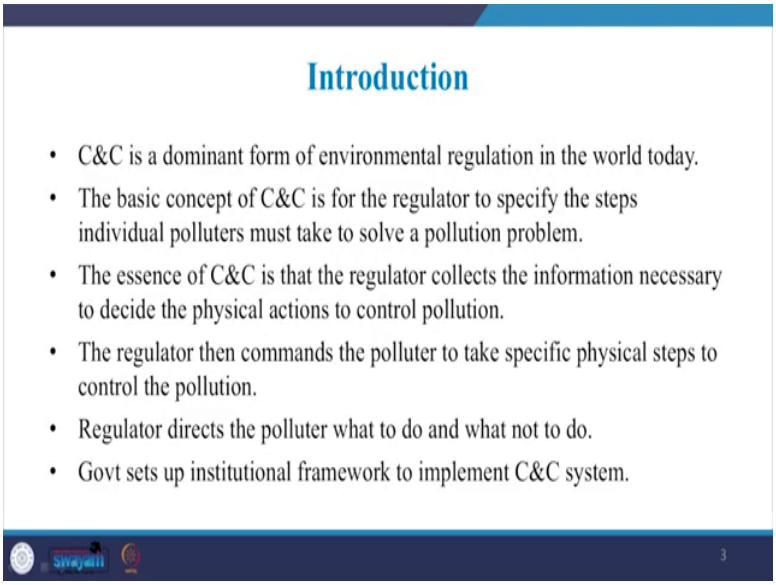
Introduction to Environmental Economics
Prof. S. P. Singh
Department of Humanities and Social Sciences
Indian Institute of Technology, Roorkee

Lecture – 52
Command and Control Approach

Dear students, in the preceding lecture; I just introduce two approaches of regulation. One is Command and Control Approach and other is economic incentives. In this lecture, you will study in detail what is command and control approach what are its main forms, key features, advantages and disadvantages.

(Refer Slide Time: 01:20)



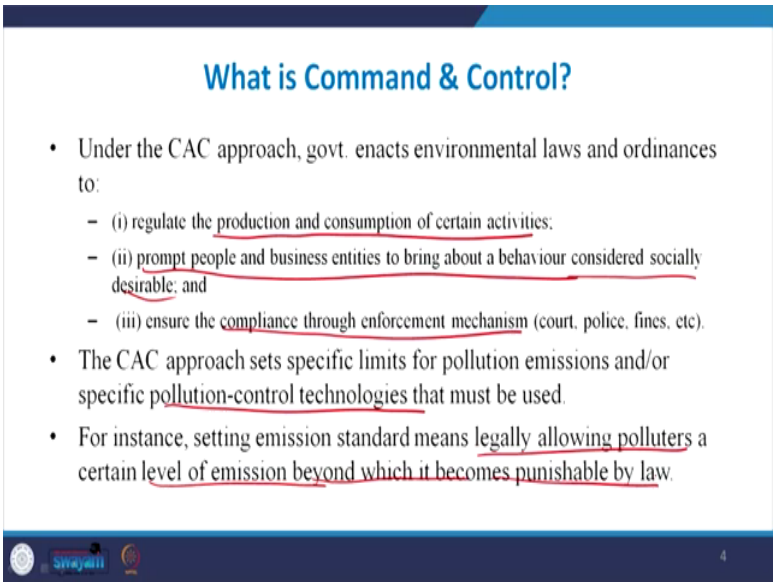
Command and control approach is a dominant form of environmental regulation which is being used across the globe. The basic concept of command and control is for regulator to specify the steps individual firms. Here firms means polluters must take to solve a pollution problem.

The essence of command and control is that the regulators collect information necessary to decide the physical actions to control the pollution. The regulator then commands the polluter to take its specific physical step to control the pollution. Regulator directs the polluters what to do and what not to do. And for this purpose; the regulator set up the institutional framework to implement the command and control system. So, command and control system is a very dominant form of regulation. Under this system the regulator or government direct the polluters to follow the instructions of the government.

So, governments can set certain kind of standards related to environment and these standards are to be met by the polluters. And if they are not following the instructions or if they are not following the standard set by the government through regulation, then the regulator can punish the company or penalty can be imposed those who are violating the regulations.

So, this is actually the direct intervention in the activities of polluters and in this case as I already discuss there may be different forms of standards that can be said by the government to regulate the functioning of the polluting companies.

(Refer Slide Time: 03:42)



So, under command and control system; government enacts environmental laws and ordinance to regulate the production and consumption of certain activities. So, that is very important, why regulations are required? Why the government enacts different kinds of environmental laws and ordinance or regulation? To regulate the production and consumption of certain activities.

Why here the emphasis is on certain activities? Because there maybe some activities which may not affect the environment to a greater extent, but there are certain kind of activities which generate negative externalities into the atmosphere or they generate pollution and that is why the regulation of these activities whether activities are related to the production of goods or services or consumption of goods and services they must be controlled regulated through certain rules and regulation.

And second to promote people and business entity to bring about a behavioral consider socially desirable or through these regulations. Now, government tried to mold the behavior of the polluters, so that the polluters may take socially desirable actions. Socially desirable actions means; that if the companies are generating pollution. So, before releasing the pollution into the atmosphere company must treat that pollution before releasing it into the environmental system. Third to ensure the compliance through enforcement mechanism.

So, if somebody is not complaining the direction of the government, then that company can be punished. And we have a system of court, police, fine. So, different kind of institutional mechanism can be set up by the government. So, that the polluters can comply the order of the government or the regulation set by the government.

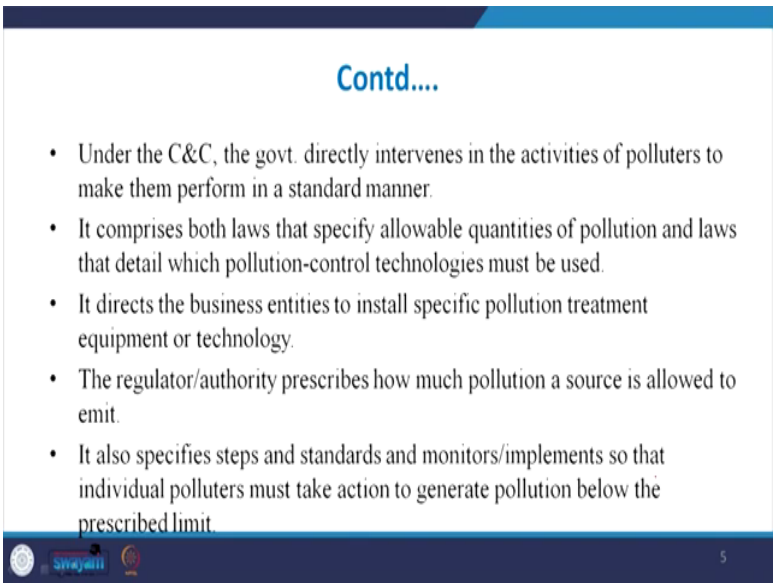
So, command and control system sets a specific limit to the pollution emission. So, emission is standard can be set and up to that standard the pollution is permissible, but if any company is polluting the environment beyond the permissible limit that company is punishable under the set rules and regulation or a specific pollution control technology can be used.

So, we can have different kinds of mechanisms to control the functioning of the government and to check the pollution. One I told you emission standards where the minimum standards can be set and if some company is not following or not maintaining that standard, then company can be can be punished other maybe technology.

So, under command and control system government can direct the producers to use the specific device, a specific design of the products, a specific process of the production etcetera. And if company is not following that instruction then company license can be confiscated or company may not be allowed to produce the goods or company may be finance. For instance, setting emission standard means; legally allowing polluters a certain level of emission beyond which it become punishable by the law.

So, this is simple things that in command and control system; government actually directly control the activities of the polluters and direct the polluters to what to follow and what not to follow. So, this is called command and control system.

(Refer Slide Time: 08:11)



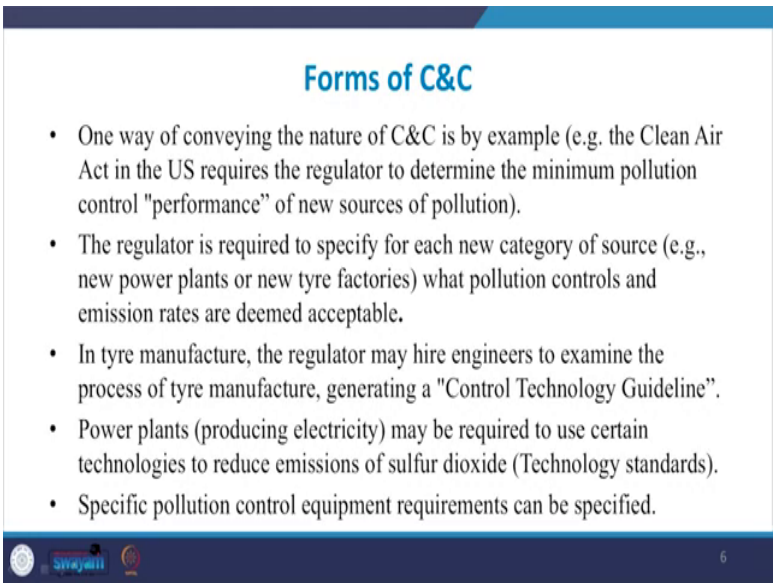
Under the system; the government directly intervene in the activities of the polluter to make them perform in a standard manner. It comprises both laws that specify allowable quantities of pollution and laws that detail which pollution control technology must be use I already told you either emission standard can be set or technology standard can be set. I will take a detailed discussion letter on all these standards.

It directs the business entity to install specific pollution treatment equipment or technologies. So, government can say that you should have the height of the chimney up to a certain limit or a specific device can be installed or a specific technology can be used and then the regulators

through its machinery or like central pollution control board. They stop all the central pollution control board can visit the company can see whether the specific device is installed or not. So, that is actually the technology standard.

It also specify the steps and the standards and monitor and implement. So, that individual polluters must take action to generate pollution below the prescribed limit.

(Refer Slide Time: 09:35)



There may be different forms of regulation. One way of conveying the nature of command and control is by example for instance the clean air act in USA requires the regulator to determine the minimum pollution control performance of new source of pollution. That regulator is required to specify for each new category of sources like new power plant or new tire factory or new cement factory what pollution controls and emission rates are deemed acceptable.

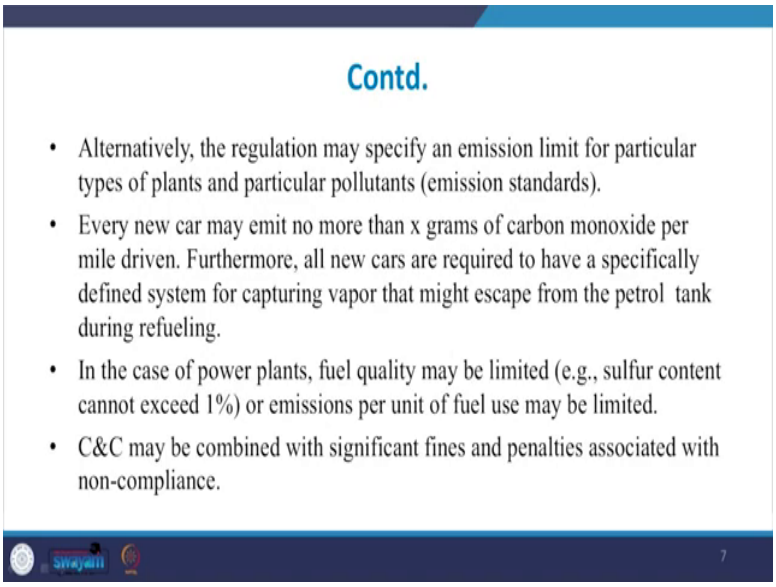
So, when a new factory is to be set up the government can set up to what extent which technology should be used and up to what extent per unit of output emission should be released into the atmosphere.

In tire manufacturing; for example, the regulator may hire engineers to examine the process of tire manufacturing, generating a controlled technology guidelines. Actually in this form of regulation lots of information are to be collected by the regulators and for that per purpose regulator requites engineers.

In tire manufacture, the regulator may hire engineers to examine the process of tire manufacturing, generating a controlled technology guideline. Similarly, in power plant; a regulator can also see the specific technologies being used to produce the output. So, that emission level can be determined like sulfur dioxide.

So, in that case technology standard can be set. So, this is one form of environmental regulation technology standards. So, technology standard can be set by the government in different factories which are polluting in nature whether it is tire manufacturing firm or power plant generating energy or cement or steel or ternary or refinery etcetera. So, specific pollution control equipment requirement can be specified in this context.

(Refer Slide Time: 12:22)



Alternatively, the regulation may specify an emission limit for particular types of plants and particular pollutants. In this case instead of deciding what kind of technology should be used. Emission standards can be set and a company has to met that standard.

Every new car may emit no more than say x gram of carbon monoxide per mile driven, this is a case of environmental emission standards. Furthermore, all new cars are required to have a specifically defined system for capturing vapor that might escape from the petrol tank during refilling the tank.

In the case of power plants; fuel quality may be limited like sulfur content cannot exceed for example, 1 percent or emission per unit or fuel use maybe limited. So, under command and

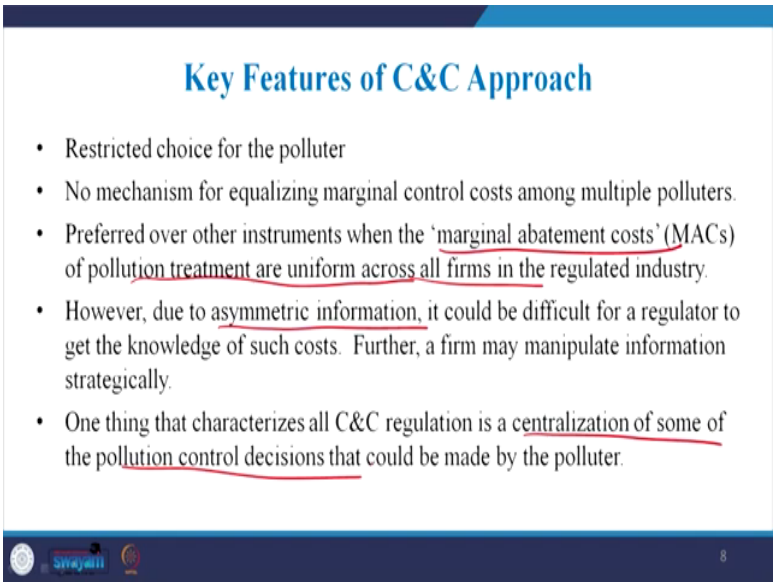
control system all these things are done and here command and control may be combined with significant fines and penalties associated with the noncompliance.

So, if a particular polluter is not following the command of the government and if emissions standards are not met, then fines and penalties can be imposed for noncompliance of the order of the government. Key features of command and control approach. First feature is restricted choice for the polluter. So, under the command and control system; polluters have a limited choice. Polluter cannot decide what kind of technology should be used to produce the goods, it is actually decided by the government through regulation.

Second, no mechanism for equalizing marginal control cost among multiple polluters. So, when there are multiple polluters according to economic efficiencies, then marginal costs of habiting the pollution should be equal to all the producers. Then the optimization can be done, but under command and control system; we do not have any mechanisms under which the marginal cost of abatement of the cost pollution can be equalized among different polluters. It is preferred over other instruments when the marginal abatement cost of pollution treatment are uniform across all form in the regular regulated factory.

Actually this command and control system is more effective to achieve the intended goal only when the marginal abatement cost of pollution treatment are uniform across all the firms where regulation is made.

(Refer Slide Time: 16:02)

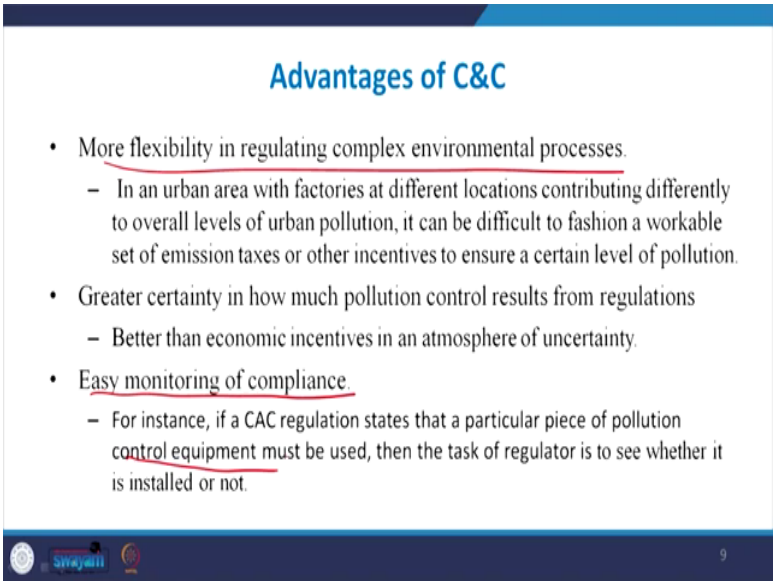


But, in reality it is not possible, because it is very difficult to collect information on the cost of abatement of pollution from different companies. So, that is why it is not feasible for the polluters to decide the emission standard at the level where the marginal abatement cost of pollution abatement is uniform across all the firms in the polluted industry.

However due to asymmetric information; it could be difficult for a regulator to get the knowledge of such cost. Sometimes, information maybe manipulated by the companies strategically, the companies or polluters may not share the correct information to the regulators and that is why setting the standard at the level where the marginal abatement cost of all the firms are same is very very difficult and that is why when standards are set generally these aspects are ignored by the regulators.

One things that characterize all command and control regulation is centralization of some of the pollution control decisions that could be made by the polluters. So, this is a command and control system which is a centralized kind of decision taken by the main authority although authority may have a structure at the lower level like in India we have ministry of environment and forestry, then we have central pollution control board. We have state pollution control board we also have the local units of the state pollution control board, but strategic decisions are taken by the central authority regarding how much emission standards should be set what kind of technology should be followed by a particular firm to produce the goods.

(Refer Slide Time: 18:27)



There are certain advantages of command and control system; first advantage is; it is more flexible in regulating the complex environmental process. So, when the environmental

processes are very complex, the economic incentives may not be as effective as the command and control system.

In an urban area where factories at different locations contributing differently to overall level of urban pollution it can be difficult to fashion a workable set of emission taxes or other incentives to ensure a certain level of pollution. So, this is very very important that when the system is very complex where it is very difficult to institutes uniform tax for all kinds of industries in that case command and control system would be more effective as compared to the economic system.

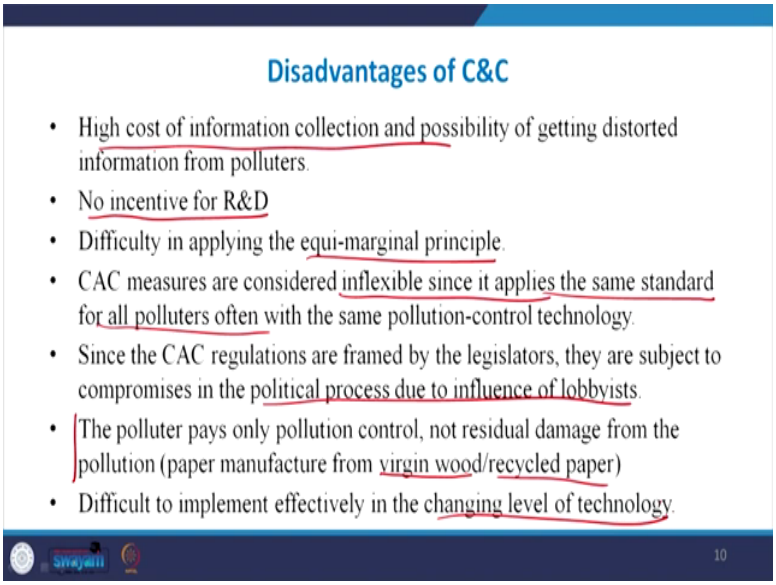
Second it has greater certainty in how much pollution control results from the regulation will occur. So, as compared to economic incentive like taxes, subsidies or tradable permits, we do not have as much certainty regarding the outcome as the case of command and control system because we set the standard we have to see simply whether standards are met or not but problem maybe how to set the standard. Sometimes standard maybe too high sometimes standard maybe too low from the society point of view or socially desirable level of pollution is difficult to be determined by the regulators.

But, one thing is clear that once you know the standards, then it is very easy to monitor whether the standards are met or not. So, there is a greater certainty in how much pollution control results will occur after following a particular regulation. It is better than economic incentives in a atmosphere of uncertainty. So, when there is a uncertainty when you are not sure whether the economic incentive will work or not in that case command and control system will provide a better result as compared to the economic incentives.

Third is easy monitoring of the compliance. So, compliance is very easy to monitor once you decide technology standard or emission standard, then the regulators is stop can easily visit the firm and can see whether the order is compiled or not whether the regulation is followed or not that can easily be known. For instance, if a command and control regulations system is state that a particular piece of in pollution control equipment must be used then the task of regulator is to see whether it is installed or not.

So, the staff of the regulator may go to the firm to see whether the specific device is installed or not, whether the design which is mentioned by the regulators to be followed is followed or not all these things are very very easy to monitor. But this system of regulation also has certain disadvantages.

(Refer Slide Time: 22:24)



First is, high cost of collecting information. When the government or regulator set the standards for setting the standards be it technology standard or ambient standard or emission standard to for setting the standard lots of information's are required. And getting information maybe very costly of here number one. Second, sometimes when even if you are able to collect the information; there may be possibility of distort you may get distorted information from the polluters. Polluters may not share you the correct information. So, distorted information and high cost of information are the major problems associated with command and control system.

And second and most important is no incentive for R and D. Actually, in case of economic incentives; the companies are free to use any kind of technology, any kind of production process and company can spend the money for on innovations to reduce the emissions or a evolve a better resource conserving technology etcetera, but once you have the command and control system company has no such kind of incentive to go for R and D. So, this is the major problem.

Then, third important problem is fourth disadvantages of command and control system is that this system is inflexible command and control measures are concerned inflexible since they apply the same standard for all the polluters often with same pollution control technology. So, that is why because different car companies may have different production system has and when you have a uniform kind of standards, then you will not be able to get the better results and that is why this system is known as inflexible in this regard.

Since the command and control system of regulations are framed by the legislator they are subject to compromises in the political process due to influence of lobbyists. I already discuss it in industrial group theory that many times both browns and grains they lobby with the government and try to mold the policy of the government in their favor and that is why many times when such kind of east standard are set they are subject to certain compromises due to the political influences of political process.

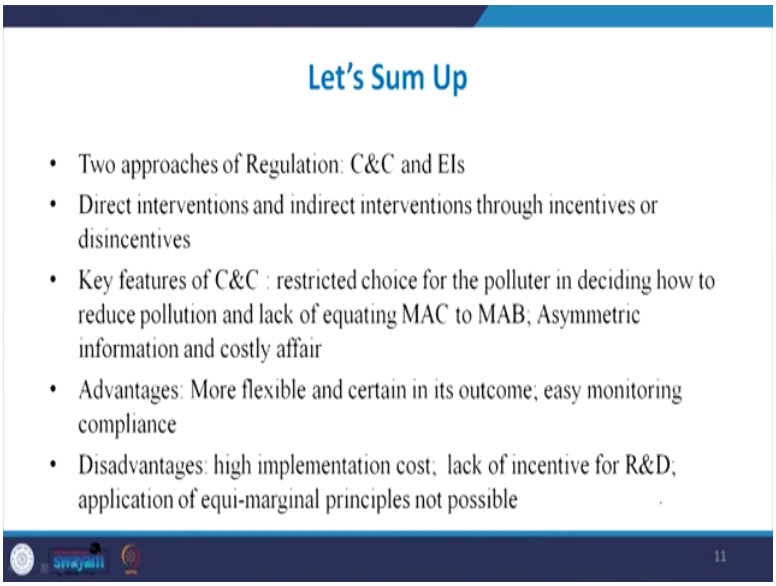
Polluters pay only pollution control not the residual damage from the pollution. This is another problem associated with the command and control system that in this system polluters pay only the pollution control cost not the residual damage from the pollution. Let me take an simple example think of the paper manufacture manufacturing the paper. Paper can be manufactured from the virgin wood, forest wood or recycled paper.

So, now, if a particular firm is using wood coming from the forest to prepare pulp and then paper other firm is using recycled paper both are meeting the same standards, but there is a lot of different. So, in that case recycled paper firm is actually saving the environment as compared to the firm which is using forest wood to prepare pulp and then paper.

It is also difficult to implement effectively in changing level of technology this is also a major problem associated with the command and control system especially in those industries where technology changing very fast. So, in the present era of liberalization globalization where we are importing technologies very fast. So, in a production process; technologies are changing very fast. So, if you are not keeping your standard inconsistent inconsistency with the technological change then you would not able to get the desired results.

So, it is very difficult to implement the command and control system when there is a fast change in that technology in the manufacturing of different kinds of products. Let me now conclude this lecture. I introduce you the two approaches of regulation; one is command and control and other is the economic incentives.

(Refer Slide Time: 28:00)



In this lecture I briefly explained what is command and control system, what are their main features, merits and demerits and also the form of command and control system. We also discuss the key advantages of this system and also the disadvantage of system.

In next lecture I will explain you the three key environmental standards under command and control system. One is ambient standard, second is emission standard and third is technology standard.

Thank you very much.