Petroleum Economics and Management
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Module - 12
Implications of Fiscal and Trade Policies
Lecture - 60
Concluding Remarks-II

Hi everyone. Welcome to the NPTEL course, Petroleum Economics and Management and I am your instructor Dr. Anwesha Aditya. So, we are in the last lecture of our course, this is module number 12. In the course, what is the name of the module is Implications of Fiscal and Trade Policies. And in the last lecture of our course that is lecture number 60, we are going to discuss some of the Concluding Remarks that we can obtain from our course.

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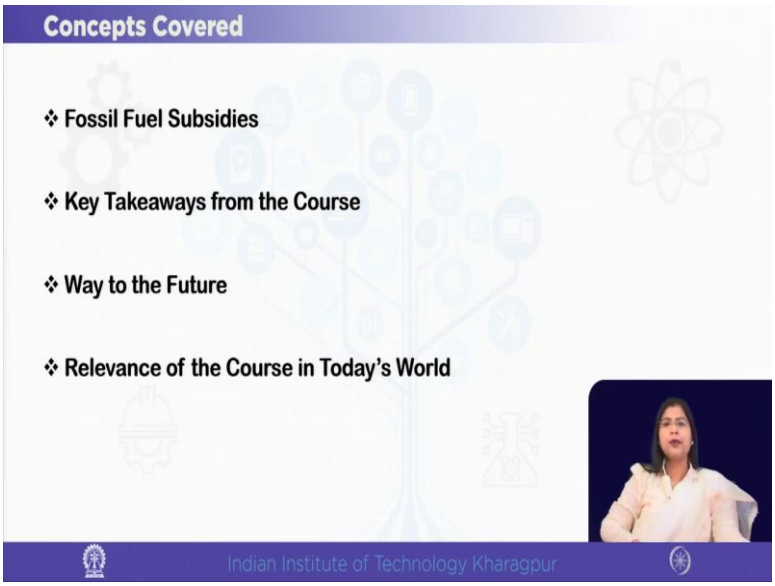

So, if you remember as I mentioned in the last lecture that we have retained two lectures at the end to present you some of the very recent world events the importance of oil in geopolitics, the role of economic sanction and another very important aspect as we already mentioned its fossil fuel subsidy.

Because you see I mentioned already that the best part why I enjoy teaching this course is that it evolves over time means this time also we are discussing about the course and

something in the world is happening economic as well as non-economic events, political events, military conflict.

So, something is happening and that has impact on the oil market. So, it is like never ending the syllabus keeps on growing, but of course, we have to stop because we have a limited lecture number and limited timing. So, this is our last lecture.

So, what we are going to do in our concluding lecture as I mentioned that I will show you some very recent observation the importance of crude oil in geopolitics, how crude oil is used as a very crucial instrument in economic sanction and another important aspect regarding fossil fuel subsidy.

So, we have already discussed about economic sanctions and the importance of crude oil in the last lecture. So, in this class we will be focusing on the fossil fuel subsidies and then what I will do I will summarize the key takeaways from the course, what we have learned in the course because we have to retain our learning from the course and we should be able to relate the contents that we are studying in the course with the recent events in the world.

So, not only the economic events as I told that many non-economic events, ok so, and finally, we will be discussing about the way to the future and the relevance of the course in today's world and how we can make a switch from non-renewable resources to renewable resources, but will it be very easy as we can say it. So, we will be discussing this in our conclusion lecture.

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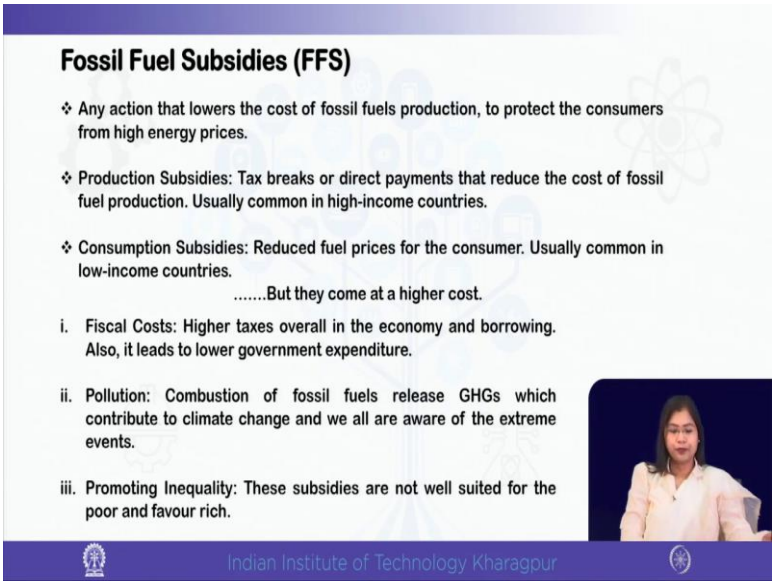

So, let us first stick to our first point of discussion that is another very important recent event is fossil fuel subsidies. We have written it down with the notation FFS; that means, abbreviation ok. So, what is fossil fuel subsidy? So, this is any action which lowers the cost of fossil fuel production to protect the consumers from high energy prices. Now, subsidies can be of two types in general also not only for fossil fuel any type of subsidy.

So, subsidy as you remember we have already discussed in our module on public policy. So, subsidy is like a negative tax right. So, subsidies can be a production subsidy or it can be a consumption subsidy. Now, in case of fossil fuel also we have a production subsidy which you can think of examples like tax breaks or direct payments, which reduce the cost of fossil fuel production.

And this type of production subsidies in the fossil fuel market is usually prevalent in the high-income countries. On the other hand, we have the consumption subsidies where the fuel prices are reduced for the consumers. So, consumer avail the they can buy the fuel at a lower price whereas, the producers are getting the same price.

So, that means, this rest of the amount that the consumers are paying less than what the producers are receiving. So, this list of this difference or the gap is being paid by the government. And this type of consumption subsidies basically paid by the low-income countries the third world countries. But of course, these consumption subsidies come at a

high cost. There can be fiscal cost means both the subsidies production and consumption subsidies especially the consumption subsidies.

They have this following associated cost because if you remember we have already discussed in case of subsidy there is a loss because in case of tax still a part is earned by the domestic government and the tax revenue can be distributed among the domestic citizens in terms of various welfare projects. But as far as the subsidies are concerned it is a net loss for the government because the government is not earning anything rather the government is paying.

So, actually how can the government pay because the government has to finance the expenditure. So, it is once again it is a burden because it is like transferring money from one hand one pocket to another. So, it is again a burden on the domestic citizens.

And also, if you remember we also discussed that in cases where we need to control the amount of production and consumption in the market betters instrument can be a tax because with tax the amount of equilibrium quantity transacted in the post tax scenario is less than the pre-tax scenario.

Whereas, in case of subsidy because the consumers are receiving, they are paying a lower price the producers are receiving a high price. So, the post subsidy quantity transacted is greater. Therefore, you see in from the point of view of non-renewable resources what happens if you subsidize the resource that will lead to greater exhaustion faster exhaustion of the resource and if the resource use also is associated with environmental pollution, like greenhouse gas emission.

So, it will not be good the subsidy policy will not be good for the environment right because it will lead to increasing global mean temperature and the problem of global warming. So, if we now specifically discuss the cost associated with the fossil fuel subsidy we can categorize in terms of fiscal cost, pollution cost and promoting inequality. So, what are the fiscal cost? These are the higher taxes overall in the economy and the amount of borrowing.

And it also leads to lower government expenditure because as we mentioned the government has when the government is providing the subsidy the government has to finance this expenditure.

So, how can it do so? It has to tax some other section some other sectors of the society either in terms of direct tax or indirect tax. So, that means, higher taxes tax rate will go up. So, to provide the subsidy in this fuel sector the government has to increase the tax the government has to borrow money from other sectors other sections of the economy.

And the government has rest of the among means the expenditure required for other purpose like creating the physical infrastructure providing better health education. So, expenditure remaining for these purposes will also fall. So, you can see that fossil fuel subsidies comes with a great fiscal cost for the domestic government. Second, I have already talked about pollution because subsidies lead to more than equal free market level of production and consumption.

So, that is not optimal from the point of view of environment because in case of fossil fuel burning of fossil fuel leads to huge amount of greenhouse gas emission. So, combustion of fossil fuel release greenhouse gases, which contribute to climate change and we are all aware of the adverse consequences of global warming and greenhouse gas emissions. And third is promoting inequality and these subsidies are also not well suited for the poor and they often favor the rich.

Because you see for example, say the if petrol and diesel are subsidized. So, those own who own a car they are better off. But of course, you see this tax is imposed to finance the subsidy. So, that is on a larger section of the society. And also, at the country level also we can find out that the developed countries can pay more in terms of subsidy than in terms than the developing counterparts. Of course, because the developed countries are rich countries they can pay more.

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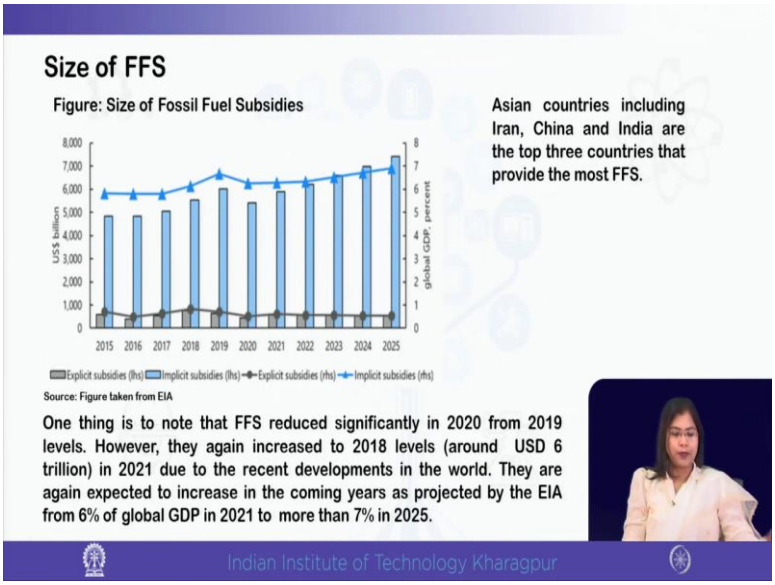

So, if we now look at the size of the fossil fuel subsidies, we can plot we have plotted here and we have also shown some forecast values, ok. So, this figure is taken from EIA. So, we have plotted the explicit subsidies means direct subsidies. You can see in gray color and the implicit subsidies are in blue and then we have shown it against you see the two axis one is the US dollar billion value and the right axis correspond to the global GDP percentage. So, you can see how the subsidies are quite a large amount.

So, explicit subsidies are quite less, but implicit subsidies are very high. So, we can note one thing from here that the fossil fuel subsidies reduced from two 2019 to 2022 it is because of the COVID-19 pandemic. But then again in 2021 the fossil fuel subsidies went back to the 2018 level due to the recent development in the world.

They are again expected to increase in the coming years as projected by the EIA from 6 percent of global GDP in 2021 to more than 7 percent in 2025. And Asian countries like India, China and Iran these are the top three countries which provide the most subsidies you see India is also part of that. So, they provide huge amount of fossil fuel subsidies.

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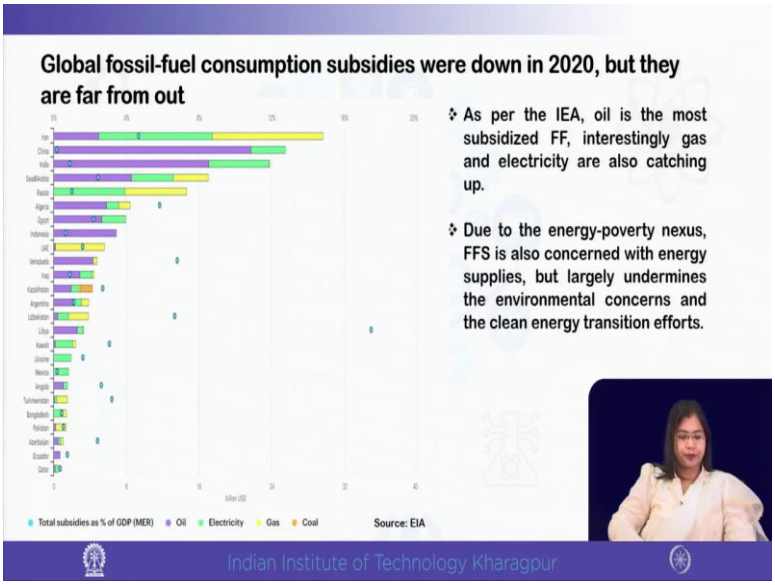

Now, you can also see the global fossil fuel consumption subsidies how that has decreased in the year 2020, but till they are quite high. So, as compared to the initial means early previous year 2018 and 2019 it has decreased, but still very high. So, here what we have shown is that we have shown the total subsidies as percentage of GDP then we have shown it as in terms of the sectors like oil, electricity, gas, coal and the source is EIA.

So, you can see that oil constitute a large part of sub fossil fuel subsidy. So, as per the EIA oil is the most subsidized fossil fuel and interestingly gas and electricity they are also increasing. So, you can see the colors oil is the purple color. So, it is very high, but oil with gas and electricity are rising at the same time.

And due to the energy poverty nexus because if you remember in the earlier lectures also, we have discussed about the energy poverty nexus. So, fossil fuel subsidies also concerned with energy supply, but many times it actually undermines the environmental consequences and the clean energy transition effort because as I mentioned when you are subsidizing fossil fuel that leads to faster exhaustion of this fixed supply of the resource.

So, you are ignoring the environmental consequences, the sustainability issues and also our entire attempt of switching from the non-renewable resource to renewable resource also is hampered because we are trying to make a switch, but if you are subsidizing the use of non-renewable resources. So, you are actually in a way promoting the non-

renewable resource you are depleting the resource if is not sustainable and also it is not good for the environment and ecology.

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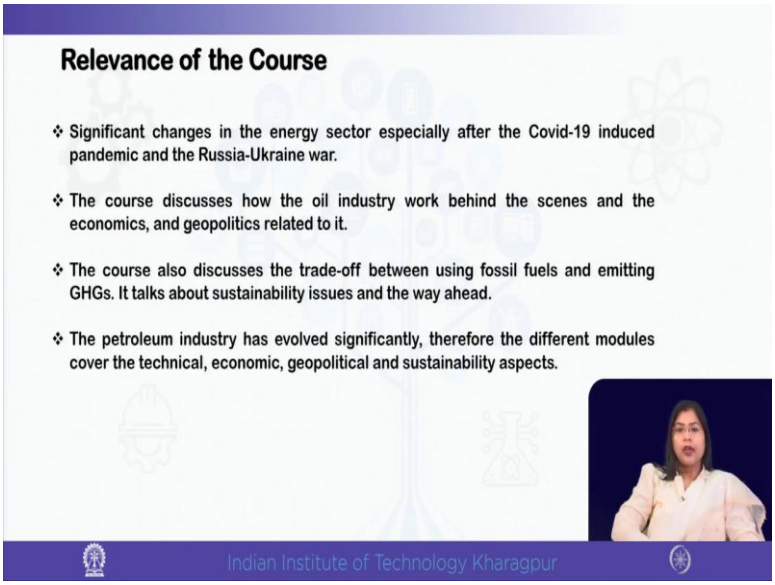

So, with these we have discussed very two recent issues one is the fossil fuel subsidy and another we discussed in the last class that was economic sanction. So, with this if we now point out the relevance of the course in the recent time.

So, we see that there have been significant changes in the energy sector especially after the COVID-19 pandemic and the lockdown and of course, the Russia-Ukraine war. So, the course has discussed how the oil industry works behind the scene and the economies and the geopolitics related to it.

We also discussed the trade-off between using greater amount of fossil fuel and emitting the greenhouse gases and the adverse environmental consequences. And we also talk about at the same time the sustainability use sustainability issues and what is the future? What will be our future of energy use?

So, that is very important because see in many modules in many lectures in the course we had a historical perspective. Like for example, if you take this current module, we discussed about India's balance of payment crisis.

In previous many modules we have discussed the country experiences of the oil exporting countries, the country experiences of resource curse and Dutch disease. So, we

discussed we had a historical perspective because our purpose is to learn from the history not to commit the same mistake right. So, that means, we want to have a futuristic view what should be our path in the future so, that we can avoid our mistakes that we committed in the past.

We can learn from the past. So, that we have a better future for our future generations like human being they think about the future generation, right. So, we think about a more sustainable better environment for our future generations. So, we have to always be concerned about the future not only human beings, but also for our ecology.

And we see that the petroleum industry has evolved so much we have many times seen that how this largest as the largest exporter of oil how Saudi Arabia was replaced by US after the shale oil revolution. So, you see how the oil market is so volatile and in the recent years the petroleum industry has evolved significantly. Therefore, the different modules have covered the technical, economic, geopolitical and sustainability aspect.

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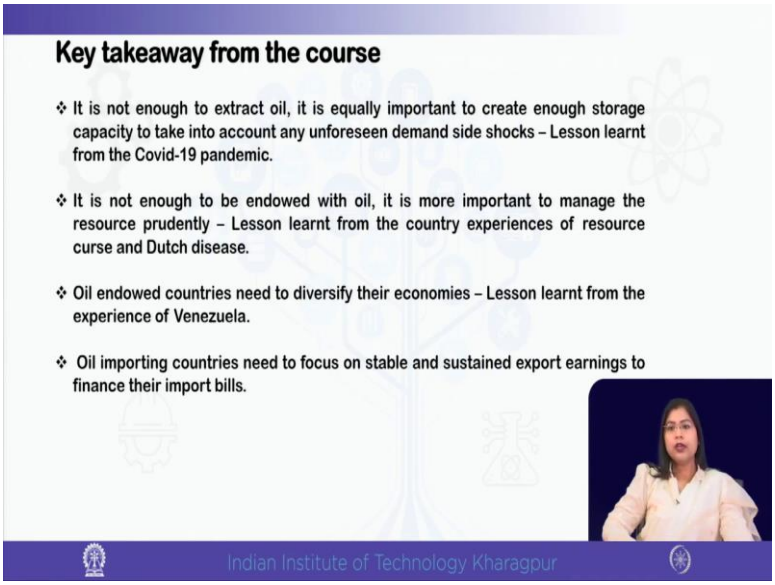

So, if we now summarize the main lessons that we have learnt from the course. So, what we are taking from this course? So, what are the key takeaways from the course because it is very important to know why we are studying a topic and what is the purpose of studying the topic and what is the outcome.

So, you can say here what are the outcomes that we are going to discuss right now? Because I am not going to repeat what we have studied because we have discussed it in detail initially in our course outlines. So, I am not going to repeat that, but what we have learnt what we are going to retain with us after completion of the course. So, first take away from our course is that it is not enough to extract oil or produce more oil.

It is also equally important that we create enough storage capacity to take into account any unforeseen demand side shock because this is a lesson that we have learnt from the COVID-19 pandemic because if you remember during the pandemic when a large part of the globe went under lockdown in April 2020 what happened the WTI future price became negative. So, we should not have a repeat of that right.

So, for that what is required because the storage facility was lacking as we have discussed already the Brent price fell the Brent crude future price fell, but it did not become negative. We have discussed the reason many times, because the Brent crude is extracted along the coastal line whereas, the WTI oil is extracted in the landlocked area. So, the cost of transportation storage is very high.

And when there was this abrupt demand side shock which was totally unexpected the companies the oil companies the suppliers the refiners, they were not able to store oil. So, they wanted to pay if the buyers are taking the oil from them. So, it is an unforeseen scenario you can say the negative price we have never experienced this before. So, suppose you become a manager of one such petroleum company. So, your target should not only be to extract more oil or refine more oil or produce more oil.

So, your target should also be to create enough storage capacity because we do not know in future also if some type of demand side shock any pandemic natural calamity arises. So, how to tackle that situation? So, we should be prepared we should be well equipped like the OPEC countries also suffered.

So, so, initially we just discussed in the previous lecture that initially OPEC countries were also not willing to cut back oil in April 2020 and that also was one of the reasons of falling oil price during the initial phase of lockdown.

But in May 2020 they agreed to reduce their oil supply. So, that means, you should be ready to supply your oil according to the demand condition you should be ready to you

should be well equipped to change the supply according to demand. Second important lesson that we have learnt from country experiences of the resource endowed countries that it is not enough to be endowed with oil it is more important to manage the resource prudently.

Because if we are not able to manage the resource prudently it may lead to extreme dualism inequality in the domestic economy as we have seen with the experiences of many of the middle east countries and it leads to illegal trading or trading of drugs, narcotics. So, we should be using the resource prudently. So, that means, see for a country like India we lack our domestic endowment.

So, does it mean that whenever a country is endowed with a natural resource which is in great scarcity that the country is better of no. We have studied it both theoretically, empirically, intuitively right we have seen the country experiences of Venezuela also right. So, therefore, what we need to do we have to manage the resource efficiently and we have seen that when this Dutch disease name was given to what is due to the stagnation and recession that occurred in Netherlands after the discovery of natural gas.

But Netherland could come out, Netherland could cure the disease. Similarly, the balance of payment crisis happened in Norway in 1986 and 87, but Norway could also cure the problem because you see Norway, Netherlands they were much developed when the natural resource was discovered. So, they had the human capital, physical capital to manage the wealth prudently.

So, we have already studied the models on how to manage the resource, how to invest in investment fund, how to use the oil wealth and how to take into account the uncertainty in oil price. So, just getting endowed a discovering the resource is not the end of the story.

You can say that this is another beginning unless and until you are able to manage the resource prudently your means your job is not over, you have to manage the resource prudently otherwise you will again run into a trap and that is our third lesson also what we can learn from the experience of Venezuela.

We all know that Venezuelan economy suffered a lot during 2018 and one of the main reasons was its dependence on oil. It finances its expenditure, its import of other

products, very necessary products like medicine and food from their export earning and after the shale oil revolution when oil price trend suddenly reversed it was not expected by Venezuela, it suffered a lot. Venezuelan currency depreciated so much that the purchasing power of the common people was very low.

So, many people who could they actually they migrated outside Venezuela also. So, it should not happen. So, that means, what the lesson learned from Venezuela is we should diversify our economy right. We should not be dependent on the resource sector, it is not specific to petroleum, it can be applied to any other resource because these resources are in fixed supply. It can also happen that due to technological advancement or technological breakthrough the resource can become useless.

So, that means, we should develop we should diversify our economy and one good thing is that earlier also we have seen that the middle-east countries have already started diversifying. So, their oil rents from other sectors of means their oil rents in GDP is declining and there are other sectors of the economy like the manufacturing and service sector also growing for many of the middle-east countries which is a good sign.

Now, see these few points I have talked the three first three points I have talked from the point of view of the petroleum endowed country. So, what about that lesson to be learned for the oil importing country like India? Because we know India has to import lot of oil and oil being inelastic in nature when oil price increases quantity demanded falls by a lesser percentage so, import bill increases.

Therefore, from the point of view of this oil importing countries since they cannot reduce their import bill what they can do they have to increase their export. And you if you remember we have seen that the exchange rate policies like devaluation may not also be successful in improving the trade balance if the Marshall Lerner condition is not satisfied. That means some of the import demand elasticity and export supply elasticity should exceed one.

Now, for the oil importing countries you see since they have to buy oil and oil is inelastic. So, this import demand elasticity is less than one. So, that means, they have to include more and more elastic items in their export basket right. So, therefore, what we can say is that for the oil importing countries perspective they should utilize their import of oil to create a proper manufacturing sector to improve their service sector.

So, that they can earn export revenues and their export basket should constitute of more and more elastic product. So, export promotion should be one of the key strategies for the oil importing countries, ok.

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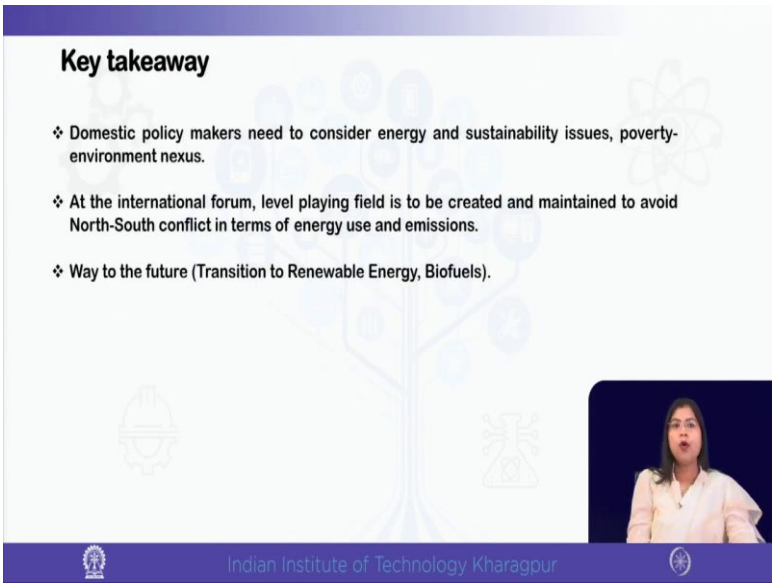

So, these are the main takeaways and some more. So, for the policy makers in the domestic country when they are formulating any policies related to oil or any type of energy, they have to consider the tradeoff between energy and poverty they have to think about the sustainability and environment nexus.

So, any policy related to oil market should not be taken into account without thinking of the environmental consequences without thinking about the sustainability issues. Similarly, you see at the international level what happens we expect a more level playing field to be created and maintained to avoid the north-south conflict in terms of energy use and emission. You see we have already discussed about the economic sanctions how and how we often lack a level playing field.

So, we should try to mitigate that and we should try to have a more equal international level where the countries have bargaining power, they have they are see even the developing countries the least developed countries should also have a voice they should be able to raise their voice they should not be discriminated. And finally, we have to our main takeaway you can say is to look at the future what should be our future how we can

make a transition from the renewable energy sources means from the non renewable to renewable energy sources and bio-fuel.

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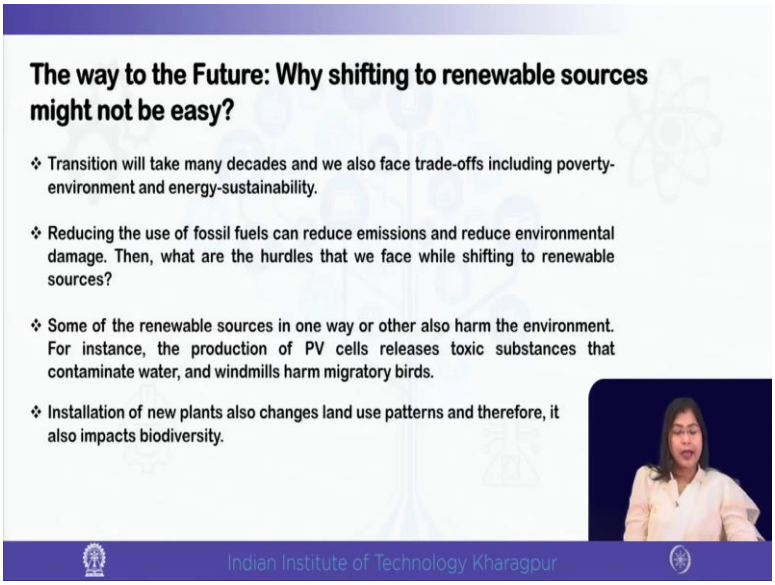

However, when it comes to the way to the future, we should remember one thing that shifting to the renewable resources it can be very easy to be said, but it is very difficult to be done because the transition can take many decades. So, it is a it can be a very long and phenomena and we have to in the meanwhile we have to go through lot of trade-offs including poverty environment and energy sustainability trade off.

So, reducing the use of fossil fuel can reduce emission and reduce environmental damage. Then what are the hurdles that we face while shifting to renewable sources see one is that some of the renewable sources can also be harmful to the environment.

So, you can think of the example of production of PV cell which releases toxic substances, which contaminate the water and windmills and harm migratory birds and other sea animals also. Next is installation of new plants can also change the land use pattern and also it can impact the biodiversity and overall ecological diversity.

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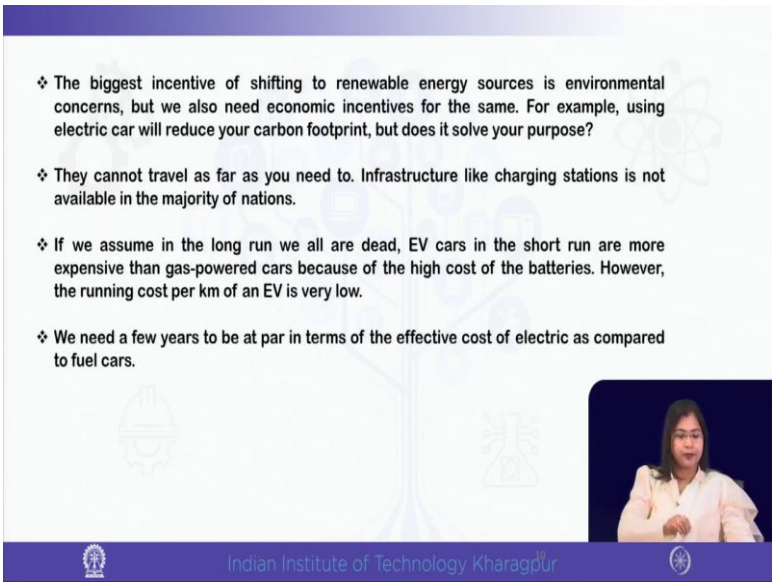

The biggest incentive of shifting to renewable energy sources environmental concerns, but we also need economic incentive for the same. For example, using electric car will reduce the carbon footprint, but does it solve your purpose because the electric car may not travel may not take you to that much, right. And the infrastructure like charging station is also not available in most of the at least in the developing and the less developed countries.

And if in the long run you see we assume that we all are dead. So, in the short run electronic vehicles are more expensive. So, you have to also think about the economic incentive, right. So, if it is costly then how many of them mass people will use go for electric vehicles? So, in the short run electric vehicles are expensive than gas powered cars because of the high cost of the batteries.

However, the running cost per kilometer of the electric vehicle is low. Therefore, what we can say that we have to wait and we have to see for few more years to be at par in terms of the cost effectiveness of electric car vis a vis the fuel driven car.

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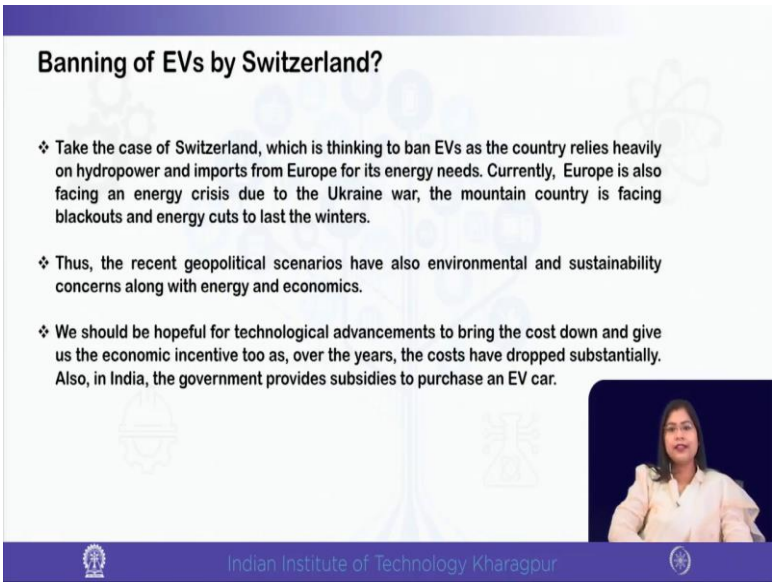

Now, one recent event one recent a very recent economic aspect that I would like to bring to your attention is that Switzerland which is one of the richest countries and part of the OECD countries. It is thinking means it is it has not a decided, but it is thinking to ban electric vehicles because the Switzerland already relies heavily on hydroelectric power and imports from Europe for its energy need.

But Europe is also facing energy crisis due to the Russia Ukraine war. Therefore, Switzerland is facing blackout and energy cuts during the winters and it makes it very difficult to sustain the winter. Therefore, the recent geopolitical scenario also has environmental and sustainability concerns along with energy and economics.

So, we should be hopeful for technological advancements to bring the cost down and give us the economic incentive also. So, that over the years the cost falls substantially and India we can see that the government provides subsidies to purchase the electric vehicle car.

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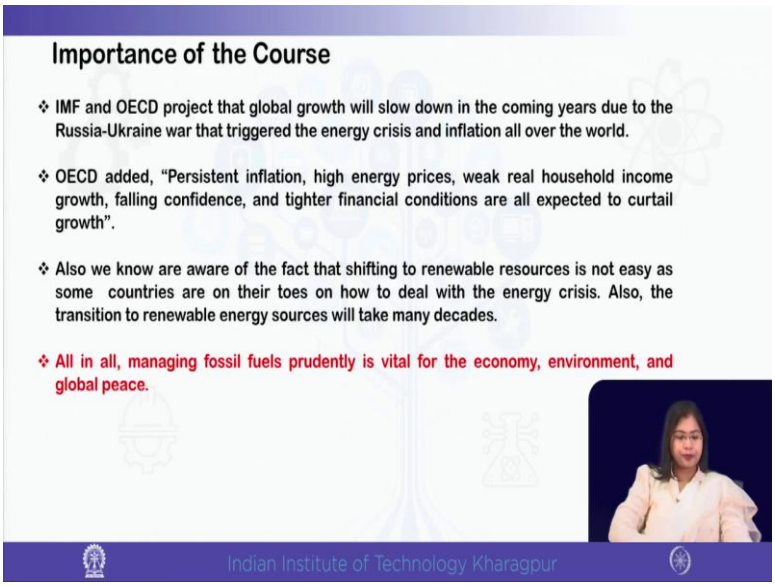

So, if we now summarize the importance of the course towards the end what we can see is that the international monetary fund and OECD project that global growth will slow down in the coming years due to the Russia Ukraine war which triggered the energy crisis that the world is going through currently and also has created inflationary pressure across all spheres of the world economy.

So, OECD further added that persistent inflation high energy price, weak real household income growth, falling confidence and tighter financial conditions are all expected to curtail growth.

And we are also aware of the fact that shifting to renewable resource is not easy. It is easy to be said than to be carried out in reality and some of the countries are on their toes on how to deal with the energy crisis, but not the same case for the developing and developed countries because, they are just embarking on their path of industrialization and developing their physical infrastructure.

And in that phase, we earlier also discussed that in that phase the requirement of energy is very high as compared to when you already reached the level of development you have developed your physical infrastructure you have set up your manufacturing sector. Therefore, the transition to renewable energy sources at least for the developing countries the less developed countries can take many decades.

So, overall, what we can say is that managing this important resource where fossil fuel prudently is vital not only for the economy, but also for environmental purpose and maintaining global peace.

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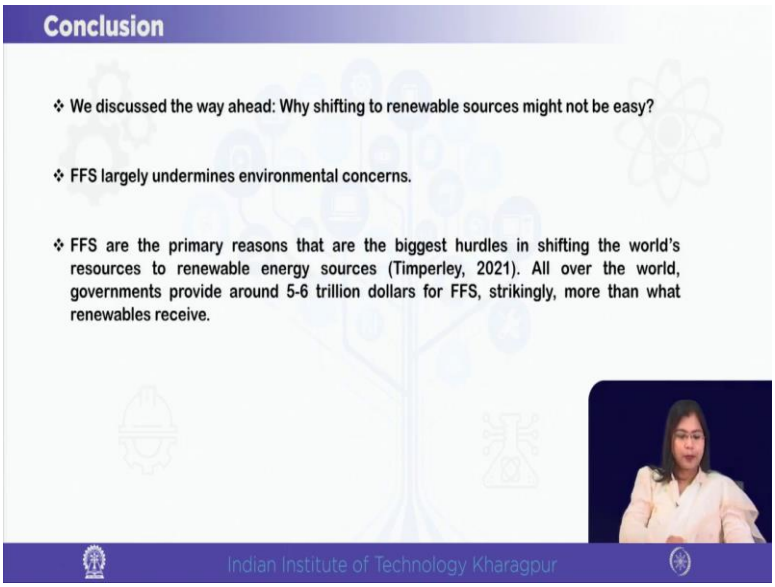

So, with this I conclude this particular lecture. So, in this lecture we discussed the way to the future why shifting to more sustainable and renewable energy sources might not be that easy. How we discussed about the fossil fuel subsidy how the fossil fuel subsidies many times they ignore the environmental issues.

And the fossil fuel subsidies have been one of the very important reason behind the shifting to renewable sources of energy so, as Timperley (2021) mentioned. So, across the world the governments provide around 5 to 6 trillion dollars of fossil fuel subsidy and this is much greater than the subsidies on the renewable receive.

So, that means, we have to make a balance also rather than providing subsidies on fossil fuel and accentuating the use of fossil fuel, which is not sustainable for the fuel stock as well as for environment we should try to make a faster switch to renewable sources of energy.

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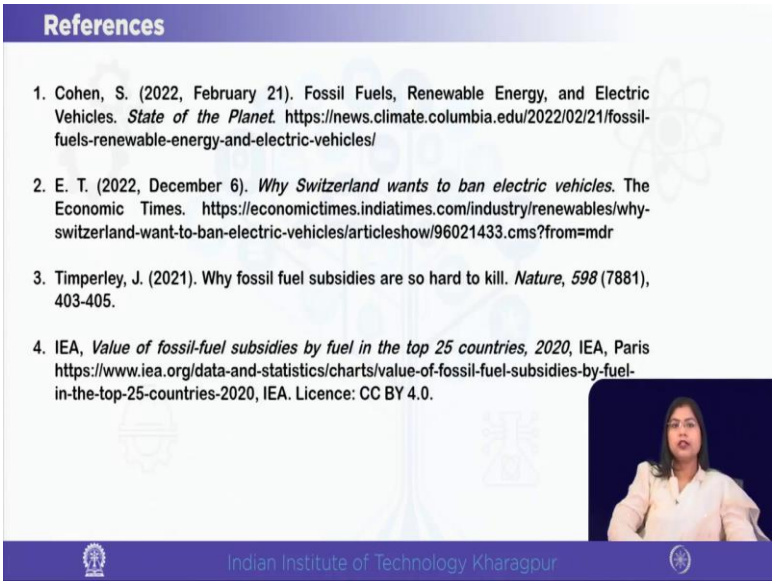

So, these are some of the sources the references that we have used as I mentioned in the previous classes also. So, we use some news links and some reports. So, we have mentioned all the news link and report with the corresponding links. So, those who are interested they should go and check the links to get a greater deeper insight because due to time constraint we could not go into very detail.

So, with this we have come to the end of the course. I would not say that we covered everything you know everything in the petroleum market in the global oil industry, but of course, you now have an idea of what are the contents, what are the issues in the petroleum industry in the current economic scenario and I hope that the course enables you to get enough interest so, that you can relate the day to day events in the current economy with the contents that you have studied in the course.

So, with this I thank you very much for showing your interest in the course and enrolling in the course. Before we end so, I would like to acknowledge my sincere thanks to some of the persons without whom I would not have been able to offer and successfully complete the course. So, first and foremost I would like to thank the teaching assistants involved in the course. So, I thank Ms. Arundhati Sinha Roy and Mr. Bhuvan Arora for their hard work sincere effort dedication and continuous involvement.

Without them it would not have been possible for me to offer the course and I am telling this from the core of my heart. Second, I also would like to thank the NPTEL office at

IIT, Kharagpur and last, but not the least I would like to express my sincere thankfulness to the technical team who has recorded and who is also doing the editing of the course and they have been our continuous support.

So, I would like to thank them. So, I would like to mention the names Mr. Uttam Sharma, Mr. Sourav Sahu and Mr. Sushobhan bhanja. So, they have been instrumental in making the course a success.

So, thank you for showing your interest in the course and enrolling in the course, best of luck.