# Unit 1

## Text A

## Recycling the Waste

Concern over global warming and the effect of pollution caused by the burning of brown fuels has become a major issue for governments. Recent encouragement from the European Union Directives to thc Member States for the recovery of waste by means of recycling and the use of waste as a source of energy has produced waste-to-energy (WTE) plants across Europe[1].

The Lomellina Energia Recycling plant in Parona, near Milan, is an integrated WTE facility for the recovery of recyclable materials, the production of refuse derived fuel (RDF), composting and electricity generation. Foster Wheeler Italiana (FWI), owns 98 per cent of the plant and was responsible for the development, construction, ownership and operation of the facility.

The plant, which began operation in July 2000, required an investment of £130 million ($121 million) and was financed by 24 per cent of equity and 76 per cent of debt. The plant is capable of handling RDF with a LHV[2] range of 2500-4000 kcal/kg.

Modern WTE plants are very different from the old incinerators thanks to technological progress made over the last few decades. They have two priorities: respect for the environment and the efficient generation of electricity. An important improvement has been achieved by converting municipal solid waste (MSW) into a real fuel that can be easily stored, transported and efficiently burned. From the combustible fraction of MSW it is

easy to obtain a product that is much more homogeneous and stable than MSW. This material is known as RDF and is a mix of particles of paper, paperboard, rubber, plastic, textile, leather and wood. Around 60 per cent of the MSW is converted into RDF and the balance yields reusable aluminum, ferrous materials, glass and compost.

RDF is an ideal fuel as it has a good heating value, a controlled chemical composition, no smell and can be used by one of the most efficient combustion technologies is available today-circulating fluidized bed (CFB) boilers. A CBF boiler is at the heart of the Lomellina plant and was selected as the technology to generate electricity because of its inherently strong environmental performance.

The Lomellina Energia recycling plant is designed to recover material and energy from 200000 t/year of MSW. The sorting process is attractive from the point of view both of recycling and for the production of RDF, a fuel that can be easily burned and produces very low quantities of bottom ash; The net power output of the facility, which commenced operation earlier this year, is about 17 MW[3]. Electricity produced at Lomellina is sold to Enel under a 15-year Power Purchase Agreement (PPA). For the first eight years of operation the electricity tariff includes an incentive since energy from waste is considered a renewable source of energy.

In addition to electricity sales, the MSW is also a source of revenue for the plant owners. A framework agreement has been signed with the Province of Pavia, which has appointed Lomellina as the "designated plant" for a total of 96 municipalities in the Province. This framework agreement ensures that the municipalities have to deliver all their waste to the Lomellina plant at an

inflation adjustable gate-fee of £28/t of MSW. Separate waste delivery agreements have been signed with municipalities in order to detail the specific terms and conditions for waste delivery.

The contracts have a put-or-pay character, which means that even if the municipalities deliver less than the agreed committed quantity, they will have to pay an amount based on the agreed gate fee and committed quantity. The system was started in December 1999, six months prior to the scheduled power plant start up. This was necessary in order to guarantee the disposal of MSW in a district which is suffering from a serious emergency due to the closure of landfill facilities.

At Lomellina the MSW waste is separated. After the first shredding MSW is sent for separation into three streams: an organic rich fraction (60mm); a metals rich fraction (60-120 mm) and a combustible rich fraction (120mm). The combustible rich fraction, after the removal of ferrous material through magnetic separators, is conveyed to magnetic separators for recovery of ferrous metals and to eddy current separators for recovery of aluminium cans. The remaining material is mixed with the combustible rich fraction and the waste material is shredded to a particle size of 90 mm or less.

The RDF then passes through the last magnetic separator and is conveyed to a storage building which can store enough material for three days of boiler operation at full capacity. By compressing the RDF this capacity can be increased to six days.

The organic rich fraction is stabilized using an anaerobic fermentation process. During this process, air for composting is partially taken from the MSW receiving and sorting building. This causes a slight negative pressure that results in a steady flow of fresh outside air through these areas. A biofilter treats

the air from composting and from the MSW processing buildings. The stabilized product is sent to the secondary trammel where materials over 20 mm in size are recovered and conveyed to the RDF stream.

The remaining organic fraction can be refined using an air classifier for the separation of glass and other solid inert. The low quality compost derived from stabilization of the MSW organic fraction can be directed to compost storage or to the RDF stream.

The RDF is delivered to three parallel fuel feed systems sized for 50 per cent capacity at full load. From here the RDF is transported to the furnace where air is injected to transport the heavier bed particles towards the drain connected to the stripper-coolers and allows for fluidification of the remaining lighter particles. Secondary air is then injected in the furnace at two elevations above the bed to achieve a staged uniform combustion. Inside the furnace RDF is burnt in this hot, fluid suspension bed, entrained in a substantial upward flow of gas. Coarse solids are separated from the gas stream, which exits the top of a cyclone and is completely cooled with saturated steam from a drum.

This design effectively handles the thermal variations and gives reliable operation and shortens the start-up time. The cyclone separates the entrained solids including unburned carbon from the flue gas and returns them to the furnace providing an excellent carbon burn-out. From the cyclone the flue gas flows through the idle pass for lowering the temperature before entering the convection section of the boiler at 650°C and then through the vestibule over the primary and intermediate super-heater sections. From the vestibule, flue gas flows down through the heat recovery area over the evaporator and the economizer and finally

flows out through the lower gas exit.

## Notes

1. from…to …介词短语及 for 引导的介词短语都作主语 recent encourage 的定语，而 by means of…energy 部分则是 reco-very 的定语，后面才是谓语及宾语部分。

2. LHV：low heat value 低热值。

## Words and Expressions

recycle [ri'saikl] *v.* （使）再循环；回收利用；再制

recover [ri'kʌvə] *v.* 重新获得，重新找到；恢复，使恢复健康；使身体复原

recovery [ri'kʌvəri] *n.* 重获，复得；复原，痊愈

integrate ['intigreit] *v.* 使结合，使并入，使一体化；结合起来，成一体

integration [ˌinti'greiʃən] *n.* 结合，综合；一体化

facility [fə'siliti] *n.* 设备，工具；方便，便利

compost ['kɔmpɔst] *v.* 把……做成堆肥，施堆肥于…… *n.* 堆肥，混合肥料

equity ['ekwiti] *n.* 公平，公道；公平的事物

incinerator [in'sinəreitə] *n.* 焚化炉，焚烧炉

priority [prai'ɔrəti] *n.* 优先权；先，前

convert [kən'və:t] *v.* 转变，变换；改变信仰

combustible [kəm'bʌstəbl] *a.* 可燃的

combustion [kəm'bʌstʃən] *n.* 燃烧

homogeneous [ˌhɔmə'dʒi:niəs] *a.* 同类的，同族的，相似的

yield [ji:ld] *v.* 出产，生长出（作物等），结出（果实）；屈服，投降。*n.* 产量，收获量，收益

ferrous [ferəs] *a.* 铁的，含铁的

composition [kəm'pəziʃən] *n.* 成分，组成，构成；合成物，混合物

fluid ['flu:id] *n.* 流体，液 *a.* 流动的，流体的，液体的

inherent [in'hiərənt] *a.* 内在的，本质的，固有的

inherently [in'hiərəntli] *ad.* 生来地

sort [sɔ:t] *n.* 种类，类别 *v.* 把……分类，整理；拣选

tariff ['tærif] *n.* 关税表，关税率，关税

commence [kə'mens] *v.* 开始，正式倡导

municipality [mjuˌnisi'pæliti] *n.* 市，自治城市，自治地区

ensure [in'ʃuə] *v.* 保证，担保；使安

全

detail [ˈdi:teil] *v.* 详述，细说 细目，细节

schedule [ˈʃedju:l] *n.* 议程表，程序表，议事日程；一览表，细目单 *v.* 安排，排定

guarantee [gærənˈti:] *v.* 保证，担保

shred [ʃred] *v.* 撕碎，切碎 *n.* 碎片，碎条

convey [kənˈvei] *v.* 搬运，转运，运送(旅客，货物等)(声音等)，传送

anaerobic [əˌniəˈrɔbik] *n.* 厌氧微生物，厌气微生物

fermentation [fə:menˈteiʃən] *n.* 发酵

trammel [ˈtrɔməl] *n.* 滚筒筛，洗矿筒

inert [iˈnə:t] *a.* 无自动力的，无活力的；惰性的，不活泼的

entrain [inˈtrein] *v.* 拖，拽，带走(人或物)(化)带走

saturate [ˈsætʃəreit] *v.* 使饱和，使中和；浸透，使充满 *a.* 浸透的，饱和的

convection [kənˈvekʃən] *n.* (热、电等的)对流，运流

vestibule [ˈvestibju:l] *n.* 门厅，前厅，气门室

economizer [iˈkɔnəmaizə] *n.* 省煤器，废气预热器

suffer [ˈsʌfə] *v.* 遭受，蒙受；经历，受痛苦；受损失

in detail 详细地

by means of 用，依靠，通过

in addition to 除……之外

prior to 先于

## Grammar 名词（Noun）

名词是用来表示人、物、概念的名称，如 chemist（化学家），bus（公共汽车），science（科学）。

1. 名词的种类

英语的名词分专有名词和普通名词。

(1) 专有名词。用来表示人物、地点和机构等的专有名称。如： Marx 马克思，China 中国，Beijing 北京等。

(2) 普通名词。用来表示人或物的通称。这类名词又可分为可数名词和不可数名词两种。可数名词是指可以计数的名词，如： college(学院)，engineer（工程师）等。不可数名词是指不可计数的名词，如： electricity（电），fuel（燃料）等。

2. 名词的数

可数名词通常有单数和复数两种形式。表示数量为一个时，名词用单数形式；表示数量多于一个时，名词用复数形式。通常是在单数名词末尾加上 -s 或 -es，便构成它的复数形式。

(1) 绝大多数名词直接加-s 即可构成复数形式，如：

tube （管子） — tubes　motor （电动机） —motors

radio （收音机）— radios　generator(发电机)— generators

(2)以字母-s，sh，-ch，-x 结尾的词加-es，如：

watch （表） — watches　box （箱子） — boxes

bus （公共汽车） — buses　brush （刷子） — brushes

关于名词复数形式的构成，还有一些特殊情况须注意掌握。

3. 名词的所属关系

名词表示所属关系即“谁的”时，可采用两种方式。

(1) 在名词末尾加“ 's 如果名词以-s 结尾，则只需在 s 的右上角加“'”. 如：

the car's engine 汽车引擎

(2) 在名词后面，用“of＋名词”表示，如：

the design of the new turbine 新涡轮机的设计

4. 名词在句子中的用法

名词在句子中可作主语、表语、宾语、定语、同位语，以及宾补，介宾，如：

The **panel** tells you the conditions of a machine's operation. （主语）

控制盘告诉你机器运作的情况。

Their factory produces **generators**. （宾语）

他们工厂生产发电机。

There happened an accident in **boiler** room yesterday. （定语）

昨天，锅炉房发生了一起事故。

其他用法不再一一列举。

## Exercises

1. *Reading Comprehension* ( *Say whether the statements below are True or False according to the text*)

1. _____ The Member State of the European Union Directives themselves have produce waste-to energy (WTE) across Europe.

2. _____ Foster Wheeler Italian (FWI) own the plant completely.

3. _____ MSW can be easily stored, transported and efficiently burned.

4. _____ RDF is much more homogeneous and stable than MSW.

5. _____ The plant is designed to recover material and energy from 200000 t/year of RDF.

6. _____ Lomellina is designated as electricity supplier for 96 municipalities in Pavia.

7. _____ The municipalities have signed waste delivery agreements with Lomellina plant respectively.

8. _____ It doesn't matter even if the municipalities deliver less than the agreed committed quantity.

9. _____ The stabilized product over 20mm in size and the low quality compost derived stablization of the MSW organic fraction can be delivered to the RDF stream finally.

10. _____ Air is injected in the furnace to realize the fluidification of the heavier particles.

Ⅰ. *Choose the definition from column B to match the word in column A.*

| A | B |
|---|---|
| 1. recycle | a. thing that is regarded as more important than others |
| 2. integrate | b. that can be adjusted |
| 3. priority | c. action or process of fermenting |
| 4. ferrous | d. the transmission of heat from one part of a liquid or gas to another |
| 5. adjustable | e. treat used material so that it can be used again |
| 6. fermentation | f. produce or provide (a natural product, a result or profit) |
| 7. inherent | g. combine something in such a way that it becomes fully a part of something else |
| 8. convection | h. containing or relating to iron |
| 9. yield | i. remainder of something after part has already been used, taken, etc. |
| 10. balance | j. existing as a natural or permanent feature or quality of somebody or something |

Ⅱ. *Fill in the blanks with the proper form of the given words.*

| compost | convert | yield | commence | ensure | commit | schedule |
|---|---|---|---|---|---|---|
| convey | suffer | entrain | detail | prior to | by means of | |
| in addition to | saturate | | | | | |

1. In regular intervals, we _____ the flower-beds in order to improve the growth of plants.

2. _____ his project to her, then he took a glass of water to quench his thirst.

3. Electricity can _____ into heat to warm the room.

4. In those old days, most of the Chinese _____ from hunger, diseases and coldness.

5. _____ taking this job, she had worked in Austria.

6. Having been conquered, the army _____ the fort to the enemy finally.

7. _____ being an electrician, he is a good engineer.

8. He has a machine that _____ documents.

9. The smell of fresh-brewed coffee _____ the tiny apartment.

10. He has made rapid progress _____ perseverance.

11. This invention has _____ changes in several branches of science.

12. They _____ electric power from a generating station to all the enterprises of this area.

13. This letter would _____ you an interview with the company you applied to last week.

14. We won't wait for him any longer because he always has a full _____.

15. Since everyone concerned is here, let the meeting _____.

Ⅳ. *Cloze*

Industries all over the world produce a great amount of dangerous and poisonous waste material. These dangerous __1__ come from many kinds of industries, from large chemical factories to small car gasoline centers. All countries face this problem, __2__ those with an increasing number of industries. In the United States, industries produce about 63000000 tons of dangerous wastes each year. __3__ number of people became seriously sick and many had to leave their homes. The poisons had come from a chemical

plant __4__ had left or dumped its dangerous wastes in this area. It is believed that there are 50,000 such chemical dumps __5__ the United States, of which at least 2, 000 may be dangerous.

__6__ United States recently made a number of new rules which are believed to be able to help control most of the dangerous industrial wastes in the country. The new rules __7__ strong limits on the future production, transportation and dumping of more than 500 dangerous chemicals and substances that are poisonous, burn easily __8__ can explode. The new rules will cost American industries almost 1000 million dollars, but that would __9__ a small cost when compared to the great danger and cost caused by the uncontrolled __10__ of dangerous wastes.

## Text B

# Division of Operating Unit 13 in the Project

13. 0 General Joint Part

13. 0. 1 The user's obligations

The user organizes operation and is obliged to determine professional attendance and maintenance of the electrical equipment, with a view to material outfit with tools, protective and working aids, spare parts, relevant documentation.

The user organizes and manages work according to needs of the operation. He is obliged to provide that all workers, who get in touch with the equipment, get thoroughly acquainted with the safety rules in necessary extent. The user is obliged to appoint for maintenance and attendance of the equipment and persons who are healthy, responsible and well-disciplined that meet the required qualification.

The user is obliged to keep "The Book of Report" and "The Book on Attendance, Maintenance and Inspections", further on

he must pay care that the time planned and defined for maintenance and cleaning of the equipment would not be shortened to the detriment of quality of maintenance. The user of the equipment is fully responsible for it that:

a) Workers authorized with attendance, maintenance and repairs of the equipment would have the prescribed qualification.

b) The installed equipment would be maintained in a perfect condition capable to operate so as to grant safe operation.

c) All roads (communications) intended for attendance and maintenance would be safe and passable.

d) Exemplary order, especially on workplaces of the attending staff would be kept everywhere.

Access to the staff workplaces of safety or signaling devices would not be stopped by any obstacles, or the staff environment would not be deteriorated by smoking, improper function of the air-conditioning system, and/or by storing harmful matters.

e) The workers would be continuously acquainted with newly issued rules, especially the rules on work and safety during work with electrical equipment and that they would be examined at least once a year from the safety rules. Re-examination should be carried out even at every heavy break of the safety rules.

f) The workers, authorized with attendance, maintenance and repairs of the electrical equipment would be adequately provided with protective working aids and that they would really use them in the given surrounding or when working under voltage.

g) The workers would get acquainted with the risk of electrical accident, with the effects of static electricity and with granting first aid at electrical injuries.

h) Maintenance and attendance of the electrical equipment would be provided with needed material, tools, aids and docu-

mentation so that workers would not be forced to carry out unprofessional interventions in the electrical equipment by themselves.

i) A suitable fire-extinguishing instrument would be placed at places with increased risk of fire.

j) The work places would be provided with respective sanitary and social outfit.

k) The instructions or rules concerning attendance and safety of work, and/or warning inscriptions would be situated on the staff workplaces on relevant spots.

l) Only persons on business would be admitted on the staff workplace.

*Reading comprehension* (*Choose the best answer according to the text.*)

1. The user decides the _____ of his equipment.

A. operation B. attendance

C. maintenance D. all of the above

2. The user can provide workers _____ the needs of the operation.

A. according to B. regardless of

C. in spite of D. despite

3. The time of the _____ of the equipment would influence the quality of maintenance.

A. maintenance B. cleaning

C. A and B D. none of the above

4. The workers must be acquainted with new rules, and the electrical equipment must be inspected _____.

A. every other year B. every year

C. half a year D. none of the above

5. Specified material and tools are needed to _____ the equipment.

A. attend B. maintain C. repair D. all of the above

# Unit 2

## Text A

## Steam and the Steam Water System

Steam is one of man's dependable servants. More and more in the background, steam is doing more and more work for man. In an electrically heated home steam may be seen only at the teakettle, but the chances are that the electricity used is generated by burning coal or gas and producing steam to turn the generator rotors in the electric power generating station. Even if the fuel is uranium and the heat supplied by nuclear fission[1], the generation of electricity is still accomplished by first generating steam.

The use of steam for electric power generation is expanding in most countries of the world, the principal exceptions being countries where available water power resources are greater than power needs[2]. Steam propels most of the world's naval vessels, and a high percentage of its waterborne commerce. It is used on a large scale in many industrial processes and is still much used for space heating.

Steam boilers today range in size from those required to heat a small-sized home to the very large ones used in electric power generating stations. Some single boilers recently or soon to be operating deliver approximately ten million pounds of steam and consume more than 500 tons of coal per hr[3]. In these large units pressures range from 2500 to about 4000 psi and the steam is usually superheated to a temperature of 1000 F or higher. Modern steam boilers operate safely and dependably and remain in

service for many years with cleaning and repairs usually required only at scheduled outage periods.

Today's boilers owe their dependability and safety to more than a hundred years of experience in the design, fabrication and operation of water-tube boilers. During this period the properties of steam and water have been accurately determined and tabulated for use by the designer. A new understanding of heat transfer, fluid flow and boiler circulation has been developed. Means have been devised for burning large quantities of fuel economically and safely and for disposing of the products and by-products of combustion.

The process of boiling water to make steam is a familiar phenomenon. Thermodynamically, boiling is the result of a special case of heat in addition to the working substance, water, in a constant-pressure constant-temperature process. The heat, which must be supplied to change water into steam without raising its temperature, is called the heat of evaporation or vaporization.

The boiling point of a liquid may be defined as the temperature at which its vapor pressure is equal to the total pressure above its free surface. This temperature is also known as the saturation temperature. The term "boiling point" is most frequently used to identify conditions at standard atmospheric pressure, e.g., water boils at 212 F, ammonia boils at −28 F, and sodium boils at 1638 F. However, boiling point or saturation temperature is actually a function of pressure and rises when pressure is increased.

Steam at saturation temperature is known as saturated steam. When heat is added to saturated steam out of contact with liquid, its temperature is increased and the steam is said to

be superheated. The temperature of superheated steam, expressed as degrees above saturation, is called the degrees of superheat.

Generation of steam in a closed vessel results in an increase in pressure due to a large increase in volume following a liquid-to-gas phase change. At the same time the temperature of both the water and the generated steam also increased. In boilers operating at pressures below the critical point[4], pressure is normally held at the desired value by maintaining a water level with a steam space above it, and regulating steam generation to balance steam flow delivered by the boiler.

In a boiler, different heat-exchanging equipment, the economizer, water cooling wall and super-heater, is linked by pipes according to the order of the water-steam flow process to form the boiler's steam-water system. After the feed water in the boiler's heat exchanging equipment passes through the three stages of heating, evaporating and superheating, it becomes steam which conforms to the requirement.

In whole steam-water circulation, the feed-water is pumped into the economizer through feed water pipes. After being heated, it is sent to the drum and then through the down-coiner and lower header to the water wall to absorb heat. After it vaporizes partly, it flows back to the drum again through a steam duct. The water separated from the steam falls to the lower part of the drum and circulates and evaporates again through the down-coiner, the boiler is required to supply qualified steam to the turbine. Therefore, it is necessary to supply the boiler with high-quality soft water continuously. The amount of supplied water should be equal to the amount of steam water lost in the heat power system.

The economizer is made up of a header and S-shape pipes. It is a heat exchanger using the surplus heat from the stack gas[5] to heat the feed water. It can raise the boiler's efficiency and improve boiler's structure and working condition of the drum.

The drum is an important part in the evaporating equipment of the natural circulation boiler. Its function is to store up water, preserve steam and raise the dependability of the boiler.

The water wall is arranged around the furnace. It is composed of headers and tubes, too. It is the main heating surface. The boiler water flowing through the water wall evaporates by absorbing the radiating heat of the high temperature flue gas. The weight of the steam-water mixture is less than that of the boiler water in the down-coiner[6]. Therefore, the water flows downwards naturally and thus makes the steam-water mixture in the water wall flowing upward and leading to the drum after distributing rationally through the steam leading pipes to form a steam-water natural circulation.

## Notes

1. Even if…by nuclear fission 这里 supplied 应是过去分词，其前面省略了 is。

2. principal…needs 这是一个分词独立主格结构。

3. Per hr.：per hour 每小时。

4. operating 引出的现在分词短语用来修饰限定 boilers，regulating 与 maintaining 是并列成分。

5. stack gas：flue gas，a smoke stack 烟气。

6. The weight … down-coiner. 这里 that 代替了 weight，以免重复。

## Words and Expressions

dependable [di'pendəbl] *a*. 可靠的
rotor ['rəutə] *n*. 转子
uranium [ju'ræniəm] *n*. 铀
fission ['fiʃən] *n*. 裂变 *v*. (使)裂变
accomplish [ə'kʌmpliʃ] *v*. 完成(任务等)

accomplished [ə'kʌmpliʃt] *a.* 有才艺擅长的；完成了的，竣工的

propel [prə'pel] *v.* 推进，推动

vessel ['vesl] *n.* 船，飞船；容器，器皿；脉管

waterborne [ˌwɔtə'bɔ:n] *a.* 由水浮起的，水上的；水运的

range [reindʒ] *v.* （在一定范围内）变化，变动；漫游；探寻；排列 *n.* 范围，区域；排，行，一系列

deliver [di'livə] *v.* 放，解放；投递，传送（信件，邮包等）；（使）发表，（使）表达

delivery [di'livəri] *n.* 释放 投递 讲演

outage ['autidʒ] *n.* 电流中断期；（机器等的）停机

owe [əu] *v.* 应该向（某人）付出，欠（债等）；应该把……归功于……

tabulate ['tæbjuleit] *v.* 把……制成表，列表显示

tabular ['tæbjulə] *a.* 表格式的，列成表的

tabulation [ˌtæbju'le:ʃən] *n.* 制表，列表

by-product ['baiˌprədəkt] *n.* 副产品

evaporate [iˌvæpə'reit] *v.* 蒸发，发散

evaporation [iˌvæpə'reiʃən] *n.* 蒸发（作用），发散

vaporize ['veipəraiz] *v.* （使）汽化

vaporization [ˌveipərai'zeiʃən] *n.* 汽化

ammonia [ə'məuniə] *n.* 铵

sodium ['səudjəm] *n.* 钠

superheat ['sju:pəhi:t] *v.* 使过热

superheater [sju:pə'hi:tə] *n.* 过热器

critical ['kritikl] *a.* 关键性的；危急的；必须的；临界的

regulate ['regjuleit] *v.* 调整，调节；管理，使遵守规章 使有条理，使整齐

conform [kən'fɔ:m] *v.* 一致，符合，遵照；使一致，使适合

feed-water ['fi:d'wɔ:tə] *n.* （经过预热或净化的锅炉的）给水

drum [drʌm] *n.* 汽包

down-coiner ['daunkɔinə] *n.* 下降管

surplus ['sə:pləs] *n.* 过剩；剩余（物）剩余额 *a.* 多余的，剩余的

radiate ['reidieit] *v.* 辐射状发出，从中心向各方伸展出；发射（光，热等） *a.* 辐射状的，有射线的

radiation [ˌreidi'eiʃən] *n.* 发射，放射；辐射；发光，发热

distribute [dis'tribju:t] *v.* 分布，分配；散布

rational ['ræʃənl] *a.* 理性的，推理的；明事理的；有推理能力的

rationally ['ræʃənli] *ad.* 理性地，推理地

## Grammar 冠词（Article）

冠词只能附在名词的前面，表示该名词所指的人或事物是特指或是泛指，起限定作用。英语的冠词只有两个，一个是不定冠词 a（an），另一个是定