG bunkering, 70 developing the capacity and capability, and 28 providing bunkering for at least one or another alternate fuel. 205 ports provide shore-side power, and around 2,500 ships are currently being fitted with shore power connections. That's again a big challenge. The fleet size is 55,000 plus, and that's where the challenge lies.

The world fleet is aging. In the next slide, we can see that the environmental targets are hardening, but progress towards fleet renewal remains slow. There are challenges. Fleet renewal will require investing in new-build ships, retrofitting the existing ones, and scrapping the older ones. There is a constraint in all. Fuels of the future remain uncertain. Today, we do not know - in 2035, what is going to be the new fuel; in 2045, what is going to be the ultimate fuel for us.

We are today, you know, aspiring with LNG, LPG, ammonia, or hydrogen - but something else may be enough. LNG carriers averaged 27% of the capacity in 2022, and it is finding interest, almost reaching 51% in 2024. LPG is again gaining another kind of interest, perhaps because there is a possibility of considering this as a dual fuel - that is, LPG and ammonia.

However, the average carbon intensity is coming down almost at the rate of 1.3% every year. That's because of various energy efficiencies being inducted into the system. The asymmetrical and tired global shipyard capacity and cost pressures have implications on renewing green ships. That means the shipping sector is not in good hands - in terms of ship manufacturing, shipbreaking, and suppliers who can really retrofit the systems.

This is the average age profile of the total fleet - more than 20 years - of different segments. The percentages are higher, and those who are below 19 years are likely to be there for the next several

years. So what is the plan for changing them? What will be the net requirement of such ship manufacturing? These are the challenges.

This slide also, of course, speaks about what is the annual addition of the deadweight tons in the ships.

Nothing will come without investment, and this is not a small one. It is a trillion-dollar question. The green revolution comes with a colossal price tag - both for the ship, for the infrastructure, and for all kinds - that is, manufacturing of new fuel, producing the new fuel, the infrastructure for bunkering, etc. Various industry analyses estimate somewhere between \$1.4 trillion to \$3.4 trillion. And where is the money going to come from? Such a sum cannot be managed by any individual or by any government. One has to see what will be the innovative financing.

A new ecosystem of innovative financing, of course, is the need of the hour.

So with this, as we look at the kind of challenges - choke points - which are there for the maritime sector globally. Because today in India, we cannot isolate ourselves from the globe. We are part and parcel of that. And we need to address this. And I'm sure in the next three sessions, we'll be delving into each detail and look for how we can provide the solutions - or some attempt to provide the solutions.

And with these few words, I close here, giving this session open to our panelists, our speakers.

Dr. Manish Tiwari: Thank you so much for enlightening us and setting the tone for this discussion. We are now going to begin our second session: *Decarbonization in the Maritime Sector*.

I would now like to invite and introduce the panelists for this session.

First, I would like to invite Shri Subrat Tripathy, President, Business Development, Adani Group. Please come to the stage.

Next, I invite Shri Amlan Bora, Chief Representative, South Asia, Port of Rotterdam. Mr. Bora is an experienced global supply chain professional, having worked with major multinationals like Siemens, Philips, and DAIO in progressively senior positions.

I now invite Shri Sanjay Verma Senior Consultant with the Inland Waterways Authority of India. He has expertise in ship design, construction, and operation, as well as modernization and development of infrastructure for shipbuilding and repairs.

Next, I invite Shri Senthil Subramanian, Chief Executive Officer of Dakshin Bharat Gateway Terminal. He has over 25 years of experience in the container terminal, port, and marine survey industry.

I also invite Shri KK Hota, Chief Executive Officer at NTPC, UP Green Energy Limited. He has graced us with his presence along with Shri Kili Moand Dao.

Now I request Shri K. M. Rao, Principal Officer (Engineering), Joint Director General at the Directorate General of Shipping in Mumbai, to join us.

Lastly, I invite Shri Arunachalam Karupiah, Assistant Vice President at Sembcorp Green Infra Private Limited, who is here with us today.

I thank all of you for taking the time to join this session.

By way of introduction, I'd like to briefly set the context before we begin. India's maritime sector contributes almost 3% to global greenhouse gas emissions and is growing at 6% annually, driven by rising cargo volumes and fossil fuel use. However, in alignment with the Paris Agreement and as a responsible leader not just of the Global South but globally, India is targeting net zero emissions by 2070, and a 45% reduction in emissions intensity by 2030.

Green shipping is a powerful tool within India's climate action strategy to neutralize carbon emissions. What needs to be done to achieve net zero will be the focus of today's session.

I now invite Shri Amlan Bora, to make his presentation on the sector, what they are doing at Rotterdam, and related developments.

Sri Amlan Bora: It's good to see some known faces from my previous role when I was working for the Ministry of Foreign Affairs of the Dutch government in India heading the trade offices. Since very recently, I have taken over as the Chief Representative of Port of Rotterdam for South Asia. What I intend to do is to share a little bit of our story, which probably many of you know better than I actually, because I just started. But please allow me to share a few slides about what we are doing in the subject, and then that probably triggers the discussion. I need this one, otherwise there are too many slides and I can't go as fast as you want.

All right. Port of Rotterdam, I'm sure, because everybody is from the sector here, is the biggest port in Europe - still. It used to be the biggest in the world. The port itself is 42 kilometers long. It plays a multifunctional role. It's a gateway port, it's a transshipment hub, but it's also an industrial cluster. I will keep it relevant to the discussion today.

The port houses four crude oil refineries today, 45 petrochemical companies, vegetable oil refineries, and three biofuel plants. In terms of its contribution to the Dutch economy, it's quite phenomenal. The Netherlands is a very small country, as you know. The only few things which are big in the Netherlands are Rotterdam. Port of Rotterdam probably is one of those. It contributes 2.9% to the Dutch GDP in terms of whatever we have in the port premises and also indirect contribution to our GDP.

Very important - I'll come to that later - is that the port actually transacts 13% of the total EU energy consumption needs. That is very relevant for the discussions today. Because of the location and because of very good connections, we can reach within 24 hours a population size of 500 million - that's quite substantial.

The port is not new - started many centuries ago - but of course, the port at that moment was very much within the premises of the city and it has expanded outside. That is the nature of very many ports and very many cities. Like Mumbai, for example - if you think about the Port of Mumbai - if it has to expand, it has to expand in a similar manner.

It is a corporation, but it is owned by the government. 70% is owned by the city government of Rotterdam and 30% by the Dutch national government.

In terms of the governance model, we split the investment roles with the private stakeholders. We are responsible for building the infrastructure, including the digital infrastructure, and the private companies play the role of building the superstructures to run the industrial complexes. That makes it possible for development of large-scale infrastructures, as you can see some of the things which are here.

In terms of throughput, the port at this moment is about 439 metric tons, 11th largest. But what is interesting to see here is 40% of that total tonnage comes from liquid bulk, and as you can imagine, the biggest chunk of that is from oil and gas. Please keep that as a point of reference.

Of this total bulk that comes in, 13% of the total EU energy consumption passes through Rotterdam. Juxtapose that with the reality that we as Netherlands are 10 meters below the sea level. The moment you land in Schiphol, you'll see minus 10 in your altitude meter. If you combine all these things together, it just becomes very natural that we need to do something for energy transition - not for anything fanciful, but for our survival. That is what we're doing today. We are very much playing a leading role - for the port, but also for the Netherlands and EU - in terms of defining the energy transition and how we do that.

We have an energy transition strategy divided into four pillars. I'm sure this is nothing new or nothing different from anything that you are doing, but this is the way we are structured. Today, this four-pillar energy strategy is of course defining the port today to be the port of tomorrow.

The port looks like this today. This is the reserve area, which is not utilized. This area - Maasvlakte 2, as we call it - is for logistics services today. These are the areas for storage, and these are the areas where the industries are housed. But then it is going to transition. This area is going to be the bio-based and circular industrial area very soon. This is going to be mostly for logistics services and the new electrification needs that will be required to run all the energy transition programs. Storage - of course, the storage will stay, but repurposed. Today where we are storing fossil fuel, tomorrow we'll be storing hydrogen, ammonia, and any other more sustainable fuels.

A lot of the industries today will probably have to change. Some will close down. New industries will come up. And even for industries which will not change, the feedstock and processes will have to be changed.

If we think of the four pillars, there are many things which are happening today. Many of the speakers before me - Madame Shankar also referenced the 2050 targets. Many others have also referenced that. Mr. Bakre, also said that we are targeting to be carbon neutral by 2050, and by 2030, 55% reduction of CO₂. These are, in a way, kind of global targets and we are no exception to that.

In all the four pillars, we are doing a lot of projects. It will not be possible for me to go through all the projects, but I'd love to, whenever we get another time or moment to interact.

I'll just touch upon a little bit on pillar two, three, and four because that is highly relevant also from the Indian context. Each of the pillars also provides the possibility for building the collaboration between Netherlands and India.

If we go to the second pillar, which is about energy production, we have been talking about green fuel. Hydrogen is one of those key elements in the green fuel. Rotterdam plays a key role in terms of two things: it is going to be Europe's green production hub, but it is also going to be the gateway for receiving green hydrogen, green ammonia, and green methanol that will be exported from other countries - including India.

To be ready for that, we are already investing in our ecosystem within the port premises. We are talking about storage facilities, carbon capture facilities, electrification, and all the other infrastructural changes that would be required to support the new industry in the future.

Offshore farms are being developed - 7.4 GW to be completed by 2030 - and that will be fueling the green hydrogen production and green ammonia production on the premises.

Cutting it short, but production, as many of you already have highlighted, is not going to be feasible. It's going to be very expensive. We do not have the capacity to produce that much. So we'll have to look into countries like India. Honestly, Mr. [inaudible] knows that very well.

In the last three years, or probably just after COVID, we have this conference called the World Hydrogen Summit. In the first World Hydrogen Summit, India was nowhere in the picture. Nobody spoke about India. Nobody discussed India. Nobody dreamed about India. Second - already changed. Everybody was starting to think about or raise a question: okay, is India really going to be that serious? Third World Hydrogen Summit - India had the biggest pavilion amongst all the participating organizations and countries. Fourth World Hydrogen Summit - India was in the inaugural dais. Our Secretary Minari was speaking there. We had a grand reception. Everybody's looking at India.

So this map of course doesn't have that many colors, but I think India's name can be written in bold letters if not already here. A lot has to happen, but the belief and the faith has developed.

Like I said, to be on the receiving end, a lot of infrastructure has to be developed. FIDs have been called. When you talk about ammonia, we're much ahead than the rest. Methanol - the same. For liquid hydrogen and LOHC, we have very concrete plans.

Production as well - the Shell 200 MW hydrogen plant will be commissioned this year. Just last week, or the week before, you may have seen the Air Liquide 200 MW project taking an FID. The slides had been sent to me by my colleagues last night, and I feel the Port of Rotterdam sometimes is more bureaucratic than the Ministry of Foreign Affairs of the Netherlands. I could not change anything without taking a clearance from the communication team. So I could not put that tick there. But if you look at the second project - Air Liquide - that project has taken FID.

We are building the pipeline network - of course within the premises of the port, but also extending all the way to the Rhine corridor, the Rhine industrial belt of Germany.

If somebody asked us today, 'Well, if I bring in all the projected cargo on green hydrogen, and your pipelines are not ready, how does it work?' Actually, that is not a problem. A lot of barging happens on liquid hydrogen already. If we look at our barging capacity and infrastructure, that is sufficient to carry all the liquid hydrogen that can come to Rotterdam Port and take it all the way to Basel in Switzerland.

These are the kind of offtakers that are possible. A lot of hydrogen projects - not everything has taken an FID - but you can see a lot of those names.

Very critical is about new feedstock and new fuel systems. One thing is very critical here, and that word is also there - critical mineral. Why is that critical? Because if you are talking about building the economy of tomorrow, if we talk about transition - be it energy transition or building resilient supply chains - then critical raw materials play the most crucial role.

I'm taking just an example here - how our energy transition, our digitalization, air and space and defense is dependent on a few of the critical minerals. I have taken some key technologies and dependencies on key materials there.

What is the issue here? The issue is the demand for critical raw materials - lithium, graphite, cobalt, nickel - these are going to grow by many times over. But at this moment, the country which has got a complete monopolistic control on this is China. Not just in terms of mining - they are lucky to have a lot of it - but when it comes to refining, China has by far the most control on critical raw material. We all know we need to build resilience in our supply chain. So we are looking for alternatives, and that is where India comes in. That is where European regulations are also gearing towards. We do not want to have more than 65% of our sourcing of critical raw material from any one country. This is one area where already India and the Netherlands are starting to talk together.

India and the European Union are talking together. I also look at private participation. The Port of Rotterdam will be a nodal organization driving the strategy for the government of the Netherlands, and we'll be seeing a lot from us.

We'll skip this. Skip this. Mandates. Share the presentation later. I can see you're looking at me. We'll skip this as well. I'll quickly maybe touch on sustainable transport. We'll skip this slide. We all know this. We know this.

I'll come to one slide here. These are all regulatory driven. If it has to happen, a lot of the regulations will have to first fall in place. The port readiness for bunkering - we talk about bunkering - quickly ends up with this topic and then I'll stop here.

Bunkering - Rotterdam is the world's second biggest bunkering base after Singapore. Singapore is by far bigger, of course, being the first one. We have been testing with liquid ammonia, and we have done the cold ammonia bunkering of ships recently. That went successfully. We have been bunkering green methanol since 2023.

We are doing shore power - we have already done it for the cruise terminal and we are slowly rolling it out for the other cargo as well.

This is an interesting one - net zero ship Samskip carrying liquid hydrogen. Of course, this is a digital image, not a reality. But there's an interesting thing - I would call it an India-Norwegian-Dutch collaboration. Green hydrogen produced in Norway would be shipped to the Netherlands - in containers - and then we'll be bunkering the green hydrogen - liquid hydrogen. But the ship itself is made in India. Cochin Shipyard is the one who is making this this year. There'll be three or four of those that will be built. Samskip is a Dutch company.

Inland shipping - also things going on - I will not go there. Let's stop here. Building the future together - that was the essence of what many of your speakers have also highlighted. Not just people to people, country to country, but everybody needs to work together here.

DR. MANISH TIWARI: As we've already started talking about what the private sector and other countries are doing, I want to ask you a quick question.

You spoke about preparing as a gateway to meet Europe's energy requirements. On the other hand, how do you see what's happening here in India or in Latin American countries? How are they cooperating?

Europe becoming carbon neutral is fine, but what's happening with countries like India or others producing green hydrogen or other new fuels? How do you see that taking shape?

Mr. Amlan Bora: Let me answer that in the context of India and the Netherlands-or broadly, the European Union and India.

First of all, when you talk about greenfield, there's a chicken-and-egg situation that India is slowly starting to solve. On one side, the buyers or offtakers are looking for a price point they are willing to pay. On the other hand, the producers are looking for long-term commitments from offtakers, which the offtakers are not yet ready to give.

A promising development is India's recent green ammonia auction, which came at a price point that surprised everyone. If we continue moving in that direction, cost reduction becomes fundamental-because we are talking about energy costs. That's just the beginning. Many things will have to follow after that.

If the cost can be contained, then naturally the interest and the market will grow. In that space, we are working together - bringing people together, developing technologies collaboratively, and fostering institution-to-institution knowledge partnerships to solve these problems together.

Another key area is midstream assets. In the slides I presented today, I focused mainly on midstream assets. These are just as critical as the producer and the offtaker. In this space, there's no need to reinvent the wheel. In some areas, India is ahead; in others, the Netherlands may lead. We need to join hands, and that's already happening.

We're in discussions with the Ministry of Ports, Shipping and Waterways. We also have an MoU between the Netherlands and MNRE. TERI was our knowledge partner in developing the first draft that helped shape the MoU.

Such collaborations are underway and will continue to grow, helping make this global energy transition a success.

Mr. Manish Tiwari:

Subrat Tripathy ji, referring to what Mr. Bora just said about collaborations-especially the kind involving the private sector, governments, and partnerships between countries-as someone who is a key player in the port sector, how do you see this kind of cooperation?

How is it contributing to this particular aspect of the energy and sustainability transition?

Shri Subrat Tripathy: As a port operator, the first word that I wish to use is 'responsible port operator.' Now the word responsibility encompasses with itself a transition which we are seeing very actively from a certain kind of energy to a new wave of energy that will come to the world.

Let's not forget, and I'm glad to hear from Amlanji - I'm glad to connect with him again - that in the world hydrogen conference we have taken a space, and at the same time the responsibility that hovers on India at large and the maritime sector therefore is to see that we handle this transition and meet the goals that we have promised.

In fact, on the maritime sectors, a responsible port operator that APSA is, and doing close to about 430 million metric tons of cargo of the 1600 that has been done in India, which corresponds about 27%, is that we would go through all that was spoken in the first half - about electrification.

Today you will be happy to note that we took this pledge in 2022 that by 2025 we would become carbon neutral. While we may have just missed it, we are very close to that. We pledged ourselves that by 2040 we will take net zero, which is extremely challenging.

To do that, it's a combination of things - it doesn't stand in splendid isolation as it were. All the ports of APSA at first are going to be entirely RE powered. To do that, not only within the ports - and I congratulate Chairman VOC Sujan GI and Deputy Chairman Rajes G for taking this great initiative - I also want to tell you that the port sector of India is a beautiful example of PPP.

Nearly 45% is done in the non-major ports. It's time that the ministry recognizes the revolution that is happening in the non-major ports. Mundra, for example, is India's port which has been the pride of place for doing 100 million first, 150, and when I'm seeing Rotterdam today, Mundra did last year more than 200. But more than the 200, with all humility I say - and which we handle - is that nearly every third container of India passes through Mundra port. Again, in all humility - but how do we handle them?

The entire set of cranes are electrically fed, the entire set of GSUs, entire cranes and ITVs. The ITV story is still happening. All ITVs - we at the moment, we've got close to about 400 ITVs. The more important fact is, when we pledged ourselves, we were the first to undertake this transition.

While a lot has been spoken, very silently APSA has been undertaking this transition. I come back to the word - a responsible port operator. So that responsibility encompasses that you have a chart for yourself, you're aware of the energy transition that is taking place, you're aware that your country's energy needs are still largely thermal-oriented.

You're also aware that in the ports, the transition that will happen - more than 200 megawatt we consume - is entirely green-fed from a combination that we do in Kavra. I was telling the other speakers during the break that while we'll be doing from hybrid power close to 30 GW by 2030, we're already close to a little more than 5.5 GW at the end of this financial year.

Now all that is being routed to our ports across the country through the power of streaming the power, and it'll be green-based.

The other thing about net zero is the indices. Now its time - in the corporatization of the Indian port sector - you'll find that today most ports are becoming landlord models. You look at JNPT - it's an entirely landlord port. Paradeep is on route to become, and I'm sure VOC and others - you already have a landlord model.

In the state government concessions, you'll have Mundra, you'll have Dhamra, you'll have Katupalli here in Tamil Nadu, you'll have Karaikal here in Tamil Nadu. All this - the transition that we are undertaking towards net zero - is a responsible transition.

When I say this, how do we get induced? Because the funding that we are going to take - and here's the difference between a major and a non-major port - while the government is a sovereign fund, the non-major ports have to go to the market to take funds.

Today, while green financing is a subject, I shudder to think that we can go to raise bonds and monies in India if you are not valued by indices such as CDP, Sustainalytics, and all. And it's my - with all humility and privilege I would say - amongst the peers that are benchmarked on the 10 best port operators in the world, India ranks with APSA - in all humility, as I said - among the 10. And our journey is perhaps going to be the fastest.

I congratulate the major ports - while the green hydrogen is taking place in one of our ports, in all the ports we have begun. In Gopalpur port, which is very newly acquired, we've got this offtake agreement. We're not just setting up green hydrogen players coming in through PPP models, but offtake agreements being signed by countries which would not be able to produce green hydrogen at their spaces at lesser costs.

Eventually, cost and technology are going to be the kings of the world as we go ahead. I'm not even talking about digitalization - that has been spoken - but cost and technology. When this transition happens, countries like Korea, countries like Japan - they are more actively pursuing our transition of hydrogen that we produce in India and we transport them as fuel in the maritime sector also to give them their security when they do their part of the transition.

All this is weaved into the strategy which Honorable Prime Minister said - by 2070. We in APSA believe our transition will happen by 2040 and we've taken all the corrective steps.

So valuing yourself - and I will encourage, as we go forward, to all the major ports - it's time you started valuing yourself on benchmark statistics. Introduce Sustainalytics, introduce CDP, introduce those to evaluate as to how I'm conducting my businesses - am I within the contours of the green transition that is taking place? That's very important.

So I come back to what I began - that as a responsible port operator, ESG is going to drive the force. The driving force of ports will be governed by ESG.

I think there were references by Madame Malini - she wouldn't recollect - and pleasure seeing her after quite a height of time. But I will tell you the ESG is what is going to determine and govern the course of the ports in the future.

Are the ports of India - major ports and non-major ports - prepared to recognize this transition? If you are, then you will chart out your territories.

What is ESG? I would love to tell you, but many people would not be knowing and accepting that this is the word today. With the IMEC which has not been spoken of - India's desire to get into the IMEC corridor - we'll have a larger share in the world supply chain.

When we do the largest part in the world supply chain, we're looking at transporting Indian goods - notwithstanding what is happening about certain countries imposing 25% tariff on us - it's not for me to comment, and penalties that come.

The fact is, when India weaves itself into a larger supply chain of the world and we become a China Plus One strategy, and we're going to be a manufacturing powerhouse - which is a desire, because that is so well linked to India's goal for poverty alleviation, etc., and for general welfare of Indian citizens - one of the goals is to root Indian products through the IMEC route.

So the western India - I mean the east would also play a part - the western India and especially ports like Vadnavan which is coming up, JNPT, Mundra, Kandla are well positioned to get into this economic corridor which is to Far East ports like Haifa, which were weaved into that - and we run a terminal in Haifa - again getting across to Europe.

While we haven't got across to Rotterdam so far - because most of the Indian products will get into US and Western Europe and they do root themselves - that is the necessity to be aware.

So IMEC and our preparedness for that is also another fact that in the green transition we should be taking up.

These are some of the competitive thoughts. If we do come back, I will share further thoughts on that. But the fact remains, as I said, a responsible port operator recognizes the responsibility - operating itself within the contours of being green, sustainable, and ESG earmarked. That's the way of the future.

Mr. Manish Tiwari: Thank you sir. I pick up the word ESG as you have said and that is I would say a keyword for this session. I come to you Sanjay ji because you are somebody who is an expert in modernization and development of all the infrastructure for ship building and repairs. So I welcome you. Please can you be there and speak about it sir that will be better because what Mr. Subrat has just told how our port should modernize or look like the new ports which are coming up. How do we go the way of ESG and we keep that word inside it.

Shri Subrat Tripathy: So I will set a cue for him. The net transport product of the country, while we are debating, is so much in favor of a mode of transportation which is non-environment friendly. Recognize that first: India's net transportation product is heavily in favor of road transportation. I'm not speaking against road transportation. We have chairman AWI. We had a wonderful session in NW5. It's time we took the leap of faith and did things correctly. So, first get India's cargo into maritime cargoes. Maritime cargo doesn't necessarily mean ex cargoes. What about coastal atma that we are talking of? What about inland water? These are some of the very concurrent themes. Even

the practicing best economies in the world, even US, and when we look at the logistics index which is very important for us in the greening thing, so nobody's going to buy your product eventually if you're not green, if you're not producing green steel and green steel going into making green products in India, your products will not be bought in the future. So when you do that, the transition to get cargos into the maritime fold in India first, our share is very little of India's net transport product. I set the cue for IWAI please.

Shri Sanjay Verma: What we have done for the model shift from road to waterways. One is the Jalwah scheme which has been introduced and going further we are having discussion with the bureau of energy efficiency for carbon credits for when the transition takes place from the road to the waterways. So these carbon credits there is an Indian carbon market which is going to be established very soon. The complete process is in hand and we are in discussion with the bureau of energy efficiency to recognize the shift from road to waterways for the carbon credits for the operators that will earn them the credits which they can earn the revenue. Of course, Jal Wahak scheme is for encouraging them to do more cargo movement through the coastal to the waterways plus in IWT sector whatever all the new terminals which are coming all the multimodal terminals which IWI is building they are all green terminals and we are going in full swing for the renewable energy and by next year we will achieve the target. All the IWAI buildings, all the IWAI terminals will be having renewable energy. So with all this support, we are trying to give support with respect to the reception facilities for the vessels for discharging their garbage, their sewage, their dirty oil, and that infrastructure is also being created and to a large extent we have already achieved that. We have in 17 of our terminals we have got the onshore power supply established. So with this type of support which the IWAI sector is giving the operators should be happy to shift to waterways and then they can achieve their target for the green part of it.

Dr. Manish Tiwari: Thank you sir. I think definitely Indian waterways where we are also with the Harit Noka and all those kind of initiative we are moving towards moving our cargo to Indian waterways and focusing less on road but I want to come to you Mr. Rao how is the DG shipping who is controlling more of all of it, how are they prepared for it?

Shri KM Rao: DG shipping is a policy maker and they make the pathway for the ship owners or ship managers to convert their ships towards the green. So for that we have made a policy and that is with the ministry for approval and that will be in due course it will be done.

Dr. Manish Tiwari: So definitely because we spoke about the kind of policies and Mr. Subrat also said and sir is also saying that those kind of things are coming up and how we can bring it into not just the whole shipping sector how you can enforce it further to get into ESG on those particularly what particular measures.

Shri KM Rao: We cannot impose directly because we have to be bound by the international regulations and international conventions. So already Indian ships are complying with those conventions, and 5,000 GT vessels and above have to comply with the requirement. The Directorate

is imposing those guidelines, and they are complying with the requirement. But our goal is to have by 2050 that our ships have to meet the net zero. For that, we put a roadmap to the entire shipping industry that is in the discussion, and it will be done. And for that, the Director General of Shipping is having a separate division for this, and then we are creating that under DGMA, Directorate General of Maritime Administration and rules that we are creating a separate division for it, and definitely we'll achieve it.

Dr. Manish Tiwari: We just want to come back from shipping to ports once again, and you know, more around energy. When we are saying Mr., I want to come back to you like you are a green energy producer who conventionally was not green energy, but more particularly towards the shipping sector-what kind of things NTPC is looking at.

Shri KK Hota: So first of all, let me congratulate VOCPA for organizing this kind of conference, and the shipping sector is taking forward the green initiative of the country. As far as NTPC is concerned, it started as a thermal power generator, but since 2004 we have been NTPC Limited, so getting across the entire energy value chain. We are now an integrated energy company and not only that-our green roadmap has started from the hydro generation much long back, and with the acquisition of THDC also that has taken forward, and NEEPCO. As far as renewables are concerned, we are a listed company through our NTPC Green Energy, which has a target of one of the biggest targets of 60 GW by 2030, and we are on its way to achieve it. Today we are around 8,000 MW, and so we have created a lot of ecosystem within ourselves with the cooperation of various stakeholders to have the land bank and the other hurdles to achieve that number. That is number one. And second is, as far as green is concerned, NTPC is already a nuclear power with two nuclear companies, and one of the first nuclear projects is already underway in Rajasthan-it's a big nuclear project-and at the same time we have identified more locations for the nuclear projects to get our green. Thirdly, we are not looking at ourselves as a power producer anymore. We are an energy producer and now helping the entire sector to green. So NTPC has been contributing say 25% of the market share to enlighten the bulbs of every house or industry. Today we would be the supplier of the basic raw material, basic fuel for each and every industry, whether it's a mobility sector or it's a blending into the blending into the natural gas pipelines or creating a big hub, creating green molecules-we'll be converting the green electrons into the green molecules and basically meeting the requirement of the various industries in India as well as export in that direction. In the recent, the Honorable Prime Minister inaugurated one of the biggest hubs of India which NTPC is putting up at Pudimadaka in Andhra Pradesh, which is very near to Vizag, and this is a very unique hub, one of its kind, wherein NTPC is both the investor as well as developing the entire ecosystem as a park, as a kind of SEZ, and we'll be having our own jetty and with a green jetty and having the storage system, having a desalination plant, and the entire-it is a 1,600-acre facility wherein NTPC will be developing, is developing, and it is in the fast track of the developments. And that will be producing around 2.5 MMT of green molecules, and that will be just getting converted out of 20 GW of solar power in Andhra Pradesh. In association with the government of Andhra Pradesh, we

have formed a company wherein that 20 GW of green power would be powering 7 GW of RTC power to the hub. So that's the target. So apart from the hub, NTPC is also supporting various industries in participating in the recent tenders of the refineries or the second tender of the green ammonia aggregation and all, wherein we get the opportunity we try to participate in that. So as far as greening the ports are concerned, we have joined hands with two of our major ports which have been identified as the green ports—both Kandla as well as VOCP—and we are very thankful to Mr. Purohit and the Deputy Chairman as well as Mr. Bhoy. We have already inked an MoU with VOCCP to take up the green mobility through hydrogen vehicles, and we have signed the MoU, and our MoU with Kandla has taken a step forward and already the tenders are in advance and it will be implemented very soon. So this is our third mobility project. The first mobility project started at Leh, wherein NTPC is the first company which established the performance of the FCEVs supplied from Ashok Leyland, and we could establish the performance of the FCB at elevation of 3,500 m and at such low oxygen levels and getting the performance of the buses much better than the design. And I'm happy to say that we have handed over all the five buses, and the Leh Ladakh administration is already playing it in four circuits and basically serving the common people. And very soon we'll be starting the operations in Odisha with the support of the government of Odisha—we'll be operating those in next 6 months. And the second project I missed—in this month itself we are commissioning the mobility project in Delhi, so that's in Greater Noida, so it'll be operating in Delhi and Agra circuit very soon. You may be seeing it in the next month—it will be commissioned and it'll be filling the hydrogen. And as far as NTPC is concerned, we have been right from day one focused on green hydrogen. So obviously, green hydrogen mobility projects are challenging because all over the country—in say China or Korea or Japan—they have gone ahead with the gray hydrogen mobility now towards the green hydrogen, but we have gone ahead with the green hydrogen. It has to have the support of the big company and the government. So that's why it has been visible. And apart from that, I'd just like to mention one of the very noble initiatives wherein we are supporting the Indian Army in the very remote locations of Ladakh. We are creating a very self-contained microgrid, and recently you might have heard about the newspaper—Adani also commissioned a microgrid—and we are also doing a microgrid for the Indian Army in Chushul, Ladakh. So that is a self-contained microgrid system with independent renewable generation and fuel cell, renewable generation, hydrogen generation, and the power generation all together. And we are also one of the first companies to decarbonize, trying to have a make and trying to establish the 8% successful blending in the gas transportation sector. So in association with Gujarat Gas Limited, now PNGRB is very kind enough to chart out the roadmap—even today in fact they're discussing with all the transporters and NTPC to chart out the roadmap and what they have got the recommendations from the ICF and all. So that's an area. So in a nutshell, what we can say—NTPC is trying to help out all the sectors to decarbonize.

Dr. Manish Tiwari: Thank you so much. Like NTPC, we have MC Corp here, which is a private sector company doing similar things. I just want to briefly let us know exactly how you and your company would be helping or how it would help you in setting up the net zero.

Shri K. Arunachalam: Welcome and good afternoon to the dignitaries. I am Arunachalam and I represent Simco. Basically, Simco is from Singapore. They have been operating-started with the power plants and then they have developed into the LNG, mostly on the bunkering and the shipping activities. And in India, we wanted to enter as a power generating company. So we have set up a thermal power plant in Nellore and after that we divested that. And at that same point of time, we wanted to contribute to the green grid of India. So today we are close to around 6 gigawatts of plants operating in India. And with that background and also with the operations in Singapore, we thought of going into the green hydrogen and the green ammonia. So basically the green ammonia we are targeting to some of the nations in the east and in the west. And we have looked at the various options and the location-Tuticorin has helped us to reach both the east and the west. And that's why we came over here. And in that aspect, we are planning to have a 200 mt plant as the first phase. And this will help us to reach the far east. And we are already in collaboration with some of the shipping companies and also with our headquarters in Singapore to use the waterways from Tuticorin to reach to the far east. And this will help us to feed them-basically the needs of green ammonia in the sectors like power plants in some of the countries and also the mobility requirements in the far east. So again, onto the second aspect: we are also an operator of the power plants in Singapore. We have the plans to use the hydrogen to be in the gas turbines for producing the power. So that's the reason we are looking at the proximity from Singapore-Tuticorin is closer. So we can take off the ammonia from here and then use it there for powering our gas turbines in Singapore. So this is the plan we have. And we are planning that also the ships which we are going to use should also be in the green nature. So we are looking at the options of using ammonia-propelled ships or ammonia-used fuel ships so that we will be in a full value chain to be in the green nature.

Dr. Manish Tiwari: Mr. Senthil, as a terminal operator here, particularly in VOC, which is experimenting a lot in terms of green energy, and a lot of new things are coming. How do you see this amalgamation of policy, design, and new technology helping you?

Shri Senthil Subramanian: First of all, I'd like to extend our sincere thanks to the VOCPA chairman for organizing such a big event under the title of green ports and shipping. So basically, in Tuticorin, which is primarily one of the major ports and a small town, so far we have been focusing only on the commercial aspects in the ports and the green sounds slightly strange even though it is now getting very much focused. So now we are getting into sort of a tune of what's happening globally and then pan India and finally into Tuticorin. So let me, before answering this thing, let me give a small scenario of what's happening in India in the container terminal sector since I represent a container terminal. So there are 32 terminals in India today out of which 20 are under major ports and 12 terminals are under minor ports out of which 20 major port terminals operating under major ports are contributing 55% whereas remaining 12 terminals are contributing 45% predominantly by other ports. So they are the leaders today. So that's a broad scale and then if you look at the kind of electric driven and the green energy, the minor ports are all they are far away when compared to the terminals which are operating under the major ports. That is a real maybe a hard bit and truth that we have to agree. So as I said, if you look into the numbers under the major ports today, forget

about quay cranes which are already electrically driven whereas if you take the numbers of RTGs the rubber tired gantries now the terminals deployed today under the major ports still almost 40 to 50% not being electrified they are still working using the diesel power supply so that means again there's a long road map there for the major ports to reach to the level of the Maritime India Vision 2030 which says that even the shore power has to be done and again the Maritime India Vision very clearly says by 2025 Indian flag vessels to be adopted to shore power supply but I can count the numbers of Indian flag vessels today which is something around 15 to 20 max container vessels Indian flag I think nothing has been moved so far that is that's again a fact number one and then when you talk about 2030 I can showcase again being local here if I look at the perspective of how we are working towards moving towards a green energy. Now to green now we have only two terminals and both are something around one, ours is 10 years old whereas J.M. Baxi was recently opened. They are 3 years old so they are already 90% electrified equipment so that way there is not much worry of talking about reducing the carbon emission but then remaining 10% is again a heading task so the port has to take a three I would say angle sort of a view. First they should start with the port as a whole. How to develop an ecosystem of engaging one power supplier green source supplier number one and number two the kind of whether the really port has sufficient land area available and then how many berths have been handed over to PPP operator and how much financially he can take it up because again the problem with the quay crane the terminal operators here since we are under major port and we have been already governed by a concession agreement which never talk about all these things. So another mechanism has to be coming in to correct all those things and then financially whether it is viable because the port has to invest and then the developer the service provider has to move it forward come and have a discussion with this. This is point number one with the discussion with the terminal operator and then when you talk about discussion with the seaside and the vessel operators. Now the kind of vessels today what we are operating to green bluntly I would say 30 container vessels in a year even though numbers I would say 500 vessels have been calling vessel calls have been made container vessels but fixed all fixed vessels but then they are all beyond 15 years old as somebody put a presentation no 49% of world fleets are almost beyond 15 years old now if you go and talk to that so you need a proper mechanism to approach those kind of customers hey what is your opinion now. Now you are shuttling between very very it's a short haul this thing and then this is another challenge and then when you look at the landside now every day there are 700 to 800 trucks have been we have been handling now how about that kind of group and what is the force plan as well as the government how they are planning to convert those kind of ITVs into they are all 100% diesel driven so what is the idea now they are talking about by 2030 we'll become complete carbon certification course. So there are a lot of effort has to be done and then for that I would say the blueprint has to be made first involve all the stakeholders then finalize one service provider first and then let the port support then things can move on it's a Herculean task but then somebody will always say no China is like tiger whereas India is like elephant so we may slow rise up slow but then when we start moving nobody can dare us so that hey, we are very confident.

Dr. Manish Tiwari: Sanjay ji, I want to come to you last for this thing. But the questions which have come from Senthil and from others also about the challenges in policy and in initiative. You, somebody who has looked at the modernization of the infrastructure, how do you see quickly what can be done faster as a policy measure and also in some more steps.

Shri Sanjay Verma: See, as far as I, I'll speak for the inland water sector. We have the Inland Water Vessels Act which is in place 2021 in which we have the uh the earlier Act of 1917 had state specific registration and all. So the ease of doing business was not there. Now we have eliminated that you can register your vessel anywhere and operate anywhere in the country. That is the first part of it. Likewise, we have developed the rules, framed the rules which have been notified. Now we are coming up with special category rules for fuels for autonomous uh vehicles which are under ministry for their deliberation and validation will come get notified very soon. So with those things coming to place we are also focusing on capacity building. Now from the IWT sector we are setting about nine regional centers of excellence. NINI is the IWAI's own institute. We are setting the second regional center of excellence in Assam. And then likewise we have got in other parts of the country which will be setting over a period of time. The second part is the aging fleet which has been mentioned by everyone. What we have done, we have made a 10-year plan for replacement of all the vessels which have aged over a period of time keeping because it is a capital intensive project. So we have to keep uh the requirement of the funding part of it. As far as the green vessels are concerned, we have ordered eight electric catamarans on Cochin. Two have been delivered. Six vessels will be delivered by the end of the year. Uh and then whatever ecosystem is required to be developed for operation of these vessels that has already been done. Then we have the uh pilot vessel of hydrogen fuel cell. Now we have got the commercial certificate from the IRS. So very soon we'll be operating the hydrogen vessel in Varanasi. For that uh we are in discussion with oil companies and all for a long-term production and supply of hydrogen for our vessel. Likewise, we are looking forward to a new uh hydrogen vessel which is being proposed to be built. New uh catamarans is required to be built and anyway whatever is required on the uh infrastructure side most of thing I have already mentioned that we have uh on the process of achieving the target or we have already achieved the target so and then the most important thing is like I mentioned about carbon credit now we need to educate and interact with the stakeholders with respect to the carbon credit so that they know the uh value of that and then they can generate the revenue through the carbon credits by reducing the emission part of it be it from the air part or the water part or uh so from that angle if you see the policies are already there now the green uh shipping policy has been drafted by DG Shipping which is under discussion and the comments on that have been uh forwarded to TERI to compile the requirement. So that should also come into place where a clear directive would emerge with respect to what is required to be done with respect to green shipping and lastly for IWT sector uh we have prepared a scope of work which we have given to TERI. Now we are under discussion with them so that we actually know for sustaining the green initiatives in reality on ground what is required to be done which is measurable, quantifiable and which can be at the end of the day uh boost the economy of the country.

K. M RAO: Some of the speakers have said that the ships' aging is day by day but ships are designed to run for 25 years and many ship owners are eagerly looking for what technology will be stabilized in the world. Unless until that one is stabilized they are not going to order for new ships and ultimately it is my personal opinion we are heading towards the nuclear power at the end of the day though the SOLAS is permitting Safety of Life at Sea is permitting for nuclear ships but we are not running only the defense sector only we are using but ultimately we are going to come nuclear power as an alternative power instead of green hydrogen ammonia whatever it is ultimately we are going to reach to the nuclear power.

Dr. Manish Tiwari: Subrat ji, I request you to give your concluding remarks for this session please.

Shri Subrat Tripathy: Well, thank you. It's been a very engaging session and besides the very wonderful inputs that have come, I would like to thank my co-panelists as I would like to thank a very animated audience over here. But Senthil Ji, many thanks. You know, I was wondering if he's shown us the mirror, you know, a reality check really. You know, so while we can pat ourselves on the back, pat each of us on the back, we're doing great work on green hydrogen. The reality check is that there is an ecosystem which does not foster a greening of the maritime sector. What does the ecosystem say? It doesn't limit itself to just a particular operation. It stretches itself into visible and invisible chains which could get into financing, which could get into supplier management. So when I say that I'm a responsible port operator, my responsibility goes across a few things. I didn't prepare a slide because you did surprise me with this occasion. I was not supposed to speak here. Net zero emissions, renewable energy, a circular economy which is dependent on zero waste to landfill. Are we even talking about this in the ports? Then a waste management which 5R principles are spoken of often but not practiced ad nauseam and then we've gone through it, you know, why are we under a challenge? We are under a microscope because we cannot get finances. We cannot go not just to the SEZs of the world, not to the NBFCs but not to raise finance then you would not be getting anything. Water management in the ports because again while ports are all saline-fed or so the question of getting sweet water management is something very important and I would like to say that we achieved a 67% biodiversity. We've taken this goal with ourselves that we'll be net zero deforestation by 2050 because we act within mangroves and a very peculiar ecosystem which influences coastal communities. So one of the pillars of Sagarmala is also to see that besides all this is your coastal communities. Eventually it's the welfare of them and when I'm looking at the suppliers you would know that when we do an ESG indexing our suppliers are encouraged to see how much greening that they have done. So today when we said we are 67% compliant with ESG standards the finances of the world are saying 67 does not pass you through. We won't come to your port unless you are 100% compliant. So I'm very glad Senthil Ji you actually showed the mirror. So the ecosystem that comes in is how do we bring in that ecosystem and as I said we don't stand in splendid isolation. We stand with trajectories of cooperation, togetherness and I think this is a joint responsibility. Let us be aware. Let us recognize it. Let us take it together. Thank you so much.

Dr. Manish Tiwari: Thank you so much sir. We have got a message from MOPSW, Ministry of Ports, Shipping and Waterways, Mr. Shantanu Thakur which has just arrived and we are just trying to play it if possible.

Shantanu Thakur: Namaskar. It gives me pleasure to know that the VOC Port Tuticorin is organizing the Green Ports and Shipping Conference on 1st August 2025. It is very important that we should make our efforts to the vision of Panchamrit given by our honorable Prime Minister Shri Narendra Modi to keep the earth and environment safe. The Ministry of Ports, Shipping and Waterways is going to celebrate the India Maritime Week 2025 in October 2025 and in the preparation for this week, everyone at the ministry is making their effort to make it a success. I congratulate the NAVIC cell and VOC Port for making contributions towards the goal of achieving net zero and organizing this conference. I thank you all for taking time out for this conference. Thank you very much. Jai Hind. Jai Bharat. Namaskar.

Dr. Manish Tiwari: I must thank everyone and as you have put it, we have to operate in an ecosystem and we know the challenges. I also want to thank the chairman of VOC Port, Mr. Susant, that he has taken up this challenge to put it all together and it is as difficult as the ecosystem is. Thank you so much sir.
