Water Economics and Governance
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Lecture - 24
Pricing Water: Water Tariff Models

Welcome friends, earlier session we were discussing about the water tariffs model and just to quickly recall that we did talk about the 2 water tariff model structures, one was the flat pricing system where the households are charged a fixed amount per month irrespective of their water consumption and generally the consumption is not metered or monitored in that case. The other was a uniform tariff structure where the consumers are charged at a fixed per unit volume of water or per unit consumption of water, the households consuming more water will be paying more the household consuming less water will be paying less and it is linear variation because the charge of per unit water remains fixed. So, a 1 meter cube of water or 1 kilo liter of water will be kept at a fixed price and accordingly how much is the consumption the households will be charged.

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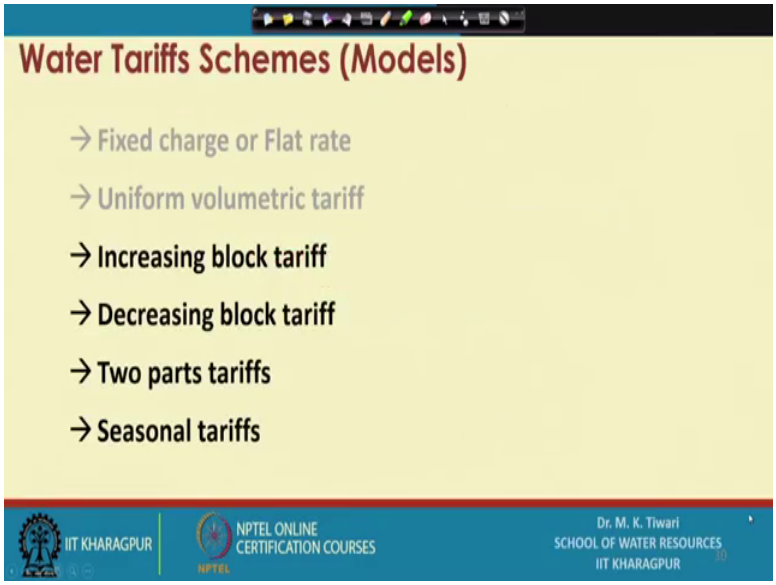

Continue from there as the first couple of one that we discussed as you are saying we will discuss the rest of the water tariff models in this session and we will start with the increasing block tariffs which is popularly known as I B T.

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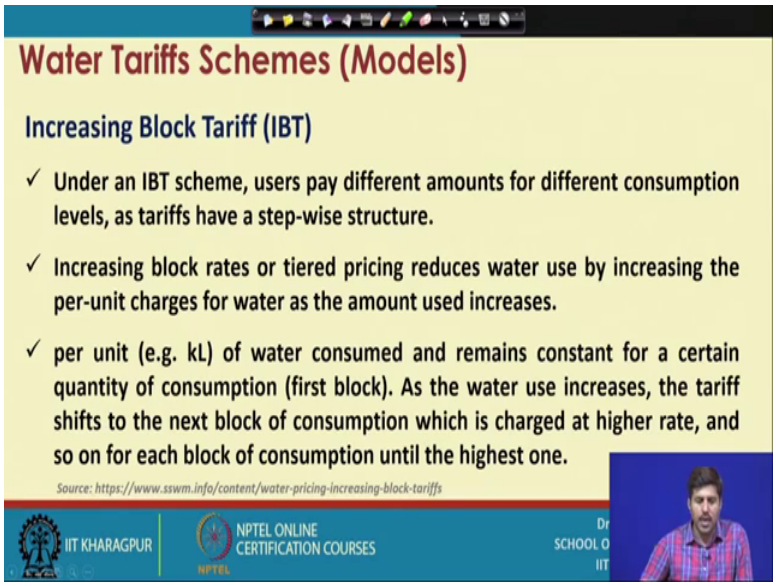

The increasing block tariff is a system where users pay the different amount for different slabs of consumption different level of consumption.

The tariffs this particular tariff has a stepwise structure, if you see the increasing block tariffs the structure would be for a consumption volume low consumption volume.

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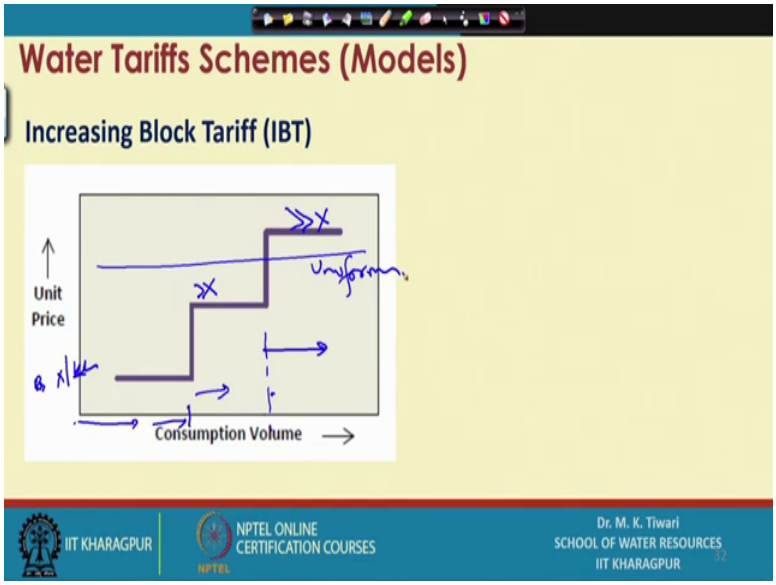

If consumption volume is up to this much maybe the customer will be charged for certain value let us say this value is X. So, X rupees per kilo liter or per meter cube, but if consumption increases beyond this point the rest of the consumption is going to be

charged at a much higher value. So, this value would be greater than X for that purpose and customer will be charged at higher value for the consumption up to the next slab.

Further if consumption increases further beyond this slab also, then the customer is going to be charged even higher which is going to be many folds higher than X probably and it could be sort of prolonged till the last slab. Generally 3 or 4 slab systems are taken it could be 3 or it could be 4, that way the pricing is done based on the consumption, now the uniform pricing model also is based on consumption, but there the prices unit prices are flat if you recall this is your uniform. So, uniform pricing the price the rate per unit water consumed is fixed while as in increasing blocked tariff the rate per unit water consumed in fact changes.

Now, that is, what is the basic idea of in I B T which is increasing block tariff models?

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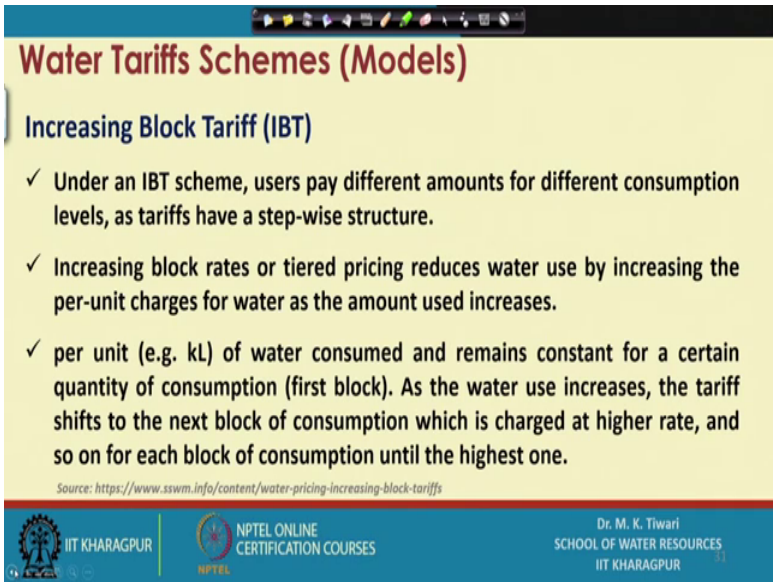

So, the increasing block tariff rates are, tiered price structures and consumers pay the higher charges for more water consumed the per unit water consumed will remain constant for some amount of water which is your first block and then as the water use increases the tariff shifts to next block of consumption and that way would be charged at a higher price.

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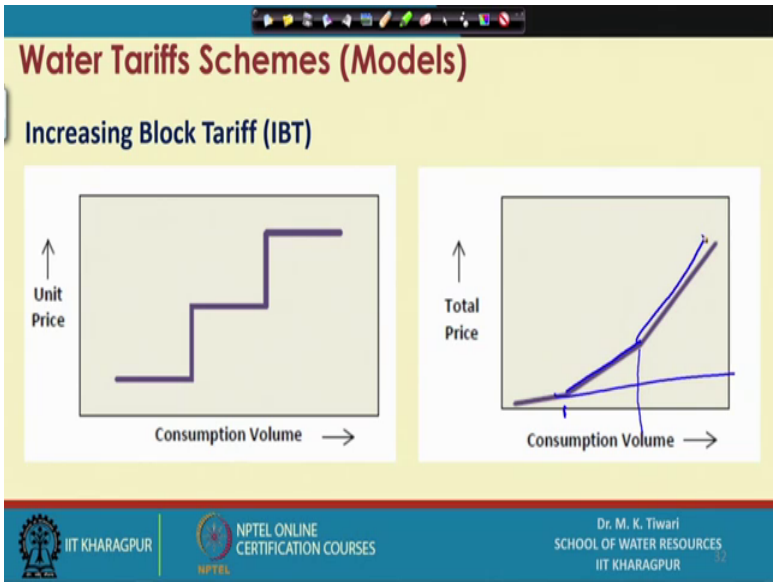

So, eventually if you see the total price, total price also changes in uniform tariff model if you see the total price line would have been going by this but now because beyond this point the rate has changed. So, you will see a steeper slope and beyond this point the rate has changed, maybe a further steeper slope. So, that way the consumption of water will decide what unit rate of water is being applied in order to while generating the water utility bills.

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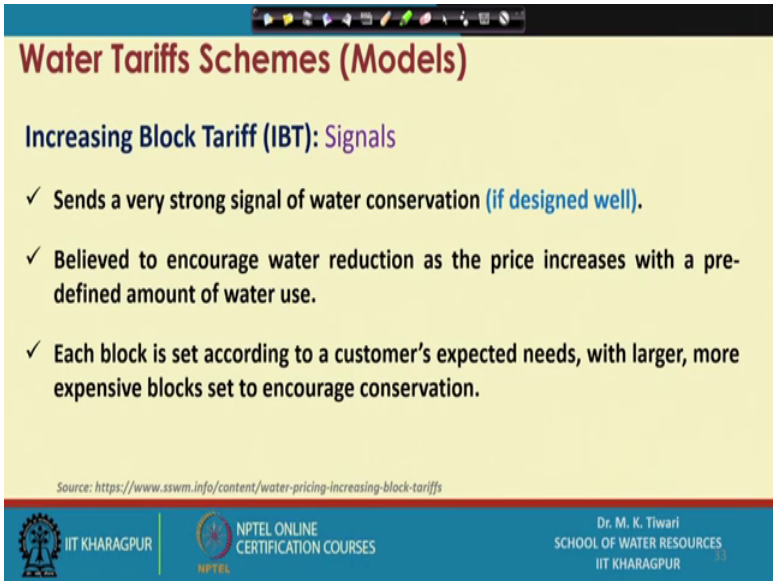

That is increasing block Tariff model.

Now this model particularly sends a very strong signal of water conservation if designed well, why very strong signal because for the basic uses generally the first slab which is often set at a lower price in order to ensure the in order to ensure the affordable water to low income groups as well. So, for the first slab or the basic slab the water is supplied at a lower tariff, but as the consumption increases the price is made steeper and steeper which indicates that the consumption should be kept low in order to attain the low per unit prices of the water.

So, it is believed to encourage the water reduction as a the price increases with predefined amount of water use and each block is set according to the customers expected need with larger more expensive block set to encourage the water conservation.

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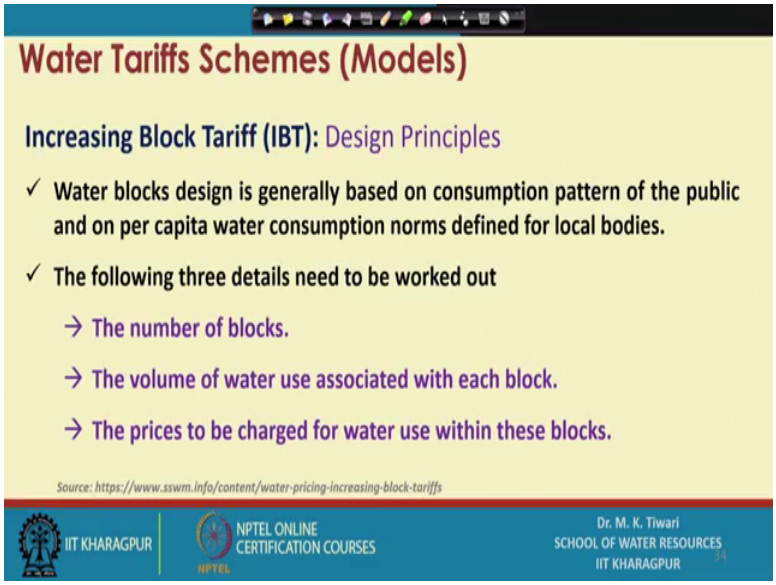

Now the design of increasing block tariffs is needs certain information, the water block designs is generally based on the consumption pattern of the public and the per capita water consumption norms that the state bodies or water bodies are defining. There are 3 needs that need to be work out 3 things that need to be worked out, the number of blocks the volume of water used associated with each block and the price to be charged for water used within these blocks.

So, you see because there are going to be n number of blocks either generally 3 4 and it could be higher as well, but typically minimum 3 blocks are always kept in a I B T kind of structure. So, you are going to decide on to how many numbers of blocks is being to

kept in the pricing structure then what volume of water use is going to be associated with each block. So, for example, your basic block, whether it should be kept at 10 kilo liters per month, or 15 kilo liters per month, 20 kilo liters per month what block one is going to install.

Then there is what is going to be the price of each unit price of water in each block what is going to be the unit price in the first block, unit price in the second block, unit price in the third block. So, these 3 components are needed for designing increasing block tariffs pricing structure for water.

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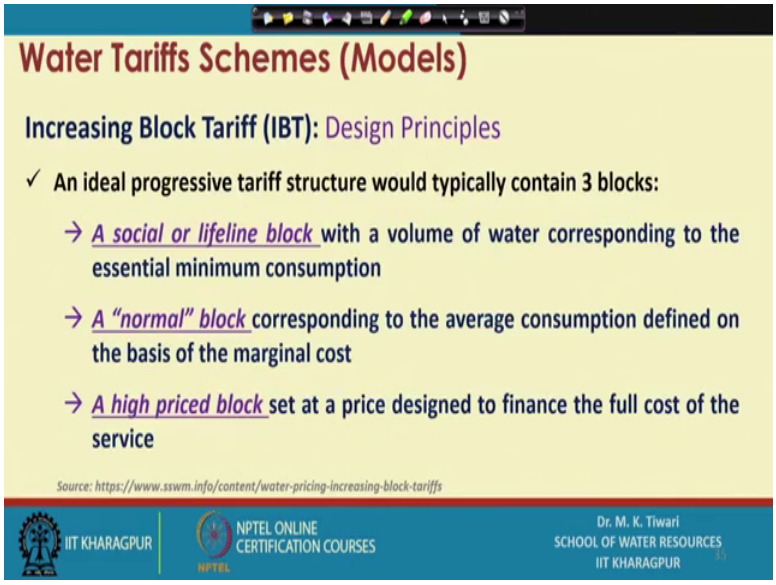

Now if you see the Design Principle a ideal progressive tariff structure would typically contain 3 blocks minimum it is not that it is always going to be 3 blocks only, but there are typically minimum 3 blocks are provided the one is for social or lifeline block which is your basic block also. So, your social block is responsible for providing a volume of water corresponding to the essential minimum consumption.

So, whatever the domestic minimum consumption is needed that should be provided by the utility at lower cost one cannot charge the exuberant price for the basic minimum a quantity of water. So, that way the social or lifeline block is to be kept at a lower level and this has to be the first block in a I B T structure post this it goes to a normal block which corresponds to the average consumption defining on the basis of marginal cost.

So, the marginal cost is the sort of assumes the recovery principle because in order to get a sustainable pricing structure one should ensure the financial recovery of the investment being made and that is done when the price is set near marginal cost. So, generally the second block or normal block which allows for up to average consumption is priced near marginal cost or that marginal cost basis while the subsequent blocks which could be third or fourth blocks typically are high priced blocks and they are set a price designed to finance the full cost of the service.

So, for higher consumption of water the prices are set higher in order to get generate the revenue for future expansion for the capital recovery at times the utility operation additional operational costs. So, all those things are set into the third or subsequent blocks and that is why the users get a message that keep your consumptions within at least first 2 blocks should not move beyond the average consumption as those users who consume more are going to bear the additional cost for the utility additional operation or revenue generation schemes.

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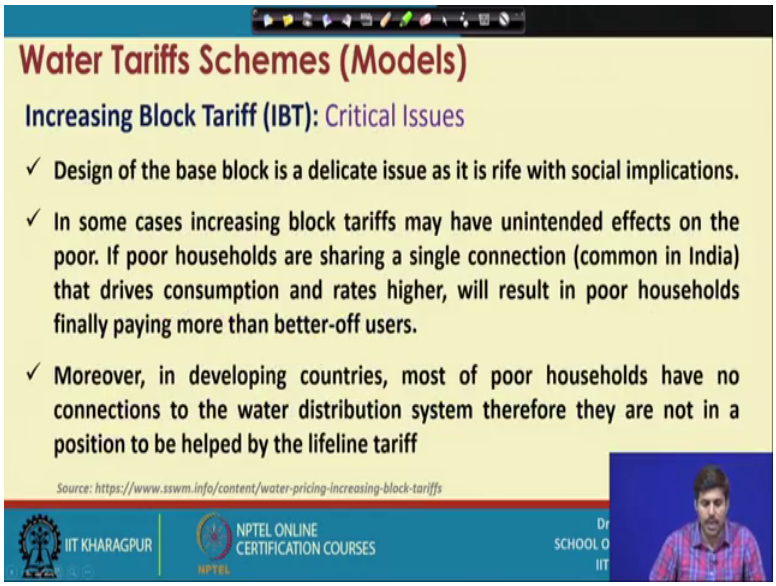

So, that is how this basic design is thought of a I B T model there are certain critical issues that design of the base block is delicate issue as it sort of gets in rife with the social implications. So, in some cases the increasing block tariffs may have unintended effect on the poor for example, if poor households are sharing a single connection, this is very common in India many times there is a single water connection between number of

households. So, all the households usually take water from there and then that way the revenue or those things are distributed among themselves what so ever their understanding is, but what happens that when more than one family are relying on to a single water connection so; obviously, because there are more families relying on to one connections; obviously, the consumption is going to be higher.

Now, if the consumption is going to be higher, the connection will be billed at a higher price at a higher unit price and that leads that those poor households eventually will be paying more or at a higher rates then the then the sort of high income group users. So, that could be one case which is particularly associated when there is a multiple users at single connection further in developing countries most of poor households have no connection of water distribution system, in such cases if the water utility have not included the poor's or low income group people in their service coverage.

The basic purpose of keeping the base tariff or the lifeline tariff low is defined because the water is not probably being reached to the needy people and the person with good financial standing are getting the undue advantage of the low lower price which is in fact, lower than the marginal cost generally because that is the second block, they get an undue advantage of lower price of that tariff structure so, that is another issue.

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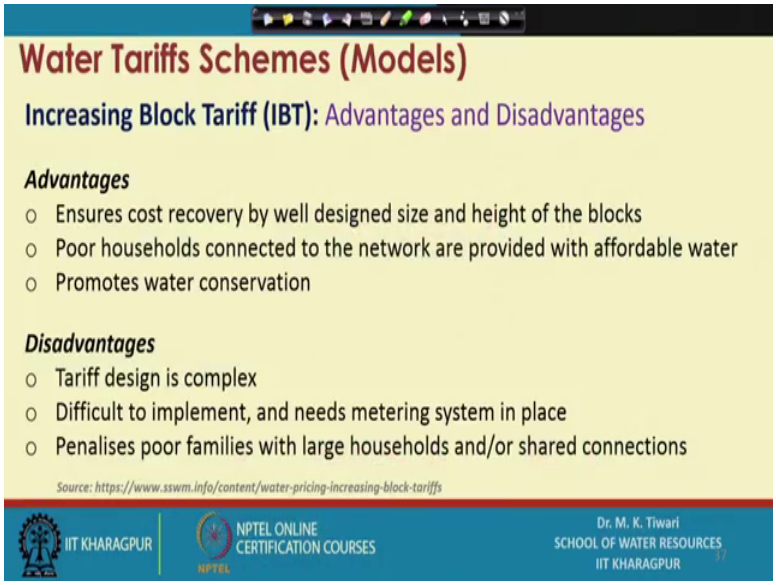

Now if you see the advantages and disadvantages of increasing block tariff system, the advantages specifically includes that it ensures the cost recovery by well designed size and height of the blocks.

If I B T is designed well it sort of ensures the sustainable financial recovery model while poor households if they connect to the network they are provided the affordable water because the lifeline or baseline price is kept very low and it also promotes water conservation because the higher consumption or the higher the wasteful consumptions at higher end are discouraged by penalizing the unit price increased unit price of the water. There are certain disadvantages also associated disadvantages which includes the that the design of tariff structure is very complex we need to work out how many slabs, what is the going to be the different sizes of the slabs, criteria for the slabs, how much water is to be allowed in each slab, then what unit price is to be fixed. So, all these aspects make the design of tariff structure relatively complex of course, it is not that complex though, but when we compare it with the flat price system or uniform price system then it is relatively complex.

For that is difficult to implement and needs metering system proper metering system in place because without the metering it cannot be implemented as flat price system and it also penalized the poor families with large households and or shared connection. So, when there are the numbers of people are more in a household or more than one family, more than one household is sharing a connection, in that case the consumption moves to the higher block and the poor families has to pay the prices at a higher block that is the basic disadvantages.

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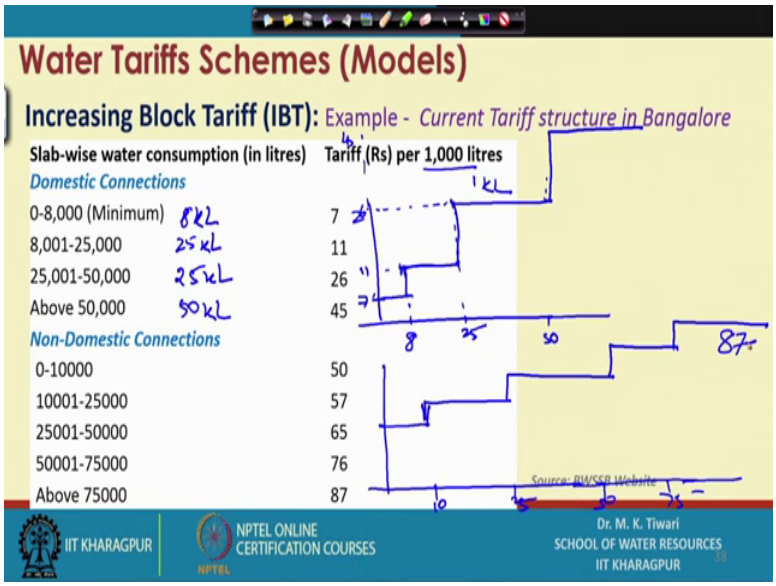

This is one of the example of increasing block tariffs I B T model and it has been a this is actually the current pricing structure for this city of Bangalore with the customers with metered connection. So, you can see that this how the model is the first 8 kilo Liters, 8000 liters means your 8 kilo Liter. So, 8 kilo Liter water is charged at 7 rupees per kilo Liter. So, 1000 Liters is equivalent to 1 kilo Liter. So, the prices here are rupees 7 per kilo Liter whereas, if you see, for the first if this is let us say 7 rupees.

So, for first 8 kilo Liters the prices are 7 rupees and then from 8 to 25 kilo Liters which is your next block which sort of the average water consumption range for 8 to 25 kilo Liters the price is charged at 11 rupees per kilo Liter, a little increase which is probably the marginal cost of the water. So, from here it is charged at up to 25 it is charged at a 11 rupees per kilo Liters, this might this will be 11 that way and then further 25 to 50, up to 50 kilo Liter which is the next block the it is charged at 26 rupees per kilo Liter, if let us say this being 26. So, water is going to be charged at this rate beyond 25 up to 50 and then beyond 50 the water is going to be charged at a rate of 45, let us say 45 is somewhere here, then it is going to be further plus which is 45, this kind of I B T is in place at the time at in Bangalore city for domestic connections.

Similarly for nondomestic connections or commercial connections of course, the charges are to be higher, but it is quite high if you can see the structure is again similar to the I B T only the model is I B T whereas, the connections the prices are very high. So, you see

that 10 25 the criteria is for 10 then 25 then there is 50 75 and beyond 75 the prices are starting from 50, up till 10 it will be charged at 50 then little higher 57 then 65 then 76 and beyond 75 it is at the cost of 87 finally. So, this kind of I B T price structure is placed in city of Bangalore for nondomestic connection.

So, that is how the I B T models are used in field and I B T is one of the models which is gaining more and more popularity these days because of the signal that it sends towards the water conservation as well as it ensures the criteria of affordable water for the basic minimum quantity. So, the basic slab is kept low in order to ensure that yes the services are affordable, but the higher consumptions are penalized in order to ensure that the system gets the complete cost recovery.

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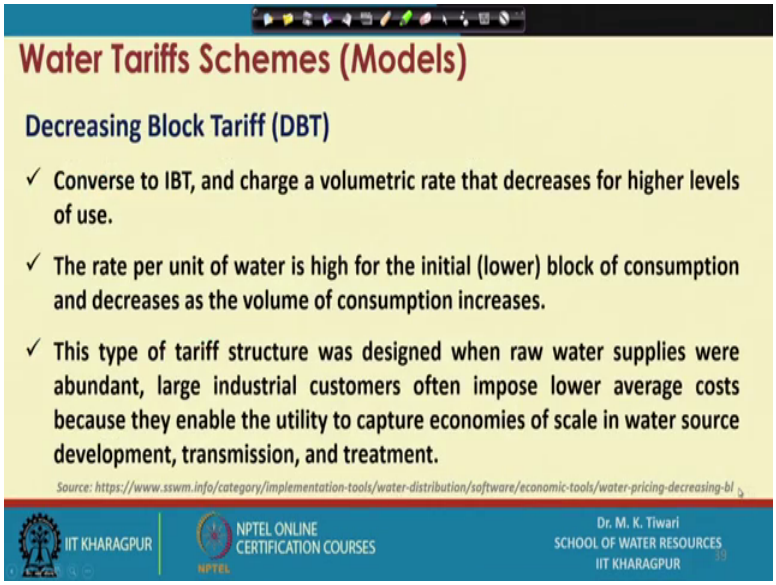

There is another model which is called Decreasing Block Tariffs which is converse of I B T as the name itself suggests and charges a volumetric rate that decreases for higher level of uses. So, it is exactly opposite of I B T where I B T charges higher price for the subsequent slabs it actually reduces price for subsequent slabs. Now the rate per unit water is high for initial or lower block of consumption and decreases as the volume of consumption increases.

So, this type of tariff structure was designed earlier when raw water supplies were is were in abundant large industrial customers often sort of impose lower average cost because the charges that they would pay to the utility would be enormous and it sort of it

was helpful for the economics of the utility to in order to compensate that. So, with the lower charger itself the economics of scale in water source development transmission and treatment all were taken care of.

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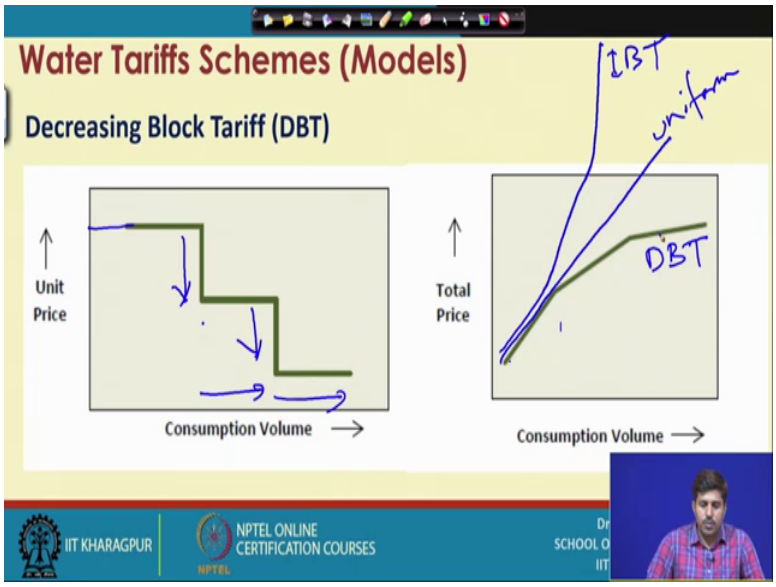

So, it was developed in that sense the structure is would be like this as we were discussing it is opposite of the I B T system. So, unit price decreases you will have a higher unit price for the basic slab and then as soon as you increase your consumption the prices fall, further increase your consumption the prices further fall. So, that is the decreasing block tariff model and if you see the total bill in such case it is going to be in the uniform tariff structure as you see this is your uniform structure model in I B T it was reversed that with the uniform it will increase the next block it is going to increase then it is further going to be steeper. So, that was kind of your I B T system whereas, total cost if you see over here in the decreasing block. So, this is your the total cost is will be lesser as the prices are going to be decreased if we start from the same initial point of course.

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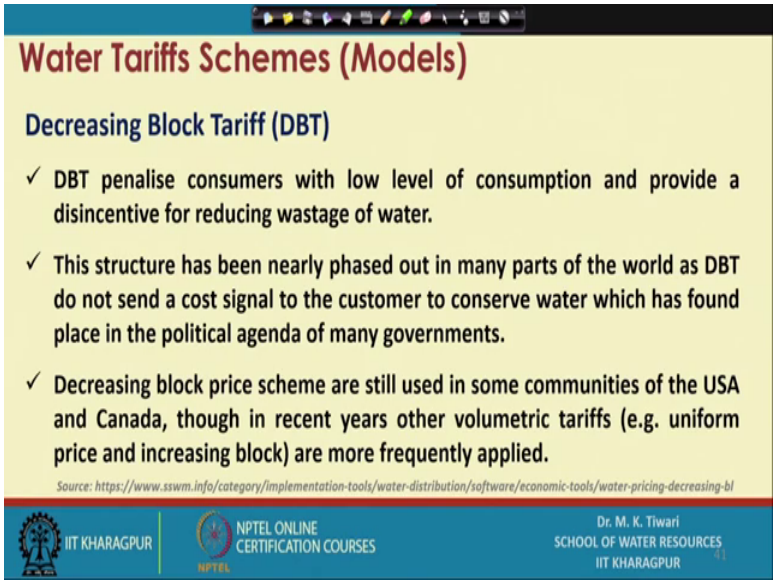

Now, the decreasing block tariff model the basic problem is that it has turned largely irrelevant in today's time because it penalized the customers with low level of consumption as they have to pay the highest slab and it provides sort of incentive for enhancing the water uses. So, the customers who use more water will pay at a lower prices and it sort of gives a disincentive for reducing the water consumption. So, that is why this structure has sort of being phased out from many part of the worlds and primarily reason that it does not send a cost signal to the customer to conserve water and the water conservation is sort of in today's political agenda also for many of the parties many of the system or government and the basic concept of decreasing block tariffs is against the water conservation philosophy, that is why this is largely being discouraged.

Although it is still being used in some communities of the U S A and Canada though the volumetric tariffs either the uniform price or increasing block price are frequently replacing the decreasing block tariff structures. So, that is the problem with D B T one example of decreasing block tariffs you can see in Indian railways. So, where you travel more and the cost of travel per unit kilometer keeps on decreasing. So, for first few kilometers you will be if your journeys of let us say 500 kilometers you may be paying 500 rupees for next 500 kilometers you would be paying barely 200 or 300 rupees or for next 500 it will come down to maybe 100 or 200 rupees.

So, those sort of market in market the decreasing block tariffs has it is distinctive advantage because when you consume the more amount or when you purchase the more amount the packaging the transportation or the various other cost actually reduces and

that way the unit prices are reduced for the higher consumption. It is as simple as that we go to the market you buy a 1 kg potato you might get at a different rate you buy 5 kg potato the vendor might offer you at a different rate. So, that is the concept of decreasing block tariffs that the higher the consumption the lower the rate, but in sense of water it is not applicable in today's time as it goes against the principle basic principle of the water conservation.

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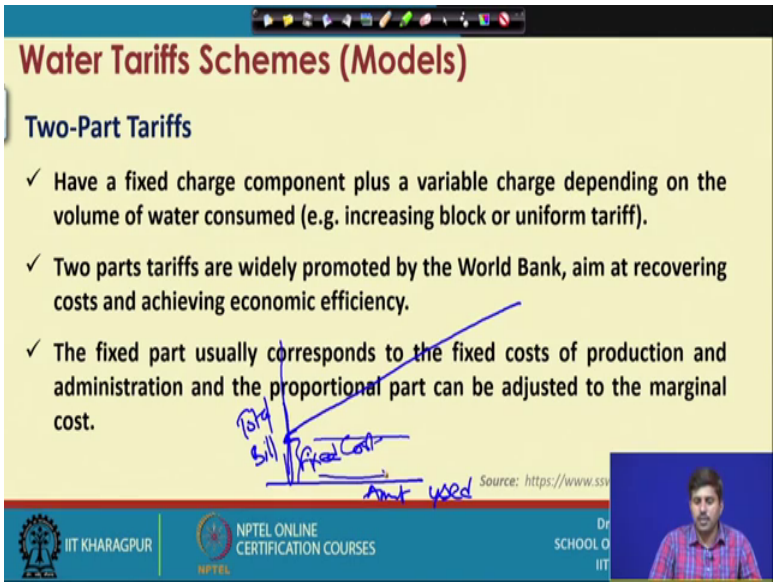

Then there are a few other models like 2 part tariff which have a fixed component plus a variable charge depending on the volume of the water consumed. So, this 2 block tariff systems would be for example, every household pays a fixed price, it is going to start from one fixed price, fixed cost and then beyond this based on the consumption charges will be there, whether it is being increasing block tariff or uniform block tariff or whatever. So, generally in increasing block tariff you can see then the rates is starting from here the consumption rate is starting from here with the amount used here and the total bill.

So, 2 part tariffs are widely promoted by the World Bank that which actually aims the recovering cost and achieving economic efficiency, it says that the fixed part should also be there which targets to which targets to achieve economic efficiency in the sense of it recovering the capital investment also in phases. So, that the system could be totally financially sustainable whereas, the amount used or recurring cost could be taken in the

form of consumption based system. So, the first part usually corresponds to the fixed cost of production and administration and the other proportional parts can be adjusted to the marginal cost in the second part that is the 2 part tariff structures there are at few places it is being adopted these days.

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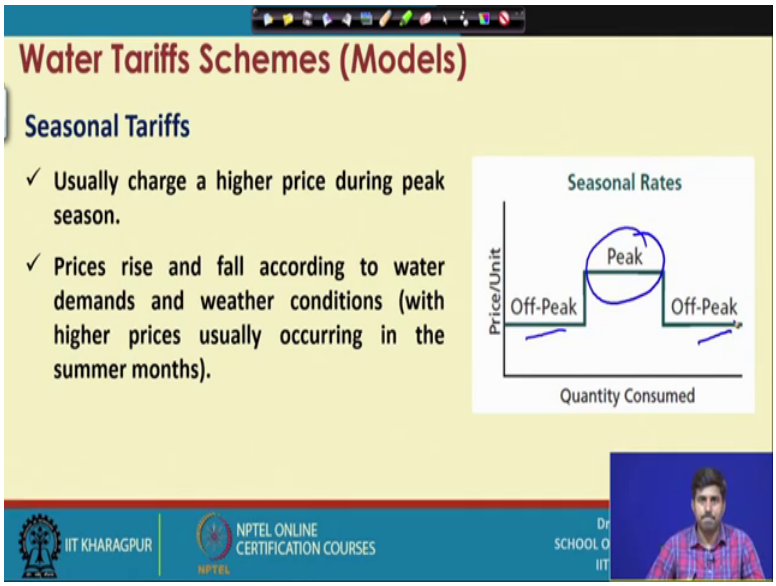

And then there are Seasonal Tariff models, which is also being like talked about for implementation at many places now which usually charges a higher price during the peak season, as you see here the in the peak season when the demand is high or the supply is low the generally peak seeker season occurs in the summer. In summer we have our rivers and these systems flow it with very low flow the groundwater depreciation or the level of the groundwater decreases too much, the cost of pumping increases we do not have adequate surface water sources.

In that case in order to give a strong signal of water conservation the charges or unit charges during the peak seasons can be kept at a higher level while in the off peak it could be kept at a lower level when there is a not much scarcity of the water. This concept of seasonal tariffs sort of provides an approach which can be adopted to time bound enforce the conservation or water saving concept, when there is a water in the scarcity the water saving concepts are more enforced in terms of increased prices, that is how the seasonal tariff model works. So, these were the different models we will stop

here for this lecture and in the next lecture we will take an example of designing water tariff scheme.

Thank you.