MINERAL ECONOMICS AND BUSINESS

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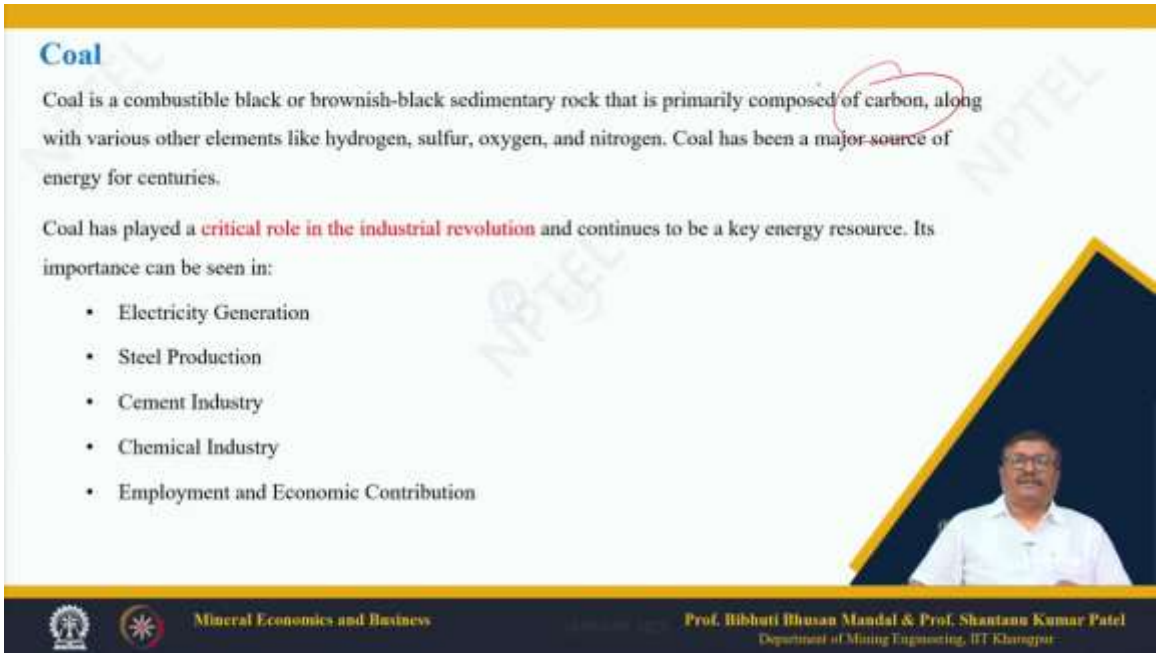
Week 11

Lecture 51 : Coal Grade and Prices

Hello everybody, welcome once again to my lecture series. Today, we will be discussing the coal grade and prices, as well as the pricing mechanism—how the pricing is done for different grades of coal, what rules and regulations we follow, how we calculate the coal price, and how we fix the price so that it can be sold. We also have to follow certain government guidelines. So, we will discuss how it is done in some other countries and also in our country. The concepts that we will cover can be broadly divided into these four titles or subtopics, such as coal and its uses—just an introductory topic which we already know. How do you classify coal? What is its broad composition, and how do you grade different types of coal based on classification or composition? Now, what are the factors that influence coal pricing? And what practices do we follow in the pricing of Indian coal that we sell or purchase in the market?

Coal is primarily composed of carbon, along with various other elements like hydrogen, sulphur, oxygen, and nitrogen. So, this is a major source of energy, like it or not. Whether it may be causing a lot of pollution, till date we have not completely abandoned coal as a major source of energy. We are dependent on coal production and its utilization, not as a domestic fuel anymore. Nowadays, we have replaced that with gas or other alternatives, but coal remains a major source of energy till date.



It has also played a critical role in the Industrial Revolution and continues to be a key energy source. Like, say, in the beginning, you must have—at least you have not forgotten— that coal and the steam generated from burning coal, and then running the steam engines in the beginning, changed a lot. I mean, the whole Industrial Revolution depended on that. Later on, electricity and other things came much later, but in the beginning, we moved forward through the Industrial Revolution based on steam engines, and the steam was produced by burning coal.

See how important they are, like the use of coal itself. Like electricity generation, steel production where coal is added, and then the cement industry and chemical industry. It generates employment right from the production, or say exploration, production, excavation—all these things. Transport, and then they are sold in the market. Then they are brought to the power plants, where we generate electricity from there. So, it has a

huge economic contribution, directly and indirectly also. Coal classification is based on, say, geological ages, geological age, and the formation process. We gave them even different names also.

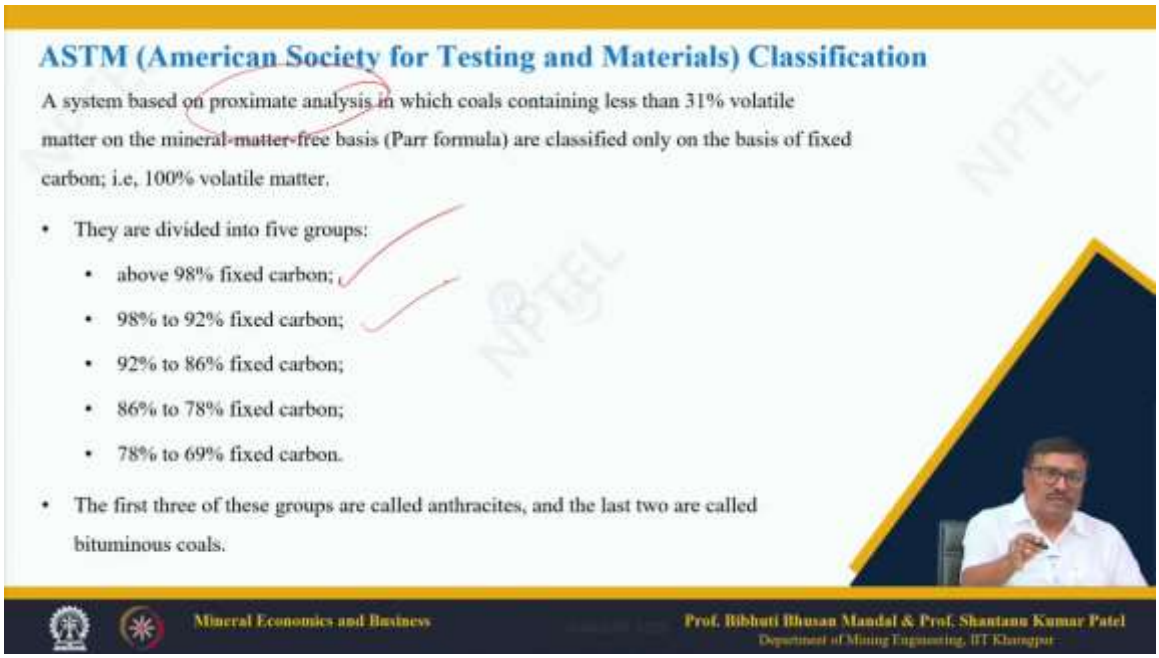
The physical properties like hardness, texture or structure, chemical composition, carbon content—a major factor by which we differentiate between two different grades of coal—the volatile matter content and ash content. Then you come back to the energy content, calorific value, and the heating potential total. Its main importance is in the calorific value—how much heat is generated per unit of the coal used. That is the most important thing. Now, the chemical composition of coal can be described as follows: like the carbon can vary from 50 to 98 percent, and it determines mainly, chiefly, the energy content—that means the capability to produce

Then hydrogen, 3 to 5 percent—small, but it contributes to the combustion efficiency. Oxygen, 2 to 30 percent, which affects the volatility of the material, and the sulfur is 0.5 to 5 that influences environmental impact. Higher sulfur leads to acid drainage because of the release of sulfur dioxide and trioxide in the atmosphere. And then it can come back when it mixes with the water, then it can form the acid drainage. Nitrogen, 0.5 to 2 percent—this affects the emissions Now, what are the factors that affect our coal quality?

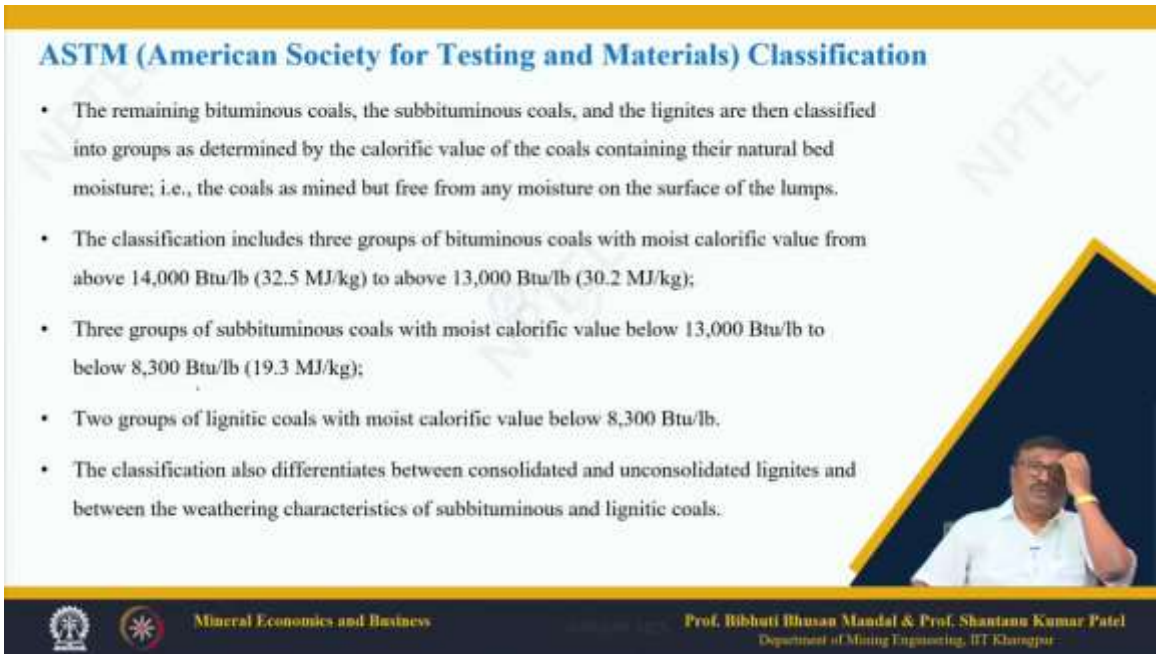
The depth of boreal means where it was formed higher temperature and higher pressure create higher grade of cold higher grade of Then the plant material composition different plant species as will result in varying coal quality in all not all of them are same. Then older coal deposits generally have higher carbon content and lower moisture that means, the carbonification the change to carbon complete carbon depends on the geological age of the deposit. Then we come to water and mineral content like the impurities like clay, silica, pyrite they affect combustion properties. Now we have the classification of coal.

We follow there are different classification system. One these two are very well known. One is the ah American society for testing and materials. This is ASTM or we have also our own Indian classification system which is slightly different ah and evolved over the years. This system ASTM is based on the proximate analysis.

Proximate analysis in which coals containing less than 30 percent volatile matter on the mineral matter free basis are classified only on the basis of fixed carbon. 100 percent ah volatile matter. They are divided into 5 groups ah ah depending on the ah fixed carbon. Like say above 98 percent fixed carbon, 98 to 92 percent Then further low grade 92 percent to 86 percent, then 86 percent to 78 and 78 to 69 percent fixed carbon.

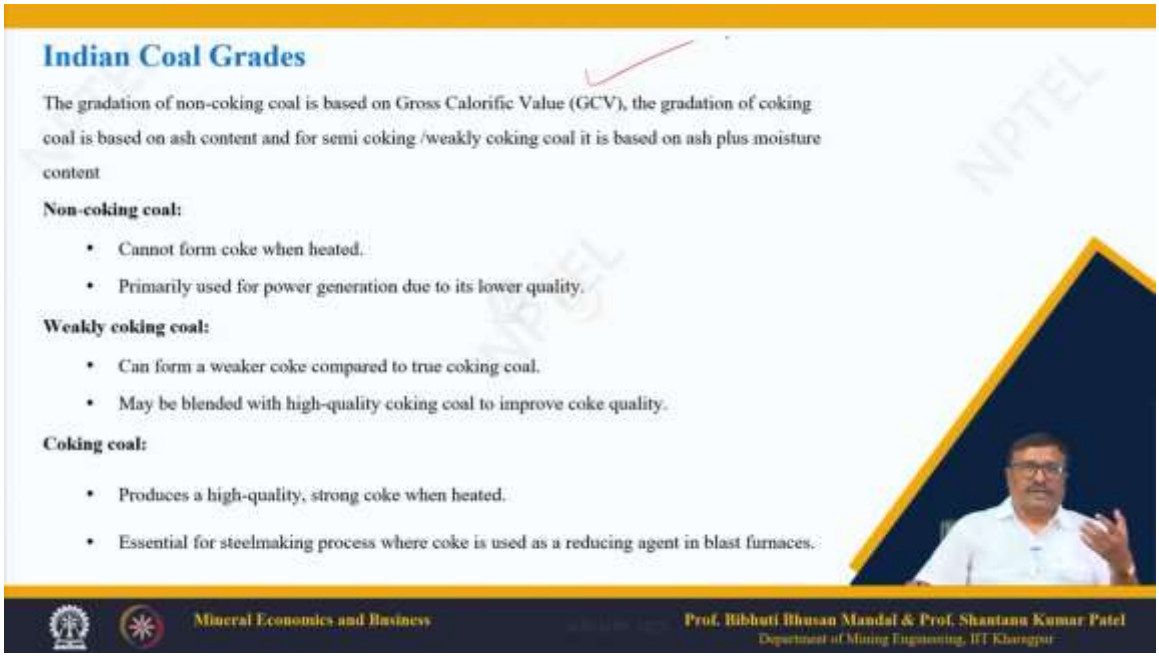


The first three of these groups are called anthracites 1, 2, 3 high grade very high grade anthracites. And the last two are called the bituminous, last two are called the bituminous coals. The ah remaining bituminous coals or the sub bituminous coals and the lignites are then classified into groups as determined by the calorific value of the coals containing their natural bed moisture. There is a coal as mine, but free from any moisture on the surface of the lump. Now the classification includes the three groups of bituminous coals with moist calorific value from above 14000 British thermal unit per pound or above 13000 British thermal unit per pound.



Three groups of sub bituminous coals with moist calorific value below 13000 to below 8300 this is one grade low and then 2 groups of lignite coals with moist calorific below 8300 British harmonium lead per pound. This classification also differentiates between consolidated and unconsolidated lignite and between the weathering characteristics of the sub bituminous and lignite coals. So, that is that is all about the ASTM grading of coal and the basis of that what are the yardsticks of measurement.

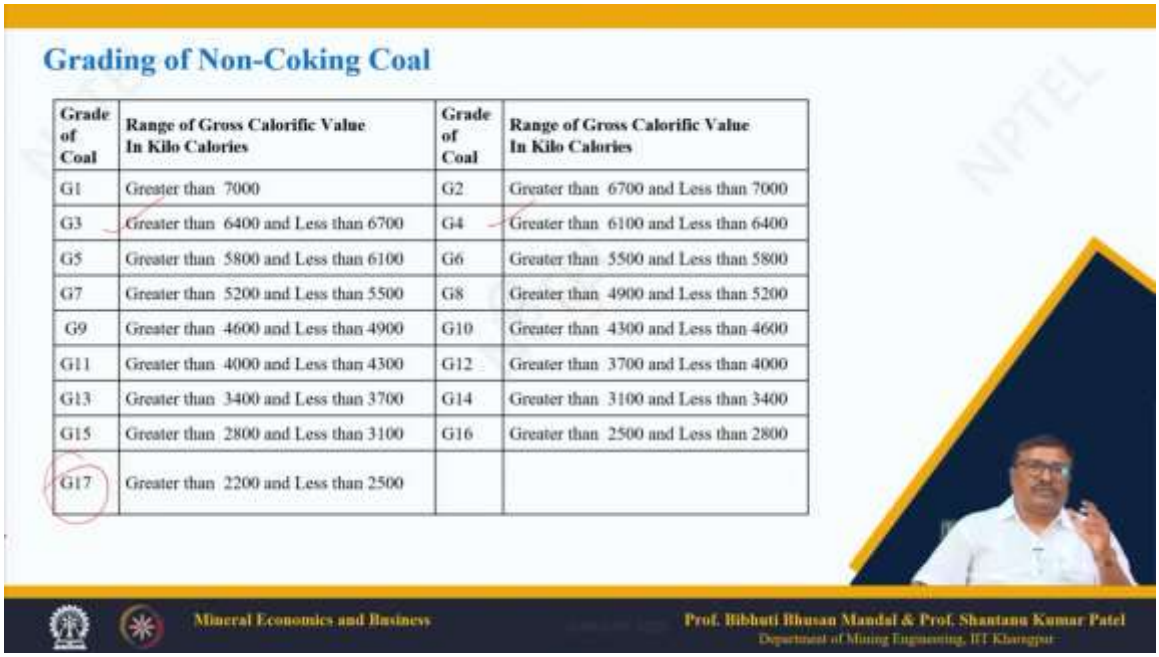
In Indian coal grading or grades ah of for for for example, for non-coking coal, it is based on GCV. that GCV means gross calorific value and the gradation of this cooking coal is based on ash content and for semi-coking or weekly cooking coal, it is based on the ash plus moisture content. Now we will talk about the non coking coal. This cannot form coke when heated and primarily used for power generation due to its lower quality. That means, we do not use it for furnace or say in steel industry.



Weakly coking coal can form a weaker coke compared to true coking coal, and it can be blended with high-quality coking coal to improve the coke quality. Now, what is this coking coal? This produces a high-quality, strong coke when heated, and it is essential for the steel-making process, where coke is used as a reducing agent in blast furnaces. Look at the grading of non-coking coal. The grade of coal is given here: G1, G2, G3, G4, G5, G6, G7, and so on, up to G17.

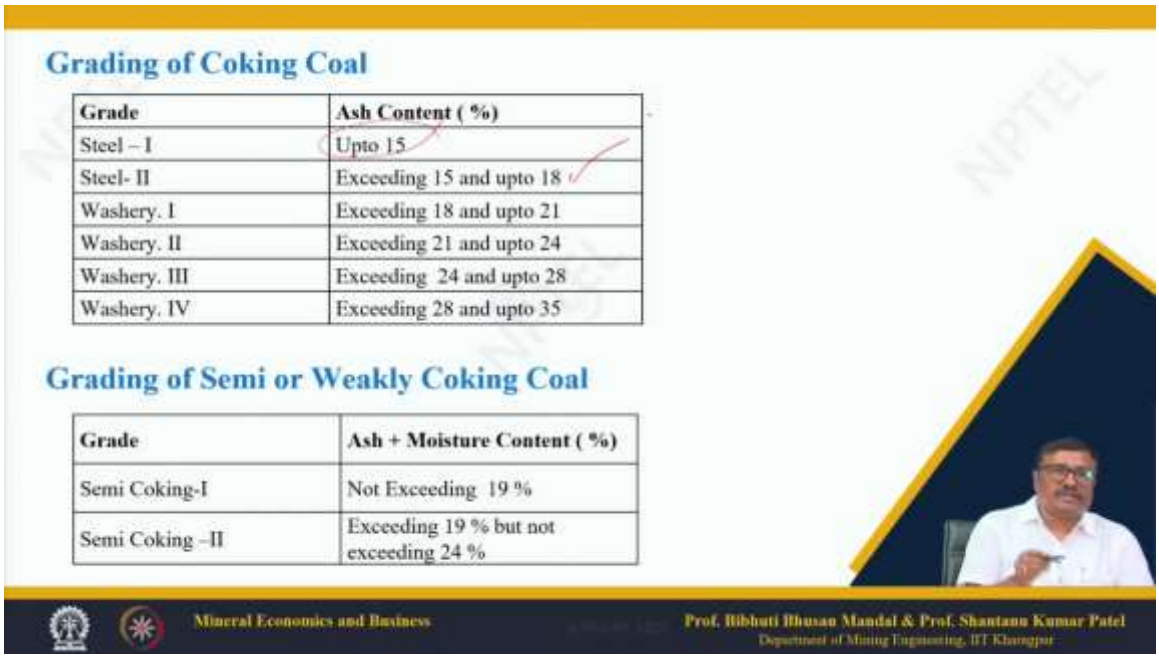
Now, the range of gross calorific value in kilocalories is this one. So, anything above 7000 kilocalories is considered as G1, the highest. Then, greater than 6400 but less than 6700 is G3. In between, G2 is greater than 6700 but less than 7000. So, like that, we have divided this entire scale from G1 to G17.

So, the lowest is greater than 2200 and less than 2500. So, up to this, we have classified And we have given the gradation from G1 to G17. Now, grading of coking coal—that was for the non-GCB. Now, about the coking coal, how do we make the grade?

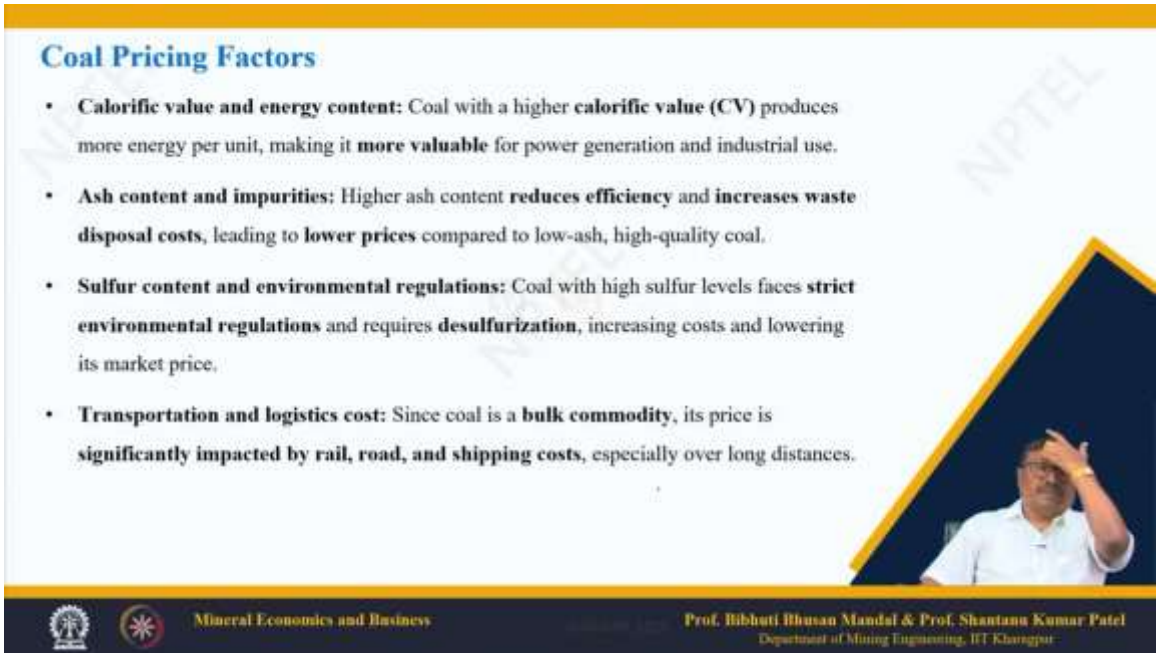


So, steel grade 1, steel grade 2, washery grade 1, 2, 3, and 4. Now, the ash content—now we are going for the... if we have coking coal, then up to 15 percent ash content. It is still grade 1, then still grade 2 is exceeding 15, but up to 15–18, then we are coming to washery grade. In washeries, we consider washery 1 as exceeding 18, but up to 21. Now, it is exceeding 21 and up to 24.

Between 21 and 24, we have washery 2. Similarly, between 24 and 28, it is washery 3. Now, washery 4 is, say, exceeding 28 but up to 35—this is what. Now, if you go for the grading of semi or weakly coking coal, then we have semi-coking 1 and semi-coking grade 2. Here, the ash and moisture—as I said earlier—are determined based on ash plus moisture content.



So, this is not exceeding 19 percent, and grade 2 is exceeding 19 percent but not exceeding 24 percent. So, what are the... that was all about grades, and I tried to give you the idea of how the grading or gradation is made for non-coking, coking, or semi-coking coals—what is the... Now, our target is—how do we fix the price on these things? So, we have calorific value, ash content, impurities—many things. So, can we make a guideline or a common reference where this information is utilized for the pricing of the coal?



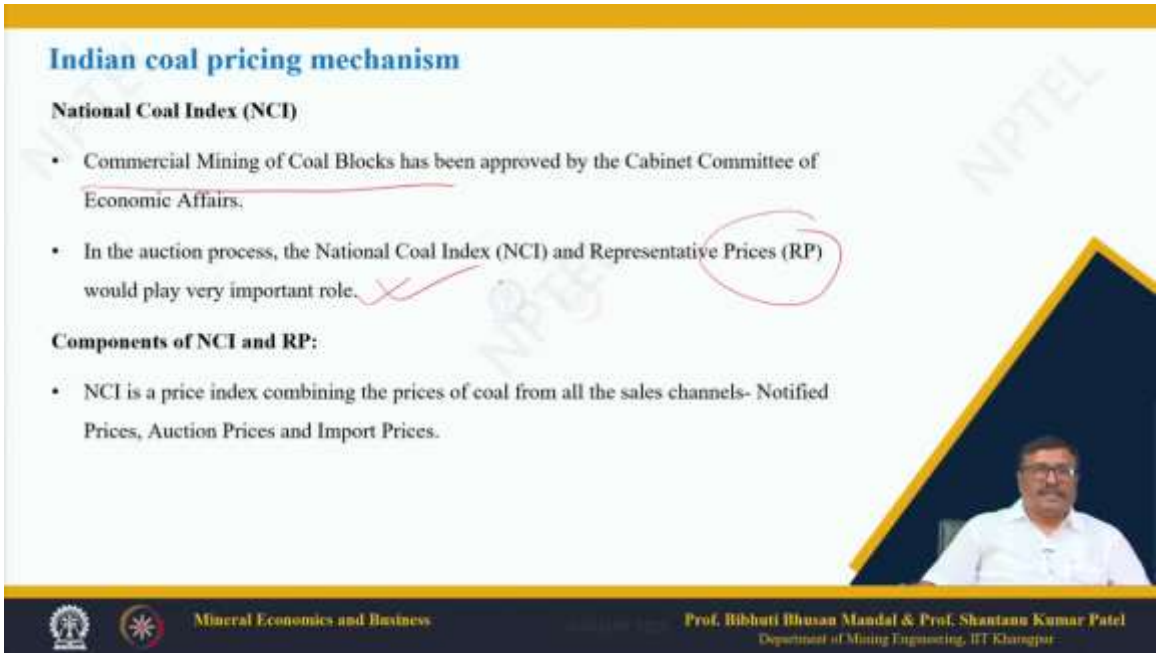
The calorific value or energy content, if you take this as a basis, then coal with a higher calorific value (Cv) produces more energy per unit. That means it is more valuable for energy generation and industrial use. But the ash content and impurities—if the ash content is higher—that reduces efficiency and increases waste disposal costs. That means it will attract lower prices compared to low-ash, high-quality coal, as we described above. Similarly, sulphur content and environmental regulations.

If coal has high sulphur levels, it will face strict environmental regulations because, when you burn it, apart from other emissions, sulphur dioxide and trioxide will be emitted, requiring desulphurization and eventually leading to higher costs. Now, we come to the transportation and logistics costs. So, coal is a bulk commodity; its price is significantly impacted by rail, road, and shipping costs. Especially when you are transporting it from one place to another over a very long distance, that will affect the final landing cost at the point where we are trying to use it. Then, demand and supply fluctuations—the price will definitely fluctuate due to seasonal demand, industrial requirements, and the availability of substitutes. If substitutes are available, prices will fall.

So, this will affect both domestic and international markets. Also, we have global market benchmarks. Pricing is also influenced by international coal indices like Newcastle in Australia, AP14 in South Africa, or NCI in India, affecting contract rates. So, in some countries—for example, India and China—we regulate coal pricing through state-owned

enterprises, while others allow market-based pricing. But in our country and in China, we regulate it through our own system of regulations.

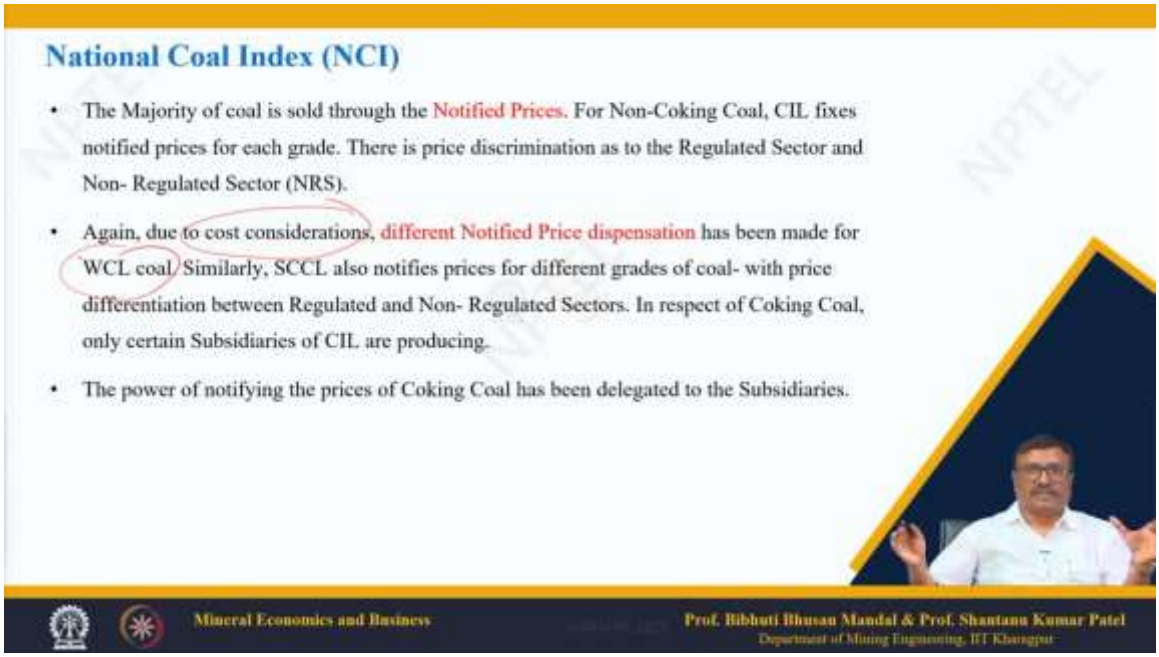
The impact of carbon taxes and sustainability initiatives is another factor. Countries that impose carbon taxes or promote renewable energy will reduce coal demand, which will, in turn, lead to price fluctuations and a long-term decline in the use of coal as an energy resource. Now, what is the coal pricing mechanism here? The National Coal Index. The commercial mining of coal blocks is approved by the Cabinet Committee on Economic Affairs. So, when we go for an auction process, the National Coal Index and Representative Prices (RP) will play a very important role. What are the components of NCI and RP?



NCI is a price index combining the prices of coal from all sales channels, including notified prices, auction prices, and import prices. What is the National Coal Index? Now, the majority of our coal is sold through notified prices. For non-coking coal, CIL fixes the notified prices for each grade. There is price discrimination between the regulated sector and the non-regulated sector, which is understood. Again, due to cost considerations,

There is a special provision for Western Coal Fields. So, different notified price dispensations have been made for WCL coal. Similarly, SCCL also notifies prices for different grades of coal, with price differentiation between regulated and non-regulated

sectors. So, in respect of coking coal, only certain subsidiaries of CIL are producing it. Only some such subsidiaries are producing the coking coal.

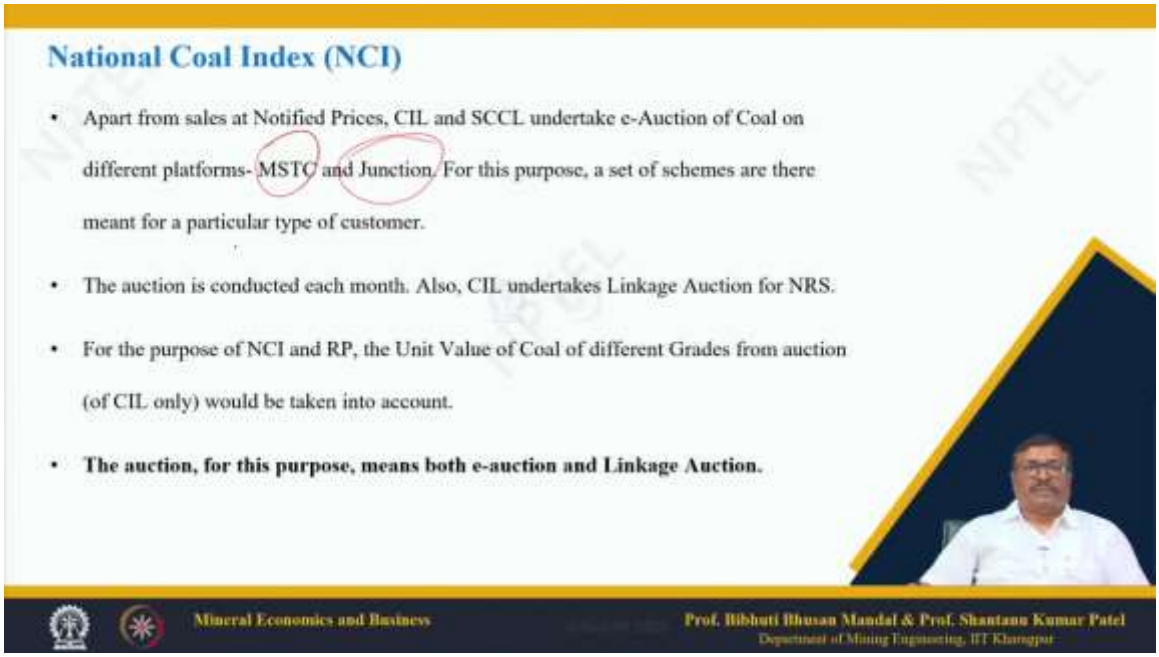


The power of notifying the prices of coking coal has been delegated to the subsidiaries. So, the details you can find—all the details you can find—on the Ministry of Coal website. If you are interested in further study, you can go through this in detail, but this will give you an idea of how this coal index is determined or how it affects our pricing. Apart from sales at notified prices, CIL and SCCL undertake e-auction of coal also on different platforms like MSTC and Junction. For this purpose, a set of schemes are there for particular types of customers. Now, the auction is conducted each month.

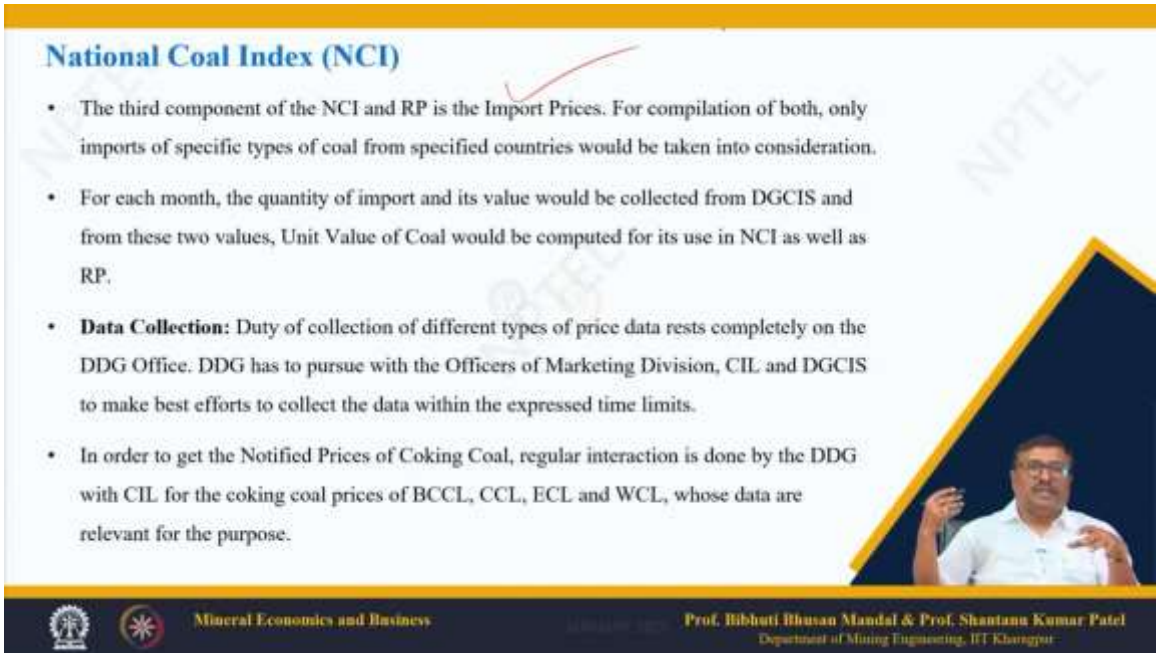
Also, CIL undertakes linkage auctions for NRS. For the purpose of NCI and RP, the unit value of coal of different grades from auctions—from CIL only—would be taken into account for the purpose of NCI and RP. That is taken into account. Now, the auction for this purpose means both e-auction and, of course, the linkage auction—both. Now, the third component is the import price. So, for the compilation of both, only imports of specific types of coal from specified countries would be taken into consideration.

These are taken into consideration. The quantity of imports and their value for every month—each month—is collected from the DGCIS. From these two values, the unit

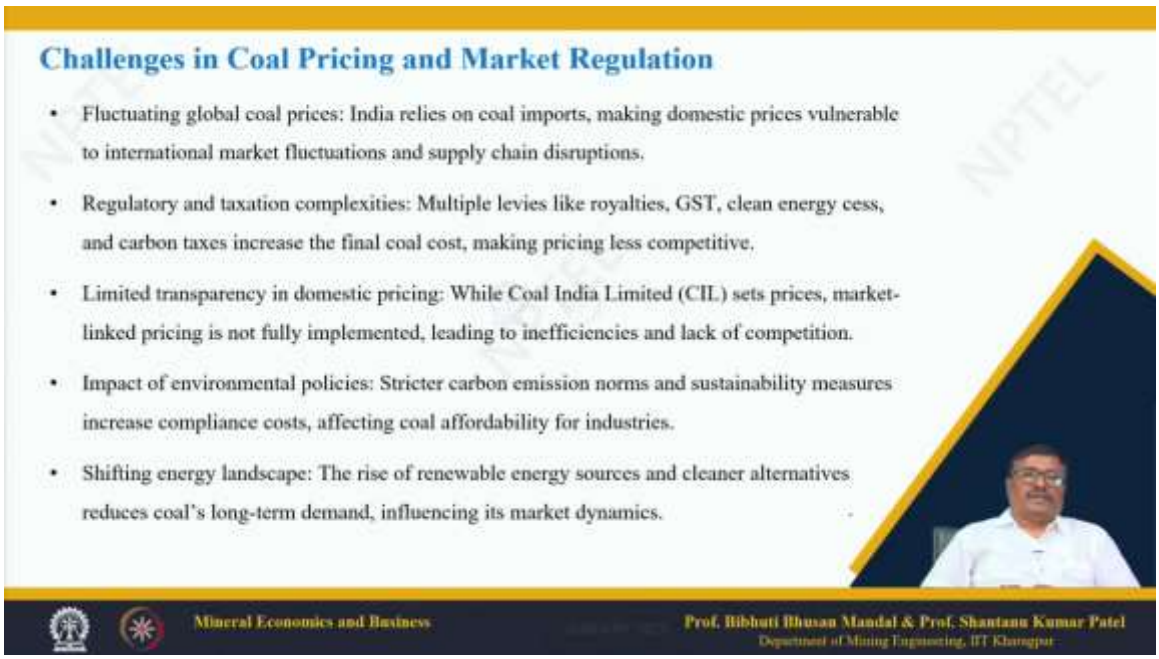
value of coal is computed for its use in NCI as well as the representative price, and the data is collected from the DDG office. In order to get the notified prices of coking coal, regular interaction is done by the DDG with CIL for coking coal prices of different subsidiaries of Coal India, whose data are relevant for the purpose. Now, the challenges in coal pricing and the market regulation. The different factors or different sub-topics that we can take: number one is the fluctuating global coal prices.



India relies on the coal import making domestic prices vulnerable to international market fluctuations and there are regulatory and taxation complexities multiple levies like royalty, GST, clean energy says, carbon taxes there was a adding to the ah cost of coal. And then there is limited transparency in domestic pricing while CIL sets the prices market link prices is not fully implemented leading to inefficiencies and lack of competition. Now, when the ah your environmental policies are strict then it has impact like the if you have stricter strict carbon emission norms and the sustainability measures increase ah they will definitely increase the compliance cost. So, the industry will definitely have it more difficult in affording I mean the affordability of coal purchasing ah the coal. Because there will be lot of if you if you buy lower grade or those things those coal which will ah cause lot of emissions and environmental degradations in that case lot of environmental cost and compliance cost will be added.



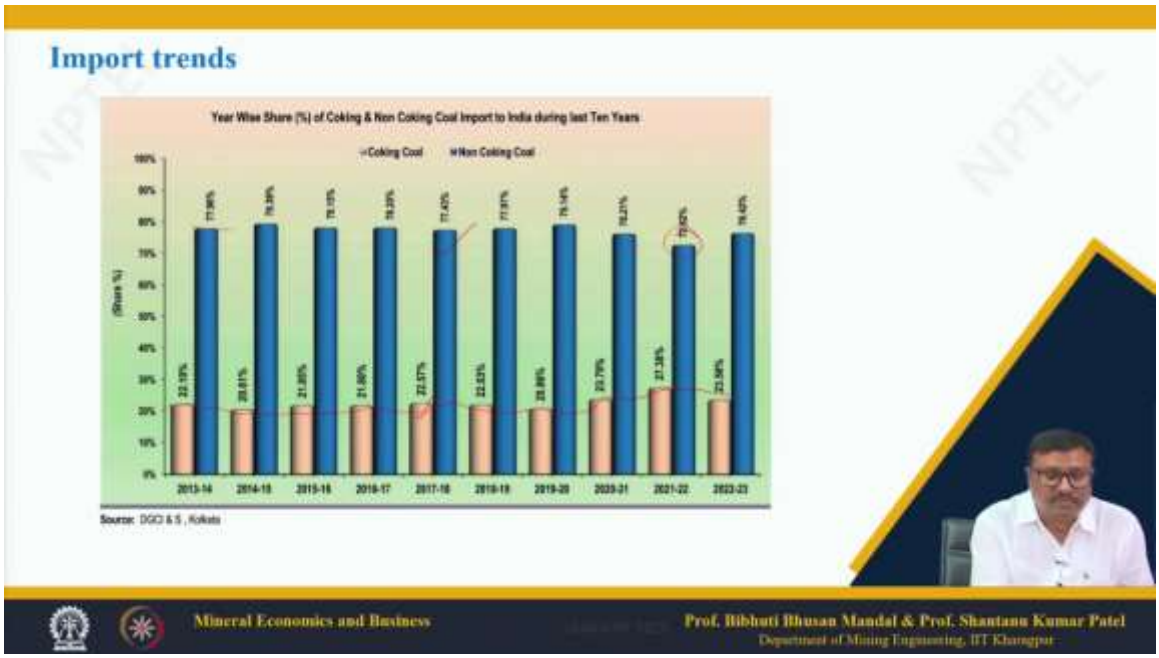
Now, the rise of renewable energy sources and clean alternatives, they will reduce coal's long term demand. will influence the market dynamics that will influence its market because now what is happening if you are going towards the more if you are going for example, electric vehicles. So, what is happening that somewhere we are not ah getting the ah bad emissions for example, in the cities. But still ultimately you are charging this ah charging this the electric vehicles from the ah electrical points. But ultimately you are using electricity which is generated somewhere in a coal fired power plant.



So, you are actually reducing the emission in the cities, but you are increasing in the countryside where more and more coal will be burnt to produce electricity and that electricity will be charged used for charging the electric vehicles. You are actually shifting from one place to the other. Also, there are clearer alternatives. So, that will definitely going to influence in future the use of coal its demand and definitely that will in turn influence the pricing. Now coal can be freely imported under the open general license by the consumers considering their needs.

And coking coal ah ah is is is imported by sales steel authority of India limited you may see trains are carrying. And, the steel manufacturing units because we have less we have coal huge reserve, but the the coking coal part is less. So, that is why we have to import the coking coal to run our steel plants. Now, the coal based power plants, cement plants, captive power plants, ponge iron plants, industrial consumers and coal trades are importing non coking coal. I mean if there is a shortage then you are using the non coking coal. Coke is imported mainly by pig iron manufacturers also and iron and steel sector consumes using mini blast furnace. So, import trades you can see the non coking coal and the and the coking coal part. So, the share you can see how it is changing over the years and more or less ah it has remained we could not vary too much in the in this thing ah in the coking coal. And, except on few occasions it is more or less in the last 10 years the

year wise share we have we have seen and then about 77, 79, 78 ah more or less 82 percent or 80 percent share of the import ah is maintained and and also the 20 percent



around 20 percent for the for the coking coal.

So, we are still dependent on these ah on these the import trends are not changing is not falling. We are continuously I mean you are maintaining these things unless we have other means to substitute. Now this is for coal export how much we are exporting. So,

the export is very low here 3 percent 0.34 percent 1.5 very low very less amount we are actually exporting we are actually deficient in cooking coal. So, in special cases in free trade you can definitely

But if you go by the total export share, then 98 percent, 99 percent, or 95 percent will be the non-coking coal, and only about 3 to 4 percent of the coal export is due to our export of coking coal, which is very low. If you want to study more and know things in much more detail, then you can visit the Ministry of Coal website, Government of India. The site name is www.coal.gov.in, and the Directorate General of Commercial Intelligence and Statistics. You can get much information from this website as well. But detailed grading, pricing, and all these things are available through the Ministry of Coal, Government of India site. With this, we come to the end of the coal grading, the basis of coal grading, and the basis of coal pricing depending on different aspects, different factors, and different grades of coal. I hope I have made the basic things clear to you, and on the basis of which the coal pricing is actually done, and the coal sale and purchase are done in our country.

Thank you very much.