Infrastructure Finance
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Lecture - 38
Context of Infrastructure Development

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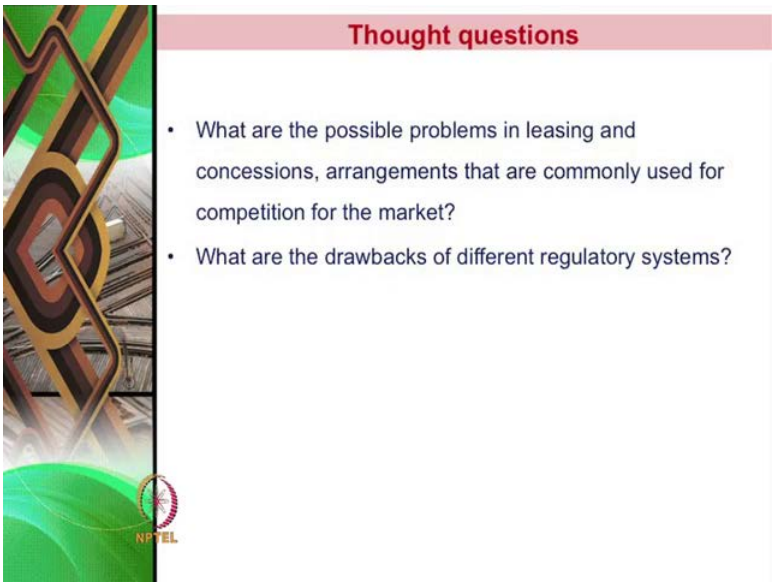

Hi, welcome back to this course on Infrastructure Finance, this is lecture number 38 and we will continue our discussion on the different Context of Infrastructure Development. Before we talk about today's topic, we will spend some time to discuss about the third question that we had at the end of the previous lecture. We actually looked at different types of competition, if you recall and we talked about broadly three different types of competition. One is competition in the form of substitutes, and then we talked about competition in the market, and then we talked about competition for the market. So, when we have competition for the market, at any point in time, there is only one provider or supplier in the market, but whenever there is a bid for the supplied to be selected, there is competition.

So, that is where we talking about competition for the market that is, the different suppliers and providers are competing to provide the service in the market place. So, the two most common arrangements, that we have in the case of competition for the market is leasing and concession. So, the question was, what are the possible problems in leasing

and concession arrangements, that we could normally think about. Before we actually do that let us try and broadly understand the differences between leasing and concession. So, though both of them are short term arrangement to attract private sector investment, there are some differences between these two types of arrangements.

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So, we will look at leasing and then you have concession, so the major difference between leasing and concession is fact that, in the case of leasing, there is no responsibility for financial investment on the private sector. So, no financial investment from the private sector, whereas in the case of concessions, the private sector is expected to make an investment, so financial investment is needed from the private sector. So therefore, we can actually applying leasing only those project or contacts, where we can clearly separate financing and operations.

So that means, we actually have financing in lumpy, which is having lumpy characteristics that is, you need to actually make financing investments only once in the while and there is no regular financing requirement that are needed. So, that is actually only those projects can be actually be put under leasing. In the case of concession, two things one is you might need regular financial investment and second is you may need substantial amount of financial investment initially.

And the government might not be in position to make that kind of investment and therefore, they are actually inviting the private sector to make an investment. So,

basically if you look at examples for leasing, typically it will include parking space. So, the government would have constructed a parking space, it could be around an airport, it could be in railway stations, it could be in a prominent marketplace and so on and so forth.

In most often the situation is that, the government do not operate, the public sector does not operate this parking spaces. So, these parking spaces are leased out to private contractors and for getting the contract, obviously the contracts will have to pay fee to the government. And after sometime, this kind of leases usually varied for a specific period, could be 2 years, 3 years, 4 years and so on. And at the end of the leased period, the government or the public sector comes back and rebids the parking space.

So, we are looking at having some kind of competition for the market, whenever the leases being rebid. In the case of concessions, several examples we see in concession for example, we have roads, where the government provides concession agreement and the concession agreement in some cases can be for longer duration. And in the case of airport, we have a concession structure for about 30 plus 30 that is, total about 60 years. So, concession is compared to leases fairly for a longer duration and but in both the cases, there are some specific problems that we need to be aware of.

So, what could be the issues, the first issue is that, how the revenue is going to be shared, let us say for example, if the person who is actually bidding, the contract is been structure as one time upfront fee then it going to be very difficult to project, let us say the traffic. And when traffic projection is going to be or revenue projection is going to be difficult to predict then the people who are going to bid will actually provide low built. On the other hand, if the structure is been, the contract structure is done in such a way that, there is a share in revenues.

For example, for every rupee of parking fee that the contractor receives, a percentage of it goes back to the government as licensing fee. So, we have that kind of arrangement in many project this days, so let us say for example, in some of the airport projects, the concession fee is structured as a percentage of revenue that the project gets. So, when you have fees structured that is, structured as a percentage of the revenue, as the revenue increases, the government also get better revenue.

But, if it is structure as one time upfront fee then it can work either way, if the concessioner gets a project by bidding the very low fee and the project becomes big success then the government will be pointed and it will be said as fault, because they have actually sold the project very cheaply. So, we are seeing this kind of instances in several project, notably in the case of telecom sector and so on. The second thing that we need to be aware of is the fact that, the people who actually want the contract might actually have short term orientation.

So, for the asset to providing good quality service, there might be adequate maintenance that is needed and the asset should have been use in a appropriate manner so that, the capital stock is not erodent. So, particularly if there is uncertainly in terms of getting the contract again at the time of rebid then there would be no incentives for the leasing contractors to actually make an investments and maintenance to ensure that, the capital stock of the assets is preserved.

Remember, any investment in maintenance cuts into the profit of the contract, so therefore there will be tendency to reduced the level of maintenance investment or the level of investment needed to keep the asset in good position. So, to ensure that, there is adequate investment being made or the assets is not over utilized, they has to be appropriate clauses inserted in the contract agreement and it has to be ensured that, the contractors comply to this requirements, that is what.

Second is, when there is an uncertainty in terms of, whether they is actually going to get it at the time of rebid. And there could be a instance of moral hazards that is, the existing contractor might actually deplete the asset so badly, the quality of the assets at the end of the lease period or concession period is actually in very bad condition. So, we have to ensure that, all of these conditions do not occur in leasing or contractual kind of a structure. And the second question that we had was, we talked about different types of regulated systems, so the question was, what are the drawbacks in the different regulatory systems?

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So, broadly we looked at two types regulatory structures, we looked at cost plus, which is also known as rate of return regulation and we looked at an incentive regulations, an incentive regulations is also called as your price cap. So, what are the drawbacks between these two types, so if you look at the cost plus, rate of return, in this kind of regulatory system, the investor is assured of for tariff, which helps in recover all the cost. It could be a operating maintenance cost, it could be debt servicing, it could be tax and in addition to that, certain specified return on equity.

So, that is your cost plus, whatever cost the investors incurs, there is a return on top of that, so cost plus profit, this is your rate of return regulations and then we are talking about incentive regulation, it is also called as price cap. So, tariff increases is limited to an extent, whereby the annual tariff increase increases at proportion of, at the change of retail price index. So, the retail price index changes by specific percentage, the tariff increases by specific percentage, but to have some kind of incentives for the provider, the tariff does not increase, either same proportion as the retail price index.

So obviously, the understanding is that, the provider would be in a position to improve it is productivity and improve the efficiency over time. So therefore, the tariff increases would be in such a way that, it does not increases same proportion as RPI, but increases slightly lesser and by what percentage, by a X percentage it increases lesser than the RPI. So, this X percentages is to account for the productivity increases, that the suppliers

might have been able to achieve, so this is called as price cap, the increase is limited to this extend.

Now, if this X is very high, if this X is very high then it is going to be very difficult for the provider to actually get good return on the investment, simply because achieving that kind of productivity improvements might be difficult. On the other hand, if this X is very low then most of the productivity gains are actually retained by the provider. So, the tariff increases but then the gains also increase, because of the productivity improvements.

So, ideally the X should be in such a way that, it actually gives adequate incentives for the provider to improve. And at the same time, it should not very high in such a way that, it become difficult for anybody to actually achieve that kind of X so that, there is no incentives for private sector to come into the project. So, the problem with the cost plus regulations is that, there is always a tendency for the contractors to actually built cost, particularly when you actually getting a return that is attractive.

So, when the Indian government open up the private sector, initially there was what is called as guaranteed return to the equity holders. And this guaranteed return was 16 percent to the equity investors, which at the time was considered to be quite attractive. Because, equity returns in the develop markets were not so high, they were in range of about 8 to 10 percent, but in India, they were getting a guaranteed return of 16 percent. So, this was very attractive return, so whenever we have this kind of situation, past research is indicated that, the suppliers had a tendency to inflate cost.

So, what would have been possible to be constructed, let us say X, in X million because of the infiltrated cost, it will take X plus Y million, because there is an incentives for the providers to earn additional returns, because of the cost plus regulatory system. So, this is to be called as a gold plating that is, we actually do not need to inflate the cost, we do not no actually have to go for a certain amount of investment, so it is like gold plating. We do not need to gold plate the investment, but because return are there, we are making this investment, simply because to earn this addition return on the larger base cost.

So, in the case of RPI minus X, between these two systems, rate of return regulations is a simple system, it is a quite easy to run the regulatory mechanism and so on. The price cap is little bit more sophisticated mechanism and in many developing countries, if they

have not developed good regulatory experience then normally they start with the rate of return regulation before moving on to the price cap system.

So, in a price cap system, the trick is to see, what should be this percentage of X, that will make it, that will give an incentives to the private investors. Under the same time, it will also give some benefits to the consumers, so now we will actually go to discussing some specific sector level characteristics. So, if you really look at infrastructure financing and infrastructure project by the private sector, there are two sector which actually have got a lot of investment from the a private sector, though are basically the power sector and then road sector.

Even if we looked at the PPP India database, you will find these two sector accounts for more than 50 percent of the total projects, so these two sectors are very important sectors in terms of getting more private investment. So therefore, we will spend some time to understand these two sectors, the feature in this two sectors in some details. So, in this lecture, we will talk about the features of the electricity sector and in the next lecture, we will talk about the road sector.

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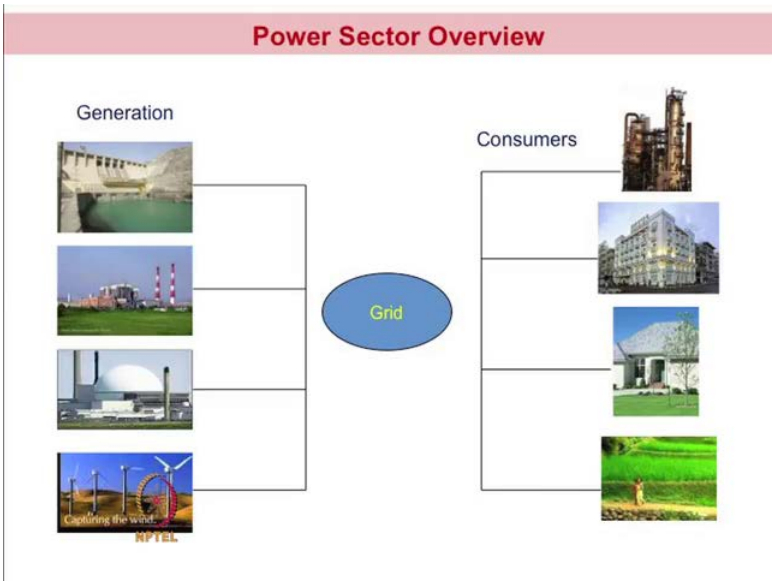

So, look at the over view of the power sector, we have really talk about it in previous lecture as well. Broadly it can be categorization into three different segments and then when we will talk about regulation, the regulation encompasses all these three segments. So, you might actually have regulations looking at generation, transmission and

distribution. So, if you look at generation, generation can be divided into different category, so for example, at the top you have what is called as your hydel power.

So, this is your hydel power, where you have dams and all of this and then you will have what is called as conventional thermal power generation, where you actually generate power by burning fossil fuels, either it could be in terms of gas, it could be in terms of coal, it could be in terms of oil, whatever it may be. And then you have what is called as the nuclear power generation, where we use nuclear fuels to generate power.

And then you have what is called as renewable sources or the non conventional energy sources, which is basically wind, today you have solar, you have tidal and so on, so of the other characteristics. We also seeing increasingly fuels such as bio fuels, which is being for a power generation. So, if you really look at it, power generation though it is a single segment, it consist of several different sub segments. Then obviously, the power that is generated, it is being transported through a electricity grid to the consumers.

Then if you look at consumers, we can broadly categorized the consumers into four different categories, here the top you have what is called as your industrial consumers. So, industrial consumers are consumers, who actually consume a lot of power and in the most of the cases, they actually consume powers at fairly high voltage. Let us say, the domestic voltage for power consumption is 220 volts, but in industries, they consume powers at a higher voltages.

And then you have the commercial segment, the commercial segment again is actually a major consumer of power. So, commercial segment is again a major consumer of power, though the commercial segment does not consume power at high voltages like the industrial segment, they are very concentrated, in a very small area, the demand or consumption is going to be a fairly high. Then you actually have what is called as a residential segment and the residential segment, the differences is that, they actually consume power at lower voltages.

And the concentration is not as high as compared to, let us say an industrial or commercial consumer. Remember, what industrial consumer will obviously consume many, many times of the consumption of electricity as compared to household. So, each and every household consumers is going to account for very small proportion of the

consumption. Then you have what is called as your rural electricity supply or the agriculture consumption, where again the supply is at lower voltages.

But, the dispersion of customers is far and wide, you do not really have in a single location a large number of consumers, like you have in a case of residential houses. So, there are differences on the consumer side as well and these has implication on the cost. So, the cost of supply, remember when you have actually generate power at the great level, let us assume that, it causes same, but from the grid when you actually take power to the consumers, the cost might actually vary.

So, we looking at the industrial consumers, the industrial consumers will actually consume power at higher voltages. So, the infrastructure requirement to actually reduce the voltage of power and then supply is going to be so much more less. So therefore, the cost of supply to industrial consumers or the commercial consumer is going to be lower as compared to residential and the agriculture consumers. So, between the residential and agriculture consumers, the cost of supply for a agriculture consumer is going to be very high.

Because, they are actually recoated in rural and inter land areas and taking power to them requires substantial investment in distribution wires, and which actually is going to increases the cost of supply. In addition, when you actually have very long distribution wires at transporting power at lower voltages, it also increases the distribution loss. So therefore, the costs of supply to agriculture consumers is the highest and cost of supplies to the industry consumers is the lowest.

Now, what actually happens to the power, the price that we charges for the power, so if you charge the price based on the cost of supply, the industrial supply should actually be costing the least and agriculture should actually be costing the highest. But, what we see today, what we see today is, we are looking at, now power being provided to agriculture at very lower rates. Generally, most of the states, the power supply to agriculture as free and the residential consumers obviously are provided power at subsidized rates, whereas the commercial and industrial segments pay the highest price.

So, the price that is being charge today in India, is not commensurate to the cost of power that it takes to supply to different consumers. So, that is something that, we need to be aware of…

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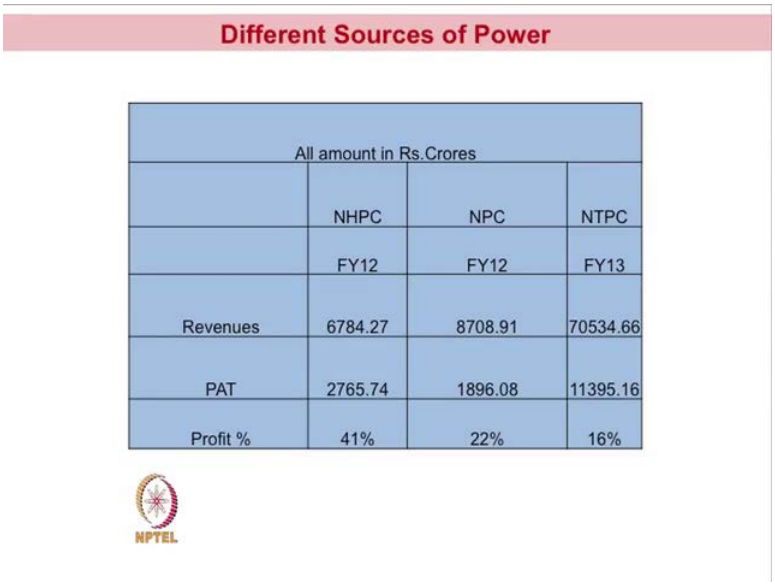

Now, let us look at the different sources of power and try and understand some characteristics. So, I have actually given the revenues and the profit after tax of three large organizations. You have national hydro power corporation, which actually generates powers from hydel sources. Then you have NPC Nuclear Power Corporation, which generates power from nuclear fuel. And then you have NTPC National Thermal Power Corporation, which actually generates power from fossil fuels that is, mainly coal.

So, if you look at the revenues and the profit percentage for each of the three different companies, we can make out some interesting trends. So, national hydro power corporation has the highest profit percentage, followed by the nuclear power corporation and then NTPC. Why is there such a big difference, let us say for example, the profit percentage of national hydro power corporation is more than twice as that of NTPC, what could be the reason for the difference.

Now, as we have discussed earlier, the biggest cost for a power generation is the cost of fuel. Now, if you look at the fuel cost for these three different sources of generation then we can explain the differences in profit percentage. So, for a hydro power generation, the cost of fuel is virtually free, we do not actually pay anything for fuel. So therefore, the profit percentage is lot higher then if you go to the nuclear power corporation, the cost of nuclear fuel is much lesser as compared to thermal fuel.

Remember, the technology involved might be very high, the complexity of extracting nuclear fuel might be very high. But then the cost of nuclear fuel per say, the unit in fuel cost that is needed to produce 1 unit of power is much lesser for nuclear fuel as compared to coal or oil or gas and so on. So, the profit percentage variation can be largely explained by the differences in fuel cost for these three types of generation. Now, we cannot simply go and say, by the profit percentage has to, this is most ideal sources power.

Now, if you look at hydropower, hydro power involves very large dam constructions and such dam constructions can actually result in rehabilitation of several people, because of village is being affected by floods, because of the dams being constructed and so on. So, the kind of cost that is association with hydel power, the uncertainty is going to be a lot higher. The externality is of hydro power, it is going to be higher as compared to thermal power and therefore, the complexity, the time it takes or for contracting hydropower is going to be a lot higher.

So, I am talking about the capital cost, the capital cost for hydro power generation might be a lot higher has compared to a thermal power. So, how do we know what is the capital cost, we need to actually find out from the balance sheet, what is the total assets, so assets is indication of the capital cost. Similarly, for nuclear power corporation, the nuclear power corporation technology is far more complex as compared to a thermal power.

And you need to have much more robo structures to be able to operator at adequate safety levels, in a case of nuclear power generation. So therefore, you might actually have higher construction costs as compared to thermal power corporations. Now, we need to actually see, whether this is actually the case, so as a homework, I would ask you to look at the total assets for each of these three companies and then calculate the return on assets for the three companies.

So then you will able to understand, which of those technologies are actually more are giving a higher return per rupee of investment. Second is, which also understand the risk level that exist between each of these three different technologies. If look at nuclear power corporation, it has a high degree of technology risk, it had high degree of safety risk as compared to the other two sources. So therefore, you do not find large, infact very

very limited private sector participation, in India if you look at it, there is virtually no private sector participation in nuclear power generation.

Next, if you look at hydel power, it is lot more challenging politically implement, because a large number of people might be affected, they might displaced, because of the dams being constructed and so on. And many cases, the construction of dams is also associated with irrigation and agriculture and so on, it is not just considered as generation of power. So, because of the multifold objectives that we have in hydel power projects, it is very limited participation in private sector.

Large hydel power projects are still propagating of the government, we are of course seeing a private participation in many hydel project. We are also seeing some amount of private sector participation in those areas, where government is finding it difficult to make an investments. And the least the risky as compared to among three is your thermal power generation and most of the private sector plants are today in thermal power generation.

There are lot of private sector projects that are coming in the renewable energy sources like wind, like a solar and so on. But, this segments have not really grown to an extent to kind of meet the kind of reliability that we have in the conventional energy systems. Even in the case of wind and solar and so on, practically the capital cost is going to be very high, because there is virtually no fuel cost, there is no fuel cost. We do not pay anything for generating power using sunrays, we do not actually pay anything for wind that actually rotates the turbines in the case of wind power.

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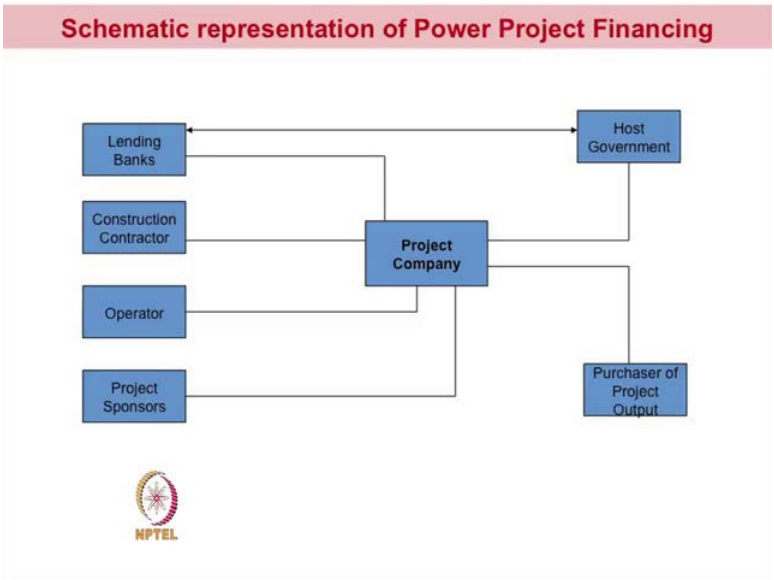

This is the schematic representation of power project financing, we have actually looked at this kind of structure in our original discussion on the project finance, but just kind of recap whatever we have done so far, I am presenting it here. So, largely you have the project company which is in the center and then there are various agreements that the project company has.

So, the project company has an agreement with the lending bank, which is a lending agreement then the project company has an agreement with construction contractor, which is your EPC contract then there is an agreement with the operator, which is your operation maintenance agreement. And then what have missed here is also called as fuel supply, so the project company's agreement with the fuel supply is the fuel supply agreement and then you have the project sponsors to actually provide the shareholder's agreement.

Then, there is an agreement with the host government, remember whenever we have a agreement with host government, we are not really talking about the very competitive situation. May be in comparative situation, agreements and support from the host government is not expected to be provided, because the market is competitive. So, there is an agreement between a host government and the lending banks.

So that means, the government actually provides some kinds of support that, if lenders are not able to recover their investment from the project company then the government

will be in a position to pay up the lending banks. And then the project company also has an agreement with the purchaser of project that means, there is a power purchase agreement, who will actually purchase the power that is generated at the specified tariff levels.

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So, now there are different types of power projects, before we actually look at different types of power projects, let us look at some broad characteristics of the demand for power. The first thing that you should be able to understand is demand for power is very fluctuating.

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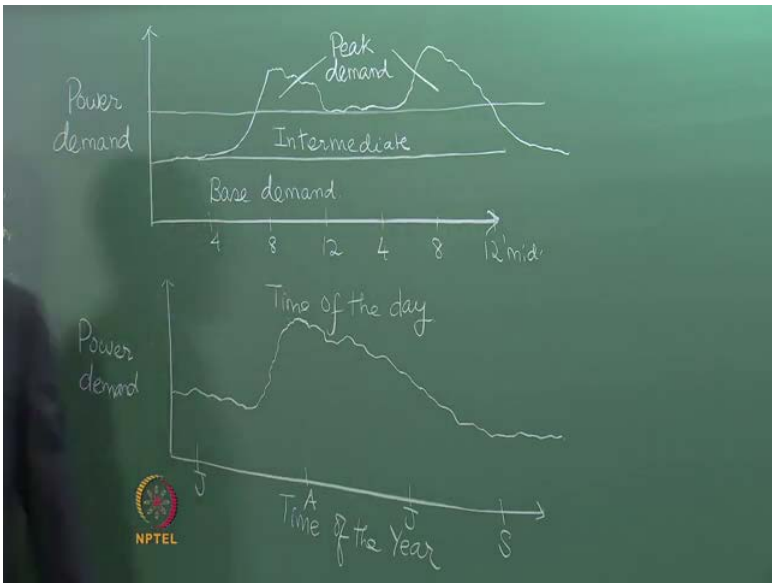

So, even if you look at single day, let us say for example, you have time of the day and then you have power demand, 4 AM, this is 8 AM, this 12 noon, this is 4 PM, this is 8 PM and this is again 12 midnight. So, this is the different time of the day and how is the demand or how is the consumption varying throughout the day. So obviously, at early part of the day, the demand is less and then as the day begins and people start preparing to go to office and so on, the electricity consumption increases.

So, it peaks at 8, 9 and so on and continue stay and by 12'O clock when most of this early morning needs are met, it falls slightly. But, because of the fact that, there is a lot of demand from the commercial that is, lot of offices and so on, there is still substantially high demand, again it is a proceeds. And then towards evening time, again people come back from offices, the demand from residential segment increases. Because, that is when you need demand for lighting, demand for cooking and all of this, again it tapers down as a night progress and towards end of the night, it till reduces.

So, basically what you actually see is, you see the demand or the consumption of power fluctuating within a day, so that is one. Second is, you will also find the demand for fluctuating during the year, so you want to plot a similar plot as say, time of the year then you have power demand. So, let us say, we have January, we have April and then we have June and then we have September. So, if you really look at from the Indian

prospective, the winters are not very harsh, so we do not really use very large heating load during winter, like the people use it in the west like Europe or US.

So for example, in those countries, the winters are very severe, where temperature go down to minus 20, minus 30, even at large populated area as main city. So, you need a lot of electricity power for heating loads, but in India, we do not really have that kind of large heating loads. So therefore, the power demand during the winters in India is fairly low, but what happens in India, we have very heavy summers, where temperature is very high.

So therefore, during the summer, there is substantial heating, air conditioning load, cooling load, therefore the electricity demand during the summers are higher. So, let us assume that, January the load is low and then it gradually rises, April comes and continues at the higher level till about end of the summer, in August and then graduate tapers down. So, during the year also, there is substantial variation in the consumption are, so we need to understand, it is very important.

So, this load, this demand that exist throughout the day, let us say for example, this can be called as let us say, the base demand for power. And then the demand for power that exist at this level can be called as your intermediate demand and then this can be called as your peak demand. So, the peak demand is not there throughout the day, but to avoid block outs, we have to ensure that, this much level of capacity is available so that, electricity can be generated when needed, so that is very critical.

This level of electricity should be generated whenever the demand fix up and if you are not able to generate then there is going to be power shortage. Now, with this understanding, we look at different types of power projects, the first is your independent power projects, independent power projects basically they have power purchasing agreement, there is purchaser and therefore, to a certain extent, the demand and the revenue risk is so much more reduce. Because, there are somebody, who signed the contract, who is willing to purchase power that is being generated.

The next category is tolling plant, a tolling plant can again be divided into two categories, tolling plant where the contractors will be fuel suppliers and tolling plant where the contractors will be the purchaser. Now, when they the contract, the contract is between the project company and the fuel suppliers or project company and the

purchaser. So, in tolling plant what happens, in tolling plant the contracting counter party decides, when to operate the plant.

Let us say for example, we have fuel suppliers, the fuel suppliers decides when he will actually operate the plant, we have a purchaser, the purchaser will decide when he will actually operate the plant. So, the project company is given return on equity, it is actually paid a capacity charge, which will help him to recover the investment and also provide the return for the investment that is being made. And whenever the project runs, whenever the power plant runs then the suppliers or purchaser provides what is called as the operation charge or the charge that is needed to run the plant.

So, if you really look at IPP and the tolling plants, both of them they have very limited risk, because the way the contract is structured, there is almost certainty in terms of recovering their investment as well as return on their investment. Then you have another category of project called as your hedged IPP, IPP is your independent power plant, so because of hedged IPP, we have what is called as your contracts for differences. That is, power plant generate power and it supplies power to the power market.

And simultaneously, there is also a contract between the power plant and the power purchaser, which is called as the contracts for differences. So, if the pool price that is, if the market price for power is beyond what is been agreed and they contract for differences then the difference in price will actually be settled between the project company and the contracting counterpart depending on what the differences is.

Let us say for example, there is agreed upon price and if this agreed upon price is lower than the market price then the contracting counter party will pay the difference to the project company. Similarly, if the agreed upon prices higher than the market price then the project company will pay the difference between the two prices to the contracting counter party, there is a contract for differences. This also ensures that, the revenue stream is more or less stable, but there is slight risk in the case of hedge IPP as compared to IPP and tolling plant.

Because, the duration of the hedging contract is much lower as compared to the life of the power plant. You have an IPP power purchasing agreement for 15 years, 20 years, it probably also have tolling agreement for a longer duration, but the hedging agreement is usually for 4 to 5 years period. So, at the end of the hedging contracting period, you

again have to renegotiate fresh contract. So, we do not know what is going to be the situation at that point in time, when there is an excess power supply then people will be able to negotiate for a lower contract for differences price.

The fourth category is called as merchant power plant, a merchant power plant has no contracts and it sells it is output directly into the electricity commodity market. So, by it is very nature, therefore merchant power plant will function only for a limited amount of time and in most cases, merchant power plant are used only to supply power during the peak demand. So, the merchant plant will then have to recover the investment cause and also get a return during the limited time that it functions.

And therefore, the tariff that the merchant power plant charges is normally going to be a lot higher as compared to, let us say base load power plant or intermediate load power plant. Now, what kind of power plant is going to be that is, going to be financed, as a lot of implication and in terms of; however we going to a finance it.

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Financing pattern for power plants

	Tolling / PPA	Merchant
Capitalization	80% + Debt	45% - 65% debt
Weighted average cost of capital	Lower	Higher
Economics	Capped upside – net income constraints if contracted with third parties	Retains full upside
Equity discount rate	Lower	Higher
Typical financing strategy	• Single asset financing • Leasing transactions	• Portfolio financing • Partial merchant / anchor tenant • Subordinated fuel • More difficult for leasing
DSCR target	1.4 – 1.5	1.7 – 4.0

Let us say for example, we have broadly let us say two different categories of power plant at the extremes ends, the one end we have merchant power plant and other end you have tolling power plant. So, in the tolling power plant, because of the fact that we actually have lower risk, because there is adequate certainty in terms of revenues and so on, the project will be able to get higher amount of debts. So, the project normally gets

funding more than 80 percent of debt, whereas in case of merchant power plant, the debt is to the level of about 45 to 65 percent.

And this has implications obviously, for weighted average cost of capital, we already seen in earlier, cost of debt is lower as compared to the cost of equity when the project is being funded by higher proportion of equity. Therefore, the weighted average cost of capital is also going to be higher. Therefore, for merchant power plant, the weighted average cost of capital higher, because it has a higher proportion of equity. Now, let us look at economics, in the case of tolling power plant, the economic is caped because of the fact that, you have a power purchase agreement.

Even if the market price for power increases, to your advantage, you will not able to take advantage of fact that, there is a contractual agreement that has been signed between the project company and the power purchaser. Let us say for example, if there is a sudden demand for power in the economy in the country, because from growth in economy and all of this things and it will not be take advantage of, let us say the sudden increase in demand, provided there is no corresponding increase in supply or capacity.

Simply because you actually have power purchase agreement and you will have to under normal circumstances, honor the terms of power purchase agreement. So, the upside is capped, you may not be able to take advantage of any sudden increases in power prices. But, whereas in the case of merchant power plant, since there is no contractual agreement, you can always sell at market price and market price increases then obviously, it is going to be a big advantage.

So, any such increases, the benefit of the full upsides is going to come to the merchant power plant let. Let us look at the equity discount rate, the equity discount rate is going to be lower for the power purchases agreement, simply because the risk levels are also lower and for merchant power plant is going to be higher, because of the higher levels of residual risk. What is the typical financing strategy, tolling PPP basically financing it as a single project, so each and every project is consider as a single asset and financed accordingly.

And so given there is kind of certainty in terms of revenues, people also use leasing transactions, so whenever you using leasing, there has to be adequate certainty of revenues, because least payment are contractual. If you do not have revenues then you

may not be able to meet the least payment as per the leasing contract. In the case of merchant power plant, each and every project might actually be highly riskier, so therefore instead of financing as a single asset, you finance it as a portfolio asset.

So that, even if one or two the projects experiencing problems, the other projects able to provide returns for the investors, so that is one difference we actually do it as a portfolio project. Second is, we do not actually have merchant kind of provision for the entire the capacity of plant, so you have what is called as a partial merchant or an anchor tanant. That is, there is purchaser who is willing to purchase power upto let us say 50 percent or 40 percent of project capacity, the remaining 50 percent or 60 percent is treated as the merchant power plant.

So, there is a guarantee for certain amount of power that is being generated and only the balances is under the risk category. The third financing provision that you normally see is, subordinated fuel that is, usually what happens, there is revenue and then there is operating cost. In operating cost, there are fuel expenses and after meeting the operating cost is when the debt holders will be paid. But, when we talking about subordinated fuel, subordinated fuel indicates that, fuel payments are subordinated to debt holders payments that is, debt holders are paid first and after that only, are fuel suppliers paid.

So, this is one of a arrangements that we actually find the in merchant power plant, because the lenders would actually find this lot more comforting, because they get their payments first even before the fuel suppliers. And because of the fact that, the revenues are no certain, it is not going to be easier to actually going for leasing kind of a transaction as compared to PPP, where we see leasing more common. And we should also understand that, the DSCR target that is, the Debt Service Coverage Ratio target that are determined by the banks is going to be a lot different between these two.

In the case of PPA, the debt service coverage ratio is the range of 1.4 to 1.5, whereas the case of merchant power plant, it can range anywhere between 1.7 to 4. So, this indicates that, people will actually, investors would actually look for higher margins, higher coverage as compared to a merchant power plant.

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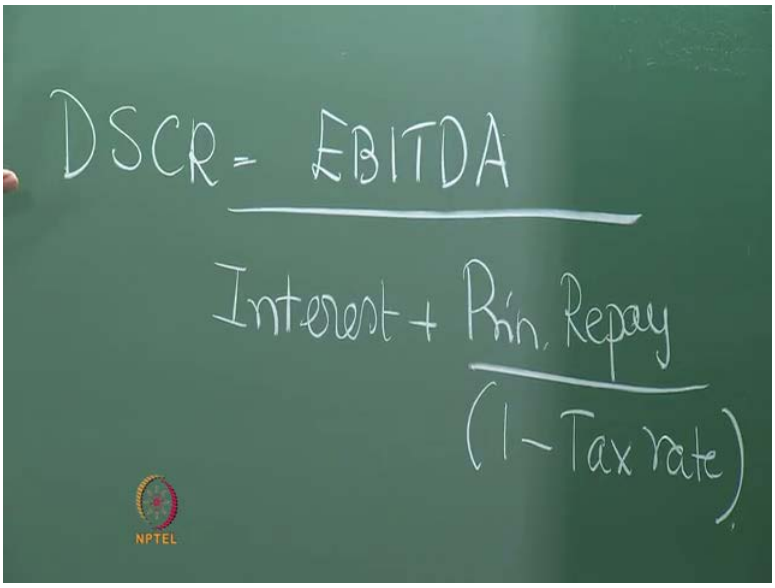

In case, you do not recall what is a debt coverage ratio, the expression for debt coverage ratio is nothing but you have earnings before interest tax and depreciation in the numerator and we divided numerator by interest payments plus your principal repayment divided by 1 minus tax rate. So, this indicates, how comfortable the project company is, in terms of honoring that debt of that is a principal as well as the interest repayments to the investors.

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Couple of ((Refer Time: 47:24)) that we can see toady in project finance is, markets are moving from regulated to the unregulated structure, that when we talk about regulated that means, we moving from rate of return regulation to completely comparative structure. Till recently, we talked about the mature market and this is largely statement that is applicable for developed countries, where we had all debt finance that is, project was being funded by even 100 percent debt, at least during the construction phase.

And how is it possible, because during construction phase, there is a guarantee from the project sponsor and this guarantee was adequate for debt holders to provider for 100 percent of the project construction. Once the project begins operations then the loan was refinance and at the time refinancing is when, the equity contribution from the project financing came in for the a project company. Normally, the funding was done as a two step process, the first step bank loans were obtained and this was subsequently refinancing by the capital markets.

So, the question that we have is, why do we actually have bank financing in initial stages, so we actually talked about it in an earlier lecture. We talked about concept called the negative arbitrage that is, when we actually take money from the capital markets, all the money comes upfront. But, when you go for bank financing, we are able to withdraw the money based on our needs and when all the money comes upfront, the interest is due right from the day the money is being obtain for the project company.

And therefore, there is surplus capital that is always available, we do not need all the capital upfront, constructing happens over the period of time. And if you get all the money of upfront then interest will have to be paid, so all the money is not necessary at that point. Whereas, when you look at bank financing, bank financing we actually withdraw at multiple stages depending on the requirements, depending on the stage of construction we are in and it helps to actually have lower interest payments, because we start paying interest only from the time of withdrawal.

So, there is a concept of called the negative arbitrage that is, the surplus capital that we have raised from the public markets. If we invest it in other marketable securities, the returns that we get from that will be lesser than the interest that the project company will be to the bondholders, so this is called as negative arbitrage. So, there is something

called construction pools, construction pools is nothing but constructing a portfolio of project, rather than looking at financing each of these project individually.

When you finance as a single assets then there has to be negotiation, there has to be a transaction for each and every project. So, this actually results in substantial transaction cost and fees to the bank, but if you really look at financing project as portfolio project then we do not of approach the bank for each and every project. So, the entire financing transaction done at one stretch and transaction cost are minimized, if we financing as a portfolio of projects.

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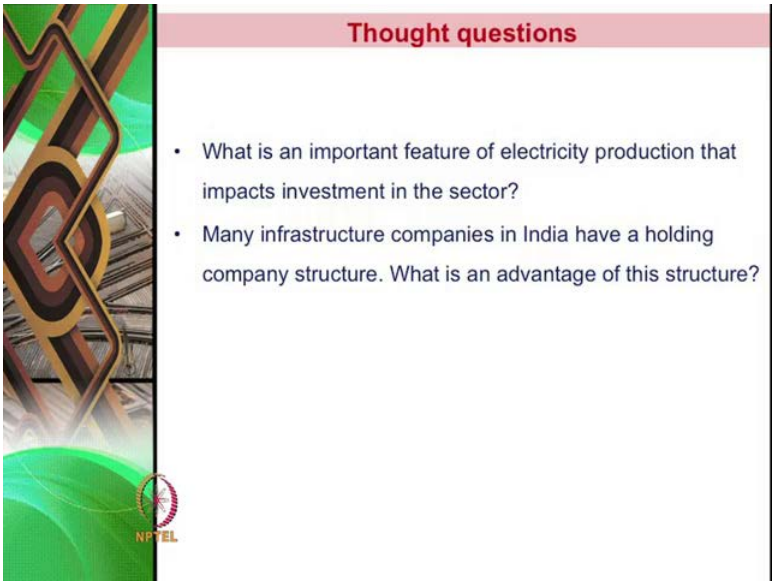

So, to complete this lecture, we have a couple of question as usual, we have two questions for this lecture. Question number 1 is, what is an important feature of electricity production that impacts investment in the sector. The second question is, many infrastructure companies in India have what is called as holding company structure, what is an advantage of this structure. In case you are not aware what is a holding company structure, we will discuss it in next lecture, but I want you to think about what is an advantage of an holding company structure.