Bay of Bengal Conversation 2023

Rising Tides

Plenary Session: " Regional Energy Connectivity in Mitigating Climate Change in the Indo-Pacific"

Welcome Remarks

Abdelkader Ed Elrahal, Chief of Party, USAID BADGE

Chief Guest Remarks

Mahbubur Rahman, Chairman, Bangladesh Power Development Board

Remarks

Muhammad Khan, Director, Economic Growth Office, USAID Bangladesh

Presentation: “Video presentation on Onshore Potential Wind Energy Development” by National Renewable Energy Laboratory (NREL)

Keynote Presentation: “Clean Energy Transition: A Regional View with a Focus on Bangladesh” by **Alam Hossain Mondal,** Deputy Chief of Party, USAID BADGE

Speakers:

Chaira Vidussi, Energy Program Manager, European Commission.

Ijaz Hossain, Professor, Department of Chemical Engineering, BUET.

Nazmun Nahar, Senior Project Officer (Energy), ADB.

Nirod Chandra Mondal, Joint Secretary, Power Division Bangladesh.

Shayan Shafi, Energy Team Leader, USAID Bangladesh.

Vidita, “ladies and gentlemen distinguished guests, honorable members from the government, respected colleagues from usa and representatives of the media assalamu alaykum and a very good morning to you all. I am Vidita currently leading communications at USA’s flagship clean energy project in Bangladesh called the badge project. I will be your host for today's session. During today's session we will get the opportunity to get insights from experts and key stakeholders on how regional and indopacific cooperation in the energy sector can lead to a secure and sustainable energy future. To commence today's session I would now like to invite on stage **Mr. Abdul Kader al Rahal**, the chief of party of usa badge project to share his welcome remarks.”

Abdul Kader al Rahal, “thank you **Vidita** aslamu alaykum chief guest **Mahbubur Rahman** chairman of the Bangladesh power development board. I understand he would be joining us momentarily. **Dr Muhammad Khan** economic growth officer for USAID and then esteemed panelist here and ladies and gentlemen again aslamu alaykum. It's an honor to be with you this morning and to introduce to you the Bangladesh advancing development and growth through energy otherwise known as badge project. Our project seeks to increase the utilization of renewable energy and energy efficient technology diversify Bangladesh energy mix with sustainable and secure resources and promote policies that attract private sector investment. In alignment with the us government team of clean energy asia enhancing development and growth through clean energy. Boosting energy trade regional energy trade is one of the five project component which also include promoting advanced energy technology, strengthening power utilities and infrastructure attracting clean energy investment and enhancing private sector development. We have some fact sheet and brochure about our project on the table outside please help yourself also to want those that has information about the project. We are delighted to partner with the center

for governance studies in Dhaka, Bangladesh to present to you today a session which includes a video presentation by the national renewable energy laboratory. The national renewable energy laboratory in real is transforming energy through research development communization and deployment of renewable energy and energy efficiency technologies all over the world. The session also included presentation by the badge team and a panel discussion moderated by **Mollah Amzad Hussein** the editor of the renewed energy and power magazine. This moderator panel also include representative from the power division in Bangladesh university of engineering and technology USAID the european union and the asian development bank. We look forward to everyone participation also in the panel discussion. Thank you very much aslam alaykum."

Vidita, "thank you **Mr. Abdul Kader al Rahal** for your welcome remarks. Ladies and gentlemen Bangladesh is at the forefront fighting against climate change facing challenges such as rising sea levels extreme weather events or changing climate patterns. And during today's session we will learn more about how we can mitigate it. Our session is called regional energy connectivity in mitigating climate change impacts in the indopacific. Now I would like to welcome on stage **Dr Muhammad Khan** director of economic growth office at USAID Bangladesh to share his remarks."

Dr Muhammad Khan, "thank you vidita, chief guest I understand he's on his way **Mr**. **Mahbubur Rahman** chairman of Bangladesh power development board, distinguished colleagues, donors partners and participants dear panelists good morning assalamu alaykum namashkar and shubo shakal. USAID is pleased to host today's session titled regional energy connectivity in mitigating climate change impacts in the indopacific at the Bay of Bengal Conversation 2023. This session supports the theme the indopacific as a frontline for climate action of the Bay of Bengal Conversation and in is an alignment with the us government's team for of

clean edge asia enhancing development and growth through clean energy badge. Today's session includes presentation on the latest renewable energy technologies and their applicability in the indopacific region regional perspective on clean energy transition with a focus on Bangladesh and a panel discussion featuring experts to deliberate on the cross border renewable energy trading to mitigate climate change. Bangladesh relies heavily on fossil fuels particularly natural gas and coal to meet its growing energy demand. The reliance on imported fossil fuels increases government subsidies to the power sector reduces available foreign currency reserves perpetuates climate change and increases vulnerability. Regional trade offers real opportunities to reduce reliance on fossil fuels increase reliability and is economically preferred. Energy connectivity is crucial for continuing economic development of the indopacific region. Enhanced regional cooperation in the energy sector can bring numerous benefits by utilizing abandoned renewable resources in region. In addition the private sector is poised to play an increasing importance role in the development of renewable energy solutions in the region. Today you will hear how USAID through several programs has been actively involved in south asia since 2000 focusing on introducing clean energy improving energy access reliability sustainability and of course regional connectivity. USAID believes that collaborative efforts would lead to a more sustainable and secure energy future contributing to a reduction in carbon emissions and meeting climate change commitments. I hope that the session today would stimulate active engagement of stakeholders in the indopacific region and particularly in Bangladesh to confront global concerns on climate actions. Thank you and have a good day".

Vidita, "thank you dr. **Muhammad Khan**. Ladies and gentlemen energy is very closely linked to climate change as it serves as both a driver and a solution. It is now the time to delve into the presentation segment of our program. We are now going to watch a video that has been prepared

by NREL. The video is on offshore wind energy development and the presenter is mr Patrick Duffy offshore wind analyst at NREL. Bear with me while I play the video."

Patrick Duffy, "hi my name is Patrick Duffy and I'm a wind energy analyst at the national renewable energy laboratory in the us. I am going to deliver a brief overview of offshore wind energy technology and considerations for potential offshore wind development in Bangladesh. Thank you for inviting me to share I hope it's helpful. So why pursue offshore wind energy? Offshore wind plants enable electricity generation near major load centers. They also allow for the development of higher quality wind resources. This is sight specific but winds tend to be stronger and more consistent offshore. Large scale projects face fewer transportation and installation constraints compared with onshore wind development and a pipeline of offshore wind projects can motivate investment in port. And manufacturing facilities which provides another option for diversifying the clean energy mix in land constrained areas. Note that there are a different set of spatial planning considerations that apply to offshore wind than apply to other clean energy technologies. So how do wind turbines work? The motor converts the kinetic energy in the wind to torque or a rotational force which is used to spin the generator that produces electricity. Multiple turbines are connected to a substation which collects and transmits the electrical power to the land based grid through subs cables. Offshore wind farms are growing in size beyond 1,000 megawatt this is comparable to some coal natural glass or nuclear power plants. These maps show average modeled wind speeds offshore Bangladesh. The amount of electricity a wind turbine produces depends on the wind conditions where it's in installed. And these figures show that the average wind speeds offshore tend to be higher than the wind speeds over land. More analysis is needed to determine if offshore wind energy could complement other clean electricity sources like land based wind and solar. NREL is currently conducting a wind resource assessment in Bangladesh and it's

important to note that measurements can help validate predictions from computational models like the ones NREL is using. In addition to the average wind speed it's also important to consider extreme events like tropical storms in the design of the turbines. Offshore wind development in other parts of asia has led to the creation of typhoon class wind turbines. These turbines are strengthened to withstand more extreme wind conditions which may arise during a tropical storm. They also shut down if the wind gets dangerously high to reduce the chance of damage. Understanding how storms interact with offshore wind turbines is still an active area of research. But it may be important for potential development offshore Bangladesh. Offshore wind turbines are some of the largest machines humans build the figure on the left shows what a wind plant might look like in the year 2035 based on a survey of wind energy experts from around the world. The figure on the right compares the rate of power output of prototypes and commercial wind turbines. Both of these graphics show that turbines are growing physically larger as well as more powerful. That's been made possible by advancements in material science and turbine control algorithms. And these larger turbines have helped realize economies of scale and reduce projects costs. But continued turbine growth may threaten to make existing factories ports and vessels obsolete. Offshore wind turbines are connected to the seabed via substructures which sit below the water. We distinguish between fixed bottom substructures which are rigidly attached to the seabed and floating substructures which are connected to the seabed with marine lines and anchors. Most offshore wind projects installed to date use fix bottom substructure technology in water depths of around 60 m or less. But some recent projects are going deeper and remaining cost effective floating substructure technology is at at is at an earlier stage of development. But rapidly maturing and holds promise for unlocking high quality offshore wind resources in regions where fixed bottom technology is not feasible. This figure shows a number of different substructure

technologies both fixed and floating. Water depths is an important factor in offshore wind energy development. The image on the right maps water depths offshore Bangladesh and shows that those waters are suitable for both fixed and floating substructure technologies. The yellow line represents a 60 m water depth which is the current limit for cost effective development of using fixed bottom substructures. The red line represents a depth of 1300 m which is the current limit for floating technologies. Both of these limits are guidelines which could change as the technology evolves. Other factors also influence the choice of substructure technology. These include seabed geotechnical conditions port conditions and manufacturing constraints. A variety of specialized infrastructure and equipment is required to support offshore wind development. Ports are crucial for installing operating and maintaining and eventually decommissioning offshore wind turbines. They need to be able to store and move large components weigh hundreds of metric tons. The figures on the right provide examples of the kinds of port and vessel infrastructure that have been used to support offshore wind projects in other parts of the world. In addition to port and vessel infrastructure grid infrastructure is critical for delivering the power generated by offshore wind where it needs to go. Integrating renewable energy technologies like offshore wind can pose new challenges to the grid. Considering the onshore electrical infrastructure and substation capacity in areas like cox's bazar and Chittagong are important when accounting for potential upgrades to accommodate offshore wind generation. Here is the list of references used for this presentation. Thank you for listening, I hope this is helpful”

Vidita, “ladies and gentlemen welcoming on stage dr **Alam Mondol** deputy chief of party of USAID badge to showcase the keynote presentation on regional energy connectivity in mitigating climate change impacts in the indopacific with a regional view and a focus on Bangladesh.”

Dr **Alam Mondol**, “aslam walaikum and good morning everyone. This presentation is about energy, energy activity, energy transition and climate change is aligned with us government initiative clean asia is means enhancing development and growth through energy. So this presentation mainly I will brief the global regional with focus on Bangladesh on renewable energy targets and climate change that mitigate climate change impact in the indopacific. So see the global energy overall scenario, we know the energy is the main component for any socio economic development. Currently most of the energy demands are made by largely from fossil fuel, fossil fuel means natural gas, coal, oil. So you see about 60% more than 60% power generation still comes from fossil fuel and fossil fuel reserves is also limited if the current rate of consumption is continued the coal will stay up to 80-100 years gas up to 60 years and oil about 42 years. And it is important to note that in the next 20 years the expected installation capacity based on the projected demand would require the installed capacity that was installed inter 20 century. And also think about the GHG emissions, 0.2 degree celcius per degree decade is global warming is reported in many IPCC reports. So about more than 70% GHG emissions is related to energy activities. And over 41% over 40% co2 emission directly from power generation. So the figure top you see the world consumption it's excluded it is only included means the commercial energy excluded traditional biomass. So is mostly served by the oil and good thing is that the declining chain of the oil consumptions is about 49% to now about 42%. And the good thing is the renewable generation is increasing, renewable share is what about 1% by 20 20 it is now is about 7%. And the lower figure clearly shows for power generations who is source giving the more like coal is the the number one then natural gas and then the hydro. So coal is 39% generation comes from coal based power plant. So let see the regional context how we are doing the region so about 60% generation again is come from fossil fuel. So although Nepal Bhutan contributing significantly generation

from hydro power. But still we are having like 60% coal based generation. And Nepal is already 98% hydro power base generation and Bhutan is 100%. And Bhutan is already the world first carbon neutral country. And net zero targets we have like by 2030 Maldives and 2045- 2050-2070 is Nepal - Sri Lanka-India . Net zero means what we are emitting or adding to the atmosphere the same amount we need to remove from the atmosphere. That is the net zero target. And renewable energy target is if you see by 2030 the east countries target is given India is 500 gigawatts. So currently they have 173 gigawatts is including large hydro. Bangladesh is now is about 1 gigawatt is targeting 60 gigawatt from renewable by 2030. So the overall it would be almost 600 gigawatt by 2030 in this region the renewable base generation. Now go back to our like the Bangladesh energy scenario how it we are doing. So up to 2020 -22 total installation capacity is almost three 23 gigawatts and highest is almost we said clear 99.5% energy access we have and contributing mostly from fossil fuel. If you see the figure the bar chart installed capacity 51 from per from natural gas 28 or total 20-34% from liquid fuel and then 8% imported, 1% hydro and 1% renewable. So the generation it looks like almost 90% comes from fossil based power generations. Although we have a significant number of installation capacity but we maximum demand met is about 15 gigawatts. So look at the cost of generation and then distribution cost for power in Bangladesh. So average cost generation cost or supply cost we say almost 9 taka or 9 cent per unit and average bulk sell price, bulk sell price means BPDB is selling to the distribution utilities about 6.2 taka or 6 cents per unit. See there is a significant gap between supply generation cost and the bulk sell. So it is like 2.7 taka per unit is additional. These are the subsidy government needs to pay per unit we are paying subsidy 2.7 taka. So and then at the same time if you see the imported cost of the electricity is 6.12 taka per unit and fossil fuel especially power generation cost is around 20 taka per unit and renewable generation cost still is high in Bangladesh is about 12 to 15 taka

per unit. So it clearly shows there is a good sign the renewable is coming up I will tell a little bit later how is contributing for generating electricity in globally and also for Bangladesh is useful. So see the Bangladesh the renewable energy capacity target so PSMP power system master plan is revisiting is called 2016 is published in 2018, it's target is about 8 gigawatts or 8 ,000 megawatt by 2041 this is the target actual capacity right now is 1100 or 1200 megawatt is including large hydro is one we have 230 megawatt including solar home system. Basically large utility scale solar wind generation solar power generation is about 600 megawatt in Bangladesh. So also mujib climate prosperity plan shows the target is about 100% by 2050 and 40% by 2040. I will focus more on the drivers this renewable is important no doubt about it renewable can contribute significant to mitigate GHG emission no doubt about it. Renewable can contribute to improve the energy security not doubt about it. So what are the main drivers need to keep in mind? So energy security the natural grow gas is the main source of electric generation and it is consuming by other sector as well. And based on the reserves natural gas cannot serve for power generation in the long term. So this is can be driver we can take positively to promote renewable bas generation so and also need to minimize the import dependency. This is another driver need to be in mind and. This is need to focus on optimum use of indigenous resources so renewable is these indigenous resources we have to maximize use them to get their benefit. So NDC target nationally determined contributions, so this is another driving force to promote renewable energy technologies and government visions clearly prime ministers mention is to cop26 is like 40% renewable met generation by 2041. So another driver is potential of renewable energy really significant potential we have in Bangladesh over 150 gigawatt solar potential and r study shows over 30 gigawatt onshore wind potential. If you add offshore wind the potential is sign significantly higher. So let's go to the cost of renewables, cost of renewables is significantly decreased in last decades. Is

currently based on the many projects is the range between levelized cost of electricity from renewables varies from from 3 taka to 4 taka basically 3 cent to 4 cents for the solar pv and wind three cent to 5 cent. So really latest the latest lowest renewable met generation cost is 0.28 cent per unit. So the cost is competitive with conventional fuel there is no doubt about it. So independent power producers so are interested so there are many you know like 15 years back private generation was in Bangladesh less than 5%. Now private generation companies is contributing about 45% for generation. USAID badge project mainly focusing or targeting to have a transition on private sector generation from fossil based power generation to renewable power generation. So independent power producers are ready so need a level playing field to get them in and promote the renewable energy technologies. So there are many challenges there are no doubt, so there is many challenges for renewable energy development policy and government commitment so important is the government commitment. Lack of clear policy and regulations and limited incentives lack of commitment. So main lacking is like the misalignment between target and the implementation plan we have many targets we don't have basically mismatch with the target and the implementation plan. And weak institutional capacity still lack of capacity and also mindset so renewable cannot contribute so need to come up with overcome this challenges. And non-standard procurement this is important USAID badge project is working to ensure based value transparent procurement renewable energy procurement is still most of the procurement is having solicited procurements not unsolicited not solicited so that's the one of the main challenges. Limited land availability there is no debate about the land avail land constate but still unused land river bank government land plotting solar agro voltaic rooftop there are many ways we can generate more. So there are significant potential as I said in my last slide so still we can have we can generate more than 150 gigawatt. And limited data is not available like the private sector the data transparency available

data is limited. And also the main thing is the grid the we need a stable grid because renewable energy generation is variable so need a stable grid for renewable. So these are the challenges need to overcome to get our target. So now we'll focus on the regional connectivity the cross border electricity trade. Because if the mention it this is the cheapest of now we see like six taka per unit the imported cost. We are not talking about the only to import but we are talking about the import and export to have a market where we can buy and sell electricity from that market. So government targets by 2041 about 9 gigawatt or 9,000 megawatt to be imported so currently importing about 2600 megawatt so currently importing. They're using three roots basically one is Cumilla Tripura, another route is Bheramara Baharampur another route is Rahmanpur and Jharkhand. So three current routs using to import the electricity. So and Bangladesh main target is to having like the participation in day-ahead market, day-ahead market is a physical market is like a stock exchange stock market 24 hours before you can confirm your buy and sell. The what is the demand what you want to buy so have negotiation can come with a consensus and you will confirm your demand or supply one day before. So government is interested to participate in the day-ahead market. Import hydro power from Nepal this is ongoing by 2024 by next year we'll have 40 megawatt additional and by 2030 so 500 megawatt hydro power from Nepal . Also join investment Nepal India Bangladesh on discussion to invest in Nepal to import electricity from Nepal similar with the Bhutan. See requirements for Bangladesh to enhance the cross border electricity case, what are the primary requirement? And also better to mention here that Nepal and Bhutan already in the market on the day-ahead market but Bangladesh is not yet. So this is important to enroll first with the day-ahead market. What are the requirement? So we need clear cut favorable policy and regulations, regulatory frameworks for this participation of regional market. And transmission network this is important we need a synchronized grid. Like grid to be synchronized with India

and Bangladesh the same. If it is synchronized then easy to import or export or to trade electricity from this market. And sizable financial investment is required for the infrastructure and griding infrastructure. And establish cooperation and trust among regional countries, this is very important we need to build up trust each other and then regional also need commitments and then it is easier to have the development of the market. And also need promote regional projects that will help to build trust among the countries and capacity development initiative. That's basically we need the capacity development for institution and also human capacity for cross border electricity trade. So government vision so if see the vision of the governments so it is upcoming basically integrated energy and master power master plan will come like this way. So where we are now? Like 2021 is middle income countries developing country status. We are expecting by 2030 and total capacity would be 40 gigawatt and by 2041 is a developed country capacity would be 60 gigawatt and by 2050 we will start clean energy regime. So the electricity generation up to 40% clean energy by sorry it is from by 2041. So USAID, what USAID is doing? There are as dr Muhammad Khan already mentioned there are many initiatives that align with clean asia is, so Bangladesh advancing development and growth through energy badge one of the projects is running in Bangladesh facilitating cross border renewable energy efficiency energy procurement so all about the capacity development sort of things. And south asia regional energy partnerships is sarep based in India but working for this region Sri Lanka energy program, urja neal program, USAID Vietnam low emission energy program and also usa Vietnam urban energy security USAID southeast asia smart power program is all about in the indopacific region. So encouraging things what are the good things as I mentioned the private sector they are interested to participate promote the renewable energy technology also participate cross border electricity trade. So this but they're looking for the transparency predictability and clear rules of law to participate in the market an adequate

infrastructure should be ready to start this market. And private sector interested to develop regional projects actually there are many private sector now ready to invest in India or Nepal to import electricity from there. USAID also recent consultation show an increase of private sector participation in cross border electricity. USAID also developing different kind of tool like corporate power purchase agreement. So corporate power purchase agreements it will help private sector to sell the electricity directly to the consumer so this type of tool USAID badge project is developing in collaboration with sarep and also other USAID organizations. The corporate power purchase allowing direct renewable as I said renewable purchase by individual user national and cross border energy power agreements. So we are developing this type of ppa how it should be and that would help to get in the market and cross border electricity trade market. So USAID what is contributed specifically to the about electricity trade? So we already developed a road map that clearly shows next steps to enroll the regional market or day-ahead market. So short term action is given participation in the power exchange by following designation authority. The designation authority is the central energy regulator India need to be enrolled there to get it approved then we can be a member of the market. So there in the road map it is clearly given three stages, like what should do immediately? What would the second stage? What would be the third stage? The first stage is all about the participation of the deadhead market, so we need a to confirm a India n trader and then agreement with the settlement agency and finally with the designation designated authority and second stages so we need power exchange approval or clearance to become a become a member of px, px means power exchange through the trader and the third stage, the if I say in a simple word, it would be the execution and to have a power exchange cell in BPDB or in Bangladesh that will confirm the market the negotiation the agreement all things. So I will stop here I hope it's gives clear little bit idea about the renewable energy the development target and

cross border electricity trade the opportunities and what are the challenges and how the initiative to help promote basically to improve energy security and to mitigate ghg emissions. So the that's the issue we try to explain here, thank you."

Vidita, "thank you dr alam. Ladies and gentlemen it is a privilege to welcome our honorable chief guest mr **Mahabubur Rahman** chairman of Bangladesh power development board to share a few words with us."

Mahbubur rahman, "distinguished guests, ladies and gentlemen assalamu alaykum and a very good morning. I am delighted to stand before you today at this significant gathering to discuss the crucial topic regional energy connectivity in mitigating climate change impacts in the indopacific. I want to express my heartfelt gratitude to us aid and badge for their dedication to addressing one of the most pressing issues at this time. The world is now moving forward to renewable energy solution for green energy transition and to get rid of dependency on fossil fuels. The increasing contribution of renewable energy-based power generation particularly from wind and solar is a significant step towards achieving a more sustainable future. It's also encouraging to see the inclusion of hydrogen-based power generation which can play a vital role in decarbonizing various sectors, such as transportation and industrial processes. Iei study net zero scenarios shows that contribution of renewable energy-based power generation will be 69% by 2030 and 81% by 2050 and mostly from wind and solar. Hydrogen based power generation share will be 1% by 2030 and 6% by 2050, so region regional connectivity is also of the utmost importance for the efficient and effective extraction and utilization of renewable energy. Currently Bangladesh has 460 megawatts of installed solar capacity on grid and an additional 450 megawatt is produced from off grid solar systems making up around 2% of the country's overall grid energy mix. Government of Bangladesh has the target up to 40% from clean energy by 2041. Solar power plants will play a pivotal role in

achieving these targets along with wind and biomass potential. We have very small potential for biomass mainly solar and wind. And it will pave the way for sustainable energy system in future of Bangladesh. Bangladesh is swiftly advancing towards its clean energy aspirations harnessing a collaborative sprit with neighboring countries to meet its targets. At present we are importing 2,656 megawatts of power from India. That has already been incorporated in our in our grid system through bilateral cooperation. However the horizon extends beyond with plans underway to facilitate the import of 40 megawatt power from Nepal. This will be the first in its kind of involving three countries in the sub region. And we are very much delighted to work with this promising venture that is pose materialize with the imminent signing of a power supply agreement. We are looking ahead to sign 500 megawatts of power from gmr upper carnally hydro power project in Nepal. This will also be the second milestone in involving three countries as a sub-regional power cooperation. These initiatives represent a substantial stride towards augmenting the clean energy share in this region. According to our draft integrated energy power master plan a total of 15,000 megawatt will be imported from neighboring countries through cross border electricity trade by 2050. And that will account for about 15% of the total generation capacity. In the bay of Bengal region a vision of greater connectivity and energy resilience is unfolding which consequently needs the development of a regional power market. Several frameworks have been proposed under BIMSTEC-BBIM-SASEC-SAARC for regional cooperation. And energy exchange BPDB already we are in a process of participating day ahead market of India n power exchange. Very soon moreover plans are underway to import power from India on an round the clock basis that ensures both renewable energy shares at low cost as well as our grid system stability and reliability. The energy outlook for the indopacific region in 2050 is dependent mainly on the choice of energy technologies. The technologies that gain dominance will not only reshape regional energy demand

but also influence mineral and fuel requirements. The energy system of 2050 is likely to be a hybrid combining traditional and green technologies with a larger role of renewables. So today's this session I hope already several technical and technological sessions already presented so I wish a successful of this session. Thanks to you all and thanks to the organizer for inviting me thanks to all."

Vidita, "thank you mr **Mahabubur Rahman** for your insightful thoughts. Distinguished guests we are now moving into an engaging and insightful panel discussion on the topic cross border energy trading to mitigate climate change in the indopacific region. Our esteemed panel will be moderated by mr **Mollah Amzad Hossain** the editor of energy and power magazine. Can we please have him on stage our moderator. Joining us as panelists mr **Nirodh Mondol** joint secretary of power division, dr **Azaz Hussein** professor of the chemical engineering department at Bangladesh university of engineering and technology, mr **Shyan Shafi** energy team leader at USAID Bangladesh, miss **Chiara Vidusi** program manager of energy investment grants and blended finance from the delegation of the european union to Bangladesh, and miss **Nazmun Nahar** senior project officer energy at the asian development bank. We also have mr **Abdul Khader al Ral** chief of party USAID badge in the panel. Over to you mr **Mamamad Hussein** for moderating the panel discussion session."

Mollah Amzad Hossain, "good morning ladies and gentlemen, distinguished guest inviting you all to the regional energy connectivity in mitigating climate change impact in the pacific region. Actually we have designated speaker today and we have time limitations so you all know the actual situation of Bangladesh energy sector and renewable energy contribution as well as the Bangladesh planning for mitigating the climate change things and meeting the ndc target reducing carbon emission. And all we know that our prime minister is very key into low carbon development in

this line Bangladesh take lot of initiatives to enhancing non-carbonized power generation one of step is the Ruppur nuclear power plant is almost in the final stage. As well as Bangladesh formulating policy to generate gd connected solar and one study funded by adb is on the final stage to generate power from wind in deep offshore. And also our chairman already informed Bangladesh now work with the regional country to import 24*7 renewable energy through cross border trade. And I hope we get some insight first I like to invite mr **Abdul Khader al Ral** to give us some thoughts on this regards how based can help Bangladesh to enhance the regional cooperation on renewable energy and specially renewable energy as well as our regulatory framework to do the things with the regional countries. Mr **Abdul Khader al Ral**."

Abdul Khader al Ral, "thank you mr hussein, okay. So you know I think what like to do is maybe talk about the role the critical role of the private sector in the development of the of renewable energy regional with a regional aspect. As you know the private sector role is critical in two ways on the demand side and on the supply side and you know now I want to acknowledge the presence of the private sector in this room here with us today I see a lot of our colleague from the private sector interested in this subject. So you know if I may start on the demand side as we all know there's a lot of pressure on the private sector to engage in net zero solutions for their product and services. You read today all the time about companies like you know large companies like google and nike and h&m who probably is here today on their goals of procuring renewable energy for their services. And a lot of these large international companies have set zero goals and are driving the development and driving development of renewable energy not only in the indopacific region specifically in the indopacific region but also all over the world. So that is a role for the private sector on the demand side. On the supply side obviously the private sector wants to supply the renewable energy to both you know the corporate customers and also to the you know local grid.

USAID through the badge program is really instrumental in at least in Bangladesh and the region in supporting the role of private sector. Through the development, for example of corporate power purchase agreement, which are agreements that allow the private sector customers to buy directly from private sector generators of clean energy. So not only that but also through the development of cross border ppa for renewable energy. You know we USAID the badge program is providing best practice example how these initiatives are done in many other countries. So you know so I again .I will emphasize the importance of the role of the private sector in renewable energy development both on the demand side and on the supply side of the equation. Thank you."

Mollah Amzad Hossain, "could you please highlight some things the mr alum mentioned his presentation on the power purchase agreement specially on renewable energy for corporate?"

Abdul Khader al Ral, "yes for sure so through the badge USAID funded badge program we are focusing on the development of two instrument that help with renewable energy. The first one is the corporate power purchase agreement again which include in it some clauses important clauses that allow the private sector to claim you know the carbon credit needed for their contribution to clean energy for their customer base and also through the corporate through power purchase agreement cross border between government also that take into advantage renewable energy. Importing renewable energy is a little different than just importing any energy. And you know I would just give you one example you know if an energy is produced in a neighbor country as important to another country you know a lot of the questions would be who take credit for the renewable energy is it the producing country? Is it the consumer? There are a lot of models and a lot of business best practice models that we are introducing also as template and examples to satisfy this equation. While at the same time remain compliant with the paris agreement in that there will

be no double counting of renewable energy were you know produced or consumed. So those are the two areas we're looking at. Thank you mr hussein."

Mollah Amzad Hossain, "thank you so much for your kind words. And now I like to request mr **Shayan Shafi** team leader energy team of USAID. We all know the USAID actually key player in this region to initiate the energy cooperation things from middle of the '90s and many programs going on and still they are supporting Bangladesh as well as the regional country to make the things reality and energy cooperation. It will be very nice if you can put some insights regarding USAID activities in development enhancement of the regional electricity trade with the project almost every country in the indopacific region. What are the same of the lesson learned that the applicable in enhance the regional electricity trade?."

Shayan Shafi, "thank you very much, so yes it is true that USAID has been working in the regional energy space for a long time. To be precise we started doing it in the early 2000. And we started doing it through a program for this region we started doing this for with a program that is called the south asia regional integration the sari program, that many of us of you are also aware. The south asia regional energy integration program was introduced in 2000 and then it had four phases. Each of the phases were for five years so in 2020 the sari program ended. But at the same time now we are operating from 2021.There is a new program called the south asia regional energy partnership the sarep program that that is still going on and the sarep program and the badge program that mr **Abdul Khader al Ral** here is the chief of party for that program the badge program is a bil USAID bilateral program in Bangladesh and the sarep program is our the regional energy program in India. So both of these programs have a common goal which is to work on regional energy cooperation. So we have been doing that and we have seen a lot of changes in terms of the capacity building of the stakeholders. The reason why I am sitting in a panel talking

about regional energy cooperation twice in the last two months is an indicator as to how the thematic area has evolved over the last couple of decades. When we started talking about regional energy cooperation in 2000 we didn't have many people to listen to us and similarly we have seen how positively the mindsets and the learning of these countries the representatives of these countries have also changed. So in the last 10 years if you look at the last 10 years versus the 23 years horizon you would see a significant change in terms of people getting more learned about the sector, people trying to ask the right questions giving you give everyone the challenging but the real questions in terms of what needs to be done for the countries to collaborate and to actually trade power. So a lot of positive change has already happened and Bangladesh is no exception. As the respected chairman of Bangladesh power development board mentioned the government of Bangladesh is also thinking about participating in the India n power exchange the day ahead market and also thinking long term in terms of renewable in terms of trading of power between countries. And when I say trade of power it is not only taking power from outside we are also planning to export power through the electricity grid. So this is this is a learning I think that has evolved over the several years and this is also something that is not only technical I think many of us are here who are already aware about the subject matter to be not to be only a technical issue but also it's actually a geopolitical issue where there are many other concerns which are embedded to this concept. But in reality I think that the sector has shifted in a very positive fashion. And we now also have many foreign friends our donor in the donor community who are also very much interested to do the same to to push the agenda of cross border electricity trade in for Bangladesh and in the region and USAID being having worked in this sector not only in the south asia region but also the central asia region southeast asia region central america region and also the africa region. And we have we are trying our best to have more peer exchange programs capacity building

exercise for our government and our private sector stakeholders so that people can go and learn and see how these actually are implemented. We conducted studies tours to south africa the southern africa power pool in zimbabwe. We visited the coordination center there were people from 4.The government of Bangladesh who also participated we also brought a team from the government of Bangladesh to India several times so we are trying our best to make this a very known segment because we have seen that it is not only us governments interest to advance energy clean energy through regional energy cooperation in Bangladesh, it is also the countries and the regions priority as well, thank you so much."

Mollah Amzad Hossain, "I think you already know the Bangladesh government especially through power development board they already has taken step to go for the real power trading between Bangladesh, India , Nepal and Bhutan. And already they started discussion with the Nepal to sell additional power in the winter season this time and Bangladesh power demand is a little low over there. Now I request former de of buet professor ezaz hussein. Professor ezaz energy expert as well as climate change expert and he do a lot of work for ipcc as well as the preparing for our ndc. I like to request you to give us some insight regarding how the cross border renewable energy clean energy project be structured to ensure the qualifiable access benefit sharing cooperation among indopacific country especially on the especially SAARC and BBI?"

Azaz Hussein, "thank you very much molla amjad, I'm actually delighted to be here to speak in front of all of you on this very important topic. I've been working in energy kind of all my career and my actual normal career has ended but I'm still continuing to work in this especially the new idea of this net zero and decarbonization that is my thing. One before I begin I like to mention that I don't know how Bangladesh we fell so far behind in renewable energy. Like the chairman said 500 megawatt great tide solar out of nearly 25,000 megawatt of power plants that's just 2% just

2%. So I mean we actually I mean despite all the efforts that you said that USAID and all every been helping each Bangladesh from 2000. We really haven't done very much I don't know what happened, why I mean when you look at India is one of the hugely success stories in terms of setting up renewable energy in terms of solar power plants. And just next door and we talking about so much cooperation but we didn't learn from them. This is the most amazing thing to me that India is now a showcase in terms of solar energy. They have so much solar energy now that they can't use it they actually can't use it because you know using solar energy apart from the morning hours that four and a half hours or 5 hours or 6 hours is very expensive because you have to put in a battery and use it so they have so much energy so they've gone into the hydrogen program which is another form of storage. So I might get into it if there is time but you know there is also a lot of good solar renewable energy right in Nepal and Bhutan. Okay, now why didn't we get this earlier on in Bangladesh? Well there are several factors here- one is that earlier electricity was so cheap in Bangladesh because we had lot of natural gas cheap natural gas that whenever we went to negotiate when to for bringing electricity from Nepal and Bhutan, I mean we found that you know we can generate electricity in Bangladesh much cheaper. So why so every time we fail but by the time by the time we were ready right now is very expensive electricity in Bangladesh extremely expensive because we have to import these fuels now. It's cheaper but now we are facing other problems only recently that we are noticing that India has opened up. I've been working in this field and I've been I've gone to India several times I've talked to the to the government technically everything is possible but is the three three-way interactions between India actually blocked India actually blocked the electricity coming to Bangladesh. It is only recently the 40 megawatt that is tripod right. Because you know that the chicken neck and all those kinds of problems so that's why we could not the main problem is technical. The other problem is that- who

will build this very expensive and hydroelectricity power plant in Bhutan and Nepal? They don't have the money. And India has never allowed Bangladesh to go directly and invest there. So it was it always have to be third party so it was always that India had to build the power plant and they agreed to give us some. So we have to overcome this kind of problem and India has what I'm saying is that India has opened up recently and it's the thing. The other problem in India is that hydroelectricity is actually much as a form of renewable energy in India is much more expensive now than solar. So they have a problem actually India itself has a lot of renewable energy potential hydro potential in their own sort of northeast. But they are not developing those they are not developing those because it's when you talk about renewable energy it's for them is solar. So right now for Bangladesh is that bringing electricity from Nepal and Bhutan is always extremely beneficial. So you know they have to work out a way of getting this electricity and I like the idea that in the winter time when the water level is very low for the hydro power we can export our well unfortunately if you export something it will be fossil electricity but at least it there will be trade possibility over there in this regard. So you know we always talk about technology but unfortunately is the political economy which we ignore and is the political economy that prevents these kind of transfers and cooperation. But I very hopeful that since solar electricity is very cheap when hydrogen production becomes very affordable that we will be able to bring hydrogen from India to power our sort of thing. I happened to be a believer in hydrogen and ammonia rather than battery. I really believe battery is very resource hungry and actually the battery disposal and other things are very difficult so I don't know which technology will win in the long run but we will have to be aware of all the technologies and choose the right one. Thank you very much."

Mollah Amzad Hossain, "thank you professor **Azaz Hussein**. Now I am happy to invite miss **Chiara Vidushi** program manager energy investment grant european delegation to Bangladesh.

Miss **Chiara**. One question to you we all know the european electricity grid is the model of regional electricity trade and uninterrupted transmission. Is the eu model applicable to indopacific region for the same purpose?"

Chiara Vidushi, "thank you for your question and thanks a lot for having me here especially to USAID badge project. Although the journey is still ongoing indeed the eu has made the significant progress in terms of the creation of an integrated and liberalized power market. Currently europe has an internal common electricity market comprising 35 countries. So this goes beyond the eu member states only where there are different types of mechanisms through which electricity can be traded maybe long-term contracts of 20 years or day ahead market intraday market. Also and I think this is particularly of interest for and relevance for other regions in the world including south asia. The europe has gained a lot of experience when it comes to ensuring trust in negotiations for cross border connectivity projects of or electricity trade between bigger and smaller countries richer and poorer technologically more advanced and less advanced countries. As well as the establishment of some well working methodologies for calculation of cost and benefits for both sides. And also there are some institutional setups and structures like for example sr which is the EU agency for the cooperation of energy regulators which is the european association for the cooperation of transmission system operators for electricity and others now. Going back to your question very quickly on whether a similar system could be replicated to other regions in the world like the indopacific? My answer would be, yes of course, but the point is when and at which conditions this can happen because of course there are certain prerequisites that would allow a region to be able to scale up electricity trade and down the line also ultimately the creation of a of a power market. And I think these points these prerequisites have been already mentioned by some of the previous co-panelists and also the very good presentation we had we released early this

morning. But in my opinion they could be basically summarized into five points first a strong political will, which ensures the commitment from the high political high level political level that's fundamental. Secondly, of course they all say that electricity knows no border but we know in fact that there are borders between sovereign countries intra regional of course and therefore what is needed is a dedicated and harmonized framework for legal policy regulatory and technical point of view so that's of course fundamental. Thirdly, the capacity which is not only the generation capacity but especially the transmission capacity. Fourth point, would be of course in order to be able to trade the right mechanism for commercial transactions intra regionally. And fifth, something that was also mentioned earlier the investments and here the key players should be both private sector and financial institutions in order to ensure that the infrastructure is is being set up. If I'm allowed one very short last point I just want to say that we do not start from a blank page on the contrary and here I'd like to praise USAID batch project and sarep and also all the other partners that already initiated like very ambitious and relevant processes here including adb, world bank. So it will be fundamental to build up on what has been already created so far the eu is also going to initiate a technical assistance project at regional level for energy connectivity so looking forward to cooperate thank you."

Mollah Amzad Hossain, "thank you **Chiara** for your input especially you mentioned five points for the political commitment and legal and regulatory framework integration, is very important. But now the days the region mentally ready to exchange for and 15 years back it's a big challenge for Bangladesh but now it's reality we are importing power from India almost 2.6 gigawatt right now. I move to our last speaker miss **Nazmun Nahar** a senior project officer energy asian development bank. I like to request you- how adb help Bangladesh to identify the renewable energy

resource especially the wind? Could you please kindly explain the latest step on the wind development and adb support to Bangladesh?"

Nazmun Nahar, "thank you **Mollah Amzad Hossain** and thanks to USAID badge for having me here today. So the renewable energy and wind resource assessment adb has its a loan financing to power division is currently conducting a pre and detailed feasibility study for offshore wind resource assessment in around 26 blocks along 200 nautical miles into the bay of bengal. And through the study the first report first stage of the report is now available. It identifies that there are 17 nearshore and 14 offshore locations where wind specific studies can be taken for offshore and nearshore wind turbine and project development. And compared to the last assessment in land based wind u map and detailed feasibility studies that was conducted under the same ti loan in 2020, we found that there the wind resource the wind speed was relatively lower less than 3 meter per second but in the offshore and nearshore area especially in the Matarbari and Moheshkhali region the wind resources says at least shows that it is more than 6.5 to7 m/s. That's promising speed at least at 20 m height and we have seen from the morning presentation made by NREL there are different type of floating and vaulted types of platforms. So based on this in the recommendation preliminary recommendation shows that 300 megawatt up to 13.6 gigawatt of different capacities wind turbines are possible in the area of bay of bengal. And for that some immediate steps are also suggested like the strengthening of the substation and power evacuation infrastructure especially in the Mirsharai, Moheshkhali as well as in the Sundarban regions so those are some low hanging opportunities that the development partners and our the dp communities that can immediately undertake. Because we have not seen into this earlier our efforts were limited to onshore and land based solar and wind resource development. And this is the time in the iepm there is a target of 5 gigawatt nearshore and 15 gigawatt offshore renewable offshore

wind development by 2041. So based on the ipmp we can start working on the transmission and power evacuation development immediately."

Mollah Amzad Hossain, "I have just one supplementary question and we know adb is supporting Bangladesh to develop their interconnection and do you have any future project to support Bangladesh or in this regional country to trading 24*7 renewable energy?"

Nazmun Nahar, "thank you that's a very important question and I'm happy to answer it yes the first and second interconnection projects in Bheramara the 51,000 megawatt back in 2010 and 2012 was financed by ADB. That was a very different time and at that time under this druto vidut ain the speedy electricity act that enabled many flexibility. And if I recall it correctly the rate of ppa was 5.5 taka per kilowatt hour rate. So the situation has changed a lot and those right now the IPMP has a target of 9,000 megawatt power import by 2041. So adb and other development partners all have revised their energy policies for full alignment with Paris agreement. ADB's energy policy was revised 2021. So our pipeline and the country partnership strategy says that we are fully committed towards regional gd development. However the political intent as the other panelists rightly identified the need has to become has to come from the ground so Nepal is ready Bhutan is ready Bangladesh is also more than ready now. It is onto the political will and how the request comes."

Mollah Amzad Hossain, "thank you so much. Actually we're running shortage of time already we finished our allocate time. But it's nice discussion but discussion on the energy connectivity especially the regional energy connectivity is the a huge landscape. Actually we achieve lots but lot of thing to do in future, especially in energy transition Bangladesh try to focus reduce their carbon emission for power generation around 7% . But on resource Bangladesh will be not able to fulfill their commitment to reduce carbon emission by own and other help 21% by 2030. So we

need to do something greater cooperation on this energy transition. Especially the energy cooperation on renewable fields that can help Bangladesh to enhance their non-carbonized electricity generation. And you know Bangladesh had a target to go develop enhance as development countries by 2041 so we need lot of energy with, we need electricity, we need primary energy. And right now Bangladesh importing almost 60% of its energy and due to volatile market Bangladesh now passing very bad time on the big pressure on the foreign currency and meeting the import bill. So hope in near future Bangladesh can replace primary energy especially coal-fuel-gas other to the cross border renewable energy thank you all. And thank you cgs and USAID to inviting me here. Thank you guest."

Shayan Shafi, "thank you very much vidita. Once again asalam alaykum. I'll be very quick first of all I'd like to thank our chief guest honorable chairman of Bangladesh power development board mr **Mahabur Rahman** sir, thank you very much for coming here and gracing this occasion. My thanks to my co- panelist and the moderator who are here at the at the panel discussion. Thanks again for very enlightening discussions. And I always feel that discussion is never ending which is which is good and a bad in many ways. But thanks for the great discussion. I would also like to thank Patrick Duffy from NREL who has presented who has prepared a 10-minute presentation for Bangladesh to discuss about offshore wind energy possibilities. We have partnership with us NREL national renewable energy lab and that's why we were able to get patrick to present virtually today. And also my thanks to the cgs colleagues for organizing this very grand gathering of stakeholders in this topic thank you very much. My thanks to the badge team for putting their efforts together and pulling up this wonderful session today. And finally lastly and not the not least the august gathering the distinguished guests here who has taken time in this morning to be here with us and listen to us and hear our thoughts. With the time limitation we were not able to provide

the q&a session but I think we'll be here. Can we take one or two questions the organizers are not maybe we can take it offline if it is with me I'll be very happy but again thanks for your presence and we would invite you to the lunch segment thank you very much."