

Science Serial Based on Sustainable Development

Towards the Bright Future

Episode-12

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Participant and Artists Introduction:-

1. Dinkar- Father
2. Vasudha- Mother (Manager in a company)
3. Saroj- Sister of Mr. Dinkar and Professor in an Engineering College.
to be with her brother in summer vacations.
4. Chhaya- Daughter of Dinkar/Vasudha
5. Ravi- Son

Title Song

In this episode listeners will listen on energy conservation with some suitable examples. They will also listen about the increasing trend of renewable sources of energies. What is carbon footprint will also be explained in simple language.

Part of title song

Scene: Ravi is busy in his school project. His sister is also with him to help. Ravi through his project is preparing a plan how to turn his school into a green building. Their Bhua (aunty) is with them to enjoy her summer vacations. It is Sunday...hence both Dinkar and Vasudha are at home.

Musical effects

Vasudha: Excellent Ravi.....your project is beautiful. You have unique imagination and ideas.

Chhaya: Mummy ! Who has given this idea to Ravi?

Ravi: Didi....You gave the idea. But I put it in practical shape by myself. I collected so many items. Put them in some definite shape. It took full two days to put it in this shape.....understand.

Vasudha: O.K. Ravi....it is fine and your imagination. This is your project and you work for that. In our country demand for electricity is rising day by day. We are at

the fifth position in the world, regarding electricity production. In 2016 we have produced and generated 304 gigawatts of power.

Dinkar: For this millions of tonnes of coal has been used. Thousands of tonnes of carbon may be released; huge quantity of water from rivers and dams was needed. Lots of fuel required to transport coal from mines to thermal power plants. All this causes pollution.

Chhaya: Yes papa you are right. It is the reason that we are now shifting on renewable source of energy.

Dinkar: Chhaya, your Saroj aunty is the best expert to give reply on it. She is a Professor of Electrical Engineering and teaching all these topics to her college students.

Vasudha: You always try to avoid the questions, whenever raised by the children. You direct them to me or someone else instead of clarify their doubts.

All are laughing

Saroj : Chhaya you are right. During year 2014, the total production of electricity from renewable source of energy was about 19.2%. In the year 2015 there is an increase of 147 giga watts in nonconventional source of energy.

Chhaya: This means efforts are going on at national and international level to encourage the production of renewable energy.

Saroj: Yes Chhaya, UNO is trying to make available clean, cheap and sustainable form of fuel and electricity to all the citizens of the world by 2030. In this renewable sources of energy will play an important role. Besides this, fuel and energy efficiency is to be doubled by 2030.

Ravi: Bhua ...Aunty this is good thing. Even lots of work is going on in our country on renewable energy.

Saroj: Yes my son! During the year 2016, contribution of this is about 14.7%. Do you know during the year 2016, the production of electricity from renewable sources was 44.812 Giga watts alone?

Ravi : Is it true that Sun was the main source for it?

Vasudha: My son ...it is not only the Sun, but there are so many others nonconventional sources also, I mean renewable source of energy. Wind energy and bio-fuels are also there. These sources are environmental friendly and non-polluting.

Saroj: Yes Vasudha Bhabi. During the year 2016 the contribution of solar energy in renewable from alone was about 27 Giga-watts. About 8 giga-watts electricity

was contributed by wind powered turbines. India is third among the countries in case of solar energy and fourth in case of wind energy.

- Chhaya: Bhua aunty...what are the others sources of renewable of energy?
- Saroj: Tidal energy and geo-thermal energy are also sources of renewable and non-conventional energy. These days there is great demand of solar energy technology.
- Dinkar: Chhayabeti, this is to be agreed by you that the idea of renewable energy is very important. For developmental works and in our day to day life there is great demand of energy and fuel.
- Saroj: Yes brother! It is impossible to think about good quality of life without electricity. Everywhere to run our industries and to light our homes, lot of demand and consumption of electricity and other fuels. You will be surprised to know that there is no electricity in 100 million houses in the world. For this renewable sources of energy can play a great role.
- Chhaya: (Laughing) It was this reason that I asked him to prepare his project on it. Do you agree Bhuaji?
- Saroj: Yes Beti....Non-conventional and renewable sources of energy will play a great role in future.
- Vasudha: Yes my sister. Fossil fuels have their limitation. Availability of coal, petroleum, diesel etc. is limited. We can't depend for long on these resources.
- Saroj: Moreover fossil fuels are polluting our environment. Due to combustion of coal, petrol, diesel etc. lots of carbon di-oxide is produced. Carbon-dioxide and others greenhouse gases are dangerous for our environment and planet.
- Dinkar: The problem of global warming is due to greenhouse effect of these gases. Scientists are warning that if we fail to control this problem, the danger will be great in future. Our demand for energy and fuels is increasing day by day to sustain and meet our developmental works. Simultaneously the problem of greenhouses for our environment is also alarming day by day.
- Saroj: If it continues and the problem of greenhouse sustains in future, a day will come when the level of our oceans and seas will rise due to global warming. Many coastal areas and cities in the world will submerge under the water.
- Chhaya: Bhua aunty ,the only solution that has been left is to use renewable source of energy in our day to day use. Efforts are going on at international level to adopt and encourage it.
- Ravi: Bhuaji ! I have listened that there are many projects going on in our country under the name, 'Solar Mission Project'

- Saroj: Yes Ravi. In our country we are working in this direction at a fast speed. United Nation has framed out some targets for the international community. One of them is to make provision for cheap and affordable energy to all the citizens of the world by the end of 2030. Renewable energy will be the main source of it.
- Chhaya: To achieve this target special attention has to be given to non –conventional and renewable energy.
- Saroj: Yes Chhaya Beti ! You are correct. Special attention has been given by most of the countries of the world to such energy. By 2030 our Government has set target to increase the proportionate of this non-polluting energy in our country.
- Dinkar: Besides this there is need to save power. The wastage of electricity is to be stopped by adopting latest modern practices.
- Saroj: By 2030 we have to increase our energy efficiency. By fuel and energy efficiency, we can double it by the 2030. You will be surprised to know that one unit of electricity saved is equal to 1.33.units of power produced. Keeping our environment in mind this is more important for us.
- Vasudha: Didi... this is an interesting thing to know that to save energy is more important than to produce it. This is the reason for the campaign that is going on at national and international level to save electricity and fuel.
- Chhaya: (laughing) This is important for you to understand. You never switch off your light and fan, when youleave your room.
- Dinkar: Ravi your didi is right. I too have seen so many times the same thing in your room. Whenever I see it, I switch off that in your absence. This is not appreciating.
- Ravi: Papa I shall keep in mind and will never happen in future.
- Vasudha: Vow ! That is nice.
- Ravi: What a good thing if our light and fan automatically switched off when we leave our rooms.
- Dinkar: It will happen soon but will take some time. In developed country such technology exists and they are using this technology in their homes. You can name such home as smart homes.
- Saroj: In our daily life we can find so many examples, when there is too much wastage of power and Natural resources. You may agree with methat in packaging too there is so much use of energy and resources.

Vasudha: Didi ...well said. It is true. When we buy something from market, sometimes you can find more than one layers of packaging. After one or two layers of polythene the item is packed in some box. What is use of all these. Wastage of power and resources. Similarly our water, milk, vegetables, oil etc. have been packed and marketed in packaging.

Ravi: Oh! This is the reason. I understand why Papa take his beg, while going to the market to purchase something. Papa never asks for polythene bags. He keeps all his vegetable items in his cloth bag. That is why there are no polythene bags in our house?

Chhaya: Such thing inculcate the habit of energy conservation among us.

Dinkar: We have to encourage such habit and technology for energy efficiency.

Ravi: Mummy...mummy....it is 11.00 O'clock in the morning. What about the breakfast? Have you ordered something special from the bazaar? (Laughing).

Vasudha: Ravi beta, don't worry. You are going to get something special from our own kitchen.

Chhaya: Vow! My Mom is great.

Everybody laughing#####

Ravi: My special sandwich....

Chhavi : No...no special sandwich Only yummy.....

Saroj : Everything is secret about your breakfast.O.K. First take your breakfast of sustainable development (laughing). And this feed of breakfast will depend on the clean and green technology.

Chhaya: Bhua...What are you saying?

Saroj: I am telling that there is need of research and development in these areas. Work has to be done at international level to encourage energy efficiency and renewable energy. The fossil fuel is to be further refined for clean and green environment. Production of clean energy is to be encouraged at all levels.

Ravi: What a good idea, if my Bhua's car can run hundreds of kilometre in a single litre of petrol.

Saroj: Yes Ravi. We need such technology not only in cars and buses but also in our day to day activities to increase fuel efficiency. That means maximum output in minimum energy.

Chhaya: Bhua ...in my views it requires improved and new technology.

Sound effect from kitchen/utensils#####

Ravi: See....see...didi...your breakfast is coming.....I means the special one (laughing)

Saroj: Didi...you are so efficient in your work.

Ravi: We need energy efficiency like our mummy(laughing). Within moments everything is ready.

Vasudha: Why all these buttering?

Chhaya: Aaha...So nice flavour....(long breathing)

Vasudha : Ravi this is your special one....

Chhaya: Where is mine... mummy? Why all this partiality for me?

Effects of cups and plates#####

Saroj: Chhaya...there is no such partiality. I love you both equally. And.....and....this is for you....can you imagine? Your yummy.....

Chhaya: Vow! Mumma you are great. 'Ma ho to aisiho.....'

Vasudha: Enjoy your breakfast along with your discussion....A good combination of meal and menu...I mean.... knowledge and food.

Laughing

Saroj: What I was saying?

Chhaya: Bhua it was all about fuel and clean energy.

Saroj: Yes Chhaya...In our daily life, we need green technology, which doesn't leave any adverse effect on our environment. We need such technology, which can do lots of work in less fuel and minimum energy consumption.

Vasudha: Improved technology is must for all these.

Saroj: Yes Bhabi, by 2030,the infrastructure will be improved to make available cheap and affordable energy in developing and underdeveloped countries. This can only be possible through efficient technology.

Ravi: Bhua can you please tell about the various departments that are working in our country for energy conservation and fuel efficiency.

Dinkar: Department of energy, Department of Renewable energy, Coal Department and Ministry of Petroleum & Natural gases are working in this direction in our

country. Bureau of Energy Efficiency is also working for energy auditing and public awareness. Our Government is also encouraging Research and Development.

Saroj: Government of India has set an ambitious plan to increase the use of renewable energy, five times by the year 2022. Presently we are producing 32000 Mega-watts of energy from solar, wind etc. and others renewable sources. Our Government is trying to increase it by 175000 mega-watts by the year 2022. In Giga-watts it will be equal to 175.

Chhaya: I think the maximum contribution will be that of solar energy.

Saroj: Yes Chhaya. There is plan to generate 100 Giga-watts of energy from solar energy. Besides there is target of 60 giga-watts of electricity to be generated by wind power. 10 giga-watts of power are to be generated through the use of bio-fuel. Mini hydro power plants are to be set up to generate 5 giga-watts of electricity.

Ravi: If it happened so, then it is possible to make available affordable electricity in all villages of our country.

Dinkar: Yes my son. Efforts are going on in this direction to achieve this target. But due to increasing consumption of electricity, demand of power is rising.

Vasudha: There is only one thing that has been left and this is conservation of electricity. We have to switch off power of our gadgets, while not using or when we are not at our homes. Better to use maximum stars rating appliances in our homes. Replace old traditional bulbs by LED lights. These steps are must to save our unnecessary exploitation of natural resources.

Dinkar: Vasudha, you are right. It is our duty to conserve fuel and electricity. Not only at individual level but at community level too. We have to take steps to save power. Special attention have to be given at industrial level. In industries we are using 50% of our electricity consumption.

Saroj: Dinkar Bhaiya this is the reason that efforts are going on to increase our industrial efficiency. This will help to reduce our power consumption. We can use modern practices to achieve this goal. The second field where the power consumption is next to industry is the transport sector. Here we are using 22% of our total power consumption. At domestic level this consumption is about 10%.

Chhaya: Still we are not in a position to make supply electricity in all villages in the country.

Dinkar: There is hope of ray and this hope is renewable energy. It can solve our problems of electricity and other fuel demands. Few days' back there was

news that Department of Science & Technology is initiating steps under the, 'Solar Power Project'. Smaller solar panels have been developed under this project to make it easily available to the needy. One can use these panels easily in their homes and on their fields.

Saroj: Yes brother! These are small steps but are very useful. Lots of power can be saved by it. These small panels can light the houses of one and all. Moreover there will be no adverse effects on our environment too.

Chhaya: It is duty of one and all to protect our environment.

Dinkar: You will be surprised to know that innovative efforts are going on in the fields of renewable energy. In Gujarat state, solar panels have been installed on Narmada canals to generate electricity. Electricity is also generated by recycling garbage in big cities.

Saroj: By such innovations, we can meet our need of power and electricity, without polluting our environment.

Vasudha: But there is no doubt that due to modernisation and developmental works, pollution is rising day by day. On an average every citizen who is living in city is generating 4 tonnes of carbon di-oxide annually

Dinkar: That means, developmental works are increasing the level of carbon di-oxide in our environment.

Ravi: It is not a good symptom. Temperature will rise with it. Oh! Then papa will definitely purchase a new AC for my room(laughing)

Chhaya: Ravi always think about luxuries and that too during some problems.

Saroj: My son! It is good to feel happy about having an AC. But it will be bad for our environmental health. It will raise the carbon level of our environment. It means enhancing carbon footprints on our Earth.

Ravi: Carbon Footprint....what is this? Is it a new demon?

Vasudha: Though not a demon, but it is not less than that. It is a great danger to our civilization. Carbon Footprint is the amount of carbon di-oxide that has been released by any industry, institution, man or animal. In short you can say it is the amount of carbon di-oxide or any other green house gases that have been produced or released in the environment.

Saroj: Bhabi you are correct. This term has its origin from ecological footprints. It is a part of life cycle assessment process. Carbon footprint of any industry, person or institution can be assessed by the amount of greenhouse gases released by them.

- Chhaya: But ...what to do with carbon footprint ?
- Saroj: My daughter, I think our desire to travel or for tourism and to enjoy luxuries too adds in carbon footprint. The increasing demand of electricity in houses is also a great reason. Scientists are of the views that our habits, ways of leaving, eating & drinking are also contributing towards carbon foot print.
- Dinkar: You know that the electricity that we are consuming has been produced by the use of fossil fuels like coal, natural gases and oils. Lots of carbon di-oxide gas has been released during electricity production. The more electricity we use, the more will be fossil fuels consumption, and more will be the carbon footprint.
- Saroj: It is interesting as well as surprising to know that the food grains that we are consuming, also play role in carbon footprint, particularly when the species is not local and farmers used hybrid varieties of seeds. Most of the items of our daily uses are produced in industries. We use minerals and fossil fuels, which can't be produced in factories or regenerated naturally. The products of industries are transported to others places by trucks and railways, which consume lots of fuel.
- Chhaya: This means we are the main culprits of carbon footprint.
- Saroj: Yes Chhaya...it is a fact. To have fertile lands, to construct buildings and to recover fuel and coal, man has to cut trees.Vast tracks of forests have been destroyed in this process, which results in less absorption of carbon di-oxide.
- Vasudha: How is it possible to tackle this problem?
- Saroj: There are so many ways to reduce carbon footprint. For this we have to release and produce minimum carbon di-oxide. Secondly we should use everything with care and precautions. Recycle our waste products as much as possible. Use public transport system in our day to day life. If possible travel on foot, instead of cars or scooters or motorcycles. Use local, recycled and natural products.
- Ravi: I am telling Papa that I am not interested to go school by car. I need a cycle for it. Hope Papa will agree with me. It will help to reduce carbon footprint too.(Laughing).
- Saroj: You all know...about one very feasible and simple method of carbon control. It is tree plantation. A tree converts one tonne of carbon di-oxide into oxygen during its life cycle. In this way trees absorb carbon di-oxide from our environment.
- Vasudha: Even by some changes and modification in houses, we can reduce carbon footprint.

- Saroj: Yes.....It is simple and easy. By using LED light and avoiding unnecessary use of electricity, we can do so. Wash your utensils with hands and dry them in sun light. Recycle glass, metals, plastic and paper. Keep your refrigerator at normal level. Use colour of light shade on the walls of your houses.
- Dinkar: Besides this, there are many others ways to reduce the level of greenhouse gases. By using solar panels, wind power and plantation, we can reduce the production of greenhouse gases.
- Saroj: You can even become aCarbon neutral.
- Chhaya: How can that be possible?
- Saroj: Carbon neutral means that you plant as many trees as to neutralise the effect of carbon di-oxide and greenhouse gases that have been produced by our activities. Only plantation is not enough. It is must to takecare of them, while they are growing.
- Dinkar: Even developed countries are purchasing carbon credit from other countries.
- Ravi: What is this carbon-credit?
- Saroj: If a country saves the production of carbon di-oxide from its activities, then it can sell it to other countries. In lieu of this the developed countries pay for it.
- Vasudha: I am still confused. How can we compensate our Nature? Already there is too much exploitation.
- Saroj: Bhabiji, you are right. In our culture and traditions, we can never imagine such thing. First spoil the Nature and exploit the resources and then replace it from elsewhere.
- Dinkar: Our traditions, our culture and our ways of living are interesting. We always think of conservation of our Nature and resources. This message has been conveyed through our festivals, traditions and religions from one generation to the other. But now we have left or forgotten all those good things.
- Vasudha: Since Vedic period we are worshiping fire as god. We offered water to Sun in the morning to show our respect it as it is main source of energy. We are worshiping trees. Our ancestors had tried to convey the message of Nature's conservation and love to one and all. But we failed to understand the meaning of those great messages. Now we are realising that sustainable development is only possible through conservation and protection of our environment. By doing so, we can make available fresh air, water and electricity to all.
- Vsudha: Then it will be possible...' Sarve bhavantu shukhine''sab kasath....sab kavikas.....

Laughing#####

Ravi: Mummy, your dream is interesting.....but my project is ready to be submitted in my school. See...see....solar panels are there on the roofs of the school building. I have painted my school building in light colour to avoid excess heating. Glass windows are there to use maximum Sun light. Solar Panels are there on the roof tops to make available hot water in all laboratories....that too without the use of electricity.

Chhaya: Vow ! Ravi your project is so good to be appreciated.

Saroj: Ravi do you know? United Nation has set a target to make available cheap and feasible energy to one and all in the world by the end of 2030. Your project is also a small step in that direction. By this you can explain the importance of renewable energy to others.

Dinkar: In the world discussion is going on for sustainable energy. You can find so many examples for it. By the use of new and innovative technology, green energy can be produced for our use.

Saroj: Here it is worth to mention that future belong to those who understand the importance of renewable energy and its conservation.

In one voice.....Lets promises not to waste our natural resources and play our role in conservation of fuel and electricity.

Title Song/ Signature tune#####

Quiz:-

1. Question : Name any three forms of renewable and sustainable form of energy.

Answer: Solar energy, wind energy and tidal energy.

2. Question : What is the percentage of renewable source of energy in our country ?

Answer: 14.7% during 2016, The total electricity generated through the use of these sources was 44.812 Gigawatts.
