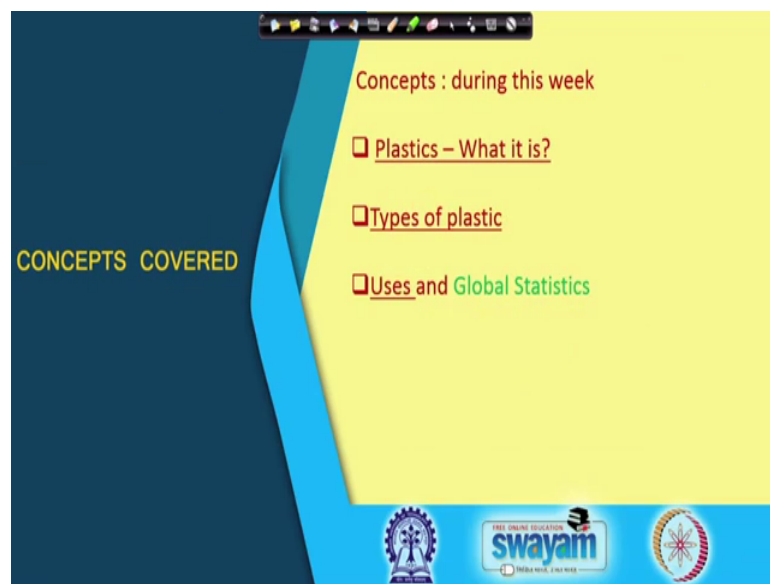


Plastic Waste Management
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Lecture - 05
Plastics - Global Statistics

Ok. So, welcome back this is the fifth module for first week. So, we will continue our discussion on the Global Statistics of Plastic.

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So, if you remember in this particular week, we have talked about so far in the first four videos what is plastic, what are the different types of plastic. We also use looked at the usage of plastic, then towards last slide of the previous module we got into the global statistics and we will continue our discussion from there.

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So, this was the last slide if you remember that we had in the previous video. Just to continue the discussion from here I put this slide. So, if you remember we said that 50 percent of the plastic is actually made in Asia and we explained why it is so and that is followed by Europe and North America and then middle East Latin America and they come and this middle east country. So, this is so I just take home message here is most of the plastic half of the plastic is actually made in Asian countries and of out of that 30 percent. So, nearly more than whatever is made in Asia more than half of that is actually made in China itself.

So, that is why if you can think about china if you remember we I said that very recently in April 2018, they have decided not to take dirty plastic waste which is going for recycling from other countries into China. Earlier china used to take a lot of plastic waste from Europe and from Japan maybe as well from Europe from North America, Australia. New Zealand from these countries lot of plastic waste used to come to China. And the reason for that was china was China had was trying to recycle it; China is a lot of manufacturing industry manufacturing industry needs lots of plastic. So, if there was a market for this kind of recycled plastic.

Now, China itself produces a lot of plastic waste itself and this recycle plastic coming from abroad was mostly very dirty. And so now, China has said I do not want dirty if you want to give me, there is the it has to be really clean plastic, it cannot be dirty plastic; I

will not take your dirty stuff and that is the reason for that is china itself is producing a lot of plastic. Now they do not really require plastic from abroad to sustain those manufacturing industry.

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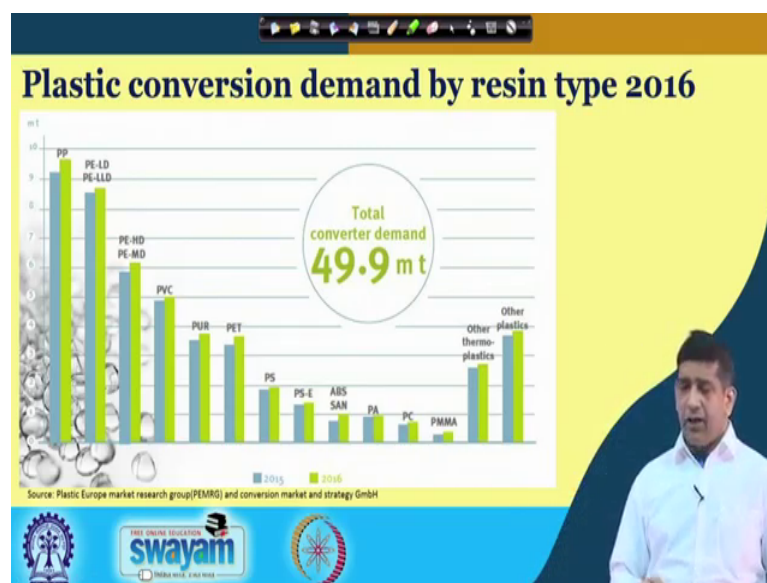


So, now if you look at plastic the main market which we talked about earlier in terms of different markets that is that is out there for plastic usage. A packaging industry which if you remember we talked about that packaging industry nearly 40 percent 40 percent of the plastic is in plastic industries, building construction 20 percent, automate if 10 percent of plastic goes there, electrical electronic 602 percent, household, leasures and the sports 4.2 percent, agriculture 3.3 percent and others is 16.7 percent which includes appliances, mechanical engineering, furnitures and medical usage in all that.

So, 40 percent of the plastic goes in the packaging industry. So, that is and many of many times in the packaging industry we are using those thin plastic film plastic or single use plastic. So, that is the where we need to kind of focus on trying to get rid off those plastic components

So, that is, these are the main market in terms of its global usage where what the plastic is being used up then.

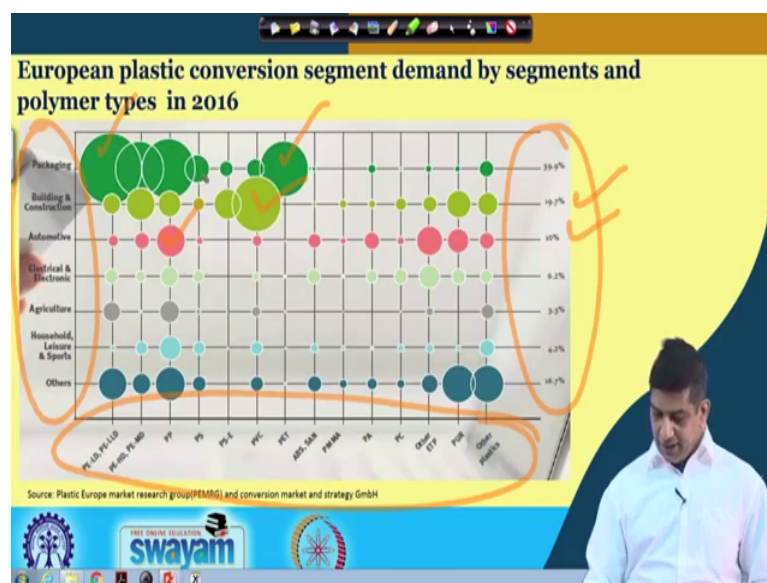
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So, if you look at from a resin type in terms of the resin type, we have around it is 49.9 metric ton where we have a polypropylene, polyethylene and a high density medium density PVCs, a pet polystyrene abs as you can see from print these two columns over here kind of shows you the data from 2015 and 2016. So, 2016 is the slightly like a greenish color and 2015 is that light blue color that you see over there and for most of the material.

In fact, for all of the different plastic type you see that actually the global production figure has gone up; global production figure has gone up in terms of the different plastic that is being used as per the different resin types. So, we are producing more and more plastic there is a lot of demand for plastics and that is why there will be and a the market in terms of managing this plastic waste out there as well.

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So, if you look at different types of plastics and where they are being used. Here bigger the bubble and I think if you do not if you have not seen these kind of pictures before, here the bigger the bubble means bigger the quantity is more. So, the data is the, we have bigger values for those particular data.

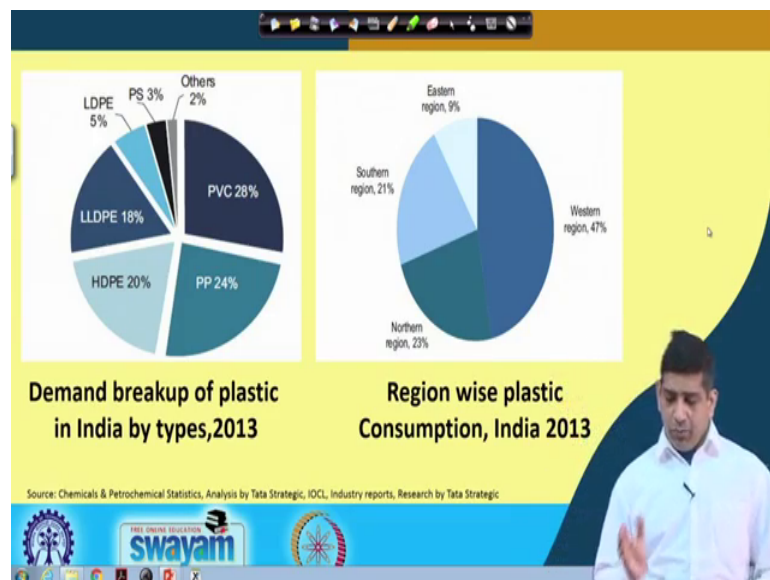
So, at the bottom in the x axis, it kinds of shows you in the x axis we have different types of plastic which is being used like PELD, PELLD, PESG, PP PP is polypropylene polystyrene and PVC PET. So, different types of plastic and here on the y axis you are saying the areas where they are used the packaging, building construction, automotive, electrical, household, leisures and the sports and others which you saw those categories in the sum of that two slides before.

And as you can see that is where the data came from where nearly 40 percent was packaging if you remember that building construction was 19.7. So, it is a break up of that particular slide that you just saw two slides before where these are these are the different types of plastics which is used in packaging industry and in terms of their volume of usage bigger the circle, more is the plastic that of that particular type.

Building construction for example, in the building construction if you can see, PVC is the most it is the biggest circle over there. So, PVC is the most used in building construction. Packaging pet is quite substantial the most the biggest one is PELD and PELLD. So, that is the polyethylene low density and so that is what is used quite a bit

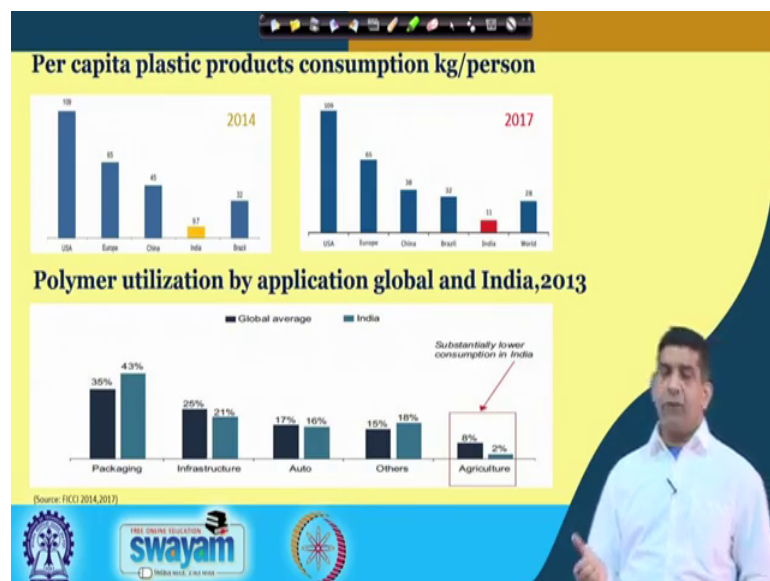
over there as well. Automotive we have a PP polypropylene that is the maximum that is being used in others again polypropylene is there and polyurethane is there. So, different types of a plastic is used in different application. So, that is and that is how we have lots of variety of plastics that is being made for our usage.

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So, if you look at in terms of in India, what are the in.

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In the Indian context just in here we missed one slide, yes. So, in terms of per capita plastic consumption, so, how much plastic we are consuming per person in a particular

year? So, here as you can see from 2014, we have data for 2014 as well as for 2017. So, last 4 years ago and last year

So, per capita plastic product consumption where if you look at the numbers, we have this is a relative figure as you can see in Indian context we are much smaller quantity as compared to US or Europe even from compared to US actually we are even (Refer Time: 08:12) 10 out of 110; so, one more less than one tenth less than tenth percent. So and same thing if you look at in terms of the per capita plastic product consumption these are kg per person. So, how much kg used per person and the other thing in the Indian context is see our population is huge.

So, for India and China when anything we put in kg per person, our numbers tends to go down because our population is so huge. So, denominator becomes so big and then even the plastic the figures may be if you look at, what is the; it will let us let us do the rough calculation. In India Indian population in Indian population is around 3 times the US population. So, we have a 3 times the USA population. So, if we have 9.7 so if so, we were actually around eleventh less. So, if you tell in terms of usage if you see. So, that should be 11 divided by 3.

So, let us if I just for round it off I can 4 so, it 12. So, it is like around 4. So, we are we are one-fourth we are in terms of plastic usage, it is one-fourth of USA because if you take into a factor just the plastic kg of plastic used in the country excluding the population data. So, it is around 25 percent of the plastic that is used in USA still it is a much less compare if you look at the again we have with so many people around, but it is still we use just 25 percent of the plastic of what it is used in US market.

So, and then we had a slight increase in 2017 as you can see for US, Europe it has not changed much. In China, they have gone down a little bit and when you see this going down you need to be actually; if you look at these two 45 to 38, then Brazil was 32 and 32. It remains like that in India has gone up. So, because of the global our GDP is going up as I have been telling you those of you took my solid waste class as well and the like waste management for the smart city, we talked about there as a GDP of a country increases the amount of waste that is produced also goes up and that includes the plastic waste.

And so; that means, our plastic consumption has gone up. And for us it stays the same, for Europe it is almost this is again it stays the same, a China it has gone down. So, either china is trying to reduce the plastic usage or at the same time, the other thing is that the plastics are getting lighter. There you can see that the packaging material is getting lighter as well and this data is kg per person. So, it is per weight. So, when it is per weight if things gets lighter you may be using the same amount of plastic in terms of the volume, but per kg it kind of goes down because you have getting a lighter plastic are being used.

And here we have the world average which we did not have the 2014 data. So, this is the world usage per kg per person. So, for the Indian context, we are much below the world average Brazil is kind of slightly half of than world Hambridge and you if you look at the type of consumption. The so called American lifestyle where they are what they are 219 divided by 28 so, that is around 3 3 and half times. So, 3 and half times more than the world average that is why many times we see that every if every one of us is start living as the 11 US in terms of consumption is style, we actually will need three earth to sustain our lifestyle. So, one earth will not be enough.

So, at the bottom that is what you see is the, this is the data from FICCI at the bottom where we have where global average in the Indian average. So, a global average packaging is around 35 percent and India in India we have 43 percent, then infrastructure we actually we are using less in global compared to global average. Auto industries more or less the same because auto it is pretty much similar cars are there.

In nowadays you have same whether it is a Suzuki or Suzuki cars are available at many other countries in the world as well they are all you are looking at in India. It is a Maruthi, Suzuki, but now it is actually Suzuki only. If we do not use that Maruti anymore at if I remember correctly and then we have for at least for many of those brands, then we have a Sevi, we have Reynolds, we have Volvo and they are standard cars, they are standard cars used in many other countries.

So, similar figures you see 17 percent and 16 percent. So, not much difference because the design is the same in others we use probably have some more usage of plastic here. And if you look at the agriculture, our plastic usage is much less. Our agriculture sector is a still very old fashion we still rely too much on rainfall, we do not have those

precision agriculture things happening in very extensive way probably that is why we do not use lot of automation in industry with the automation comes a lot of parts with the lot of parts, lot of equipment comes lot of plastic.

So, our usage in plastic in agriculture is one-fourth of the global average. So, that is what kind of highlights in that particular picture and the data came from FICCI's data FICCI is the Federation of Indian Chamber of Commerce and Industries. So, that is what the data comes from.

Now, if you look at again this is this particular information is coming from chemicals and petrochemical statistics. So, that is the analysis by Tata strategic IOCL industry reports and research done by Tata strategic. So, here if you look at the demand and breakup of plastic in India by types in 2013 and the reason why is also plastic consumption in 2013. So, now, again these data is from 2013.

If you have a newer data if you find a report which has available the newer data, if you get hold of that just send us the link on the discussion forum, it will be nice for us all of us to look at that because as I said we are trying to put together this information, this lecture material, these slides using lot of information on the web from authentic sources.

We are just trying to get from authentic sources; we are not taking any website information. We are always looking for reports technical reports, government reports, good industry reports like a reported industry reliable industry reports and to get this information. But we may miss some newer data. If we do please educate as well it will be good for all of us while we are learning this course.

(Refer Time: 15:06) So, in terms of demand break up of plastic in India by different types again polypropylene, HDPE, PVCs. So, that is in you see that HDPE has pretty high demand polypropylene a PVC has a lot of demand as well LD LDPE LLDPE. So, those are we are mostly used is in the industrial setting you see, this kind of the demand. And reason wise it is not no surprise, you see a lot of demand in the western side and then southern and that is why you would do that because that is where most of our industries are is not, it?

The western India and the southern India, but that is where most of the industry are instant region we do not have that many industries. So, most of the jobs for the younger

generation actually they go either to south or west of the country whether most of the like a placement when it is done in campuses like IITs and other places you see those companies. Most of them, they will have the placement the joining happening in cities in southern India or in western India.

So, or some in Delhi side depend, but that is mostly service industry and most of the manufacturing industries in this area and that is why you see a lot of plastic consumption over there and northern region also has 23 percent. So, that is where most of the industries west north and south east has very low industry that is why you do not see that much sowing up over there.

So, again for your, these are you just you should try to understand them from a conceptual point of view. So, that it becomes easy for you to follow, then you do not have to like it just memorize these numbers. So, that is what the like a, we had in terms of usage in terms of the plastic usage for different different sectors. We also looked at the global production of plastic. We try to compare many countries like India, China and other places.

So, in nutshell, we will try just try to in next few minutes I will try to kind of summarize the entire week first this particular video and then the entire week that we covered. So, for this particular for video the focus was on looking at the usage of plastic and the global statistics like in terms of what is the global figures, how much plastic is being used, what type of plastic is being used in different application. And in the global scale which countries are using most of the plastic, we saw that us and European Union kind of leading the pack, when we look at the kg per person usage.

And in the China in India is where is also China is kind of catching up much faster India is a still in a very low level as compared to other countries in terms of the plastic usage. But if you think if you just look at on you, you see a lot of plastic. So, think about how much plastic is being used in the other country.

So, one natural question which comes into mind which we will discuss as we go forward in this particular course that although we see lot of plastic being used in say Europe or US in terms of the plastic pollution. When we get into the plastic pollution sources, we see most of the plastic pollution is actually coming from the Asian countries. What, why it is happening that way? You should think about that why it is that our in it from the

Asian countries. We see more plastic being getting into the environment as opposed to you environmental means in a mismanaged way I kind of give you the answer.

So, the management of plastic waste is very poor in Asian countries especially in countries like Asia in India and several others countries around a in Asia as opposed to the plastic waste a managed in North America or in European countries especially western European countries or Japan or Australia or New Zealand. There they do have the very robust waste collection infrastructure where the plastic is also collected and whatever can be recycled is that say they also another aspect that you need to look at is more many of these plastic we are coming from North America and Europe to China or India and other places too. So, although it they are produced over there, but ultimately it is disposed in this environment especially when they are trying to recycle it in a very informal sector.

So, taking all those factors into consideration although you see that a lot of plastic is used in North America and Europe, but many of this plastic is in terms of mismanagement and getting into the environment, getting into the ocean is actually happening from the Asian countries and the reason for that is not a proper management system here and at the same time dumping of the plastic waste from rich countries to the poor countries. So, that is that is we need to look into that and we will talk about all these things as we make progress in this particular course.

So, that was kind of what we try to do in this particular video. Now in terms of the entire week what we try to talk about; just a recap for you to help you prepare for your quiz which is due actually as you know, this NPTEL courses requires you to do a weekly quiz and it will not be tough, just keep do it properly and you will be fine. So, in terms of this week, we is first started with looking at what is plastic, we define plastic, we can talked about the history of plastic, how the plastic came into existence and how the different types of plastic were evolved, how they were invented.

Then we moved in looking into like what are the different usage of plastic, where the plastic is being used, what type of plastic is used in what kind of applications. Then we also started looking into the figures facts and figures of what are the different types of plastic that is made in relatively how much quantity, what are the different industries where the plastic this different types of plastics are being used and what is the global

figure in terms of plastic production as well as usage and what is the Indian figure in terms of the plastic usage. In India we also looked at the region wise which region has more plastic demand versus less plastic demand. So, that is kind of what we have covered in this particular week.

Now, going into the next week this week was kind of looking at what is plastic. Now from next week first like week 2 video 1, we will start getting into what is plastic waste. So, we will start with what is first of all what is waste and then what is plastic waste and how we can handle plastic waste, what are the issues associated with that, what is a human health environmental. So, you will get a lot of discussion happening around that in starting of next week

So, that is what pretty much that covers the week 1. Again you will please do the weekly quizzes and if we use the discussion forum for discussion of the material and if you have any questions, any feedback, any new information that you find please share it on the discussion forum for the benefit of all including us.

So, thank you for taking this course. Hope you like the first week and we will continue our journey for next 7 weeks and this is an 8 week course.

Thank you.