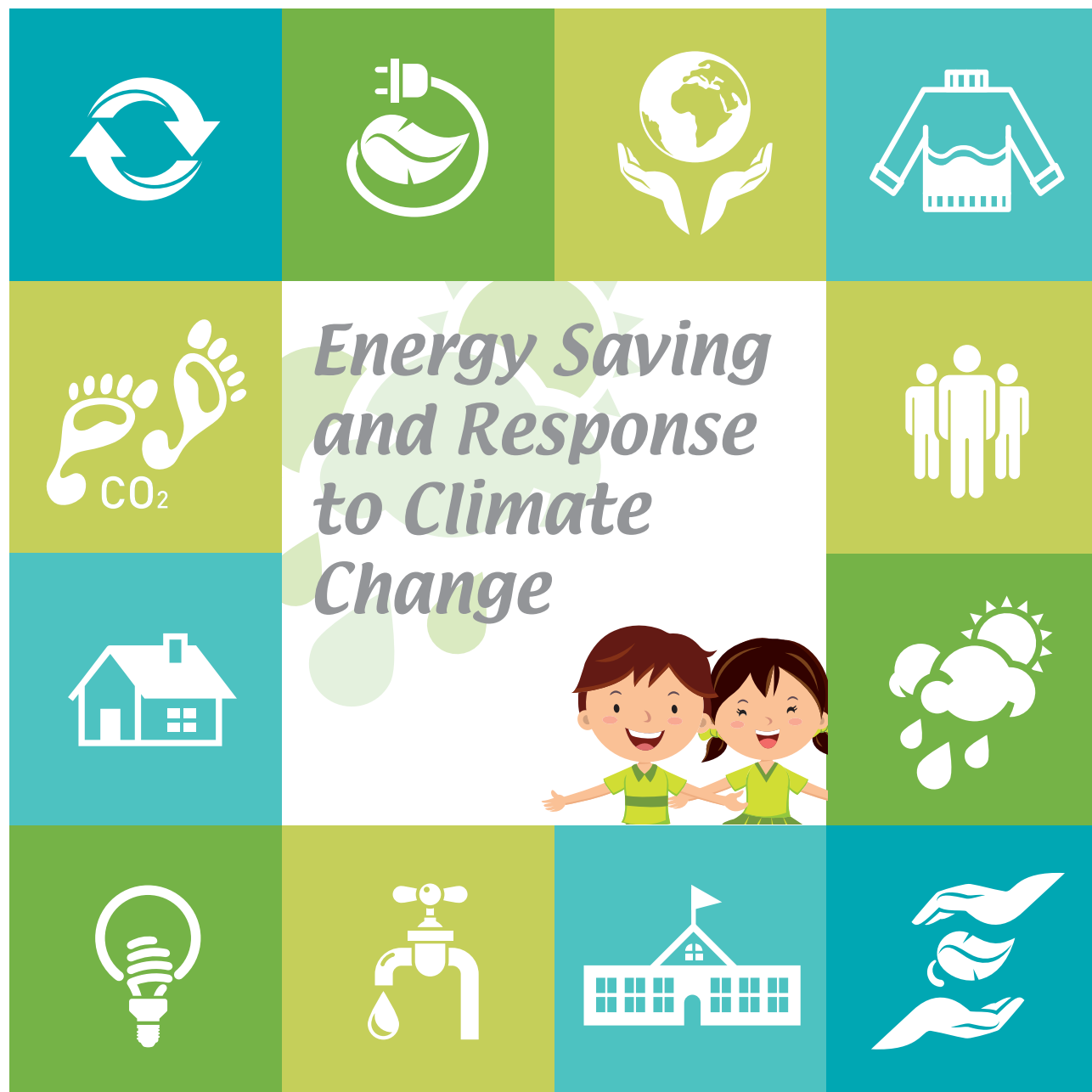


# For Our Common Future



**For Our Common Future**

# **Energy Saving and Response to Climate Change**

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# I. Climate Change

## Sense the Climate Change

Human beings exchange ideas and feelings with language. The nature also has its own language, reflected in growing and withering of grass and forest, coming and leaving of migratory birds, freezing and melting of rivers and other natural phenomenon called phenological phenomenon.



*Find the starting date of Beijing Peach Flower Festival from 1988 to 2005 to see if there is any change.*

Year	Starting date of Beijing Peach Flower Festival
1989	April 15
1991	April 10
1993	April 10
1997	April 12
2001	April 6
2003	April 3
2005	April 1

Phenological phenomenon can help people understand the climate change changing with seasons and the impact of such change on flora and fauna. Ancient Chinese people had found the relationship between phenology and agricultural production, thus using it to guide the farming work.

### Activity 1.1



*In order to study the climate change, Zhu Kezhen observed the weather and phenology every day. What is the relationship between the weather and climate? Why would he study climate change?*



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## *Story of Zhu Kezhen*



Zhu Kezhen was China's great scientist and educator and famous meteorologist and geographer. In order to conduct research on climate change, he kept on recording the phenology every day, even when he was in his sixties. When he did outdoor exercise every morning, he put the pen thermometer nearside for measuring the temperature, and he would record the readings and other climate elements after he finished the exercise. At that time, he lived in the east side of Huangchenggen District in Beijing, while the Chinese Academy of Sciences was located in Wenjin Street. He bought the monthly ticket of Beihai Park through which he walked twice every day to and from work, during which he would write down such details as which day the ice would melt, which day the winter jasmine flower would blossom, which day the apricot flower would produce the petals, and never stopped in all four seasons. Later, based on his observation data, records on meteorology and phenology in archaeological material and historic documents, Zhu Kezhen put forward the trend of climate change in recent 5000 years in China. His achievements made great contribution to the research on climate change.

## Knowing About Climate Change

There are many climate change policies, such as United Nations Framework Convention on Climate Change, Emissions Trading, Carbon Tax, Leipzig Declaration, Economics of Global Warming, Climate Change Mitigation, Economics of Climate Change Mitigation.

The United Nations Framework Convention on Climate Change (UNFCCC or FCCC) is an international environmental treaty negotiated at the United Nations Conference on Environment and Development (UNCED), informally known as the Earth Summit, held in Rio de Janeiro on June 3-14<sup>th</sup>, 1992. The objective of the treaty is to "stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system".

### Activity 1.2



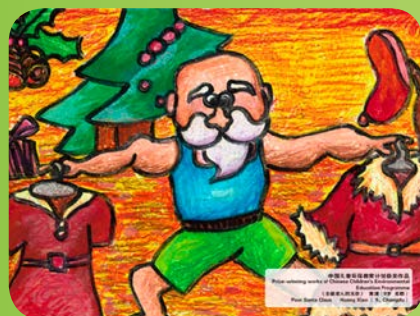
*why the Santa Claus's winter clothes are changed into summer gown and why his sleigh is gone?*


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Global warming is due to the excessive increase of greenhouse effect on the earth. To make it simple, greenhouse effect is the thermal insulation of atmospheric layer to the earth surface. The gases leading to greenhouse effect are called greenhouse gases, which is mainly referred to CO<sub>2</sub>. The greenhouse effect caused by CO<sub>2</sub> accounts for two thirds of the increase of current greenhouse effect.

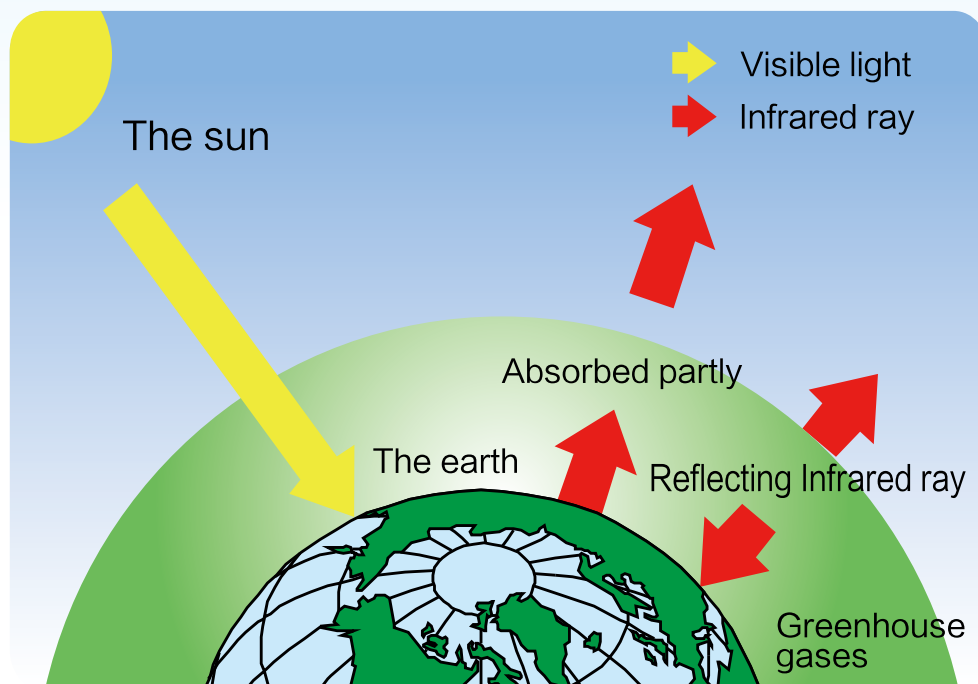
Ranking	Greenhouse Gases	Major Human Activities
1	CO <sub>2</sub>	The use of fossil fuels and the change of land use
2	CH <sub>4</sub>	Agricultural activities and the use of fossil fuels
3	N <sub>2</sub> O	Agricultural activities

Three Major Greenhouse Gases Caused by Human Activities

Greenhouse effect is a double-edge sword. Appropriate greenhouse effect can protect human beings, but excessive greenhouse effect will bring harm to human beings.



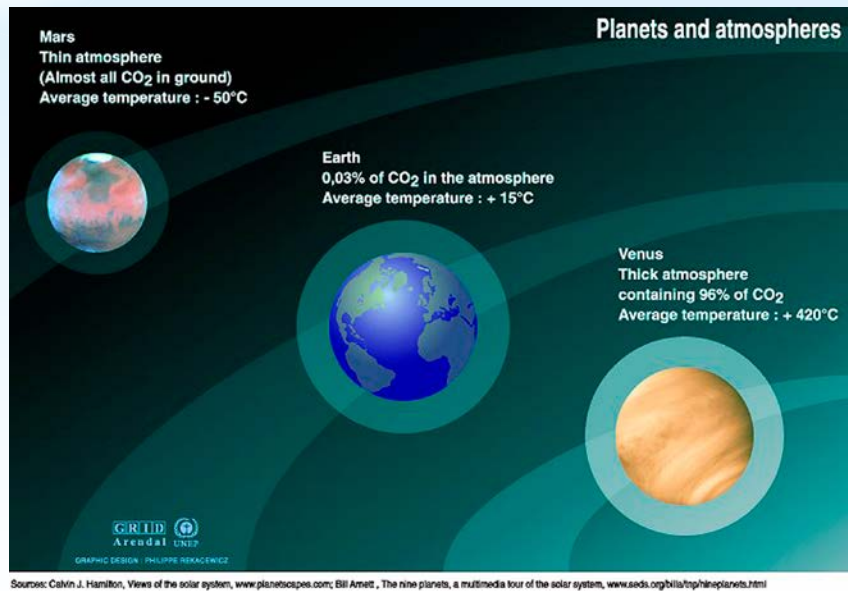
If there is no atmospheric layer on the earth surface, the average temperature on the earth will change to  $-18^{\circ}\text{C}$  from current  $14.5^{\circ}\text{C}$  and human beings cannot live on the earth. This difference in temperature is caused by the existence of greenhouse gases. Greenhouse gas can protect the earth from losing heat.



If the greenhouse gases concentration increases, the heat absorbed by the earth and the temperature on the earth will also increase with it. Therefore, greenhouse gases concentration should be kept at an appropriate level to prevent temperature rise.







The average temperature on the surface of Mars is – 55°C  
The average temperature on the surface of Venus is 480°C

Figure 1.3 Comparison of the earth, Mars and Venus, which shows the concentration of CO<sub>2</sub> should be kept at an appropriate level.



### Activity 1.3

*Why there is a large difference between the temperature on the earth surface and that on the surface of Mars and Venus. Tell us your idea.*

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Since the 18<sup>th</sup> century, with the rapid development of economic and industrial activities, people have begun to consume largely the energy and resources on the Planet, especially the fossil fuels (such as coal and oil) that will discharge large amount of greenhouse gases when burning. As a result, the concentration of greenhouse gases in the global air has begun to increase sharply since 1750. Research conducted by scientists show that human activity has become the major cause for the increase of greenhouse gas concentration.

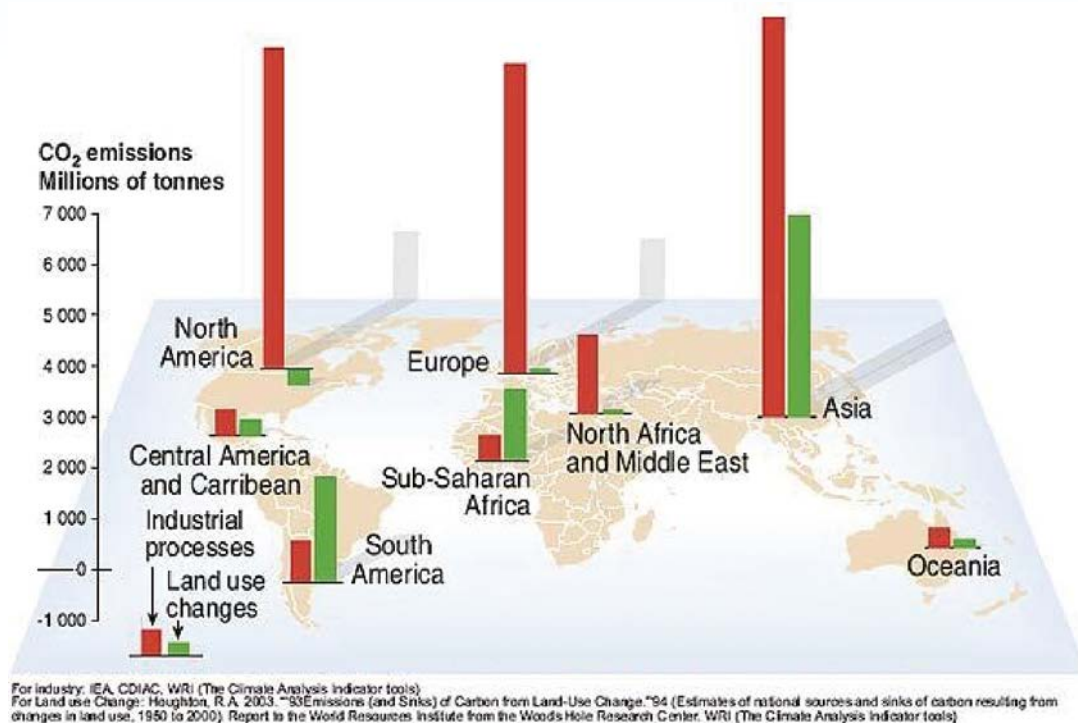


Figure 1.4 CO<sub>2</sub> emissions from industrial processes and land use

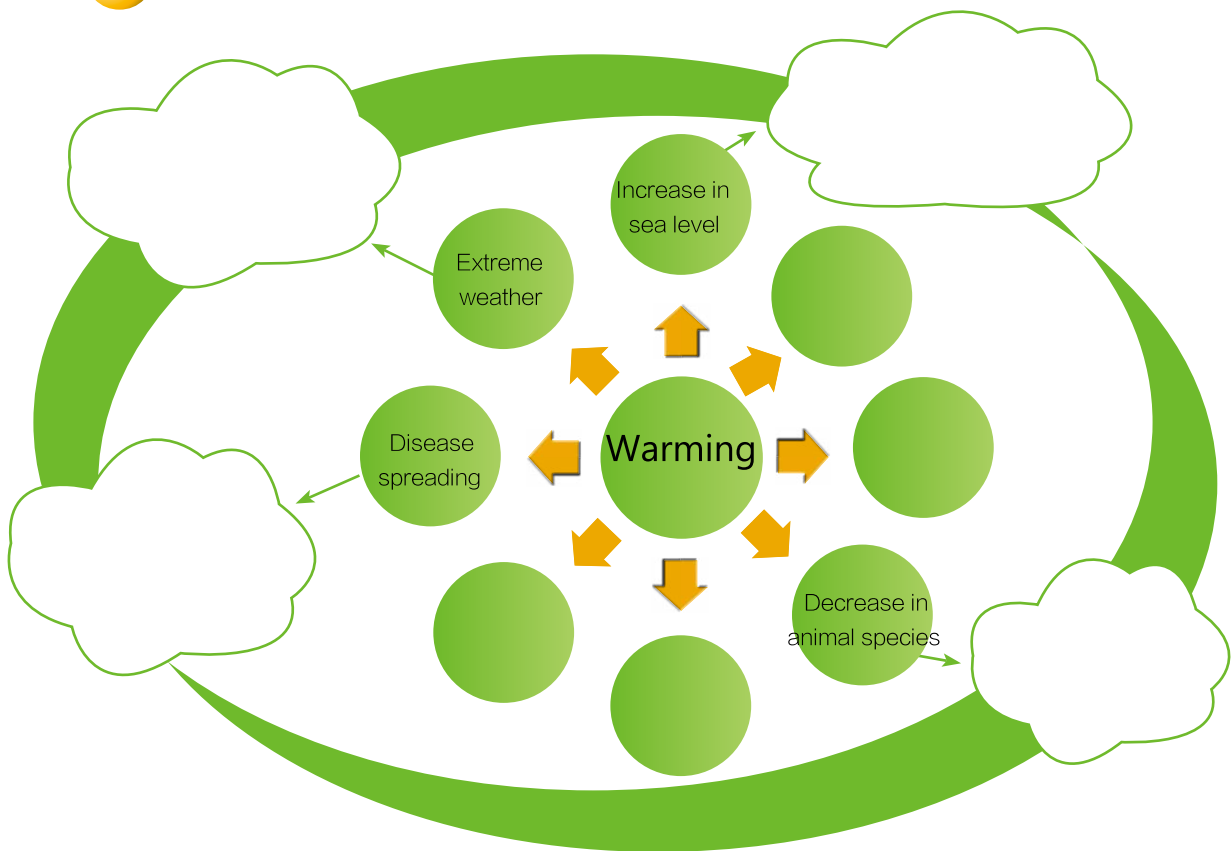
## Impact of Climate Change

The impacts of climate change include increase of sea level leading to submerging of coastal and low-lying areas and decrease in biodiversity leading to species extinction.

### Activity 1.4



*Find information about what climate change may cause.*



In recent years, serious natural disasters such as storm, sand storm, flood, drought, typhoon and mud-rock flow occur more and more frequently, which is closely related to climate change. Climate change increases their probability.

### Activity 1.5



*Do you know what serious natural disasters happened in recent years? Did they have any relation with climate change? Have you felt climate change in your everyday life? Write down your answers in the following box.*



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Climate change has great impact on human life. The television and broadcasting will report news about climate change.



Figure 1.5 Weather report and climate change news on TV and newspaper

## II. Energy and Climate Change

### Fossil Fuels and Climate Change

Fossil energy is transformed from the dead body of animals and plants buried underground millions of years ago and, after a long history of geological change, it has become the most extensively used energy, including coal, oil and natural gas. Human beings cannot live without fossil energy. To a certain sense, human society cannot develop without fossil energy.

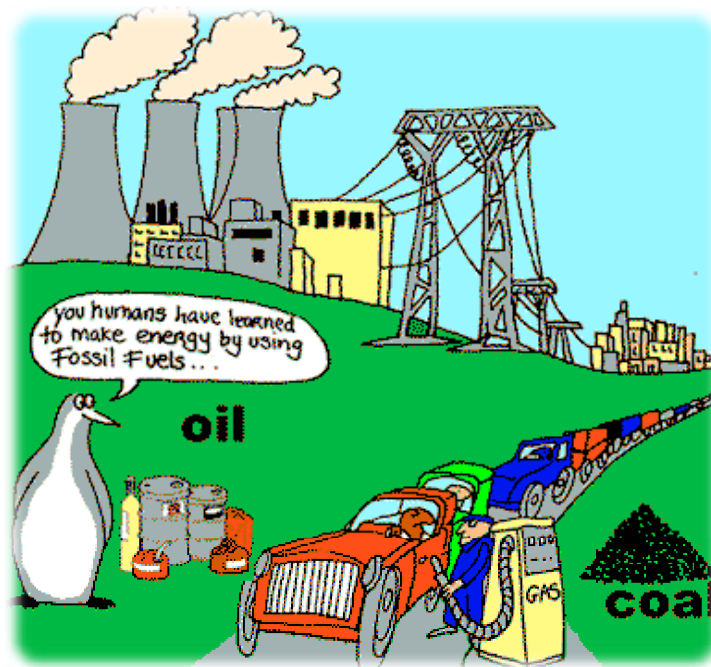


Figure 2.1 "Pride" of fossil fuels

The burning of fossil energy will generate greenhouse gases, especially CO<sub>2</sub>. Using fossil fuels and discharging much greenhouse gas to the air is an important reason for climate change. In order to address climate change, we have to try to use less or no fossil energy, and then the greenhouse gases shall be reduced. Under such condition, on one hand, we need increase the utilization efficiency of fossil energy; on the other hand, we shall try all means to seek for the clean energy to replace fossil energy.



Crude oil



Raw coal

We are the major energies for industrial production. Industry will go bankrupt without us. Meanwhile, human beings' life relies on us. We support people's heating, lighting and vehicles.



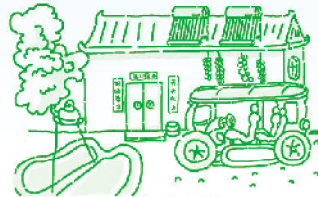


## Seeking for Clean Energy

Clean energy refers to the energy which does not discharge any pollutant, including hydropower, wind power, solar energy, bio-energy (biogas) and ocean tidal power.



Natural gas



Solar energy



Wind energy source



Hydro energy



Geothermal energy



Ocean energy



Biomass energy

The use of new energies will reduce the emission of greenhouse gases from production and living activities, which contributes to avoiding global warming. Now, all the people in the world are trying to find new energies to reduce the emission of greenhouse gases. One thing to note is that clean energy will reduce carbon emission, but improper treatment will also cause certain damage, nuclear energy for instance. Therefore, we need to use and treat clean energy correctly.

### Activity 2.1



*What new energies are used in your life and write them down in the box.*



## Energy Saving

Nowadays, saving energy has become the common choice for all the people in the world. The main energy we are using currently is still fossil energy, which will discharge a large amount of greenhouse gases into the air. Saving energy means the reduction of greenhouse gases into the air, which is conducive to mitigating global warming. Therefore, energy saving has become more important, and many countries' governments have formulated energy saving policies to stop wasting and encourage saving.

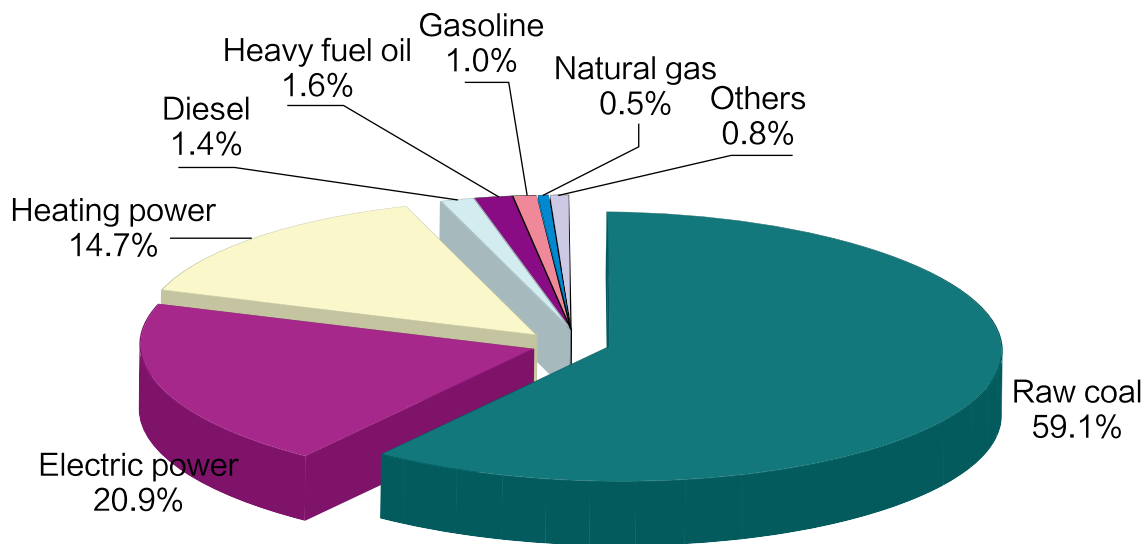


Figure 2.5 World energy consumption structure

In every corner of the world, low-carbon lifestyle is becoming a fashion. Various policies have been adopted by China, Japan and Korea. Japan formulated the policy to transform coal into clean energy, use fuel cell to generate power, use fuel cell vehicle, use coal to recover CO<sub>2</sub> and produce hydrogen, use coal bed methane to produce hydrogen, and develop zero emission power generation technology. Japan also encourages the use of clean energy in households. In 2008, China and Korea held the 7th Clean Energy Technology Seminar for the development of clean energy for reducing the emission of greenhouse gases. Kunming in Yunnan Province in China has been called "Solar Power City" by the World Observation Institute for the popular use of solar water heater. On the windmill farms in the mountain areas in Korea, wind power has been used as a clean energy.



Many enterprises have taken measures to save energy and reduce emission, such as BP, a large oil company in the world. In 2008, the total greenhouse gases emission of BP was 61.4 thousand tons of CO<sub>2</sub> equivalent, 2100 tons less than that in 2007, 63.5 thousand tons of CO<sub>2</sub> equivalent, down by 3.7%. Currently, the carbon emission amount ranks low in oil manufactures.



## Activity 2.2



How can we save energy? First, think about when and where you use energy in your life and write them down in the box.

A large green apple-shaped frame with a pencil icon at the top right. Inside the frame are six horizontal dashed lines for writing.







*Second, think about how long you use them, if it is necessary.*

5 hours, in which 1 hour can be replaced  
by the use of sunlight.

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*Third, according to the above two steps, plan your time of energy using  
and try to reduce the use of energy.*

I will use it 4 hours every day in the  
future.

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*Fourth: if there is energy saving product, use the product to save energy.*

I will use energy saving bulbs.

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### *Energy saving suggestions:*

1. Try not to use tissue paper but the handkerchief, so as to protect the forest and live a low-carbon life;
2. Use both sides of each paper, then half the forest would not be cut down;
3. Turn off the light and unplug, this is the first step as well as a good behavior; climb the stairs instead of using the elevator, save electricity for all and get a healthy body for yourself;
4. The storage of food in the refrigerator should occupy 80% of the space, as the electricity would be wasted if the storage is more or less than 80%. Save a space of more than 10mm between each package;
5. If the use of air-conditioner is cut down by 1 hour, about 0.6k g emissions of CO<sub>2</sub> would be reduced.



# III. My Low-carbon Life

By planting one tree, you can reduce 111 Kg of carbon dioxide emissions. If one conducts 1,200 km of air travel, he will produce 166.8Kg carbon dioxide. If you want to achieve carbon offsets, you need to plant two trees.

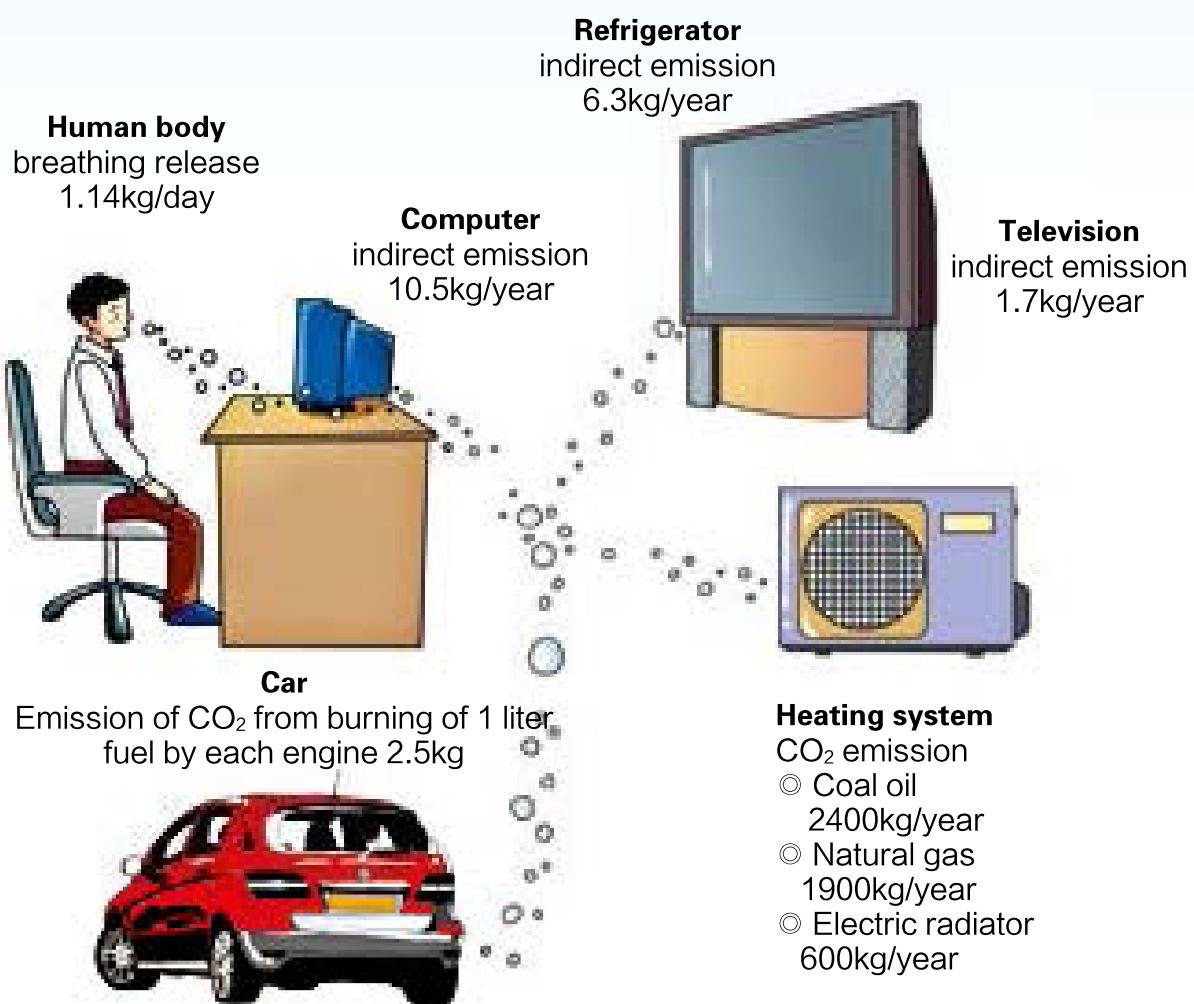


Figure 3.1 Amount of CO<sub>2</sub> emission in everyday life

## Activity 3.1



### Have a try: calculate household carbon emissions

*There are many carbon emission calculators, and what we choose is the calculator developed by Energy Research Institute of National Development and Reform Commission. The website is <http://www.hinature.cn/co2>. Calculate your household carbon emission with your parent on the website for one month to see whose carbon emission is the least.*

#### Carbon Footprint Calculator

##### Clothing

- Quantity of clothes bought
- Amount of washing powder

##### Dieting

- Quantity of cigarette smoked
- Quantity of alcohol drunk
- Quantity of beer drunk
- Meat consumption
- Grain consumption

##### Housing

- Electricity consumption
- Coal gas
- Natural gas
- Fire coal
- Wood for decoration
- Ceramics for decoration
- Central heating
- Steel for decoration
- Aluminum for decoration

##### Traveling

- Airplane
- Train
- Steamer
- Subway
- Bus
- Private car of low fuel consumption
- Private car of medium fuel consumption
- Private car of high fuel consumption

##### Everyday use

- Quantity of plastic bags
- Paper products
- Disposable chopsticks

Total of carbon emission \_\_\_\_\_





*Discuss household energy calculation methods, including the way to read electricity meter. And discuss how to reduce carbon emissions in households.*



Handwriting practice area with six sets of dashed lines on a white background.



## IV. Stories from China, Japan and Korea

There are many tips for energy saving and emissions reduction in China, Japan and Korea, find out the interesting methods and ideas and write them down in the boxes.



*Stories from China*



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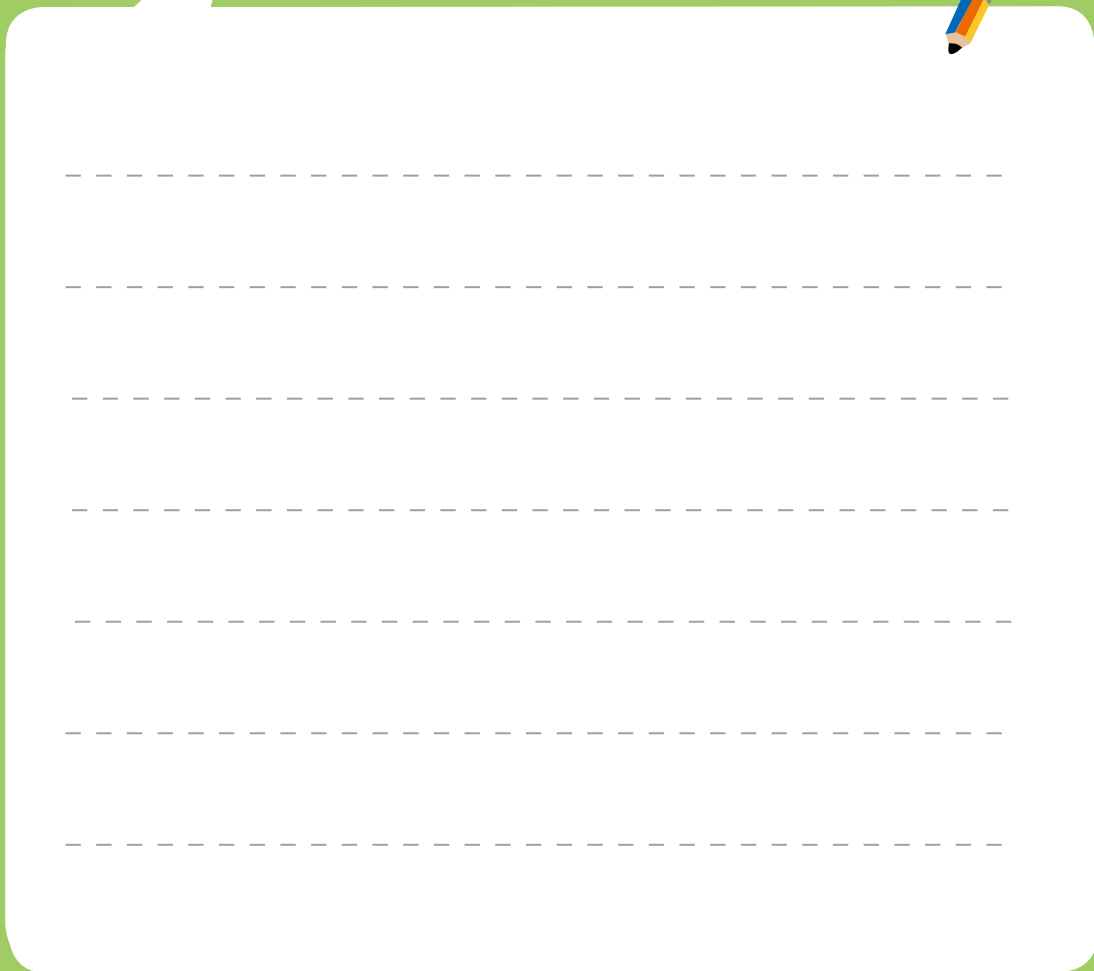
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😊 *Stories from Japan*



😊 *Stories from Korea*



A large white rectangular area with a dashed line for writing, set against a purple background. The area is designed for a story, with a small white triangle at the top left corner and a small pencil icon at the top right corner.





