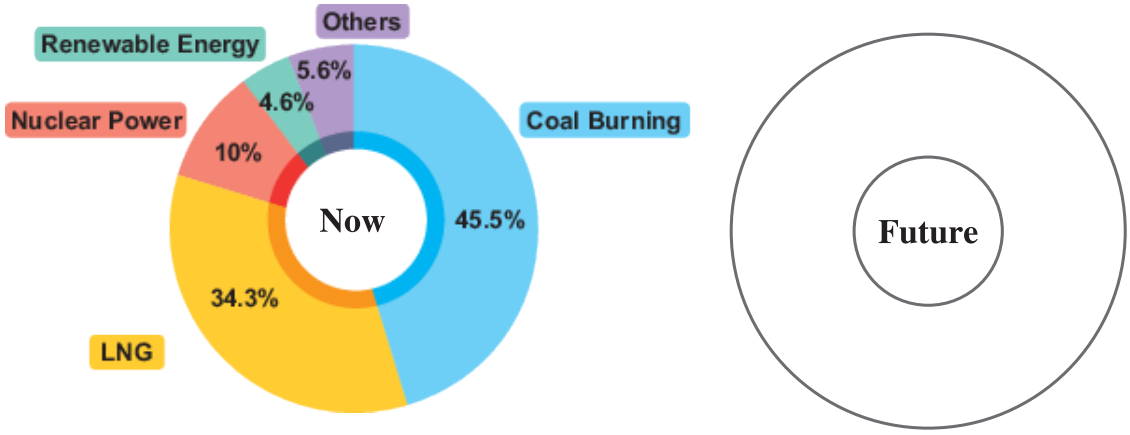
Energy 1

Harvesting Power from Rotten Tomatoes

Warm Up

Let's Develop an Energy Policy for Taiwan

According to a report from the Ministry of Economic Affairs, Taiwan's energy allocation is 45.5% coal burning, 34.3% LNG, 10% nuclear power, 4.6% renewable energy, and 5.6% others. If you were the Minister of Economic Affairs, how would you modify Taiwan's energy policy? Draw a pie chart in groups of 3–5 and share your ideas with the class.



Some guidelines for the ideal energy allocation:

1. Maintain a stable, affordable, and low-risk supply to meet the demand for energy.
2. Adopt innovative green technology to foster employment and economic growth.
3. Design a clean energy system to create a healthy living environment.
4. Make reforms in the energy market to effect the transition to green technology.

allocation 分配　coal burning 燃煤發電　LNG 液化天然氣　foster 促進

Read About It

Title:
Prediction:
Good readers read the title first and predict what will be discussed in the text.

★ What is the title of the passage?

★ What may the passage be about?

1 Among the common ingredients used in cuisines around the world, the humble tomato is almost **universally** loved. Found in everything from Italian spaghetti to garden salads, tomatoes add a **splash** of color to platters and **stimulate** diners' taste buds. It is easy to grow tomatoes from seeds or from **juvenile** plants in warm climates. Ease of **cultivation**, along with steady consumer demand, makes them a popular crop choice for farmers.

prep. 在...之中（三個以上）　成分

分詞構句　As tomatoes are found in everything...

from A to B 從到B

add A to B

刺激味蕾

幼嫩的、未成年的 (juvenile crime)

What is the subject of the last sentence?

Why do some farmers prefer the cultivation of tomatoes?

What is the topic sentence?

2 Not all tomatoes that are planted make it to markets, however. In fact, millions of **tons** of tomatoes are thrown away annually because they have been damaged by **frost** or excessive rain, have been eaten by insects, or have gone rotten before they could be sold. Supermarkets and sauce factories also routinely dump huge numbers of tomatoes. Not only is this terribly wasteful, but it contributes to global warming. All these truckloads of rejected tomatoes **constitute** a huge quantity of organic material. As the fruit rots, it releases the greenhouse gas, methane, which becomes trapped in the atmosphere and **accelerates** global warming.

部分否定，並非所有的
成功達到目的
as a matter of fact, actually
數百萬
throw away
dumped
腐壞
go sour 發酸
throw away
倒裝句
A 導致 B
bring about/lead to/give rise to/result in
huge quantities of
conj. when 當
釋放、發行
大氣層；氣氛

Paragraphs 2–3: Identifying the Text Structure:

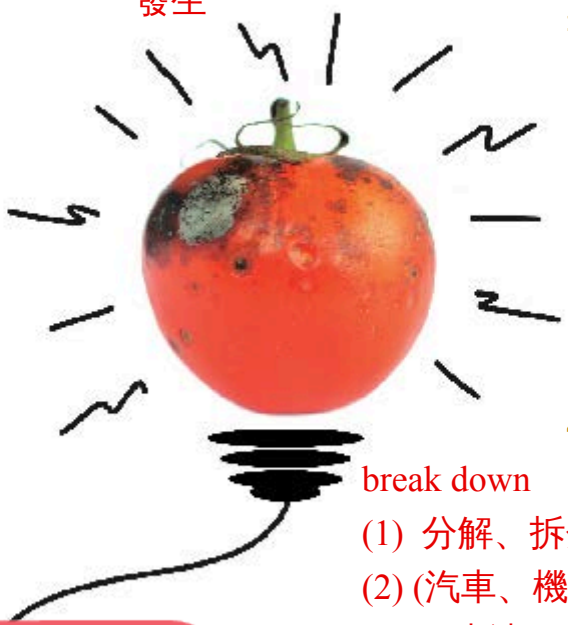
Good readers find out the topic and use signal words to identify the text structure of the passage.

★ What is the topic of the passage?

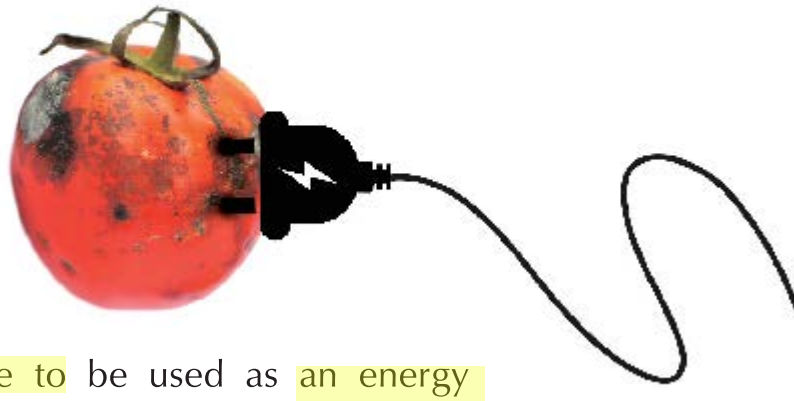
★ What is the text structure of the passage?

★ What signal words do you find to help you identify the organization of the paragraphs?

3 Fortunately, technological **innovation** and scientific knowledge have the potential for turning what seems like a problem into a solution. According to scientists, methane is at least 28 times more influential than the CO_2 in global warming, and using tomatoes to generate **electricity** could help solve the problem of methane produced by rotten tomatoes. This is how it works. Unwanted tomatoes are put into a sealed container, called a cell, with a special kind of **bacteria** that uses them as a food source. The hungry bacteria instantly go to work, breaking down the tomatoes as they **digest** them. As this happens, a chemical reaction takes place, causing the tomatoes to release electrons. An electrical circuit has been thus developed to capture these electrons and to store them in a fuel cell that acts like a **battery**. This stored energy can be



have the potential for + N/ to +Vr 有潛力
turn A into B 把A變成B
根據
倍數
發電
adj.
use A as B 把A當作B
immediately, in an instant, right away
decompose
when
化學反應
發生
v. 儲存
break down
(1) 分解、拆分
(2) (汽車、機械) 故障 The car broke down.
(3) 崩潰 She broke down in tears.



converted into electric
convert A (into B)
power that researchers expect will one day be able to be used as an energy source. As it turns out, the natural **properties** of rotten
能源 結果 特性；屬性/財產、不動產
tomatoes make them ideal fuel for generating electricity.

4 So far, the technology that can turn rotten tomatoes into electricity is still in the testing stage. Researchers have **obtained** a positive result and proved that the **procedure** works in the laboratory, but the electric **currents** they have managed to produce to date have been very weak. Even so, scientists consider it possible to find a method to increase the scale of the process and **boost** the level of electrical **output**. Take Florida—a leading producer of tomatoes—for example. Based on scientific calculations, it is **presumed** that the rotten tomatoes this state throws away each year could power the Walt Disney World Resort for one and a half months. What's more, producing electricity from rotten tomatoes would also result in

到目前為止 turn A into B 把A換變成B
在測試階段
water/air/electric currents
up till now 直到現在
consider A (to be) N/Adj.
current(adj) 目前的
*current prices
*the current year
currently (n.) 目前
Additionally/In addition/Besides/Moreover/Furthermore

Paragraphs 4–6: Prediction:
Good readers predict the writer's purpose of providing proof, examples, statistics, etc. in the passage.
★ What is the writer's purpose in the three paragraphs?

Scientist consider to find a method to increase the scale.. (to be) possible.

a foul mood
a foul temper
foul language
sb's foul mouth

simultaneous waste treatment. The process could **purify** 廢棄物處理
the vegetable matter and the **foul**-smelling liquid that
accumulates when it rots. This is preferable to having tons
be preferable to+ N/Ving 較適合的
of plant waste causing bad odors and occupying space in
《=》scent
fragrance
perfume
garbage dumps. a foul odor 難聞的氣味

deodorant (n.)

5 Another advantage of this new technology is the
relatively low cost. Rotten tomatoes have no cash value. In
低成本
addition, farmers and supermarkets actually find disposing
find + O. + O.C.
of them costing a fortune. Furthermore, no other **raw**
非常昂貴
materials are needed after the initial **investment** in
原料
equipment is made.

make an investment in

6 The technology could be especially helpful in the places where power supplies are unstable, with people sometimes left in the dark. Most importantly, this new method of electricity production successfully reduces the emission of methane and is thus eco-friendly. Although the technology is still in the development stage, tomatoes may be the "power plants" of the future. in the testing stage

—Jason Grenier

Understand the Text Structure

According to the passage and its structure, fill in each of the blanks with your own words. The first one has been done for you.

Introduction

Tomatoes are welcome all over the world.

Body

Problem

❶ Damaged or unwanted tomatoes cause a big problem for the environment.

- Damaged by [1] frost or excessive rain
- Eaten by insects
- Rotten before being sold

❷ The fruit rots and then releases [2] _____, which accelerates global warming because the gas gets trapped in the atmosphere.

Solution

Rotten tomatoes can generate electricity.

- The chemical process of electricity generation from tomatoes
- Example: [3] _____

_____

- Other advantages:

❶ The process also helps purify [4] _____

_____.

❷ The technology is of relatively low cost.

Conclusion

With the advance of science and technology, rotten tomatoes can become fuel for [5] _____.

Check Your Comprehension

I. Choose the correct answer to each question.

( ) 1. What is the writer's attitude toward using rotten tomatoes to generate electricity?

(A) Optimistic. (B) Pessimistic. (C) Neutral. (D) Doubtful.

( ) 2. According to the passage, why does the writer consider tomatoes to be "humble" in the first paragraph?

(A) They can only be grown in warm climates.

(B) They stimulate diners' taste buds.

(C) They are common and easy to grow.

(D) It costs more to buy dishes made with tomatoes.

II. According to the passage, check (✓) each of the following statements as true, false, or not given.

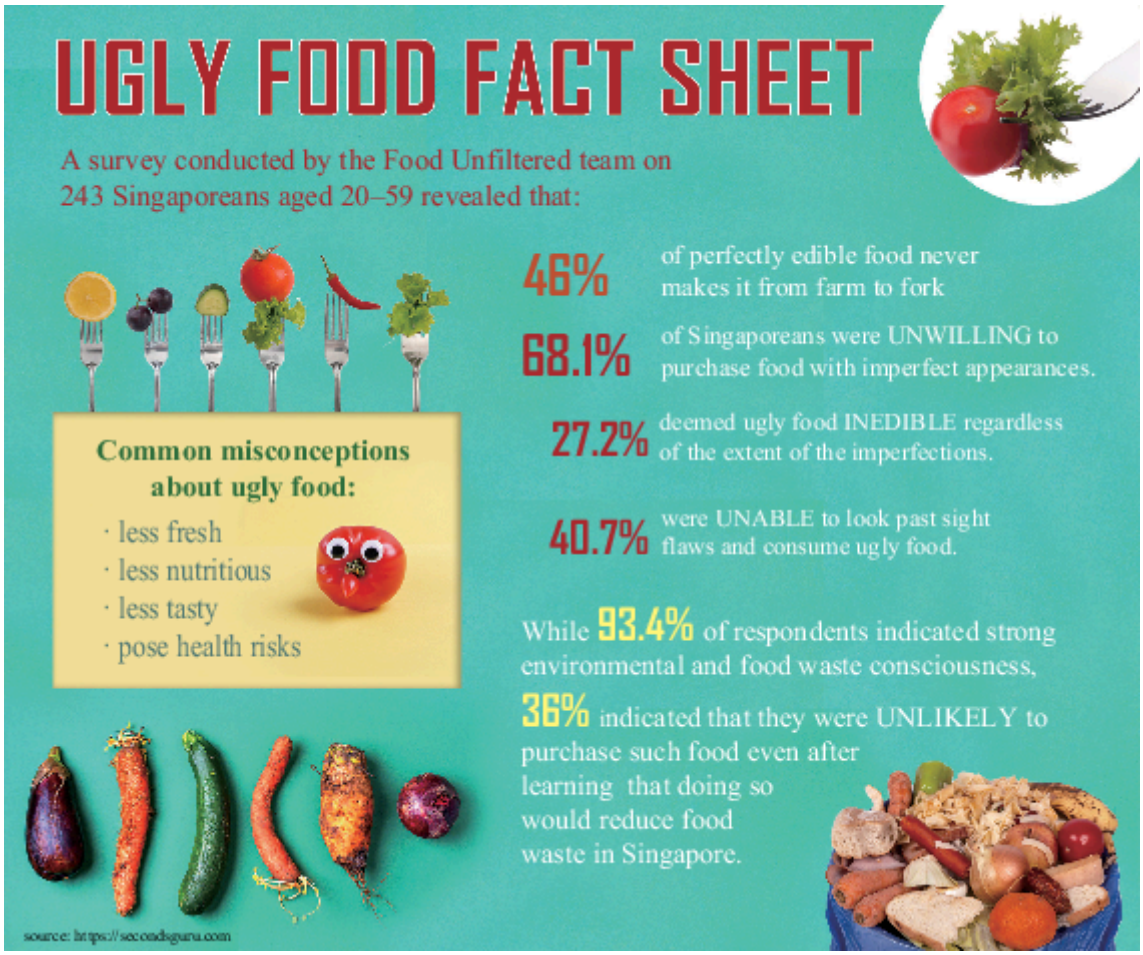
Statements	True	False	Not Given
(A) Rotten tomatoes are of no use, and they only cause problems, such as the problem of disposal and financial burdens for farmers.			
(B) Methane, which is released from rotten tomatoes, is one of the gases that cause global warming.			
(C) Turning tomatoes into electricity has already been very successful in Florida.			
(D) Bacteria with electrons make tomatoes become rotten.			
(E) It is presumed that rotten tomatoes will be a reliable energy resource in the coming decades.			

Think Critically

1. Could you think of any other fruit or vegetable that could generate electricity in addition to tomatoes? Do research into this question and share your findings with the class.
2. Do you think that this kind of "tomato-powered plant" could be built in Taiwan? Could it replace other ways of generating electricity? Share your opinions with the class.

Figure out Information Graphics

The following picture indicates some facts about ugly food. Discuss the picture with your partner and answer the questions below.



( ) 1. Which of the following statements is **NOT** true?

(A) People commonly hold the opinion about ugly food that it is less fresh and less tasty.

(B) Over half of Singaporeans are unwilling to buy ugly food.

(C) Over 36% of Singaporeans are likely to purchase imperfect food to reduce food waste.

(D) Only 54% of perfectly edible food can make it from farm to fork.

2. What can be done to reduce the waste caused by ugly food? Share your opinions with the class.

Expository Writing

Expository writing explains an idea by providing factual information or experimental evidence. The common organization of the body in this type of writing includes comparison-and-contrast, process, cause-and-effect, problem-and-solution, etc. Expository writing often starts with a hook, which is something interesting like a vivid example or an inspiring story, and often concludes with restatement of the main idea.

Example:

Not all tomatoes that are planted make it to markets, however. **In fact**, millions of tons of tomatoes are thrown away . . . the technology that can turn rotten tomatoes into electricity is still in the testing stage. Researchers have . . . **proved that the procedure works** in the laboratory . . .

→ In the second paragraph, the writer provided factual information about tons of tomatoes having been thrown away, and in the third and the fourth paragraph, the writer provided experimental evidence for the success that has been achieved in turning rotten tomatoes into electricity. Thus, the passage is an example of expository writing.

Exercise A:

According to the description of expository writing, answer the following questions.

( ) 1. How is the passage organized?

(A) By comparison and contrast. (B) By cause and effect.

(C) By problem and solution. (D) By process.

2. What is the hook that is used in the passage?

_____

3. Find the sentence restating the main idea in the concluding paragraph.

_____

expository 說明的

Exercise B:

Read the following passage and answer the questions.

drain (v.) 排空，（使）流乾
（n.）下水道
排水管

sewer 污水管；下水道

sewerage 排水系統 污水處理

sludge 淤泥

chlorine 氯氣

Early civilizations often built drainage systems in urban areas to handle rainwater that ran down the street during a storm. The Romans constructed elaborate systems that also drained wastewater from the public baths. However, as the population of the cities grew, the old drainage systems became overloaded. During the Industrial Revolution, manufacturing waste was added to sewage, which increased the need for more efficient sewage treatment. [1] _____

Sewage or wastewater treatment in modern times is the process of removing harmful physical, chemical, and biological elements from wastewater and house sewage. The whole process starts with screening out large objects such as paper and wood, and removing heavy materials like dirt. The screened wastewater is then ready to go through a series of concrete tanks for further treatment. [2] _____ Here, human waste, called sludge, settles to the bottom while oils and grease float to the top, where they are collected. [3] _____ The remaining sewage then enters the secondary tanks for the third stage of treatment. The solids that were not treated in the primary tanks are removed here through decomposition, which digests the material. [4] _____ This filtering process gets rid of almost all bacteria, as well as other solid particles that remain in the water. [5] _____ After the bacteria are destroyed, the chlorine is eliminated from the water, and the treated clean water is discharged into a river or the ocean. 【109 指考】

1. What is the passage mainly about?

_____

2. Fill in each of the blanks above with one of the following sentences (A–E) below.

(A) In the second step, the sewage passes into the primary tanks.

(B) Then, the liquid sewage is filtered through sand.

(C) In the mid-19th century, the first steps were taken to treat wastewater.

drainage 排水　sewage 汙水　sludge 生活汙水　decomposition 分解　chlorine 氯

(D) Finally, the wastewater flows into the last tanks, where the chemical chlorine is added to kill the remaining bacteria.

(E) At the same time, organic matter like eggshells or coffee grounds in the sewage is broken down into smaller substances.

( ) 3. How is the passage organized?

(A) By comparison and contrast. (B) By cause and effect.

(C) By problem and solution. (D) By process.

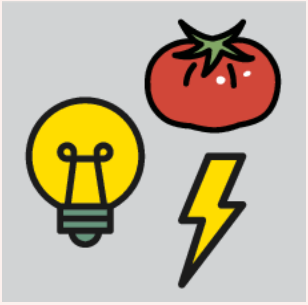
Object Complements in Various Patterns

Examples:

❶ The natural properties of rotten tomatoes **make them ideal fuel** for generating electricity.

❷ Farmers and supermarkets actually **find disposing of them costing a fortune**.

❸ The technology could be especially helpful in the places where power supplies are unstable, **with people** sometimes **left in the dark**.



What do the sentence structures look like?

❶ S + make + O + { adj. / N }

❷ S + { leave / keep / find } + O + { adj. / prep. phrase / V-ing / p.p. }

❸ with + O + { V-ing / p.p. / adj. / prep. phrase }

Exercise A:

Explore the differences among the three sentence structures above. Then, complete the following passage by circling the correct words in each sentence in the parentheses. Note that there may be more than one possible answer. The first one has been done for you.

❶ Many studies suggest that being optimistic (leaves/makes/with) people (health/healthier/for good health). ❷ Also, those who are optimistic are said to be more likely to (find/make/with) themselves (successes/succeeded/on the path to success). So, what is "being optimistic" exactly? According to the Mayo Clinic, being optimistic is to think positively and to look on the bright side. ❸ For example, (keep/make/with) a fierce typhoon (approaching/approached/accessible

parenthesis 括號

to) his or her neighborhood, a person may be thankful that the weather forecast has given an early warning. ❹ Therefore, how can a person (find/make/with) himself or herself (optimistic/an optimist/thinking positively) in order to enjoy the many advantages that positive thinking provides? ❺ One way to do so is to (keep/make/with) oneself (surrounding/surrounded by/in the surroundings of) optimistic people and then make an effort to follow their lead.

Exercise B:

Translate the following pairs of Chinese sentences into English. Use one of the sentence structures on page 15 to translate one of each pair.

I.

1. Johnny 以前覺得數學這個科目非常困難。

2. 然而，據說他現在在大學主修數學。

II.

1. 隨著派對來到尾聲，每位客人都顯露出滿足的表情。

2. 派對企劃肯定投入了很多精力在策畫這件事上面。

Listen Carefully

Listening Strategy: Determining the Relationships of Ideas

Converting Food Waste into Cooking Gas

In a speech, a speaker uses discourse markers to indicate different relationships of ideas. These markers can be one word, one phrase, or expressions when a speaker conveys his or her ideas. Sometimes, they may work as transition words. For example, markers of consequence are similar to the transition words that are used to indicate an effect of a previous action or ideas. The following are discourse markers of this type.

as a result, so, because of this, therefore, consequently, in this case, for this reason, thus, etc.

I. Read the example sentences of two new words first, and fill in each of the blanks with one word to complete the definition of each new word.

❶ **fertilizer** *n.* [U]

Example: The gardener spreads natural fertilizers on the lawn once a month. For this reason, the rich soil makes the plants and flowers grow well.

Definition: material someone adds to a garden to _____ the nutrients in the soil and help plants _____

❷ **agricultural** *adj.*

Example: Urban development greatly reduces the country's supply of agricultural land. Consequently, holding small pieces of land to sow crops, farmers are forced to find other jobs.

Definition: related to the science or occupation concerned with cultivating _____, growing _____, and feeding, breeding, and raising livestock; _____

cultivate 種植

II. Listen to the words in Vocabulary Bank first. Then, listen carefully to the video clip. When you listen, pay attention to the discourse markers mentioned above, and make notes on the sentences with discourse markers.

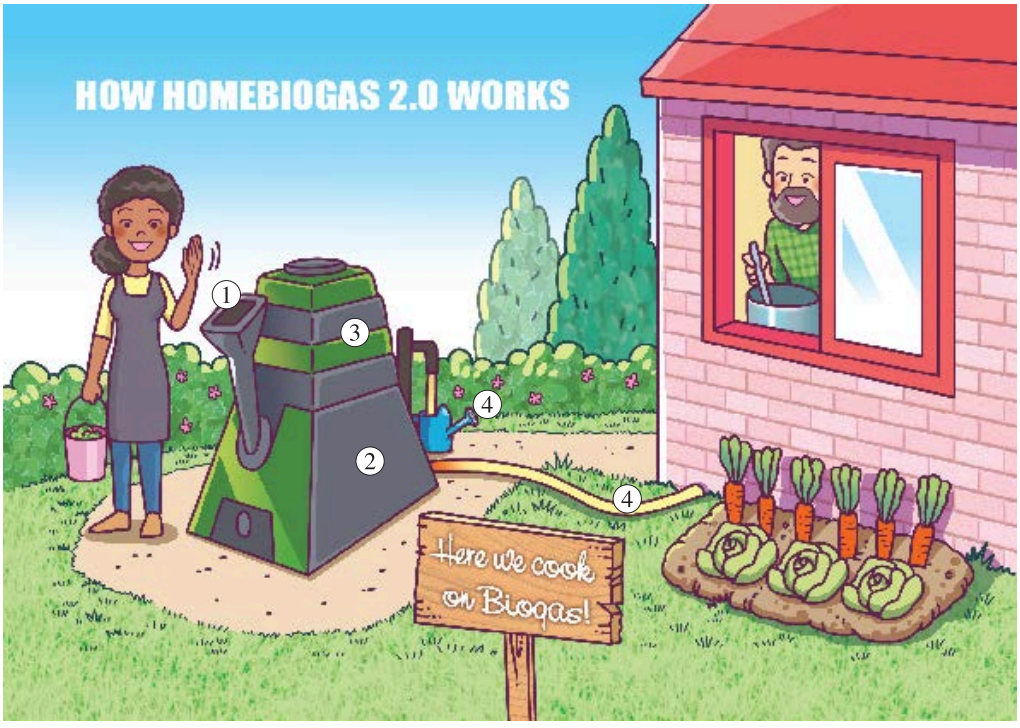
Vocabulary Bank

1. biogas *n.* [U] 沼氣
2. generator *n.* [C] 發電機
3. accessible *adj.* 可使用的
4. leftovers *n.* pl. 廚餘
5. contraption *n.* [C] 奇妙的裝置
6. inlet *n.* [C] 投入口
7. digester *n.* [C] 處理器
8. anaerobic *adj.* 厭氧的
9. fermentation *n.* [U] 發酵
10. renewable *adj.* 可再生的

Notes: _____

_____

III. Figure out how the machine works by thinking about the clues in your notes. The following is a picture showing how the HomeBiogas machine works. Listen to the video clip again, and write down each part of the machine.



① _____ ② _____

③ _____ ④ biogas and liquid fertilizer