OXFORD ENGLISH FOR CAREERS

OIL AND GAS 2

Jon Naunton and Alison Pohl

With additional material by Peter Astley

Teacher's Resource Book

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Contents

Introduction

Oil and Gas 2 is aimed at preparing students who intend to get a job in the oil and gas industry. It presents them with English from a wide variety of oil and gas industry fields and situations, develops their communication skills, and provides them with background in major oil and gas concepts. Many students using this course will find themselves in a supervisory or managerial position and this is reflected in the content.

Kick off

This is designed as a warm-up activity to the unit. It usually consists of a number of pictures, and often introduces key vocabulary or concepts. It should be used to get students to focus on the topic.

It's my job

These occur in most units, as either a reading or listening exercise. They are designed to be of interest to the students as they deal with key roles in the oil and gas business. Students will read about a variety of people who work in the oil and gas industry and learn about the skills they require.

As an ongoing project, encourage the class to build up a portfolio of other *It's my job* features. For example, if students have contact with someone who is fully qualified and works in oil and gas, they can write their own *It's my job* article or interview, with photos.

Professional skills

These give students advice about how to behave in a professional environment. Awareness-raising activities help them reflect on some of the differences that may exist between different cultures.

Top margin

This top part of the page contains facts, statistics, and quotes. These are optional extras and can be used to add variety and interest to your lessons, or provide additional material for strong students who are 'fast finishers'. Ways of exploitation include asking whether your students are surprised by the facts and statistics, or whether they agree, disagree, or can identify with the quotes.

There are also definitions for difficult words or phrases which are important to understand a text which appears on the same page.

Vocabulary

Students meet a large amount of vocabulary during the course. It is important to encourage good learning skills from the start, for example:

- organizing vocabulary into word sets and word groups rather than simple alphabetical lists
- understanding the context of vocabulary and whether it is a key word needed for production or for comprehension
- checking and learning the pronunciation of a word or phrase.

Language spot

This focuses on the grammar that is generated by the topic of the unit and concentrates on its practical application.

If your students need revision after completing the *Language spot*, direct them to the *Grammar reference*, which provides a handy check.

There is also one photocopiable *Language test* for each unit in this Teacher's Resource Book.

Listening, Reading, Speaking, Writing

These activities give realistic and communicative practice of language skills needed in oil and gas.

In the listening activities, students are exposed to different text types from monologues and talks to two-way conversations, interviews, meetings, and discussions related to oil and gas. They also hear a variety of English accents, both native-speaker and non-native speaker.

In the reading sections, students meet a variety of oil- and gas-based texts.

In the speaking sections, try to ensure use of English during activities, particularly those involving some discussion. Encourage this by teaching or revising any functional language students may need. Functional language is often introduced or revised in an introductory listening task. A page of photocopiable material accompanies each unit in the Teacher's Resource Book. It includes role-plays and problem-solving / case study activities, picture compositions, games, fluency drills, and activities to practise and recycle vocabulary.

Writing practice in the units is designed as consolidation and extension of the topic with structured, meaningful writing tasks. There is always a model that students can follow for guidance and support.

Pronunciation

This practises aspects of pronunciation which are of maximum importance for intelligibility.

You can repeat the recordings in the *Pronunciation* as often as you like until you and your students feel confident they have mastered a particular sound or feature.

Project

This encourages students to take an active role in the learning process, in terms of both their English language work and the subject of oil and gas itself.

Projects can be set as homework assignments, but it is worth spending time in class preparing students for the task. Students are usually required to use search engines such as www.google.com to find information, as well as websites dedicated to oil and gas issues. Help can also be given by brainstorming some standard places where they can gather information.

Checklist

This allows students to check their own progress. You may want to get students to grade or assess how well they can perform each of the 'Can do' statements, e.g. 'easily', 'with difficulty', or 'not at all'. They can also test each other in pairs, by giving examples from the unit of each of the 'Can do' statements.

Key words

These are the main items of oil and gas vocabulary introduced in the unit. A definition of each of these words appears in the *Glossary*. You should certainly check students' pronunciation, including the stress, of words likely to be used orally.

Reading bank

This is in the middle of the book and gives more in-depth skills practice in reading about oil and gas. The reading texts may give more detailed information on a topic that was covered in a unit, or provide useful background knowledge. It can be used throughout the course, either in class, or as self-study or homework. There are recommendations for when to use the different exercises in the teaching notes in this Teacher's Resource Book. There is also an *Answer key* in the Student's Book to encourage students to check their work, but it is important for you to check extended written answers with reference to the models provided.

Speaking activities

This section contains one or more parts of the information gap activities from the main units (see *Speaking*).

Irregular verbs

This is a list of the most common irregular verbs in English, including ones not used in the book. Students can use it as a reference and may find it especially useful for writing and project exercises.

Grammar reference

This can be used together with the *Language spot*, as a handy check or revision. It shows the form of a particular grammar point, briefly explains its use, and provides example sentences as well as indicating likely student errors.

Listening scripts

This is a complete transcript of all the recordings. Direct students to it for checking answers after they have completed a *Listening* task, or allow weaker students to read it as they listen to a particular recording, perhaps for a final time.

Glossary

This is an alphabetical list of all the *Key words*. Each word is followed by the pronunciation in phonetic script, the part of speech, and a definition in English.

The section begins with a phonetic chart, with an example word from oil and gas to illustrate each of the sounds. There is also a list of the most common irregular verbs relevant to oil and gas.

1 Oil and gas today

Background

The oil and gas industry employs hundreds of thousands of people worldwide. Many teams have a mixture of nationalities so that English is often the language used, and is often specified for formal communications. Although most of the world has adopted an international measuring system and measures volume in litres, the oil industry often uses the US barrel as a measure even though most oil today is never contained in a barrel.

The sector of the oil and gas industry from discovery and drilling to production and refining is known as the **upstream sector**. Initially, producing countries allowed trading countries (USA, Britain, and Holland) to exploit their oil as a raw material. But they needed to control their own resources commercially and they realized the advantages of processing their crude oil locally to increase the value of the product. They built their own **refineries** where the **crude oil** is separated into different forms and converted into different products. The production of oil and gas has become a major element in international relations and politics. A large part of the industry has developed, transporting oil and gas from the producing countries to consumers and this is sometimes referred to as the **midstream sector**.

The processing of oil into different products is known as the **downstream sector**. These products include the different fuels required for cars, trucks, and airplanes, fuel for power stations and heating, the basic material or feedstock for plastics, fertilizers, pharmaceuticals, and the asphalt that covers our roads. Oil and gas are finite resources and because of the increasing scarcity of oil and gas, concern for the environment, and concerns over security of supply, a huge effort is being made to develop alternative sustainable sources of energy, but the skills of the people working in the oil and gas industry across the world will ensure that oil and gas will be available to us for many years to come.

Kick off

- Before you look at *Kick off*, ask students *Have you have filled up a car recently?* Ask *What are the different stages before the petrol gets to you?* This will act as an informal test to see how much vocabulary they can actively use. Then do **1** and **2**.

1 1 a 2 e 3 b 4 g 5 c 6 f 7 d

✱ Tip

Check / teach the following.
crude oil – oil in its natural state straight from the ground
the Straits of Hormuz – the narrow stretch of water that links the Gulf to the Gulf of Oman
Druzhba pipeline – the world's longest pipeline, which starts in south-east Russia

✚ Additional activity

(weaker students)
Ask students to go to the recording script on p.123 and get them to read and listen to the recording at the same time. Afterwards, if you wish, go though the script checking the meanings of unknown vocabulary. Ask students to take turns to read aloud the script. Check pronunciation.

Listening

A barrel of crude oil

- Go through the questions in **1** and elicit answers to see what the students already know. Play the recording and check answers.
- Read **2**. Ask them how they think this is possible. Students listen and label the diagram. Then do **3**. Students may be surprised to find out that chewing gum and deodorant are made from petroleum.

1 1 black, green, or clear
2 two billion
3 eighteen million
4 four thousand kilometres
5 over a million

2 1 petrol
2 diesel
3 jet
4 LPG (liquefied petroleum gas)

3 ammonia, bitumen, plastics, chewing gum, deodorant

* Tip

The value of projects
Explain to the students that the objective of the *Projects* in this book is to widen and deepen their knowledge. Students from some cultures may not read enough so this is a way of encouraging them to do more reading. Tell them they can often find useful information in the *Reading bank* in the middle of the book.

* Tip

Check the meaning of *trainee*, i.e. someone who is training or learning to do a job. Ask them what an *instrument engineer* does.

Project

- Discuss useful websites and search questions that will help them find the information. You could ask students to research in pairs or threes.

It's my job

- Students work in pairs to answer the questions in **1**. Check answers.
- For **2**, give students a time limit to complete the task. Ask them to find the parts of the text that give them their answers. Discuss **3**.

1 a 3 b 7 c 1 d 2 e 6 f 4 g 5

2 1 He joined the oil company's training programme.
2 He enjoys it. He says it is interesting and that there is so much for him to learn. He is thinking of applying to the company's graduate development programme. He obviously sees his future with the company.
3 No, he doesn't. He mentions different areas he wants to learn more about: administration and petroleum engineering.
4 Because it is important for local people to acquire knowledge and know-how.
5 It has a guest house and sports facilities and offers further training opportunities.

* Tip

This should be revision for students so do not be afraid to move through the exercises quickly.

Additional activity

(stronger students)
If you think they are ready, introduce *always* + Present Continuous.
Example
He's always telling me what to do.
Tell them that we use this to talk about habits that we find annoying.

Language spot

Routines and activities

- This section looks at some of the different uses of the Present Simple and the Present Continuous.

1 1 b 2 c 3 a

2 1 f 2 d 3 e

3
1 PS
2 PC
3 PS
4 PC
5 PS
6 PC
7 PC
8 PS

4 1 know
2 like
3 owns
further examples: *understand, want, mean*
Be is used in the Present Simple 99% of the time.

5 1 sits, is getting
2 work, have
3 don't understand, works
4 is having, always has
5 enjoys, goes, is training

* Tip

Begin by drawing a picture of a stream on the board. Say it is like a small river. Show how it flows from the mountain to the sea. Then draw a picture of a well / derrick at one end of the stream and a petrol pump at the other. Then teach the terms *upstream*, *downstream*, and *midstream* in that order.

Reading

The petroleum process

- Give students five minutes to read the text and complete **1**. For **2**, write *explore* on the board and ask if it a verb or noun. Then ask how to make it a noun. Get the students to do **2** then **3** in pairs.

1 1 Midstream
2 Downstream
3 Upstream
4 Downstream
5 Upstream
6 Downstream
7 Upstream
8 Downstream

2 1 exploration
2 transportation
3 distribution
4 discovery
5 recovery
6 refinery
7 lubricant

3 1 explore •● exploration ••●•
2 transport •● transportation ••●•
3 distribute •●• distribution ••●•
4 discover •●• discovery •●••
5 recover •●• recovery •●••
6 refine •● refinery •●••
7 lubricate ●•• lubricant ●••

* Tip

A useful way of dealing with word stress is to use a bubble to represent each syllable. Small bubbles show unstressed syllables and large bubbles show stressed syllables.

⊞ Additional activity

(stronger students)
Students who finish quickly can find six other words in the text they have read and use the bubble system to represent their stress.

Vocabulary

Key jobs

- Read through the jobs in the list and get the students to do **1**. For **2**, lead a short discussion. In **3**, show where the stress in each word lies. Ask students to listen and repeat to practise pronunciation.
- Students do **4** and **5** in pairs, then do whole class feedback.

1 1 b 2 d 3 c 4 a 5 f 6 e

4 1 maintenance technician
2 safety engineer
3 refinery manager
4 piping designer
5 land surveyor
6 petroleum chemist

5 surveyor designer
technician manager
chemist officer

* Tip

Check that students understand *interesting* (mime reading an interesting book or watching an interesting film). Contrast with *boring*.

⊞ Additional activity

(all students)
Play a version of twenty questions. Students think of one of the jobs in this unit and have to answer questions with a simple 'yes' or 'no'. Students try to guess the other person's job. Use other oil industry-related jobs to make it more challenging.

Language spot

Describing responsibilities

- For **1**, read through the list with the students. Refer them to the recording script on p.123.
- Choose a good student and model the conversation in **2** in front of the class. Then put the students in pairs to practise.
- Use the example in **3** to demonstrate the activity.

* Tip

It is important that students develop an awareness of appropriateness. Of course, the simple message is: if in doubt, be polite.

Additional activity

(all students)

Create a milling activity where students stand up and move around the class having short conversations using the language you have just covered. Clap your hands and say 'change' when you want them to find another partner. Milling activities are a good way of getting a large amount of practice.

Speaking

Hello, goodbye

- Read **1** and ask who students think the most and least senior people are. Play the recording. For **2**, students listen and answer the questions.
- Do **3** in open class. Clearly, the first conversation is more polite and uses many more politeness formulae. Read through the questions in **4** and play the recording.
- Ask the students to do **5** in pairs and then lead an all class feedback. Ask students to listen and repeat to practise pronunciation. Insist that students use a wide and enthusiastic voice range.
- In **6**, find out how important age and status are in your students' culture and how people show respect to each other. Take a vote on which type of situation students feel more comfortable with.
- Demonstrate **7** so students are clear about what to do. If students are unhappy to work in groups, lead the activity.

1 1 (May I bother you a moment?) I'd like to introduce you to my new trainee.
2 So how are you finding it so far?
3 I'm very happy to be here.
2 1 Farid is another trainee.
2 He is with a piping designer.
4 1 F 2 T 3 T 4 F 5 T
5 1 g 2 d 3 e 4 b 5 h 6 i 7 f 8 a 9 c

* Tip

Professional skills

Most units of *Oil and Gas 2* have a *Professional skills* section. These aim to help students understand how to behave appropriately in a work context and examine skills such as telephoning, working in teams, and delegating. We imagine that many students will go on to occupy supervisory and management roles where these skills will be important.

Additional activity

(all students)

For homework, ask students to prepare an information sheet for new visitors to their country, or new employees at their company.

Introduction: 40–60 words

Dos: 5–6 points

Don'ts: 5–6 points

Pair a stronger with a weaker student.

Professional skills

Meeting and greeting

- The petroleum industry is an international business. Everybody needs to be aware of the basic cultural differences that may exist. Do **1** to find out how people greet each other in your students' country.
- When discussing **2**, remember that in the Middle East, it is bad manners not to ask about the other person's health. However, it may not be a good idea to ask about the other person's family as this can be a private topic area reserved for other family members or very close friends.
- Students' answers to **3** may vary according to how traditional they or their culture and family background are.

Checklist, Key words

- Go through the checklist and ask students to tick the statements they think are true. Run through the key words and check students' understanding and pronunciation. Refer them to the glossary if necessary.

2 Discovery

Background

Oil has been collected from **seepage** through the ground for centuries and used as a medicine, in lamps, as pitch for waterproofing ships, and for building walls. The invention of the internal combustion engine increased the demand for oil immensely. In the USA, with its need for cheap transport, the necessary filling station and road infrastructure developed. **Bitumen**, a by-product of gasoline refining, was perfect as a road surface.

In the 1950s, BP became involved politically in Iran and in 1979, Iran confiscated BP's assets. Since then, all oil-producing countries have recognized the importance of oil to their economies. In 1960, Iran, Kuwait, Iraq, Saudi Arabia, and Venezuela formed OPEC (the Organization of Petroleum Exporting Countries) to control the production and price of oil. They were later joined by Qatar, Indonesia, Libya, United Arab Emirates (UAE), Algeria, Nigeria, Ecuador, Angola, and Gabon.

Some experts believe that oil and gas production is at its peak. As reserves run out, production will move to areas where hazards to the environment and costs are higher, such as the Arctic and Antarctic. There are also plentiful reserves such as bituminous oil sands and oil from deep oceans that are already being developed but at a much higher cost.

The discovery of oil and gas has changed the lives of ordinary people worldwide, particularly in countries that were previously non-industrial, with agrarian or subsistence economies.

Additional activity

Before doing **2**, ask students what these numbers represent and which pictures in **1** they relate to.

11 million gallons
159 litres
300 million years ago
47%
650,000 tonnes
4,000 kilometres

Answers

a Oil was formed over 300 million years ago
b 11 million gallons – the estimated amount of oil which was spilled from the Exxon Valdez in 1989
c 4,000 kilometres – the longest oil pipeline, Druzhba, which pipes oil from south-east Russia to Europe
d 159 litres = 1 barrel of crude oil (42 American gallons)
e Approximately 47% of a barrel of crude oil ends up as gasoline (fuel)
f 650,000 tonnes – the approximate amount of oil carried by the biggest supertankers

Kick off

- Ask students to say what is in the pictures. Do **1** and help with any vocabulary. Students work individually on **2**. Check answers.

1 a sea plants and animals (thought to be the origins of crude oil and natural gas)
b oil spillage (can cause serious problems for the environment)
c pipelines (carry oil and natural gas long distances)
d barrel of oil (a measure of oil and gas, not normally a physical object)
e gasoline / petrol fuel pump
f large supertanker (transports oil around the world)

2 1 e 2 d 3 f 4 c 5 a 6 b

Listening

The history of oil

- Allow students about five minutes to discuss **1**. Help with any unknown vocabulary.
- After listening in **2**, give students time to make notes of the answers. If necessary, play again.

* Tip

An important listening skill is anticipation. By looking at the questions before listening, students can gain a good idea of what they are going to hear. It's also important for students to use their own knowledge and experience to help them predict what they will hear.

⊞ Additional activity

(weaker students)
Ask students to identify which verbs in **1** are regular and which are irregular.

* Tip

To form the Past Simple of regular verbs we add -ed to the verb, e.g. *collect → collected*. However,

- for verbs that end in -e, add -d, e.g. *use → used*
- for verbs that end in a consonant and -y, change the -y to -i and add -ed, e.g. *try → tried*
- for most verbs that end in one vowel and one consonant, double the consonant and add -ed, e.g. *stop →stopped, plan → planned*.

⊞ Additional activity

(stronger students)
Get students to look at the listening script again and write six questions in the Past Simple. They can answer each other's questions in pairs.

2 1 building, making ships waterproof
2 mid-nineteenth century
3 oil for lamps for lighting their homes
4 when the automobile (car) was invented
5 fuel for cars, lorries, aircraft, heating and cooling of buildings, plastics, medicine, fibres, and detergents

Language spot

Past Simple

- Introduce the Past Simple by reviewing sentences from *Listening*, e.g.
  What did people first use oil for?
- Ask students to read the rules. Point out the list of irregular verbs on p.114 for students to use. Remind students we use the infinitive of the verb and not the past in negative and question forms.
- Do 1 with the whole class. Students then do **1** individually. For **2**, they can use the list of irregular verbs on p.114. Verbs in the exercise which do not appear in the list are regular.
- Check students' questions in **3** before they do **4**.

1 1 burned 2 collected 3 could 4 distilled 5 found 6 produced 7 put 8 threw 9 used 10 wanted
2 1 was 2 visited 3 saw 4 put 5 drained 6 used 7 took 8 analysed 9 said 10 saw 11 had 12 invested 13 became
3 1 When did George Bissell visit Pennsylvania?
2 What did people use oil for?
3 What did Silliman say about the oil?
4 Where did Bissell get the idea to drill for oil?
4 1 in 1853
2 medicine
3 It could be very useful.
4 from pictures of people drilling for salt

Pronunciation

- Write the words *stopped*, *lived*, and *waited* on the board and ask students to listen to the different ways of pronouncing the endings. Get them to repeat after you.
- 🎧 In **1**, stop the recording after each word to give students time to write.
- Give students time to do **2** and **3** in pairs.

1 /t/ produced, seeped, worked
/d/ stored, distilled, analysed, used, drilled, burned, drained
/id/ collected, invented, invested, visited, wanted
3 1 /id/ 2 /t/ 3 /d/

Top margin

- The fact about early drilling could lead to an interesting discussion on how we base our thinking on current knowledge. Early oil drillers saw that oil often appeared near small rivers and streams so deduced that these would be suitable sites to drill. Nowadays we use sophisticated equipment to detect structures underground which suggest that oil and gas may be present.

Additional activity
You may want to look at the *Reading bank* text on p.53 on Zayed bin Sultan Al Nahyan.

Reading

The effects of oil

- Ask students to describe the way of life in the rural areas of their country. Give students about ten minutes to discuss **1**. Encourage weaker groups by asking questions such as *Do people earn more money? If so, why? What sort of jobs can they get? Are there enough homes for everyone? What can they do about this?*
- Discuss what students know about Venezuela. Ask them to do **2** individually. Do **3** as a class discussion.

2 1 1914
2 other countries, mainly Britain and America
3 Because the foreign oil companies took all the money earned from oil and gas out of the country so local people were not able to benefit from the increased wealth.
4 Oil companies had to give half of the money they earned to the Venezuelan government.
5 Oil is still very important; it's the fifth largest oil exporting country in the world.

*** Tip**
In listening and reading activities, students should focus on the information being given and not on the accuracy of their spoken or written English. Students should be encouraged to read questions before listening and make notes of key words only while listening. They shouldn't be expected to give full sentence answers.

Additional activity
(all levels)
Ask students to write a paragraph about the job of a jug hustler. They should include enjoyable and less enjoyable things about the job and say whether they would like to do the job.

It's my job

- Ask students to work in small groups for **1**.
- Play the recording without stopping for **2**.
- Get students to read the questions in **3** before listening. If necessary, play the recording again for **4**. Do **5** as a class or group activity.

2 He didn't want to study at college. He wanted an outdoor job with some excitement.
3 1 recording helper / jug hustler
2 12–14 hours per day (28 days on, seven days off)
3 long distances (6–20 km per day)
4 No, he didn't.
5 basic training in safety and petroleum industry hazards and special driving test for driving heavy vehicles
6 become a coordinator
4 difficult environments
long hours – 12–14 hours a day, seven days a week
equipment very heavy – has to be carried a long way
walks 6–20 km every day

⊞ Additional activity

(stronger students)

For further practice of the Past Simple, ask students to write six questions about the history of Shell. They can then swap questions with a partner and answer.

⊞ Additional activity

(weaker students)

Ask students questions. For example, *What happened in 1892? What did Marcus and Sam Samuel do in 1897? What happened in 1903?*

Writing

A short report

- Ask students if they can tell you anything about the company names in **1**.
- Point out that the notes in **2** are written in the Present Simple but the report is in the Past Simple. Students should work individually to complete the text.
- Ask students to read the notes about report writing. They can do **3** in class or for homework.

1 The Standard Oil Company became Exxon, which then joined with Mobil to form ExxonMobil. Esso was a fuel produced by Standard Oil Company.

2
1 Standard Oil Company
2 brought out a new fuel
3 Esso
4 make more gasoline
5 produced the first artificial rubber
6 tyres
7 new technology
8 produce gasoline
9 changed its name to Exxon Corporation
10 Exxon and Mobil
11 help expand

✱ Tip

We use a comma or small space when writing large numbers to indicate thousands, millions, billions, and trillions. The comma or space makes the number quicker and easier to read and helps prevent mistakes happening.
2,455,000 or *2 455 000*

⊞ Additional activity

(all levels)

Prepare two numbers grids similar to the ones shown. Students should work in pairs to fill in the missing numbers. They should use the box grid reference, for example, *What's A4?* When they have completed the grid, they should check their answers together.

	1	2	3	4
A	$214,000		7,000,000,000	
B		639,043		6.6 trillion
C	327,450		$2,957,500	
D		€2,900	907,315	

	1	2	3	4
A		€3.4 million		666,666
B	705,000,000		2.1 million	
C		€9,508		1.075
D	€10.6 billion			5,000,000,000

Vocabulary

Numbers

- Make sure students can say the words *billion*, *million*, *trillion*, and *thousand*.
- Students should read the notes about numbers before doing **2**.
- Students can work individually or in pairs to do **3**.

1 1 c 2 b 3 d 4 a

2
1 one thousand, six hundred and fifty
2 seven point four million
3 one hundred and eighty-seven thousand
4 five point seven billion dollars
5 three hundred and eighty thousand, five hundred euros
6 four billion, five hundred and fifty-five thousand, two hundred

3
1 A thousand workers now live in this area.
2 $20 billion is a lot of money.
3 Oil was formed 300 million years ago.
4 Nine million barrels of oil leave the refinery each day.

Additional activity
Get students to use the information about one of the oilfields to write a report. This could be set for homework.

Speaking

Checking understanding

- Ask students *When do misunderstandings happen? Why do they happen? How can you try to prevent them happening?* Read the notes individually. Get students to read the sentences. Check that the intonation is friendly.
- Students should work in AA / BB pairs before they move into AB pairs to think about the questions they can ask in **1**. Students should compare notes once they have finished.
- Students do **2** in pairs.

2
1 Kazakhstan
2 Tengiz
3 CPC pipeline to Novorossiysk
4 Novorossiysk
5 Azerbaijan
6 ACG field (offshore from Baku)
7 Sangachal (south of Baku on the coast)

* Tip

In order to complete the project, students should be allowed to look for information in their own language and make brief notes in English, but the finished essay or presentation should be written in English and not a translation of an essay in their own language.

Additional activity
When your students have done their research for *Project*, you may want to look at *OPEC* in the *Reading bank* on p.52.

Project

- **1** is an opportunity for students to find out about the oil industry in their region. Encourage students to find pictures as well as facts.
- Students will need some time to prepare the poster in **2**.

* Tip

We use the verbs *have, set, meet* together with *deadline*, e.g. *We have a deadline of the end of March. The deadline the college set is December 10th. I don't think I can meet the deadline.*
Distract (v), distracted (adj), distraction (n). *People's voices distract me when I'm working. I get distracted easily. A telephone ringing is a distraction.*

Professional skills

How to manage your time

- Ask students why it's important to manage their time. In **2**, check students know the meaning of

  deadline *(n) the time or date before which a task must be finished*

  distract *(v) take someone's attention away from what they are doing.*
- Some students may think that *Keep your mobile phone switched on and near you* is also bad advice. Discuss this point with the class.
- Encourage a class discussion for **3**.

2 Do the tasks you like best first. (The tasks you don't like doing will never get done. You have to do tasks in the order of importance and / or urgency.)
If you don't want to work, leave it until tomorrow. (*Tomorrow never comes.*)

Checklist, Key words

- Go through the checklist and ask students to tick the statements they think are true. Run through the key words and check students' understanding and pronunciation. Refer them to the glossary if necessary.

3 Hydrocarbons

Background

Oil and gas were formed from the remains of organic matter, particularly zooplankton and algae (microscopic animals and aquatic plants) in seas and lakes millions of years ago. The organic material decayed to produce a sludge consisting mainly of carbon and hydrogen molecules which we call **hydrocarbons**, with small proportions of other elements such as sulphur. It was covered in mud and heavy sandy sediment which caused heat and pressure to build up and convert it to oil and, after exposure to higher temperatures, to gas. The sandy sediment bonded together to form **porous sandstone**. The oil and gas travelled up through the spaces or pores in the sandstone, until reaching an impermeable layer. By drilling through this impermeable rock, the oil and gas can be recovered at the surface.

The hydrocarbons in crude oil are a complex mixture of different sizes and shapes of molecules depending on where the oil and gas are found. The chemistry of hydrocarbons and their complexity allows them to be used to make a wide variety of products.

Atoms combine to produce compounds by forming bonds with other atoms to produce molecules. Carbon forms four bonds and hydrogen forms a single bond. Bonding together, they form hydrocarbons. The simplest hydrocarbon is the gas methane, known by its chemical symbol CH_4. Heavier molecules are formed as the carbon atoms form longer chains. The chains are formed by each carbon atom inside a chain using two of its bonds to join with other carbon atoms on each side and the other two bonds to join with two hydrogen atoms. The carbon atoms at each end of the chain only require one bond to hold on to the chain so they each attach to an extra hydrogen atom. Fuel gases are mainly butane (C_3H_8) and propane (C_4H_{10}). By more complicated bonding, hydrocarbons form rings and branches. The simplest ring formation is benzene (C_6H_6). The content of benzene as an additive to petrol is restricted to 1% because it is carcinogenic. Hydrocarbons with more than four carbon atoms are liquids and as the size and molecular weight increases, compounds become practically solid, as bitumen. The compounds in crude oil are not used directly but are separated in a refinery by distillation and either broken or joined together to make fuels, plastics, paints, and fertilizers.

Crude oil is classified according to its density, whether heavy or light, and its sulphur content. Oil with a low sulphur content is described as 'sweet'. The sweet crude oil from the North Sea and West Texas are more valuable than Middle East crude because the low weight and sulphur content means they are easier to transport and refine. Sulphur is a useful by-product of refining and is used in steelmaking, papermaking, fertilizers, and dyes.

Kick off

- Ask students what things are made from oil. Ask students to work in pairs to do **1**. Check answers with the whole class.
- If possible, collect pictures of products derived from oil and ask students to identify them for **2**.

1 1 e 2 b 3 g 4 f 5 d 6 a 7 c

2 **Possible answers**
plastics, synthetic textiles (nylon, polyester, polyethylene, polyvinylchloride, polystyrene, etc.), pigments, solvents and paints, pharmaceuticals, fertilizers, explosives, floor / furniture / car polish, crayons, sports equipment (balls, bats, etc.), washing detergents, guitar strings

* Tip

The compounds in a mixture are not chemically joined together. This means that it is possible to separate the compounds. Crude oil exists as a mixture so it is possible to separate crude oil into its constituent compounds.

Reading

The chemistry of hydrocarbons

- Check that students understand the basic chemistry words in **1**. Check that they understand what a *chain* is in **2**.
- Students read the text and do **3** individually. Then they work in pairs for **4**.

1 1 c 2 a 3 d 4 b

2 a ring
b straight chain
c branching chain

3 1 F 2 T 3 T 4 T 5 F 6 T 7 F 8 T

4

methane	fuel
ethane	fuel
propane	fuel
butane	fuel
gasoline	fuel
naphthas	fuel, paints, quick-drying products
kerosene	fuel
diesel	fuel
fuel oils	fuel
bitumen	road building

Additional activity

To help increase students' ability to guess meaning, put the word *plankton* on the board and ask students if they can explain what it means (microscopic aquatic animals and plants). Then write *phytoplankton* and *zooplankton*. Ask students if they know what *zoo* means (a park where wild animals are kept). Ask what *zooplankton* means (microscopic aquatic animals). Ask them what they think *phyto* means in the word *phytoplankton* (plants).

Listening

The formation of oil and gas

- Before listening, check that students understand the terms in **1** and **2**.
- Ask students to suggest labels in **3** and **4**. Play the recording. Give students time to write the answers. If necessary, play again.
- Ask students to do **5** individually, then check their answers in pairs.

1 Fossil fuels were formed from plants and animals which died millions of years ago.

2 Finite resources are limited and are not being replaced. It takes millions of years for oil and gas to be formed.

3 1 land
2 sea
3 (microscopic) plants and animals
4 organic matter / dead plants and animals on the seabed
5 (sedimentary) layers of sand, mud, organic matter

4 a cap rock
b oil and gas
c reservoir rock
d source rock

5 1 a 2 c 3 b 4 d

Speaking

Exchanging information

- Encourage students to compare the figures in **1**.
- **2** could be set for homework. Ask students to find out what they can and to share this information.

1

	Crude oil	Natural gas
Carbon	84–87%	65–80%
Hydrogen	11–14%	0–0.2%
Sulphur	0.06–2%	1–15%
sweet	<0.5% sulphur by weight (more valuable)	no H_2S
sour	>1% (can be a problem)	measurable amounts of H_2S
Nitrogen	0.1–2%	1–15%
Oxygen	0.1–2%	0%

2 When burned, sulphur forms sulphur dioxide which pollutes the air and causes acid rain. Refineries must remove it to prevent damage to the refinery equipment. Hydrogen sulphide is a very poisonous gas in small quantities. It is very corrosive and causes damage to equipment and tooling. It has to be removed before the gas enters the pipeline. However, sulphur is used to make sulphuric acid for industrial processes as well as medicines and fungicides.

Language spot

Nouns and articles

- Ask students to give you some examples of nouns and group them as countable or uncountable. Read the *Grammar reference* section on countable and uncountable nouns on p.116 together with the students.
- Students do **1** individually. Allow them to use an English dictionary to check their answers.
- Students do **2** individually and then check their answers in pairs.
- Read the *Grammar reference* on the use of articles on p.117. Students do **3** individually, then check their answers in pairs.
- Get students to do **4** individually in class or set for homework.

1 Countable 1, 2, 3, 4, 12, 13, 14, 15, 16, 18
Uncountable 5, 6, 7, 8, 9, 10, 11, 17, 19
N.B. Gas is normally U but it can also be C (*Oxygen and nitrogen are gases*).
Noise is normally U but it can also be C (*There was a strange noise*).
Paper is normally U but it can be C (*The papers were lying on the table*).

2
1 sand
2 paper
3 water
4 information
5 gas
6 equipment

3
1 reservoirs
2 equipment
3 A barrel
4 energy
5 experience
6 layers

4 1 the 2 – 3 the 4 –/the 5 – 6 the/an 7 the 8 a 9 – 10 – 11 the

* Tip

Most English–English dictionaries indicate whether a noun is countable, uncountable, or both, using [C] and [U]. It's important for students to understand that this can be very useful but they must also be encouraged to look at all the entries for a word in case it is both [C] and [U], e.g. paper.

Top margin

- Ask students to check the meanings of the words in bold. They have already seen *pore* and *permeable*. Get them to explain what they can see in the diagram and how this will affect the total volume and production rate of the field.

Professional skills

Making a presentation

- Ask students to think of examples of formal and informal presentations. When students have finished, discuss at class level and do **1**.
- In **2**, encourage students to be constructive in their criticism.

1 1 F 2 T 3 T 4 F 5 T 6 F 7 T 8 F 9 T 10 T

* Tip

The key to a good presentation is preparation. Being well prepared helps the speaker feel more confident. It shows professionalism and respect for the audience. Another important factor in good presentations is talking for the exact length of time, not longer or shorter. Using pictures and diagrams is good practice but they must be clear and easy to read and not contain too much information.

Additional activity

(stronger students)

Get students to prepare a short presentation on what they have found out, using drawings and diagrams. Limit them to two minutes. Ask the other students to comment on their performance by saying what has been done well. Encourage them to be positive and constructive.

Project

- Allow students to do their research in their own language, but encourage them to make notes in English.
- In 1, encourage students to share websites and useful sources of information. Get them to write a short report for homework.
- In 2, ask students to work in pairs and investigate one type of trap.

Vocabulary

Recording new words

- Discuss ways of recording and learning vocabulary. Allow students to read the notes in **1** and then discuss.
- In **2**, ask students to tell the rest of the class why they have chosen their five new words.

* Tip

One of the best ways to increase the range of vocabulary is to read extensively. Encourage students to read English books, newspapers, magazines, etc. for pleasure. There is an extensive range of graded readers available from Oxford University Press. Students can be guided to read a book at their level so that they are not distracted by too much unknown vocabulary.

Additional activity

(all levels)

Point out the word *calibrate* in the top margin. Put the following words on the board and ask students to find the meaning in a good English–English dictionary. For homework, ask them to write these words in sentences.

practical – (adj) doing things rather than thinking about them

catalyst – (n) a substance that makes a chemical reaction happen faster without being changed itself

technique – (n) a way of doing something

routine – (adj) the usual way and order that you do something

commissioning – (n)bringing a piece of equipment or machinery into operation

draw a conclusion – (v) to decide that something is true

It's my job

- Ask students what they think a petroleum chemist does and where they are likely to work. For **1–3**, students work individually and then check their answers in pairs.
- Discuss **4** at class level or get students to write a paragraph for homework.

2 All the boxes should be ticked *yes*.

3
1 She thought the work was more practical.
2 She had done her thesis on catalysts used in the petroleum industry.
3 routine laboratory work
4 so she can work on an offshore platform
5 **Possible answer**
to work with others so teamwork is important
6 because the environment is important at the moment

Writing

Analysis report

- Write the words *analyse* (v), *analysis* (n), and *analyst* (n) on the board and check that students understand the meaning. Ask them what they think an analysis report is.
- Get students to first do **1** individually and then discuss answers at class level.
- Students can work individually on **2** and then check their answers in pairs. The report for **3** can be written as a class activity or for homework.

1 1 high levels of mercury
2 A meeting with the project design team to discuss equipment design, material selection, and waste disposal issues, because high levels of mercury can cause damage to piping and equipment if materials are not chosen correctly. It can also be hazardous to health and the environment. He also wants further discussions with Petrolink to decide on the procedure for sampling and further testing, costs, etc.

2 1 Subject
2 Objective
3 Results
4 Recommendations
5 Attachment

Checklist, Key words

- Go through the checklist and ask students to tick the statements they think are true. Run through the key words and check students' understanding and pronunciation. Refer them to the glossary if necessary.

4 Exploration

Background

The world population is increasing and becoming more industrialized. As countries become wealthier, their consumption of energy and oil and gas increase. But the earth's reserves of oil and gas are a finite, non-sustainable resource. As accessible reserves are depleted and become more expensive, scientists and engineers are using increasingly sophisticated **methods of exploration**.

Geologists study the structure of the earth's crust and understand how different rocks were formed. With this knowledge, they can identify and map structures that may contain hydrocarbons. Geophysicists survey these areas, visibly inspecting and sampling the surface, often using **subsea remotely operated vehicles (ROVs)** and **aerial** or **satellite surveys**. The results determine whether more detailed measurement is justified. **Magnetic, gravitational**, and **chemical properties** are measured as well as **seismic analysis**, measuring the time taken for reflected sound waves to travel through the rock. The sound is generated by vibrators, air guns, or dynamite. Drilling is expensive, and companies risk millions of dollars in taking the decision to drill.

Exploration is now taking place in areas of the world that are less accessible to production such as the Arctic and Antarctic. A dispute has arisen between Russia and Canada over the position of the border between the Russian and Canadian arctic continental shelves where there are potentially exploitable oil and gas reserves.

Oil sands, which are heavy, bitumous deposits that are difficult to mine, transport, and process, have been found in extremely large quantities in Canada and Venezuela. The Athabasca Oil Sands deposit in Alberta, Canada is the largest reservoir of crude bitumen in the world. Processing this resource is expensive in cost and carbon emission. However, a significant advantage is the political stability of Canada and the proximity to a large consumer market.

Kick off

- Students do **1** in pairs.
- Lead a short whole-class discussion for **2**. Everything depends on the presence of the thing they are looking for. They have to be drilling or looking in the right place.

1 1 looking for water
2 drilling for oil
3 looking for metal
4 trying to find gold

* Tip

Scanning for information

Students may not have a lot of experience of reading longer texts. Treat **1** as a scan-reading exercise. In other words, do not insist that students understand every word of the text. If you set a time limit to complete the task, this can encourage the right kind of reading behaviour.

Reading

Research methods

- Students do **1** in pairs. Set a time limit for **2**. **3** and **4** can be done in pairs.

1 1 a 2 c 3 d 4 b
2 1 aerial survey – first paragraph 'photographs are taken from planes or satellites'
2 chemical analysis – under geochemical methods
3 magnetic survey – under geophysical methods
4 seismic survey – under geophysical methods

3 1 a geological
b geochemical
c geophysical
2 They can help to identify the kind of rock formations where oil is often found, e.g. anticlines.
3 A well log is a record of the rocks that are met at different depths when drilling. It is important to keep one as it can help identify where there are petroleum traps for future drilling.
4 They take samples of surface water and soil. These may contain small traces of hydrocarbons showing the presence of oil.
5 A magnetometer shows the magnetic properties of a rock; a gravimeter tells us about its density.
6 They make a hole in the ground and make an explosion. They then measure the shock waves. The shock waves tell geophysicists what type of rocks lie beneath the surface. If they do not use explosives, they will use a vibrator truck.

4 1 f 2 b 3 a 4 d 5 c 6 e

* Tip

Remember: The Passive isn't a tense.
The Passive always contains the verb 'to be' and a past participle.

* Tip

Three forms of the verbs
Check students understand the three forms of the verb and the term's base form: the infinitive, Simple Past, Past Participle. Choose an irregular verb like *eat* or *write* to make your point.

eat	ate	eaten
write	wrote	written

Additional activity

(weaker students)
Write the table below on the whiteboard for students to copy and complete. It is essential that they know the three forms of the verb to create the passive.

Infinitive	Past Simple	Past Participle
analyse	analysed	analysed = *regular*[1]
drill	drilled	_____[2] = _____[3]
find	_____[4]	found = _____[5]
see	_____[6]	seen = _____[7]
take	took	_____[8] = _____[9]

Three forms of the verbs

2	drilled	6	saw
3	regular	7	irregular
4	found	8	taken
5	irregular	9	irregular

Language spot

The Passive

- Students do **1** in pairs.
- Read through the rules in **2**. Do the first sentence in **3** as an example with the whole class. Students do the rest of the exercise together.
- Students study the *sentences* in **4**. *Can* and *will* are 'modal' verbs. Point out that we make the passive by following the modal verb with *be* and the past *participle*.

1 2 and 4
2 1 and 3 use the passive.
4 1 An aerial survey is conducted from a plane or satellite.
2 The photographs are studied for examples of reservoir rock formations.
3 Rock samples are collected and analysed.
4 The rainforests will be explored for oil soon.
5 Magnetic fields are measured/can be measured by a magnetometer. Gas can be analysed with a gas chromatograph.

Pronunciation

- Say the words in **1** or play the recording.
- Drill or practise the word *petroleum* in **2**. The stress is on the second syllable.
- Listen, repeat, and practise saying the jobs in **3** intensively. Get students to read the sentences in **4** aloud. These sentences show the words from **1–3** in context.

1 1 geologist – four syllables, the second syllable is stressed
2 geophysicist – five syllables, the third syllable is stressed
3 geochemist – four syllables, the third syllable is stressed

* Tip

A phrasal verb is a verb + particle (either a preposition or an adverb) that has an idiomatic meaning.
When Hamid heard the noise, he *looked up* = easy to understand the meaning.
Hamid didn't understand the word so he *looked* it *up* in the dictionary = more difficult to understand. Here 'look up' means to refer to something. Here *look up* is a phrasal verb.

Additional activity

(all levels)
Get students to brainstorm other phrasal verbs they may know.
Show how they can record phrasal verbs by topic, by verb, or by the particle.

It's my job

- Pre-teach *microscope*, *three dimensions*, and *available*.
- Set a realistic time limit in **1**. Allow students to confer and check their answers.
- Students discuss **2** in pairs.
- Students may need help with understanding what a phrasal verb is in **3**. Read the Tip for a possible approach. Tell students to use the context to try and help them understand the meaning of the phrasal verb.
- Students do **4** in pairs.

1 1 Not very much. Most of the time he works in an office.
2 He creates models and operates equipment.
3 It is where the core samples from drilling are kept.
4 A microscope and computers. He also operates underwater equipment from his workstation.
5 The three special skills are
- being able to recognize rocks from their characteristics
- being good at seeing / visualizing how things will look in three dimensions
- knowing what the data means (data = information) and interpreting it.

6 He is part of a team that includes a seismic interpreter and a reservoir engineer.

3 1 come across 2 find out 3 look up 4 look out for 5 look into

4 1 find out 2 look it up 3 came across 4 look out for 5 look for 6 looking into

Listening

Trends in oil consumption

- Explain the title – a 'trend' is the general direction that something goes in.
- Look at the map in **1** and discuss the questions with the students.
- Ask students to predict what they are going to hear in **2**.
- You may need to play the recording more than once for **2** and **3**.
- Students do **4** and **5** in pairs.

1 The countries that are the biggest consumers take up the most space and the countries that are the smallest consumers the least space. The biggest consumers are the USA, Europe as a whole, Japan, China, and South Korea.

2 a 2006 b 17% c 3.4% d doubled e 120

3 1 domestic 2
industry 4
transportation 1
commerce 3
2 a more than half
b over 70%
3 In China and India, most oil is used for industry.
4 He believes that China and India will probably use more oil for transportation as more and more people buy cars.
4 ↑ go up, increase, double, rise
↓ decrease, fall, go down, halve
5 increase – decrease
rise – fall
go up – go down
double – halve

Additional activity
Posters are a useful way of presenting the results of project work. Give students large sheets of paper, for example from a flip chart, and ask them to write in note form the results of their research. Place the posters in different parts of the classroom or in a common area in the training centre. Students present their poster and project to passers-by and other students.

Additional activity
You may want to look at *Exploiting the Arctic* in the *Reading bank* on p.56.

* Tip

Common mistakes
Run through the other expressions and highlight where problems could occur. Stress the importance of using the correct preposition.
***From** my point of view. **In** my opinion.*
We can't say 'according to me', We can only use 'according to' to report someone else's opinion. A common mistake is 'I am agree' – 'agree' is a verb.

Project

- Read through the task and discuss where students could find this information. Students could work in two groups. Group A researches **1**, and group B researches **2**. The following lesson students work in pairs to exchange information. Finding out about the Athabasca Oil Sands in Canada will prepare students for the speaking task that follows.

Speaking

Athabasca Oil Sands

- Ask students to report back on their research into the Athabasca Oil Sands. Tell them to read the notes in **1**. From their research and the notes, ask if they think it is a good idea to exploit them.
- 🎧 In **2**, you may want to pause each time there is a change in speaker.
- Play the recording again and pause each time one of the introductory expressions is used in **3**.
- Students do **4** in pairs.
- Listen in and monitor the conversations in **5** discreetly. Make notes of a couple of mistakes. Write them on the board and correct them. Praise the good things you have heard. Lead an all-class feedback and vote on Greenland's future.

2 1 Rafiq 3 Steve 5 Amin
2 Amin 4 Rafiq

3
In my opinion . . .
They should . . .
Some people say . . .
Yes, but . . .
I hear what you're saying.
What do you think?
What's your view on this?

4 **Advantages** huge reserves; Greenland will become rich; it can become completely independent from Denmark.
Disadvantages exploration difficult; difficult drilling and exploration conditions / danger from icebergs; there may not be any oil; if Greenland becomes oil-rich, it will destroy the traditional way of life; drilling can cause a lot of damage to the environment and destroy wildlife habitats.

* Tip

Vocabulary
You may need to check that students understand the headings. Help them with the synonyms / definitions.
environmental – to do with nature
financial – to do with money
recommendations – what you think people should do
background – history
business opportunity – opportunity = a time when it is possible to do something

Writing

Short reports and linking words

- Give students one minute to skim read the text and answer the question in **1**.
- Check that students understand the headings in **2**.
- Give the students two minutes to do **3**.
- Students rephrase the sentences in **4**.
- Students create their own short report in **5**.

1 Dave is against becoming involved.
2 1 d 2 e 3 b 4 a 5 c
3 1 so
2 in addition
3 because
4 although
5 in my opinion
4 1 Although there are reserves in offshore Greenland, exploration will be difficult.
2 Temperatures are –30 °C in winter so drilling offshore will be difficult.
3 It is dangerous because there is a risk from icebergs.
4 In addition, there is a chance there is no oil.
5 In my opinion, oil will help Greenlanders live more successful lives.

Checklist, Key words

- Go through the checklist and ask students to tick the statements they think are true. Run through the key words and check students' understanding and pronunciation. Refer them to the glossary if necessary.

5 Drilling

Background

Although drilling rigs are similar in principle, they vary in size and complexity depending on the size and depth of the hole, the rock formation, and the surface conditions, particularly whether onshore or offshore. The drilling rig rotates a **drill string** which holds a **drill bit** to create the borehole. The bit is a **tricone** comprising three conical rollers containing teeth made of a hard material: tungsten carbide, or sometimes diamond. To clear the rock cuttings, cool the bit, and provide control of pressure around the drill string, **mud** is pumped down the hole. The mud is a complex mixture of clay and chemicals and can be water-based or oil-based. A steel casing is cemented into the hole for support. At the surface, sections of pipe are added to form the drill string. **Completion** of the well involves the final sealing off of a drilled well after equipment has been removed from the borehole, with valves and control and safety devices in place. The well is then ready for production. As the drilling proceeds, the mud logger collects and analyses the cuttings, and lowers instruments into the bore to monitor the process and equipment performance. At the surface, tubing is installed in the casing, and on an onshore well, a pump jack, or a 'nodding donkey' is attached to bring the oil to the surface. For a more complex well, a **blow-out preventer** is installed, which shuts off the oil to prevent it rushing to the surface. A '**Christmas tree**' is installed which is a collection of valves to control the flow and connect the flow lines.

The direction of the borehole is controlled by various methods at the surface. Techniques have been developed to drill not only vertically, but also at angles and even horizontally. Directional drilling and extended reach drilling can be achieved using motors at the drill bit driven by mud pressure and steered at the surface. Drilling from an offshore platform can be directed from the platform to different parts of the reservoir, reducing the number of expensive production platforms required. Drilling can also take place onshore to offshore or to avoid drilling in environmentally sensitive areas.

The drilling process requires the use of some very powerful and complex equipment: the main **derrick**, drive motor and rotary table, mud pumps, mud mixing and storage tanks, shale shakers for separating the cuttings in the mud, pipe-handling equipment, and drawworks to lower the draw string. Where a matrix of wells is drilled on an offshore platform, the drilling equipment moves on rails and the electrical power cables move on large drag chains. There are different types of offshore drilling rigs. Barges and jack-up rigs, semi-submersible rigs, and drill ships are used where a mobile rig is required. The production platform often has its own drilling module which continues with well-completion or drilling of new wells after the drilling rig moves on. Drilling is a hazardous process, particularly offshore and so a lot of automated handling and control systems are used to reduce the risk of accidents.

Whatever equipment is used, drilling for oil and gas will always require a dedicated drilling team with a mix of technical and managerial skills. Valuable experience gained in manual jobs allows workers to progress to well-paid supervisory levels in an operation which will be in demand for a long time ahead.

Kick off

- Read **1** and ask the students if they can say what has happened in the picture.
- Ask the students to look at the picture to answer **2**.

1 The photograph shows what can happen if the pressure of the well isn't carefully controlled. The pressure from the well can easily destroy the drilling rig and cause injury.

2 The picture shows a blow-out preventer that is a valve, or series of valves, that are sensitive to well head pressure. If the pressure from the well is too high, then it seals off the well head immediately.

Additional activity
(stronger students)
What am I?
Students work in pairs and give each other definitions of the words in **1** and **2**. The partner has to supply the word.
A *I have four or six sides and I go through the rotary table. What am I?*
B *The kelly.*

Vocabulary

The drilling rig and the drill string

- Look at the diagram in **1**. See how many parts of the rig students are already able to identify.
- Do **2** and check answers.

1	1 hook	4 swivel	7 crown block	
	2 drawworks	5 monkey board		
	3 derrick	6 travelling block		
2	1 kelly	3 drill collar		
	2 drill pipe	4 bit		

Tip
Remind students that there are different ways of saying 'over' and 'under'.
over, on top of, at the top
below, beneath, underneath, suspended from

Additional activity
As an alternative to **3**, before students work in pairs you can make groups of all the students who have picture A and picture B so that they can work on a description together. The teacher monitors the groups and improves the descriptions. When they are ready, put the students into pairs to carry out the activity.

Language spot

Prepositions

- This is revision. Run through the diagram in **1** quickly. Add further prepositions or phrases as you go, for example *on top of, at the top, underneath, below.*
- Students create further sentences of their own in **2**.
- Student A has one picture in **3** and student B another.

1	1 on / at	3 on / on top of	5 around	
	2 between	4 through	6 under / underneath	

Tip
Teach 'crew': *the team of people who make something operate.*
Ask students to think of other things that need a crew for them to work, e.g. ship, plane.

Listening

Drilling crews

- Students do **1** in pairs.
- Students listen and check their answers in **2**. They can do **3** in pairs.
- Read through the questions in **4**. Elicit what students think the answers will be. Students listen again. Pause the recording if you think that students are being left behind.
- Put students into pairs or groups to discuss answers.
- Lead a short all-class discussion for **5** and **6**.

Tip
-ough
-ough has different pronunciations.
Roughneck rhymes with *stuff*.
Other words: *enough, tough.*

2	1 f 2 d 3 e 4 c 5 a 6 b 7 g			
3	1 company man	3 mud man	5 roustabout	
	2 derrickman	4 motor man	6 roughneck	

4 1 The company man is the oil company representative who wants to check that the well is being drilled according to the contract. The drill pusher is in charge of the drilling operation.
2 He supervises the raising and lowering of the drill string. He can see what is going on from the monkey board. Each time a length is added, part of the string has to be raised out of the ground.
3 tripping out and tripping in
4 The mud has four functions.
a lubricating the drill
b stopping the drill bit from becoming too hot
c carrying the drilled rock to the surface
d controlling the pressure in the well

✱ Tip

Teach the three *-als*
vertical – straight down
horizontal – straight across
diagonal – from top left to bottom right or vice versa

✚ Additional activity

Refer students to p.58–59 in the *Reading bank*. The reading passage talks about advanced recovery techniques.

Reading

Drilling methods

- Check top margin vocabulary on p.31. Elicit what drilling methods students know in **1**.
- Set a two-minute time limit for **2**.
- Students read intensively for **3**.

1 They may mention straight down drilling, deviated drilling, and horizontal drilling. They may also talk about offshore and onshore drilling and different types of rigs.
2 1 several hundred
2 62
3 five to six times
3 a straight down drilling with a deviated hole
b onshore derrick to offshore reservoir
c horizontal drilling
d offshore platform with multiple wells from the same borehole

Speaking

Options and suggestions

- Set the scene for **1**. Make sure that students realize that there are three speakers.
- It is important that students know what form of the verb comes after the introductory expression in **2**. A common mistake is the use of the infinitive with *to*, e.g. *We could ~~to~~ drill...*
- Allocate roles in **3** and refer students to the back of the book.

1 1 A 2 S 3 M 4 A 5 S 6 M
2 All the forms take the base form (i.e. infinitive without 'to') except for *How about / What about drilling*. This *-ing* form is called the gerund. We use the gerund with verbs that come directly after a preposition.

✱ Tip

Improving voice range
If students find it hard to use a wide voice range, get them to hum the sentence, or even sing it.

Pronunciation

- 🎧 Students often have a flat voice range that can sound uninterested or even aggressive. Use the recording to model the pronunciation and intonation of the expressions.

It's my job

- Refer students to the top margin text. Ask them if they remember what a well log is from Unit 4.
- *Resistivity* is the ability of something to carry an electric current. Set a five-minute time limit for **2**.
- Set a three-minute time limit for **3**.

2 wireline log 1, 3, 5
well log 2, 4, 6

3 1 'Well completion' is preparing the well for production. This means lining it with steel and making a concrete casing.
2 Well completion is usually more expensive.
3 The basic reason is to make as sure as possible that the well will be productive. Well completion is expensive so oil companies want to reduce the risk of a dry hole as much as possible.

✱ Tip

Highlight that nouns used as adjectives are singular.
A seven-inch bit not *a seven ~~inches~~ bit.*

✚ Additional activity

When we have several words before a final noun our voices move down a step on each of the words. Write an example on the whiteboard to show how 'steps' downwards. Use the board to highlight what happens. Drill for pronunciation and practise with further examples.
Example
A seven-inch
diamond-covered
tricone
drill bit.

Writing

Placing an order

- Students compare Mustafa and Patrick's conversation with their final order.
- In **2**, students study the example. Point out that adjectives and pre-modifiers come in front of the noun.
- Students do **3** and **4** individually or in pairs.

1 another kelly; 20 twenty-foot lengths of drill pipe; circular core extractor bit

3 1 a six-sided kelly
2 a hardened steel drill collar
3 30-foot-long drill pipe
4 a tricone tungsten drill bit
5 a circular core extractor bit

4 Possible answers
An expert would put the information before the nouns.
We need some diamond-covered drill bits.
We also need a circular core extractor bit.
We're going to need 40 30-foot-long drill pipes and twenty twenty-foot-long drill pipes
We'll also need a four-sided kelly.

Checklist, Key words

- Go through the checklist and ask students to tick the statements they think are true. Run through the key words and check students' understanding and pronunciation. Refer them to the glossary if necessary.

6 Environmental protection

Background

Environmental protection is considered by the global oil and gas industry as an integral part of resource development. **Oil spills**, damage to land, air and water pollution, **accidents**, **explosions**, and fires have occurred; local communities have been disrupted and permanently changed by the physical and economic effects of installations. Industry, national governments, the United Nations Environment Programme, and other organizations are working together to ensure that best practice, training, and national legislation are established, implemented, and monitored.

During the exploration and appraisal phase, the environmental considerations have to be assessed and an **environmental impact statement** produced and considered before a project is sanctioned. The exploration and drilling operations are relatively short periods and it is during the production and disposal phases, where installations can operate for over twenty years, that environmental impact has to be seriously considered. Health, Safety, and Environment (HSE) is a coordinated discipline of engineers who require a very broad knowledge of the different specializations in project engineering, construction, installation, production, and disposal.

Oil and gas installations need to safely dispose of produced water, drilling fluids and cuttings, drainage and sewage, and cooling water. Emergency planning and training need to be in place to avoid or deal with accidents and emergencies such as well **blow-outs**, fires, **leaks**, spills, and explosions. Because gas is present with oil, methods need to be put in place to reduce **flaring** where the gas is not going to be gathered. Sometimes gas or produced water can be re-injected into the well and this promotes increased flow of oil. Every installation has to consider how it will dispose of the installation at the end of its life.

In shipping crude oil, the introduction of **double-walled hulls** and the retiring of old vessels is reducing the number of crude oil spills. These actions to avoid pollution are just as important in the downstream sector at the refinery. The large-scale consumption of oil and gas generate carbon dioxide which is seen as a major cause of climate change. Refineries are involved with the development of new fuels, the removal of harmful additives and impurities such as sulphur, which can cause acid rain, and the blending of petrol with sustainable ethanol.

⊞ Additional activity

(all levels)

Get students to work in small groups. Give each group either land, air, or water and ask them to think of ways in which the oil and gas industry causes pollution there. Alternatively, refer students back to the flow diagram in *Reading* p.6 and ask them to think in terms of upstream, midstream, or downstream. They should appoint a note-taker and a spokesperson (stronger students) so that after their discussion they can explain their ideas to the rest of the class.

Kick off

- Ask students what *environment* means. Do **1** as a class activity.
- Get students to discuss **2** in pairs or small groups and then at class level.
- Discuss the ideas of greenhouse gases, global warming, and rising levels of the oceans, then get students to do **3** in small groups.

1 air, water

Reading

Oil pollution

- Get students to discuss **1** in small groups and then compare ideas.
- Get students to do **2** individually, then compare answers with a partner.
- Explain to students that a heading must cover the contents of the whole paragraph. They should work individually on **3** and then compare answers with a partner.

1 waste oil
2 a offshore drilling activities
b major tanker disasters
3 1 a 2 b 3 b 4 a

Pronunciation

- Check students understand what *syllable* means. Give students an example: *technology* (four syllables with the second one stressed).
- Play the recording for **1** as often as necessary. Get students to check their answers in pairs.
- Get students to do **2** in pairs and underline the two-syllable nouns in **1**. Play the recording to check answers and to answer the question.
- Get students to do **3** in pairs. After checking their answers, get them to practise saying the words.

1

waste 1	rocks 1	disaster 3
economy 4	damage 2	sand 1
accident 3	result 2	drilling 2
tanker 2	problem 2	pollution 3
aircraft 2	environment 4	
error 2	effects 2	

2 ●• tanker, aircraft, error, damage, problem, drilling
•● result, effects
The most common stress pattern is ●•.
3 ●• sector, ocean, members, river, training, people, measures
•● mistake, amount

Language spot

Cause and result

- Read the *Grammar reference* on p.118 together with the students.
- Get students to do **1** individually and then check their answers in pairs.
- For **2**, remind students that the verbs have to be put into the correct tense (Present Simple or Past Simple) and made singular or plural. Get students to work individually and then check the answers.
- Get students to try to use different ways of expressing cause and result in **3**.

1 1 Waste oil is responsible for the most pollution.
cause → result
2 Oil is sometimes spilled because of burst pipes.
result → cause
3 Major oil tanker disasters account for slightly more oil pollution.
cause → result
4 Accidents with ships are the result of ships hitting each other or hitting sand or rocks below the water.
result → cause
5 Accidents with ships happen because of human error.
result → cause
6 A major oil spill can result in very serious damage.
cause → result

Additional activity

Put the following words on the board in two columns and ask students to form word combinations that appear in the text. Give them the first one, *waste oil*, as an example. Ask them to work without looking at the text.

(weaker students)
Allow students to look through the text to find the word combinations.

waste	error
oil	problems
burst	damage
human	spills
local	pipes
technical	oil
serious	economy

Answers
waste oil
oil spills
burst pipes
human error
local economy
technical problems
serious damage

* Tip

Harm, damage, injure, hurt
harm – to have a bad effect on something or someone. *Pollution harms the environment.*
damage – to cause physical harm to something. *The fire damaged the equipment.*
injure – to harm a person's body physically. *People were injured in the accident.*
hurt – refers to a person's physical pain. *He's hurt his leg.*

Additional activity

(weaker students)
In **3**, give the students a cause / result expression to use in each sentence. Before they begin, make sure they can identify which part of the sentence is the cause and which is the result. Help them decide if the verb is singular or plural.

2 1 accounts 3 result 5 is
2 caused 4 resulted

3 **Possible answers**
1 Oil in sea water *results in / causes / is responsible for* the death of marine plants and animals.
2 Birds can't fly or feed *because of / as the result of* oil on their feathers.
3 Pollution of the coast *results in / causes / is responsible for* a reduction in tourists.
4 Contaminated drinking water *is the result of / is because of* leaking oil pipes.
5 The use of satellite technology *accounts for / is responsible for / results in* the quick detection of oil spills.
6 Some pollution *is the result of / is because of* human error.

Listening

Protecting our environment

✱ Tip

For some students, listening is a difficult activity. It is even more difficult if they have to read at the same time. By reading the questions before listening and guessing what the answers might be, students are prepared for what might be said.

- Help with the meaning of any of the words in **1**.
- For **2**, play the recording once without stopping. Ask students to make short notes. Give them time at the end to write more if necessary. Listen again if necessary.
- Discuss the answers to **3** as a class then get students to write full answers.

2 1 at each stage of the process
2 by using new technology
3 no, it doesn't
4 by burning oil and gas, carbon dioxide and particulates are produced
5 new fuels, better car engines, new technology
6 light pollution

3 1 the rise in the average temperature on the earth
2 by building more efficient engines that use less fuel and burn more efficiently
3 by flaring on gas platforms and refineries and indirectly by producing energy to light up our towns and cities

Additional activity

Discuss gas flaring with the students. Ask them what they know about it and why it happens. You may now decide to do the *Reading bank* text on p.57.

Top margin

- Students should discuss these questions in pairs or small groups.
- Stronger students can prepare a short presentation covering what they have discussed and the possible reasons or the measures that can be taken.

Additional activity
Ask students to discuss these questions.
Should oil companies drill in such deep water?
Could a similar disaster happen again?

Project

- Ask students what they know about deep water drilling. Ask them to think about the challenges of drilling in depths greater than 1,000 metres, e.g. *too deep for divers to work so ROVs have to be employed, problem of visibility at that depth.*
- Ask students to work in groups of three. Ask student A to find the answer to question 1, student B to work on questions 2 and 3, and student D questions 4 and 5. Each group should then discuss their answers and make notes so they can either give a short presentation to the rest of the class or write a short report about the disaster. Encourage students to use different sources of information (BP, newspaper articles, oil industry reports) so they have a balanced view.

*** Tip**
Scanning a text for information is an important reading skill. The information you require can often be found in one paragraph. It's important to be able to identify where the answers are without wasting time reading the whole text in detail.

It's my job

- Students should work in pairs and discuss **1**. Get students to work individually to read.
- Explain that students have to read in more detail for **2**.

1 the design of equipment to protect fish around offshore platforms, the flaring of gas offshore, protecting wildlife habitats when laying pipelines

2
1 to produce oil and gas and not damage the earth
2 safety engineers
3 the law – so that the company operates within the law and doesn't get involved in illegal activities
4 design studies for new oil platforms
5 Most likely. He has to travel to other countries.
6 The oil and gas industry tries hard to protect the environment. Most publicity about the oil industry is bad, e.g. oil spills causing pollution.

Vocabulary

Word families

Additional activity
(weaker students)
Go through each sentence with the students and help them identify whether a verb, noun, or adjective is required before they do the exercise.

Additional activity
(stronger students)
Get students to write sentences with six different words from the table. Get them to write the sentences with gaps for a partner to complete.

- Read the example of a word family with the students. Check that they understand what a verb, noun, and adjective are. Get students to do **1** in pairs.
- Get students to complete **2** individually in class or set for homework.

1

1 pollution	7 protection	13 environmental
2 polluted	8 transport	14 seep
3 technology	9 transportation	15 spill / spillage
4 damage	10 leak	16 spilled
5 damaged	11 leak	
6 protect	12 globalized	

2

1 environment	4 technology	7 spilled
2 pollution	5 protect	8 seeps
3 global	6 damage	

✱ Tip

It is possible to begin an email with *Dear Mr De Martino, Dear Peter, Hello Peter*, or *Hi Peter*, depending on how formal you feel you ought to be. Americans tend to be informal, even in a business situation and use first names all the time, but Germans use a person's full title even after they have been working together for several years. It's important for students to realize that other cultures may be different from theirs and that they must be sensitive to what is *normal* for other people.

Professional skills

Writing emails

- Discuss formal and informal emails. Students do **1** individually.
- Students do **2** individually and then compare answers in pairs. Ask students to discuss how they feel about beginning with *Dear Peter* and ending with *Best wishes*. Discuss alternatives and how formal their culture is. Alternative endings are: *Regards, Best regards*.

1 Ken Nadal engineering manager
Peter De Martino environmental engineer
2 He has broken rules 5, 7, and 9.

Top margin

- Get students to read and discuss. Stronger students can prepare a short presentation to give to the rest of the class giving and explaining their opinion.

Writing

An email

- Get students to read the email in **1**. Ask *What is the email about? Who is it from? Who is it to?* Get students to complete the exercise individually and check their answers in pairs.
- Get students to discuss the advantages and disadvantages in **2** in pairs. Students should write their email in class time or for homework.

1 1 the three options
2 cause problems
3 environmental conservation groups
4 poor quality land
5 I recommend that you carry out a survey
6 I will be happy to help
7 Regards

Checklist, Key words

- Go through the checklist and ask students to tick the statements they think are true. Run through the key words and check students' understanding and pronunciation. Refer them to the glossary if necessary.

7 Engineering & construction

Background

The oil industry employs many thousands of specialist engineers in a variety of disciplines. During the exploration phase, **reservoir engineers**, **environmental engineers**, and **process engineers** work on developing the ways in which a prospect can be developed.

At first, the emphasis is on process engineering. The process engineers take the initial basis of design and work with the pressures, temperatures, and flow rates to select the processes and basic specifications of the equipment required. The information passes to **mechanical**, **electrical**, **instrument**, and **control engineers** to specify the material in sufficient detail to order the equipment to exacting codes and standards. **Layout**, **piping**, and **structural engineers** calculate the forces and stresses and select the materials required. For onshore projects, **civil engineers** determine the ground preparation and design the foundations. **Safety** and **environmental engineers**, **cost engineers**, and **project engineers** are also part of a team that can number several hundred. During operations, for the life of the installation, engineers provide support for maintenance and development.

As the engineering challenges grow to develop installations in more complex and hostile environments and produce solutions at lower costs, engineers are using more sophisticated computer software tools for analysis, **computer aided design (CAD)**, and information management.

Kick off

- Ask students how many branches of engineering they can name and what people in these fields do. Don't correct students or give answers yet.
- Look at the list of different branches of engineering and ask students about any they have not already mentioned. If they are unsure about what some of these specialist areas are, tell them they will find out by reading the texts.
- Get students to work individually and then check their answers in pairs.

1 c 2 e 3 f 4 d 5 h 6 a 7 b 8 g

* Tip

Students will find that they often have to read texts where they don't understand all the vocabulary. Students should be encouraged to realize that one of the skills in reading is being able to find the information we need, or understand the gist of a text, without understanding every word. They can use the context to help guess meaning, use their own knowledge about the topic and use their knowledge about similar words they know in English or in their own language.

Reading

Oil platforms

- Discuss each diagram in **1** with the students. Make sure that they understand the meaning of each pair of adjectives.
- Students do **2** individually and **3** in pairs. They should draw on information in the text and also their own knowledge to decide. At class level, discuss the ideas from each pair and encourage a class discussion.
- For **4**, get students to explain how they guessed the meaning. This is an important reading skill and students should be encouraged to make guesses even if the guess turns out to be incorrect. Get students to think of other words which begin with *semi-*, e.g. *semicircle, semi-final, semi-conductor, semi-skilled*, etc. Get them to think about other words beginning with *sub-* (below), e.g. *submarine, sub-heading*. Get students to work out the meaning of *semi-submersible*. Get students to use the context and the pictures to help them work out the meaning of *columns* and *pontoons*.

Additional activity
(all students)
Ask students the following questions: *What does ROV stand for? (remotely operated vehicle) What is it used for? Where does the pilot sit? How does he direct the ROV?* Ask students to work in small groups to make a list of the advantages and disadvantages of using ROVs.
Possible answer
Advantages ROV systems make life much easier. Safer than sending down divers, more cost-efficient, can be used for a variety of jobs, can be used at any time of the day or night, can be used to assess work required before sending down divers.
Disadvantages Expensive, can break down, underwater breakdowns may lead to loss of ROV, can't access small corners, operators need training.

Additional activity
(stronger students)
Ask students to write two paragraphs giving the advantages and disadvantages of using ROVs offshore.

- Before reading the text for **5**, discuss the conditions offshore that engineers have to deal with. Then do **6** and **7**.

1 a unstable c weak e submersible
b vertical d shallow
2 a jack-up unit
b semi-submersible drilling rig
c drillship
3

	Advantages	Disadvantages
Semi-submersible drilling rig	Can move easily into position Stable	Can only be used in up to 300 m of water
Drill ship	Can move easily into position Operates in deep water up to 1,500 m	Unstable in bad weather
Jack-up unit	Stable	Has to be pulled into position by a ship Can only be used in water up to 100 m

4 **submersible** can be put under water, **semi-submersible** can be put half under water
column a tall, solid, vertical post
pontoon a hollow structure used to support a floating platform
5 **Possible answers**
Weather can change quickly. Rain, wind, ice, and the sun all have an effect. Structures can be far from land and difficult to get to. It can be dangerous.

Additional activity
Get students to work in pairs. They should cover the text in **2** and use the list of features to explain CAD to their partner. Encourage them to use different ways of talking about ability.

Language spot

Talking about ability

- Read the *Grammar reference* on p.118 with students. Remind students about the use of the passive verb form.
- Encourage students to complete **1** without looking back at the reading text. Once they have finished, they can work in pairs to check their answers in the reading text.
- Ask students what they know about CAD programs. Get students to read the information about CAD. Students should complete **2** individually in class or for homework.

1 1 can move 4 can be used 7 can't be used
2 can't be used 5 can't move
3 can't be used 6 can operate
2 1 to store 5 to rotate 9 (to) calculate
2 be displayed 6 (to) view 10 be tested
3 sent 7 to change 11 see
4 make 8 to add 12 add

Top margin

- Get students to look at the two-word glossary and photo of a manifold. Ask students what the topsides of an oil platform comprises (drilling

equipment, production plant, living accommodation, helideck, flareboom, lifeboat stations, pipe rack). Explain that large oil platforms are modular so units can be easily updated and replaced.

Additional activity
After doing the *Listening*, students might be interested to read *Life offshore* in the *Reading bank* on p.60.

Listening

Listening for detail

- Revise the sorts of conditions that engineers face offshore and ask students if they can suggest what the biggest challenges are in the North Sea.
- **1** prepares students for the listening activity. Make sure they understand all the vocabulary used here. Get them to think about the units of measurement (centimetres, metres, kilometres) that are likely to be used and make some guesses about the answers. After listening in **2**, students can see how close they were.
- Play the recording once for **3**. Repeat if necessary.

1 a a date
b a measurement in metres / kilometres
c the name of an oil company
d a measurement in metres
e a description of position
f measurement in metres / centimetres
g a feature
h a number
i a measurement of depth in metres
j a number
k a number of people

2

a 1975	e 15 km from platform	i 105 m
b 210 km	f 94 cm diameter	j eight
c Conoco	g hot water jacket	k 140
d 150 m	h twenty	

Tip
It's also possible to form questions and answers using the noun, e.g. *What is the length of the pipeline? → It's 200 km in length.*
For some nouns we use different adjectives. In the answer we don't repeat the adjectives.
Weight, heavy: *How heavy is the container? → It's 172 kg.*
Or we often say: *It weighs 172 kg.*
Area, big / large: *How big is the site? → It's eight square kilometres.*
Distance, far: *How far is the platform from the coast? → It's 145 km.*

Top margin

- Students read about the Yastreb drilling rig. Ask them to consider when it is financially viable to build such a structure and to drill to such depths.

Vocabulary

Talking about measurements

- Ask students to do **1** individually and then compare answers in pairs.
- Point out the use of nouns and adjectives in the questions and answers in **2**. Warn students that *weight* has a very different adjective. For **2** and **3**, students should work individually and then compare answers in pairs.
- After doing **4** in pairs, students could write the questions and answers for homework.

1

a length	d depth	g weight
b width	e area	
c height	f distance	

2 1 high 3 deep
2 long 4 heavy

3 1 long 3 deep 5 wide
2 heavy 4 high

Additional activity
(stronger students)
Explain that it is possible to use nouns in questions and answers of measurement (see Tip on p.36). Get students to change the sentences in **3** and write questions and answers for **4** using the noun.

Language spot

Asking questions

- Read the *Grammar reference* on p.118 with students.
- Students should work individually on **1** and then compare answers in pairs. For **2**, students write questions individually first, either in class or for homework. Remind them to think about which tense to use. Tell them there are a large number of possible questions they could make.

Additional activity
(stronger students)
Get students to write a similar dialogue about a famous pipeline or oil platform.

- Students should complete **3** individually in class or for homework and then practise reading the dialogue in pairs.

1 1 f 2 d 3 c 4 g 5 b 6 h 7 e 8 i 9 a
3 1 Where 3 Is it 5 How much
2 How long 4 How long 6 Why

Pronunciation

- Ask students to read the questions in **1**. Check that they understand the vocabulary. Ask them to decide what sort of question each one is. Play the recording. Check students' answers.
- Play the recording again and ask students to repeat each question. Get students to work in pairs and give short appropriate answers to the question. Students could write new questions for homework.

1 a wh- b yes / no

Additional activity
After completing the exercise, get students to use the notes to write up a short report on the Sakhalin 1 Project, in class or for homework. Remind them about using the appropriate tenses.

Speaking

Sharing information

- Do **1** as a class discussion.
- Read the useful language in **2** and make sure students can use the phrases. Ask them to sit back to back to do the exercise. Choose a pair who have used these expressions well to perform in front of the class.
- Invite students to discuss **3** in small groups or as a class.

1 Most students find the telephone more difficult. They cannot see the speaker's facial expression or body language. They cannot use visual material to help clarify points. They have to depend fully on listening and speaking and therefore the use of language. It is therefore necessary to make sure that they can ask for clarification and repetition when necessary.

Additional activity
(stronger students)
Get students to prepare a presentation on ERD for the rest of the class. Get them to find appropriate diagrams to help them explain.

Project

- Get students to work either individually or in pairs. Allow them to research in their own language but to make notes in English.

Professional skills

Listening skills

- Ask students to suggest what *active listening* means. Don't tell the students that they are right or wrong at this stage and don't give them any ideas which they haven't suggested themselves.
- Ask students to discuss **1** in small groups and then draw together ideas at class level.
- In **2**, try to get students to empathize with Karl. Develop the idea that it is difficult to continue speaking if others don't appear to be listening.
- Students work in small groups and discuss **3**. Discuss possible cultural issues, e.g. *How appropriate is it to make eye contact? Do you nod your head or shake your head?*
- Get students to be positive about one another, not critical in **4**. Ask *How did Jamil make it easy for you?*

1 Listening: Sam, Tanmay
Not listening: Richard, Pierre, Jamil

3

You should	You shouldn't
look at the speaker	yawn or sigh
check you understand what they are saying	move around
show your interest in your face (smile, etc.)	look out of the window
lean forward a little	look for things in your bag or drawer
nod your head a little	scratch your head / face and rub your eyes
make sounds to show you are interested: *really, oh, hm, yes, aha*	
ask questions	

Checklist, Key words

- Go through the checklist and ask students to tick the statements they think are true. Run through the key words and check students' understanding and pronunciation. Refer them to the glossary if necessary.

8 Production

Background

Production facilities in the industry include onshore oil installations and **gas gathering plants**, **offshore platforms** and floating production ships, and **downstream refineries**. Every manned installation will have a single person with overall responsibility, a refinery manager (or an oil installation manager (OIM) offshore) whose first responsibility is the safety of the employees and the safety of the plant. The manager is responsible for meeting production targets, efficient day-to-day production, and maintenance.

Upstream facilities have processes to separate the oil and gas and remove solids, sulphur and other unwanted elements, and condensed water. To carry out these operations offshore, a manned platform is often required. Facilities will then be required for living accommodation, helicopter landing, escape and rescue, and cranes for unloading equipment and supplies from marine supply boats. Many platforms will have their own permanent drilling facilities. Pipelines, which may be heated, transport the oil onshore.

The platform comprises a **jacket** and **topsides**. The jacket is made of concrete or steel fixed with piles to the seabed and supports the topsides facilities and equipment. Platforms can also be supported by semi-submersible structures beneath the surface, or in deep water by tension leg cables or spar structures, vertical storage cylinders anchored to the seabed. Oil and gas may also be received for processing by pipeline from satellite platforms or from subsea well heads remote from the platform. Another type of facility is the **Floating Production Storage and Offtake (or Unloading) facility (FPSO)**. This is a specially constructed or converted tanker supporting the topsides which is either moored in one position or moved to new locations as wells become depleted. The oil is stored in the hull of the vessel and taken off by shuttle tankers.

Refineries take crude oil delivered by tankers and separate the oil into its different constituents by fractionation. Further processing takes place to in order to maximize the value of the end product.

Kick off

- Read the items and check pronunciation. Students do the exercise in pairs.

🔑 1 b 2 d 3 a 4 c

* Tip

The first FPSO was the Shell Castellon built in 1977.
The world's largest FPSO is currently the Kizomba A off the northern coast of Angola. It was built by Hyundai of South Korea and can hold 2.2 million barrels.

Listening

Floating Production, Storage, and Offtake facilities

- 🎧 Read through the questions in **1** and **2** before you play the recording.
- Pause after each piece of important information in **3** to allow students to write their answers.
- Lead a brief all-class discussion in **4**.

🔑 **1** 1 1998
2 Texas, Saudi , Nigeria, and the North Sea
3 as a roughneck before university
4 on a North Sea FPSO

2 1 like the hull of an oil tanker with the equipment you find on a platform without the drilling rig
2 It flows up from the well head through flow lines.
3 The oil is separated from water and gas.
4 It is stored in the hull until a tanker comes to collect it.
5 Because the well may be too far offshore for a pipeline.

3 a 100 b Delta c 300 m d 60 m
e Korea f Tyneside g 22,000 h 16

✱ Tip

Teaching the Present Perfect

This tense is difficult for students because it is used in two different ways: for the indefinite past; i.e. when we don't say when we did something, and for the unfinished past; i.e. when something began in the past and continues, or has a result in the present.

Indefinite past

Use questions to help you. Write each line on the board and engage in question and answer with the students.

1 Write: Ali has been to Oman. Teacher: *Is this correct?* Student: *Yes.* T: *Do we know when?* S: *No.*

2 Write: Ali went to Oman last summer. T: *Is this correct?* S: *Yes.* T: *Do we know when?* S: *Yes, last summer.*

3 Write: Ali has been to Oman last summer. T: *Is this correct?* S: *No.* T: *Why?*

Move into dealing with the rule. If we know 'when', then we need the Simple Past.

The unfinished past

Use timelines to show the connection between the past and the present.

The past ---------- The present

He has worked in the oil industry for 10 years / since 2000.

2000 ---------- 2010

A He started to work in the oil industry. B Now, he still works in the oil industry.

✱ Tip

Ever

Ever = in your life until now. *Ever, just, yet,* and *already* are adverbs that often trigger the use of the Present Perfect.

The change of tense is because we are moving from the general to the specific. A *have you ever* question wants to find out if someone has had an experience or not. If the answer is *Yes*, then we can go on to ask specific questions about it.

Language spot

Past Simple v Present Perfect

- Get students to study the sentences in **1** and to discuss their answers.
- Remind students that we use the Present Perfect for actions in the past when we don't say the time; so it is the indefinite past. We use the Past Simple when we give a definite time or date or it is known. Get students to do **2** and to be prepared to justify their answers.
- Get students to say the sentences in **3** making the contractions.
- Treat the first sentence in **4** as an example. Students expand the other prompts.
- In **5**, focus on why the questions move from the Present Perfect to the Simple Past.
- Students can do **6–8** in pairs.

1 1 b 2 a 3 b 4 a

2 1 Did you see
2 has managed, has even written
3 left

3 1 Both use the Present Perfect.
2 yes
3 yes
4 for – to talk about the duration / length of time
since – with a date when something began

4 1 They have exploited that oilfield for more than twenty years.
2 He has worked on an FPSO since 2005.
3 How long have you been in the oil business?
4 He hasn't visited the platform for three months.
5 They have lived in Saudi Arabia since 1980.
6 How long have you studied English?

5 *Have you ever worked in Africa?* asks about experience. It uses the Present Perfect. The short answer is *Yes, I have*. The next question is in the Past Simple.

6 1 Have you ever been a roustabout?
Yes, I have. I was (one) in Texas for two years from 1988 to 1990.
2 Has he ever worked offshore?
No, he hasn't.
3 Have they ever dived in sub-zero temperatures?
Yes, they have. They worked on the Sakhalin project. They made lots of money.

Additional activity
For intensive practice of the Present Perfect, exploit the interview task on the photocopiable communication page.

7 1 What's the most frightening experience you've ever had?
The most frightening experience I've ever had was five years ago. The helicopter I was in crashed into the sea. We had to wait three hours to be rescued.
2 What's the longest you've ever worked offshore?
The longest time I've ever worked offshore is six weeks.

8 1 has worked, studied
2 Have you ever visited
3 joined, have worked
4 studied
5 have known

Tip
Kuwait
Read the top margin note about Kuwait. Provide this other background information.
1934 foundation of Kuwait Oil Company (KOC)
1938 oil found in Burgan fields
1946 first shipment of crude oil
1975 Kuwaiti government obtains 100% of KOC
2005 discovery of superlight crude oil
2006 discovery of deep gas reservoirs

Reading

Gas gathering in Kuwait

- Lead into the topic of gas and gas gathering. Students discuss **1** and **2**. Ask what students know about Kuwait. Refer them to the top margin text. Ask if they know of any oil-rich states that do this.
- Refer students to the vocabulary in the top margin. Remind students that all the statements in **3** are wrong and that they have to correct them.
- Students can do **4** in pairs.

Tip
gather (v) to group together and collect

Additional activity
You may want to look at *An international conference* in the *Reading bank* on p.61.

1 There is always gas in the oil cap. It is dangerous because it could cause an explosion. Oil companies either burn it off ('flaring') or else they try to gather it. This is more ecological.
2 Russia, the USA, and Iran (2010)
3 1 so. It is a new gas field.
2 use it to generate electricity?
3 they are going to use it to meet the country's energy needs.
4 First of all it is dehydrated and the sulphur is taken out.
5 have to boost / increase it at regular intervals.
6 they were operated remotely.
4 b, e, f, d, a, c

Pronunciation

- English is notoriously difficult as words are often not pronounced the way they are written. Students listen and identify the different pronunciations of *-sure* in **1**.
- Treat **3** as a 'fun' pronunciation activity.

1 measure /'meʒə(r)/ pressure /'preʃə(r)/ ensure /ɪn'ʃʊə(r)/
2 1 b 2 e

Project

- Read through the project with the students and discuss where they might find useful information. If you wish, divide the topics up so that students research a topic individually or in small groups.

Tip
dehydration removing water from oil and gas
dew point the temperature at which a gas becomes a liquid
sphere the shape of a ball. A sphere is a naturally strong shape.

Additional activity

Students work in pairs. Student A takes the role of Mahmoud Hamdi. Student B interviews him.

Practise the pronunciation of the question forms, particularly the contractions.

How long have you worked in the oil industry?

When did you begin your career?

Extension

Students find other people to interview.

It's my job

- Lead into the reading passage by asking your students how ambitious they are. Ask them what they see themselves doing in ten and twenty years' time. Find out how important they think it is to have qualifications. Students can do **1–3** in pairs.

1 1 23 years
2 He began as a trainee mechanical technician and then became an apprentice. Later on he did a Diploma in Mechanical Engineering. He became a maintenance engineer and now he is in charge of a platform.
3 110
4 the captain of a ship
5 30,000 barrels of oil a day
6 safety
7 with a meeting with the supervisors
8 He does a daily tour of the platform.
9 being away from his family

3 1 operation, performance, maintenance, breakdown, supervision
2 responsibility, safety

Speaking

Updates

- Students do **1** in pairs.
- In **2**, students listen and identify the two problems from **1**. Then students listen again and complete the table in **3**.
- Students do **4** in pairs. Set up the situation in **5** and refer students to their roles. If necessary, demonstrate the activity with a good student. Students can repeat the activity by reversing roles.

1 1 c 2 d 3 b 4 a

2 1 and 4

3

	Situation 1	Situation 2
Problem	Separator pump	Broken lighting
Update	Broke down again but have fixed it	Can't find the fault
Action	Change to replacement pump Order a new one	Install temporary lighting

4 1 What is the situation with the separator pump?
2 Have you identified the problem yet?
3 I have already installed some emergency lighting.
4 You had better change over to the replacement pump.
5 I have just tested it and it works.
6 We have not located the fault yet.
7 How are you getting on with the broken lighting?
8 It has gone wrong three times this week.

Professional skills

What makes a good manager?

- Students do **1** in pairs. They may add that good managers think about the career development of their staff and are interested them as people / are concerned about their happiness.
- Students can do **2–4** in pairs.

Additional activity
Get students to write replies to the emails giving further updates on what has been happening.
If you like, set up a chain of correspondence across the class.

Writing

An email

- Point out the subheadings in the email: *From, Sent, To, Subject.* Check comprehension by asking *Why is there still a problem with the separator pump? How will the new pump get to the platform?*
- Students use the email as a model and write their own email based on the situation they role played in *Speaking*.

Checklist, Key words

- Go through the checklist and ask students to tick the statements they think are true. Run through the key words and check students' understanding and pronunciation. Refer them to the glossary if necessary.

9 Transportation & storage

Background

The sources of oil and gas are often thousands of miles from where the oil and gas is used. **Oil tankers** were first used in the nineteenth century to carry oil from the Black Sea to the Far East through the Suez Canal. Today, Ultra Large Crude Carriers (ULCCs) can carry two million barrels of oil, which is about two per cent of the world's daily consumption. The transportation of oil is hazardous and improvements in design have been made as a result of lessons learned from accidents such as fires and explosions, sinking, and oil spills. Oil tankers are characterized by a large oil storage area forward (i.e. at the front), and engine rooms, bridge, and quarters aft (i.e. at the back). Most new tankers are **double-hulled** to prevent oil spills. Pollution can also be caused by flushing and cleaning and by exhausting vapours to the atmosphere. Oil tankers load and discharge their cargo at special jetties, or in the case of very large tankers, at special offshore mooring points or intermediate tankers. To maintain stability, the tanker is ballasted with seawater for the return journey.

Oil and gas are transported by **pipelines** over large distances of thousands of kilometres using steel or plastic pipe up to 1.5 metres in diameter. Pipelines are inspected and cleaned using **pipeline inspection gauges** (pigs), which are plugs inserted into the line at special pig traps along the pipeline. Intelligent pigs contain sophisticated devices which measure the condition of the pipe. Gathering pipelines transport hydrocarbons from wells to treatment areas where contaminants are removed before use or onward distribution. Transportation pipelines deliver products over longer distances to terminals where the pressure is regulated to feed into smaller diameter pipe to distribution pipelines for supplying consumers.

Gas is also transported in liquid form as liquefied natural gas (LNG). The natural gas, mainly methane, is processed to remove contaminates then cooled to about –162 °C when it condenses to 1/600th of its volume. The LNG can be transported over long distances by special tankers by road or sea.

* Tip

Large quantities can be transported economically by pipeline but smaller quantities are carried by road or rail. Large ocean-going tankers transport crude oil over long distances. Smaller quantities of oil or oil products over a shorter distance are carried by smaller coastal tankers.

Kick off

- Ask students *Why is it necessary to transport oil and gas over long distances? What are the challenges in transporting oil and gas? How they it be stored? What are the challenges in that?* (see *Background* above). Ask students to do **1**.
- **2** is an opportunity for students to discuss the different forms of transport and to consider the advantages and disadvantages of each.

1 a ultra large crude carrier (ULCC)
b small refined product tanker
c terrestrial (above ground) and sub-sea (underwater) pipelines
d road tanker
e refinery storage tanks
f oil-carrying freight train

Listening

Pipelines

- Get students to start thinking about pipelines by asking them what they already know.

- Get students to read the questions in **2** and then listen to the recording. Play again if necessary.
- Ask students to read **3** and suggest possible answers before listening. Play the recording once and ask students to make brief notes. Play the recording a second time so students can add anything they have missed or to check their answers.

2 1 more economical – cheaper to build and carry larger quantities
2 corrosion leads to leaks
3 build-up of wax and paraffin in colder climates
4 Seawater causes corrosion so pipes have to be protected.
5 either Norwegian offshore gas fields in the North Sea to European terminals or North Africa to Italy

3 1 Pipelines can be attacked or supplies cut off for political reasons.
2 remotely

Professional skills

Preparing visuals for a presentation

- Get students to suggest different ways of presenting visuals (posters, overhead slides, PowerPoint, flipchart) and different sorts of visuals (charts, tables, graphs, maps, photos, pictures, diagrams, etc.). Discuss **1** at class level.
- Allow students to discuss **2** briefly in pairs and then ask a few students to tell the rest of the class. Ask students how a presenter could have improved their presentation.
- Get students to work in pairs for **3**.

1 To communicate effectively, i.e. to help the audience understand a point. People understand and remember more easily when they see things. Visuals make the presentation more interesting, provide excitement and / or shock the audience. They are stimulating and hold the audience's attention.

Additional activity
Get students to prepare three questions they could ask their partner to check whether they have understood and remembered what they said.

Speaking

Using visuals in a presentation

- Get students to look at the visuals and discuss them in the light of what they have read in *Professional skills*. Ask *Will these visuals help the audience to understand and remember? Are they interesting? Do they follow the advice about visuals?* Ask students what they learn from the visuals. Play the recording once. Discuss at class level.
- Explain that in **2**, students are listening to the way Ken moves through the presentation rather than the content. You may want to stop the recording to give students time to write down the answers.
- In **3**, students are required to produce good effective visuals from the information. They can use PowerPoint if it is available, produce visuals on flipchart paper, or make overhead slides. Help students with any unknown vocabulary. Remind them to look again at the advice in *Professional skills*.
- It's important in **4** to make sure that students are not reading the text they were given. Ask them to close their books and use only the visuals

for support. Remind students about active listening. Students may need to try their presentation more than once. As you move around listening to some of the presentations, encourage students to think of ways they could improve. Select one or two good students to give their presentations to the whole class.

1 It carries natural gas from western Siberia to central and western Europe. Compressor stations push gas through. Temperatures are often below –40 °C. The pipeline is on supports to protect it from the frozen ground.

2 1 I'd like to talk about ...
2 you can see some technical ...
3 This photo shows ...
4 there any questions before I move to my next point?

Project

- This is an opportunity for students to find out about pipelines in their country or region. After doing their research, students can prepare a short presentation in small groups. Ask students to write a short report on what they have found out.

Top margin

- Make sure students understand the meaning of *piracy* before they read the text. Ask students what they think of when they hear the word *pirate* (probably the image of a sword-waving sailor with an eye patch and a wooden leg as read about in children's story books). Ask students what modern pirates look like and do. Ask about incidents of piracy that they have heard about.

Additional activity
Get students to find out about some of the worst oil tanker accidents. They can then either prepare a short presentation or write a short text about what they have found out.

It's my job

- Get students to suggest answers to **1** before reading the text.
- In **2** and **3**, get students to work individually and then compare answers in pairs.

1 The ship's crew are not properly trained or they are overtired. Sometimes the crew don't know about local conditions and can make mistakes. Some ships are not well maintained so leaks and spills can easily happen.

2 1 It takes nearly eight km to stop the ship and about three km to turn it.
2 The crew were tired, and there was poor communication between the officers in charge.
3 They could cause damage to the environment.
4 Modern oil tankers are double-hulled.
5 Piracy – he is responsible for the safety of his crew.

3 1 disaster
2 crew
3 shipping lanes
4 avoid

Language spot

Comparative / superlative adjectives

- Read the *Grammar reference* on p.119 with students.
- Students do **1** and **2** individually.
- Get students to look at the information in **3**. Ask them *How much oil does Seawise Giant carry? How long is M/T Hellespont Alhambra? When did Exxon Valdez start service? Which is the longest tanker? Which is the oldest tanker? Which tanker carries the most oil?* Get students to work individually to complete the exercise.

1	1 smaller than	3 more expensive than	5 more expensive than
	2 more efficient than	4 safer than	6 more stable than
2	1 The worst	3 the most expensive	5 the largest
	2 the hardest	4 The most efficient	6 the biggest
3	1 the largest	3 longer than	5 older than
	2 smaller than	4 The longest	6 The newest

Additional activity
(stronger students)
Get students to write a paragraph about either Seawise Giant, M/T Hellespont Alhambra, or Exxon Valdez.

Additional activity
(weaker students)
Get students to find pictures of these supertankers on the internet by typing in the names.

Top margin

- Ask students if they know anything about these ships. (Seawise Giant is the longest ship ever built, M/T Alhambra is one of the largest ocean-going ships, Exxon Valdez was involved in one of the worst shipping accidents, causing enormous damage to the environment.) Get students to discuss the question in pairs.

Pronunciation

- In **1**, stop the recording after 1 and ask students which words are stressed (4,500). Do the same with 2–4. Play the whole recording once more without stopping before students practise in pairs.
- In **2**, students should first decide on how to correct the information. Play the recording to check answers. Students should then practise the dialogues.

Reading

Liquefied natural gas

- **1** is an opportunity for students to share what they already know about natural gas.
- Ask students to do **2** individually. Check their answers before moving on to **3**. Help with any pronunciation problems as you walk round the class.
- Get students to do **4** in pairs or small groups. Ask them to think about the risks from the processes.
- Make sure students understand the word *insulate*. It is sometimes confused with *isolate* – to put or keep something or someone separate from other things or people. Ask students to give you the noun *insulation*. Ask students if they can give examples of materials that are used for insulation.

1 Much natural gas is transported by pipeline, up to about 4,000 km, for example across North America and Europe, but pipelines are not possible across oceans. Liquefied natural gas is transported in LNG tankers over greater distances. Tank trucks can transport liquefied or compressed natural gas over shorter distances.

2 1 liquefaction
2 regasification
3 local pipeline system
4 customers

4 People are afraid of explosions. They are also afraid of pollution.

* Tip

Most good learner's dictionaries such as Oxford Wordpower provide lists of prefixes and suffixes and their meanings in the reference section. In addition, there are several pages of reference about grammar and vocabulary which students will find very useful.

Additional activity

Get students to work in pairs and use the reference pages in their dictionaries to make ten quiz questions relating to vocabulary. Two pairs can then work together to ask and answer their questions. Alternatively, collect the questions from the pairs and produce one quiz sheet with about twenty questions which the students can then answer in pairs or do for homework.

Vocabulary

Suffixes and prefixes

- Put the following words on the board.

  economy (n) *economical (adj)*
  liquid (n) *liquefy (v)* *liquefied (adj)* *liquefaction (n)*

- Underline the suffixes and explain that when we add a suffix to the end of the word, we change the type of word (verb, noun, adjective, adverb) it is. When we add the suffix *-al* we form an adjective; *-ion* forms a noun. Ask students what kind of word is formed with the suffixes *-able*, and *-ly* (adjective, adverb) and if they can think of any words as examples.
- Get students to do **1** and **2** individually and then check their answers in pairs.
- For **3**, ask students if they can think of any examples of words beginning with *re-* where it means *again* (*remake, redesign, redo, reform, rebuild*). Ask them to give examples of words beginning with *un-* where it forms an opposite (*unlock, undo, unwind, unpack*). Students should look through the text individually and find two more examples with *re-* and one example with *un-*.
- Students can do **4** and **5** individually or in pairs.

1

Verb	Noun	Adjective	Adverb
transport	transportation	transportable	
		quick	1 quickly
insulate	2 insulation	3 insulated	
4 fuel	fuel		
5 store	store	6 storage	
separate	separation	7 separate	separately

2 1 transportable 3 quickly 5 store, storage
2 transport 4 insulation 6 separate

3 regasification, reheated, unload

4 1 c 2 g 3 e 4 a 5 h 6 b 7 f 8 d

Checklist, Key words

- Go through the checklist and ask students to tick the statements they think are true. Run through the key words and check students' understanding and pronunciation. Refer them to the glossary if necessary.

10 Refinery processes

Background

An oil refinery takes crude oil and, by several different processes, it turns the oil into useful products. Most oil refineries are situated on sheltered coasts or river estuaries where the crude oil can be unloaded from tankers or from where the end products can be shipped. These locations will also have ample supplies of cooling water. Crude oil is pumped from the jetty to crude **storage tanks** and then to a desalter unit to remove any salt before distillation. The crude is heated in a reboiler and enters a **Crude Distillation Unit (CDU)**. This is a column with trays at different heights fitted with special holes. The vapour rises and the different compounds in the crude **condense** on the trays with the lighter products in the higher trays. The products are taken off by pipes connected to the column. Sulphur is removed by various processes depending on the weight of the product stream. The bottoms from the CDU are separated further in a Vacuum Distillation Unit. The aim is to produce as much high value petrol as economically possible. The heavier products of distillation are therefore broken up or cracked in Catalytic Cracker Units, hydrocrackers, visbreakers, and coking units, and lighter ones combined or changed in molecular shape by isomerization units, alkylation units, and catalytic reformers. The different products are sent for blending and tank storage to await collection and distribution. Sulphur and asphalt are also processed at the refinery. In addition to the many vessels and towers for these processes that you see in a refinery, there are flare towers, power generation units, cooling towers, furnaces and heat exchangers, and a maze of pipe tracks and cables.

Safety is the highest priority at a refinery, so the processes, procedures, and working practices are rigorously defined, communicated, enforced, monitored, and audited. No lighters or matches are allowed, and vehicles and electronic equipment that can cause sparks are restricted to safe areas. Critical plant is shut down regularly and inspected and maintenance or upgrades are carried out. Preservation of the environment is also a high priority. Although incidents are rare, when they do occur, they can have disastrous consequences.

Refinery processes are being continually developed to make them safer and to ensure the environment is protected, not only from the immediate effects of the refinery on its surroundings, but to produce cleaner fuels by removing more contaminants and blending with biofuels to reduce carbon dioxide emissions.

* Tip

Nouns from verbs
evaporate – evaporation
distil – distillation
condense – condensation

Additional activity

Ask students what traditional ways they know of finding water in desert or dry areas.
Ask what stories of survival they know.

Kick off

- Check the meanings of the words in italics: *evaporates, condenses, distilled.*
- Students work together and number the steps in **2** before moving on to **3**.

1 A solar still uses essentially the same processes as a refinery. Some of the basic vocabulary is the same. It takes dirty or salty water and makes it pure and drinkable.
2 1 f 2 a 3 d 4 e 5 b 6 c
3 1 evaporate
2 distil
3 condense

Reading

Refinery processes

- Students should by now know a lot about refinery processes but may lack some vocabulary. Treat **1** as an informal test to see what they already know.
- **2** is to generate interest in the text that follows and aims to build on what they already know. Students should remember that crude oil contains a number of different carbon molecules. These molecules have a different composition and length.

3 1 T 2 F 3 F 4 F 5 T 6 F 7 F 8 T 9 T 10 T

4 The underlying principle is the same, but of course refining crude oil is enormously more complicated.

5 Essentially they change the molecular structures of the longer molecules and heavier oil.

It's my job

- Lead into the listening activity by getting students to imagine the different tasks and duties a refinery manager might have. Play the recording, pausing where you think necessary.
- Students discuss the advantages and disadvantages of the job in **2**.

1 a 150,000
b at the deep-water jetty
c four million barrels
d sulphur and bitumen
e rail
f road tanker
g fuel oil
h aviation fuel
i looking after the 600 people who work at the refinery
j taking care of the environment
k Day-to-day
l shutdowns

Vocabulary

Phrasal verbs

- In **1**, tell students to search for the phrasal verbs in *It's my job* or *Reading*. Use the context and 1–7 to match the phrasal verbs with their meanings. Tell students that it is always important to notice the context that a phrasal verb appears in.
- In **3**, students use each phrasal verb once to complete the sentences.

1 1 e 2 d 3 a 4 b 5 g 6 c 7 b

2 1 stop working
2 transform / change

3 1 wearing out, breaks down
2 shut (the refinery) down, carry out
3 build up, turn into
4 break (it) down

* Tip

Show students that we can sometimes make 'phrasal nouns'.
build up → a build-up
break down → a breakdown
shut down → a shutdown

Additional activity

(weaker students)
Students take turns to test each other by giving definitions and supplying the phrasal verb.

Additional activity

(stronger students)
Ask students to create a story using as many of the phrasal verbs as they can.

Additional activity
Students turn to the *Listening script* on p.127 and practise reading the dialogue in *It's my job* for rhythm and intonation. Make sure that interviewers use a wide range and sound interested and enthusiastic. When they have finished, swap roles.

Professional skills

Conversation and active listening

- Students read the tips in **1** aloud. Practise intonation and showing interest.
- Demonstrate **2** as you listen to the recording again. Stop the recording each time students put their hands up.
- Students work in pairs or groups to do **3**. Alternatively treat this as a milling activity.

Additional activity
Give students some expressions for welcoming visitors and giving a guided tour.
Good morning / good afternoon.
On behalf of..., I'd like to welcome you to...
I am going to show you...
First of all... then / afterwards...
Remember that... is not allowed.
Please follow me...
This is the...
This is where we...
Then tell them to imagine a guided tour of their training centre or school.
Exploit the photocopiable page on p.99 about the terminal and refinery visit.

Project

- Discuss with students the best sources for finding out this type of information.

Listening

Loading terminals

- Lead into the topic by eliciting the names of the most important oil terminals in **1**.
- Read through the questions in **2** checking that students know where the terminals are situated.
- In **3**, elicit from the students what they think the expert will say.
- Read through the questions in **4**. Check that they understand the meaning of *jetty* and *loading rate*.

1 Sullom Voe receives oil from offshore fields. It is then taken to refineries elsewhere.
Fawley refinery receives oil at its terminal and then refines it.
2 a six b 300 c 300,000 d 13%
4 1 $4 bn
2 by pipeline
3 13 km
4 to keep the loading jetty ice-free
5 with special boats
6 It has eight sides. It is supplied by underwater pipes.
7 70,000 tonnes
8 8,000 cubic metres an hour

*** Tip**
Gerund or present participle?
Point out that the gerund is not the same as the present participle of the Present Continuous.
He is swimming. (Present Continuous)
Swimming is good for you. (gerund) Here the gerund is a noun and the subject of the sentence.

Language spot

Forms of the verb

- Read the *Grammar reference* on p.120 together with the students.
- Students complete the exercise.

1 to export	5 accept	9 building
2 to expand	6 to create	10 provide
3 to load	7 constructing	11 to service
4 building	8 to receive	12 to build

* Tip

Read through the top margin note. Elicit from students if they know which parts of a refinery would need to use these different metals.

* Tip

If students ask why *to* in 'need to' and 'ought to' isn't the infinitive, tell that it's because it 'belongs' to *need* and *ought*, not to the verb that comes after them. We can see this from the short answers.
Why do you want to speak to Mr Ali?
Because I need to. (not: ~~*Because I need*~~)
When practising pronunciation, remember that the 'd' of *need* and 't' of *ought* are both assimilated by 'to'.

Speaking

Problem solving

- 🎧 Set up the situation and read through the questions in **1**.
- Students study the useful expressions in **2**. It is important that they understand what follows each of the verbs. They aren't learning a list, they are learning a system.
- Students do **3** in pairs. If you wish, divide the students up by role to begin with so they can work out together what they are going to say.

1 1 corrosion in the feed section
2 yes
3 sulphide attack
4 in ten days' time, when the unit is shut down
5 a nickel or titanium alloy
6 He suggests stainless steel.
7 It should take two men six hours, so twelve hours altogether.
8 Samir needs to speak to Mr Ali; Mehmet needs to make a list of spares.

2 1 *must, need to, should, ought to,* and *had better* all take the infinitive without 'to'
needs + gerund
2 a We should use nickel or titanium.
It should take two men about six hours.
b How long will the work take?
I'll schedule the manpower.
Will you give me a list of the spares?

Pronunciation

- 🎧 Students listen and repeat. You may want to point out that in 1, 3, and 4, /l/ is different from the 'l' in say 'load' or 'light'.

Writing

Plant inspection report

- Students do **1** as a quick comprehension check.
- In **2**, students complete a job card based on the role-play from *Speaking*.

1 1 They drained and replaced the corroded section.
2 Change valves at next shutdown. Weekly monitoring of section, replace valves at next shutdown, request for engineering to check materials and do possible design change to improve corrosion resistance before next shutdown.

Checklist, Key words

- Go through the checklist and ask students to tick the statements they think are true. Run through the key words and check students' understanding and pronunciation. Refer them to the glossary if necessary.

11 Downstream distribution

Background

Downstream distribution is the transportation, marketing, and selling of oil and gas to the consumer in its different forms. Petrol and diesel oil for vehicles is transported to filling stations by large road tankers. There are strict safety and health and environmental regulations applied to transporting fuels and to their storage and sale at **filling stations**. Smoking and the use of mobile phones are banned from station forecourts.

There is little difference between brands and very little brand loyalty from consumers, price being the overriding factor. Supplies are collected from oil depots or directly from the refinery. The main filling station owners are **downstream oil companies**, supermarkets, and **independent retailers**. The main brands may only differ by the additives such as lubricant or detergent for engine protection. Heating oil is supplied directly to homes by road tanker.

The distribution of gas to consumers is mainly by pipeline using the National Grid in the UK. Other countries with larger distances between suppliers and consumers and no indigenous supply rely on LPG (liquefied petroleum gas), not to be confused with LNG (liquefied natural gas). LPG is either butane, propane, or a mixture of both, and is supplied under pressure at normal temperature in cylinders. In colder countries, propane is more common since butane does not vaporize above 0 °C.

Kick off

- As revision, ask students to explain what the unit title means (see *Background* above).
- Ask them to do **1** in pairs, look at the pictures and then work out the customers and the products. Check answers at class level.
- Students should do **2** in pairs. Discuss answers at class level.

⊞ Additional activity

Put the following words on the board and ask students to use the context to work out the meaning. *Trainee, local, supplier, regulation.*

trainee – a person who is learning how to do a job
local – in the area nearby
supplier – a company that sells products
regulation – an official rule you have to follow

Ask students to copy these words and the words from **3** into their notebooks. Say the words and ask the students to identify which syllable is stressed and to underline it. Put the word *depot* on the board as an example. Ask students to read the words to you.

It's my job

- Students should work in pairs to discuss **1**. Ask if they can imagine buying at each of these types of filling stations and what is available there. Ask students to think about the amount of fuel each one sells and how and why that affects prices.
- Get students to do **2** and **3** individually then compare answers in pairs.

1 a small family business
b large oil company
The small independent has to increase business by doing a variety of jobs. Their problem is getting fuel at a cheap price because of their lack of negotiating power. The large oil company has more negotiating power and doesn't need to rely on other forms of income.

2 1 those owned by large oil companies, those owned by supermarket chains, independents
2 sell used cars, do car repairs and sell drinks, snacks, and food. To increase their business – selling fuel isn't enough.

3 the cheapest fuel
4 buying and selling filling stations. She enjoys dealing with getting permission and decommissioning.
5 No, because people will always need their cars if there is no public transport (buses and trains) available.

3 1 d 2 a 3 b 4 c

Additional activity
Play the first part of the recording again and ask students to listen to the greetings. Get them to repeat the first five lines: *Good morning ... Fine, thanks.* Get students to practise in pairs, with the correct friendly intonation.

Additional activity
Get students to make up their own telephoning scenarios and to practise them in pairs.

Speaking

Making arrangement on the phone

- Ask students what sorts of arrangements they commonly make on the phone.
- Get students to read the questions in **1** before playing the recording. Repeat if necessary.
- In **2**, you may wish to stop the recording after each sentence to give students time to note down the missing words.
- Play the whole recording again before students read in **3**. Encourage them to use friendly intonation.
- Get students to work back to back so that they cannot see each other in **4**. After each call, ask them to compare notes on what they have arranged to make sure there is no misunderstanding. Ask them to keep the notes because they will need them in *Writing*.

1 1 Yes. They greet each other in a personal way and use first names.
2 to make an appointment for a meeting with the local environmental officer
3 to meet at her office next Friday 10.30

2 1 Could we meet
2 I'll be out, How about
3 Let's say
4 I'll, seeing you

Professional skills

Telephone skills

- In **1**, try to get students to focus on the difference between making and receiving phone calls and the idea that when they receive calls, they are often unexpected and therefore the receiver is unprepared. When they make a call, they have a chance to prepare in advance.
- Students do **2** and **3** in pairs. Ask them if there are any suggestions they feel they would like to begin to use.

Writing

Emails

- Students do **1** individually. They can do **2** individually first and then compare answers with a partner. For **3**, students can refer to the notes on p.77 that they used for *Speaking*. Get students to read each other's emails in pairs and comment on them.

2 1 With *Hi*. Only with people you know fairly well and who you are often in contact with.
2 Yes. He asks her to have the last two months' delivery reports available.
3 No. She could send a very short *Thanks. See you next Friday* if she wants to.
4 This message is often attached at the bottom of company emails. It is a security message to stop people stealing ideas in the email.

Additional activity
(stronger students)
Ask students to do a short presentation on gas distribution using the diagram given and their notes. Don't allow them to use the *Listening script*. Ask other students to give helpful feedback on the presentation.

Listening

Gas distribution

- Ask students to do **1** in pairs.
- Read the words in **2** with the students before playing the recording. Don't give them the meaning at this stage. Give students a few moments to study the diagram. Play the recording without stopping and ask students to do as much as they can. Play the recording again if necessary. Check answers at class level.
- In **3**, you may wish to stop the recording to allow students time to make notes.
- Help with any pronunciation problems in **4**.

2 B underground storage
C LNG storage
D offtake
E governor
F industry
H domestic customers

3 A push the gas through the system
B store gas in underground cavities / holes
C gas stored as a liquid
D gas is taken off the National Transmission System
E reduces the pressure
F produce electricity
G manufactures products or makes hydrogen
H use gas for heating, water, cooking

Vocabulary

Approximations

- Write the quantities *4,104 litres* and *3,922 litres* on the board. Ask the students *What large number are these two close to?* (4,000). Explain that we often round up / down numbers when we don't need to give an exact figure. Ask students to suggest ways we can express an approximation.
- Read the notes together with the students. Make sure that students realize that some expressions can only be used when the actual number is below the approximation and others can only be used when the figure is above the approximation.

- Get students to work individually and then compare answers in pairs.

1 The temperature at the top of the tower is about / roughly / around / approximately 20 °C.
2 The equipment costs just over / about $3,000.
3 In 2009, oil prices fell to just under / around $80 a barrel.
4 The pipeline is just over / approximately 1,800 km long.
5 This pipe is just under / roughly / 15 cm diameter.
6 I started work just after / about 7.00 a.m.
7 I have worked in Kuwait for just under / nearly / roughly seven years.
8 The container weighs just over / around 40 kg.
9 The rigs are located about / approximately / roughly 150 km from the coast.
10 The estimated amount of gas is about / roughly / approximately 470 billion cubic metres.

* Tip

A paragraph has one main idea. This main idea is often contained in the first sentence, but not always. By reading only the first sentence of each paragraph the reader can usually get an overview of what the text is about. It's not necessary to understand every word in the text in order to understand the gist.

⊞ Additional activity

Get students to write a short report on power generation in their country or region. They should describe the present situation and consider what will be the position in the future.

Reading

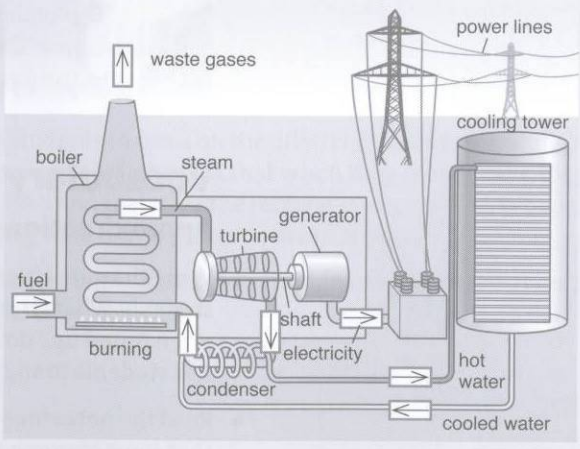
Power stations

- Get students to do **1** in pairs and check answers at class level.
- Get students to do **2** and **3** individually and then compare answers in pairs. Explaining how a process works is a skill required in many fields of work. Students should practise explaining by using only the diagram and should not look at the text. Teachers may want to save **3** until after *Language spot*.
- Get students to do **4** in pairs or small groups. Encourage them to think about non-renewable resources and pollution.
- **5** could be done in class time or for homework.

1 1 ice (solid), steam (gas). We need energy. To change from a liquid state to a gaseous state, energy has to be added. Energy is released when we change a gas to a liquid and a liquid to a solid.

2 1 d 2 c 3 b 4 a

3



4 Oil and gas are finite resources and are running out. Steam turbine generators are very inefficient operating at between 40% and 60%. Burning fossil fuels produces CO_2 which leads to global warming and pollution of the environment. There is now a move towards renewable sources of energy (see Unit 14).

Top margin

- Get students to read and then discuss the question.

Language spot

Time clauses

- Read the *Grammar reference* on p.120 with the students. Write the words *when, as, before,* and *after* on the board and ask students *Which word do we use to show actions happening at the same time? Which words do we use to show actions in sequence? Which word do we use to show actions happening close together?*
- Students should do **1** individually. Point out that more than one answer may be possible. You may want to do 1 as an example with the class.
- Get students to do **2** individually and then compare answers. Point out that there is more than one possibility for some of the answers.

1
1 When / after I left school, I joined a major retailing company.
2 After I check other companies' prices, I decide on my prices.
3 Before I buy fuel, I negotiate a price.
4 As / when the water is heated, it changes to steam.
5 As the steam passes into the turbine, it makes the blades turn.
6 As / when the shaft turns, it creates a magnetic field.
7 After the steam leaves the turbine, it passes into the condenser.
8 As water falls, it cools.

2
1 When / After
2 After
3 When / As
4 before
5 when / after
6 When / After
7 When / After
8 before
9 before
10 When
11 when

Project

- How familiar are your students with liquefied petroleum gas (LPG)? Get them to look at the picture and discuss **1**.
- Students should carry out the research in **2** either individually or in pairs. Allow students to research websites in their own language but insist that the notes should be made in English.

Checklist, Key words

- Go through the checklist and ask students to tick the statements they think are true. Run through the key words and check students' understanding and pronunciation. Refer them to the glossary if necessary.

Additional activity
(stronger students)
Get students to use the notes they have made to prepare a short presentation. They should prepare visuals and notes. Get them to look back to *Professional skills* in Units 3 and 10 for advice on good presentations and preparing visuals. Encourage the other students to think of a question they can ask at the end of the presentations. You may decide to ask students to work in small groups with each student doing part of the presentation. Ask students to decide how to divide up the work and how to link it all together.

Additional activity
(all students)
Get students to write a short report on LPG. Ask them to write four paragraphs to answer the questions in **2**. They may find this easier to do after the presentations.

12 Project management

Background

When an oil company decides to commit a significant amount of capital, it creates a project. Projects differ from daily operations in that they have specific **objectives**, **budgets**, and **deadlines**, and often require dedicated teams. The oil and gas industry carries out massive projects costing billions of pounds which require dedicated project management. A typical project goes through several phases. The first phase is **conceptual design**. The oil company's engineers examine a prospect and look at the various options for its development, focusing on technical feasibility and economics, i.e. its capital costs and the likely return on investment. The company then decides whether to invest further in developing a chosen concept by doing more engineering and producing a more accurate estimate and schedule. This phase is called Definition or Front End Engineering. At the same time, the company negotiates with the governments involved over licensing and with financial institutions. The company may decide to partner with other oil companies for the project. With the approval of these various stakeholders, the project enters the **detailed design phase**. Large projects may be divided into several smaller, more manageable projects: topsides, jacket, pipelines, and onshore terminals, for example.

Design contractors are appointed to develop the previous design work to where materials and equipment can be ordered from suppliers and construction yards can be appointed. The design is developed to produce construction drawings, commissioning plans, and spares and maintenance information for operation. Offshore facilities require to be loaded out on to special barges to be transported and installed offshore. The project then goes through the **commissioning phase** when plant is started, product is introduced, and full-scale production is tested before handover from the project phase to the **operations phase**.

Kick off

- The cartoon shows how different people can view the same task in different ways.
- In **2**, get students to talk about a time when there was a breakdown in communication.

* Tip

Prediction is always a useful skill to develop. Helping students to predict the content of reading texts and listening passages will often show them that they already know something about a topic. Prediction develops expectations and develops a reason for reading or listening. It makes both activities more meaningful experiences.

Reading

Different phases of a project

- Elicit from the students what they think goes on between discovery and production. The ideas they come up with will help them to predict the content of the text. Write their ideas on the whiteboard and try to put them in some kind of order.
- Students do **2** in pairs. Perhaps take the first two comments as examples.
- Students do **3** in pairs then check answers in whole class.

1 Possible answers
Students may talk about wireline logs, well completion, raising money, finding partners, etc.

2 a 2 b 3 c 4 d 7 e 1 f 5 g 6

3 1 deadline
2 bid (you may wish to introduce *tender* as a synonym)
3 budget
4 schedule
5 viable
6 consultants
7 contractors
8 estimate (you may wish to contrast the pronunciation of *estimate* the verb /'estɪmeɪt/ with *estimate* the noun/'estɪmət/)

Listening

Planning and cost

- This section follows on from *Reading* and provides a context for the work in *Language spot*. It also reviews the vocabulary from *Reading*. This is listening for gist, i.e. general meaning. You may have to play the recording more than once for **1**.
- **2** practises listening in depth.

1 a 4 b 1 c 3 d 2
2 1 an estimate
2 five o'clock this evening
3 They are choosing contractors.
4 no
5 because everyone else is depending on them
6 that they'll have to work late
7 prepare a schedule for the maintenance upgrade
8 study estimates for the flare tip upgrade
9 tomorrow when he has a moment
10 some drawings
11 He needs them for a meeting.
12 not very

Language spot

Obligation and necessity

- Students look at the sentences in **1** and match the forms with the definitions.
- In **2**, practise pronunciation.

  have to is usually /hæftə/
  we must do /wɪ mʌs duː/
  mustn't /mʌsnt/ *(the first 't' of mustn't is completely silent)*

- Read through the Tip on the left. Then students make sentences.
- Students work in pairs to do **3**.

1 1 must
2 mustn't
3 have to / need to
4 don't have to / don't need to

* Tip

Many students overuse *must* when telling other people what to do. *Must* is restricted to very strong orders or when people are telling themselves what is urgent or necessary. Explain to the class that this can seem rude and aggressive, especially to native speakers of English. Emphasize that orders often take the form of requests and that *have to* is the most common way of talking about duties.

Additional activity

Tell the students that they are welcoming a new group of students to their school or training centre. Explain the rules and regulations to the students. Talk about

- attendance
- being on time / lateness
- homework
- behaviour and dress
- performance / examination results.

2 1 I need / must / have to find out the cost of parts / work out how long it will take / prepare an estimate for a job.
2 You mustn't / can't / aren't allowed to smoke or bring drinks into the design office.
3 Do I need to / have to wear a uniform?
4 No, you don't have to / don't need to, but you have to / must wear a hard hat.
5 I really must finish it this evening, it (really) mustn't be late!
6 I'm sorry, but I have to / need to finish some work of my own.

* Tip

Collocations
Word partnerships like this are also called collocations.
Collocations are words that tend to appear together in a particular order. Use these examples. We would say
a strong cup of coffee
a powerful drill
but the following wouldn't sound right
a powerful cup of coffee
a strong drill.

It's my job

- **1** practises intensive reading.
- Set a three-minute time limit for **2**.
- Students discuss **3** and do **4** in pairs.

1 1 He is a project manager for an international design contractor.
2 the design for an FPSO
3 that the design is accepted and that his company is invited to develop it
4 It would provide work for hundreds of designers and support staff for several years.
5 He could be given overall responsibility for the design team.
6 He would be in charge of several hundred engineering and support personnel.
2 1 It develops the design provided by the client oil company. It prepares time plans, cost assessments. It also analyses risk and prepares purchase orders for major equipment.
2 They need to understand basic design and construction engineering. They have to know how to control costs, planning, purchasing, and risk management.
3 They need to be a team player but to know how to manage their workforce as well.
3 by working hard and delegating
4 project manager
time plan
top priority
risk management
major equipment
purchase order
cost estimate

Pronunciation

- **1** moves from two-part nouns, to nouns with several pre-modifiers. Write the nouns on the board and highlight the stress.
- Students think of further examples in **2**. If they have trouble doing this, refer them to the *Writing* section of Unit 5.

Project

- Discuss how students will find information about this. Newspapers and magazines often have calls for tenders for large capital projects.

Speaking

Delegating and monitoring progress

- Set up the situation and read through the questions in **1** before playing the recording.
- In **2**, students turn to the *Listening script* on p.129 and find examples of how the different things are done. Elicit from the students and write a clear record on the whiteboard for them to copy. Practise pronunciation.

1 1 They are waiting for the fourth supplier's bid before they can make a decision. Yaseen suggests reminding them of the deadline.
2 They are still waiting for the parts to come from onshore (it's holding everything up). Yaseen suggests that Dave should chase the order up.
3 He asks Kithsiri. Yaseen says he will brief him and give him advice as necessary.
2 1 I want you to remind them of the deadline, I need you to chase the order up, Give me an update later.
2 I want you to tell them to submit it by ten o'clock, I'd like you to ask the maintenance manager to call me.
3 I'll make it my top priority, I'll call them straight after the meeting.

* Tip

Read the top margin quotation and make sure that students understand what it means.
interfere – become involved and try to change a situation

Additional activity

Get students to practise giving indirect orders. Demonstrate the activity with two or three students. Possible cues are
lend me his dictionary
let me borrow his mobile phone
do my homework for me.
Example
Teacher: Gabril, I want you to ask Malik to lend me his mobile phone.
Gabril: Malik, the teacher would like you to lend him your mobile phone.
Malik: Of course, here you are.
Students invent their own requests. Get them to use a variety of methods: *want you to / need you to . . .*, etc.

Professional skills

Delegation

- Students read the definition of delegation and find examples of how well Yaseen delegates in the meeting.

2 Yaseen delegates well, because he gives people tasks and sets time limits for when they have to give him an update. He also makes it clear that he will give Kithsiri all the help he needs with the gas flaring project.

Additional activity

Lead a discussion about delegation. This gives a very positive point of view about delegation.
- What are the problems with delegating?
- How good are people at giving instructions or following orders?
- What personal experience do you have of delegating, or being delegated to?
- Do you think delegation works well in your organization / culture?

Vocabulary

Phrasal verbs

- Read through the list of phrasal verbs. Students do **1**. Make sure that you practise the pronunciation of the phrasal verbs – make the liaison between the verb and the particle, for example *hold up*; *carry out*.
- Get students to practise and personalize the phrasal verbs by thinking of times when they did the things in **2**.

1 1 fall behind
2 carry out
3 hold up
4 chase up
5 catch up
6 get on with

Speaking

Organizing an exhibition

- This task practises the language and concepts dealt with in the previous *Speaking* activity. Appoint the strongest student to be student A, who is in charge of running the meeting. For greater volume, repeat the role-play by swapping the roles around. Monitor discreetly at a distance. Have a short correction spot.

Writing

The minutes of a meeting

- Students can do **1** and **2** in pairs, with whole-class feedback after each exercise.
- Study the example in **3** and take further examples from the minutes. Write them on the board and elicit from the students the full version. Students do the same in **4**.
- For **5**, remind the class about the meeting Yaseen ran. Refer back to the *Listening script*. Get them to work in pairs or groups to write the minutes. If the class finds this too difficult, begin by writing a template / grid on the whiteboard. Elicit the names of participants and topics and fill them in. Refer back to the recording script and fill in the rest of the grid.

1 Four people were at the meeting. These are listed at the top of the minutes. These people are referred to by their initials in the rest of the minutes.
They decided to organize new practice drills, recruit an extra engineer, and chase up quotations for a new pump.

2 The report is organized into four columns.
The number of the item, the description of the topic and the action to be taken, the initials of the person to take action, and the end date for completion of the work.

Checklist, Key words

- Go through the checklist and ask students to tick the statements they think are true. Run through the key words and check students' understanding and pronunciation. Refer them to the glossary if necessary.

* Tip

Minutes are not to do with time, but are a record of what happened at a meeting.
Someone is chosen at the beginning of a meeting to take the minutes.
The minutes always begin with details of who was present and who couldn't come.
Minutes are usually sent out within one or two days of the meeting.

13 Safety & risk management

Background

The oil and gas industry is a hazardous industry, but has a very good **safety record**. Maintaining a high level of safety is at the top of the list of corporate values in the boardrooms of oil and gas companies and their contractors and suppliers. Measurement and reporting of incidents are required by companies and government safety agencies. Deaths and major incidents have to be reported by national law. All incidents need to be reported and analysed for a root cause and recommendations made for improvement, from simple first aid to more serious incidents. Accidents are recorded by the immediate people affected, in an accident log book, after which a formal report is made.

An important tool in safety management is **risk management**. Risk management can be defined as 'the management of any uncertain event that might affect what we wish to achieve'. This definition highlights the two things we have to consider, the probability (uncertainty) and the impact (effect). Before starting a task, supervisors must carry out a risk assessment to identify hazards and assess the probability and impact. If these are not considered low, actions must be proposed and implemented to reduce the risk to an acceptable level.

A good safety record starts with good design. All installations require rigorous analysis of any design for its safety implications using established codes and standards. Since the Piper Alpha accident in the North Sea that killed 167 men in 1988, UK offshore operators must submit a Safety Case identifying safety critical technical and managerial risks and how they will manage them. This is then approved by the Health and Safety Executive (HSE). The approach has been adopted by other countries and replaces a system of individual inspections against codes, standards, and regulations which became unworkable.

Additional activity

Help students make sentences to practise the words in context.

Examples

You wear a hard hat to protect your head.
You wear a harness to hold you securely.
Gloves protect your hands from knocks and burns and keep them warm.

Kick off

- Read through the equipment in **1** for pronunciation. Remind students that *equipment* describes the things you need to do a job. It is uncountable, i.e. *some / a piece of equipment*. Students do **1**.
- Refer students to the definitions of *hazard* and *risk*. Students do **2** and **3** in pairs or groups.

1 a ear protectors
b overalls
c gloves
d lifeline
e eye protectors / goggles
f safety boots
g hard hat
h harness

2 1 a using noisy equipment without ear protectors
b welding without goggles
c working without a harness / lifeline
2 a damaging eyesight / becoming blind
b damaging hearing / becoming deaf
c falling

3 Wearing goggles can reduce the risk of hurting your eyes. Ear protectors can reduce the risk of damaging your hearing.

* Tip

Teach *blame* and *fault*.
blame – (v) think or say that a person or thing is responsible for something bad that has happened
fault – (n) the responsibility for sth wrong that has happened or been done

Additional activity

Lead an all-class discussion on safety and accidents.
Do accidents happen or are accidents caused?
Is an accident always someone's fault?
Is it important to find someone to take the blame?
How can we make sure that similar accidents don't happen again in the future?

Speaking

Warnings and reminders

- Set the scene for **1**. This kind of talk is known as a 'toolbox talk'. Students read the questions, then listen and answer them.
- Students do **2** in pairs. Play and pause the recording to allow students time to do **3**. Students practise saying the sentences aloud. Point out that most of the sentences use the imperative.
- Students do **4** in pairs. Refer them to the *Listening script* on p.129.

1 1 They are working on the west side of the platform. It's windy and slippery.
2 overalls
3 lifelines and harnesses (later on hard hats and eye protectors)
4 seabirds

2 A isn't wearing a lifeline.
B isn't wearing a hard hat. He is working directly under A. A has left tools lying around that could injure B.
C isn't wearing eye protectors.
D is well equipped, but only has one hand and one leg on the rungs as he climbs the ladder between levels.

3 1 are a must
2 Remember to
3 Make sure
4 Never
5 Don't leave
6 Mind
7 Can I remind you
8 Don't forget to
9 watch out for

Listening

Target, metrics, and risk

- Students read the definition in **1** and discuss if it possible to eliminate risk.
- In **2**, you may want to focus on what Peter Astley says about ALARP again as it is quite a difficult concept. ALARP recognizes that zero risk doesn't exist. Its purpose is to show that the time and money spent on reducing a risk further is not reasonable.

2 1 No, he thinks it is possible to reduce it, but that there is no such thing as zero-level risk.
2 when they want to present the design safety case
3 to reduce the number of accidents and hours lost to a minimum
4 two shifts lost for 100,000 man hours worked
5 measuring and recording and keeping records to see if targets are met

3 Companies are afraid of nationalization as they could lose their controlling interest in exploiting a hydrocarbon source, and all their investment in money, time, and equipment.

4 1 It will lose money.
2 a The area can become a war zone, like Kuwait.
b Nationalization means that a foreign company can be left with little or nothing to show for its investment.
c They can say before we agreed to a share of 10%, now we want 50%.
3 In Nigeria, some rigs and oil workers have been attacked. If it gets too dangerous, it will become difficult to recruit people.

Language spot

First conditional

- The main difficulty students have with the first conditional is they think that *will* should appear in both clauses as they refer to future events.
- Students do **1–3** in pairs. Check answers in open class.

1 1 'if' introduces the condition clause
2 *if* + Present Simple, *will* + infinitive (without *to*) for the result clause
2 won't
3 1 won't let you, don't wear / aren't wearing
2 are, we'll start drilling
3 you accept, you'll have to
4 don't find, will lose
5 won't fly, gets

Additional activity
Students often find it difficult to distinguish between *won't* and *want*. Carry out some training with your students. Tell them to put their hands up each time they hear *won't*.
e.g. You say: *won't... want... want... want ... won't... want... won't... won't.*

Additional activity
Consequences
Set up a chain using the first conditional. Write the first sentences up on the board and elicit a continuation for sentence 2. The consequence of sentence 2 becomes the condition clause of sentence 3 and so on.
If I pass my course, I'll become a technician.
If I become a technician, I'll...

It's my job

- Students read the top margin note about the Piper Alpha disaster and answer the question in **1**.
- Set students a time limit of four to five minutes to do **2**.
- For **3**, students will have to read the second paragraph intensively. Allow them to confer / compare their answers in pairs.

1 It was the result of poor design, management systems, and human error.
2 1 He did a degree in chemical engineering and then did several safety courses.
2 It goes to the health and safety executive panel for examination and approval.
3 The disaster caused the introduction of regulations covering operations and maintenance.
4 He carried out a risk assessment.
5 He thinks that it is very good, but that deaths, serious injuries, and lost time accidents still happen.
3 1 DSC 2 PSC 3 DSC 4 PSC 5 DSC

Project

- Discuss with students how best to search for this information. Try to tailor the search to the areas where your students work.

Reading

One day in Texas

- Read through the vocabulary in the top margin. Exploit the photograph to generate interest. Set a time limit to read the text and answer the true / false questions. In feedback, ask students to justify their answers.

1 F (it had been shut down for two weeks)
2 F (there were orders)
3 T (someone had switched it off)
4 F (this happened automatically)
5 T
6 F (it escaped up a vent into the open air)
7 F (even though it has been recommended, BP said it didn't need one)
8 F

Writing

Risk assessment report

- This section introduces students to another writing task based around forms and reports. Look at the top part of the form first, explaining its organization. Students do **1** in pairs.
- Compare the full comments in **2** with their abbreviated form in the report. Ask students to point out the type of words that are missing.
- Students complete the third part of the report in **3**.
- **4** allows students to personalize what they have learnt. If they cannot think of any hazards, get them to invent them!

1
1 personnel not wearing hard hats
2 poor lighting
3 Not wearing hard hats. Probability of harm M = medium.
4 Not wearing hard hats. Degree of harm H= High.

2
1 some personnel not wearing hard hats
2 regulations in place
3 discuss with D4 area supervisor
4 measure lighting levels, install portable lights until permanent lights installed

3
Tidy up the area. Enforce regulations.
Regulations about food and drink in place.
Low risk.

Additional activity

There are a number of phrasal verbs in the text. Get students to match them with their definitions.

set off start up turn off fill up
build up burn off blow up

a explode
b make an engine or process work
c fill completely
d increase
e remove excess energy by burning
f move the switch on a piece of machinery to stop it working
g do something that starts a reaction, example: a bomb, an alarm

You can then ask them to complete the sentences with the phrasal verbs.

1 We need to evacuate the area – something has _____ the smoke alarm.
2 Park the van and _____ the ignition.
3 Wax is _____ in the pipeline, we need to clean it.
4 It takes about 24 hours to completely _____ the tanker with crude.
5 Isn't it a waste of gas to _____ it _____ with a flare?
6 It is difficult to _____ the engine _____ in cold weather.
7 Sharif was lucky, the unit _____ and destroyed the refinery while he was on holiday.

* Tip

Practise the sentences for pronunciation. Even though we should not generally expect our students to use contracted forms, it is important that they can recognize them in fluent connected speech. In addition, there is often a double contraction in the negative, i.e. *they shouldn't've done it.*

Back-chaining is a useful practical technique for helping students repeat difficult forms and phrases. With back-chaining we start from the end of the sentence or phrase.

a *done it*
b *'ve done it*
c *shouldn't've done it*
d *they shouldn't've done it*

Language spot

should have done

- The questions in **1** build up and test the underlying concept of *should have done* (*should* + perfect infinitive). Make sure that students realize that the modal + *have done* remains the same. i.e. We **don't** say *he should ~~has~~ done.*
- In **2**, do the first two sentences as examples and get the students to do the rest on their own.
- Put students in pairs or groups to do **3**. Then write the order for each group on the board. Try to find pairs / groups where they have a very different order. Ask them to explain their reasons to the class as a whole and lead a whole-class discussion.

1 1 no 2 yes 3 unreal 4 the past

2 1 The operators should have followed the instructions on the instrument panel.
2 The system shouldn't have used a blow-down drum.
3 BP should have fitted a flare system.
4 Someone shouldn't have turned off the alarm.
5 Refinery managers shouldn't have allowed vehicles into the danger zone.

Checklist, Key words

- Go through the checklist and ask students to tick the statements they think are true. Run through the key words and check students' understanding and pronunciation. Refer them to the glossary if necessary.

14 Industry future

Background

The oil and gas industry is changing. The reserves that have been easy to exploit are running out, but demand is still high. World consumption has doubled in the last 30 years and will double again in the next 30 years. This is in spite of very high price rises. But the fossil fuels – oil, gas, and coal – are finite resources and they generate carbon dioxide, which contributes to climate change. So scientists, engineers, and economists are looking at alternative forms of energy. They are also looking at more efficient ways of producing and using energy and reducing the emission of pollutants.

Meanwhile, oil and gas companies are widening their exploration activities to include the Arctic, Antarctic, and deep water areas. Engineers face huge challenges designing equipment to cope with low temperatures, storms, and earthquakes, while still providing safe working conditions and protecting fragile environments.

Carbon capture is being seriously considered as a way to reduce carbon emissions. In this process, carbon dioxide is removed from fuel before or after combustion and is then compressed, transported, and stored away from the atmosphere. Equipment is being built to use depleted North Sea wells, platforms, and pipelines. The technology is well proven since natural gas is often re-injected to increase the flow of oil from a well. Carbon capture is expensive, but costs can be offset against carbon taxes.

Renewable sources such as wood, waste, and alcohol from sugar are becoming widely used. Development of biomass from algae is also promising. Both steam reforming, that is, generating hydrogen from fossil fuels, and electrolysis – generating hydrogen from water – could reduce pollution in cities by providing hydrogen to charge fuel cells in vehicles. This would reduce emissions from the vehicle, but would not reduce overall carbon dioxide emissions. More sophisticated batteries are also being developed, but these too have to be supplied with energy produced from fuel at a power station.

Investment in wind and wave power, geothermal, solar, and nuclear energy is also increasing, but there appears to be no one solution to provide enough **clean energy** in the future. A mix of solutions is likely with oil and gas playing a large part for many years to come. Demand for qualified engineers and technicians in the oil and gas industry is already high and will continue to grow.

Additional activity

When you have finished your discussion in *Kick off*, you may want to look at *Peak oil* in the *Reading bank* on p.54.

Kick off

- Get students to work in small groups to do **1** and **2**.

Language spot

Predicting the future

- Get students to do **1** individually and then compare answers in pairs.
- Read through the *Grammar reference* on p.121 with students.
- Get students to do **2** and **3** individually and then check answers in pairs.

1 1 S 2 N 3 N 4 N 5 N 6 N 7 N 8 S

2
1 may do
2 will
3 'm meeting
4 might try, could look
5 won't
6 could

3 Possible answers

1 I'm not sure. I might take the exam next month or I might take it next year.
2 I'm not sure. They may be working in Algeria or they might be working near Greenland.
3 I'm not sure. We could make electricity from water or we could make it from the sun.
4 I'm not sure. I may look for a job in exploration or I could look for a job in refining.
5 I'm not sure. It could last six months or it might last a year.

Additional activity
(stronger students)
Choose a strong student in each group and ask them to use the ideas from their group discussion to prepare a short presentation about renewable energy in their country. Encourage other students to help their presenter by preparing visuals and helping to structure the presentation.

Listening

Renewable energy

- Get students to identify the pictures in **1** and suggest other ways of making electricity.
- Play the recording once for **2**.
- You may want to stop the recording to give students time to note their answers in **4**.
- Students should do **5** in pairs. They can do **6** in pairs or small groups.

1 wind, water in a river, sun, wave

2 1 solar 2 wind 3 water 4 wave

3 1 b 2 d 3 a 4 c

4

	Advantages	Disadvantages
Solar energy	Renewable, produces lots of energy in sunny countries	Sun doesn't always shine, especially in some areas of the world
Wind power	Renewable, can be used offshore	Wind doesn't blow all the time. Offshore turbines need to be strong
Hydroelectricity	No air pollution	Dams damage the environment
Wave power	Lots of energy	Machines must be very strong

5 1 wind energy
2 solar energy
3 hydroelectricity

6 Other renewable energy may include geothermal energy, nuclear energy, tidal energy, biomass.

Additional activity
(all students)
Get students to write a short report for a local magazine on the future of the oil and gas industry in their country.

Additional activity
(stronger students)
Get students to prepare a short presentation on the future of the oil and gas industry in their country.

Speaking

Talking about the future

- Give students just five minutes to decide individually for **1**.
- Encourage students to explain their reasons in **2**. Tell each group that they must reach a consensus. Compare the opinions of the different groups at class level.

Top margin

- Get students to work in pairs. They can look at the BP logos to help them think about it.

Reading

Cars of the future

- Discuss the pictures before students do **1**.
- Get students to do **2** and **3** individually, and then compare answers in pairs.
- Draw together the ideas for **4** from different groups at class level.

1 Alternative energy sources include solar power, electricity (batteries), hydrogen, and biofuels from plant matter.

2 1 B
2 D
3 A
4 C

3 **Paragraph A** Ensuring there is enough oil in the future, concerns about pollution.
Paragraph B hydrogen
Paragraph C Steam reforming. It produces carbon dioxide that is a greenhouse gas.
Paragraph D It produces electricity from hydrogen and oxygen in the air. Most vehicles use petrol at the moment because there are very few hydrogen filling stations, but plenty of gasoline stations.

Project

- The introductory notes provide information about carbon capture. Students can do their research as homework.

It's my job

- Revise the differences between verbs, nouns, and adjectives then get students to do **1** individually.
- Discuss **2** at class level.
- Make sure students can pronounce the words in **3**.
- Get students to do **4** individually, then check answers in pairs.
- Get students to discuss **5** in small groups and then draw ideas together at class level.

1 1 analytical 2 analyse 3 analysis

* Tip

The suffixes *-ist*, *-ian*, *-er*, *-or* usually indicate a person, e.g. scientist, electrician, teacher, director, but analyst is spelt *-yst*.

Additional activity

Put the words from **3** on the board. Ask students to close their books and try to remember how the words were used in the text.

4 1 Business Studies
2 He speaks Kazakh, English, and Russian.
3 Analyse company accounts, write reports, use computer programs to do financial modelling, compare different companies, work out the value of oil and gas reserves.
4 looking at what will happen if the company decides to do different things
5 Team members have different knowledge and experience, teams can do more by working together.
6 to increase his expertise

Top margin

- Get students to consider the question in pairs then share ideas at class level. Get students to research a famous engineer or scientist that they are familiar with and try to find out if they worked alone or in a team.

Vocabulary

Compound nouns / adjectives

Additional activity
(weaker students)
Work with students to form the compound nouns before they decide on which words to use in each sentence.

Additional activity
Get students to write sentences with the compound adjectives in **2**.

- Read the introduction with students. Get students to do **1** and **2** individually and then compare answers in pairs.

1 1 fossil fuels
2 oilfield
3 filling station
4 renewable energy
5 global warming
6 Fuel cells

2 1 a vehicle powered by a fuel-cell
2 a diver who dives in deep sea
3 a tanker with a double hull
4 a pipeline 20 kilometres long
5 pressure at the head of the well

Professional skills

Working in a team

- Discuss **1** at class level.
- There is no definitive answer to **2**, but encourage students to justify their choices.
- In **3**, get students to first identify the points they agree on and then discuss the final five.
- Discuss **4** at class level.

Writing

Sending a covering letter

- Check that students understand that a covering letter is sent together with other documents / enclosures.
- Get students to do **1** and **2** individually and then compare answers in pairs.
- Students can complete **3** in class time or for homework.

1 1 transportation of oil from well AB178 to Seatown (the coast)
2 a pipeline
3 arrange a meeting to discuss the report
4 Oraz is going to Kazakhstan next month for three months.

2 1 completed the analysis
2 You asked me
3 I am attaching
4 As you will see
5 The next task
6 arrange a meeting

3 Possible answer

Dear _____

I have now completed the analysis for the route of the pipeline from well AB178 to Seatown. You asked me to consider the best route for the pipeline.

I am attaching the analysis with this email. As you will see I have studied the three routes X, Y, and Z. My calculations suggest that route X is the most feasible. The next task is to put together a project group.

I would be grateful if we could arrange a meeting for a discussion of the report. I am on holiday next month for three months, so, if possible, I'd like to meet before then.

Best wishes

_____

Checklist, Key words

- Go through the checklist and ask students to tick the statements they think are true. Run through the key words and check students' understanding and pronunciation. Refer them to the glossary if necessary.

15 Careers in oil and gas

Background

The industry employs hundreds of thousands of people internationally through owners and operators, contractors, suppliers, and service providers. A wide range of disciplines are employed in the upstream and downstream sectors and in transportation and distribution: scientists, engineers, technicians, accountants, and commercial and administration personnel. People with a range of skills from project managers to manual workers all have a part to play in supplying the world with oil and gas. Employment opportunities exist in offices in large cities, onshore plants and refineries, offshore facilities, and factories. **Experience** is valued as well as **qualifications** and there are ample opportunities for progression and the development of an interesting and well-paid career.

The first step in choosing a career is to decide which specialist area you wish to focus on and the qualification level where you want to start. Useful help can be obtained from career advisors at school. Some people start out getting practical experience with no initial qualifications. There may be national vocational qualification schemes where you can become qualified by gathering evidence of your work which is then independently assessed to prove your ability to employers. A more common approach is to choose an **apprenticeship** or a position as a **trainee** with a structured training plan, or for professional careers, a **university degree** in either a general topic such as accounting or mechanical engineering, or a more specialist degree in petroleum engineering, for example.

The points of contact with the industry are the Human Resources (HR) departments of the various companies. The HR department contributes to meeting the strategic goals of a company by fitting its values and objectives with the needs and aspirations of its employees. The HR department handles recruitment, induction, training, pay and benefits, pensions, and performance appraisal. HR departments have to operate increasingly in an international environment and have to understand the culture, tax, and regulatory practices in the countries in which they operate.

Job applications usually start with a **curriculum vitae (CV).** This should be a brief summary of personal details, qualifications, and experience and should be sent with a covering letter. Studying and understanding the background, values, and objectives of a company will help an applicant to provide a CV which will stand out sufficiently to achieve an interview with the HR department and with potential department managers. Some competence in a second language is often a significant advantage.

Most forward-thinking companies carry out regular performance appraisals where supervisors and employees together discuss short- and long-term career plans and training needs and ensure they are implemented. This statement from BP is a good example of the values of forward-thinking companies in the oil and gas industry.

To BP, the most important form of energy comes from the people who work with us. They help us push the frontiers, succeed, and make a difference.

Additional activity

Get students to work in teams of four and appoint a note-taker. Give them two minutes to write down as many jobs in the oil and gas industry as they can. Give one point for each job they have thought of including cleaners, cooks, and teachers.

Additional activity

Play a simple version of *Twenty questions* where students think of a job. Other students ask *yes / no* questions to try to guess what they do.

Kick off

- Get students to guess what each person in the pictures does in **1**. Then ask them to do **2** and **3**.

2 Outdoors: 2, 3, 7
Indoors: 1, 4, 5, 6, 8

Vocabulary

People and jobs

- Read the introduction and ask students to give examples of jobs with these suffixes.

- Get students to do **1** in pairs.
- You could set **2** for homework. Put together a list with all the students' suggestions.

1
1 welder
2 electrician
3 supervisor
4 driller
5 technician
6 operator
7 planner
8 geologist
9 surveyor
10 scientist

Additional activity
(strong students)
Ask students to put these things in order of importance for them and compare their answers in groups.
- interest / job satisfaction
- freedom to travel
- salary
- opportunities for promotion
- status
- job security
- family wishes

Reading

Jobs in oil and gas

- Allow pairs a maximum of five minutes to discuss **1**, then discuss at class level.
- Get students to do **2** and **3** individually and then compare answers. In **3**, they may need to discuss whether an engineer has the opportunity to travel – the answer is not in the text.
- Check that students understand the meaning of the words in **4** first, then get them to work individually.

2
labourers
apprentices
technologists
engineers

3

	Office job	College education	University education	Opportunity to travel	Overtime
Labourer	✗	✗	✗	✔	✔
Apprentice	✗	✔	✗	✔	✔
Technologist	✔	✔		✔	
Engineer	✔		✔	✔	

4
1 promotion
2 overtime
3 wages, salary
4 office job
5 certificate
6 degree

Additional activity
Get students to research a job they would like to do. Get them to write a report about the job and explain why they have chosen it.

Additional activity
(stronger students)
Get students to use the information they have found to produce a short presentation.

Project

- You may decide to allow students to choose one category to research. Students may want to research in their own language but notes should be made in English.

Top margin

- Get students to discuss in pairs or small groups and to share their ideas with the rest of the class.

Additional activity
Patrick's uncle helped him find a job. Ask students if it is fair to use contacts such as family and friends to get jobs.
Ask how important it is to know someone and have good contacts in their culture.

Listening

Into the future

- The first exercise tests the students' ability to get the gist of a conversation.
- In **2**, students listen again for detail. Pause each time you hear something that answers a question. In feedback, ask students to justify their answers.

1 Walid and Patrick have both found jobs. The other two are still looking.
2 1 F – it finishes next month
2 T
3 T
4 T
5 T
6 F – he might apply for a course that starts in September
7 T
8 F – his uncle helped him get the job

*** Tip**
Students often use *will* to express the future. This is OK as it makes it clear that they are talking about a future event, but native speakers use *will* far less often so it is important for students to understand why different ways are used.
Will is used
- to talk about fixed future events: *He **will** be twenty next month.*
- to make predictions: *Companies **will** continue to discover new sources of oil.*
- for spontaneous decisions and offers: *Don't walk, **I'll** drive you home.*
- after certain verbs, e.g. think / hope. *I think I'll go for a walk. I hope he will arrive next week.*
- in conditional sentences, for promises and threats. *I will call you tomorrow. I will make a complaint.*

Will can also be used to make a request. *Will you answer the phone, please?* (= I want you to answer the phone).

Language spot

Talking about the future

- In **1**, students match the ideas in 1–5 with the language in a–e.
- In **2**, students decide which sentences in **1** use which form of expressing the future.
- Be willing to listen to students' reasons for choosing a particular way of expressing the future in **3**. So much depends on how they interpret the situations.

1 1 d 2 c 3 b 4 e 5 a
2 **going to** c and d
will a
the Present Continuous + a time marker e
the Present Simple b
3 1 are flying
2 am going to work, I am going to do
3 happens (it is a regular occurrence)
4 I'll do / I'm going to do
5 are having / have
6 am going to visit / am visiting

*** Tip**
A gap year is usually a year between high school and university, or between the end of higher education and work. Young people often use it to travel. Some get involved in volunteer or charitable work and work experience.

It's my job

- Discuss exploration at class level, then get students to do **1** individually.
- Students do **2** in pairs, then discuss in open class.
- Read the Tip and discuss with students what a gap year is.
- Get pairs to share their ideas for **3** at class level.

1 1 no
2 travelled around the world
3 students' own answers
4 the wide variety of tasks
5 English and French
6 students' own answers
7 Yes. It's well-paid. There are opportunities to study and travel.
8 He's away from home for long periods of time.

Vocabulary

Finding jobs

- This vocabulary is not strictly to do with oil and gas, but is essential for students wishing to apply for jobs and placements. Get students to read through the sentences and check the words in bold for pronunciation. Students match the words with the definitions.

1 covering letter
2 fill in
3 experience
4 qualification
5 candidate
6 interview
7 application form
8 placement
9 internship
10 referee
11 vacancy /-ies
12 train
13 recruit
14 CV
15 apply for

Additional activity
Place the students in two lines (A and B) facing each other. Give them three to four minutes to ask each other and answer the questions. When the time is up, ask the students in row B to stand up and move one chair along. Repeat the activity until the people in each line have interviewed everyone else. (Maximum six students.)

Speaking

Talking about your future

- This section helps students to be able to talk about themselves fluently and confidently, and answer basic questions about themselves. Students describe their experiences of trying to find work placements / internships in **1**.
- Students can do **2**–**5** individually then check answers in pairs.
- Students are now fully equipped to handle some basic interview questions and to give personal details and state their ambitions and preferences. Get students to write their own scripts in **6**. Go round the class checking these carefully so that they are word perfect.
- Students do **7** in pairs. They should take turns to be the interviewer and the candidate. The first time, give them the script to make sure that they can ask and answer without making mistakes.

2 1 geology at Nottingham University
2 a placement in an exploration company for the summer
3 field trips
4 to work in an exploration company as a wireline logger or seismic engineer
5 send a CV and a letter of application
6 no

3 1 Could you tell me something about yourself?
2 Have you got any experience of exploration?
3 What do you see yourself doing in the longer term?
4 Would you prefer to work in an office or in the field?

4 1 in 2 of 3 at 4 in / with 5 for

5 1 Well, my ambition is to work in an exploration company like yours, perhaps as a wireline logger or a seismic engineer. But first of all, I'd like to get some first-hand experience of these jobs.
2 I'd rather work in the field.

* Tip

CV stands for *curriculum vitae*, a Latin expression meaning the course of someone's life. *Résumé* is the North American equivalent.
A letter of application is also commonly called a covering letter.

Additional activity

Discuss these questions with the class.
In some countries, businesses expect a covering letter to be handwritten. Why do you think it is the case?
Do you think you should include a photograph with your CV or letter of application? Why / why not?
Should businesses expect to know personal details about your age, health, family, and religion when you apply for a job?

Writing

A CV and letter of application

- Students complete the letter in **1** with the words from the list.
- Students can do **2** in pairs. **3** can be set for homework.

1 1 Dear
2 Thank you very much
3 As I told you
4 I would now like
5 Please find attached
6 if you need them
7 I look forward
8 Yours sincerely

2 a 2 b 1 c 6 d 4 e 5 f 3

Checklist, Key words

- Go through the checklist and ask students to tick the statements they think are true. Run through the key words and check students' understanding and pronunciation. Refer them to the glossary if necessary.

Instructions for communication activities

General principles behind the communicative tasks

1 The tasks are designed to practise the grammar, vocabulary, and functional language from the units. They are there to help develop students' fluency, but also to encourage students to use the language they have been taught accurately.

2 Information gap tasks encourage students to exchange information by asking and answering questions. We are interested that students successfully complete the tasks, but hope that they do so with a reasonable level of accuracy.

3 Many students may be unfamiliar with communicative tasks so will need to be taught how to do them. It is often easier to demonstrate an activity to the class with a student than to try to explain it.

4 In general, teachers should not correct students in the middle of an activity unless there has been a breakdown of communication caused by inadequate language. Teachers should monitor their students at a distance rather than standing over them. The teacher should make a few notes that deal with mistakes that appear to be common to the class as a whole. It can be a good idea to round off an activity with a brief 'correction spot', although this should be kept short. Where we can, we should always emphasize the positive.

5 In general, students carry out these communication activities in their pairs and groups simultaneously. Where possible, take the time to arrange tables and chairs so that students are working together. If space is limited, it can be useful to play some music to stop students being distracted by what is happening in other groups.

General information for information gap activities 6, 9, 11

1 Divide students into pairs.

2 Give worksheet A to one student of each pair, and worksheet B to the other. Do not let them look at each other's worksheet.

3 Student A asks questions and asks questions and obtains information from Student B and completes his / her worksheet.

4 The students switch roles, with Student B asking Student A questions and completing his / her worksheet.

5 When they have both completed the task, the two students look at each other's worksheets and check their answers.

General information for role-play activities 1, 8, 10, 13

With role-play activities, it can be useful to put students into sub-groups by their role before beginning the group work activity. This helps to students share language and ideas, and gives the teacher the opportunity to clear up misunderstandings, help with language, and introduce further information or prompts. Weaker students can learn from the stronger ones. With key roles, make sure that these are given to the stronger or most outgoing students.

Unit 1

Follow the general information for role-play activities. Choose one student who will act as the host and make the initial introductions. For volume of practice, get students to swap roles. You can round off the activity by getting students to be themselves.

Unit 2

You can give the students the picture composition as it stands and ask them to work in pairs or groups to create the story. Otherwise, you could cut the story up and get students to re-arrange it, or treat it as an information gap activity where students describe their pictures to each other and put them into the correct order. As a minimum, the story should be narrated in the Past Simple. Do not allow the 'dramatic present'! If students seem comfortable using the Past Continuous and Past Perfect, allow this too. Once the narrative is established, run through it again and get the students to imagine what happened between the pictures. Finally, you can get students to create what people are actually saying in each of the scenes. Get them to write the story for homework. This could take the form of a narrative or a magazine article with sub-headings.

Unit 3

Photocopy one sheet per pair of students and cut them into squares. Put the squares face down on the table. Students work in pairs and take turns to turn over the cards one at a time. After both cards are turned over, they must be turned face down again if there is no pair.

When they see a picture, they must say what the picture is. If they pick up a card with writing, they read it aloud. If they pick up a pair, they keep the cards and have another go. The winner is the person with the most pairs at the end.

Unit 4

1 Set the scene and get students to read the text about Madranaa. Check comprehension.

Answers

1 in the north part of the island
2 Poor. There is no road from north to south. It is divided by a mountain and rainforest.
3 from fishing and farming
4 It has beautiful beaches and there is a coral reef for diving. It has a rainforest with rare birds and wildlife.
5 Poor. There are only five doctors on the island, life expectancy is low, and there is a problem with malaria. Boys go to school to the age of twelve.
6 Kasmara is a threat. It wants the oil and has claims on Madranaa. Boats and villages are often attacked by Kasmaran pirates.

2 Students work in pairs and discuss generally how to improve the lives of the islanders.

3 Put students in groups to discuss how to spend the first three years' income from oil. The island has a choice between tourism and industry, and may need to do something to protect itself against its bigger neighbour.

4 Continue until the class reaches a general agreement.

Unit 5

Students work in groups and answer the questions. All the answers are in the unit. Insist on accurate language and full answers.

Unit 6

Use the pictures to generate interest in the topics. Follow the general information for information gap activities. Students work in pairs.

Unit 7

Choose a good and confident student and run through the conversation. Emphasize the use of corrective stress. Get other students to practise the activity across the class in open pairs, and then in closed pairs. Get them to practise the dialogue from the prompts. Complete **3**: *length, width, depth, weight.*

Students practise dialogues based in the prompts in their pairs.

Unit 8

Follow the general instructions for role-plays.

Extension. Get students to imagine other 'Old-Timers' and characters.

Listen out for the correct use of the Past Simple and the Present Perfect.

Unit 9

Follow the general instructions for information gap activities.

Unit 10

Follow the general instructions for role-plays. Get students to work in groups of four. Give the refinery engineer role to the strongest student.

Unit 11

Follow the general instructions for information gap activities.

Unit 12

This game practises the phrasal verbs that are introduced in the course. Photocopy the sets and get students to work in pairs or groups. Insist that students use the phrasal verbs correctly in a sentence.

Unit 13

Follow the general instructions for role-plays. Get students to work in groups of four.

Lead into a whole-class discussion on who bears the overall responsibility for what happened.

Unit 14

Put students into groups and allocate a time frame to each of the groups.

Go round the class and prompt / monitor. When students are ready, form new groups with a student from each of the original groups.

Unit 15

This is a fun activity that nobody should take too seriously. However, emphasize that students need to be fair and not just to vote for their friends. You could use yourself as a model to show them what to do:

Example

'Hello, I am an English teacher and I am going to give you my reasons why I should be allowed to stay in the balloon. I know many of you would love to throw me out, but I am going to tell you why I am important for your future career. As you know, English is the international language of the oil and gas industry. Having a good level of English can make all the difference between getting a good job or not getting it. English is important for safety as well – just think of how many accidents are the result of people not understanding each other. Another thing is that we don't know where the balloon is going to land, but you can be sure whichever country it is, someone will speak English. So you will need me to help communicate the ideas of the group.'

1 Language test

1 Complete the conversations using the Present Simple or the Present Continuous.

1 **A** What _____ (they do) down at the port?
B They _____ (build) a new jetty.

2 **A** _____ (you know) how to do this exercise?
B No, I _____ (not understand) it.

3 **A** How much _____ (the refinery manager earn)?
B I _____ (not know), but he _____ (drive) an expensive car and _____ (live) in a beautiful house.

4 **A** What _____ (you think about), Gabril? _____ (you worry) about something?
B No, everything's fine, I _____ (just try) to write a letter.

5 **A** _____ (Nabil / work) here today?
B Well, he _____ (usually / work) the morning shift, but this week he _____ (work) nights.

6 **A** What _____ (Rashid / do) here?
B He _____ (wait) to see Dr Hamid. He _____ (want) to talk about his next project.

2 Jack is talking to Hamza about his job. Put the words in the correct order to make questions and answers.

1 **Jack** at / you / what / do / refinery / do / the?
_____

2 **Hamza** responsible / I / safety / am / for
_____

3 **Jack** does / involve/ what / your/ job?
_____

4 **Hamza** I / in / of / a / technicians / of /am / charge / team
_____

5 **Jack** are / moment / you / on / what / working / at / the?
_____

6 **Hamza** panels / we / monitoring / the / instrument / are
_____

3 Match sentences 1–6 with replies a–f.

1 May I introduce myself? I am Mustafa Gabril.
2 What are you doing here, Mr Black?
3 How are you finding it so far?
4 Is this your first time in my country?
5 So what do you do, Mustafa?
6 How interesting. What does your job involve?

a I analyse soil and rock samples for petroleum.
b Please call me Harry. I'm visiting the new oilfield.
c I'm a petroleum chemist.
d I'm very happy to be here. It's very interesting.
e I'm very pleased to meet you. I am Harry Black.
f No, it's my third.

1 Communication

A

You are at a hotel where lots of people in the petroleum industry stay. Study your role card and introduce yourself to other guests. Make conversation and find out about them.

You are:	Manuel Chavez
You are from:	Venezuela
Number of visits:	First
Reason for your visit:	To interview staff for your refinery
Your job:	Refinery manager
Your job involves:	Running a large refinery and oil terminal

B

You are at a hotel where lots of people in the petroleum industry stay. Study your role card and introduce yourself to other guests. Make conversation and find out about them.

You are:	Ho Ming
You are from:	China
Number of visits:	Second
Reason for your visit:	To exchange ideas and techniques with colleagues
Your job:	Safety engineer
Your job involves:	Maintaining safety at a large refinery

C

You are at a hotel where lots of people in the petroleum industry stay. Study your role card and introduce yourself to other guests. Make conversation and find out about them.

You are:	Mike Rogers
You are from:	The USA
Number of visits:	Third
Reason for your visit:	Survey a new zone
Your job:	Land surveyor
Your job involves:	Taking aerial photographs and rock samples

D

You are at a hotel where lots of people in the petroleum industry stay. Study your role card and introduce yourself to other guests. Make conversation and find out about them.

You are:	Boris Ivanov
You are from:	Russia
Number of visits:	First
Reason for your visit:	Visit the oil and gas gathering centre
Your job:	Piping designer
Your job involves:	Creating piping systems for pipelines

2 Language test

1 Colonel Edwin Drake is considered one of the fathers of the oil industry. Read the first part of his story and complete the text using the Past Simple.

Edwin Drake was born in New York in 1819. When he _____[1] (be) nineteen, he _____[2] (leave) home. He _____[3] (get) a job on the railroad and he _____[4] (meet) George Bissell and Jonathan Eveleth, founders of the Seneca Oil Company. They _____[5] (employ) him to inspect oil springs on their land and make money. Seep oil from the springs _____[6] (give) just three to four gallons of oil a day. Drake _____[7] (develop) technology to drill for oil. His men _____[8] (dig) a shaft. That _____[9] (not work), because the shaft _____[10] (flood) with water. Next, he _____[10] (use) salt mining techniques. He _____[11] (build) a wood-fired engine and boiler to power the drilling tools and _____[12] (erect) a derrick to hoist the drilling tools. However, the sides of the shafts _____[13] (fall in), so he _____[14] (invent) the drive pipe which _____[15] (protect) the drill.

2 Read the rest of the story about Colonel Drake and write questions for the answers.

In August 1859, Drake hit oil. His well was 69.5 feet (21.18 m) deep. Drake produced ten to 35 barrels a day. He sold the oil to two refiners and got $8,800. But Drake was not a good businessman and didn't register his invention. Other people copied him and produced thousands of barrels of oil a day. He never became rich – in fact, he lost all his money and his business failed. In 1872, Pennsylvania gave $1,500 a year to the 'crazy man' who founded the oil industry. Drake died in 1880.

1	When _____?	in August 1859
2	How _____ his well?	69.5 feet
3	How _____ barrels _____ each day?	ten to 35 a day
4	Who _____ to?	to two refiners
5	How _____?	$8,800
6	_____ his invention?	No, he didn't. He wasn't a good businessman.
7	What _____ do?	They copied him.
8	_____ rich?	No, he didn't.
9	How much _____ Edwin Drake?	$1,500 a year
10	When _____?	in 1880

3 Rearrange the sentences to form sentences to check understanding.

1 you / a / say / 30 / did / thirteen / or / day / barrels?

_____

2 sorry / I'm / what / but / did / say / you?

_____

3 me / can / excuse / repeat / me / you / the / for / number?

_____

4 you / could / please / spell / that?

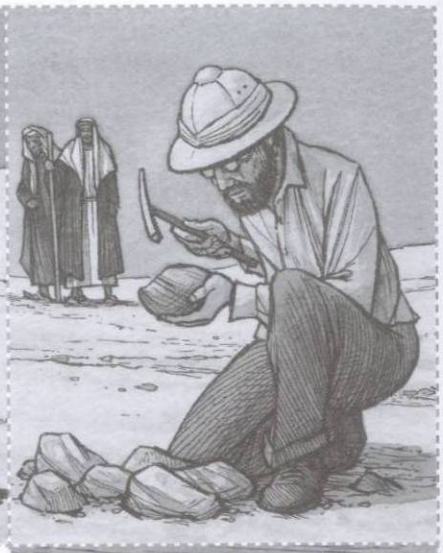
_____

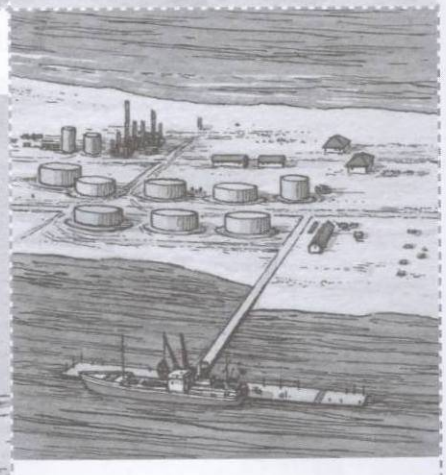
2 Communication

Work in groups and tell the story of how Quombai became a rich oil-producing country.

The Quombai desert: 1930

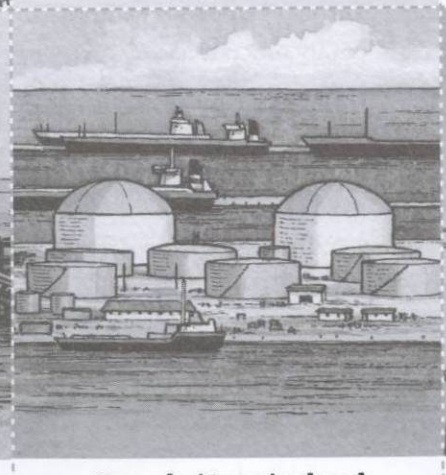
Three years later





Port Quombai 1940

Port Quombai 1978



Quombai terminal and loading bay 2000

2005

3 Language test

1 Complete the text by choosing between *a / an*, *the*, or nothing.

Before _____[1] discovery of petroleum and natural gas, coal was _____[2] most important source of energy. Coal was formed from _____[3] plants that died between one million and four hundred million years ago when _____[4] lot of _____[5] earth was covered in _____[6] marshes. Tall plants grew in _____[7] marshes When they died, they formed _____[8] thick layer that was eventually covered up. As with oil, _____[9] weight of other layers of rock helped to change them into _____[10] coal. First of all, they formed _____[11] substance called peat*. In some places, people still use _____[12] peat as _____[13] fuel. _____[14] youngest coal is _____[15] brown coal (lignite) that is used to generate _____[16] electricity. _____[17] best coal is anthracite, which is black and shiny. _____[18] main problem with coal is that it causes _____[19] pollution. Even so, even if oil and gas run out, there is enough coal for _____[20] next 250 years.

* a soft brown substance that is often burnt as fuel or used to make the soil in a garden richer

2 Write these words as numbers.

1 Three thousand six hundred and seven
2 Four million three hundred and fifty-seven thousand
3 Two and a half billion
4 Three point seven million
5 Two trillion

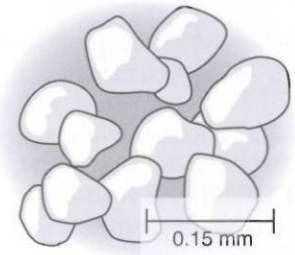
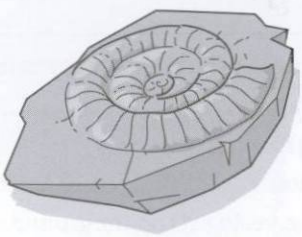
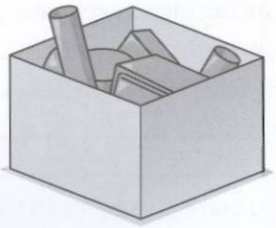
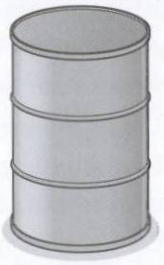
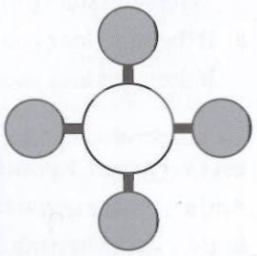
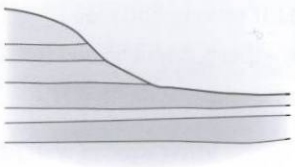
3 Write these numbers as words.

1 78,723
2 3,870,000
3 5.5 tr
4 7 bn

4 Study the sentences. Underline the articles that are unnecessary.

1 She has got *an* experience as *a* hydrocarbon chemist.
2 *The* sedimentary rock is made of three parts – *the* grains, *the* natural cement, and *the* pores.
3 Visiting *the* oilfield was *an* experience I'll never forget.
4 Stop! There is *a* smell of *the* gas.
5 Oil, gas, coal, and peat are all *the* fossil fuels.
6 *The* samples you sent me contain traces of *the* hydrocarbons.
7 I don't know how to use *the* equipment you sent. I need *a* more information.
8 Methane is *an* important part of *the* natural gas.

3 Communication

a molecule of methane		a fossil	
	bitumen for road building	an oil refinery	a barrel of oil
a laboratory		a porous reservoir rock	
			
a drilling rig	a can of lubricating oil		sedimentary rocks
		a bottle of propane gas	a box of equipment

4 Language test

1 Complete the table.

Infinitive	Past Simple	Past Participle
analyse	_____[1]	analysed
collect	collected	_____[2]
drill	_____[3]	_____[4]
find	found	_____[5]
keep	_____[6]	kept
make	_____[7]	made
see	saw	_____[8]
_____[9]	took	_____[10]

2 Rewrite the sentences using the Passive.

1 Experts take aerial photographs for land-based exploration.
Aerial photographs _____.

2 Afterwards, geologists analyse the photographs carefully.
Afterwards, the photographs _____.

3 They can see oil-bearing rock formations.
Oil-bearing rock formations _____.

4 If the signs are promising, geologists on the ground collect samples.
If the signs are promising, samples _____.

5 At this point, a drilling team can dig an exploratory well.
At this point, an exploratory well _____.

6 During drilling, the drilling team keeps a well log and they store core samples.
During drilling, a well log _____
and core samples _____.

7 Geochemists analyse water and soil samples for traces of oil and gas.
Water and soil samples _____.

8 If the signs look good, the oil company will drill a well.
If the signs look good, a well _____.

3 Three friends are talking about exploration in Alaska. Unfortunately their English isn't very good. There is one mistake in each line. Underline and correct the mistakes.

Amin What are you thinking about drilling in Alaska?
Boris According my opinion, they must stop drilling.
Amin I am hearing what you say, but the world needs oil.
Carlo I am agree with Boris. It's a very bad idea.
Boris They shouldn't to drill there, it will be bad for the environment.
Amin I see what you are meaning.

4 Communication

1 Read about the discovery of oil on the island of Madranaa and answer the questions.

1 Where is the oil and how long will it last?
2 How good are communications on the island?
3 How do people live?
4 What is special about the island?
5 How good are medical care and education?
6 What problems are there between Madranaa and Kasmara?

2 In groups, discuss what Madranaa can do to improve the lives of its people.

3 The grand council of Madranaa has to decide how to spend the money from oil. Over the next three years it will have $200 million to spend. Work in groups and decide how to spend the money.

international airport	$40 m
modern fishing boats	$20 m
fish processing factory	$10 m
international conference centre	$10 m
tourist hotels	$40 m
foreign embassies	$20 m
modern housing	$20 m
coastal road	$50 m
small modern army	$60 m
police force	$10 m
palaces for royal family and prime minister	$20 m
small navy with gun boats against pirates	$30 m
national TV channel	$10 m
schools	$20 m
university	$20 m
deep-water port	$30 m
farming and agriculture	$20 m
hospital	$40 m
environmental protection	$30 m
	Total $500 m

4 When you have finished, form new groups with students from the other groups. Present your plans and try to come to an agreement.

Oil has been discovered on the tropical island of Madranaa. It is a small reserve that can be exploited for fifteen years. The oil is in the north part of the island near Desperation Bay and the town of Newport. The island is divided by mountains and rainforest. The only way of getting to the south side of the island is by small plane or boat. The biggest town, Alban, is on the south coast. Its nearby beaches are beautiful and there is a coral reef that is perfect for diving. The island's population of 80,000 people are mostly fishermen or farmers. Some primitive tribes live in the rainforest. The rainforest is home to some rare wildlife. Madranaa has been described as a tropical paradise, but life is hard.

- Over half of the population is under twenty.
- There are five doctors for the whole population. There is a very small hospital in Alban.
- Boys go to school to the age of twelve.
- Men live for 50 years and women 40.
- One child in three dies below the age of five.
- Malaria is a big problem.

Relations with Madranaa's larger neighbour Kasmara are difficult. Kasmara's president says that Madranaa belongs to them. Many Kasmarans believe that they should share the oil. Kasmaran pirates often attack fishing boats and small villages.

5 Language test

1 Complete the sentences by choosing the correct preposition.

1 The crown block is _____ top of the derrick.
a in b by c on

2 The rotary table turns _____.
a around b up c down

3 Each time they add a length of pipe, they lift the kelly _____ the borehole.
a away b off c out of

4 There's a problem, I can't put the bit _____ the collar.
a by b into c by

5 They pump the mud _____ the borehole.
a down b onto c at

6 Horizontal drilling goes _____ the reservoir rock.
a at b across c opposite

2 Rearrange the sentences to complete the conversations.

1 **A** Aziz / you / will / drive / to / site / the?
_____

B of / yes / course / there / take / I'll / him
_____

2 **A** how / results / about / looking / the / at / again?
_____

B we / Harry / ask / can / thinks / what / he
_____

3 **A** we / shall / ask / for / head / office / advice / their?
_____

B straight away / OK / telephone / I'll / them
_____

3 Complete the second sentence so that it is similar in meaning to the one above.

1 What about using a diamond bit?
Why _____ a diamond bit?

2 We could use a semi-submersible rig.
How _____ a semi-submersible rig?

3 Please send me the results of the samples.
Will _____ the results of the samples?

4 Complete the words that match the definitions.

1 the metal tower that holds the lifting equipment de_____
2 a member of the drilling crew rough_____
3 to raise or to lift ho_____
4 another way of saying 'drill' b_____
5 what we put down a well wire_____
6 broken up or damaged frac_____
7 not straight dev_____
8 a drill bit with three parts tri_____

5 Communication

Play the drilling game. Work in groups of three or four. Use two coins and follow the instructions. Each time you land on a square, complete the task on that square. You can only move on if the rest of the group says you have performed the task or answered the question well.

one head, one tail = move forward one square

two heads = move forward two squares

two tails = move forward three squares

6 Language test

1 Study sentences 1–4. Identify the cause and result clauses in each sentence.

EXAMPLE The weather was bad so the tankers hit each other.
cause *result*

1 Nine spills out of ten are the result of faulty valves.
2 Poor repairs caused the accident.
3 Acid rain is caused by sulphur emissions from power stations.
4 Broken pipes were responsible for the pollution.

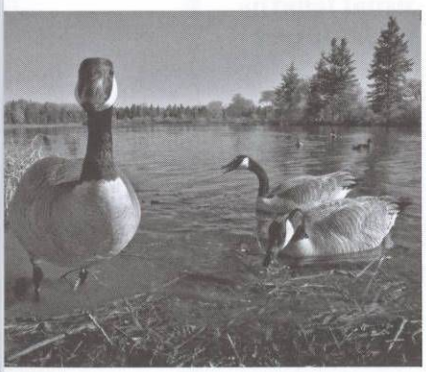
2 Rephrase the sentences in **1** using the words in brackets. Make sure that you put the cause and the result in the correct order!

EXAMPLE The weather was bad so the tankers hit each other. (because of)
The tankers hit each other because of the bad weather.

1 Nine spills out of ten are the result of faulty valves. (account)
_____
2 Poor repairs caused the accident. (because of)
_____
3 Sulphur emissions from power stations make acid rain. (responsible)
_____
4 Broken pipes were responsible for the pollution. (resulted)
_____

3 Correct the spellings of these words.

1 goverment	5 developement
2 maintainance	6 desicion
3 comunnication	7 aciddent
4 flareing	8 fasilities



4 Make word partners by matching a word from column A with one in column B.

A	B
1 wildlife	a rain
2 global	b error
3 greenhouse	c pollution
4 acid	d warming
5 human	e habitat
6 oil	f gas
7 air	g spill

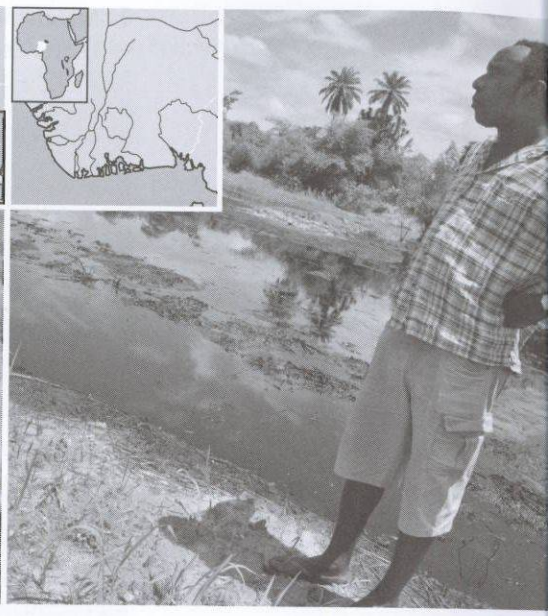
5 Complete the sentences by using the word in brackets in the correct form.

1 Rising temperature levels is a _____ problem that concerns everyone. (globe)
2 Double-hulled tankers have made oil _____ much safer. (transport)
3 She is an _____ engineer. (environment)
4 There was a big _____ at the refinery last week. (explode)
5 An oil _____ has contaminated the water supply. (seep)
6 The equipment is _____ by a safety valve. (protect)

6 Communication

1 Work in pairs. Both photographs show examples of oil pollution. How has this been caused?

2 Student A, study the information about the Erika spill. Student B, study the information about the Niger Delta court case. Fill in the information for your column. Then work in pairs and exchange information.



	The Erika spill	The Niger Delta court case
Where and when did it happen?		
Why did it happen?		
How big was the spill?		
How long did it last?		
What caused it?		
Which company was involved?		
What does the company say?		
Who was / is responsible?		

Student A

The tanker Erika was built in 1975. It was a popular tanker with oil companies. It used less metal than other boats of its size. It was a single-hulled ship.

In 1999, it broke up and sank off the coast of France in a storm. It had 20,000 tonnes of heavy fuel oil on board.

It killed millions of birds and other wildlife. It is considered the biggest environmental disaster to hit France.

The ship was owned by an Italian shipping company, but was registered in Malta. It had certificates from the Italian Naval Register (Rina) that said it was in good order.

The Total oil company, Mr Savarese the ship owner, and Antonio Pollara (the agent) of Rina were fined almost 200 million euros. Total was found guilty of 'imprudence' (lack of care – because the vessel was almost 25 years old).

Student B

Four Nigerian farmers from the Niger Delta have accused Shell of polluting their farms and fish ponds from a leaking pipe and well-head 'Christmas tree'.

The pollution took place in 2006 and again in 2007.

Shell said that the case had to be heard in Nigeria, but the Dutch court said that it could hear the case in Holland because Shell is an Anglo-Dutch oil company.

The Niger Delta has been contaminated by oil spills for the past fifty years. 1.5 million barrels of crude oil are spilt ever year. Each incident is like the Exxon Valdez disaster.

The company says it is not responsible because the pipes were damaged by sabotage.

7 Language test

1 Match the beginnings of the sentences with their endings. Make sure that the sentences make sense!

1 A properly trained diver is able ...	a divers to work without cylinders.
2 Divers aren't able ...	b be pulled to the surface by the tubes.
3 A hot water suit allows ...	c breathe normally at different depths.
4 Surface supplied air allows ...	d to use a wetsuit in very cold water because they lose body heat too quickly.
5 Surface supplied air also lets divers ...	e to carry out tasks such as welding underwater.
6 In an emergency, divers can ...	f divers to operate for longer in cold conditions.

2 Match the words in A with their opposites in B.

A	B
1 old	a horizontal
2 stable	b submersible
3 vertical	c weak
4 deep	d new
5 strong	e unstable
6 floating	f shallow

3 Read the text and write questions for the answers below.

In 2009, BP made a very big find in the Gulf of Mexico. The 'Tiber Prospect' was in the Gulf of Mexico 400 kilometres from New Orleans. The 'Tiber Prospect' could have four billion barrels of oil. It is below 1250 metres of water and the oil is 10,700 metres below the seabed. BP looked for new fields to increase its reserves because production was using up existing oil.

1 Where _____ its find?	in the Gulf of Mexico
2 How far _____ from New Orleans?	400 km
3 How much _____ there be?	4 bn barrels
4 How _____ the well?	10,700 m
5 Why _____ new fields?	to increase its reserves

7 Communication

1 Read the conversation in pairs. Take turns to be A and B.

A How high is the derrick?
B Sorry, could you say that again?
A I said, what's the height of the derrick?
B It's forty-three metres high.
A Did you say forty-three feet?
B No, forty-three metres.
A So it's a forty-three metre high derrick?
B Yes, that's right!

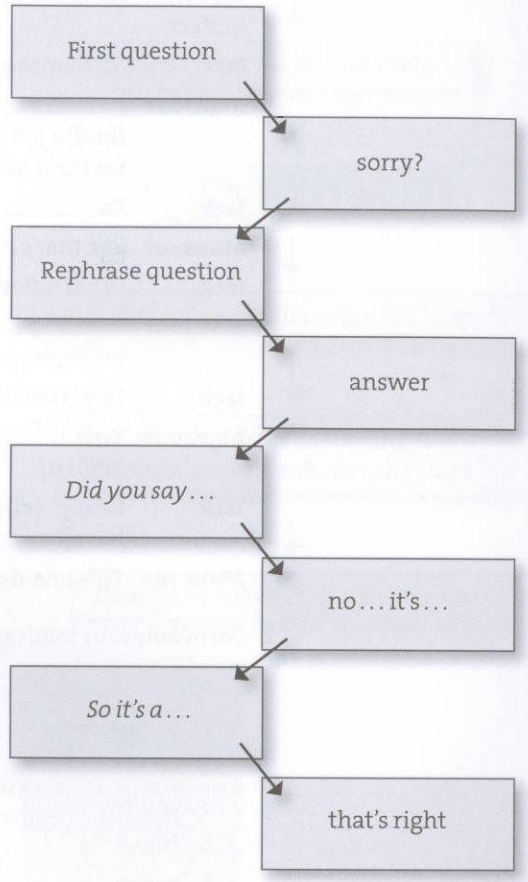
2 Use the prompts to try and repeat the conversation from memory.

A high / derrick?
B 43 m
A 43 feet?
B no 43 m
A so 43 m high derrick
B yes

3 Make the nouns from the adjectives.

adjective	noun
high	*height*
long	_____
wide	_____
deep	_____
heavy	w_____

4 Work in pairs. Create conversations from the information on your files. Follow the flow chart.



Student A

Situation 1
You want to know how long the pipeline is.
You hear nineteen kilometres.

Situation 2
Your partner wants to know how heavy the tanker is.
It is 30 tonnes.

Situation 3
You want to know how wide the pipe is.
You hear fifty centimetres.

Situation 4
Your partner wants to know how deep the well is.
It is 3,500 feet deep.

Student B

Situation 1
Your partner wants to know how long the pipeline is.
It is 90 kilometres.

Situation 2
You want to know how heavy the tanker is.
You hear thirteen tonnes.

Situation 3
Your partner wants to know how wide the pipe is.
It is 15 centimetres wide.

Situation 4
You want to know how deep the well is.
You hear 35,000 feet deep.

8 Language test

1 Mansour Muqtar is a manager of a gas gathering plant. He has more than twenty years' experience in the oil and gas industry. He is talking to Jack Richardson about his career. Complete the conversation by using the verbs in the Past Simple or Present Perfect.

Jack So, Mansour, when _____[1] (you start) your career?

Mansour I _____[2] (begin) in 1990 after I _____[3] (graduate). I _____[4] (find) a job with an American company in Saudi. I _____[5] (be) there for three years.

Jack So _____[6] (you join) this company afterwards?

Mansour Yes, that's right. I _____[7] (be) with it since then.

Jack What different jobs _____[8] (you have) since you joined the company?

Mansour Well, I _____[9] (do) lots of different things, I _____[10] (work) as a junior engineer in the desert and a senior engineer on an FPSO.

Jack I see. How long _____[11] (work) at this plant?

Mansour Well, I _____[12] (be) here for five years. I even _____[13] (help) to build it!

Jack Really! Tell me, what's the most interesting job you _____[14] (ever have)?

Mansour This one, definitely.

2 Form nouns by joining the beginning of a word in A with its ending in B.

A	B
1 compress-	-ee
2 corro-	-ian
3 equip-	-ics
4 fric-	-sion
5 logist-	-ment
6 supervis-	-or
7 technic-	-or
8 train-	-tion

3 Match the words in **2** with the definitions.

1 someone who is learning how to do something
2 the things you need to do the job
3 a machine for squeezing gas into a smaller volume
4 the person who checks other people's work
5 the force of two things rubbing together
6 someone who has skills in a technical area
7 the science of organizing the flow of supplies and people
8 the damage caused by oxidization

8 Communication

Student A

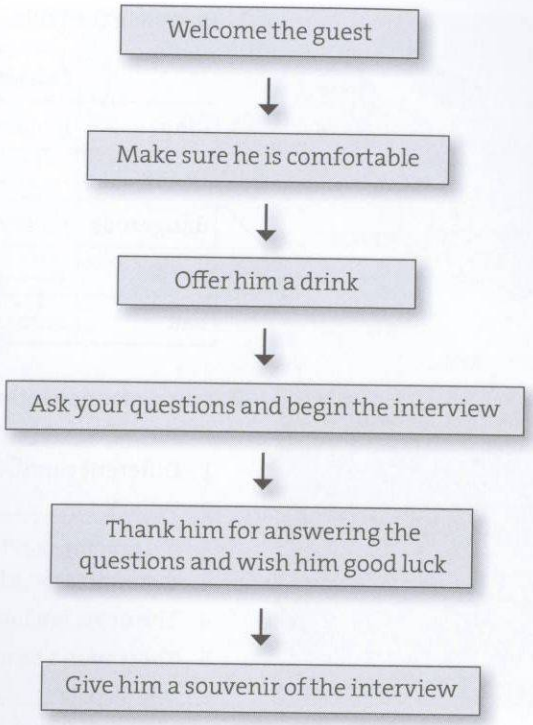
The big oil company where you work has its own TV channel.

Each week there is a programme dedicated to 'old timers'. These are people who have worked in the petroleum industry for many years and who are going to retire soon.

You are the interviewer. You are going to interview Steve Ryan, one of Big Oil's most experienced pilots. He is the personal pilot for Sheik Ahmed, the boss of Big Oil.

You want to find out

- how he became a pilot
- his early career
- any exciting / frightening experiences he has had
- how many different jobs he has had
- where he has worked
- how long he has been with Big Oil
- what he plans to do when he retires
- what he will miss.



Student B

The big oil company where you work has its own TV channel.

Each week there is a programme dedicated to 'old timers'. These are people who have worked in the petroleum industry for many years and who are going to retire soon.

You are Steve Ryan and you are going to be interviewed for Oil TV.

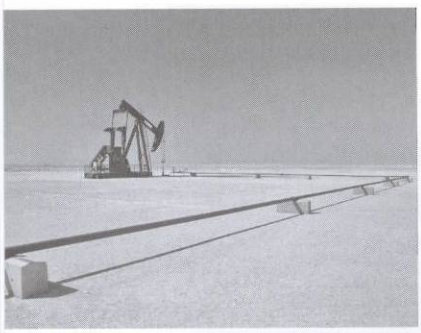
Study your personal details.

- You are 55 years old.
- You were born in Germany, where your father was with the British Army.
- You joined the Royal Air Force when you were nineteen.
- You trained to be a helicopter pilot. You learned how to fly Chinooks.
- You flew lots of different missions. You were a pilot in the Falklands War and the first Gulf War.
- You left the air force when you were 38. You had the rank of Squadron Leader.
- You are still flying today.
- You spent ten years in the North Sea – flying to and from offshore rigs.
- You have worked offshore in Nigeria and the Gulf of Mexico.
- Most frightening experience: engine failed in the Gulf of Mexico. Five passengers. Everybody escaped.
- Since then you have worked for Big Oil.
- For the past four years, you have been Sheikh Ahmed's personal pilot.
- When you retire, you are going to spend more time with your family and play a lot of golf.
- You will miss all your friends and Sheikh Ahmed, who is a kind employer.

9 Language test

1 Complete the table.

	Comparative	Superlative
long	longer	the _____[1]
heavy	_____[2]	the heaviest
dangerous	more / _____[3] dangerous	the _____[4] / least dangerous
good	_____[5]	the best
bad	_____[6]	the _____[7]



2 Complete the sentences using a comparative or superlative form based on the words in brackets.

1 Different countries claim to have _____ pipeline in the world. (long)
2 What's _____ job you have ever had? (dangerous)
3 If a pipeline isn't possible, the _____ way of transporting gas over very long distances is in a liquefied form. (good)
4 The news is a lot _____ than we thought. (bad)
5 There won't be a _____ pipeline in Africa than the trans-Saharan one. (long)
6 The jetty is _____ one in Europe. (large)
7 Nowadays, piracy is a _____ threat to maritime traffic than collisions. (big)
8 It's often much _____ (easy) and _____ (expensive) to transport gas by road tanker.

3 Match the beginnings of the sentences 1–8 with the endings a–h.

1 *LNG* stands for	a used to transport crude oil or LNG.
2 At a *liquefaction plant*, gas is	b work on board a ship.
3 A tanker is a kind of ship	c to spill oil in an accident.
4 If something is *insulated*, it prevents	d liquid back into gas.
5 The *crew* are the people who	e cooled until it becomes a liquid.
6 A ship with a *double hull* is less likely	f large changes in temperature.
7 Giant *storage tanks* contain millions	g liquefied natural gas.
8 *Regasification* is the process of turning	h of gallons of LNG.

4 Complete the sentences by putting a prefix from the list in front of the rest of the word. Use each prefix only once.

inter- micro- off- over- re- semi- trans- tri-

1 A _____ cone bit allows mud to be pumped through it.
2 The _____ Siberian pipeline crosses one of the most difficult environments in the world.
3 _____ national trade in petroleum is the biggest business in the world.
4 He worked _____ shore on an FPSO in the Niger Delta for five years.
5 If you _____ heat the liquid, it will turn back into gas.
6 A _____ submersible rig half floats in the sea. It is anchored to the seabed.
7 Our geologist examines samples through a powerful _____ scope.
8 When there is an _____ production of oil, the price falls.

9 Communication

Student A

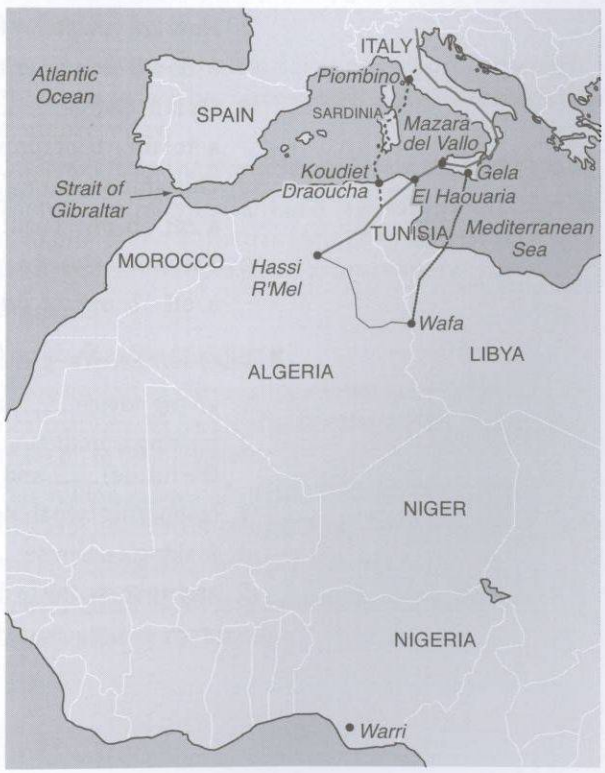
1 Look at the map of Africa. You want to know how gas will travel from Africa to Italy. Listen to your partner's instructions and complete the map with the routes of the pipelines.

2 Tell your partner the routes of the pipelines between Warri in Nigeria and Spain.

Student B

1 Study your map. Answer your partner's questions about how gas travels from Africa to Italy. Give them information about the different pipelines.

2 You want to know the routes of the pipelines between Warri in Nigeria and Spain. Listen to your partner's instructions and complete the routes.



10 Language test

1 Use the words in the list to complete the passage about refining.

condenses broken down distillation evaporate fractionating fuels turned into vapour

At an oil refinery, crude oil is _____[1] into its different molecules using an advanced _____[2] process. The crude oil is heated in a furnace and passes into a _____[3] column. The oil molecules _____[4] at different temperatures according to their composition. The _____[5] rises in the column and then it cools down and _____[6] into different 'cuts' of oil. These 'cuts' are _____[7] the petroleum-based products and _____[8] we need.

2 Complete the sentences by choosing the correct option.

1 My job involves _____ all the instrument panels.
a check b checking c to check

2 We should _____ these three valves.
a change b changing c to change

3 You had better _____ the accident.
a report b reporting c to report

4 Let's _____ what is blocking the pipe.
a to find out b finding out c find out

5 We have to shut _____ the operation immediately.
a up b down c out

6 His team in responsible for _____ the entire plant.
a maintenance b maintaining c maintain

7 How are you planning _____ the service?
a do b doing c to do

8 He is in charge _____ the entire terminal.
a to run b of running c for run

9 This unit is wearing _____ – it's time to replace it.
a off b on c out

10 The unit is closed so we can carry _____ our monthly safety check.
a off b out c on

3 Read sentences a–g and write which one(s) is / are

1 giving advice ___ and ___
2 making a prediction (a guess about the future) ___ and ___
3 comparing two things or people ___
4 making a promise ___
5 asking someone to do something. ___

a Juma is a *better* technician than Khalid.
b You *had better* talk to your boss.
c You *should* stop smoking.
d The job *should* take about half an hour.
e *Will* you show me how to operate this machine?
f *I'll* help you in two minutes.
g It *will* be ready in three days.

10 Communication

Work in groups of four. You are visiting a refinery. You are going to interview four people – the refinery manager, a foreman at the jetty, an engineer at the fractionating column, and a technician at the tank farm.

For three of the interviews you are a visitor. For the fourth, you are one of the people who is interviewed.

1 You are speaking to the terminal and refinery manager. You want to find out about • its size • what it produces • the number of people who work there • its safety record.	**2** You are speaking to a foreman at the jetty. You want to find out • what is special about the jetty • how often it operates • how many tankers it receives a day • what happens to the oil that is unloaded.
3 You are speaking to an engineer who controls the fractionating column. You want to learn about • the refining process • what can go wrong and safety processes. It is a complicated process, so make sure you ask lots of questions.	**4** You are speaking to a technician at the tank farm. You want to find out • where all the pipes go • what other ways are used to transport the refined oil • what problems can occur.

Student A

You are the refinery manager.

The terminal and refinery cover 600 hectares.

It produces petrol, diesel, fuel, and plastics.

2,000 people work there.

It processes 300,000 barrels of crude oil a day.

It has an excellent safety record.

Student B

You work at the jetty. It is a deep water port. It operates 365 days a year. It has sixteen berths. Five to seven tankers come every day.

Oil comes from the North Sea and from the Middle East.

There are 250 storage tanks. Storage tanks are 50 metres in diameter and 80 metres high. They hold 150,000 cubic metres of oil. The oil is piped to the refinery.

Student C

You work at the refinery. Explain the process.

Crude oil contains different molecules. The refinery purifies the oil and separates the molecules by heating the crude.

Light molecules evaporate to the top; heavy molecules stay near the bottom.

They condense into different 'cuts' for different products – for example, gasoline comes from naphthene.

Heavier crude is broken down into short molecules in cracking units.

The tower is regularly maintained.

Corrosion is a problem. Pipes and valves have to be checked.

There are regular shutdowns.

Student D

You work at the tank farm.

There are lots of different pipes that go to different destinations. Jet fuel is piped to the airport. One pipe takes oil to Birmingham!

Ten million gallons of oil pass through the pipes every day. Pipes have to be cleaned to prevent a build-up of wax.

Fuel for filling stations is put into road tankers.

Some refined oil is piped back to the terminal to be transported by sea tanker.

11 Language test

1 Put the words in the correct order to make sentences.

When changes in temperature produce wind, it can be used to create electricity. So how does this work?

1 earth / sun / when / heats / shines / the / it / the

_____

2 hot / as / from / rises / the / it / replaces / air / the / cold / ground / air / creating / wind

_____

3 a / wind / operate / before / it / turbine / can / wind / needs

_____

4 wind / passing / it / the / turbine's / the / through / blades / turn / makes

_____

5 the / hub / when / around / rotates / the / it / generator / electricity / creates

_____

6 power / afterwards / lines / the / grid / transport / electricity / to / the

_____

2 Write approximations for these figures.

EXAMPLE three thousand and fifty-three = *3,000*

1 nine point nine six centimetres = _____

2 seven kilos and thirty grams = _____

3 three million and thirty thousand = _____

4 four hundred and ninety five = _____

3 Rewrite these sentences with the words you are given, and the nearest approximation.

EXAMPLE We spent $81,000 on the refit.

We spent just over eighty thousand dollars on the refit.

1 The refinery produces between 1.8 to 2.1 million barrels a day.

_____ *.around*

2 The platform is 387 kilometres offshore.

_____ *.approximately*

3 77 people work on the FPSO.

_____ *.just under*

4 He studied in America for two years and eleven months.

_____ *.roughly*

4 Make words from the letters to complete the sentences.

In a traditional power station, the _____[1] EEGNRY produced by burning fossil fuels is used by giant _____[2] OLIBERS to heat water to produce strong jets of _____[3] SEMTA. This is used to turn the blades of the _____[4] UBRITNE, enabling the _____[5] RGNEEATRO to produce electricity.

11 Communication

Student A

Even big petroleum companies are interested in alternative energy sources. They call this the future energy mix. You are going to talk about bio-diesel. Use the diagram and the notes below to describe the process to your partner. Then discuss which of the two sources of renewable energy would be more suitable where you live.

Grow plants that produce lots of seeds for oil, for example colza, maize, sunflowers, and jatropha.

Grow the crop and harvest the seeds.

Take them to the refinery.

Grind them in a machine.

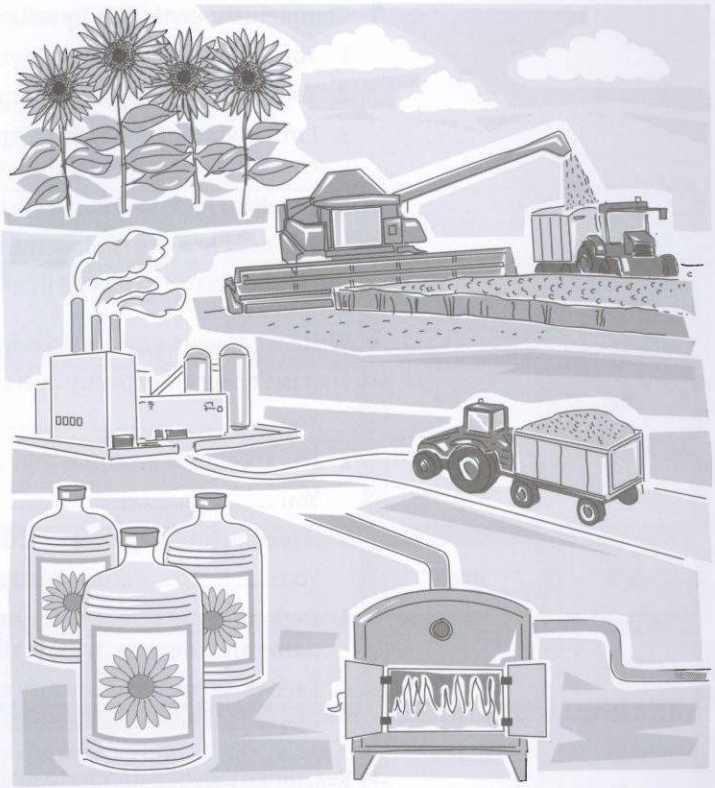
Take oil from the seeds.

Heat it and mix it with methanol.

Advantages Renewable resource, not a fossil fuel.

Pollution: produces half CO_2 of a normal diesel engine.

Disadvantages Takes up land that can be used to grow food. Should not use farming land, but waste land, e.g. along roads or railway tracks.



Student B

Even big petroleum companies are interested in alternative energy sources. They call this the future energy mix. You are going to talk about solar power. Use the diagram and the notes below to describe the process to your partner. Then discuss which of the two sources of renewable energy would be more suitable where you live.

Simple principle. Some substances produce an electrical charge when they receive sunlight. Used to provide power for satellites in space.

In theory, solar-produced energy could satisfy the world's energy needs!

Photovoltaic cells have become more and more efficient. Can put panels on roofs.

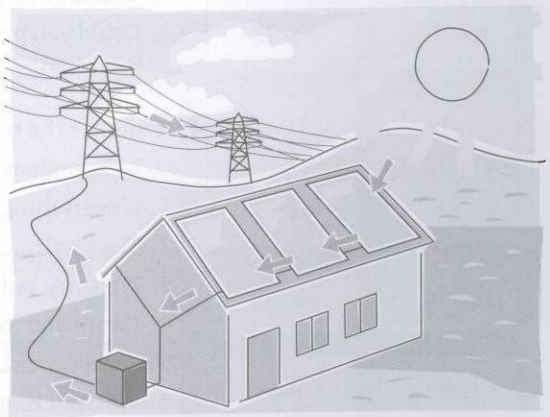
Advantages Does not produce CO_2. Sustainable energy.

Disadvantages Panels and installation are expensive. Intermittent energy source. Only when the sun shines!

Storage problem: you have to use it , transport it to where it can be used, or stock it.

Solutions: connect it to electricity grid.

Off grid: store in batteries.



12 Language test

1 Complete the sentences by underlining the most appropriate form.

1 You *don't need to / mustn't* write the report – I have already done it.
2 You *mustn't / don't have to* smoke anywhere in this zone.
3 I'm a maintenance technician. I *must / have to* tour my area and I *have to / must* check the instrument panels and fill in the records sheets. It's my job.
4 You *don't have to / mustn't* bring food with you – all meals are provided.
5 You *need to / must* follow the safety procedures.
6 I really *have to / must* fill in my time-sheet or else they won't pay me this month.

2 Write what you say in the following situations.

1 It isn't necessary to buy overalls and boots. The company supplies them.
You _____.
2 It is absolutely essential that you wear a hard hat on the site.
You _____.
3 It is completely against the rules to smoke at a gas-gathering plant.
You _____.
4 Each time you come on duty and each time you leave, it's important to write your name and the time in the staff book. It's a duty.
Each time you come on duty and each time you leave, you _____.

3 Rearrange these sentences to make indirect orders. Begin with the words you are given.

1 I want you meeting / them / ask / to / come / to / to / next / the
I want you _____.
2 I need you what / to / out / happening / find / at / is / ministry / the
I need you _____.
3 I'd like you to / the / to / refinery / tell / me / manager / visit
I'd like you _____.
4 Could you provide / them / ask / origin / certificate / to / a / of
Could you _____?

4 Complete the sentences with the words in the list.

bid budget deadline estimate priority schedule update viable

1 If everything goes according to plan, we should be able to keep to the _____.
2 The final _____ for this project is the last day of the month.
3 I'm sorry, but this well is simply not _____ – there isn't enough oil there.
4 I want you to give me a(n) _____ on how the project is progressing.
5 Have you made a(n) _____ of the likely costs?
6 We can't keep going over _____ – our partners won't agree to give us more money.
7 We are waiting for our main supplier's _____ before we make a final decision on which company to choose.
8 I want you to make this your top _____; forget about everything else.

12 Communication

1 Work in groups of three or four. Take turns to make phrasal verbs by putting a definition and a verb with a preposition.

2 Make a correct sentence with the phrasal verb to 'win' it. Try to make your sentence on the topic of projects and project management.

stop working because of a fault	look	out
try to find sb / sth	find	up
start a process or series of events	build	off
make weaker through continuous use	shut	for
gradually increase in number or quantity over a period of time	wear	up
spend extra time doing sth because you have not done it earlier	break	out
stop a refinery, etc. from operating; stop a machine form working	catch	down
discover information by searching	set	down

try to find something special / pay special attention	come	up
explode	look	down
contact somebody in order to remind them to do something	carry	up
meet or find by chance	break	out for
make sth full of sth, e.g. fill a tank with petrol	chase	across
transform / become something else	turn	up
do and complete a task	blow	into
make a substance into parts or change into a different form in a chemical process	fill	out

13 Language test

1 Complete the sentences by underlining the correct words.

1 You *will miss / miss* your family if you *will work / work* offshore.

2 The helicopter *won't leave / doesn't leave* if the weather *doesn't improve / won't improve.*

3 If the spare parts *won't arrive / don't arrive*, we *will have to / have to* stop drilling.

4 *Will you / Do you* take the job if they *will offer / offer* more money?

5 If Bashir *won't arrive / doesn't arrive* soon, *we'll have to begin / we have to begin* the meeting without him.

2 Continue the second sentence with *should have* or *shouldn't have.*

EXAMPLE Why did he break the safety regulations? (He injured two of his workmates.)

He shouldn't have broken the safety regulations.

1 He hurt his eyes because he didn't wear goggles.

Yes, he _____ goggles.

2 He hurt himself because he didn't use a lifeline.

You're right, he _____ a lifeline.

3 Why didn't you follow the safety procedure? (There was an accident.)

I'm sorry, I _____ the safety procedure.

4 There was a dangerous incident because the company didn't fit a blow-out preventer.

They _____ a blow-out preventer.

3 Put the words of the safety talk in the correct order.

1 your / boat / step / mind / the / as / get / you / into

_____

2 sure / goggles / that / have / you / make / got / your

_____

3 your / wear / ear protectors / at / times / all

_____

4 to / keep / hard / remember / hat / your / on

_____

5 forget / to / lifeline / don't / attach / your

_____

6 out / for / watch / finally / waves / high

_____

13 Communication

1 Read the situation and answer the questions.

1 Who was visiting the plant and why were they late?
2 Why did the plant manager interrupt the tour?
3 Why did the group pass through an unauthorized zone?
4 What was blocking the way?
5 How did the fork-lift truck driver damage the pipework?
6 Was anybody hurt?

2 You are going to work in groups of four. First, all the students with the same role work together. Answer the questions.

1 What did you do wrong?
2 What did someone else do wrong? Who were they?

3 When you are ready, work in groups with the four different roles. Have a meeting to find out what happened and listen to the other people's points of view. Decide whose fault the accident was. Criticize other people using *should have / shouldn't have done*.

4 Write a notice about safety procedure for future visits to the site.

Last week, there was an incident at the plant where you work. A group of VIPs (important visitors) was visiting the site. The visit was behind schedule because of a problem at their hotel. Halfway through the visit, the site manager telephoned the group leader to call everyone back so they wouldn't be late for the next meeting. The group leader took the most direct route through an unauthorized area. On the way back, a fork-lift came around the corner. The area had lot of equipment and drums that blocked the path, so there wasn't enough space for everybody to get through. Fortunately, the fork-lift truck driver saw the people at the last second and moved out the way, but the load fell off the fork-lift and damaged some pipework. Two of the visitors had to jump out of the way of the load.

Student A The fork-lift driver

You agree that you were going fast. You didn't expect to see a group of people in an unauthorized area. You were talking to your foreman on your walkie talkie. He wanted to know where you were. You didn't notice the people until the last second. You are sorry for what happened, but you don't think it was your fault. You couldn't see where you were going because you had a big load on the fork-lift.

Student B The group leader

You know it was an unauthorized area, but you wanted to get the group back to the reception area. The most important visitor received a phone call to tell him he had another urgent meeting. You decided to take a short cut across the site. The visit was late because of a problem at the hotel.

Student C The foreman

You feel partly responsible. You asked the fork-lift truck driver to take a large load that was needed urgently on the other side of the site. You didn't think he would meet people walking around the site. You think that the group leader broke regulations because he wanted to get back to the reception quickly. You do not know why the area was blocked by barrels and equipment. It is not your responsibility.

Student D The manager

It was a mistake to allow the full tour of the site. There wasn't enough time. You didn't expect the group leader to take a short cut, but you understand why he did it. It was a bad idea that the truck driver had too much on his fork-lift. You want to know why he was carrying so much. You also want to know why the area was so untidy.

14 Language test

1 Complete the sentences by underlining the most likely way of talking about the future.

1 I *am finishing / may finish* the report this evening, but I can't make any promises.
2 I *will / might* change to a hybrid car – it all depends on the cost.
3 He *is going / will go* to the gas gathering centre tomorrow. *He's meeting / He will meet* the safety engineer.
4 The well log results aren't very good; we *could / will* be disappointed.
5 They *might not / won't* invent a hydrogen-powered car in the near future – the technology doesn't exist. I don't think it *will / may* happen yet.
6 I *might / will* have some free time tomorrow, but I'm not sure. *I'll call / I'm calling* you if I'm available.

2 Make a word partnership with a word from A and one from B. Then complete the text using each word partnership once.

A	
fossil	renewable
global	solar
greenhouse	wind
hydroelectric	

B	
dam	panels
energy	turbine
fuels	warming
gas	

Burning _____ _____[1] releases a lot of CO_2 into the atmosphere. CO_2 is a _____ _____[2]. It is contributing to _____ _____[3] and making the ice pack melt. This is why scientists are trying hard to find ways of developing _____ _____[4] that doesn't depend on burning carbon.

The Three Gorges _____ _____[5] in China produces enormous amounts of energy from water power. But we don't need to carry out a huge project do fight climate change. For instance, have you ever thought of putting _____ _____[6] on your roof? It's a great way of cutting your energy bills. Otherwise you can build a _____ _____[7] in your garden – but your neighbours may complain about the noise!

3 Put the words in order to create compound adjective and noun combinations. Don't forget to put the hyphen (-) in the correct place.

1 station oil powered _____
2 hulled double tanker _____
3 diamond bit covered _____
4 head well pressure _____
5 1,100 pipeline European mile trans _____
6 based petroleum products _____
7 shore platform off _____
8 four sided kelly _____

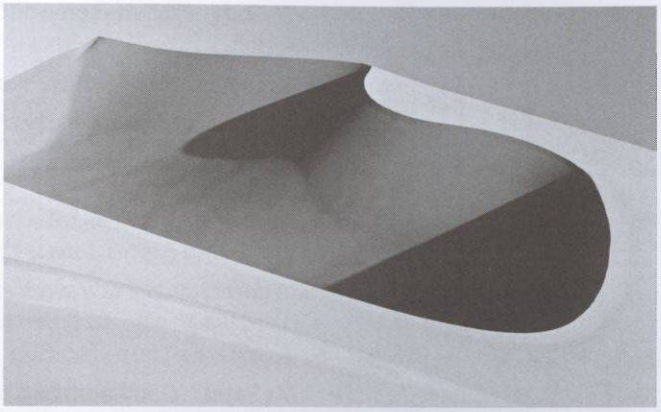
14 Communication

1 Discuss your answers to these questions.

1 Do you like science fiction books or movies?

2 How well do you think they predict life in the future?

2 Work in three groups. Answer the same questions, but from a different time in the future. Make your predictions about the future. Group A, think about ten years' time. Group B, think about fifty years' time. Group C, think about one hundred years' time.



1 Will there still be oil?

2 Will there be a new source of energy?

3 Where will oil and gas be found?

4 Will there still be hydrocarbons in Saudi Arabia and the Gulf?

5 Will there still be jobs in the industry?

6 Will people still have petrol- / diesel-driven cars?

7 Will people travel around in hydrogen-powered cars?

8 Will people still need nuclear energy?

9 What will the new energy be?

10 How important will sustainable energy (wind power / solar energy) be?

11 Will there still be global warming?

12 Will there still be polar bears and penguins?

13 What will the weather be like?

14 How much of the earth will be covered in water?

15 How much rainforest will be left?

16 What animals we know today will be extinct?

17 How many people will live on the earth?

18 Will there be colonies in space?

19 Will there be space tourism for ordinary people?

3 Make new groups with one person from each of the first groups. Tell each other what you think the future will bring.

4 As a class, try to come to a general agreement.

15 Language test

1 Complete the sentences. The first letter of the missing words is given.

1 He has got a d_____ in chemistry from the University of London.
2 We need to r_____ some new staff for the gas-gathering plant.
3 It's a great o_____ for an ambitious young person – you should take it.
4 He retired after a thirty-year c_____ in oil exploration.
5 Can you help me with this a_____ form? I don't know how to fill it in.
6 He earns a small s_____ at the moment as he's just a trainee technician.
7 They asked me some difficult questions at the i_____. I don't think I'll get the job.
8 Last month Hamid did thirty hours' o_____ so he made a lot of money.
9 Juma is having a party this Friday to celebrate his p_____ to manager.
10 He was the best c_____ so they offered him the job.

2 Ahmed is having an interview with Mr Patel. Complete their conversation with the words and expressions in the list.

afterwards any work experience could you tell me don't you want
I'd like to get I'd prefer to I'm in my second year looking for an apprenticeship
my long-term ambition see yourself doing would you rather work

Mr Patel Good morning, my name is Mr Patel. Please sit down and make yourself comfortable. So, _____[1] something about yourself?

Ahmed Well, I'm nineteen and _____[2] of a diploma course at technical college. I am _____[3] in a petroleum company.

Mr Patel I see. Have you got _____[4]?

Ahmed Not in this area, but I help my father and my uncle in their shop.

Mr Patel Well, we all have to start somewhere. So tell me, Ahmed, what do you _____[5] in the longer term?

Ahmed Well, _____[6] is to become an engineer.

Mr Patel So why _____[7] to do a degree?

Ahmed Because first of all, _____[8] some practical experience of what it is like to work in the industry. _____[9], I may go back to my studies.

Mr Patel I see, that makes sense. And _____[10] in this country or abroad?

Ahmed I think _____[11] work in this country for the time being.

3 Underline the most suitable way of talking about the future.

1 *I play / I'm playing* volleyball tonight. Do you want to watch?
2 Be careful, that hook *will / is going to* hurt someone.
3 We *are going to / will* have a safety training course next month – everything has been arranged.
4 **A** We don't have any jobs at the moment.
B In that case, *I'll look / I'm looking* for one abroad.

15 Communication

To celebrate the end of your course, your English teacher has invited the people from *It's my job* for a balloon trip over the terminal and the refinery. Unfortunately, as they are up in the balloon there is a terrible storm and the balloon is blown towards the mountains. The balloon is too heavy for everyone to stay on board, so three people will have to jump – or be pushed overboard. In order to choose who will go, everybody has to give a speech.

Instrument engineer Unit 1, p.5	Oil tanker pilot Unit 9, p.66
Jug hustler Unit 2, p.12	Refinery manager Unit 10, p.71
Petroleum chemist Unit 3, p.20	Filling station manager Unit 11, p.77
Geology lab technician Unit 4, p.24	Project manager Unit 12, p.85
Wireline logger Unit 5, p.32	Safety engineer Unit 13, p.90
Environmental engineer Unit 6, p.37	Oil and gas analyst Unit 14, p.97
Oil installation manager Unit 8, p.49	Explorationist Unit 15, p.103

1 Take a role from the box on the right and prepare your speech. Go to the page where your job appears, to remind yourself about what the person does, and why they are important.

Everyone has to speak for at least one minute to say why they should stay in the balloon. You need to say how important your job is for your company and the people around you.

2 Listen to each person speak. Judge them on

- the quality of their English
- how convincing they are.

Complete the table.

3 Put a cross (×) by the three people you think should leave the balloon.

Respect the rules of 'fair play'. No deals, no agreements.

4 When everyone has finished speaking, give your paper with your decision to your teacher.

	Student's name	Job	Speech		Your decision
			Good English?	Good ideas?	
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Language tests key

Unit 1

1
1 are they doing, are building
2 Do you know, don't understand
3 does the refinery manager earn, don't know, drives, lives
4 are you thinking about, Are you worrying, am just trying
5 Is Nabil working, usually works, is working
6 is Rashid doing, is waiting, wants

2
1 What do you do at the refinery?
2 I am responsible for safety.
3 What does your job involve?
4 I am in charge of a team of technicians.
5 What are you working on at the moment?
6 We are monitoring the instrument panels.

3 1 e 2 b 3 d 4 f 5 c 6 a

Unit 2

1

1	was	7	developed	13	erected
2	left	8	dug	14	fell in
3	got	9	did not work	15	invented
4	met	10	flooded	16	protected
5	employed	11	used		
6	gave	12	built		

2
1 did he hit oil
2 deep was
3 many, did it produce
4 did he sell it
5 much (money) did he make / earn
6 Did he register
7 did other people
8 Did he become
9 did Pennsylvania give
10 did he die

3
1 Did you say thirteen or 30 barrels?
2 I'm sorry, but what did you say?
3 Excuse me, can you repeat the number for me?
4 Please could you spell that?

Unit 3

1 1 the 2 the 3 ∅ 4 a 5 the 6 ∅ 7 the 8 a 9 the 10 ∅ 11 a 12 ∅ 13 a 14 The 15 ∅ 16 ∅ 17 The 18 The 19 ∅ 20 the

2
1 3,607
2 4,357,000
3 2,500,000,000 / 2.5 bn
4 3,700,000 / 3.7 m
5 2,000,000,000,000 / 2 tr

3
1 seventy-eight thousand, seven hundred and twenty three
2 three million eight hundred and seventy thousand
3 five and a half trillion / five point five trillion
4 seven billion

4
1 She has got *an* experience as *a* hydrocarbon chemist.
2 *The* sedimentary rock is made of three parts – *the* grains, *the* natural cement, and *the* pores.
3 Visiting *the* oilfield was *an* experience I'll never forget.
4 Stop! There is *a* smell of *the* gas.
5 Oil, gas, coal, and peat are all *the* fossil fuels.
6 *The* samples you sent me contain traces of *the* hydrocarbons.
7 I don't know how to use *the* equipment you sent. I need *a* more information.
8 Methane is *an* important part of *the* natural gas.

Unit 4

1

1	analysed	5	found	9	take
2	collected	6	kept	10	taken
3	drilled	7	made		
4	drilled	8	seen		

2
1 are taken for land-based exploration (by experts)
2 are analysed carefully (by geologists)
3 can be seen
4 are collected on the ground (by geologists)
5 can be dug (by a drilling team)
6 is kept and core samples are stored
7 are analysed for traces of oil and gas
8 will be drilled (by the oil company)

3
Amin What are you thinking *do you think* about drilling in Alaska?
Boris According my opinion *In my opinion*, they must stop drilling.
Amin I am hearing what you say, *I hear what you're saying*, but the world needs oil.
Carlo I am agree *I agree* with Boris. It's a very bad idea.

Boris <u>They shouldn't to drill</u> *They shouldn't drill* there, it will be bad for the environment.

Amin I see <u>what you are meaning</u> *what you mean*.

Unit 5

1 1 c 2 a 3 c 4 b 5 a 6 b

2 1 **A** Will you drive Aziz to the site?
B Yes, of course. I'll take him there.
2 **A** How about looking at the results again?
B We can ask Harry what he thinks.
3 **A** Shall we ask head office for their advice?
B OK, I'll telephone them straight away.

3 1 don't we use
2 about using
3 you send me

4 1 derrick
2 roughneck
3 hoist
4 bore
5 wireline
6 fractured
7 deviated
8 tricone

Unit 6

1 1 Nine spills out of ten are the result of faulty valves.
result cause
2 Poor repairs caused the accident.
cause result
3 Acid rain is caused by sulphur emissions from power stations.
result cause
4 Broken pipes were responsible for the pollution.
cause result

2 1 Faulty valves account for nine spills out of ten.
2 The accident happened because of poor repairs.
3 Sulphur emissions from power stations are responsible for acid rain.
4 Broken pipes resulted in the pollution.

3 1 government
2 maintenance
3 communication
4 flaring
5 development
6 decision
7 accident
8 facilities

4 1 e 2 d 3 f 4 a 5 b 6 g 7 c

5 1 global
2 transportation
3 environmental
4 explosion
5 seepage
6 protected

Unit 7

1 1 e 2 d 3 f 4 a 5 c 6 b

2 1 d 2 e 3 a 4 f 5 c 6 b

3 1 did BP make
2 is / was it
3 oil could
4 deep is
5 did it look for

Unit 8

1 1 did you start
2 began
3 graduated
4 found
5 was
6 did you join
7 have been
8 have you had
9 have done
10 have worked
11 have you worked
12 have been
13 helped
14 have ever had

2 1 compressor
2 corrosion
3 equipment
4 friction
5 logistics
6 supervisor
7 technician
8 trainee

3 1 trainee
2 equipment
3 compressor
4 supervisor
5 friction
6 technician
7 logistics
8 corrosion

Unit 9

1 1 longest
2 heavier
3 less
4 most
5 better
6 worse
7 worst

2 1 the longest
2 the most dangerous
3 best
4 worse
5 longer
6 the largest
7 bigger
8 easier, less expensive

3 1 g 2 e 3 a 4 f 5 b 6 c 7 h 8 d

4 1 tri-
2 trans-
3 Inter
4 off
5 re
6 semi-
7 micro
8 over

Unit 10

1 1 broken down
2 distillation
3 fractionating
4 evaporate
5 vapour
6 condenses
7 turned into
8 fuels

2 1 b 2 a 3 a 4 c 5 b 6 b 7 c 8 b 9 c 10 b

3 1 b,c 2 d,g 3 a 4 f 5 e

Unit 11

1 1 When the sun shines, it heats the earth.
2 As hot air rises from the ground, cold air replaces it, creating wind.
3 Before a wind turbine can operate, it needs wind.
4 The wind passing through the turbine's blades makes it turn.
5 When the hub rotates around the generator, it creates electricity.
6 Afterwards, power lines transport the electricity to the grid.

2 1 ten centimetres
2 seven kilos
3 three million
4 five hundred

3 1 The refinery produces around two million barrels a day.
2 The platform is approximately 400 kilometres offshore.
3 Just under eighty people work on the FPSO.
4 He studied in America for roughly three years.

4 1 energy
2 boilers
3 steam
4 turbine
5 generator

Unit 12

1 1 don't need to
2 mustn't
3 have to, have to
4 don't have to
5 must
6 must

2 1 don't have to buy / don't need to buy overalls. The company supplies them.
2 (really) must wear a hard hat on the site.
3 (absolutely) mustn't smoke at a gas gathering plant.
4 have to / need to write your name and the time in the staff book.

3 1 to ask them to come to the next meeting.
2 to find out what is happening at the ministry.
3 to tell the refinery manager to visit me.
4 ask them to provide a certificate of origin?

4 1 schedule
2 deadline
3 viable
4 update
5 estimate
6 budget
7 bid
8 priority

Unit 13

1 1 will miss, work
2 won't leave, doesn't improve
3 don't arrive, will have to
4 Will you, offer
5 doesn't arrive, we'll have to begin

2 1 should have worn
2 should have used
3 should have followed
4 should have fitted

3 1 Mind your step as you get into the boat.
2 Make sure that you have got your goggles.
3 Wear your ear protectors at all times.
4 Remember to keep your hard hat on.
5 Don't forget to attach your lifeline.
6 Finally, watch out for high waves.

Unit 14

1 1 may finish
2 might
3 is going, He's meeting
4 could
5 won't, will
6 might, I'll call

2 1 fossil fuels
2 greenhouse gas
3 global warming
4 renewable energy
5 hydroelectric dam
6 solar panels
7 wind turbine

3 1 oil-powered station
2 double-hulled tanker
3 diamond-covered bit
4 well-head pressure
5 1,100-mile trans-European pipeline
6 petroleum-based products
7 offshore platform
8 four-sided kelly

Unit 15

1 1 degree
2 recruit
3 opportunity
4 career
5 application
6 salary
7 interview
8 overtime
9 promotion
10 candidate

2 1 could you tell me
2 I'm in my second year
3 looking for an apprenticeship
4 any work experience
5 see yourself doing
6 my long-term ambition
7 don't you want
8 I'd like to get
9 Afterwards
10 would you rather work
11 I'd prefer to

3 1 I'm playing
2 is going to
3 are going to
4 I'll look

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