Infrastructure Finance

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Lecture - 29

Risk Management

Welcome back to this course on Infrastructure Finance, this is lecture 29, we will continue our discussion on Risk Management that we began in the previous lecture. And today we will trying to classify different types of risks and try and look at some of salient risk that in PC infrastructure project in some detail.

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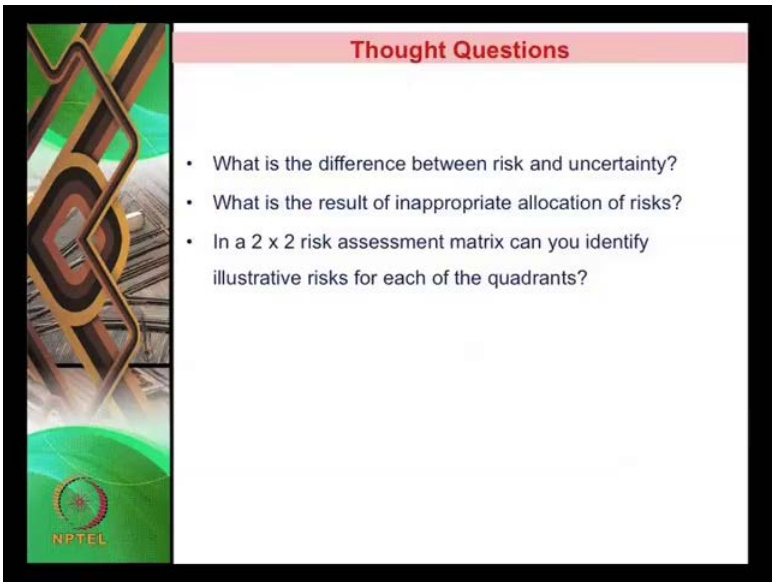

But, before we do that let us look at discuss, let us spend some time discussing the questions that we had in the previous lecture. The first question was, what is the difference between risk and uncertainty, and basically if you really look at you know literature or some of the common reading, you will find risk and uncertainty being used in fairly synonymous way. But, you know there is a very you know deep meaning between these two words.

So, essentially if you look at risk, risk is something where you actually have, what is called as probability distribution of the various events right. So, now, for example, is you

actually toss a coin and you are not very sure what exactly going to be outcome, the outcome can be a head or outcome can be a tail. But, we know for sure the probability distribution of the outcome for example, there is a 50 percent chance that it can be a head or 50 percent chance then it can be a tail.

So, this probability outcome probability distribution is known, and whenever we have a distribution which is known that essentially is called as you know risk events. But, then there are many events for which we may not be able to actually you know predict what could be the probability distribution of outcomes; and whenever we have situations like that, we called them as uncertainty.

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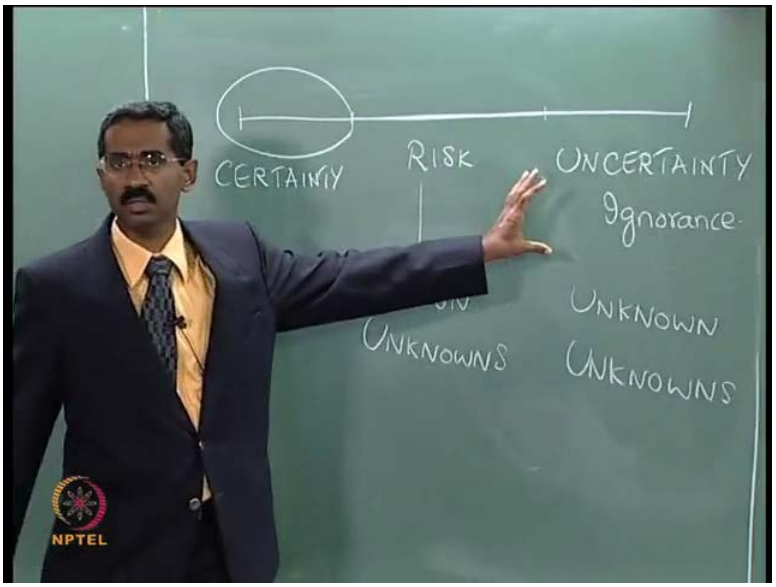

So, if you really look at spectrum of events in terms of the information that we have right. So, on the one hand what is called as we have all the available information, and therefore, we are very sure in terms of what is going to happens, so that is basically a certainty. So, tomorrow it is going to be the morning, and it is yet another day, the sun is going rise in the east, so these are all events that we know for sure, so there is certainty in it And you know between certainty, we have let say a spectrum where we actually called as a risk.

We do not know for sure what is going to happen, but we have a distribution a probability distribution, which tells us the likelihood of a particular event happening. So, let us say for a example, we can kind of predict whether the price is going to increase or

whether the price is going to decrease, if it is going to increase by what percentage it is going to increase and, so on.

So, based on past occurrences we are able to construct the probability distribution curve which kind of tells us, what is going to be the lightly outcome and the weights associated with the at each of the outcomes. And the on the other hand we have, you know we have probability instead of events for which we do not even have a probability distribution what are going to be outcome right. So, this is called as your uncertainty, this is your uncertainty and we are probability ignorant of a what is going to be the outcome.

So, as we move from one to the other, we are actually a looking at set of situations, where we have a lesser and lesser information. And; obviously, the across is to see how much can be actually increase our domain of uncertainty or how much can actually increase our domain of risk, and reduce the reducing uncertainty parts. So, that is actually corrects, so in terms of common parallels you know risk is called as your known, unknown. So, risk is your known, unknowns and uncertainty is your unknown, unknowns.

So, people are not very comfortable in having lot of functions the risk is because, risk can be manage, risk can be mitigated reducing of radio off ways, but uncertainty we find it very difficult to handle. So, therefore, from the project prospective if you want to really manage a risk appropriately, we will have to reduce the domain of or the footprint of uncertainty that we have. So, the next question that we has was what is the result of inappropriate allocation of risks.

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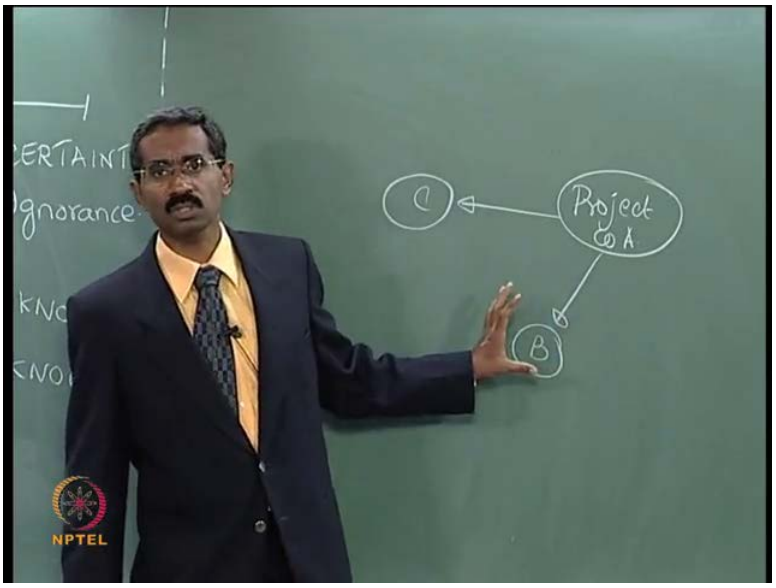

So, let say there is project company A and then there are different counter parties right, so there is B there is C and, so on. So, there is set of risks which needs to be allocated between different parties, who are in the better position to manage or allocate them, so the question is, if a particular risk is more appropriate to manage by project B, but it is get allocated inappropriately in this case example I have mentioned is, the risk it was more appropriately handle by project more appropriately by party B, if it gets allocated to the project company what is going to happen.

So; obviously, the sponsors because, of the fact they are going to then deal with the higher risk, they are going to expect a higher return. So, when they actually expect a higher return, it gets manifest several ways for example, the price of the product might become higher. The risk of the project increases or if the project company is not able to manage the risk appropriately throughout the project life cycle, the project might collapse a project might stop functioning.

So, essentially it jeopardize the whole project it probably increase the financial risks as well because, of the inappropriately allocation of risk. So, therefore, it is very important to allocate risks, to those party that is most appropriate equip to handle those risks, it may be tempting you know for a person, which actually having a lot of bargaining power, it may be tempting to actually half load as much as of risk is possible or to another party.

Now, doing, so can actually you know provide some short term gains, but in the long run it can be actually very harmful for the project. Because, it actually affects the you know the project viability itself, the third question that we asked was to think through, potential risks. In the risk assignment framework that we discussed in the previous class, right to think through potential risk that we can used to illustrate the different quarters that we saw in the risk assignment framework.

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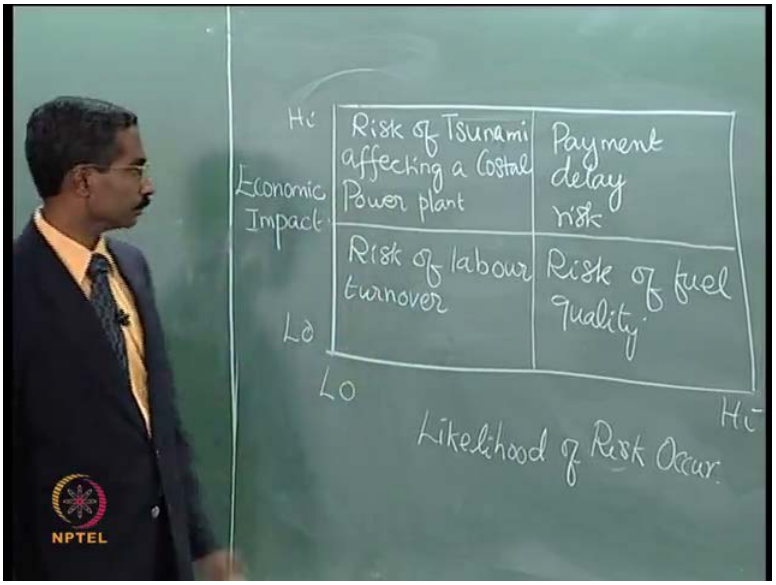

Try to recollect what we did was we had a two by two risk assignment matrix, on one axis we had likelihood of the risk occurrence. And then on other axis we had, the economic impact if the reason occurs right, so this end is low, and this end is high similarly this end is low and this end is high. So, you make a conceptual demarcation and we have for quarters, low risk occurrence and low economic impact, low risk occurrence, but high economic impact, high risk occurrence, but low economic impact, and high risk occurrence, but high economic impact.

So, we can think of examples you know just to help us because, lot more clarity on how we actually used this risk assignment framework. So, let us say for example, there is a costal power plant and; obviously, because is power plant is located in coastal region, if there is a chance of let say naturally occurring event tsunami, it is actually going to affect the plant. So, therefore, if a tsunami occurs in the area of at the power plant is located, the power plant is going to be provably affected.

So, the economic impact of such an event occurring is going to be very high, the plant might have to closed, it might have actually affect the equipment, so on and, so for. But, what is a chance of tsunami itself occurring, now it is very difficult to predict, but then if you go by the history, the chances of tsunami occurring is very, very rare. So, therefore, the likelihood of risk occurrence is very low, this case right, but if the risk occurs the economic impact is going to be a very high.

So, let us kind of fill this quarter an saying that it is a risk of tsunami affecting a costal power plant. So, now let us look at another, so this power plant generates power, and it actually has to supply the power to this distribution company, and this distribution company is state own entity. And as state own entity it is finances are not mange properly it does not pay it is supply on time, so therefore, though there is ready market available for selling the power.

The risk of getting the payment on time is very high and the risk of getting the payment in time is going to be very high, and whenever the payment comes on time; obviously, it affects the cash position of the project company. And when the cash position is affected; obviously, it is going find out very difficult to paid suppliers like fuel and all of us. So, the likelihood of the risk occurring that is the likelihood of the distribution company not paying on time.

So, the risk is payment delay risk right the likelihood of the occurring is very high because, the ((Refer Time: 12:30)) has never had a history of paying it is supply on time. Now, what is the economic impact of the risk, if the payments do not come on time; obviously, it is going to affect the operation of the plant. So, therefore, the economic impact is also going to be very high.

So, likelihood is high and economic impact is going to be very high, so therefore, we will put this in this quarter right the payment delay risk. Now, let us think of some examples in this two categories let say for example, you have a lot of labor who are employed or in the project, and if you consider a circumstance that there is going to be a lot of employment problems, in the sense that there are no adequate employment opportunities in the society. Then the people who are employing in the project, are not going to leave the project unnecessarily and seek employment elsewhere.

So, the risk of labor leaving the project to actually go ahead and take employment elsewhere is very limited because, there are no jobs available in the society right, the risk of people leaving is low. Now, even if the people leave because, of the fact there are surplus labor that is available, it is possible easily hire the labor to meet the shortfall right, so it is possible to quickly hire the labor without any additional delays right. So, the economic impact is also going to be low. So, therefore, we can kind of classify least risk of labor turnover as that of low likelihood of occurrence.

And even if it occurs the economic impact is going to be lower because, it can be quickly remediated. Now, we will have the thing of some examples in this category, where the chance of risk occurrence is very high, but the economic impact is low, let say for example, this is a plant that actually gets a fuel from coalmines. So; obviously, the purity of coal plays a very important role in terms of operation of the plant, now it is not possible being a natural resources, it is not possible to guarantee in very strong way what is going to be the purity or the quality levels of the fuel.

So, the risk of quality of fuel supply I am not talking about the fuel supply itself, but talking about the quality of the fuel supply, can be very high. But, whenever we actually have a or getting fuel supply of lower quality, there are adequate techniques that exist which can help us to improve the quality of fuel right. So, for example, there are several enrichment techniques that help us to improve the quality of fuel, which reduces a economic impact that can happen because, of the low fuel quality.

So, this is a risk that could probably we best position in this quarter right, risk of fuel quality. So, we can identify all the potential risks of the project, and we can try and assess those risks in terms of their similarity and the economic impact, and then use it in the quarters. So, the objective of doing this is to ensure that, whenever we identify risks that have a high chance of occurrence, as well as create a high economic impact, we have to ensure that these risks are appropriately mange. Because, if these risks are not properly manage, then it can affect the project viability in the tremendous fashion.

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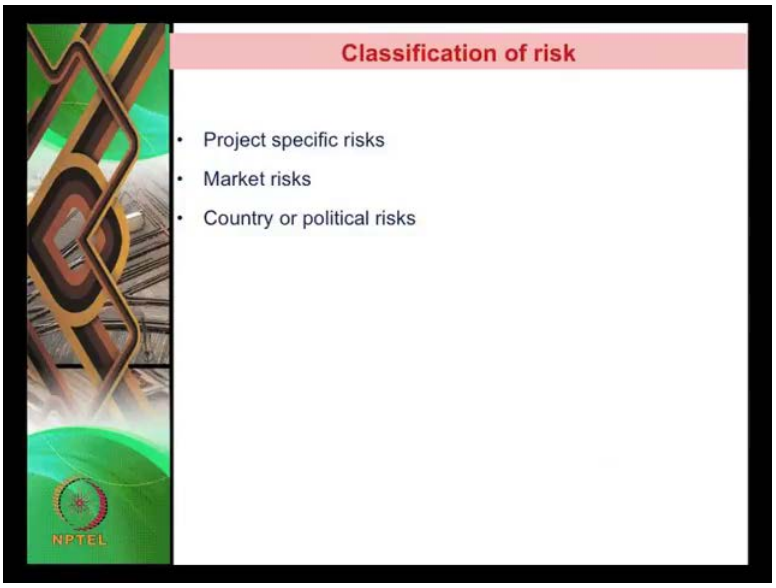

So, now let us go to today's topic, we will talk about risk management we will look at different steps in the risk management. One important aspect in risk management is to look at risk by classifying it in different ways, one form of classification is based on what level of risk it is. A risk that is specific to the project or is it a risk that is market specific or is it a risk that is important to the country in which investment is being made or political risk right.

So, what are project specific risks, project specific risks of those risks that affect the project. So, if there are two power plants, if it affect only one of the power plant, but not the other one, then it becomes a project specific risks, next we come to market risks. So, the market risks indicate those risks that generally occur in market that affect all projects that are as in market. So, if there are any regulatory changes, if there are any changes in the economic conditions such as inflation and, so on.

It is not going to impact project A or project B, but it is going to be impact all the projects that is going to that it being setup right, so that actually becomes a market risks. The third category of risk is called as your country risks, so country risks pretend to the country in which investment is being made, either it can be several types such as expropriation risk, non convertible risk and, so on.

So, we will look at some of these risks in greater detail as we go along, but then we have really try and classify what kind of risks are we talking about because, the risk management differs depending on the classification of risk as well.

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Another classification of risk is time based right when does the risk occurs in the project life cycle. So, as we have seen earlier project life cycle can be classified into two broad timeline, one is you are the construction phase and the second is your post construction or the operation phase. So, again if you look at the risks actually the existence of risks throughout the project life cycle, it is not the risks are only at the construction phase and the risks automatically vanishes in the operation phase.

Some level of some types of risks will be higher in the construction phase whereas, in the operation phase your might had actually different kind of risks. So, again we probably have to classify when does the risks affect the project, so we will take some of the main risks that we see in the infrastructure project one by one, and try and look in some detail as to how we manage those risks.

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First we will talk about project specific risk, so when talk about project specific risk there are various risks that come to my mind. But, primarily we can think this seven or a important risk factors that needs to the addressed, the first is there construction risk. Construction risk is talking about is a project is going to be construction on time, and on cost and it is going to actually perform as per specific essence after the construction is over.

Then we talk about supply risk, supply risk is about availability of fuel or availability of natural resources for the operation of the project. So, if you are talking about a mining project, do we have adequate resources to recover the investment made in the project, if you talking about power project do we go are we going to adequate supply of goal, to ensure uninterrupted operation of the plant this is your supply risk. So, revenue risk talks about the risk in generating revenue for the project is there a market for the project.

What is the price at which we can actually sell product or the price level going to be volatile, it is all of this comprises what is called as your revenue risk Then we talk about operation risk, we will be able to operate the plant as per required specifications, will be plant able to perform as expected all of this potent to operation risk. Then we have environmental risks, there are several clearances and permits that needs it be obtained, what is the risk of non able to gets those permits or when the plant is being operated.

What is the risk of plant not being able to ad head to the environmental regulations and rules. So, that is your environmental risks then we have force majeure, force majeure or generally what is called as axe of god for example, there is war, there is political strives that could be earthquake, heavy rain and, so on. And these are all events that are beyond the control of the people involved in the project right, so this is a force majeure. So, occurrence of such force majeure impacts a projects, so that is a risk.

And then we have completion risks, are we able to complete the project on time what are the different factors that we need to ensure that the project becomes a completed on time. So, that is your completion risks, so there are different types of risks, but these are the key project specific risks that we have to be aware of and we will have to mitigate them appropriately. So, now, let us try and look at them one by one the first is your construction risk.

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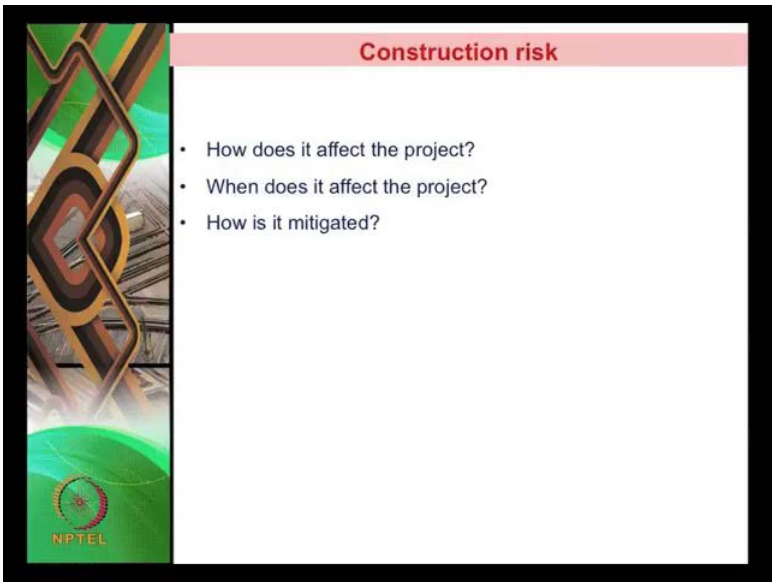

So, why is the construction risk is the first point that we are discussing because, ultimately look at the most infrastructure projects are construction projects, a lot of capital is needed for complete in construction activity. So, that actually a biggest risk factor as per as infrastructure projects are concern, so we start with construction risk, so question the first question is how does it affect the project. So, what is construction risk, the construction risk is the ability to construct project at a particular cost.

The ability to construct the project in a given timeline, and the ability to perform and ability to project perform as per specification. So, this is essentially what we expect from the construction activity, so what is the risk in this, the risk in this there is seclusion in cost. We now able to strict to the estimated budget, the risk is the project is not being able to complete on time there is a delay. So, whenever there is a delay or whenever the cost increases, it is actually going to affect the project if there is a delay it is; obviously, going to affect because, the revenues are going to get delayed.

And when the revenues are going to get delayed, we are not able to a service lender as well. So, the lenders servicing the lender get delayed right, so lenders get affected and if the project cost increases how are we going to finance a additional cost, who is going to bear this a additional cost. So, that becomes an issue and if the project does not perform as per expectations, then it affect the revenues of the project let say for example, a power plant estimated to function at capacity of 300 megawatts, but it able to generate power only up to extend of 200 megawatts.

Then it affects the project performance in terms of lower revenues, when lower revenues mean low profits, and lower profits mean it is going to affect the returns right. So, it affects the project in multiple ways, so primarily it affects the lenders because, it can cost disruptions are timely. service of loans, it can also reduce the coverage ratios. So; obviously, lenders are very concerned about medicating the construction risk that exists in the project, and when does it affect the project.

So, we talked about the project being compressing of two distinct phases, one is construction phase and the operation phase. So, in the construction phase the delay you know delay affects the construction phase, when the construction phase increases it affects us, and the project performance affects the operation phase right. So, if you look at the construction risk, it impacts both the construction phase, as well as the operation phase.

If the project is not able to perform as per specification, the risk is fell only in the operation phase, if it takes more cost, if it takes more time then affects the construction phase. A question is how do we actually mitigate the construction risk, what is the strategy whereby project companies are able to mitigate the construction risk. So, the answer is how a construction contract, so what happens in a construction contract.

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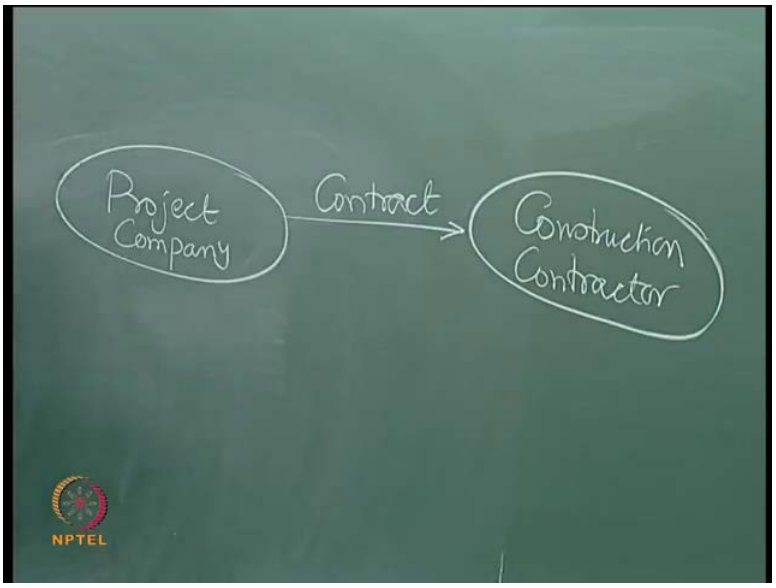

So, there is a project company and then there is your construction contractor, so right now the project company expose to construction risk, now this risk can be mitigated. If the project company can allocate this construction risk to a construction contractor because, a project company might not have the expertise to built very large construction projects. So, therefore, it will not be able to budget, it not be able to manage a project properly which can result in cost seclusions, you can result in delays and, so on, so forth.

So, this project company allocates the risk of construction to a construction contractor right, by signing a contract. A construction company because, of expertise will able to manage this construction risk a lot better, and signing this contract therefore, helps to reduce the a project risk. So, when we talk about construction contract what kind of contract is it, so general it is called as a EPC contract, EPC is Engineering Procurement and a Construction Contract.

So, this is also called as your turnkey contract that is there is one main contractor responsible for successful completion of the project. So, there are different ways in which you can go ahead with the construction contract for example, let us assume that you are constructing a house. So, when you construct a house you can individually hire a carpenter, you can hire a plumper, you can hire a painter you can hire a mesentery, and then get the work done.

So, you can have individual contract for each of this activities, on the other hand you can hire one prime contractor. And then the prime contractor interns sub contracts the work to other parties, the prime contractor is a single player responsible for the house owner. And he intern manages the risks, between all the other player like plumber, carpenter painter, mesentery and, so on and, so forth. So, when we talk about turnkey contract, the turnkey contract means there is one main contractor, who is responsible for successful completion.

And this main contractor can intern have various subcontractors, who are going to execute portion of the work, but then the project companies link is only with the main contractor. Another advantage of having a turnkey contractor is, we ensure that different elements do not fall between cracks see for example, we actually have different contractors looking at each and every aspect of the project, they can always be issue of playing the blame game.

So, for example, if you actually have a painter, the painter might say that oh the woodblock was not complete on time, thereby leading to delay. And the carpenter might say that of the machineries was not complete on time and therefore, I am not able to complete my insulation on time. So, there can be several cracks and what may fall between the cracks, when you actually have multiple, but when you talk about the turnkey contract we can avoid this kinds of situations.

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And in most cases having a turnkey contract, ensure that is the fixed price contract, and when it is fixed price contract the lenders are more comfortable with what is going to be the total project cost. If there is a variance in project cost that can create a lot of uncertainties for the lenders, so the lenders therefore, prefer a fixed price contract such as a turnkey contract. So, before we actually go ahead and hire a contractor there are various qualification criteria that the contractors have to meet.

For example, the contractors have to show the evidence that they can actually built the project this nature, they have to show what technical expertise and they should also show that they have the financial strength to built the project this nature. So, we will be able to mitigate all the risks associated with the construction contract, only if the contractor or the counter party is able to observe some of these risks. So, if we actually give a contract for the constructing a very large project, to a very small contractor.

Then the contractor might not be able to observe all the risks simply because, of the fact that he will not be able to good do good all the damages. He may not be in the position to incur the financial expenditure, whenever there is a problem with the project.

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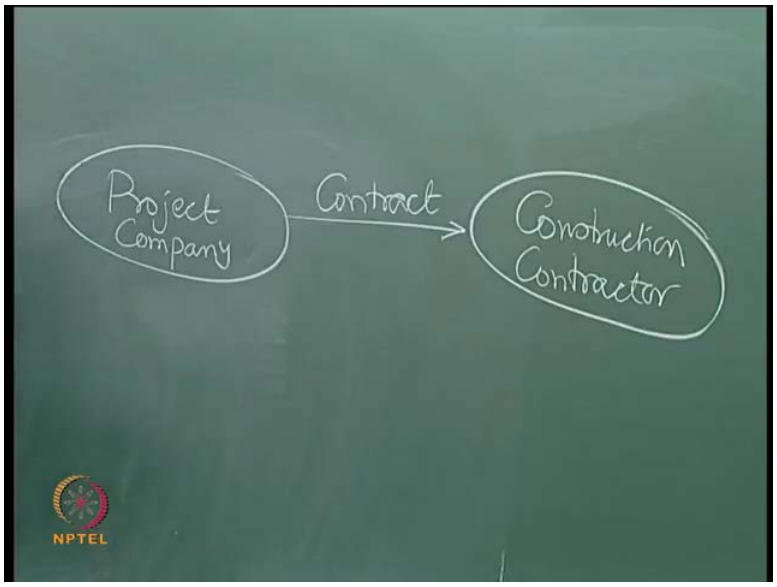

So, this risks allocation will be proper only if the selection of the contractor is proper right, if the contractor in the position to observe the risks that we have identified. Otherwise, the risks allocation will not be appropriate, so as we have seen earlier the EPC of the turnkey contract should be a fixed price contract to reduce the uncertainty of

price. And the contract should clearly state that the completion must occur within a fixed period, right that is a why we are trying to mitigate the construction risk, we are mitigating the price risk, we are mitigating the completion or the time of completion risk.

So, whenever we are trying to sign such a contract there are always going to be a negotiation, the negotiation between the owner which is the project company as well as the contractor. And many instances the negotiation is on what do we classify as force majeure events that is, occurrence of this events observe a contractor by from completing the project on time. So, for example, if there is earthquake, if there are floods occurrence of such events lead to delays, and whenever such delays occur the contractor absorbed.

Because, these are force majeure are events and he does not have any say or in any control over this events right. So, we have to ensure that the force majeure events listed in a contract or limited and well defined.

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Now, we look at some the aspect of the EPC contract, the first is called as your scope of the contract. So, primarily the EPC contract sets out the design, the technical specifications and the performance criteria for the project, the three things how should be the design be, what should be the technical specification of project has to be meet, and what will be the performance criteria for the project.

The second aspect of the scope is, the detail design for the project is the responsibility of the contractor. So, it is not that once a equipment if it is construction contract has been signed, the project sponsor is not you know is completely given all the responsibility for the contractor. Now, the project company in his own interest will have to ensure that some parts of the contract are, you know monitor and they will have to approve some parts of the contract some execution of some aspect of the contract.

So, one such is basically approval of detailed engineering and design drawings, even though the drawings are prepared by the contractor, and it is a responsibility of the contractor to prepare these drawings. These drawings and designs have to be approved by the project company, in the interest of the project before it can proceeds for construction. So, similarly if you look at the project, the chosen if is contractor can have several subcontractors.

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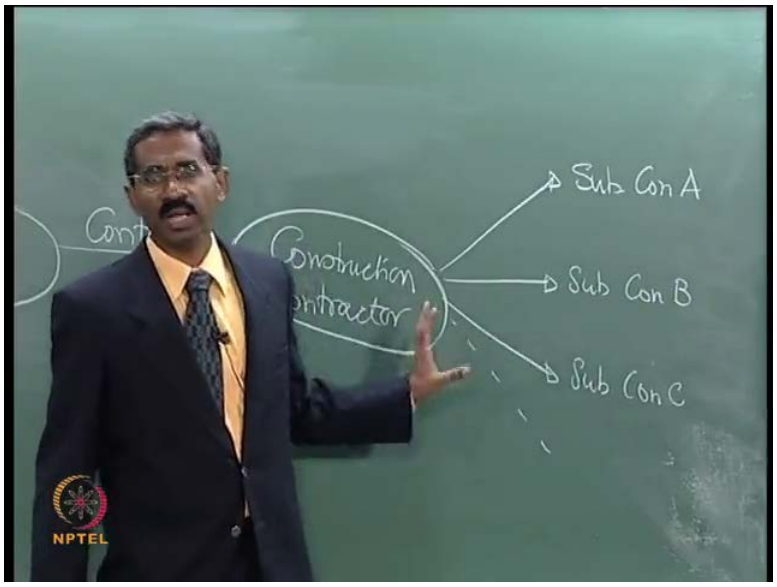

So, for example, you can have you know the construction contractor can have a subcontractor A for equipment, you can actually have a subcontractor B for materials and supplies, you can actually have a subcontractor contract C for designs and engineering right. So, it can have a various subcontractors, and it is an interest of the project company to ensure that, the subcontractors are approved before they can be engaged by the EPC contractor.

Because, ultimately the quality of the project also depends on the quality of subcontractors that are engaged right. So, some of the major the subcontractors will have to approved by the project company, if you talking about appropriate risk mitigation, and normally we should also aware that EPC contractor is not responsible for ancillary and support infrastructure work. So, the project is clearly defined, and the EPC contractor is responsible for what is begin defined within the boundaries of this project.

That may be other hand ancillary work for example, construction of a road to ensure access to the project site, the you might have actually need to provide electricity and other utility supplies for the construction. You might have to ensure that the land is available in the proper form and fashion for a construction. So, all of these are out of the scope of the EPC contractor, it is responsibility of project company to ensure that this are provided for the EPC contractor.

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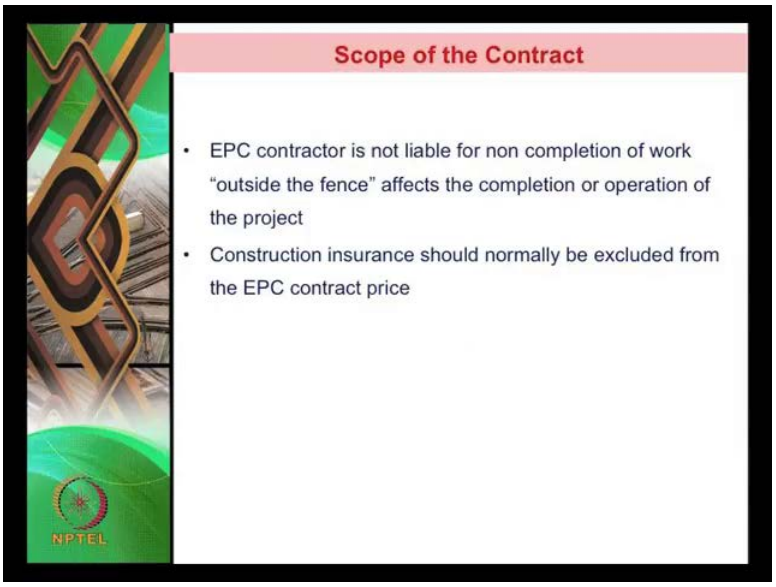

So, EPC contractor is not liable for non completion of work outside the fence right, if it affects the completion or the operation of the project. Now, if it gets delayed because, of the fact that the road was not available, if the project is delayed because, of the fact that the electricity supply was not available right. If the permits are not obtained by the project company, then any such events that affect the project completion date is not you know the responsibility of the EPC contractor.

Now, usually to mitigate some of the risks of the construction, many of the EPC contract in companies also take what is called as you are a construction insurance right. If there is a problem in the construction, then the contractor needs to be compensated right, so the contractor normally takes insurance that protects from some of these events. And; obviously, this insurance has a cost, and it ensures that the EPC contract does not cover this insurance cost that, the construction insurance is not support of your EPC contract price.

Because, this is a risk management strategy that the contractor himself has taken, and it should not be pass on to the project company.

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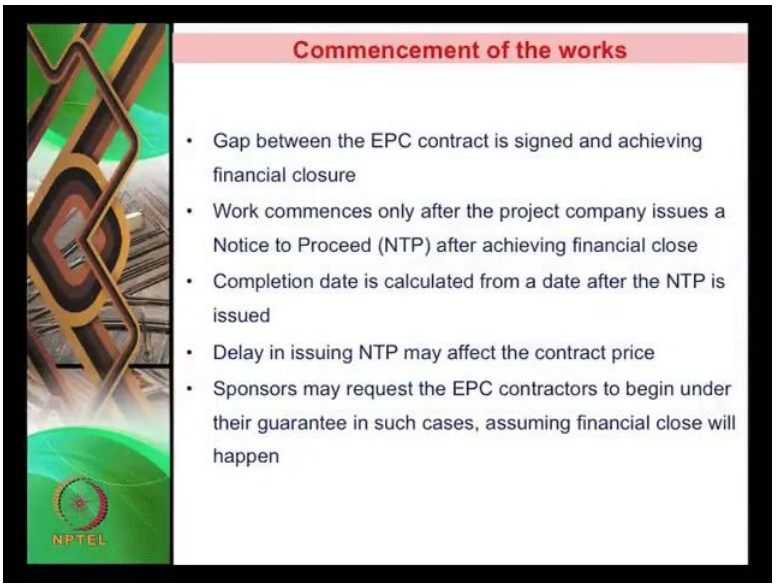

A next is your commencement of works, so in terms of the sequence of events a EPC is signed before financial closer because, the lenders would like to know the firm's price which the product will be constructed. And therefore, the EPC contract has to be signed before actually financial close. Now, there can be a delay right from the time EPC contract has be signed, till the time of achieving financial closer, see normally what happens of achieving financial closer, the project company issues a notice to proceed called NTP to the EPC contractor.

So, the EPC contractor will proceed only after it has obtained a notice proceed from the project company, and the completion date of the project is calculated not on day in which the contractor was selected. But, on the day in which the notice to proceed was issued to

the contractor because, from the time contractor has been selected till the date the notice to proceed was issued that can be substantial delay. And if the time to completion is decided based on the construction award date, it can actually create problems for the EPC contractor.

And we need to be aware that whenever there is substantial delay in achieving financial close from the time of signed EPC contract, then it can lead to seclusions. So, for example, the EPC contract the price in the EPC contract is valid only for a certain time, and achieving financial closer takes more than the time specified, then the price meant to get revises, and when price gets revise it again results in delays in financial closer. So, we have to kind of ensure that subsequent the EPC contract, the financial closer is achieved in reasonable time.

So, whenever there is a delay the sponsors may request the EPC contractors to beginning work, under their guarantee of this sponsors right, assuming that financial closer will be achieve very soon. Because, as far as EPC contractor is concerned they are basically get the comfort that they will get the payment for the works done, only if there is financial close. If there is finance, if there is no financial close who is going to pay the EPC contractor, where is a source of finance coming from.

So, unless until they are sure about the source of money, the source of payment to them they are not going to being the work. So, therefore, if the work has to proceed before financial closer, the sponsors will have to guarantee that they will make good the payment for the EPC contractor, till the time the financial closer is achieved.

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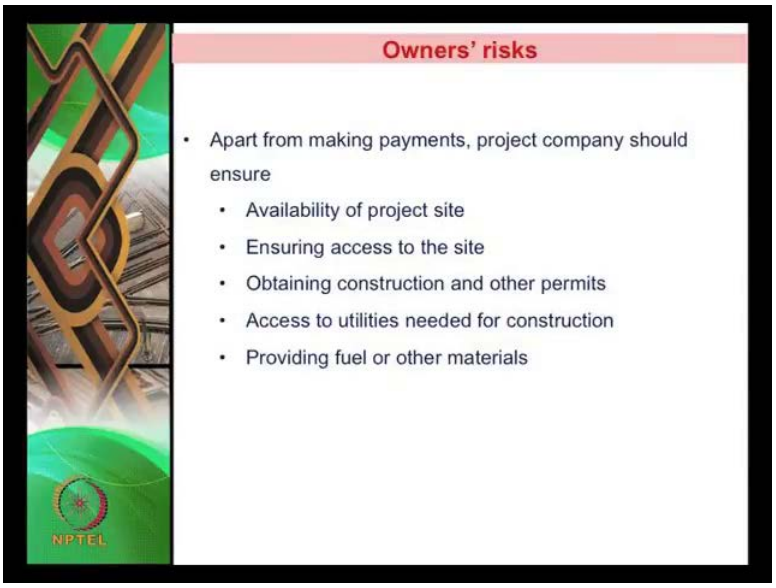

So, there are something called as owners risks right though you actually allocate most of the risks of the construction to the EPC contractor, there is some part of it which rest on the owners. And this has to be borne by the owners because, it cannot be allocated to the EPC contractors. So, some of these risks are availability of project site, the project site should be given to the EPC contractors, so that they can begin construction if there is a delay then there is going to affect the completion date.

Ensuring access to the site right, there should be way in which the EPC contractors can access to site there could be roads, you know there should be uninterrupted access, so on. And construction other permits have to be obtained by project company because, you need to have government approval before you can actually begin construction. For example if is a conversion of let say a firm land to industrial land again it needs some approval.

If there are some clearances needed from the environment ministry, then you need to actually obtained some approval. So, all these permits need approvals need to be obtained by the project company before construction can begin, and when the construction begins; obviously, you need to access to electricity, you need to access to water supply, you need to have access, so many other facilities, so you need to access to telecom facilities, communication facilities. So, all of these facilities needs to be provided at the project site for the construction to happen.

Sometimes you also need to provide access to some other third party supply for example, you need to provide access to fuel, you may need to bringing the diesel into the project site. You know you may need to bringing you know some other resources to the project site for construction. So, all these accesses needed and this is the responsibility of owners to ensure that these are made available to the project site.

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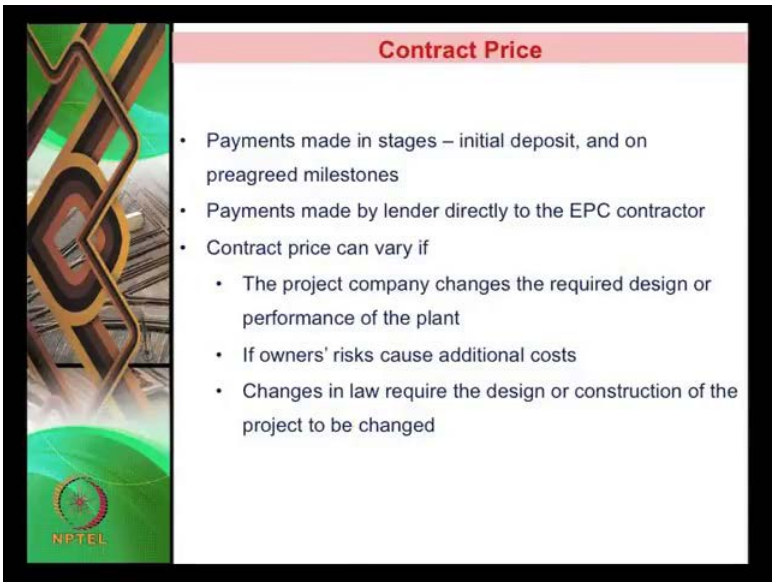

Next is a price of the contract at what price is the EPC contractor signed. So, for example, if you look at the entire contract price is not made at one goal, the payment in contract is made in many stages for example, there will be initial deposit may to the EPC contractor. So, that it can about 10 percent, it can be about 20 percentage of total contract value, and the reaming is paid on pre agreed milestone.

So, for example, if certain amount of work is completed then the next tranke of payment is made on and, so on. So, the payment is made in stages, so the entire outflow is not in cut off rent, and it also ensures that the contractor incentivizes enough to continue to perform the job, in a effective way. Otherwise if all the payment is made off rent, then he may not actually have enough of an incentive to continue to work after having receive the payment. And how are the payments made, the payments are made the payments are made directly to the by the lender in most cases the EPC contractor right.

So, most of the capitalist by browning, so instead of the lender giving money to project company and project company intern dispose it to the lenders, most of the payments are

directly made from the lender's back account to the EPC contractor's bank account. And we talked about the EPC contractor being a fixed price contract, but this price can be vary, under some circumstances in a normally it is a fixed price. But, then you know there are always exceptions provided, you know whenever some events occur then the price can be vary.

For example, if they decide or the performance of the plant changes you know after the specifications are being finalized what are the reasons. If that could be a superior technology that is available or it could be because, of some other reasons, if some of this specifications get changed then; obviously, the contract price will change . Second is if some of the owners risk is not mitigate appropriately, if the project site is not made available on time, if access is not proper for the project site.

So, all of this harm can create a additional costs, so that needs to be accounted for the other reason where the price can changes. If there is change in law and this changes in law requires, a changes to the design or changes to the construction features of the project, then it can result in price changes to the contract. So, by and large we have to be clear that EPC is a fixed price contract, but then there are some situations which can result in the changes in the contract price.

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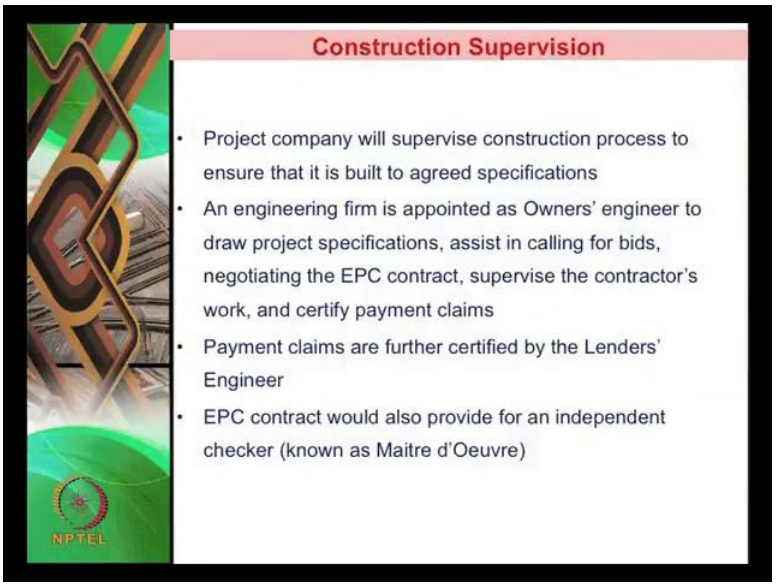

Next we will have to understand how do we actually, you know supervise the construction right, one is you signed the EPC contract, but is it enough. You will also

have to properly supervise, a continuously during the construction phase to ensure that things happened on time, things happened as per that decide specifications. So, it is an interest of the project company to supervise construction process and ensure that it is built us per specifications.

So, how is it done, so normally the project company hires an engineering firm, which is called as owners engineer, and owners engineer responsibility is to draw project specifications. And it assists in calling for bids for the EPC contract, and it negotiates EPC contract, and more importantly having been involved in the process of selecting the contract there also supervising the contractor's work. And whenever certain milestone has been reached, then owners engineers have the responsibility of certifying the payment claims right.

The payment claims is submitted by the EPC contractor to the owners engineer, and the owners engineer certifies and validates that yes job has been completed and then releases it for payment. And once owners engineer certifies payment, then it is also certified by the lenders engineer, lenders have their own engineer who's going to look at the progress of the project. So, they actually also certify before the payment is being released by the lenders.

In many cases the EPC contract allows the feature of having and independent checker right, independent engineer who is not a owners engineer, who not a lenders engineer. But, somebody independent who checks the progress of the project, and you know certifies some of the claims of payment to the lender.

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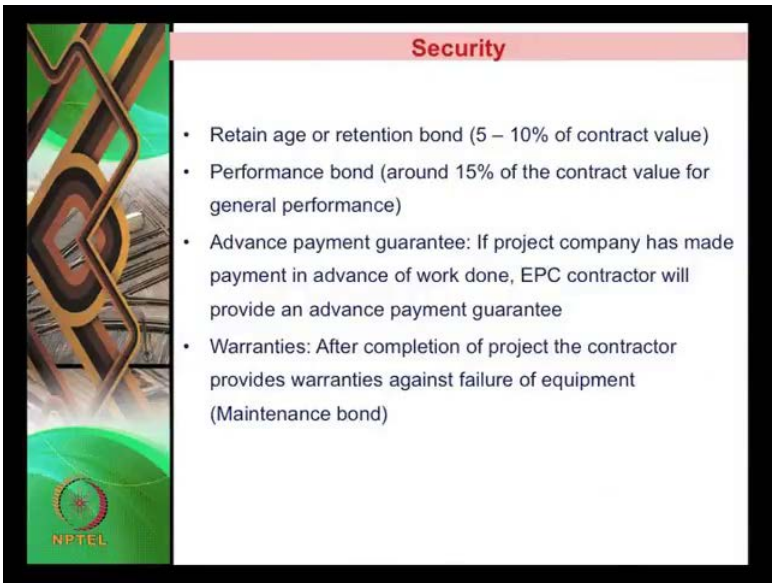

What is the security for the EPC contract, there are various types of security to ensure that the EPC contractors sticks to sticks to the classes. There is a retain or retain age or retention bond, where 5 to 10 percentage of the contract value or 5 to 10 percentage of payment is retained, by the project company. And then the performance bond, which is around 15 percentage of the contract value for general performance.

So, if the project does not perform in general then the bond value is utilized to ensure that the performance is corrected, and then there is advance payment guarantee. An advance payment guarantee is to ensure that, after receiving the advance the initial payment received from the project company, the contractor does not run away with the run away from the job. So, they actually give a guarantee which ensures that, for any job there is not paid for any job there is not done, then the remaining portion of the advance payment is given back to the project company.

So, this is your advance payment guarantee, in addition to that the EPC contract will also have to give warranties to ensure that, the project will perform as per specifications for example, if there is a road project, the road condition will look good for 5 year or faith 10 years or whatever the agreed period. So, if the project is not, if the project fails to meet the specifications during the operation phase, and there is warranty given by the EPC contractor to ensure that the cost incurred for maintenances are taken care of.

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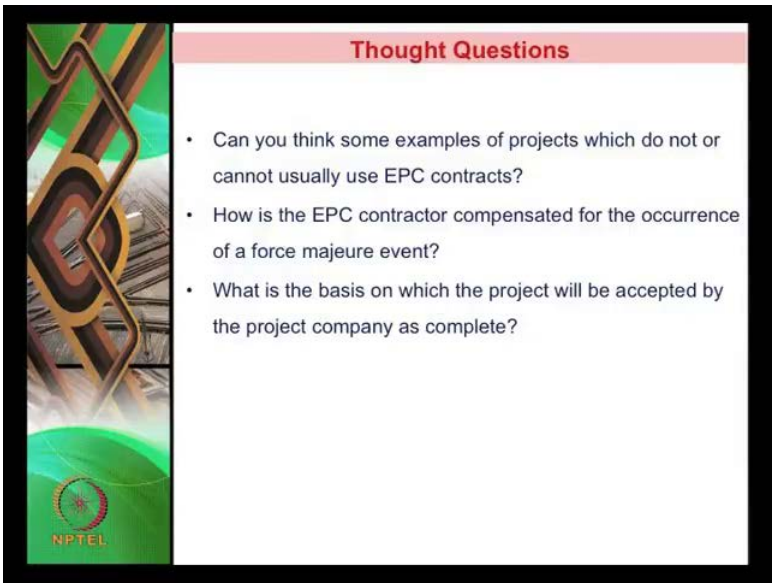

So, there are few questions that I want you to kind of think about and ponder and related to the EPC contract The first question is, we talked about EPC contract as a most common way of awarding construction contracts. But can you think of examples of projects which do not or cannot usually use EPC contracts. The second question is whenever there is force majeure event, the occurence of force majeure event is not in anybody's control, it is not in the control of the project company, it is not in the control of the EPC contractor. So, therefore how are the EPC contractor compensated for the occurrence of such force majeure events. And the third question, we talked about completion date. So, on what basis will the project be accepted by the project company as complete. What signifies as a project being complete and what are the events that surround this acceptance of the project as being complete. Okay, so we will talk about these questions in the next class.