

Episode No -11

-Joseph Toscano, Pune

Docu-drama: **Efficient and rational use of Fossil Fuels as Energy Source**

(Summary: This docudrama pertains to fossil fuels which are important sources of energy. They are mainly three types; coal, oil and natural gas though petroleum oils having dominance among them. Once upon a time, they appeared to be abundant in crust of the earth, however they are now depleting speedily, thanks to their uses by man for their comfort and consumerism. They need to be saved and conservation is the first step towards this effort.)

Characters: A narrator/A teacher/A lecturer (one person)

Audience group comprising Jayden/Nicole(school students) and Jayesh/Vinay/Rita(college students)

Narrator: Energy! Energy!!Energy!!!Friends, it is today's buzz-word. Everyone talks of its shortage, more production and new forms of energy. Why? Because the world cannot move ahead without energy. It is required in industries, needed for household activities and in vehicles too. Almost all gadgets used for entertainment, education, comfort and household chores run on different forms of energy. Energy derived from fossil fuels is abreast all of them. Let's take a look at their kind. Coal, oil and natural gas are three main types of fossil fuels. Fossil fuels are combustible materials that are formed over millions of years by the decomposition of plants and animals.

Scene-1

(A school class, most of the students are chitchatting, a teacher enters the classroom.)

Teacher: Students keep silence please. Today we are going to learn about fossil fuels.

Students:(All together):Fossil fuels?

Teacher: Yes, let me explain you what fossil fuels are. They are called fossil because they originate from decomposition of dead plants and animals underground. This natural anaerobic process took place millions of years ago. Though coal and natural gas are also included in them, they are majority of petroleum fuels. Do any of you tell me why they are called ‘petroleum’?

One student (Jayden): I know sir. Originally they were found in rocks. In Latin language ‘petra’ means rock and ‘oleum’ means oil. Thus the name ‘petroleum’.

Teacher: You are absolutely correct, Jayden.

Jayden (pleased): Thank you, sir.

Teacher: Then, I shall narrate the story of how first time petroleum oil was found. This happened in a village by name Titusville in Pennsylvania district of America., in the year 1857. Colonel Druck and Bill Smith were two friends living in that village. Colonel had retired as a driver in railway and possessed an old outdated engine. Both were very active and always in search of something new. Invention is mother of necessity .They had read in Bible and also heard gossips of oil hidden inside earth’s crust. It was August 27 when these two dared to make a hole to nearby hill with the help of engine. They used the old railway engine as a drilling machine. And lo! Oil flushed out from inside of the hill. Their joy knew no bounds .It was thick, dark coloured liquid having hydrocarbon smell.

A few students: Wow! Oh !! Very interesting !!!

Teacher: And that thick coloured liquid was called ‘crude oil. It is also found under the deep bottoms of seas, too. And you know how many products are obtained from this crude oil?

Another student (Nicole): I read it in a science book and can tell that we get Gas, Petrol, Diesel, Wax, Sulphur and few other products from it.

Teacher: But my dear students, it is said that the list of total number of products goes to 7500. You name any substance and it is either directly or indirectly made from this black oil. This is the reason, why it is also known as ‘black gold.’

A few student : Really? Wonderful!

Teacher: But this stock of oil in earth’s crust is limited whereas our population is increasing on gigantic scale. Our needs rather than our wants are sky rocketing. Petroleum fuels are consumed in factories and in vehicles. They are hydrocarbons in nature

and after burning in vehicle engines and equipment and generators, they pollute air. Hence, we ought not only to make their efficient use but also rationalize their use and conserve them. We will later learn how each kind of fuel shall be used in rational way.

(back ground music: with song 'Let's unite and fight the crisis

Let's unite and fight the crisis.....'(Repeat)

Scene 2

(A lecture hall in a college and an honorary lecture is in progress)

Lecturer: Young friends, in today's lecture, we are dealing with fossil fuels. I am sure, You must be aware what they comprise?

Audience 1(vinay): Yes sir, they are petroleum products like petrol, diesel, kerosene, kitchen-gas etc

Lecturer:. Partly right. What is your good name?

Vinay: I am Vinay, sir.

Lecturer: So Vinay, besides petroleum product, there are coal and natural gas, also. Friends, little knowledge is dangerous thing. We must be aware of details of commodities we use in our daily life. As you are promising citizens of this great country, the future rely on you and, I hope, the power of knowledge will help you to fight the energy shortage we are facing, now. I shall explain it to you step by step their origin, uses and conservation in our daily life.

Audience 2(Jayesh) raises his hand.

Lecturer: yes please?

Jayesh: Sir, my name is Jayesh. We burn wood and get black substance, isn't that coal?

Lecturer: Not exactly though both are forms of solid carbon. Coal is generally extracted through mining, and its use has historically been a factor in raising standard of living around the world by providing jobs and electricity. However, mining for coal is detrimental to human health, and when unregulated, it can be a dangerous and deadly job. Burning coal releases carbon dioxide and is known to cause ozone pollution and acid rain.

Audience 3(Clevin, whispers): And sir, man produces natural gas by farting, right?

(The whole hall burst in laughter)

Lecturer(smiling): Dear friend ,you produce very small quantity gas in your stomach by decomposition of food particles Composition of both these are entirely different. Natural gas is commonly found near deposits of oil as it is formed by a process that combines high temperature and compression that breaks down organic matter. Natural gas deposits are generally trapped inside sedimentary basins which serve as a reservoir that can be accessed through a drilling process. Natural gas is a mixture of methane and other hydrocarbons. It is used for heating and to make a variety of products, including paints, plastics, glass and paper. It also produces carbon dioxide when burned but has a lower carbon output compared to coal and oil. Natural gas extraction causes damage to the environment.

Vinay: What about petrol and diesel, kitchen gas which we use every day, Sir?

Lecturer: Yes, before I come to this important part of topic today. let me appreciate your curiosity, young man.

(Sounds of clap by audience)

Oil is extracted from underground as crude oil and refined into products like gasoline, diesel, jet fuel etc. Though the use of oil has been essential for technological, economic and social developments, there are many problems associated with this fossil fuel. Drilling process for oil destroys natural habitats, and the refining process is energy intensive and uses toxic chemicals. Burning oil emits carbon dioxide and other pollutants into the atmosphere, and the transport of oil can lead to oil spills .However, we cannot ignore the vital role played by petroleum fuels in our life. Life will come to standstill if suddenly their supply stops. Crude oil provides us fuels like LPG, Petrol. Diesel, Kerosene, Furnace oil besides useful solvents, chemicals, lubricating oils, bitumen and so many other products.

We shall deal with them, one by one. And yes, ladies first, so I will first talk about LPG who is friend of women in kitchen.

(There is light laughter in the hall)

Friends, food is our one of the basic needs. Food needs to be cooked for taste as well as for better digestion. Man has been struggling to discover safest fuel that can be used in kitchen with comfort. After wood, coal, kerosene and electric heater, he found LPG suitable for the purpose and started transporting to kitchens through cylinders. Regarding LPG we can coin a proverb as “LPG came, saw and

conquered women's hearts. (Again lighter laughter) They found LPG user-friendly and safer to larger extent. Besides kitchen, it is now used in vehicles, for heating houses, in refrigeration system, and welding works etc. Same is case of CNG which is a natural gas. It is supplied in homes through pipelines. It is also known as LNG, meaning liquefied natural gas. Besides kitchen, production of electricity and fertilizers, CNG is used mainly in vehicles as it possesses higher octane number.

Jayesh raises hand, saying ' "Sir, I wish to have a confirmation, please"

Lecturer: "Please free to ask, Jayesh..."

Jayesh: I have read that octane number is a measure of burning quality of fuel in engines. When fuel burns in an engine, knocking takes place there which can damage engine parts in long run. The vehicle running capacity is enhanced by fuels which has higher octane number. Is it right, Sir?

Lecturer: Yes, you are right, Jayesh. Certain cyclic hydrocarbon chemicals boost this number. So, you can understand my friends, that vast use of gaseous fuels leads to high consumption, and calls for its conservation. There is a research organisation in our country called PCRA. Have you heard of it?

Audience(in chorus) : No, sir.

Lecturer: PCRA stands for Petroleum Conservation and Research Association which guides not only to various industries but also to individuals to save LPG and CNG efficiently. They provide simple tips and if we follow them, we can save considerable gas which is a costly commodity. According to PCRA, before heating the cooked food items from fridge, bring down to room temperature so that the gas required to burn for bringing those food-items to usual temperature is saved. Use of flat-bottomed utensils and use of pressure cookers will lead to considerable saving of gas. Reducing gas flow when water starts boiling and keeping steady flow, use of minimum water for cooking food, covering the pot with lid during cooking also help in this efforts of saving.

Viany:- 'May I ask...'

Lecturer: Yes, of course.

Vinay:- My question is... 'Sir, is there any difference between the gas in cylinders we receive from petroleum companies and the one which we receive through pipelines of Mahanagar Gas company ?

Lecturer: Good question, Vinay. Yes, both are gaseous fuels but they differ in their composition. We get LPG from oil companies like Indian Oil Corporation, Bharat Petroleum and Hindustan Petroleum. LPG stands for liquefied petroleum gas. It mainly consists of hydrocarbons - propane and butane in 30:70 ratio. When pressure is applied, it gets converted into liquid and filled in cylinders. The volume reduction of gas is 240 times and large quantity of gas could be stored in cylinders. On the other hand CNG that stands for 'compressed natural gas which mainly comprises methane and it is dry gas. It is compressed under 25000 kiloton pressure and its size is reduced 25 times before filling in cylinders for use in vehicles. CNG provides more heat than LPG owing to its high calorific value. Both these gases are versatile and should be saved, says PCRA guidelines.

Anyway, let's look at some liquid fuels like petrol, diesel, kerosene and furnace oil. Do you have any idea as to what colours these fuels have?

Vinay: I have seen orange coloured petrol and blue coloured kerosene. But diesel comes with different colours, doesn't it?

Lecturer: Yes, you are right Vinay. But these are externally added hues for identification and to avoid their misuse for adulteration. As crude oil is a natural source, the products obtained from it are having natural colours only. In fact, petrol is water-white in appearance. But because of its explosive nature, orange dye is added for its easy recognition from other products. Kerosene is also originally colourless, but some greedy people use it for mixing in costly fuels like petrol and diesel before their sale to customers. If petrol or diesel are adulterated with the blue coloured kerosene, blue colour is imparted to fuels and the theft comes to light. So, before kerosene is sold at public distribution system (PDS), it is dyed. Diesel fuels too have natural colours but they vary depending upon the geographical sources. For example, diesel refined from Russian crude is colourless whereas Gulf crude is dark brown in colour and crude oil in our country gives diesel of pale yellow colour. Of course, colours do not matter in their respective performance.

Jayesh: My Papa often goes abroad for official work. He had once told that petrol is known by different names in different countries. Is it so, Sir?

Lecturer: As the great dramatist Shakespeare asserted, 'What is there in name?' is true for petrol fuel. Its British technical name is motor spirit. Due to its evaporable behavior, in America it is called gasoline. In France, it becomes benzene. However, its application everywhere is same and used for running two stroke and four stroke engines. These engines are spark ignition type but engines that run on diesel fuel are compression ignition types.

Vinay: But how to save these fuels? Shall we stop using our motorbikes and cars?

Lecturer(smiling): Don't be that desperate, Vinay. Crisis leads to innovations. Friends, PCRA has studied extensively how to save these two costly but versatile, commodities largely consumed by us. We should avoid usage of automobile vehicles for short distances like visiting temple, going to market, school or colleges which are close-by. Use bicycle if required. We thus save costly fuels, besides will not pollute air. We get fresh air to breath and exercise by walking as well. Running vehicles with speed of 40 to 50 km per hour which not only calls for safe driving but also consumes less fuels like petrol and diesel. Following traffic norms to avoid traffic jams which unnecessary burn fuels in no-go condition and causes not only pollution but also frustrations to riders and drivers.

Jayesh (raising hand): But Sir, if we drive fast, we will reach our destination early thus we can save fuels, don't we?

Lecturer: That is absolutely wrong concept. Saving fuels is in hands and feet (laughs!) of a driver. For getting speed, he or she applies accelerator very often and push more and more drops of fuel in vehicle engine. This fuel burns partially in that short period and not fully utilized as this half burnt fuel gets emitted through exhaust and pollute air in the form of carbon monoxide. I tell you a data on this issue. There are three types of drivers. Some drivers are quite cool and they give consideration on road to traffic, signals, pedestrians etc, and thinks before applying accelerator and brakes in proper manner. Drivers who prefer medium speed make few mistakes of wrong applications of ABCs, that is Accelerator, Brake and Clutch..But drivers with high tempo of speed invariably make frequent such errors and besides wasting fuels, they also occasionally become victims of accidents. 'The Flemish Institute for Technological Research' in Belgium has extensively studied behavior of drivers and consumption of fuels, casualties, pollution related to it, by using sensors and confirm that for every 100 km, a steady driver consumes 10.45 litres of fuel, medium driver 12.51 litres whereas fast driver requires 15.86 litres. Such is the consumption pattern. Now, choice is yours! Use the ABC of driving with wisdom.

Apart from these precautions, PCRA has discovered that 100 litres diesel is required to cover 500 km with speed of 40 km per hour. The same distance if we try to cover with 80 km speed, the required fuel is 197 litre. Similarly, we must stop engine if we happen to wait at signal or railway crossings which result in saving of considerable fuel. Moreover, checking for fuel leakage, sufficient air in tyres, avoiding use of frequent gears and brakes and travelling by public transports also help in this task of saving. My young friends, small is beautiful

and same is applicable to such small saving tips. The only thing we need to do is to change our mind-set.

Vinay: What about industries? More fuels are used there, aren't they?

Lecturer: Yes, Vinay. Energy audits are compulsory for them. Organisations like PCRA, TERI(Tata Electrical Research Institute), NPC (National Productivity Council), CRPCER (Coordinator Research Project Centre on Energy Requirement) and WPSIL(The Water and Power Services Limited of India) conduct these audits and advise how to save fuels like furnace oil which are largely used there for heat production. Their projects have proved that our Government can save more than 3300 Crores of rupees every year if our industries rationalize the use of fuels.

Jayesh: Sir, will you please tell us something about fuel consumed in air-travels .I heard that it is called as white petrol but like kerosene,too.

Lecturer: Right! SKO i.e. Superior Kerosene Oil is mostly used in stoves in houses of the poor. PCRA provides tips like use of stoves with less dip and large size fuel tank, new types of burners besides same precautions taken for saving kitchen gases. The fuel used in aero planes is also kerosene type but highly refined and known as Aviation Turbine Fuel, in short, ATF. People wrongly call it 'white petrol, but it is high energy kerosene fuel. Due to large scale of air travels these days, huge quantities of this fuel are being consumed, causing pollution also. When a plane takes off or lands, it requires lot of fuel to burn and that's why Air companies' avoid halts of lesser distances to conserve ATF fuel. Moreover, fuel has to be discarded in air in certain climatic conditions to reduce weight of the plane which is skillfully avoided with proper meteorological predictions.

So, young friends, last but not least is the mantra we shall perpetually mind i.e. 'Conservation is production.' What do you understand by this modern mantra?

(A girl on last bench raises her hand) Yes Miss?

Rita: Sir, my name is Rita. What I understand that when we save a commodity like fuel, we get credit of its production of that much quantity. In short we save money, and we help nation to grow by saving foreign exchange. Because we have to import crude oil on large scale.

Lecturer: Absolutely correct. I wish you all a 'Happy Conservation !'

(Sound of claps!)

-Joseph Toscano,

(Retired Manager, Quality Assurance, Western Region, Bharat Petroleum Corporation Ltd.)

A-1402, Clubbe Life, Ahuja Towers, Eksar Road, Borivali (W), Mumbai-400091

Cell: 9820077836 /email: haiku_joe_123@yahoo.co.in