Commodity Derivatives and Risk Management
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Week-11
Lecture 55
Carbon credits (CDM, JI, RGGI, REC, ESCerts)

Welcome to the 55th lecture on Commodity Derivatives and Risk Management. And today we are going to continue with our discussion related to various aspects of carbon credits. And please recall that in the previous session we discussed UNFCCC's Cap and Trade Program. We also discussed how the European Union Energy Trading System undertakes a book building uniform price option to allocate carbon credits to different industrial units. So, in addition to this Cap-and-Trade Program, UNFCCC also mandates countries to undertake CDM as well as joint implementation initiatives. And in this context, we will also understand an initiative which was done in the USA which is known as RGGI. And in the context of India, we will also understand REC that is Renewable Energy Certification Scheme as well as Energy Saving Certificates. So, these are the five different concepts or topics related to carbon trading we are going to cover in today's session. Please recall that in addition to the carbon credit part of the Cap-and-Trade Program countries can enter into initiatives which are known as Clean Development Mechanism. Please note that countries 38 industrialized nations which were part of the Kyoto Protocol agreed to limit greenhouse gas emission by a certain percentage. Please recall we had calculated, or we had explained the concept related to the maximum amount of greenhouse gas emission to be done for Australia by taking some numerical examples. So, in addition to the Cap-and-Trade Program countries belonging to the Annex I can undertake certain initiatives which are known as your Clean Development Mechanism. So, as part of the Clean Development Mechanism, an Annex I country which are which are basically those 38 industrialized nations or countries. So, those countries who have an emission reduction commitment can implement an emission reduction project in a developing country. So, basically the money will come from a company belonging to an Annex I country and that same company can initiate a project for reducing emission reduction and that project could be undertaken in a developing country. And when a company belonging to Annex I country undertakes a emission reduction project in a developing country, they will earn CERs. So, that basically Certified Emission Reduction Units. Again, I would like to highlight that these are the same carbon credits, but these are named differently. So, one CER is equivalent to one ton of carbon dioxide equivalent. So, how exactly these CERs are generated? Let us understand this process. So, basically as you can see in the right panel the first CER which was issued under Kyoto Protocol was done on 20th October 2005. As you can see

the Executive Board of the Clean Development Mechanism issued the first ever Certified Emission Reduction Units under the Kyoto Protocol. So, the CERs are issued to two hydroelectric projects at Honduras and this, but these two projects were undertaken by Italy as well as Finland. So, basically money for developing the hydroelectric electricity project at Honduras came from Italy and Finland companies. And both Italy and Finland companies are Annex I countries and both projects generate about 37,000 and 17,800 CERs annually for the host countries or for the sponsoring countries basically Italy and Finland. And both projects were validated by a company called DNV Certification of London. Please note that whenever a company belonging to Annex I country creates a project basically spends money and creates a project for reducing greenhouse gas in a developing country. The Clean Development Mechanism Board of the United Nation FCCC says that particular Clean Development Mechanism Board goes ahead and really checks whether the initiatives are leading to reduction in greenhouse gases or not. And that audit process validation process has been interested with the third-party vendor which is the DNV certification of the London. So, this particular company will go and do the validation and check and really if the initiatives are leading to reduction in greenhouse gas emission in that case, then the CERs will be issued to the Annex I country companies, companies belonging to the Annex I countries in this sense this will be Italy and Finland. In this context, please note I have highlighted some of the new most recent CDM initiatives as you can see the 30th of June 2023 very recently only the CDM board has issued CERs that is about 265,579 CERs as issued to a company belonging to the Germany and this particular project has been undertaken in Pakistan. Similarly, you have a biogas and biomass-based co-generation project at CBDL this particular in particular project has been undertaken at India and the money the funding has come from a company in Switzerland and the certification date of issuance of CERs is 2nd June 2023 and total amount of CERs which have been generated is 71,430. So, this clean development mechanism efforts are also leading to significant reduction in greenhouse gas emission. So, the money will be invested by Annex I companies and the certified emission reduction units will be given to the member companies belonging to the other belonging to the Annex I countries and in this context, I would also like to highlight that whatever the electricity or whatever the benefit they are generating that benefit remains with the host country. Let us say in this particular project in the hydro power project whatever the electricity is being generated the benefit of selling that electricity will go to the company, which is belonging to Pakistan, but the associated CERs will be given to the Germany. Please note that the total benefit of creating the project will not only come to the Germany it will also come to the other host country. So, CERs also can be used to offset the GHG emission by a company belonging to the Annex I country. For example, if enough cap-and-trade related activities cannot be undertaken to reduce the reduce the amount of GHG as committed by a particular country. The countries companies can go ahead and do a clean development initiative in other countries and generate CERs and

those CERs can be utilized to offset the emission reduction unit set by the countries as part of the Kyoto Protocol. This particular again image which I have taken for CDM verification process as you can see which day the verification has been done, what is the format related to the verification, this particular verification or certification relates to the biogas and biomass-based co-generation project at CDBL which is an Indian project. As you can see the project participant is Chandigarh distilleries and butlers. So, this is one of the project participants and the foreign company which has been associated with this particular CDM project is your Bunge emission fund limited. So, money has come from Bunge emission fund limited and the CERs will go back to the Bunge company and whatever the benefit for generating electricity from biogas and biomass that electricity will be utilized by the Chandigarh distilleries and butlers limited. And also, this particular certification mentions how many amounts of what amount of carbon saving have happened. So, all this detail is available. In fact, if you are more interested to understand how CDM mechanism has benefited different country different countries different developing countries you will be able to get the complete list of all CDM projects at the UNFCCC website. Now, in addition to the Cap-and-Trade Program and CDM Kyoto Protocol also talks about joint implementation and removal units. So, what exactly is a joint implementation? In fact, joint implementation is the same as your clean development mechanism, only the location of the project differs. In case of a joint implementation annex one country with an emission reduction commitment in a Kyoto Protocol can implement an emission reduction project in another annex one country. So, in this case in the previous case of CDM annex one country was undertaking a project in a non-annex one country or a developing country in this case annex one country will be able to reduce the emission reduction or meet the emission reduction commitment by creating a project in another annex one country. So, both parties can earn the emission reduction units, and these are known as ERUs. Again, I would like to draw your attention that this is again a name given to the carbon credit and, but a separate name this is known as your emission reduction units. Similarly, like your clean development executive board under UNFCCC the there is a joint implementation supervisory committee under UNFCCC which verifies the projects and grants the ERU's. In addition to the ERUs there is also another type of carbon credit which a country can generate basically that those are known as your removal units. So, what exactly is a removal unit? A removal unit is earned when an annex one party initiatives leads to reduction or absorption of 1 kiloton of carbon dioxide equivalent due to improved land use or land use change and forestry such as reforestation in existing barren land aims at creating a carbon sink. Basically, this as the name suggests if a particular company from annex one country goes ahead and undertakes in a reforestation or afforestation drive which leads to the reduction of 1 kiloton of carbon dioxide equivalent from the earth atmosphere those will be known as our removal units. In this context you may hear or read the word LULUCF. So, that stands for land use or land use change and forestry. So, any initiative which improves the

land use or land use change and forestry and that leads to reduction in or absorption of 1 kiloton of carbon dioxide that company will be given one removal unit. And please note that when a particular company creates a reforestation drive or afforestation drive it creates a carbon sink. A carbon sink is something which absorbs more carbon from the atmosphere than it releases. So, basically forestry initiatives will create a carbon sink and every kiloton of carbon dioxide equivalent the forest is absorbing will lead to one RMU being given to a particular company. So, this particular slide or this table I have directly in verbatim I have taken from a particular article which is prepared by Interpol's environmental crime program guide to carbon trading crime. So, this wavelength which is mentioned here let me click the wavelength I hope it opens quickly yes. As you can see this Interpol environmental crime program guide to carbon trading crime this particular is a very interesting article which explains the concept of carbon market in a very lucid and very simple manner. So, please if you want to understand more about the carbon credit market and how exactly carbon trading happens and how exactly the carbon trading crime happens that you will be able to understand in detail by going through this particular article. As I mentioned this particular image, I have taken from this report guide to carbon trading crime. So, this shows very clearly the different types of carbon units or carbon credit which annex one country can generate. Please note that the first type of carbon credit which we have discussed is comes which are known as a signed amount unit that comes from your cap-and-trade program. The second one is known as your emission reduction units that comes from your joint implementation program where a annex one country for an emission reduction initiates a projects in another annex one country. Clean development mechanism gives rise to certified emission reduction units CERs which are owned by annex one countries for implementing emission reduction projects in developing countries and LULUCF initiatives gives rise to removal units. So, these are different types of carbon units that is AAUs, ERUs, CERs and RMUs are nothing, but the carbon credits, but these are named differently depending upon how this particular carbon credits have been issued. In this context I would like to draw your attention that in a in the year 2010 and 2011 there has been a massive theft of carbon credits, and it is relatively easy for people to steal carbon credits because carbon credits do not have any tangibility. It will always be an intangible or digital asset or a commodity and hence prone to cyber theft. In the year 2010 there was a hacking attack on the cement maker Holcim which led to 1.6 million carbon credits worth 23.5 million euro were stolen. Similarly in the year 2011 the hackers stole about 2 million carbon credit from the registries of Austria, Czech Republic, Estonia, Greece and Poland and this hacking happened at the European Union energy trading system. It was a major blow to the initiatives undertaken by the European Union energy trading system. In fact, after that hacking event Interpol got involved in identifying who were the thefts what happened to the carbon credits where those carbon credits were traded. So, Interpol got into this whole process and that is how Interpol published a nice report related to how the carbon credit

market works and how the stealing of carbon credit happens. In this context Interpol's July 2013 report very clearly mentions the intangibility aspect of carbon credit. So, it mentions unlike traditional commodity which is at times which is at some time during the course of their market exchange must be physically delivered to someone carbon credits do not represent a physical commodity, but instead have been described as a legal fiction that is poorly understood by many sellers, buyers and traders. Basically, this particular quote unquote goes on to prove that carbon credits will always be an intangible asset. Hence safe keeping of this intangible asset remains the core of the carbon trading market. Now, let us come to the initiative which is done in the USA which is known as RGGI. Please note that the USA was never a signatory to a Kyoto Protocol because their senate did not approve the Kyoto Protocol. In this context we will understand more about this RGGI initiative by USA. As I mentioned, a lot of different types of initiatives are done at different labels to reduce the greenhouse gas emission. However, because of the paucity of time we will not be going into each of these details. We have already discussed a little bit on EU-ETS that is also RGGI of USA there is Western Climate Initiative of USA. There is energy trading system of China, UK ETS in India we have two initiatives which is you perform achievement trade. We will discuss in detail what is the initiatives by India government and countries such as Australia, New Zealand, Vietnam, Japan, Korea, Taiwan, Mexico have done considerable amount of initiatives efforts to reduce greenhouse gas emission. And each country's mechanism or each country's approach to reduce the greenhouse gas emission varies from country to country. So, we will be only discussing going forward the RGGI initiative of the USA and all that has been done in India in terms of reducing the greenhouse gas emission before we proceed to understand the few just or derivative trading related to carbon credits. Now let us come to the RGGI initiative of USA this RGGI stands for Regional Greenhouse Gas Initiative of the USA. And more detail about this particular initiative is available at this web link and it is a very nicely elaborated document you can read more about the RGGI initiatives. But today I will be explaining the essence or the core concept of this particular initiative. Please note that RGGI is a cooperative effort of 12 states of the USA and the list of 12 states is mentioned here. And this cooperative of 12 states basically aims towards capping and reducing the power sector carbon dioxide emission. Please recall we had discussed that thermal power and natural gas power generation units are the major contributors of greenhouse gases. However, we cannot wish away these power generation units because as we discussed solar power or wind power, or other renewable sources power generation have a limited capability limited capacity as of now. So, we cannot wish away this non-renewable source of power generation. However, a lot of initiative can be done to cap and reduce the power sector carbon dioxide emission. So, that initiative basically has been done by this RGGI. So, what exactly RGGI? So, RGGI is a market-based carbon trading system of in the USA within the RGGI states those 12 states all these 12 states have agreed that all fossil fuel fired electricity power generation units having a capacity of

more than 25 megawatts or higher are required to hold one RGGI CO2 allowance based on the amount of carbon dioxide they will be emitting. Please note that whenever coal fired electricity is generated or natural gas fired electricity is generated a significant amount of carbon dioxide is emitted into the earth's atmosphere. So, if a particular power generation company is emitting x ton of carbon dioxide, they are going to they are mandated to hold some amount of CO2 allowance. So, what basically RGGI mentions that any electricity power generator with a capacity of more than 25 megawatts or greater is required to hold one RGGI CO2 allowance for every short ton of carbon dioxide these units emit. So, one short ton is equivalent to our 907.18 kilogram one ton is about 1000 kilogram and when we are talking about the one short ton short ton is about 907.18 kg anyway that is not a very important that is not a very important aspect to understand the most important concept here is that if a particular power generation company is emitting x unit of carbon dioxide they are required to hold some y units of RGGI. And please note that these units are not given freely to the power sector companies they are auctioned off and this auction of these are auctioned at the regional auctions and in addition to the regional auction they can buy these units also from the secondary market. Let us understand how exactly the auction process is done please note that let us let us let us take the latest auction, which was done on June 7, 2023, on this date. So, how many allowances were initially offered for sale. So, about 22 million allowances were offered for sale and finally, the ratio of bids to the supply. So, basically 1.9 times the bidding happened, and the closing price is 12.73, the reserve price was 2.50. Reager price means the electricity generation company cannot bid at a price which is lesser than 2.50, but they are free to bid at a higher price. So, please note that this is a simple ascending price auction. So, the same process of book building as we have discussed in the previous session, the same process of IPO auction on book building is done exactly the same process is replicated. The seller is interested to sell 22 million and different buyers will be bidding for it, in this case 1.9 times bidding has happened and different buyers have given different buy prices and buy quantity. Obviously, exactly in the same manner of book building process of IPO auction, the discovered price is 12.73. And as you can see from the total number of bidders in auction 60, this is the 60th auction in which 51 bidders were participated in the auction process. And as you can see the total amount of proceeds from the auction 60th auction is mentioned here. And since the beginning of the RGGI process as you can see this is about 64 billion US dollars has been raised by RGGI states. And this amount of money goes to the different RGGI states and this RGGI states will be able to utilize that money to create the infrastructure develop electricity infrastructure in the states will be able to utilize the money to generate more solar power units solar power infrastructure in the state. And as you can see this particular table shows the closing price of different last 7-8 auctions. And each of these auctions are done once in 3 months as you can see the last auction was done on 7 June 2023 before that the previous auction was done on 8 March 2023. And as you can see the clearing price is

increasing almost every auction. So, this particular chart shows the clearing price that is uniform clearing price which is increasing year on year or for every auction. And the RGGI CO2 allowances tracking system is maintained at a location or maintained in an IT system which is basically known as RGGI codes. And this is a platform where the records and tracks the data related to which particular electricity power generation unit has how many units of RGGI. There is also a secondary trading platform that is one particular unit will be able to sell the other unit the RGGI amounts. So, with this we will end our session on understanding the initiatives various initiatives such as clean development mechanism and joint implementation mechanism as well as RGGI initiative of the USA. In fact, Government of India has done considerable amount of effort in terms of creating PAT system as well as energy saving certificate system that part, we will be discussing in the next session. Once again, I eagerly look forward to interacting with all of you on discussing various aspects of carbon trading in the next session.