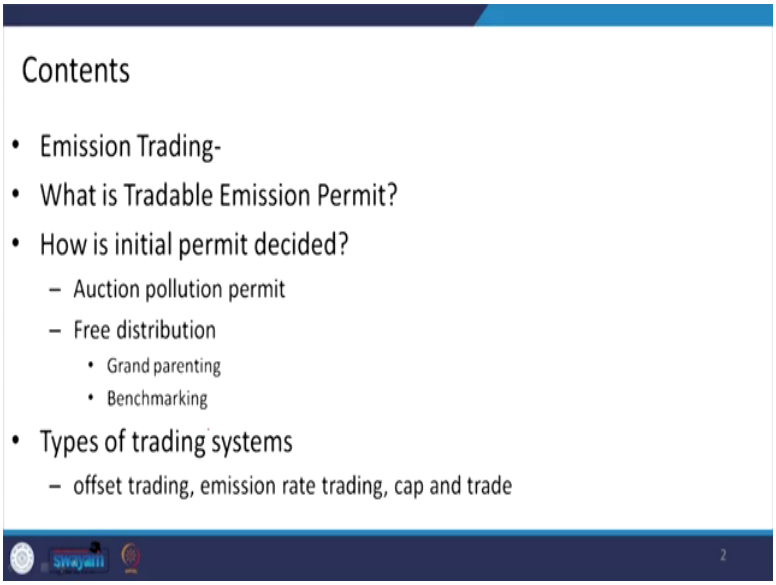
Introduction to Environmental Economics
Prof. Diptimayee Nayak
Department of Humanities and Social Sciences
Indian Institute of Technology, Roorkee

Lecture - 59
Environmental Regulations and Basic Regulatory Instruments - Market Trading Systems – I

Today, we will be discussing the Market Trading System and this is one of the instruments; market instruments for regulating your pollution.

(Refer Slide Time: 00:35)

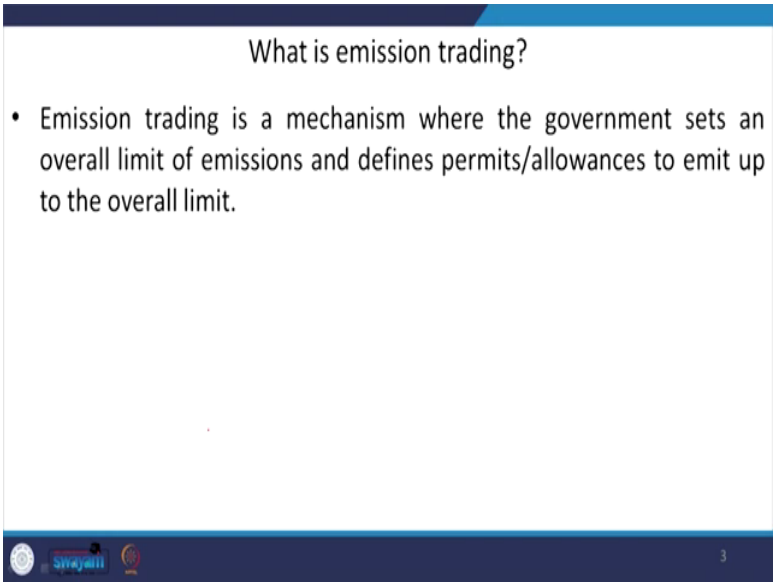


So, broadly we have planned our contents and that we need to discuss what is the emission trading and what is the emission tradable emission permit, then we will be discussing how this initial permit tradable permit is decided. And there we will be talking about two different

mechanisms; one is auction pollution permit and second one is free pollution distributions; free permit distributions.

And again, under this free permit distributions, we are generally using two methods that is the first one is grand parenting and the second one is benchmarking that we will be discussing. And lastly, we will be discussing different types of trading systems; the first one is your offset trading, then emission rate trading and cap and trade. So, this is the broad overview of our discussion for today.

(Refer Slide Time: 01:28)

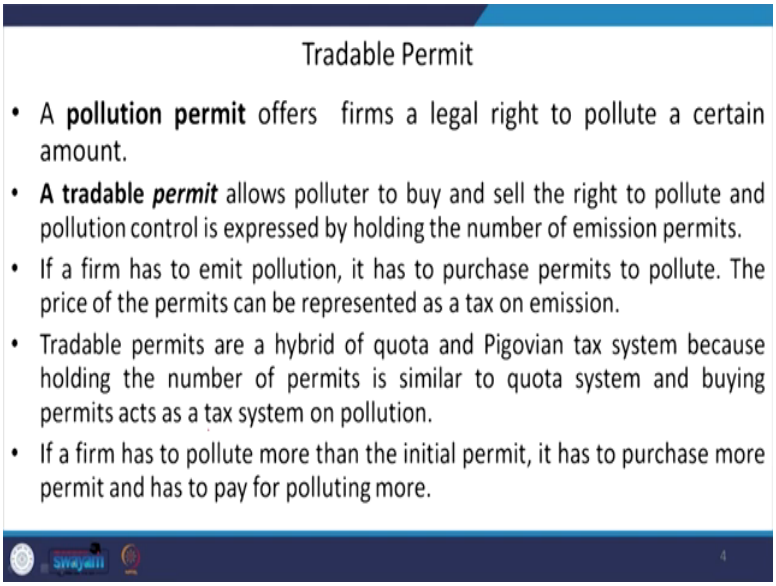


So, let us discuss with the very meaning of emission trading. So, what is the definition, meaning of this emission trading? Obviously, when you are saying that it is trading it involves buying and a selling, right. So, it involves the market mechanisms, but here this is not a typical

case of buying and selling. So, here the item sold or the material sold is emission or pollution itself, right; so, that is why a the name is emission trading.

So, you can define this emission trading as a mechanism right, where the government is setting the upper limit for emissions, right. And accordingly, the government defines what is the permit; what is the number of permits or permits are also called as the allowances that to be emitted, right. But, this upper limits of permit right or allowances are given are kept or are fixed by definite limit, that limit is as for the government overall limit, right.

(Refer Slide Time: 02:34)



So, after understanding this emission trading let us understand what is the permit itself, tradable permit because government fixes or settles what is the number of permits, right. So, here we can see this pollution permit is a kind of instrument right and what instrument this

instrument is giving the legal right to the concerned polluting agencies to pollute a certain amount of pollutions or emissions, ok.

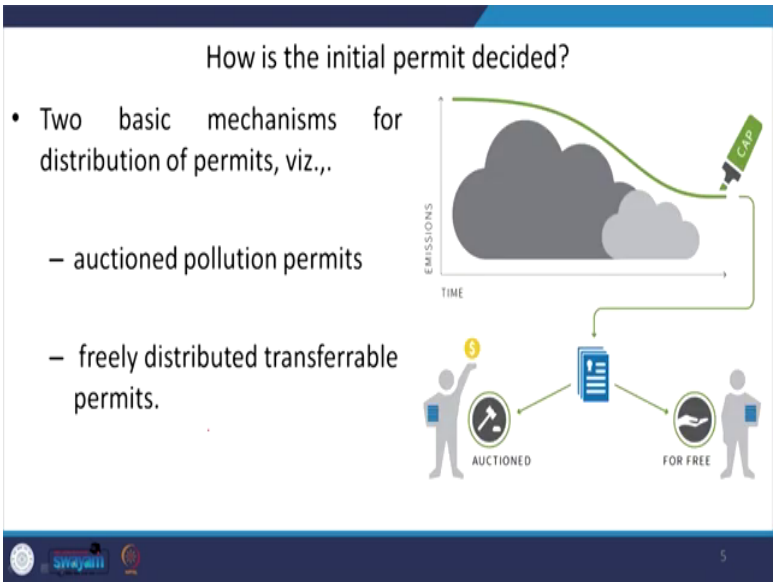
And, what is tradable permit here, here the permit can be traded. If you are if you are having surplus permit then you can sell it, if you are if your pollution is exceeding; that means, you are lacking the permits then you can buy from the competitors or buy from the market itself, ok. So, in tradable permit, we are allowing the polluter to buy and sell the right or appropriate amount of pollutions. And thereby, the pollution control authority, it can hold the number of emission permits and accordingly the apportionment of permits will be done.

So, suppose if a firm has to emit pollution then; obviously, the firm has to by the permits, right. So, that it can pollute or so, that it can continue production and pollution. And here, the price of the permits, it can be represented in terms of a tax; tax on the emissions itself. And again, if you see the very nature of this tradable permit, then you will be finding it is a mixture of quota systems and tax system; pigovian tax system. So, why it is we are saying the quota system? Because here the regulating agency it is fixing the upper limit of the pollution.

So, in that way the if the permit how much to how much unit of emission is granted that is fixed. So, it is a kind of quota. And then if your if the polluting agency is crossing this limit by one more unit or two more unit or likewise then a tax is imposed. So, that is why this tradable permit is treated as a hybrid of this quota systems and the pigovian tax systems, right.

And, if a particular form has to pollute more than the initial permit, it is it has been assigned with it has been granted, then; obviously, the firm has to purchase more permits from the from the market itself and then only he can continue the, firm can continue pollution and production, ok. So, this is how in a nutshell the very meaning and the process of tradable permit is concerned.

(Refer Slide Time: 05:49)



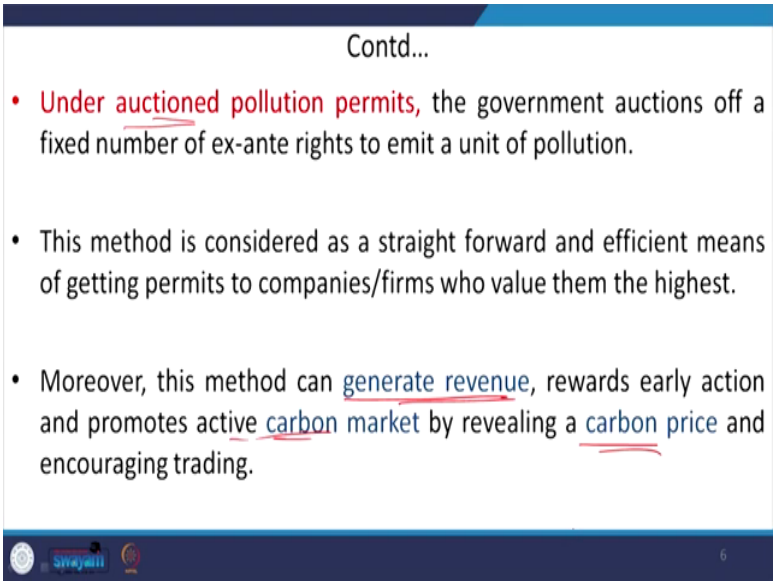
So, now the question is how this initial permit is decided right; obviously, we are saying that so far the allocation of permit is concerned, the government or regulating authorities settled down; discusses and settled down that what is the maximum number of permits that can be that can be granted. But, what is the initial permit decided? because there is no we do not think that in a market competitive market only one industry or two industries are polluting and producing there may be many.

So, in this case how we are how the government or regulating authority is going to apportion this limit; this limit of permit among or between the existing polluting units. So, for that reason two basic mechanisms are followed; the first one is known as auctioned pollution permits, right and the second one is known as the freely distributed transferrable permits, ok.

So, we can say the from this figure it is clear that this initial permits is decided, right. So, the overall permit amount is decided that what is the maximum number of pollution can be accepted, but how to distribute, it depends on the two mechanisms that who is going to get what number of a permits.

So, the first mechanism is that it is through the auction itself right and the second one is it is freely distributed. But, now the question is auction is understood that when a firm is thinking that it is going to produce more and pollute more, then obviously, it has to pay more for permit. So, that is how the auction will be working, but for in case of free distribution of the permit then how it is going to work.

(Refer Slide Time: 07:48)



So, now, let us discuss with the first case that we are talking about the auctioned the pollution permits distributed under auction systems. So, here the government auctions of the number of permits that is already granted by the regulating agency itself.

So, here we can say that this method of pollution distribution is a kind of efficient means of getting the permits to the respective firms, because which of the firms or industry they are valuing them valuing these a permit the highest. So, they then only they can pay the highest amount for the for the permit itself.

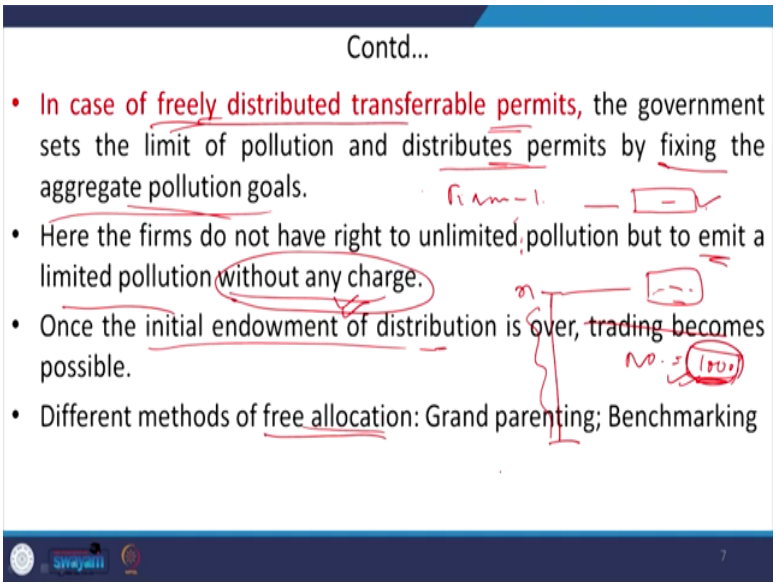
So, what is the meaning of this? So, it means that if a particular firm is planning that for this financial year we are going to produce this much of production and that is why the pollution would be high. So, accordingly, the a the firm will be will be a paying the highest price for the for the permit itself, right. But, and in this mechanism though the beauty of the system is that or the beauty of this method auction permits method is that the government can also get revenue out of this auction systems, right.

And this method therefore, can generate a sustainable kind of systems right it can generate revenue and rewards the early actions and promotes the carbon market, right. So, when it is promoting the active carbon market or active pollution market you are saying and this carbon market is a part of your pollution market. So, thereby we the price of the carbon itself it can be rebuilt, ok.

So, when you are practicing this auctioned mode of pollution distribution; pollution permit distribution then the first benefits that we are finding that it is generating revenue; so, the government can get that revenue. Second one is that it is promoting the active carbon market and the third one is that we are finding the price of the carbon. What is the price of or what is the value of this emissions that the polluting industries they are putting.

So, now, let us discuss the second method or distribution of this permits. So, it is known as freely distributed transferrable permits that it is freely distributed without any charge.

(Refer Slide Time: 10:33)



So, here the government actually setting the limit of the pollutions that what is the maximum upper limit of the pollution that can be generated, and distributes this permit by fixing the aggregate pollution goals that for firm 1 right, if there are n firms. So, for firm 1, what is the maximum limit this can produce or this can pollute, right. So, likewise up to nth firm what is the maximum limit.

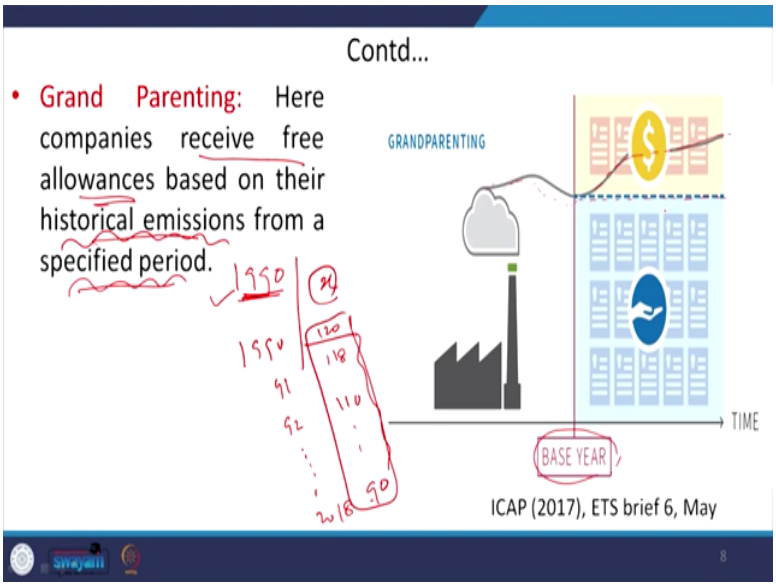
So, there we are actually the government is fixing the aggregate pollution goals that, suppose say this number of pollutions in terms of units is let us say 1000 units. So, accordingly this is fixed, this aggregate pollution goal is fixed and accordingly this one is set. So, here the firms they actually a do not have the right to pollute n number of pollutions, but they need to emit a limited pollutions without any charge. So, that is what you are saying this is freely distributed permits.

So, here the limits are set, but they are not chargeable right we cannot say that because they are the permits are not chargeable the respective industries or a firms they are allowed to pollute n number of pollutions, no this is not. So, this is the very simply we are saying that here the firms are not allowed to pollute n number of or unlimited amount of pollution rather the firms are allowed to emit a limited pollutions without any charge. So, that is what the freely distributed and transferrable permits are meant.

And again, once this initial amount or initial endowment of this distribution is fixed, then the trading may happen that who is actually exceeding the limit and in that case the firm needs to needs to purchase from the other and vice versa. And, next question is that what are the different methods for this free allocation, right; how the government is even freely allocating the firms. What is the method? Is there any system or is there any mechanisms or rule that the government is following in order to distribute this permits free of charge? What is the basis?

So, the first one and the first method is known as grand parenting and the second one is known as benchmarking. So, the government can follow either of this methods in distributing the permits free of costs. So, let us discuss the first one grand parenting. So, what is the meaning of grand parenting? So, in this case the respective firms or industries they receive three permits, right and these permits are based on the historical emissions from the specified period.

(Refer Slide Time: 13:42)

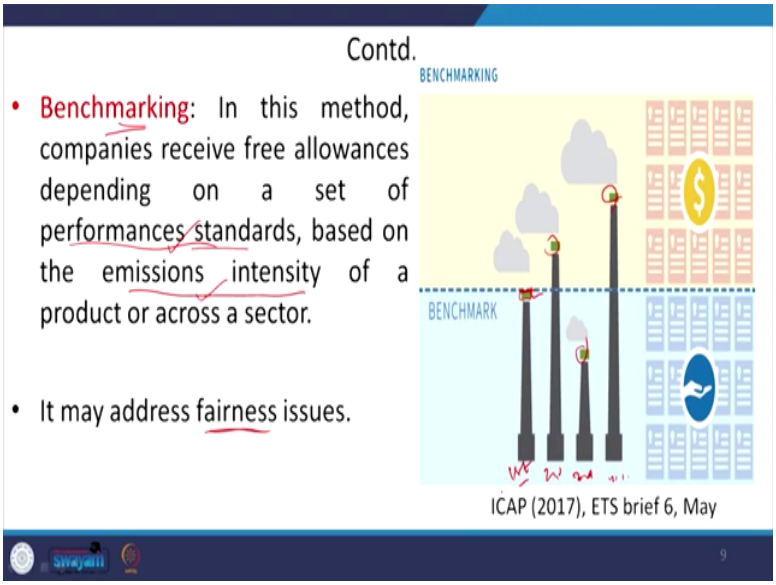


Let us say we are talking these specified period reference here is 1990 for a particular polluting firm. So, taking and for that year, right so, let us say the emission amount is x, right. So, the based on these, the now they now the government can distribute the permits as per this method. So, here the permits are distributed based on the historical emissions from the specified period. So, from 1990 onwards what are the emission level, for 91, what is the emission level, 92 up to let us say 2018.

So, accordingly depending on this number of pollutions, right whether it is in 90s let us say it is 120 units of pollution; for 91 let us say, it 1 118; for 92, it is 1 110 and for likewise; for let us say 2018, it is 90 only units of units of pollution. So, depending on these historical emissions data from a specified year. The government decides that what is the amount or number of permits that needs to be distributed to a particular company, right.

So, here the in the from this picture it is clear that we are taking it this base year, right and we are setting that what is the different historical emissions, ok. So, accordingly we are specifying from the base year what is we are setting the limit, right and then we are finding that then we are actually distributing this permits to this particular firms.

(Refer Slide Time: 15:56)

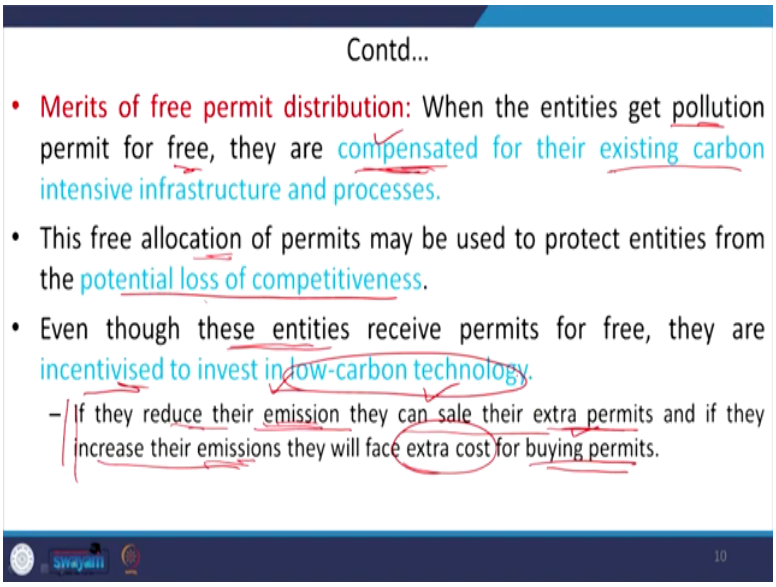


So, now let us discuss the second method that is the benchmarking. So, in case of benchmarking the firms or the industries they are also receiving this free of cost permits, but it depends on certain criteria. So, what are the criteria? The government follows in distributing this a this permits. So, it depends upon certain benchmarks. So, what are these benchmarks? These are the performance standards that the firms are taking into account in their production and emissions in intensity of the product they are producing or in that particular sector, ok.

So, you can say that in this benchmarking system it is actually addressing the question of fairness that which of these a companies or industries if they are following a set of performance standards right or depending upon the emissions intensity the permits are distributed. So, that is why this fairness issue is taken into account in this systems, right. So, here we are talking about this benchmark systems, right. So, they are we have taken into account this benchmarking in terms of the standards that which standards for; this is for the first let us say first firm, this is for the second firm, this is for the third polluting industry and forth.

So, what is the benchmark standard of what kind of performances, performance standards each of these firms they are taking into account in their production for updating pollutions or what kind of technologies they are using for reducing or controlling the pollution level, right. So, depending on it, the government is going to distribute the permits.

(Refer Slide Time: 17:46)



So, now let us discuss the merits of this three permit distributions, right. So, here we are saying that when the permits are given free, right these are treated as a compensation for the firms, why? Because obviously, it is a compensation for the firms because if they are taking any kind of the existing carbon intensive infrastructure or processes, right for that region you can say it is a kind of compensation.

And moreover, this free allocation of permits it can also be used to protect a industries from potential loss of competitiveness from the loss, it can avoid the potential loss or it can protect from the potential loss. The third one that we are also need to take into account for free merit; free permit distribution is that this free industries were, these industries were getting this free permits that they are incentivised to invest in low carbon technologies, right.

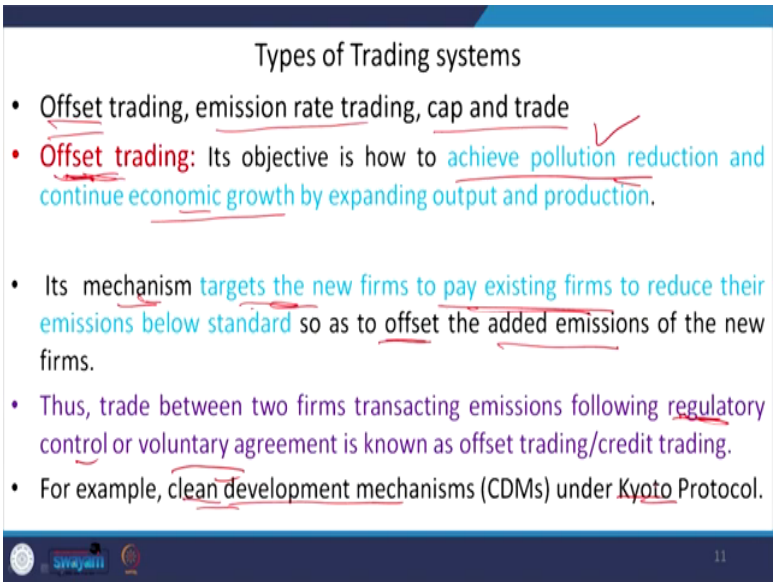
So, further they can also control the pollutions, because for the for the time being they do not have to actually pay anything for getting this permit and that is why, it will be treated as an incentive for investing further in the low carbon technology. So, that is also an important aspects in the permit free permit distributions, right.

So, when they are these firms are taking into account this investment in the low carbon technologies, thereby they will be reducing their emissions, right. So, when they are reducing their emissions they can they will be having the surplus permits.

So, they can now sell the surplus permit, right in the market and get the revenue and if they are going to increase the emissions then; obviously, there will be a deficit in the permits and this deficit of permits will be in terms of buying the permits, they need to buy the permit. So, when they are going to buy the permits then; obviously, it is it is going to incur a cost to the respective firms, right.

So, because of this logic, you are saying that when free permits distributions are there it is permits are distributed freely to the polluting a industries, then it is going to incentivised to invest in the low carbon technologies.

(Refer Slide Time: 20:43)



So, now let us understand what are the different types of trading systems that we are finding in the literature or practice? So, we are we will be discussing three important types of trading systems ah; the first one is known as the offset trading, then we are having this emission rate trading and the third one is cap and trade. So, let us discuss the very meaning of all these types of trading system one by one.

So, what is the offset training trading? So, the meaning of this offset trading is to balance, right to balance the trading itself. And, the basic objective when it was it was actually formulated; the basic objective was that how to achieve this pollution reductions and simultaneously we can continue with the economic growth and expansion of output and production of the goods and services, ok.

And, when you are when you are targeting for it is it is a the very mechanisms, right. So, the very mechanisms targets that the new firms who are entering into the productions and also they will be a polluting. This new firms they must pay the existing firms, right to reduce the emissions level below the standard, right. So, this activity will offset or balance the added emissions they are going to create and in that way you can say the net of pollutions will be will be balanced, right.

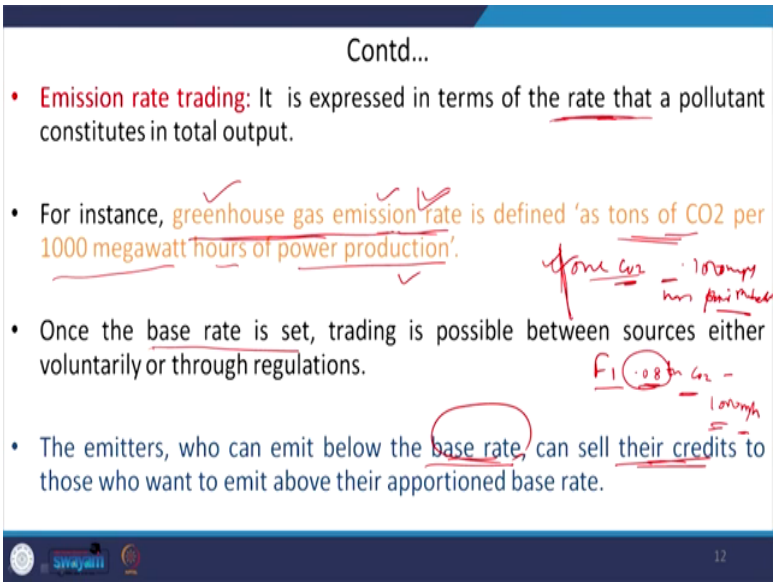
And if you see the examples then we can find that for the first time we experienced this situation in the Southern California case and there we observed that although almost all the all the companies and polluting industries they followed the regulating authorities standards and limit, but still the pollution was not controlled.

So, from the very experiences experience at that point of time during 1970s we found that what is the reason behind it, every existing a polluting industry it was following the standards and it was subject to the regulation itself. But still, why this pollution control could not be successful. So, that is the reason, that is the actually historical background this offset trading was created at that point of time.

So, there we talked about that we need to reduce the pollution level and simultaneously the economic growth and the new entrance of the of the industries must be there. We must be allowing the new industries and firms in order to expand the output and have and production and simultaneously, we need to achieve the pollution reduction itself.

And moreover, the so, for this offset trading is concerned it may be taken as a as a voluntary agreement or it can be in terms of the regulatory control itself. So, we can take this example from the UNFCC; United Framework Convention on Climate change. So, they are we are finding a an instrument, which is known as the clean development mechanisms CDMs under this Kyoto Protocol under the UNFCC. So, this CDMs in the a Kyoto protocol there also the example of the offset trading.

(Refer Slide Time: 24:41)



So, another mechanisms is emission rate trading. So, what is emission rate trading? So, it is expressed in terms of the rate that if pollutant constitutes in total output that is produced, ok. So, we are concerned here the rate of the pollutant. So, we can take this example, suppose say in the greenhouse gas emission, right we need to define what is the rate.

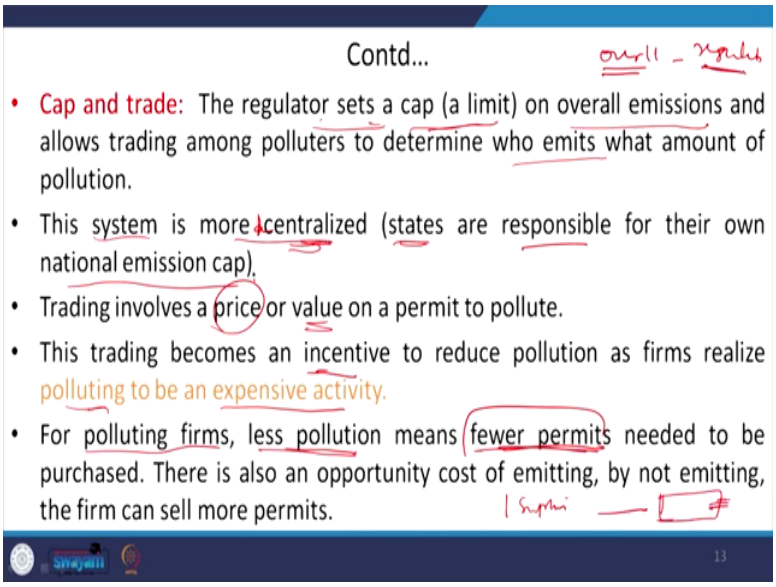
So, in green greenhouse gas emission rate. It is defined as the tons of carbon dioxide per 1000 mega Watt hours of power productions, right. So; that means, what is the amount of what is the amount of CO2 production for every 1000 mega Watt hours of power production and that determines the rate of greenhouse emissions. So, if for every pollutions right pollutant if this rate is found then we can actually set this rate and this is a this is the base rate that is set as per this and then only the trading is possible between the sources or among the sources.

So, now, the emitters who can emit below this base rate, let us say this rate is fixed now. This is a standard rate for this greenhouse gas emissions, we are saying this is ah, what is the 1 ton let us say? 1 ton of CO2 is produced for every 1000 mega Watt hours of power production, so; that means, now the base rate is decided, right.

And if a particular industry let us say firm 1, who is producing this power. If it can emit below this rate, that is let us say it is less than let us say 0.08 tons of CO2 is now produce for every 1000 mega Watt hours of power productions, right. So; that means, the this is the base rate, it is the standard rate and a company is producing much below that is less than 1 CO2; 1 ton of CO2 that is 0.08 ton of CO2 for every 1000 mega Watt hours of productions.

Then, what will happen, the firm is having it surplus right, it can sale this credit or this surplus is express in terms credits. So, the firm can sale it is credit to other firms who are emitting above this apportioned standards that is 1000 CO2 per 1, sorry 1 tons of CO2 per 1000 mega Watt hours of power productions.

(Refer Slide Time: 27:57)



So, the last mechanisms that is known as the cap and trade. So, what is cap and trade? So; that means, we are putting a upper limit, right. So, here the regulator is setting a upper limit for what is the overall emissions and then it can allow trade among the polluters. So, that we can determine who is emitting what amount of pollutions.

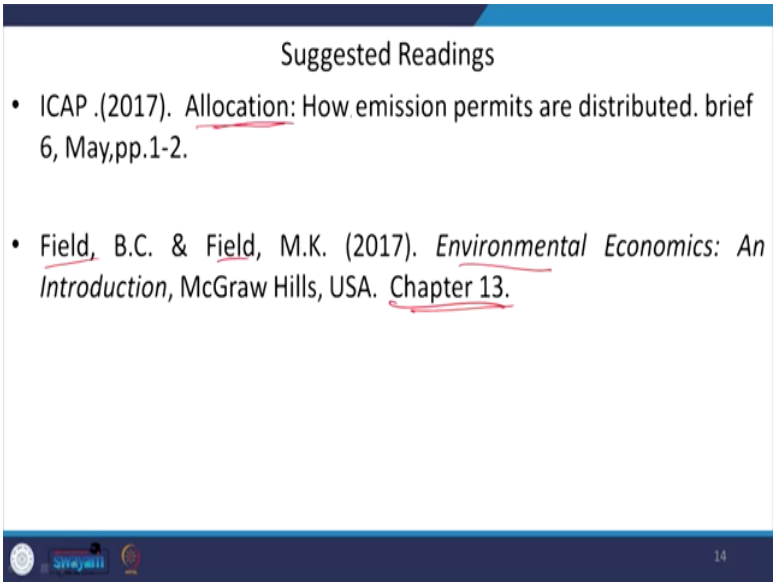
And if you see the very structure then you will be finding that this system particularly cap and trade is a kind of more decentralized a system. Why it is more decentralized? Here the cap the overall limit of production, it is decided by the regulating authority or regulator itself. Then, each of the states they are responsible for setting their own national emission cap that is why it is known as a more decentralized kind of systems.

And more about this trading is involving a price or a value on a on a permit to pollute. So, you can say that this trading acts as an incentive to reduce the pollution right, because the

firms now realize the if they are going to pollute then this pollution creating pollution is a is an expensive activity, right because they need to pay for it, ok. And for polluting firms if they are producing less pollution it means they are requiring fewer permits, right. So, what is the opportunity cost? So, the opportunity cost here is that the if they are producing lesser pollutions then; obviously, they will be recurring lesser permits, right.

So, when they are using lesser permits right then; obviously, this less the surplus permits now it can be sold in the market and they can get the revenue for that, ok.

(Refer Slide Time: 30:24)



And for this portions you can follow this Field and Field, chapter 13 of this book. And moreover you can follow this a article, allocation how emission permits are distributes a distributed, it is a policy brief. So, you can also follow that, ok. In the next lecture we will be

talking about the cap and trade in detail along with the liability as an as an instrument to control the pollutions.