Indian Institute of Technology Kanpur

National Programme on Technology Enhanced Learning(NPTEL)

Course Title
Bioenergy

Lecture -02
Oil Economy of The World

By
Prof. Mainak Das
Biological Sciences & Bioengineering &
Design Programme
IIT Kanpur

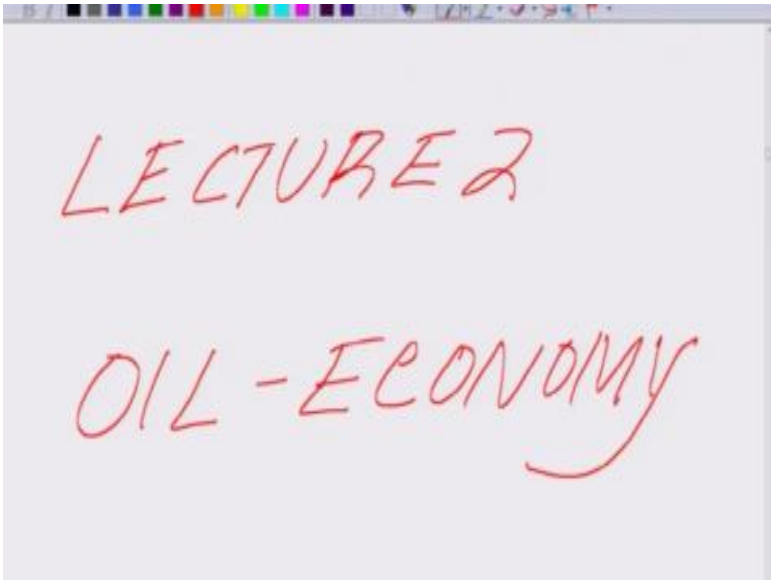
Good morning everybody so today we are starting the second class so in the first class we talked about how energy has intertwined in our day to day life affairs we talked about some of the basic requirements where energy plays a critical role we talked about the case of study of ammonia production and then we concluded the class with the fact that India is a oil-dependent economy where it is continuously importing oil in order to run most of its industrial functioning.

And all other automobile industry, transportation industry and different kind of production unit so today what we will talk about in the lecture 2 is what really is this oil economy and what is the genesis when this will realize that we really have to think beyond the oil, so if we look back if you really read through the history of energy dynamics will realize fairly early in around 1950s 1940 the 1950s it was realized the United States that oil or any other fossils well as a matter of fact will not be there forever.

A time will come when they will be sufficiently depleted from the floor of Earth and we really need to think well in advance how you we will get around the oil deficit situation what will be the technologies which will circumvent that situation so a mitigation effort has to be initiated at least 30 40 50 years ahead of time before the crisis really emerges out so just have a look in this lecture first of all we will talk about that how these reports were coming and there are several contradictory reports over a period of time.

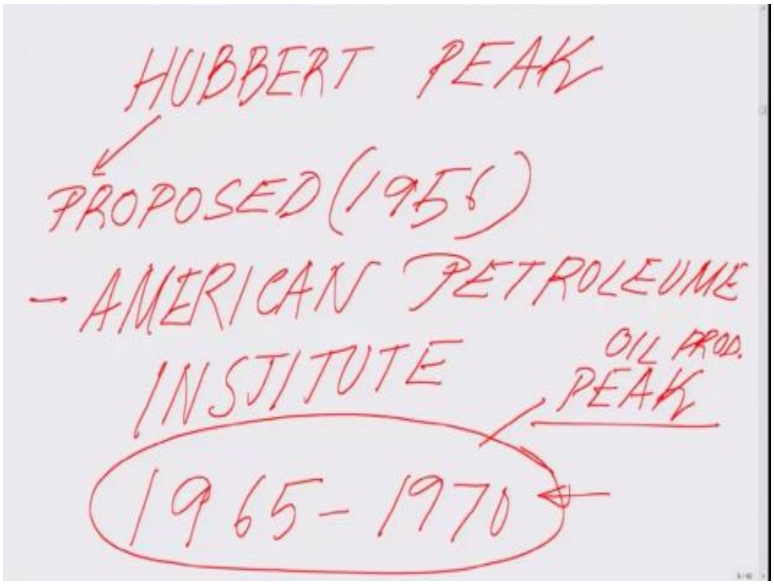
And today we will kind of summarize in the first part of the of this lecture that what were those initial reports which are kind of landmark report today and where we really stand and were in a specific India stance retrospective based on those us reports and a current report of Indian energy sector okay.

(Refer Slide Time: 03:16)



So let us start the lecture to choose our lecture 2 which is first part we will talk about the all economy of the world, so as I was telling you that there are several reports which were coming.

(Refer Slide Time: 03:34)



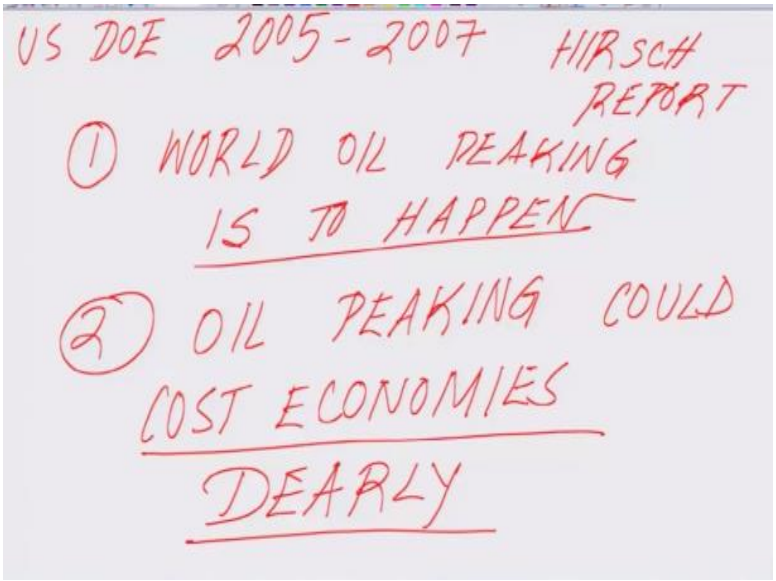
And the very first report which team was called Hubbert peak theory what is the hubbert peak theory okay who would think theory so there was a scientist gentleman called Hubbert who proposed in 1956 so first proposed in the year nineteen fifty six that is basically a paper he presented in the meeting of the American Petroleum Institute when he was American Petroleum Institute where he stated that oil production in the United State would peak between nineteen sixty-five and1970.

So this was what all production think, so this was the very first report and kind of a historical report which was given by Herbert stating that possibly this is where mankind will see that there will be shrinkage in the oilfields unless otherwise new oil resources are found across the globe whether under the sea that is why you see there are a lot of undersea drilling taking place all over the world or any other places in the world where there is sufficient oil.

And which is easily pulled out from the base of earth and which could be easily transported okay, so this was the very first early historical report but interestingly though who but predicted that will be around nineteen sixty-five and nineteen seventy that really did not happen all

production did not be but that does not mean that who boat was wrong followed by this there were several back and forth report which came but in between 2005 and 2007 the United State Department of Agriculture came out with another report which is also called the harsh report and we will narrate it in the next slide.

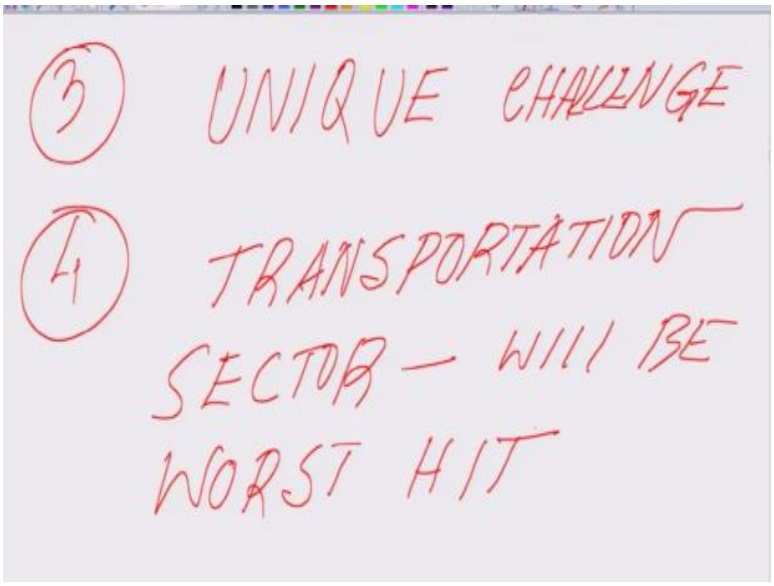
(Refer Slide Time: 06:10)



Where we will talk about so this is between 2000 such kind of little eight like this between 2005 and 2007 and the source is US Department of Energy and this is also called harsh report which was published during this time HIRSCH report okay, so the hash report highlights on these following points so point one eight phase these are the key point the first key point is world oil seeking is going to happen.

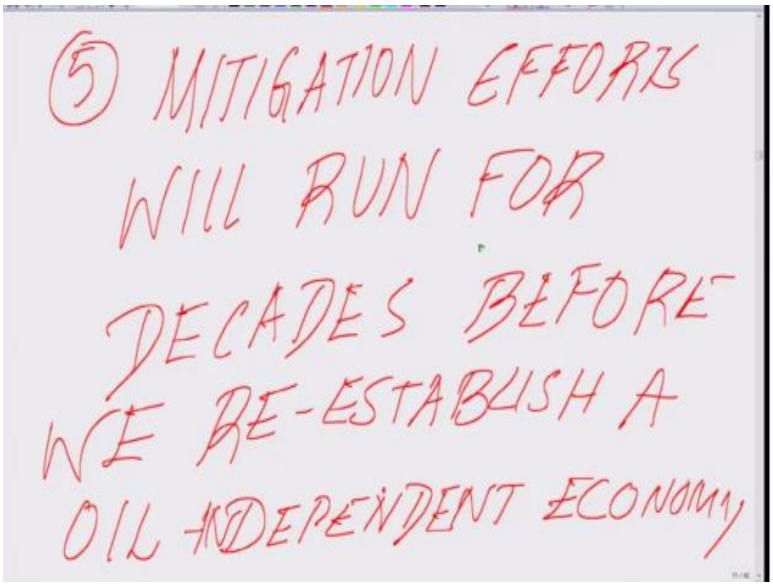
So this is true some day or other is going to happen it is just a matter of when it is going to happen the second critical point so this is important so this phenomena of oil taking which is the maximum production could cost economies the early it is it will have a direct impact on the economy of any country so because we are oil dependent economy.

(Refer Slide Time: 07:35)



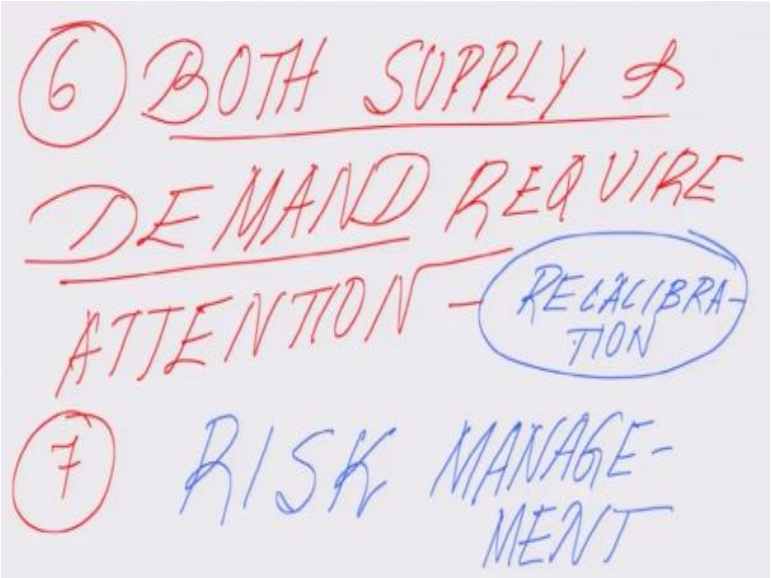
Next the third point which harsh report highlighted is it is an unique challenge this situation poses an unique challenge to mankind a challenge in modern times since Industrial Revolution man has not faced the fourth interesting point in is that it is a real problem is the liquid fuel for transportation so where it is going to hit the most is the transportation sector because this is one sector which is the lifeline will be all our economic development.

(Refer Slide Time: 08:32)



And that you can always see that if you walkthrough I will move through the highways it will always see that it is the trucks which are carrying all the goods from one place to another then what they fade in order to mitigate this problem mitigation efforts will run for decades before we re-establish oil independent economy or I would say I economy where you are not fully relying on oil, oil maybe a very small fragment there will be other sources which will be used to derive the energy for it. So this report further continues as we come to the next slide so one second let me check okay.

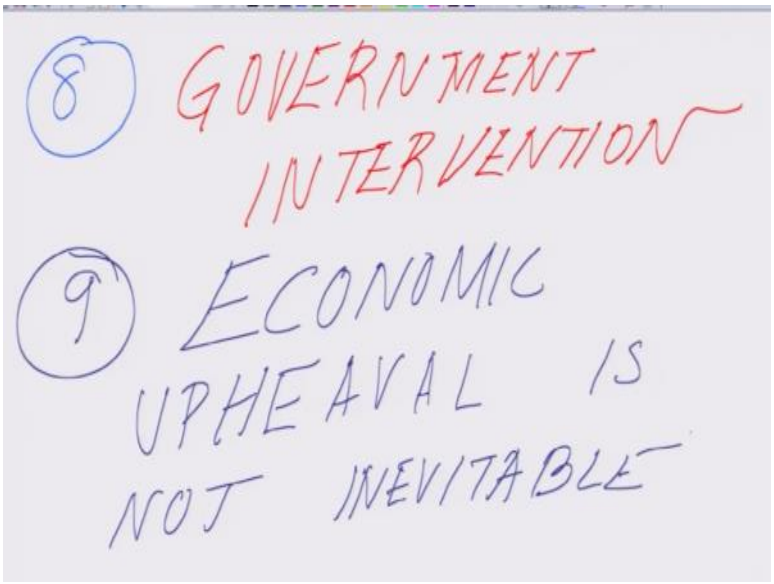
(Refer Slide Time: 09:57)



So the sixth point of the report was both supply and demand will require attention, so we really have to see that what is the real supply and demand because as of now because of the oil economy we are not really clear what is the real supply and demand but with the change of the landscape we really have to be careful and recalibrate so there will be a lot of recalibration which will be needed and this recalibration have to come at multiple level at the level of the nation at the level of small townships at the level of household level where all we are starting or utilizing this different kind of supplies where we needed the supply and what are the demand for such supply okay.

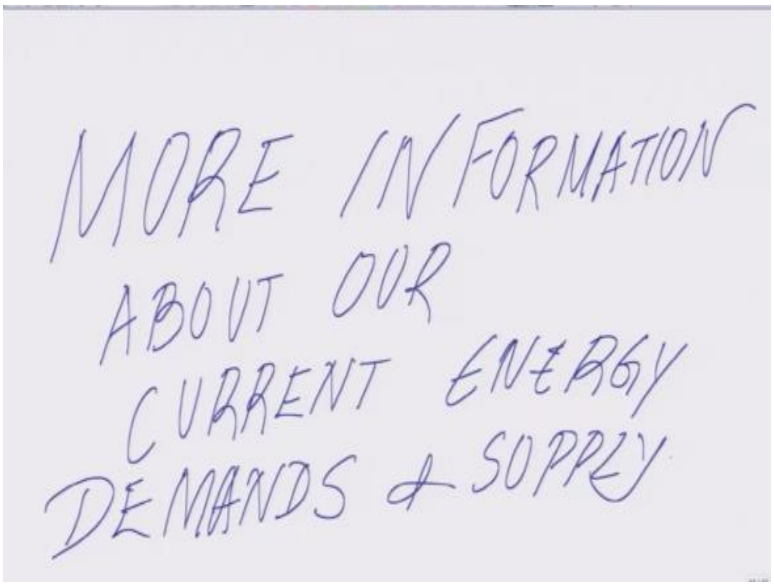
So coming back to the next point into it what we will be talking about is so once the both supply and demand require attention so the next one is it is a matter of risk management so this is a classic situation where we really have to think that this is a huge risk and we have to develop strategies for managing these risk which is on our way.

(Refer Slide Time: 11:32)



Next important part for such kind of things you need very importantly government intervention, without government intervention the whole area of mitigating the oil crisis cannot be tackled this is a very Herculean in task the next point what Hirsch report very clearly says is that economic upheaval is not inevitable.

(Refer Slide Time: 12:25)

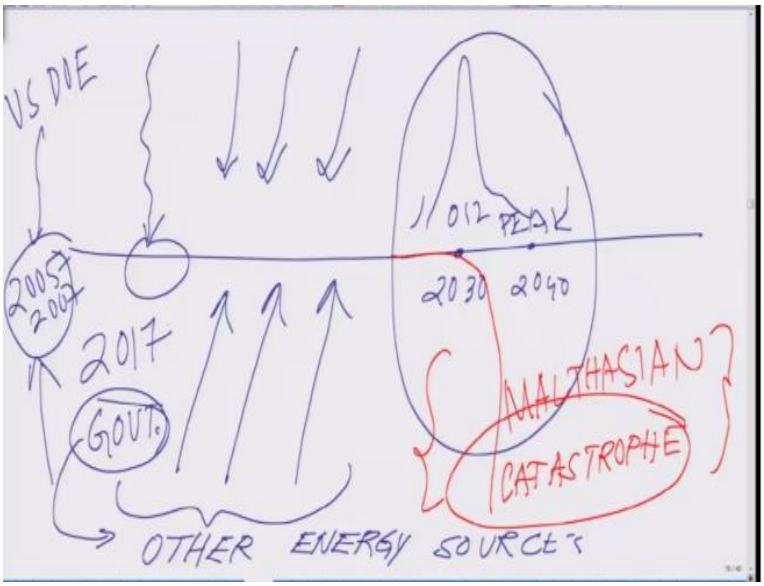


And the last point we need most importantly more information about our current energy demand and use or supply so overall harsh report or the do a report between 2005 and 2007 highlighted it very clearly that it is high time that mitigation efforts have to be initiated because if you think of it so say for example currently we are in 2017 we are totally dependent on oil economy and I say see next within next15 years of the total amount of oil what we are getting in India will go down to half just try to imagine the situation if such a situation occurs.

It is going to affect our economy big time because the trucks the trains which are the lifeline of this nation which are carrying goods from one corner of the nation to the other corner of the nation feeding our soldiers feeding our civilians all over the nation will go down to half and that is something which we cannot afford it may lead to a catastrophe, so if we do not wish that catastrophe to hit us then we probably have to think.

Much earlier and this could even lead to something called a Malaysian catastrophe if we really do not want it so if we look at it if we kind of plot it next slide.

(Refer Slide Time: 14:42)



I will just do a plotting for you guys just to give you an idea so say for example today is for example and sitting in 2017 okay now this is where I have the reports with me the report came in 2008 2005 even 10 years before2007 okay this is where the US DOE report clearly tales that you know the mitigation efforts have to be started so and I know safe for example 2030 or say 2040 where we are seeing the whole oil thing oil peak is going to happen just for the.

So then it is high time that I start investing on ways and means today on other energy sources and if I if I do not do that now if the government does not invest money on other energy sources today then what we are looking at is at this stage if we reach when we are looking for a catastrophe and this does not need for the reiteration that if we fail to run our transportation business in any place in the world if we cannot fly our planes if we cannot run our trucks we are in serious problem.

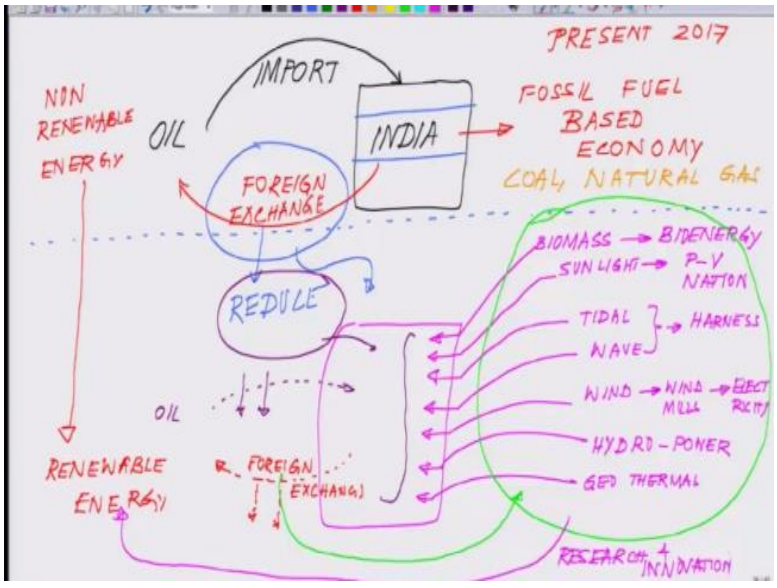
So now in the light of this when I took talked about the other energy sources in my flight out here where India stands so now this was the very beginning brief giving you the outline of the oil economy of the world and India it is just like a spider net so say for example if you imagine a

spider net out here say for example oil producers or as consumers if there is a shaking in the oil-producing nations the we are shaking the economy of the all-consuming nation.

So it is a worldwide web so you cannot run away from it we have to accept the fact it is time we get our self educated about other sources of energy and one of the thing the one of the very social purpose of this course is to educate our youth about what are the possibilities India has where India can make a complete a big change big difference which could we could be you know one of the leaders in this area where so let us evaluate where India stand.

So you remember in the last class we talked about India today is a oil-dependent economy it is importing oil from Venezuela it is importing oil from Saudi Arab it is importing oil for Iraq Iran whatever is importing natural gas and so on so forth but let us see what India has so let again three draw the graph and reposition ourselves and then from there we will slowly start moving towards the core of it the by energy okay let us move on to the next slide.

(Refer Slide Time: 18:19)



So in the next slide what we talked about so you remember in the last class I told you assume that this is this box will close in to India and at this point what India is doing it is importing oil

and in that process we are spending a lot of our foreign exchange we talked about that okay and so basically we are currently we can call ourselves this is present okay so this is in the present time this is 2017 we are talking about fossil fuel dependent economy or fossil fuel-based economy.

Of course India is producing apart from it is also producing significant amount of cool natural gas and all other things okay so this is where we are today so we evaluate the situation now where we wanted to go now if this is where we are standing today so where we want the first thing what we wanted to do this foreign exchange spending if we wanted to reduce this that is our goal because if we reduce this then we should be able to invest this or fun of this money for doing more and more research into the area of renewable energy.

Now let us see what India can offer and what India has as a matter of fact which could be very helpful now these are the resources India is having we are the rich diversity of biomass which is the direct source of the cracks of this course called by energy 180 we are diversity rich then we have plenty of sunlight the country has no dearth of sunlight so we are a very healthy photovoltaic nation we have solar cells TV here stands for photo voltaic.

We have a huge sea line which gives us the tidal energy we have waves if you see the bio bring all on one side Indian Ocean and bottom and Arabian Sea you could harness them harness energy from this moment then we have plenty of wind which could be running the wind mills those of you who have visited the Gujarat coastline all the way along the swim not all the way to up if you go to Dhaka you will see a lot of wind mills located in that region.

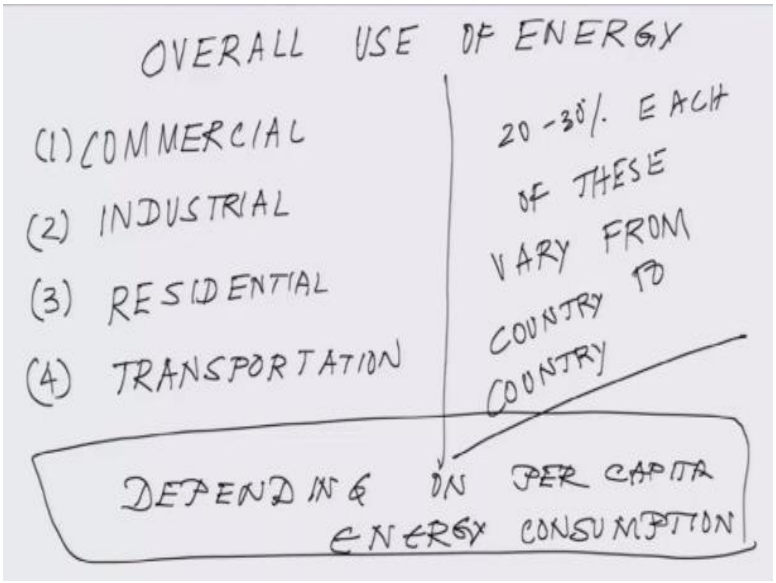
So this is for the electricity then we have the crisscross network of rivers which is the hydro power and we have the geothermal sources, so if we could integrate all this if we have a national program today which ensures that all these different resources what India is having starting from biomass to tidal to solar to win to geothermal then we can and if all we put all our resources all our research all our investment on all our a huge chunk of our youth dedicate their life in terms of the research and getting a feel of the technology in these areas.

Like the biomass the sunlight tidal wave wins then we definitely can reduce this foreign exchange and slowly what will happen is our import percentage of oil in years to come is going to go down and automatically if the input goes down automatically our foreign exchange expenditure is also going to go down in a spending at and that foreign exchange which is not being used could be funneled for more and more research into this area more and more research and teaching into this whole domain of renewable energies.

So this is where if this is what we talked about nonrenewable energy India today where we are heading is which should hit is the world of renewable energy and in this sector there is a lot there is a huge room for different form of innovation which is waiting so this is where research and innovation is needed, now out of this whole thing our concern for this course is the easiest of all of them which is very abundant indignation is the first point what I mentioned in the flight should go back to the slide is this part.

This is what we will be dealing with and partly we will talk about some of these part where the plant dies and all these things will come very handy to us okay and so this is where we will be concentrating but before we get into this let us move on to the next slide where we will be talking about.

(Refer Slide Time: 25:35)



What are the overall use of energy if you look at it so the overall use of energy is four different areas one is the commercial which we talk about all sorts of you know Aviation Transportation and all those kind of things the second is the industrial this is all the product manufacturing industries then we have the residential requirements and then fourthly we have exclusively on different kind of transportation.

In every country twenty to thirty percent each of these vary from country to country depending on which country you are depending on the per capita energy consumption as I mentioned in the previous class energy consumption so the overall energy use of any nation is dictated by this force lot this is a commercial use or transportation or industrial use or residential use how much you are using so if we have to create a newer set of grids of renewable energy then another interesting thing what possibly we needed to develop is.

We have to utilize the existing grids what we are having for the current sources of energy and we have to integrate these renewable energy sources on those existing grid to transport energy from one place to another or transport power from one place to another okay so today let us summarize what we have talked about so today we talked about first of all we talked about

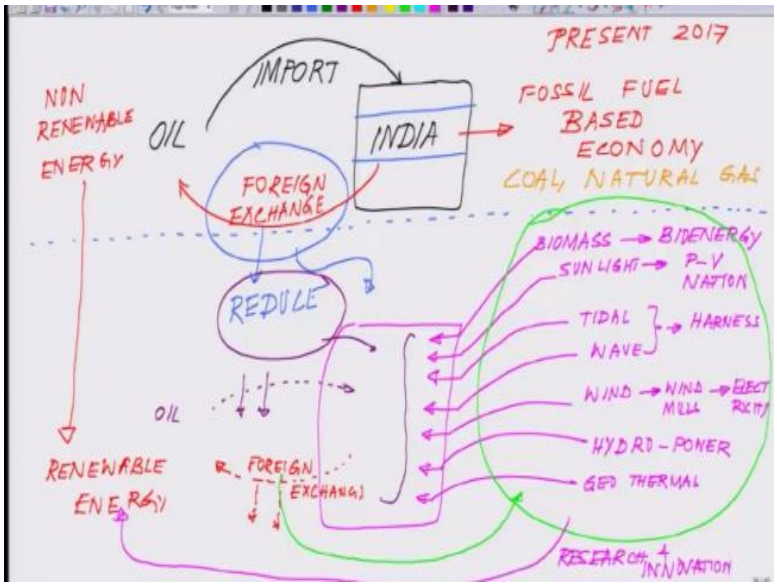
historically the oil landscape of the world how from 96 1950s stills till this day how the different predictions have shaped the way the governments of different nations have acted towards mitigating what is called as the oil peaking.

So there will be a time when they will be maximum and after that the oil production is going to fall down since that time, then we talked about where India stance and what are the different energy forms which are very easily available to us and which could be utilized for or which could be channelized using technologies to mitigate the problem of the declining oil production across the world so and lastly we talked about the four different areas the namely the commercial industrial and residential and transportation where energy is being consumed to the maximum level.

So with this today we will conclude the second lecture in the third lecture we will move on to describe the different units which are used for measuring energy and then we will talk about the domain of bio energy Presume with these two first two lectures where you get an overall idea about how energy in your first lecture we talked about how energy rules our life and in the second lecture we talked about how the oil economy is influencing and then the how the oil economy is slowly shifting to reaches maturity and after that there will be further decline only it will be aging industry done.

And how from that point onward different sources of energy whereby energy will play a very critical role will take over from there and where India can make a whole range of different because if you look at it again reiterating the fact that if we look at in your situation all these things whether we talk about the biomass which is abundant.

(Refer Slide Time: 30:38)



Sunlight tidal again abundant wave it is abundant wind it is abundant hydropower it is abundant geothermal it is abundant all these added together we could make a enormous difference in the energy landscape of the world, so okay with this I will close in the second lecture in the third lecture we will move on to the units of expressing energy and we will talk we will move into a real domain of bio energy thank you.

Acknowledgement

Ministry of Human Resource & Development

Prof. Satyaki Roy

Co-ordinator, NPTEL IIT Kanpur

NPTEL Team

Sanjay Pal

Ashish Singh

Badal Pradhan

Tapobrata Das

Ram Chandra

Dilip Tripathi

Manoj Shrivastava

Padam Shukla

Sanjay Mishra

Shubham Rawat

Shikha Gupta

K. K. Mishra

Aradhana Singh

Sweta

Ashutosh Gairola

Dilip Katiyar

Sharwan

Hari Ram

Bhadra Rao

Puneet Kumar Bajpai

Lalty Dutta

Ajay Kanaujia

Shivendra Kumar Tiwari

an IIT Kanpur Production

©copyright reserved