Education for Sustainable Development
Prof. Atasi Mohanty

Indian Institute of Technology, Kharagpur

Lecture - 29
Sustainable and Clean Energy

Hello viewers, welcome back to this course on ESD Education for Sustainable Development. In the last classes we have already discussed about sustainable health, sustainable development and food security all kinds of thing. Today we will discuss about Sustainable and Clean Energy.

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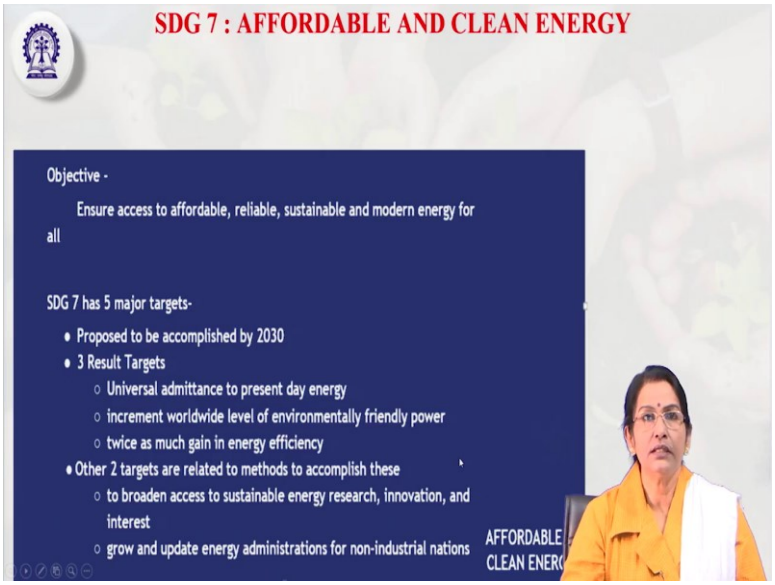

So, as you can see the it relates to the sustainable development goal 7. So, SDG 7 advocates for affordable and clean energy. So, these are the objectives like how to ensure access to affordable reliable sustainable and modern energy for all ok.

And under these SDG 7, there are also 5 major targets. As you can see that has to be achieved by 2030 that is the targets like universal admittance of admittance to the present day energy increment of worldwide level of environmentally friendly power twice as much as gain in energy efficiency.

Then again target to related to the methods of accomplishing these that is to broaden the access to sustainable energy research innovation interest grow and update the energy administration for non industrial nations etcetera.

But, ultimately the goal is that how to ensure affordable which can be affordable which going to be; that means, economical affordable by everybody by all nations reliable; that means, sustainable and reliable and modern energy with minimum carbon emission, minimum damage, minimum negative impact on the environment are in our ecosystem.

Because, now in the today's context climate change is the biggest challenge and keeping in mind this population explosion, pandemics, disasters, and climate change etcetera. So, we have to think about the energy sources resources energy sources how to create energy from different sources, which is not only sustainable reliable and affordable but, also which is also you know renewable and which is very eco-friendly.

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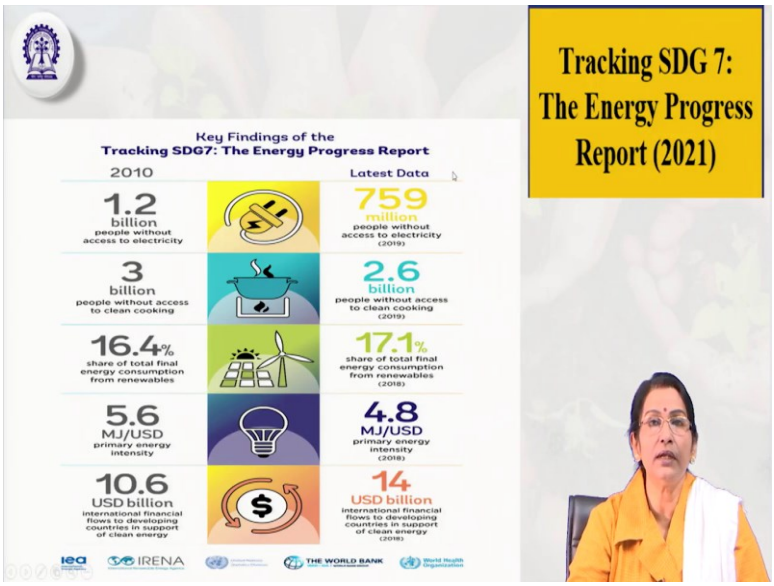

Now, when we proceed well the data says the data says that the energy progress report as per the countries is like you can say the, from the electricity and from the access to electricity by the year 2019. Then from the like for example, from the you know cooking gas from the cooking purpose that is 2019 2.6 billion people without access to clean and clean cooking energy that is from specifically from the fossil fuels or the forest roots etcetera.

Then by 2018 again energy source was you know consumption from the renewable then 17.1 percent that is from the renewable source from the solar energy then 4.8 by that from the primary energy intensity by from the electricity bulb.

And how; that means, by 2018 again the international financial rose to equip; that means, to support this clean energy. So, it is the; that means, how this progress started from 2018 and gradually how it is moving off. So, what how to; that means, this is the tracking of SDG 7 the energy process report as per the 2021, how it has how the evolution, how the process has taken place sequentially.

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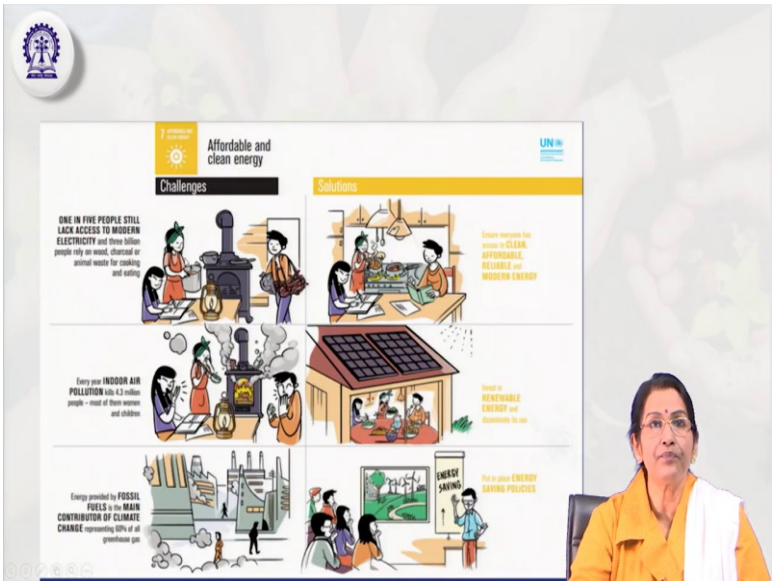

Now, the present date at present, then these are some of the clippings like the affordable energy challenges that challenges that we are facing. Challenges we are facing that like for example, lack of access to modern electricity that is one challenge then indoor air pollution, indoor air pollution because of the cookings because of the fireworks inside the house.

Then fossil fuels main contributors to the climates action fossil fuel and there is the solutions how it can be solved, the solution probably solutions like the affordable, reliable and modern energy.

Second is how the energy can be renewable can be renewed from time to time renewable energy and energy saving policies in terms of saving energy saving policies renewable energy and access to clean affordable and the renewable energy. So, these are the possible solutions and these are the challenges that we are facing.

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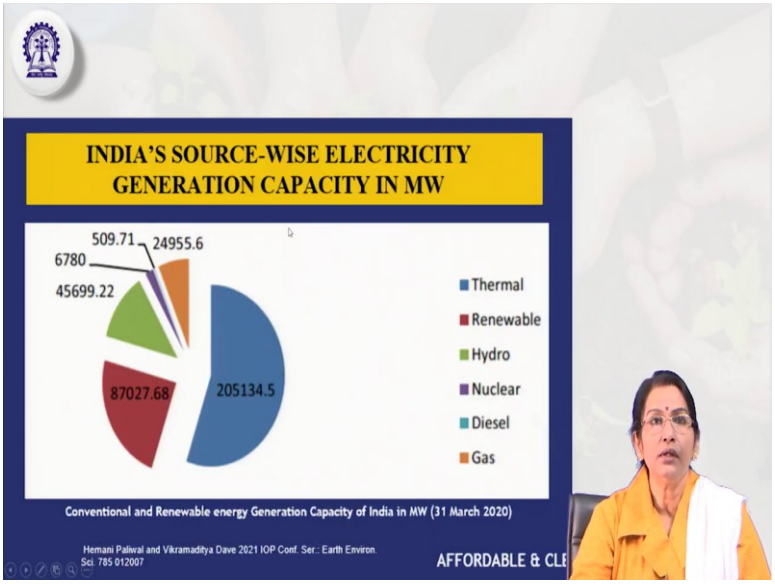

So, no so India's source of India's source of energy from the different aspects from different domains like let us see like India's source wise electricity generation capacity like primarily it is from the thermal, thermal that is coal industry that is from this is the megawatt; that means, the this portion there is the major portion that we get the energy in India from the thermal source ok.

Then next becomes the, that this much this much portion is only renewable energy and then again this portion is from the hydro energy hydro energy from the water resources and this much 6780 is gigawatt is only from the nuclear energy nuclear source. And then the this portion is from the petroleum gas a sources. So, this is the distribution of India's energy resources that we are using and consuming in our day to day life.

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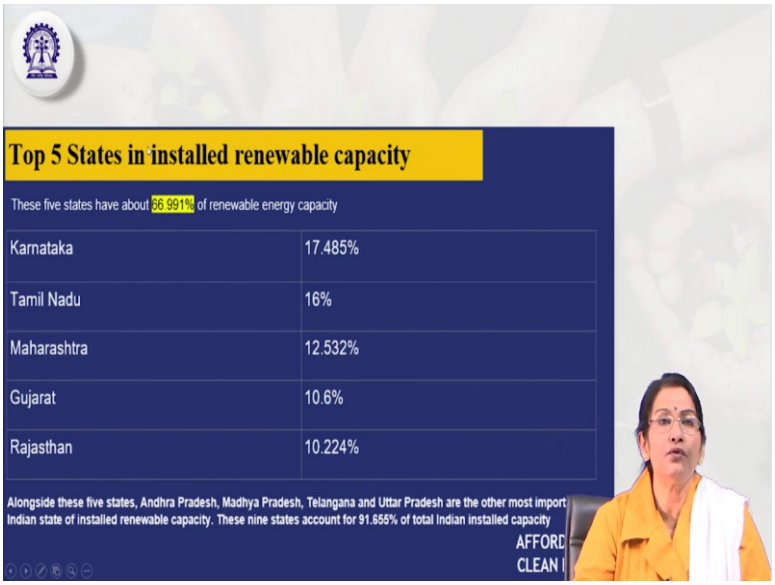

So, again the top 5 states who have already installed the renewable capacity in of energy resources like for example, top 5 states those who have actually acted open this renewable energy how to create it, how to use it, how to maintain it, manage it. So, these 5 states are like for example, they have about 66.9999 percent of renewable energy capacity they have got the potentiality.

First is that you know Karnataka states 17.449 almost percentage, Tamil Nadu 16 percent, Maharashtra 12.53 percent, Gujarat 10.6 percent and Rajasthan 10.22 percent. So, these are the 5 states those who have made the advanced progress in renewable energy, resources capacity, building capacity and managing these things and using it from time to time.

Alongside the 5 other states are also there like for example, Andhra Pradesh, Madhya Pradesh, Telangana. They are also working on this to, they are also planning for the renewal to build a infrastructure for the renewal energy and 9 states account for 91.65 percent of the total Indian installed capacity of affordable and clean energy.

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So, the nationwide policies yes nationwide policies and the targets what it says let us see. The current status that government of India said that that for installing the say one 75 gigawatt of renewable energy capacity by the year 2022, which includes also 100 gigawatt from solar and 60 percent 60 gigawatt from the wind and 10 from the bio power and 5 from the small hydropower.

So, this is the current status and the targets of Indian government to achieve 175 gigawatt renewable energy from different sources solar wind then the hydropower and the bio. The policy what the policy says that the policy says that the portion that focuses on the behaviour towards the industries to industries that produce energy at present.

So, the industries both the public sector and private sector, who are actually producing the energy so, this is the there are some there are some guidelines in policy 1, they have to follow these guidelines how to focus on the renewable energy sources. And policy 2 addresses the future needs of energy for sustainable growth.

So, we have to assess the need future needs as well right now and accordingly plan our uses not only uses, but the creation of this renewable resources. So, it is necessary to address the sustainability part of the sustainable energy whatever resources that energy we are creating right now.

How to sustainably use it and what would be our future needs for the energy requirement for future generation to come and how to not only create it, store it, preserve it and sustainably use

a energy. So, this one is that creation of the energy for the present and assessing the need and second is then assessing the need for the future requirements and sustainably use the energy.

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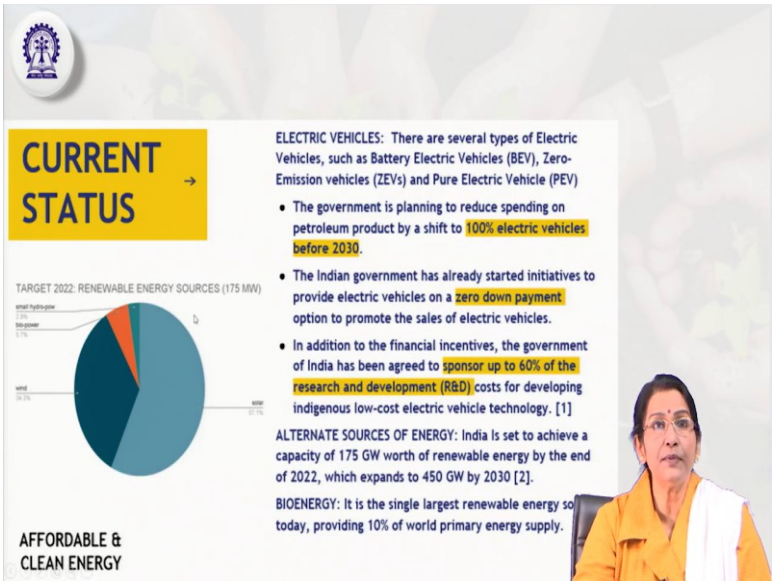

So, the policies explain these kind of aspects. Now, the current status is like that. So, target of 2022 renewable energy source 175 mega watt that is the minimum. So, here the we are focusing more on electric vehicles. So, how electric vehicles battery electric vehicles or you know zero carbon emission vehicles pure electric vehicles how these are to be replaced by the replaced by the present you know petroleum or diesel oriented petrol or diesel oriented vehicles.

So, which are actually creating the carbons and for the pollution in the environmental pollution. So, the government is planning to reduce 10 reduced spending on petroleum product by shifting to 100 percent electric vehicles by 2030 or before 2030.

So, all these electric vehicles battery electric vehicles and the pure electric vehicles that is primarily the chargeable, the chargeable renewable energy sources are going to replace the whole replace the whole automobile sector by 2030, which are primarily based on petroleum and the petroleum and the diesel products petroleum products.

So, here again the Indian government also has already started initiative to provide the electric vehicles on zero down payment, again on loan basis on the loan basis also they have started to provide these vehicles these kind of vehicles with zero down payment; that means, in EMI basis on installment.

And then again financial incentives also the government in has all agreed to sponsor up to 60 percent of the research and development. So, government is willing to spend 60 percent of the fund of the budget in the research of this research and development of the renewable energy.

So, these are the major you can save major attempts major effort major endeavor taken by the government 10 percent replacement of the vehicles, zero down payment; that means, providing the electric vehicles with the zero down payment and investing more on the research and development of the energy renewable energy.

So, similarly alternate source of energies are like for example, it is not only solar energy and wind energy or the hydro energy, but bio energy: bio energy again it is the single largest renewable source energy source providing 10 percent of the worlds primary because all these kind from the plant bio products recycling and the creating the energy from the bio products. So, that bio energy also; however, also we are going to get it by 2030 and use it maximally for our day to day activities.

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So, as the policy says as the policy says the portion and now the policy one focuses more on the behaviour towards the industries that produce the energy at present. How the industries are producing how they are consuming it, how they are using it. So, the policy 1 refers to the behaviour of the industries, those who are producing this kind of energy.

And similarly so, what are the policies what the policy 1 recommends for them, first thing is that yes we have already discussed that the decentralisation of power. Decentralisation of power that is encouraging the installation of community solar farms like in the village, in the rural areas, in the blocks, in the small towns that is to set up the set up or install the community based solar farm.

So, that they will take the responsibility of not only creating, but maintaining also that farms. So, electrifying the households and areas of the income generation activities also that is also that farm is also responsible will responsible not only providing the energy sources or electrifying the households, but also it also become a source of income generation for the people also.

That is one decentralizing the power system and giving the responsibility and access to the to manage the solar farms being installed in the different in the rural areas or small town areas. Second thing is that energy diversification: energy diversification is that using different sources different sources and supplies and transportation routes.

So, you have to develop the mechanism for diversifying the energy sources and from multiple sources not from one sources, but from multiple sources, how to use multiple sources of energy, how to diversify it and in terms of supplier, in the in terms of multiple suppliers, stakeholder, transportation, what would be the channels routes etcetera, that is the diversification. So, one is decentralization, second is the diversification.

Third is that the increase in the R and D fund: increase in the R and D funds for the government of India and the private companies also like Reliance and other kind other companies not only Hindustan Petroleum or Indian Oil or you know ONGC, but other private agencies especially like these Reliance and other power sector petroleum sectors.

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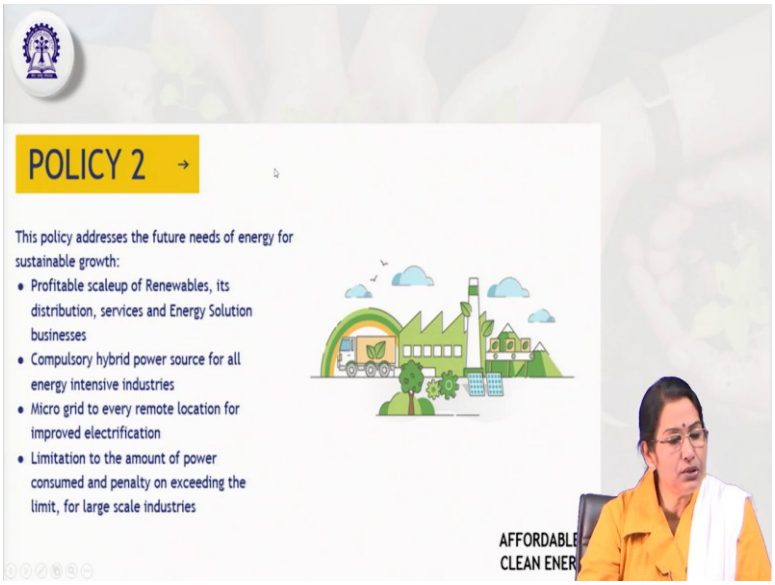

So, then policy 2, what the policy 2 says that? Policy 2 addresses future needs of the energy for the sustainable growth. So, we have to assess before and right now what would be a down the line 20 years what would be our energy requirements because not only the cities are growing, infrastructure is growing, industry is growing, but also peoples consumption is also is increasing people's consumption also increasing.

So, and again in terms of even though we are producing the modern gazettes, modern gazettes in terms of you know economical or you can say (Refer Time: 14:29) or economical aspects, but even then we have to assess it map it from time to time. So, profitable scale up of the renewable energy its distribution its service its energy solution business everything.

So, starting from the production to starting from the production economical aspects that is where how profitable it would be to scale up the renewable things cost effectiveness, its distribution system, its service, its solutions, it is business again the business. So, all kinds of things are that comes under the purview of policy 2.

Then the compulsory hybrid power source for all. So, it means it we should not depend on the only one source of energy, but compulsory hybrid power source for all energy intensive industries; that means, you have to rely on multiple sources of energy not just only one.

Micro grid, installing the micro grid to every remote location for improved electrification is micro grid is like just your transformer kind of, but micro in terms of electric supply. So, micro grid to be installed in the remote locations in the rural areas in the small towns for the better

electrification and limitation to the amount of power consumed and penalty on exceeding the limit for large scale industries.

So, nowadays it has already become a features like you know as for the you know as for the consumption of your electric electricity you are not going not only; that means, the boards are not only hiking the prices of consumption, but also they have also minimize; that means, they have customized it; that means, for every household this much of power can be only be distributed.

And again, similarly we are also the; that means, the government is also putting control on the water consumption also. So, because power energy, water these are the very valuable resources. Similarly the limited grant limited permission is there for the for household water consumption, for household you know power consumption, electrification.

So, there are the; that means, we have to spend it; that means, sustainably we have to spend it sustainability and there are the some few guidelines. So, policy 2 prescribes for the domestic use for the industrial uses of the power or energy sources and who have to assess beforehand how what would be our future needs and how to create renewable energy in a very cost effective way.

And what would be its distribution system, its energy solutions, channels, transport all kinds of thing A to Z would be elaborated and discussed thoroughly accordingly all the both the private like Tata Power System, Tata Reliance they are also investing in the they are also engaged in this energy sector.

So, they are also they are also as a partnership also they are also the stakeholders in the business. So, how to function it, how to govern it, how to manage it, how to distribute it, so everything is related to policy 2 and as per the guideline they have to follow both the public sector and the private sector.

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So, now the global energy demand, global energy demand is growing faster than ever. So, and however because with the increasing population, with the increasing infrastructure, with the increasing business, with the increasing GDP with the increasing expectations also financial condition and expectation of the people.

So, definitely the global demand is also growing faster. So, the total amount of renewable energy that is available now is growing very fast and we have to meet the demands we have to meet this demand. So, currently so as per the global power market is it is experiencing the rapid power demand because you know it is also for the economic growth also energy is a very is a measurable major source is a major resource.

So, we cannot ignore it; that means, at the household we can control it, we can economize it, but in the for the economic growth, in the actually the enhancement in the global power market or the for the business market and even especially for the health sector during the pandemics or the you can say disaster time since time.

So, the amount of power currently created generated by the renewals is still not enough to meet these increasing demands. Demands of the you know disaster mitigation, health services and you know industry requirements everything. So, this as whatever we are creating even in the from the renewable sources that is not enough.

So, it is an, it is also estimated assumed that the global power supply of the renewable will grow by 35 gigawatt from 21 to 22 and it is gradually increasing. So, the global power demand

growth will go up by 100 gigawatts over the same period. So, how to meet this demand? So, the so similarly we have to invest enough.

So, we have to invest enough in this renewable energy its infrastructure, its maintenance, its you know distribution everything so. So, therefore, it required to meet the rising demand for energy sources in a sustainable way.

So, sustainable; that means, that is starting from the production to the infrastructure to the distribution to the consumption to the restoration to the conservation all in all every aspect we have to be very calculative we have to be very particular in not only using it sustainably, but also preserving it sustainably for the future generations.

So, we have to transit, we have to move from one presently; that means, present practices to the more affordable and sustainable and economical practices so, how to move on, how to not only create the clean and renewable energy, but how to use it sustainably in sustainably and meet the future needs as well.

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So, let us do a SWOT analysis. SWOT analysis that is analyzing our strengths weaknesses opportunities and the threats. So, when we talk about the strengths strong points like we can say the yes renewable energy will be definitely cheaper, it will be cleaner, it will be sustainable in the long run and even it will be economical also in the long run and then it also sustainable in running the stable financial market also.

So, fuel prices will not be hiked and will not fluctuate very often and that will be less monopoly by the big companies or oil rich countries. So, oil price will be controlled under control. So, that these are the strong points strengths, but what are again what are the weaknesses like yes, but for installing the renewable creating renewable energy we need to have the strong infrastructure and especially in India.

So, we have to build the which we were which we are lacking right now is a lack of good infrastructure for renewable energy. Faster growth of the energy demand and geographical constraints all across the country so, these are some of the weaknesses maybe because renewable energy; that means, to reach the outreach activities for the installing the renewable energy, infrastructure and distribution transport etcetera.

These are also there are also remote areas some geographical locations are also having the constraints for quick action in this way and opportunities about even then opportunities are there, like we can diversify our energy sources from you know from solar to wind to hydro energy to bio energy.

So, there are the scope for diversification of energy sources and affordable energy for all that is also it also gives the market also gives the opportunity for creating more affordable energy for all, then influence in the global market and decision.

And if we become capable of creating this renewable energy, sustainable energy and from multiple sources and we can diversify our energy sources definitely we are going to progress make progress in the global market also. Not only in terms of our economic growth, but also in terms of business also like in we can also supply, we can also export this kind of resources energy resources also throughout sourcing.

So, then again yes threats are there, yes everywhere there is a threat. So, corruption and lack of interest of the law makers that these are the; so corruption is the you know you can say it is the inhabitable feature in our country in our culture. So, first thing is that how to mitigate how to you know curb the corruption and lack of interest yes.

For that for you know for getting the maximum benefit of this in a renewable energy and government spending and strategies for installing this infrastructure of this. So, we have to maintain it. So, here maintenance is another after implementation the maintenance is maintenance and continuous monitoring evaluation is these are the major tasks.

So, we have to take; that means, all the stakeholders this is here the thing is that government cannot take any every responsibilities the private sector whoever they are installing they cannot take the responsibility of maintaining yes, they have their responsible for maintenance of the equipments in infrastructure etcetera technical maintenance, but regarding the consumption regarding the management regarding the you know restoration that all the stakeholders they must also play a key role.

So, therefore, how to curb corruptions, lack of interest in the lawmakers yes, we have to be very strict in the law in the policies and following the policies etcetera; so, corruption how to curb the corruptions, how to educate people especially educate people like the for example, installing the solar power plant solar energy plant farm in the rural areas, then we have to involve and engage the rural people youth and adults educate them, then educate them, inform them and give them the responsibility of maintaining their own thing.

So, they have to we have to educate them, motivate them, think that if you run these things if you maintain these things properly so, you will be benefited. So, once the government and the private sector they have installed. It is your job it is your responsibility to maintain, because it is it has been meant for you only for you people to or for your householder for your users only. so, you have to take care of.

So, how to decentralize it? How to diversify it? So, that you know for that we can develop a mechanism of or a regular monitoring control evaluation and give the responsibility to the major stakeholders. So, that has to be done both in terms of education information as well as through in terms of the rules regulations the policy and the laws also.

So, for that law makers to be very active, industrialist they have to be very vigilant about this. So, and the growing energy demands are also increasing that this is also a threat, but thing is that like the other resources this energy should not be wasted it should be consumed sustainably, restored it should be preserved, it should be used not only sustainably, but it will be conserved it will be preserved for the future generation.

So, up to this we have discussed about these basic things basic requirements of energy its sources and how to diversify and etcetera. So, next class we will continue with this thing now, for the timing I am just remaining I am closing the session right now.

Thank you very much.