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## ***Beware...Earth may be another Venus!***

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### **Research and Script : Hemant Lagvankar**

*It is proved that the Green House Gasses are responsible for the global warming. This episode narrates about what are these Green House Gases and why are they called so. The episode also gives insight about why these gases are responsible to trap the heat in the atmosphere due to their optical properties. This episode describes how these Green House Gases are responsible for global warming which leads to climate change and also talks about some measures which one can do at personal level very easily to avoid emission of green house gases and thereby avoiding temperature rise.*

#### **List of Characters:**

<b>Chandra :</b>	A school going boy – Age 13 to 15
<b>Devi :</b>	Chandra's younger Sister – Age about 10-12 years
<b>Suraj / Papa :</b>	Chandra's Father (Age about 45)
<b>Sunita / Mamma:</b>	Chandra's Mother (Age about 42)
<b>Devendra :</b>	Suraj's Friend (Age about 45 years)

*(Episode starts with a sound of a moving car. The car slows down and stops. Sound of opening of doors of car is heard. Also sound of small puppy (dog, whose name is Bruno) is heard.)*

**Suraj :** Come on... get down fast. It seems we are already late. All parking lots are full. Now let me search for the place to park, but you get down first.

**Chandra :** Yes, Papa....

**Devi :** What's about Bruno?

**Sunita :** Devi, we cannot take Bruno with us inside the theatre. We will leave him inside the car only.

**Suraj :** Yes, Devi. What Mamma is saying is correct. After all, we will be back after an hour or so.

**Devi :** Okay.

**Suraj :** Come on now. You get down... I will park the car on one side and come.

*(Sound of closing of doors of car heard and a beep sound of locking the doors thereafter)*

**Sunita :** Chandra, Devi.... now come fast. I think the show is about to start now. Let's get inside and occupy our seats.

**Chandra :** Yes...Mamma.

*(Change over music. The noise of people coming out from the theatre is heard. They are chatting regarding the show.)*

**Sunita :** That girl was so cute and was dancing like a professional artist.

**Devi :** Mamma, I know her. She comes for my tuition....

**Sunita :** Okay.

**Chandra :** Don't waste time on discussions now. Let's move, otherwise it will be difficult to take out our car from the crowded street.

**Suraj :** Yes. Chandra is correct!

*(Beep sound of opening of door lock is heard and then sound of opening the doors of car)*

**Devi :** (Calling to Bruno) Bruno.... My dear.... We came! Where are you?

*(Chandra spots Bruno lying down near the seat. He was dead! Chandra shouts with sorrow)*

**Chandra :** Devi..... See Bruno.... Bruno is here! Devi, our Bruno is no more!*(Sad tune of music starts at the background)*

**Sunita :** (Shouts with surprise) What!

*(Devi starts crying)*

**Suraj :** Come on Chandra..... What has happened? He must be sleeping.

**Chandra :** No Papa, see how is he lying..... *(Chandra also started crying)*

**Suraj :** Ohh no! How did this happen?

**Devi :** *(crying)*I know nothing.... I want my Bruno back, that all!

**Suraj :** Calm down Devi. Let's go to home first and we will consult doctor. After all we have not given anything wrong to Bruno for eating.

**Sunita :** Then how did this happen?

**Suraj :** Don't know. Let's consult the doctor.

*(Sound of moving car is heard and the sound fades gradually. A sad tune of change over music)*

*(A scene of Suraj's home. The door bell rings in the morning time. Suraj opens the door. His friend Devendra comes in)*

**Suraj :** Ohh... Devendra! What a surprise, in the morning!

**Devendra :** *(Laughing)*Yes! Being Sunday today, I thought that everybody will be at home so let's meet you all!

**Suraj :** Yes, sure! Come in. Have a seat!

**Devendra :** But Suraj, no noise, no shouting today! Where are the kids, Chandra and Devi? Are they still sleeping or what? *(Laughs)*

**Suraj :** No...no. They are inside.... In their room.

**Devendra :** Ohhh.... Studying! Good!

**Suraj :** Actually they are not in good mood.....

**Devendra :** Why? What happened Suraj? Anything wrong?

**Suraj :** *(In sad tone)* Yes... Devendra! Actually yesterday, Bruno passed away.....

**Devendra :** What? It's so sad..... and shocking also.

**Suraj :** Yes. Children are still in the same shock.

**Devendra :** But... How did it happen? Anything wrong in food?

**Suraj :** No. Nothing like that.

**Devendra :** Then?

**Suraj :** Wait. Devendra, have a glass of water. I will just go inside and bring Chandra and Devi with me.

**Devendra :** Okay.

*(Sound of pouring water in a glass)*

*(Suraj comes with Chandra and Devi from inside)*

**Devendra :** Come on..... Chandra and Devi..... Have a seat. Actually, Suraj told me about Bruno! I am very much sorry to hear that. But how did it happen?

**Suraj :** Actually, yesterday afternoon, we all went to dance show after shopping. Bruno was also with us. But, we left him inside the car and went for the show.

**Devendra :** And when you came back.... You found that, Bruno was dead!

**Suraj :** Yes.....

**Devi :** I was telling Papa that, we should not leave Bruno in the car..... but he did not listen.

**Suraj :** Beta, pets are not allowed inside the theatre.... So....

**Devendra :** I understood... Suraj, you must have parked your car in sunshine and not in the shadow, right?

**Suraj :** Yes. There was no parking space. So I kept it along one side of the road.... But not in the shadow.... Sun was shining brightly.

**Devendra :** Then Bruno died due to deadly heat which was trapped in the car..... That's the reason.

**Sunita :** What?

**Devendra :** Yes, Sunita Bhabhi.

**Chandra :** Doctor, was also saying the same thing. He guessed that the death is due to dehydration and not due to any disease or food poisoning.

**Devendra :** Correct!

**Sunita :** But, we spent just one hour or so during the show and –

**Devendra :** Sunita Bhabhi, lot of heat gets trapped in one hour when you keep the locked car in bright sunshine.

**Sunita :** But how come the heat is being trapped in a locked car? I did not understand.

**Suraj :** Yes. I was about to ask the same question, Devendra.....

**Chandra :** We too.....

**Devendra :** Actually, scientists have studied precisely the same problem. Just in the year 2018, there have been six recorded cases of infants who have died after their parents left them in the car in the United States.

**Suraj :** Ohh my god!

**Sunita :** It's horrible!

**Devendra :** A survey in united state says, on average, 37 children die annually because of such incidents from hyperthermia — a condition due to failed thermoregulation that occurs when a body produces or absorbs more heat than it dissipates.

**Suraj :** But so much heat gets trapped in the car to harm lives?

**Devendra :** Suraj, at about 70 degree Celsius, you can safely fry an egg. That's the kind of temperature you can find not just on the surface of a frying pan, but also on a car's dashboard if you keep it locked for an hour or so in bright sun shine.

**Suraj :** Ohh no!

**Devi :** Yes. That's why it was so hot inside when we opened the doors of our car.

**Devendra :** Infants and pets are susceptible to hyperthermia and heatstroke even if the car was left locked just under two hours even in the shade. Internal injuries due to hyperthermia may occur at temperatures about 40 degree Celsius.

**Chandra :** But uncle, how do the temperature inside the car rises so much? What happens exactly?

**Devendra :** Good question, Chandra! It's like 'green house effect'! Have you heard about it?

**Chandra :** Yes. We have this term in our text book.

**Devendra :** Correct!

**Devi :** But uncle, I am not knowing about this. Please tell me about that.

**Devendra :** Yes, surely Devi.

**Sunita :** You continue your discussion, I will bring tea for all of you.

**Devendra :** Okay bhabhi. So what is 'green house effect'? The greenhouse effect is the process by which radiation rises the temperature. The term generally used when the heat radiation from a planet's atmosphere warms the planet's surface.

**Devi :** Uncle, I do not understand anything what you are saying.....

**Chandra :** And what is its connection to the death of Bruno?

**Devendra :** Hmm..... Let me explain in simple words. Your Papa parked the car in sunshine, right?

**Chandra :** Right.

**Devendra :** So the heat due to solar radiation enters inside the car.

**Chandra :** Okay.

**Devendra :** The heat gets absorbed by various objects or the material of the car. So temperature inside the car increased. At the same time, heat from outside continuously got pumped in. So the heat got trapped inside the car rising its temperature too much.

**Devi :** But uncle, I have one doubt....

**Devendra :** What is that, Devi?

**Devi :** If heat can get inside the car, then why can't it come out of the car? How did it get trapped inside?

**Devendra :** Million dollar question, Devi! Actually, you made the point! Heat from solar radiation can enter in the car through its material. However, the heat radiations emitted by the material inside the car cannot come out of the car. As a result, the heat radiations get trapped inside the car.

**Chandra :** But uncle, why it is so?

**Devendra :** Chandra, it's because the properties of radiations. When material emits heat radiation, its wavelength is different than that of the incident heat radiation. Therefore, heat emitted by the material inside the car cannot come out of the car and gets trapped inside.

**Suraj :** Ohhh.... That's the reason why we felt hot when we get inside the locked car after long time.

**Devendra :** Exactly the same thing happens with our mother Earth also.

**Chandra :** *(Surprisingly)* What!

**Devendra :** Yes.

**Chandra :** *(Asking with doubt)* You mean to say global warming, uncle?

**Devendra :** Yes, absolutely correct! Global warming!

**Devi :** What is that? Chandra might know it, but I don't. Uncle, you please tell me.

**Devendra :** Yes, surely Devi. But not now!

**Sunita :** *(Brings cups of tea from inside)* Absolutely correct! Let's have a tea first.

**Devi :** Okay.

**Devendra :** Devi, you come to my office tomorrow. We will discuss in detail.

**Chandra :** I will also come!

**Devendra :** Yes, of course. You both are welcome. Come after your school gets over, okay?

**Chandra :** Yes, done!

***(Change over music. The scene in Devendra's office.)***

**Chandra :** *(knocking on door)* May we come inside, Uncle?

**Devendra :** Yes... Come in.

***(Chandra and Devi enter along with Sunita in Devendra's office)***

**Devendra :** Ohhh... Chandra and Devi! Welcome Sunita bhabhi.

**Sunita :** Namaste....

**Devendra :** Please, have a seat.

**Chandra :** Thanks uncle.

**Devendra :** So you are very much interested in knowing about green house effect!

**Chandra :** Yes. Actually Uncle, I have read about it from the text book and also collected some information from internet web sites..... See these print outs!

**Devendra :** Great! Basically, what is green house effect and who is responsible for that?

**Devi :** That's what we want to know from you, Uncle!

**Devendra :** *(laughs)* Okay Devi....I will tell you. You already know that our Earth is surrounded by the mixture of many gases.....

**Chandra :** Yes. We call it as atmosphere!

**Devendra :** Correct. We receive energy in the form of heat and light from the Sun. this energy is the prime source for all living organisms on the Earth. Also, it regulates water cycle on the Earth.

**Chandra :** Yes.

**Devendra :** Now, energy from the Sun reaches Earth through this atmosphere. All the objects on the Earth absorb this energy, but most part of this energy is absorbed by the surface of the Earth.....

**Sunita :** .... And temperature of the Earth increases.....

**Devendra :** *(laughs)* No... no. That's not correct!

**Chandra :** *(Surprisingly)* Not correct? How? It's global warming.....

**Devi :** Chandra, please allow Uncle to speak. Don't pock in between.

**Chnadra :** *(In slightly louder voice in scolding tone)* Devi.....

**Sunita :** Chandra, calm down. Uncle will explain what he wants to say and then you can ask your queries.

**Devendra :** Don't get confused. Every object which absorbs heat, also emits heat. Surface of the Earth and all other objects on the Earth also emit heat. This emitted heat gets trapped inside the atmosphere. This heat is responsible for raising the temperature of the Earth.

**Chandra :** Uncle, you mean to say, instead of direct heat from the Sun, the emitted heat from the surface of the Earth is the cause of temperature rise? How is it possible?

**Devendra :** I know its slightly abstract and therefore difficult to digest, but I will make it clear with the help of an example.

**Chandra :** Okay....

**Devendra :** When you are flying through aeroplane, you are about thirty to forty thousand feet above the Earth's surface.

**Chandra :** Yes....

**Devendra :** So that way you are closer by thirty to forty thousand feet to the Sun as compared from the Earth's surface.

**Chandra :** Correct....

**Devendra :** Then the temperature should be more as compared to that on the surface of the Earth.

**Devi :** Yes, obviously....

**Devendra :** But that's not the case. The temperature outside the plane at that height is about zero degree Celsius or even below that depending upon the height of the flight from the Earth's surface.

**Chandra :** Yes, Uncle, you are right. I have seen once on the dashboard while traveling through plane, the temperature was below zero degree Celsius.

**Devendra :** So as you come closer to the Earth's surface rise in temperature takes place. Now, let me summarize this. About 26% of the incoming solar energy is reflected to space by the atmosphere and clouds, and 19% is absorbed by the atmosphere and clouds. Most of the remaining energy is absorbed at the surface of Earth.

**Chandra :** Okay.

**Devendra :** Earth receives energy from the Sun in the form of ultraviolet, visible, and near-infrared radiation. Because the Earth's surface is colder than the Sun, it radiates at wavelengths that are much longer than the wavelengths that were absorbed. Most of this thermal radiation is absorbed by certain gases in the atmosphere and eventually temperature of the globe increases.

**Chandra :** Which gases?

**Devendra :** Mainly Carbon dioxide gas absorbs the heat and traps into atmosphere, but other gases such as methane, nitrous oxide, Chlorofluorocarbons, Hydrofluorocarbons and to small extent water vapour also absorbs the heat emitted from the surface of

the Earth. These gases are responsible for green house effect and therefore, they are called as green house gases.

**Devi :** Uncle, I do not understand one thing.

**Devendra :** Which is that thing, Devi?

**Devi :** Why these gases only are responsible?

**Devendra :** Good question. These gases have peculiar property. These gases only can absorb infrared radiation in the wavelength range emitted by the surface Earth. The other gases cannot absorb these radiations.

**Devi :** This means, if amount of these gases in the atmosphere increases then temperature will rise.

**Devendra :** Absolutely right Devi. You got the point and this is known as global warming.

**Devi :** Then can we remove these gases.... so that there won't be temperature rise.

**Devendra :** No... Devi. This will create imbalance in nature. We require carbon dioxide gas. Without carbon dioxide, how can plants prepare their food by the process of photosynthesis? So we need these gases also. Without these green house gases, the temperature of the Earth would be minus eighteen degree Celsius which is not suitable for the life to sustain on the Earth. So this green house effect is helpful. In fact, in a closed house like structure, temperature is raised and maintained at certain fixed value so that growth of plants takes place properly. Such house is green house where temperature is comparatively more than outside temperature. From this only the effect is named as 'green house effect'.

**Devi :** Ohhhh. I understood now.

**Devendra :** Also, if you see temperature on planet Venus, it is about 450 degree Celsius.

**Chandra :** Why?

**Devendra :** It is because atmosphere of Venus contains huge amount of carbon dioxide gas. So lot of heat gets trapped and temperature on Venus rises.

**Chandra :** May be in future we also face the same thing on the Earth!

**Devi :** How is it possible Chandra?

**Devendra :** Devi, what Chandra is saying is not impossible if we continue to emit carbon dioxide gas into atmosphere the situation is quite possible in future. Carbon dioxide gas is produced by burning fossil fuel and other activities such as industrialization, deforestation etc.

**Devi :** But what will happen if temperature on the Earth increases?

**Devendra :** The immediate effect of this warming is the climate change.

**Chandra :** Climate change? Means?

**Devendra :** Means we might experience late arrival and early departure of monsoon, the rains will not be evenly spread over the three-four months duration. Sometimes it may rain heavily and many other days there won't be a single drop. We may experience cyclones. Generally our east coast is cyclone prone region, but now west coast is also facing cyclones. In some parts of the country rain comes along with hail stones and that too in the month of February or March. All these are the indications of climate change.

**Devi :** So, Uncle... you mean to say the process has already started....

**Devendra :** Yes, Devi. Now, every one of us should think about it very seriously. Like other countries, India is also doing great efforts to reduce carbon dioxide emissions so that the amount of green house gases in the atmosphere should not increase.

**Chandra :** Otherwise, the Earth will be another Venus!

**Devendra :** Yes, Chandra. Global warming can cause rise in sea level and that is dangerous for the coastal areas.

**Devi :** Can't we stop this?

**Devendra :** Yes. We can. The only way to stop this is to reduce emission of green house gases. So our government has taken great steps to promote the use of solar energy and to reduce the use of fossil fuels and electricity.

**Chandra :** Yes. We are also using LED lamps to reduce the consumption of electricity.

**Devendra :** Great. Such simple steps taken by an individual can reduce emission of green house effect. Another important thing is to reduce the use of plastic.

**Devi :** Plastic? Why?

**Devendra :** Plastic is produced mainly from fossil fuels. Plastic waste emits carbon dioxide when it degrades. In 2018 a research claimed that some of the most common plastics in the environment release the greenhouse gasses - Methane and Ethylene when exposed to sunlight in an amount that can affect the earth climate.

**Sunita :** Devendra, this is very important and we all can do this easily. Carrying cloth bags along with us will automatically reduce the use of plastic and thereby we can avoid emission of green house gases.

**Devendra :** Absolutely correct, Sunita bhabhi. Everybody of us should think about global warming and climate change for our future generations and act accordingly.

**Chandra :** Otherwise, our Earth will be another Venus in the solar system.....

**Devi :** And all living organisms on the Earth will die like Bruno in that hot atmospheric conditions.....

**All :** So reduce carbon emission, deforestation and save our Earth for future generations.

***(Music piece. Episode ends.)***

*Written by*

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