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**IONELA IONIȚIU**

**English for Maritime  
and Industrial Engineering**



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## Foreword

Efficient communication represents a prerequisite of the globalized environment, particularly when it comes to fields shaped by never-ending and swift technological progress, such as maritime and industrial engineering. In such contexts, proficiency in English, especially in English for Specific Purposes (ESP) is paramount for the comprehension of technical documents, dissemination of research results, and the establishment of collaboration relationships across the world.

Ionela Ionițiu's course, *English for Maritime and Industrial Engineering*, is designed for students who aim to develop their English skills in professional and technical settings. Structured in 16 chapters, the course covers a broad spectrum of maritime and industry-relevant topics, including thermal equipment and installations, types of ships and systems, naval architecture, offshore engineering equipment installations, work safety and industrial hazards, industrial engineering, and management, monitoring and control, virtual reality systems and internet security, industrial design, technology in use and technical development, components and assemblies, etc.

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Each chapter integrates carefully crafted tasks that reflect the author's expertise in ESP instruction and extensive experience in teaching English to maritime and industrial engineering students. Moreover, the course aligns with the latest research in technical language and professional communication in engineering, incorporating – among many others – specialized terminology, international standards and relevant authentic materials, in both written and video format.

The methodology implemented by the author is characterized by novelty, practicality, and interactivity, featuring specialized vocabulary exercises, professional communication simulations, case studies, project-based learning, etc. Therefore, the course caters to all receptive and productive language skills, i.e., reading, listening, speaking, and writing, while maintaining a logical progression of information.

By improving their ESP skills, students will gain broader access to resources (such as research papers, manuals, reports, etc.), enhanced opportunities for disseminating their research findings and professional achievements, and stronger collaboration prospects at the international level, enabling them to contribute to worldwide innovation and to integrate into the labor market. This book equips students with linguistic competencies that will empower them to engage in a wide array of activities typical of their professional setting. Thus, given the pivotal role played by

the English language in the contemporary world, the course furnishes students with a set of instruments that will successfully foster their development in both the academic and professional environment within maritime and industrial engineering, and will support them in facing the challenges in this field.

Alina Buzarna-Tihenea (Gălbează)



**Task 2. Before reading the passage, discuss these questions:**

- a. How many thermal systems do you know?
- b. What is the difference between photovoltaic panels and thermal solar systems?
- c. Which is the most cost-efficient thermal system in your opinion: geothermal pumps, photovoltaic panels, or solar thermal systems?

**Task 3. Reading activities**

**3.1. Skim through the text to fulfill the following tasks:**

A solar thermal system converts sunlight into heat and consists of the following components: collector, storage technology (e.g. boiler, combined storage), and solar regulator system (e.g. temperature difference control).

The key element of a solar thermal system is the solar thermal collector, which absorbs solar radiation. The purpose of the collector is to convert the sunlight very efficiently into heat. Solar heat is transmitted to a fluid, which transports the heat to the heat exchanger via pumps with a minimum of heat loss. The exchanger transfers the heat into the domestic hot water store. The distance between the collector and storage tank should be as short as possible to minimize heat loss. There are two solar thermal systems:

- a. solar heating system to produce hot domestic water
- b. solar power system as supplementary heating

Two main types of solar thermal collectors are available: the evacuated tube collector and the flat-plate collector. An evacuated tube collector is made of parallel glass tubes. Each tube contains two glass tubes: the outer glass tube and the inner glass tube. Between the two glass tubes, there is a vacuum that allows small heat loss. The absorber is included in a tube. The flat-plate collector consists of an insulated (bottom and side) box with a glass or plastic cover on the top and a solar absorber located at the bottom. Almost 90% of all collectors in Germany are flat-plate collectors.

The detrimental issues surrounding roof-mounted photovoltaic panels also apply to the provision of solar heating installations in that the high winds containing salt spray and abrasive sand would both impair the efficiency of the units and reduce their lifespan. This would make this potential sustainable energy provider an unfavorable option at Starr Gate tram depot, as it would greatly increase the payback period for such an installation.

Solar power is amongst the fastest-growing renewable energy sources. For many countries, solar power means an eco-friendly alternative concerning the environmental impacts of electricity production based on fossil fuels or hydroelectric plants. Similar to the installation of photovoltaic systems, the architect should consider the installation of solar thermal technologies on the building of the depot. Compared to Photovoltaic, this system is not as expensive and the depot can use renewable energies easily.

(Adapted from [https://solarthermalworld.org/sites/default/files/Solar\\_Thermal\\_Systems.pdf](https://solarthermalworld.org/sites/default/files/Solar_Thermal_Systems.pdf))

**3.1.1. Mark the following statements as True (T) or False (F):**

- a. Photovoltaic systems are the least expensive.
- b. There are three main types of solar thermal collectors.
- c. The distance between the collector and the storage tank should be as short as possible.

**3.1.2. Answer the following questions:**

- a. What is the difference between the evacuated-tube collector and the flat-plate collector?
- b. Why should the distance between the collector and the storage tank be short?
- c. What are the cons of roof-mounted photovoltaic panels?

**3.2. Read the text below and complete the following tasks:**

At the largest scales, solar and geothermal techniques can be used to generate clean, renewable electricity. However, for most residential and commercial property owners, geothermal energy can only be used as a heating and cooling solution, while solar energy can generate electricity with photovoltaic (PV) technology. For anyone looking to save money on electricity bills, installing solar energy is the way to go. You can use a residential geothermal energy system for your home climate needs, (1).....

Heat trapped deep in the center of the earth radiates outward towards the planet's surface slowly over time. The center of the earth is similar in temperature to the sun's

surface, and as some of that heat escapes outward, you can *harness* it for energy.

There are two main ways you can capture and use geothermal energy: power plants and heat pumps. Geothermal power plants are massive systems that are mainly installed and operated by utilities. (2)..... Steam produced by underground water reservoirs at these great depths is brought to the earth's surface where it spins turbines that generate electricity.

A geothermal heat pump necessitates drilling a well, but only for a few feet below the earth's surface instead of a few miles. At these depths, the temperature in the ground is constant, somewhere around 50°F. During warm months the ground temperature is cooler than the air, and fluid can be cycled through pipes in the ground to transfer heat from your home into the surrounding earth. The reverse process occurs in colder months when the air is colder than the ground: fluid is cycled through the geothermal system and *captures* heat from the ground to then be *dispersed* into your home. Geothermal energy can't be used to *offset* electricity use, but in some cases, it can be a worthwhile renewable energy option that will save you money on heating and air conditioning in the long term.

For example, (3)..... You could still install a small solar array to cover the majority of your electricity needs aside from heating and cooling and use geothermal energy for climate control alongside solar.

Another situation where installing a geothermal energy system makes sense is if you live in a region with an especially cloudy climate. Installing enough solar capacity

on your property to offset the energy needed to run an electric climate control system can be difficult if, for most of the year, your panels aren't receiving lots of sunlight.

(4).....

Geothermal heating is not an appropriate solution for every property. For example, if you live in or near a city, you may not be allowed to dig deep enough into the ground to support a geothermal system. High upfront system costs may also be prohibitive, especially because, unlike solar, geothermal systems can't do anything besides home climate control.

Luckily, you don't need to install a geothermal energy system to power your home heating and air conditioning with renewable energy. By *pairing* an electric climate control system like air source heat pumps (ASHP) with a solar energy system, you can run your heating and AC entirely on electricity generated from the sun.

(Adapted from

<https://www.energysage.com/about-clean-energy/geothermal/comparing-solar-energy-and-geothermal-energy/>)

**3.2.1. Four sentences/ groups of words have been removed from the text. Select the appropriate sentence/ group of words for each gap in the text. There is one extra sentence/ group of words which you do not need to use.**

- a. Power plants involve drilling wells several miles deep into the earth where temperatures are very high.
- b. Solar panels still produce energy when it's cloudy, but not at their full capacity.

- c. Curious about installing an electric heater (like an air source heat pump)?
- d. If your home has a small roof that can't fit that many solar panels consider a geothermal setup for your heating and cooling needs.
- e. But it will not produce electricity to run all your appliances like a solar energy system.

**3.2.2. Explain the underlined words. Do not translate them.**

**3.2.3. Sum up the text in about 50 words.**

**4. Vocabulary**

**4.1. Match the words or phrases in column A with their definition in column B:**

1. to disperse	a. an element designed to convert solar energy into electricity.
2. geothermal pump	b. to emphasize, represent, or preserve (something, such as a scene, mood, or quality) in a more or less permanent form
3. photovoltaic panel	c. counteracts (something) by having an equal and opposite force or effect.
4. to capture	d. a device or piece of equipment designed to perform a specific task.

5. to harness	e. also known as ground-source heat pumps, can heat, cool, and even supply hot water to a home by transferring heat to or from the ground.
6. solar thermal system	f. to distribute or spread over a wide area.
7. to offset	g. to collect and control something so that it can be used effectively
8. appliance	h. a technology that harnesses sunlight and converts it into heat.

**4.2. Fill in the blanks with the missing words from the box:**

*damage, challenge, renewable, pricey, maintenance, resources, disadvantage, convenient, restored, emission,*

It is believed that currently, geothermal energy is the most **1**..... choice for most people. It might not be as developed or popular as the solar one, but it is on its way of getting there.

Another evident advantage is that it is **2**..... What makes it a better choice than solar power is the fact that it is available all year long meaning that the weather conditions cannot disturb it in any way. Another important fact is that this type of energy is naturally **3**..... meaning that we cannot ever run out of it.

What we mean by ‘energy-efficient’ is that power plants that turn geothermal power into electricity use up to 50% less power than any other type of pump. In addition, these require little **4**..... and they can work perfectly for about 20 years.

Even though this energy is environmentally friendly, it doesn’t mean that it doesn’t cause some sort of **5**..... When being extracted from the earth, some greenhouse gasses are also released like methane, carbon dioxide, hydrogen sulfide, and ammonia. Nevertheless, the **6**..... of these is still significantly lower than those produced by fossil fuels.

Another **7**..... of geothermal power is the fact that it is quite expensive. Individual homeowners are required to invest significant initial funds, and this is the reason why most of them change their minds about it. Still, even though the installation of the system is very **8**....., you have to know that you will be able to earn or save that amount of money in the future.

Due to the fact that this system is not yet fully developed, the location plays a significant role. After all, finding these reservoirs is quite a **9**..... Countries like Iceland and the Philippines have been blessed with natural **10**..... on their territory, while many others haven’t. Additionally, if one were to try to transport power via hot water, a considerable amount of electricity would be lost.

(Adapted from <https://fergusonaction.com/geothermal-vs-solar-energy/>)

**4.3. Pair work activity – role play. You were left without heat in the middle of winter. Talk to your partner about alternative heating sources or systems. (10 lines)**

**5. Group work activity – brainstorming. Translate into English:**

Radiația solară poate fi folosită pentru producerea în mod direct de energie electrică cu ajutorul panourilor fotovoltaice, sau indirect prin utilizarea căldurii generate (căldura → apă → vapori → turbine → generator; motoare Stirling etc.). De asemenea, radiația solară este folosită pe scară relativ largă pentru producerea de apă caldă menajeră sau chiar industrială.

Turbinele eoliene cu ax vertical sau orizontal transformă energia cinetică a curenților de aer în mișcare (denumită energie eoliană) în energie electrică. În unele cazuri energia eoliană este folosită pentru pomparea apei din puțuri.

Cea mai comună utilizare a unei energii naturale regenerabile, fără a avea un caracter de noutate, o constituie energia cinetică a apelor curgătoare, care este transformată în energie electrică prin acționarea unor sisteme turbină-generator electric. Mai nou, sisteme similare valorifică energia mareică produsă de deplasarea apelor oceanice datorită mareelor, dar există și tehnologii aflate momentan în stadiul de cercetare sau demonstrare, care valorifică energia valurilor transformând o în energie electrică.

În unele zone geografice cum ar fi Islanda, energia termică generată și stocată în interiorul Pamântului se află în apropierea suprafeței, ceea ce permite captarea acesteia și

convertirea în energie electrică sau utilizarea ca sursă de încălzire rezidențială, pentru procese industriale, pentru desalinizarea apei sau în agricultură. Este cunoscută sub denumirea de energie geotermală.

(Adapted from [https://isb.pub.ro/docs/Energii\\_regenerabile.pdf](https://isb.pub.ro/docs/Energii_regenerabile.pdf))

**6. Listening/ viewing. Watch the video and try to perform the tasks:**

[https://www.youtube.com/watch?v=Ug\\_8cZd1TJ0](https://www.youtube.com/watch?v=Ug_8cZd1TJ0)

**6.1. After viewing the material, mark the following statements as true (T) or false (F):**

- a. The less wind, the less power.
- b. Since 2012, wind farms have produced more than 15% of electricity in 9 US states.
- c. Wind farms don't produce or generate any toxic emissions and don't affect global warming.
- d. The photovoltaic technology was used for the first time by NASA in 1958.
- e. The inverter converts the type of electricity produced by the panels called alternating current or AC.
- f. Wind turbines are less expensive than solar panels.

**6.2. Answer the following questions:**

- a. What does renewable energy mean?