

# 新能源

应用技术系列教材

NEW ENERGY IN ENGLISH

# 新能源专业英语

张素贞 刘晓艳 主编



化学工业出版社

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(New Energy in English)

张素贞 刘晓艳 主编



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· 北京 ·

本书对太阳能、风能、地热能、海洋能、生物质能和核聚变能等新能源作了简要介绍,同时引用部分国内外专业研究报告及文章,对一些主流新能源应用(如光伏发电、风力发电等)的最新产品、最新技术、国内外行业发展现状及形势作了一定阐述,最大限度地让读者了解新能源的相关知识,同时能够轻松地学习相关行业英语。

本书可作为高职高专院校新能源专业的教材,也可作为从事新能源尤其是太阳能光伏发电、风力发电、风光互补等专业学习和研究的人员提高其专业英语水平的参考用书。

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## 序

根据《国家战略性新兴产业发展规划》和国家“十二五”先进能源技术领域战略,国家出台了一系列扶持新能源产业发展的政策,在国家产业政策的引导和支持下,中国新能源产业呈现出快速发展的态势,推动了新能源产业规模化发展。新能源产业发展的速度和规模取决于新能源技术的发展,特别是核心技术的突破与进步,中国新能源增量在多个领域位居世界前列,部分新能源关键技术获得突破。中国风能与光伏产业具有较强的国际竞争力。目前中国风电产业链已逐步形成,并呈现出向产业链上游延伸、向垂直一体化发展的趋势。风电零部件制造业逐步成熟,已经有一套比较健全的风机制造供应链,市场整机设备的国产化率已经达到70%~80%的水平。光伏产业成熟度在不断提高,中国光伏产业目前已形成包括太阳能电池制造、光伏组件封装等在内的完备的产业链体系。光伏制造业规模较大,具有一定的技术和成本优势,国内光伏市场正在逐步启动,国外市场占有率稳居世界前列。新能源产业具有很大的发展前景和空间。

近年来国内20多家开设新能源应用技术专业的高职院校组成新能源专业建设协作组,与行业企业一起加强合作与交流,走访40多家光伏、风电企业,根据企业需求进行新能源专业设置和订单培养,与企业共同开发新能源应用技术人才培养方案、课程和实训基地建设方案,加快推进学校专业建设对接风电和光伏产业,人才培养目标对接企业岗位,实训设施对接企业生产实际,促进校企信息互通、人才融通,加强校企各项资源共享、交流与合作。在此基础上成立了新能源应用技术系列教材编委会。

新能源应用技术系列教材主要包括光伏和风电技术应用,涉及到光电子材料与器件、动力、机械、电气、电力电子、自动化等多个专业学科领域,具有技术性、工程性和实践性。为解决当前高职新能源应用技术专业教材匮乏,新能源专业建设协作委员会与化学工业出版社联合策划、组织编写了新能源应用技术系列教材。本系列教材从主编和主审的遴选到编写大纲,都是经教材编委会专家反复研讨确定的。在教材编写中,内容紧扣新能源行业和企业:工程实际,以新能源技术人才培养为目标,重在提高专业工程实践能力,尽可能吸收企业新技术、新工艺和案例,并以教学项目、任务为载体,按照基础、应用到综合的思路进行编写,循序渐进,努力突出高职教材的特点。本系列教材取材新颖实用,层次清晰、结构合理;内容精练,具有易于学习、理解、教学、应用的特点。

本系列教材适合高等职业学校、高等专科学校和成人高校等新能源专业教育的需要,也可作为企业员工的培训教材。

教材编写过程中得到社会各界的关心和支持,在此一并表示感谢。

教材编审委员会

2013年5月

# 前 言

新能源又称非常规能源,是指传统能源之外的、刚开始开发利用或正在积极研究、有待推广的能源,如太阳能、地热能、风能、海洋能、生物质能和核聚变能等。随着煤炭、石油及天然气这些常规能源的有限性以及环境问题的日益突出,以环保和可再生为特质的新能源越来越得到各国的重视。在中国可以形成产业的新能源主要包括水能(主要指小型水电站)、风能、生物质能、太阳能、地热能等,都是可循环利用的清洁能源。新能源既具有可再生、不含碳或含碳量少、对环境影响小等优点,同时又存在能源密度低、间断式供应、波动性大、开发成本高等缺点。其产业的发展既是环境治理和生态保护的重要措施,也是满足人类社会可持续发展需要的最好能源选择。英语作为一种重要的全球化的交流工具,发挥着重要的作用。学好新能源专业英语是学生、学者和工程技术人员获取相关信息、了解产业发展动态、学习专业先进技术、进行学术交流的基本前提。为此编写本书,希望能对从事新能源尤其是太阳能光伏、风力发电、风光互补等专业学习和研究的人员提高其专业英语水平有所帮助。

本书每一章均由若干个单元组成,每个单元由一篇课文和阅读材料组成,其中阅读部分的内容一般对课文内容提供背景知识或者是课文的续篇和补充材料,从而达到拓宽课文内容的目的。本书分为7章,包括阅读材料在内共54篇课文,其中第Ⅰ部分内容针对传统能源存在的问题,介绍常见新能源的优点及类型;第Ⅱ部分系统介绍了光伏发电的概念、原理与类型;第Ⅲ部分介绍光伏发电在生产生活中的应用;第Ⅳ部分介绍风力发电;第Ⅴ部分介绍除光伏、风电外其他一些常用新能源;第Ⅵ部分是新能源最新产品介绍;第Ⅶ部分则是技术篇,介绍新能源产业发展的最新技术。

本书以提高学生专业英语阅读能力、拓展和深化学生对新能源技术的认知、培养学生应用能力为主要目的,具有以下特色。

① 在新能源产品和技术介绍中,倾向简单易懂、新颖有趣的课文,避免过于复杂难懂的材料,力求展现的内容清楚、准确、简练。

② 本书所选的课文全部来自原版英文教材和著作、公司和个人的科技报告及专业期刊,文章内容全面,几乎包含了新能源所有的能源种类,同时又突出光伏、风电、风光互补等重点能源的技术和应用。

③ 本书所选文章专业词汇丰富,在形式上注重图文并茂,疑难句有注释,既可作为新能源专业的英语教科书,又可用于自学。

本书由张素贞、刘晓艳主编并负责全书的编写,张素贞统稿。同时本书在编写过程中参阅和利用了国内外相关文献资料,充实和丰富了本书的内容。南京康尼科技实业有限公司高级工程师夏庆观以及成建生、张楼英、韩迎辉、于建明、刘乔等老师对本书的出版也给予了一定的支持,在此一并表示感谢。新能源技术涉及面广、发展迅速,由于本书编者水平有限,书中难免有不足和疏漏之处,恳请各位专家、同仁和广大读者批评指正。

编者

2014年6月

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# Part I Overview

## Unit 1

### A. Text

#### Energy Source

Energy means the power which does work and drives machines.

All living things (including humans) rely on the sun as a source of energy. Coal, petroleum, and natural gas are energy sources available today because organisms in the past captured sunlight energy and stored it in the complex organic molecules that made up their bodies, which were then compressed and concentrated.

With the development of society, a large of energy sources have been used, such as coal, petroleum, natural gas, geothermal energy, nuclear fission power, nuclear fusion power, solar energy, and Hydrogen gas. However, under the circumstances, the quantity of energy source is limited. Unlimited usage of energy source results in energy crisis.

At present, most of the energy consumed by humans is produced from fossil fuels. The greatest recoverable fossil is in the form of coal and lignite. Although world coal resources are enormous and potentially can fill energy needs for a century or two, their utilization is limited by environmental disruption from mining and emissions of carbon dioxide and sulfur dioxide. These would become intolerable long before coal resources were exhausted.

Only a small percentage of coal and lignite has been utilized to date, whereas much of the recoverable petroleum and natural gas has already been consumed. Petroleum has several characteristics that make it superior to coal as a source of energy. Its extraction causes less environmental damage than does coal mining. It is a more concentrated source of energy than coal, and it burns with less pollution, and it can be moved easily through pipes. These characteristics make it an ideal fuel for automobiles.

Since the first "energy crisis" of 1973~1974, some concrete actions have even taken place. However, the several-fold increase in crude oil prices since 1973 has extracted a toll. In the U. S. and other industrialized nations, the economy has been plagued by inflation, recession, unemployment, and obsolescence of industrial equipment. The economies of some petroleum-deficient developing countries have been devastated by energy prices.

Energy crisis was accompanied by worldwide shortages of some foods and minerals, followed in some cases by surpluses, such as the surplus wheat resulting from increased planting and a copper surplus resulting from the efforts of copper-producing nations to acquire foreign currency by copper export.

As known to all, the availability and cost of energy has become dominant factors in society today. Obviously, solving the “energy crisis” makes good sense. Many schemes have been proposed for conserving present energy resources and for developing new ones. It is always possible to use less energy in any process. Therefore, energy engineer is created and developed. The first goal of energy engineer is to determine the methods by which energy utilization is reduced but the output remains the same or even increases. The second goal is to determine which methods of using less energy are cost effective.

Meanwhile, looking for ideal energy sources is also very important to solve energy crisis. The recipe for an ideal energy source calls for one that is unlimited in supply, widely available, and inexpensive; it should not add to the earth's total heat burden or produce chemical air and water pollutants. Solar energy fulfills all of these criteria. Solar energy does not add excess heat to that which must be radiated from the earth. On a global basis, utilization of only a small fraction of solar energy reaching the earth could provide for all energy needs.



## New Words and Expressions

petroleum [pi'træliəm]

*n.* 石油

molecule [mə'likju:l]

*n.* [化学] 分子; 微小颗粒, 微粒

utilized

*adj.* 被利用的

organism ['ɔ:g (ə) niz (ə) m]

*n.* 有机体; 生物体; 微生物

fission [fiʃ (ə) n]

*n.* 裂变; 分裂; 分体; 分裂生殖法

potentially [pə'tenʃəli]

*adv.* 可能地, 潜在地

dioxide [daɪ'ɒksaɪd]

*n.* 二氧化物

obsolescence [əb'səʊlesəns]

*n.* [生物] 退化; 荒废

fulfill [fulfil]

*vt.* 履行; 实现; 满足; 使结束



## Technical Terms

traditional energy

传统能源

new energy

新能源

energy crisis

能源危机

fossil fuels

化石燃料

one-time energy

一次能源



## Notes

1. With the development of society, a large of energy sources have been used, such as coal, petroleum, natural gas, geothermal energy, nuclear fission power, nuclear fusion power, solar energy, and Hydrogen gas.

随着社会的发展,许多能源已被使用,如煤,石油,天然气,地热能,核裂变能,核聚变能,太阳能和氢气。

2. Only a small percentage of coal and lignite has been utilized to date, whereas much of the recoverable petroleum and natural gas has already been consumed.

至今,只使用一小部分煤和褐煤,而大部分可回收石油和天然气已经被消耗掉。

3. Therefore, energy engineer is created and developed. The first goal of energy engineer is to determine the methods by which energy utilization is reduced but the output remains the same or even increases.

因此,能源工程师出现并发展起来。他的首要目标是想方设法降低能量消耗的同时,保持输出不变或增加。

4. On a global basis, utilization of only a small fraction of solar energy reaching the earth could provide for all energy needs.

在全球基础上,利用到达地球的仅一小部分太阳能来满足所有的能源需求。



## Exercises

### 1. Put the following phrases into English:

- |          |         |         |
|----------|---------|---------|
| ① 温室效应   | ② 可再生能源 | ③ 太阳能电池 |
| ④ 风力发电系统 | ⑤ 核能    | ⑥ 海洋能   |

### 2. Decide whether the following statements are true or false:

- ① Fossil energy and nuclear are considered nonrenewable energy types.
- ② Solar energy is the most important renewable sources of energy, the planet with all kinds of energy are closely related.
- ③ There is high efficiency crystal silicon solar battery, high conversion efficiency greater than 14%.

### 3. Translate the following sentences:

① Energy is an important material and energy foundation of human survival and development, its plays a vital role in the development of human civilization. New energy usually refers to the new energy technologies based on new development and utilization of energy, including solar, biomass, wind, geothermal, ocean energy and hydrogen etc.

② Therefore, in the 21st century, the prospects for energy, you may have to face the depletion of oil and gas resources, the commercialization of fusion power failure during the



period of temporary shortage of such people.

③ Global warming is becoming more serious. Energy saving and clean technology only can cure symptoms not cause. The only way is to find a zero emission new energy. Solar energy is the only choice to meet human development.

## B. Reading

### Renewable Energy Resources

#### 1. Introduction

Some sources of energy are known as renewable energy resources. This is because, unlike non-renewable energy resources, they will not run out.

Renewable energy resources include solar energy, geothermal energy, energy from the wind or waves, energy from tides and energy from biomass.

#### 2. Solar energy

Every year the earth receives about  $3 \times 10^{10}$  billion kilojoule of energy. This energy drives processes in the atmosphere that cause the wind and waves.

Some energy is absorbed by green plants and used to make food by photosynthesis. So ultimately, the sun is the source of most energy resources available to us, including fossil fuels.

Scientists also try to use the energy of the sun directly. This we call solar energy. "Solar" means "sun".

Solar energy can be used to heat fluid such as water in solar collector panels. Simple types use flat collector panels mounted on a south-facing roof or wall, each with transparent cover to admit sunlight (Figure 1-1).

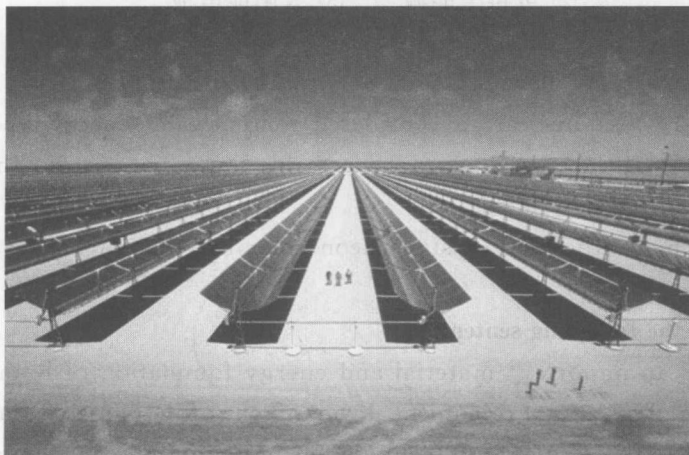


Figure 1-1 Solar thermal power plants in southern California

#### 3. Geothermal Energy

Geothermal energy (Figure 1-2) is the natural heat of the Earth's crust. The temperature at the Earth's core is over  $70000^{\circ}\text{C}$ .



Figure 1-2 Geothermal energy

The rocks, not too far below the surface, are also quite hot, perhaps at  $500^{\circ}\text{C}$  about 1 km down.

In some areas there are “hotspots” where the temperature below the surface is higher. This is usually near where the earth’s tectonic plates meet. The existence of hot springs, geysers and volcanoes points to evidence of hot rocks below the surface.

#### 4. Wind Energy

When the Earth is irradiated by the Sun the ground absorbs some of this radiation. This heated ground warms the air above it. Hot air rises in what are called convection currents. The uneven heating of the earth’s surface causes winds.

For example, if the Sun’s rays fall on land and sea, the land heats up more quickly (Figure 1-3) . This results in the air above the land moving upwards more quickly than that over the sea (hot air rises) .



Figure 1-3 Wind energy stations

As a result the colder air over the sea will rush in to fill the gap left by the rising air.

It is processes like these that give rise to high and low pressure areas, and thus to winds.

### 5. Tidal Energy

Tides are caused by the gravitational pull of the Moon, and to a lesser extent the Sun, on the oceans around the world. The difference between high tide and low tide can be many meters, and the energy of the tidal movement can be used to generate electricity (Figure 1-4) .

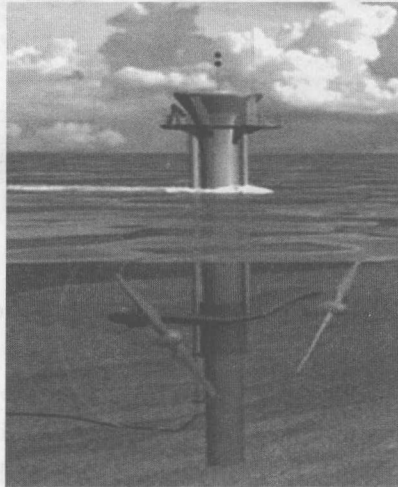


Figure 1-4 Tidal station

### 6. Hydroelectric Energy

Flowing rivers have kinetic energy. This energy can be collected and used. Hydroelectric power is generated by the falling of water through a turbine (Figure 1-5) .



Figure 1-5 Dam

If a dam is built across the river, water can be allowed to flow in a controlled way through turbines that generate electricity.

## 7. Energy from Biomass

Biomass is material from living things. This could be plant material, animal material or even bacteria. Organic matter can be burned to provide heat, or fermented to produce gas.

Plant material such as wood or hay can be burned to provide heat to raise steam and so generate electricity in a power station.

Animal waste (e.g. animal slurry from a farm) can be treated to provide gases that can be burned to generate electricity. Landfill sites emit gases (mainly methane) that can also be used to provide energy. Some plant materials such as sugar cane and maize (sweet corn) can be fermented to produce alcohol. Alcohol can be used in cars as a substitute for petrol.



### New Words and Expressions

tides [taɪd]	<i>n.</i> 潮汐
photosynthesis [ˌfəʊtəʊˈsɪnθəˌsɪs]	<i>n.</i> 光合作用
transparent [trænsˈpærənt]	<i>adj.</i> 透明的, 显然的, 明晰的
crust [krʌst]	<i>n.</i> 外壳, 硬壳
convection [kənˈvekʃən]	<i>n.</i> 传送, 对流
tectonic [tekˈtɒnɪk]	<i>adj.</i> 构造的, 建筑的
gravitational [ˌɡrævɪˈteɪʃənəl]	<i>adj.</i> 重力的
kinetic [kɪˈnetɪk]	<i>adj.</i> (运) 动的, 动力 (学) 的
ferment [fəːˈment]	<i>n.</i> 酵素, 发酵; <i>v.</i> (使) 发酵, (使) 激动
maize [meɪz]	<i>n.</i> 玉米, 黄色; <i>adj.</i> 玉米色的, 黄色的
run out	紧缺



### Technical Terms

organic matter	有机物。
renewable energy	可再生能源。
non-renewable energy	非可再生能源。
solar energy	太阳能; 一般是指太阳光的辐射能量, 在现代一般用作发电。
geothermal energy	地热能; 是由地壳抽取的天然热能, 这种能量来自地球内部的熔岩, 并以热力形式存在, 是引致火山爆发及地震的能量。
wind energy	风能; 地球表面大量空气流动所产生的动能。
tidal energy	潮汐能; 是指海水潮涨和潮落形成的水的势能, 其利用原理和水力发电相似。潮汐能是以势能形态出现的海洋能, 是指海水潮涨和潮落形成的水的势能与动能。
hydroelectric energy	水能; 是一种可再生能源, 水能主要用于水力发电。水力发



电将水的势能和动能转换成电能。

energy from biomass

生物质能；就是太阳能以化学能形式贮存在生物质中的能量形式，即以生物质为载体的能量。



## Notes

1. Some sources of energy are known as renewable energy resources. This is because, unlike non-renewable energy resources, they will not run out.

有些能源被称为可再生能源资源。这是因为，与不可再生能源资源不同，它们不会紧缺（即取之不尽，用之不竭）。

2. Simple types use flat collector panels mounted on a south-facing roof or wall, each with transparent cover to admit sunlight.

一种简单的使用方法是在朝南的屋顶或墙壁上安装带有透明盖板的集热板以接收阳光。

3. The difference between high tide and low tide can be many meters, and the energy of the tidal movement can be used to generate electricity.

涨潮和落潮之间的差异可以有数米，潮汐运动的能量可以用来发电。

4. If a dam is built across the river, water can be allowed to flow in a controlled way through turbines that generate electricity.

如果大坝横跨河流，可以通过涡轮控制水流方式实现发电。

5. Animal waste (e. g. animal slurry from a farm) can be treated to provide gases that can be burned to generate electricity.

可以使用动物废弃物（例如农场的动物粪便）产生可燃气体，通过燃烧发电。

## Unit 2

### A. Text

#### Solar Energy

Nonrenewable energy is obtained from sources at a rate that exceeds the rate at which the sources are replenished. Renewable energy is energy obtained from sources at a rate that is less than or equal to the rate at which the source is replenished.

In the case of solar energy, we can use only the amount of energy provided by the sun. Because the remaining lifetime of the sun is measured in millions of years, although solar energy from the sun is finite, but should be available for use by many generations of people. Solar energy is therefore considered renewable.

Solar energy is unlimited in supply, but its exploitation and utilization are limited owing to the limitation of technology and conditions.

Solar energy utilization needs an enormous amount of land, and there are economic