

# INFORMING LOCAL COMMUNITIES, CIVIL SOCIETY AND LOCAL GOVERNMENT ABOUT OIL & GAS

A PRACTICAL GUIDE ON TECHNICAL ASPECTS

## ACKNOWLEDGEMENTS

We are very grateful for the financial support received from the Netherlands Ministry of Foreign Affairs to produce this practical guide; without such support this work would not be possible.

We want to express our gratitude for the initial guidance in developing the guide received from all the members who attended the consultative meeting held in Juba in August 2014. We were encouraged by the comments received from Nile Petroleum Corporation (Nilepet), Dar Petroleum, Sudd Petroleum, South Sudan Law Society, Ministry of Petroleum & Mining, etc.; they all promised to use the material in their areas of operations. Thank you.

We also want to thank Daniel Segal and Didas Muhumuza for their input at the start of this work which set the right foundation upon which the rest has been built. Special thanks to Arne Winther, Philip Obita, Michael Akatwijuka, Mathew Lule, Tullow Oil (Kenya), Oxfam (Kenya) and Lien de Brouckere for their invaluable comments, guidance and detailed critique which tremendously improved the work. We would like to thank Jane Carroll for the language and copy-editing of this report.

We are equally grateful to the team who carried out the illustrations, led by Dickson Amanyua. They were very professional in their work and patient enough to include all comments/changes in the illustrations.

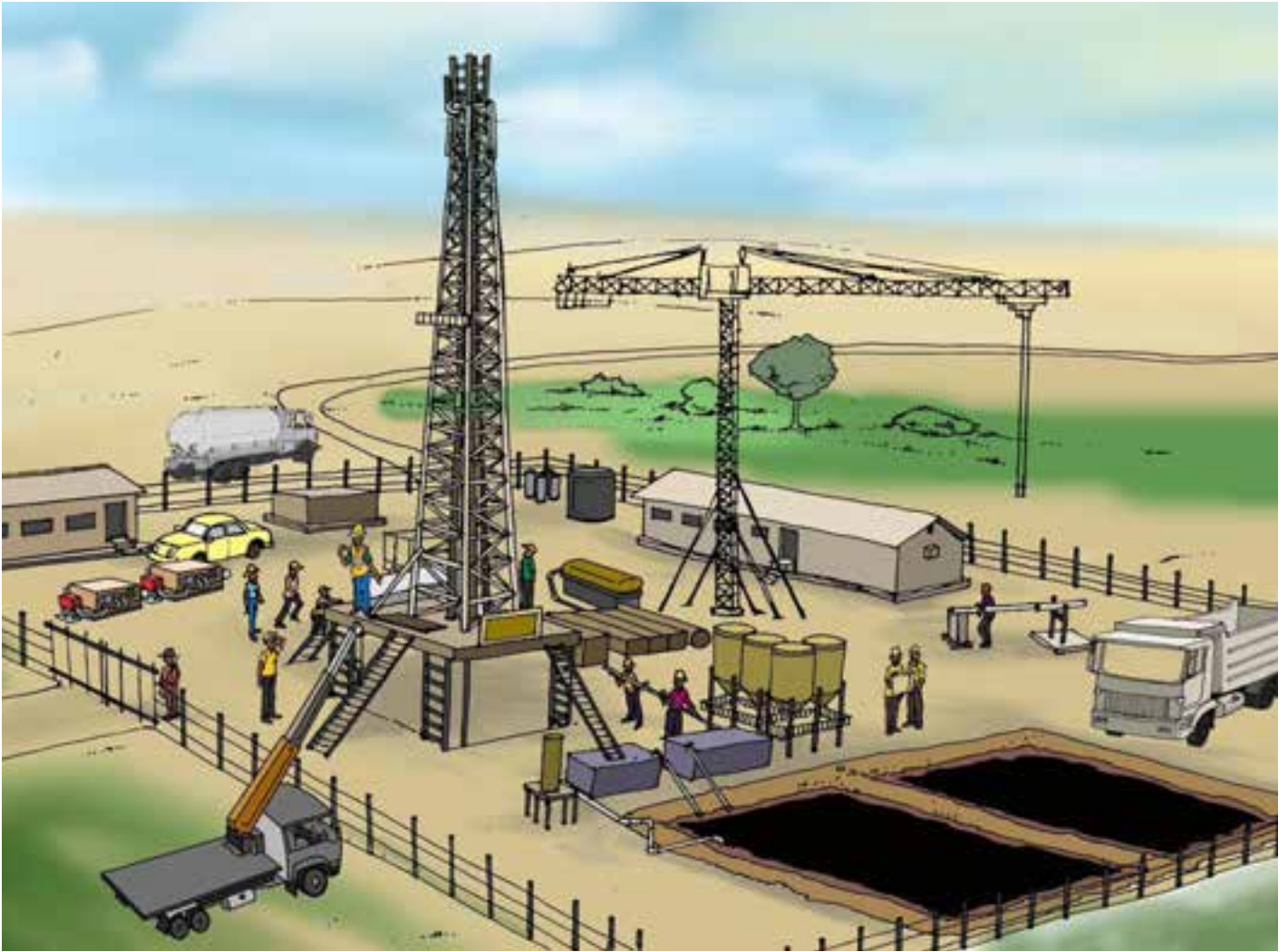
**Karidewa Nyeinga** – Rtenn Petroleum

**Jeroen de Zeeuw** – Cordaid Kenya

**Martin Kwor** – Cordaid South Sudan

# CONTENTS

<b>INTRODUCTION TO THE TECHNICAL ASPECTS GUIDE</b>	5
<b>FORMATION OF OIL AND GAS</b>	8
<b>UPSTREAM ACTIVITIES</b>	10
<b>Step 1: Licensing</b>	10
<b>Step 2: Exploration</b>	14
<b>Step 3: Development</b>	22
<b>Step 4: Production</b>	27
<b>Step 5: Termination and Restoration</b>	29
<b>DOWNSTREAM ACTIVITIES</b>	30
<b>COMMON PETROLEUM PRODUCTS</b>	33
<b>ENVIRONMENTAL IMPACT OF OIL AND GAS ACTIVITIES</b>	34
<b>BENEFITS FROM OIL AND GAS ACTIVITIES</b>	39



*A drilling site with fencing for protection and safety, offices and cabins for workers, power generators, produced water ponds, etc...  
The big structure with the metal tower is the drilling rig.*

.....

# INTRODUCTION TO THE PRACTICAL GUIDE

## Background

This guide has been developed as a result of discussions held during several oil and gas training programmes delivered by RTENN and Cordaid for government officials, oil company personnel and civil society organizations in South Sudan and the East Africa region. The general observation was that local communities living in oil producing regions lacked learning material that would provide them with a basic understanding of the oil and gas industry. This lack of awareness has resulted in suspicion/mistrust and represents a challenge in the development of oil and gas projects.

Therefore, the guide covers basic aspects of the petroleum industry; mainly the upstream sector, with a general overview of downstream activities. It provides a brief introduction to oil and gas formation and how oil companies get permission to carry out activities. This is followed by how companies search for oil and gas; carry out development, get the oil out of the ground and terminate the project. Finally, the impact of the industry on the environment is described, with a specific focus on the common challenges encountered by local communities living within oil producing regions. Safety aspects are clearly highlighted in the form of “cautions”. The material is presented in simple terms/language and is accompanied by illustrations.

## Purpose

This guide is specifically designed for facilitators and trainers wanting to raise awareness of local communities in oil and gas producing regions. Relevant activities are described from a non-technical point of view.

This technical aspects guide should be read/used in conjunction with related community outreach materials such as cards and posters as well as with the separate, social aspects guide,<sup>1</sup> which focuses more on company structures, community organization, potential impacts of oil, gas and mining production, and community-company engagement strategies.

It is expected that by using this guide, local communities, civil society organizations and local governments will acquire a basic understanding of the operations of the oil and gas industry, and thereby be able to engage oil companies and government more effectively and constructively. Having better-informed communities will help to reduce misunderstandings and/or suspicion, manage expectations, and build trust and confidence between the key stakeholders of oil and gas projects (i.e. communities, civil society, government and companies).

<sup>1</sup> Cordaid (forthcoming), *When Oil, Gas or Mining Arrives in Your Area. A Practical Guide for Local Communities, Civil Society & Local Government on the Social Aspects of Oil, Gas & Mining.*

## Audience

The main audience for the guide includes:

- facilitators and trainers working with local communities in oil and gas producing regions;
- local communities living in oil and gas regions with little or even no formal education. For the latter group, the guide will be translated in key local languages and in different formats such as posters and cards with simplified messages in the form of illustrations;
- local and national government, oil companies and civil society organizations, which may find the guide useful for local community sensitization;
- people with no background in oil and gas, who may find the guide useful for understanding basic aspects of the industry;

The guide is specifically designed for the East Africa region. However, it can also be easily adopted for other regions.

## Design and Format

The material is presented in simple form describing activities in the various phases of the oil and gas industry:

- The structure of the chapters follows the so-called 'life cycle' of oil and gas projects 'upstream', i.e. from licensing to exploration to construction/development, production and, finally, closure/termination. And it also briefly mentions key 'downstream' activities.
- Technical terms are simplified.
- The main focus is on aspects of activities that local communities can see, hear, smell, feel or touch.
- In some cases, illustrations are grouped in sequences describing activities in the form of a story.
- Text and all main concepts are accompanied by illustrations. Moreover, the text is accompanied by a mascot, 'Madam Mafuta' ('Mrs Oil' in Swahili), who provides further information and also features in outreach material accompanying this guide.
- Main safety measures for local communities are highlighted in the form of "cautions".



**INFO:** Exploration usually takes 3 – 5 years and development 1 – 2 years. From the moment seismic trucks and exploratory wells are visible in the landscape, it takes at least another 4 – 7 years before the oil starts flowing (and 1 – 2 years more if a long pipeline needs to be built).



## Structure of the Guide

The chapters of this guide follow the different steps of the oil and gas life cycle:



### **Licensing – Getting permission**

Oil companies must first get permission from the government before they can start carrying out any activity.



### **Exploration – Searching for oil and gas**

Companies search for oil and gas by carrying out seismic surveys and drilling exploratory wells.



### **Development – Building infrastructure**

Companies build infrastructure that will allow them to get the oil and gas out of the ground and transport it; this may include roads, railway lines, pipelines, airports, etc.



### **Production – Getting the oil out of the ground**

At this stage, the company gets the oil out of the ground and separates the mixture of oil, gas and water.



### **Termination and Restoration**

After getting the oil out of the ground is completed, the project is closed; equipment is removed and the land is restored to almost its original state.



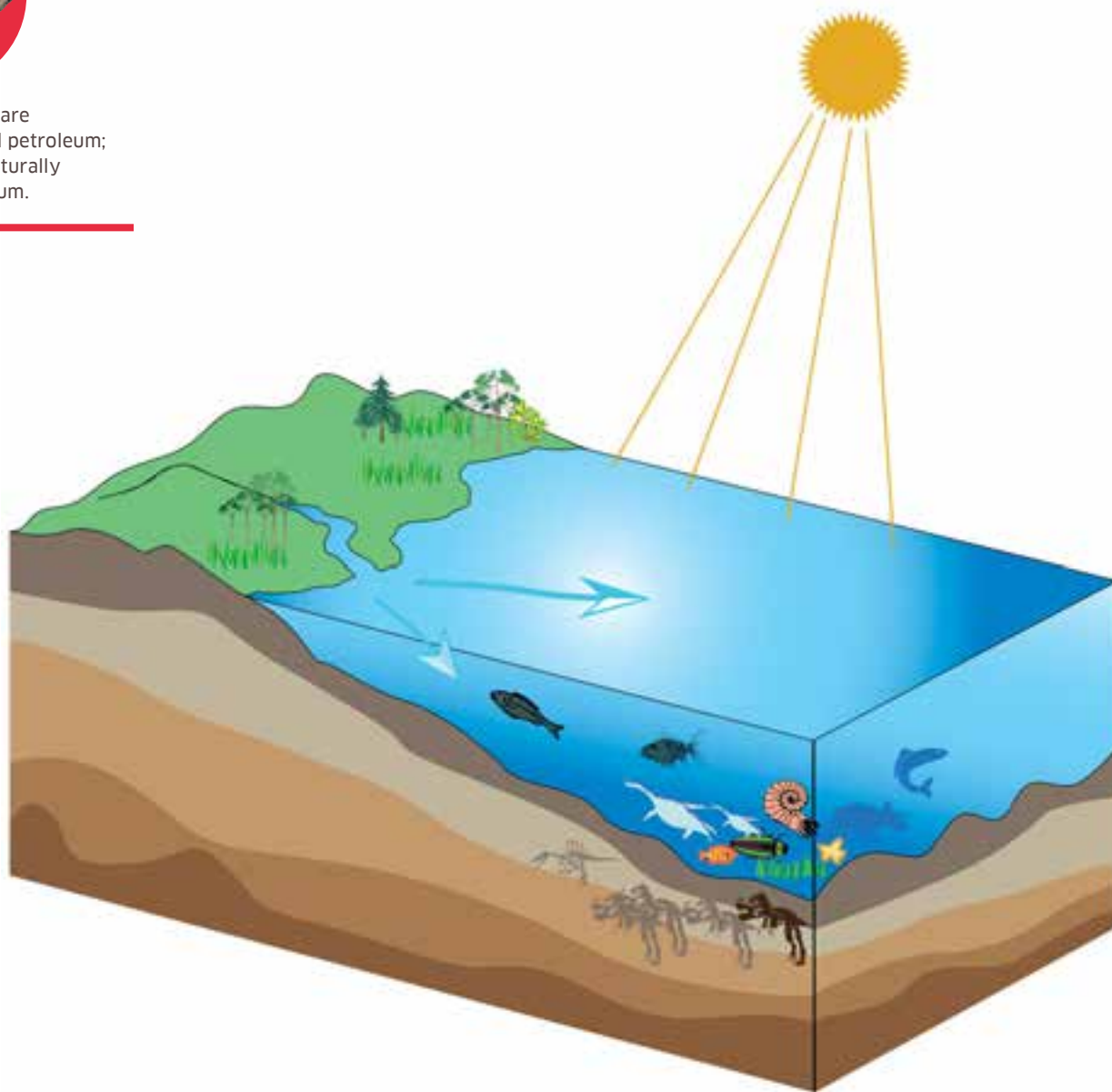


## FORMATION OF OIL AND GAS



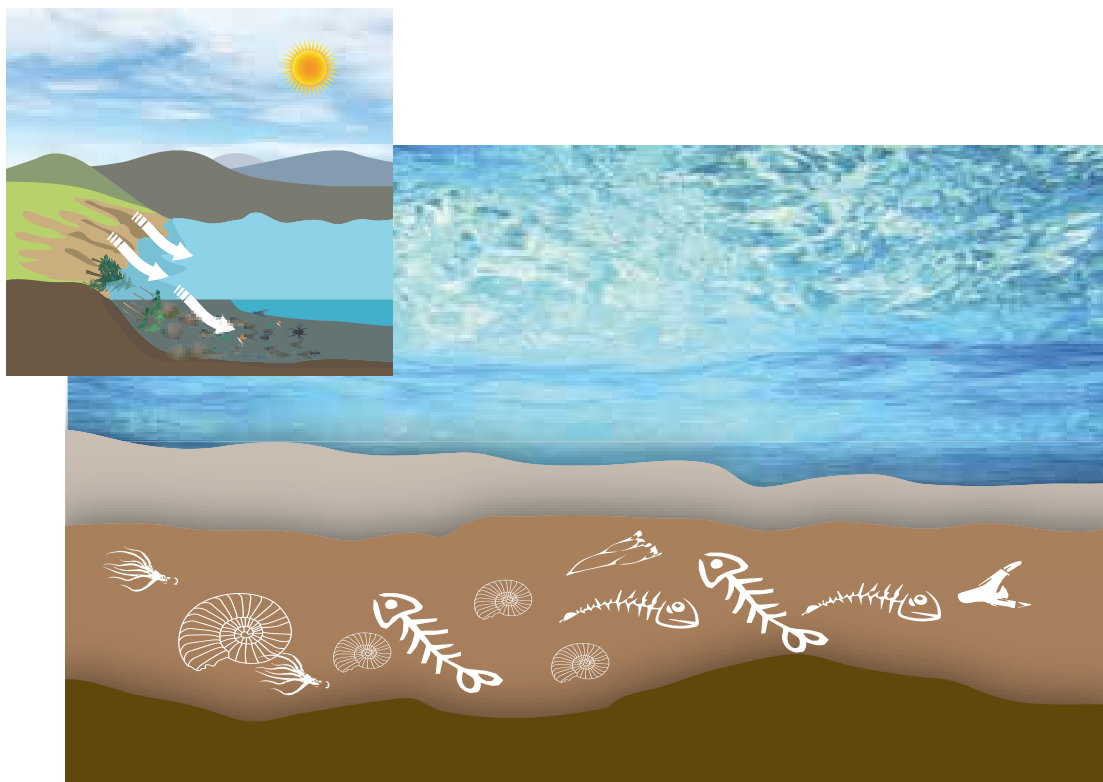
**INFO:** Oil and gas are collectively called petroleum; crude oil is the naturally occurring petroleum.

Oil and gas are formed from the remains of dead plants and animals which lay buried on the ocean floor. Millions of years ago, these were covered by layers of sediments and exposed to high pressure and temperature which turned them into oil and gas.



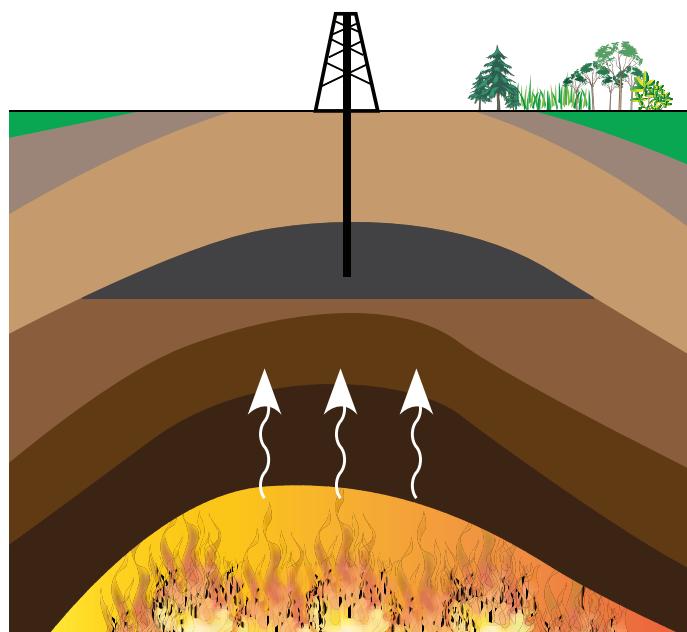
*Some 300–400 million years ago, tiny plants and animals which had died lay on the ocean floor, and over time were covered by many layers of sediments.*





*Over hundreds of millions of years, more layers of sediments were added and the dead plants and animals were buried deeper and deeper.*

Deep down in the Earth the pressure and temperature are very high. The high heat and pressure turned the dead plants and animals into oil and gas.



*Oil and gas moved upwards through the pores of rocks until they were trapped by a layer of rock called the cap rock, or the seal, and they accumulated in what is called a reservoir. Today, companies drill down through the layers of rock to reach the reservoir.*

# STEP 1

## UPSTREAM ACTIVITIES LICENSING

Before oil companies start carrying out any activity in the oil and gas industry, they must first get permission from the government. The company has to meet several conditions set by the government before getting the permit or license.

### The Role of Government

The government usually collects basic information about the types of rocks in a given area and these are analyzed to identify particular rocks associated with oil and gas. Certain types of rocks are a pointer to the possibility of oil and gas underground. After studying the data, the prospective sites are split into areas called 'blocks'. The blocks can be either on land ('onshore') or in the sea ('offshore'). The blocks are put out to tender and oil companies are invited to bid for exploration of oil and gas within the blocks.



**INFO:** The government puts in place the laws and regulations for exploration for and production of oil and gas in the country. All minerals discovered in a country usually belong to the government and not the individuals owning the land (except in the US).



*Government officials gather rock samples in the field.*



*Samples of rocks are analyzed to identify types of rocks associated with oil and gas.*



*The land is then demarcated into blocks for exploration to be carried out.*

## The Role of Oil Companies

Activities in the oil and gas industry are very expensive and are carried out usually by international oil companies (IOCs). These companies have the experience and resources required to search for oil and gas. They sign formal agreements with the government on how the exploration will be done, and they invest in the project to carry out the activities.



*The government issues 'tenders' calling for companies to bid for licenses to explore for oil and gas; these tenders may be advertised in local and international media. However, in some countries, competitive bidding may not apply, especially if the country has yet to discover oil and gas.*



*Representatives of oil companies interested in the blocks hold meetings with government officials to discuss and negotiate the agreements.*

### Giving Oil Companies Licenses to Explore for Oil and Gas

Oil companies sign agreements with the government to explore for oil and gas in the blocks they have been awarded. The agreement includes terms and conditions to be followed by the oil companies and the host government, regarding how to share costs, revenues, profits, etc. The companies may be required to pay fees, royalties, taxes and bonuses to the government.

The government then issues the oil company a permit to look for oil and gas, commonly called an exploration license. The company is also issued with several other permits for specific activities such as disposing of waste and accessing the land to be explored for petroleum.

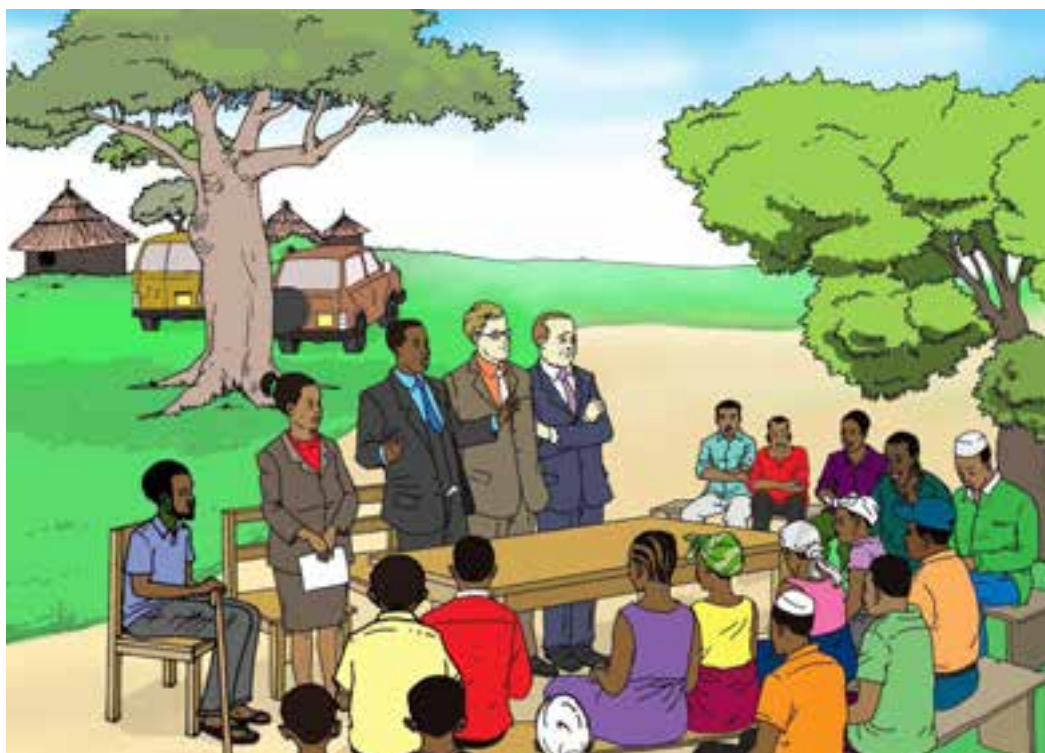


*Government and oil company officials brief the media/public about oil and gas activities. It is the role of government to keep the public informed about what is taking place.*

### Environmental and Social Impact Assessments

Before starting exploration, oil companies are required to assess the impact of the proposed activities on the environment as well as the local society in a study that is called an environmental and social impact assessment (ESIA). These assessments are usually carried out by experts from independent companies and then reviewed by the government. If the assessments identify harmful effects to the environment and/or society, the experts may propose ways of reducing these harmful effects. Local communities are usually involved in the impact assessments and their views and concerns are important in the project design.





*Government and oil company officials carry out awareness-raising among the local community about the project.*

## Community Consultation

Before oil companies start searching for oil and gas, the government and the companies should talk to local communities about the proposed activities. The topics they discuss may include access to land owned by the community on which the companies will look for oil, the impact of the company's activities on the community, jobs in the oil and gas sector, etc.

In addition to the permit the companies receive from the government; it is very important that the communities should be able to give their views and ideally 'consent' to the project.

**INFO:** The Social Aspects Guide provides more details on the various aspects and forms of local community engagement during oil and gas exploration.



# STEP 2

## UPSTREAM ACTIVITIES EXPLORATION

Exploration for oil and gas is the search for oil and gas deposits beneath the Earth's surface. It involves the search for specific types of rocks associated with oil and gas. Oil companies search for oil and gas on both land and water.

### Oil and Gas Exploration Survey Methods

Because petroleum is underground, finding it requires special techniques and equipment. The most common ways of searching for oil and gas are aerial surveys and seismic surveys.

#### Aerial Surveys

This method involves flying an airplane or helicopter with special equipment hanging from it at low altitudes above the area of interest. The airplane collects information about the types of rocks underground with the aim of identifying those with the potential for containing oil and gas.



**INFO:** The low-flying airplanes over the local area do not cause any harm to people or animals.



*A low-flying aeroplane collects data about rock types, which will be analysed in the laboratory to determine the potential for oil and gas in the area. Local communities will see aeroplanes flying over their villages.*

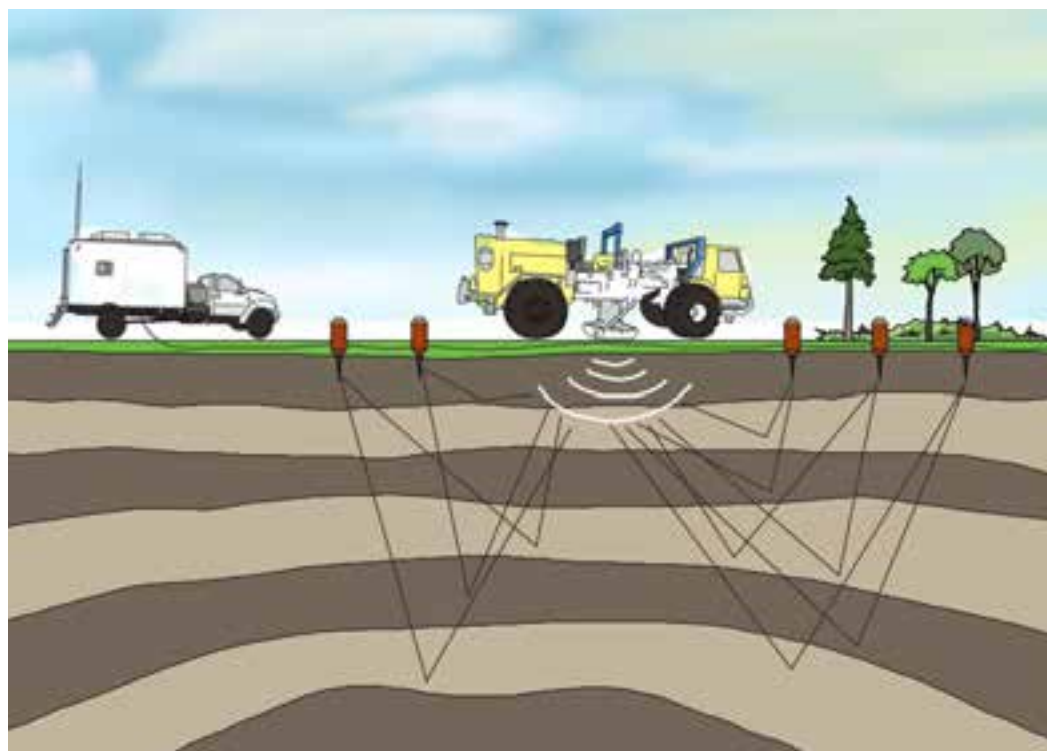


### Seismic Surveys

A technology called seismic is used to build the image or picture of what lies under the ground. This technology uses disturbances caused by energy travelling through the earth's surface called sound waves to reveal what lies deep in the ground. When sound waves are directed into the ground and hit something they cannot penetrate, they bounce back, returning to the surface where they are recorded by microphone-like devices called geophones. The recorded information is used to create a picture of the underground. Specialists from the oil companies use these images to look for places underground where there may be oil or gas.



**INFO:** In the old days the geophones were connected by electric cables to a computer in the recording truck. Nowadays, with improved technology, the cables are no longer required.



*Special trucks send sound waves into the earth; the waves bounce at particular rock layers and the returning waves are recorded by special equipment.*

On land, special trucks called vibrator trucks are driven in the area of exploration. On water, special ships called seismic vessels move around. The trucks or ships cause shaking of the ground or movement of water at particular points. The shakings, referred to as vibrations or pulses sometimes make a noise or cause a minor tremor that can be heard or felt by people in the community but are harmless to both people and animals.

In order to carry out seismic surveys on land, the companies need access to the land. Government and the company are supposed to discuss with the local communities about the seismic activities and where and when they will take place. The company will seek permission to access any private land along the survey routes. The survey routes are planned and approved by the relevant authorities. Some new roads might be established, or strips of land cleared, allowing access for the vibrator trucks.



**INFO:** Companies should avoid, where possible, and as far as they can, carrying out seismic surveys during crop-growing seasons and in sensitive areas, to reduce the impact.



*Clearing strips of vegetation for carrying out seismic surveying; the company is expected to restore the land to its original state after completing the survey. It is possible that the routes will pass through farming fields and animal grazing land.*



*Workers carrying out seismic surveys in the field; this involves a number of trucks and foreign and local workers.*

### **After the Seismic Survey**

When the oil companies finish the seismic survey, any land that has been disturbed during the survey is restored to almost its original state. Temporary camps are removed, grass and trees are replanted



**INFO:** The only way to confirm that there is oil or gas is to drill a well.

## Exploration Drilling

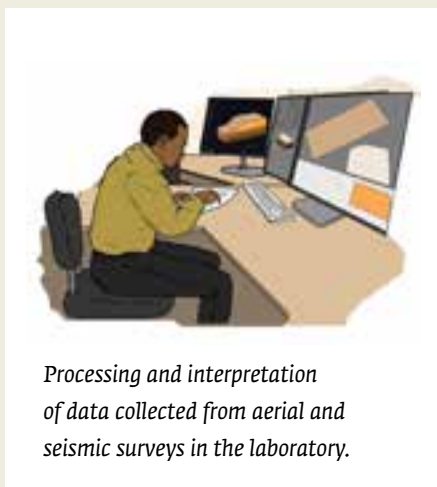
Aerial and seismic surveys help oil companies build an image of the ground under the surface so that they can decide whether or not to drill a well. The images of the underground are used to find where oil or gas may be trapped. These traps are the target for drilling wells –also called exploration wells– to find out if oil or gas is present or not. An oil or gas well is a hole drilled into the earth, usually lined with pipes, and goes several (hundreds of) meters deep into the earth before reaching any oil and gas reservoir.



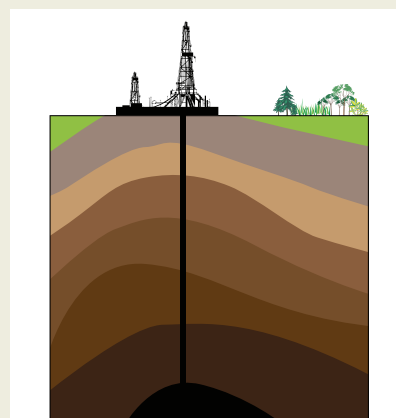
*Carrying out seismic and aerial surveys.*



**INFO:** Drilling a well is very expensive so companies carry out careful analysis of the seismic data before deciding to drill.



*Processing and interpretation of data collected from aerial and seismic surveys in the laboratory.*



*Drilling of exploration well to confirm the presence of oil and gas.*

## Preparation for Drilling a Well

Before any drilling activity is done on the land, oil companies will need to get consent from the government. The government will assess the effect that the drilling activities will have on the environment and if these activities are found to be harmless it will give approval for the drilling to start. The local communities should be consulted as well.

### Site Preparation

The next step is to select the location where the drilling rig is to be positioned. The drilling rig is a large steel tower approximately 45 meters high. A drilling rig may weigh more than 100 tons (more than the total weight of 100 bulls). A large area, about twice the size of a football field, needs to be cleared and prepared for what is called the well pad. This location will house the drilling rig and all the equipment necessary to drill the well.

A temporary camp may be established during exploration. However, during production, the camp may become permanent since production activities take a longer time. It usually takes about one to three months to drill a well.

The camp facilities include water, tanks, generators, clinic, waste storage area, mobile offices, accommodation units, communication, etc.



**INFO:** Local communities should be consulted on a suitable location for the drilling site and base camp.



*Construction of a drilling site; the site is usually fenced with barbed wire or a wall to prevent illegal entry, protect the expensive equipment, and keep people and livestock at a safe distance.*

### Manpower

There are about 100 people or more working on the drilling rig, working in shifts day and night. Highly skilled foreign and national workers are employed to carry out technical work. Local communities may be employed to provide unskilled and semiskilled labour.



*Local and foreign workers at a drilling site.*

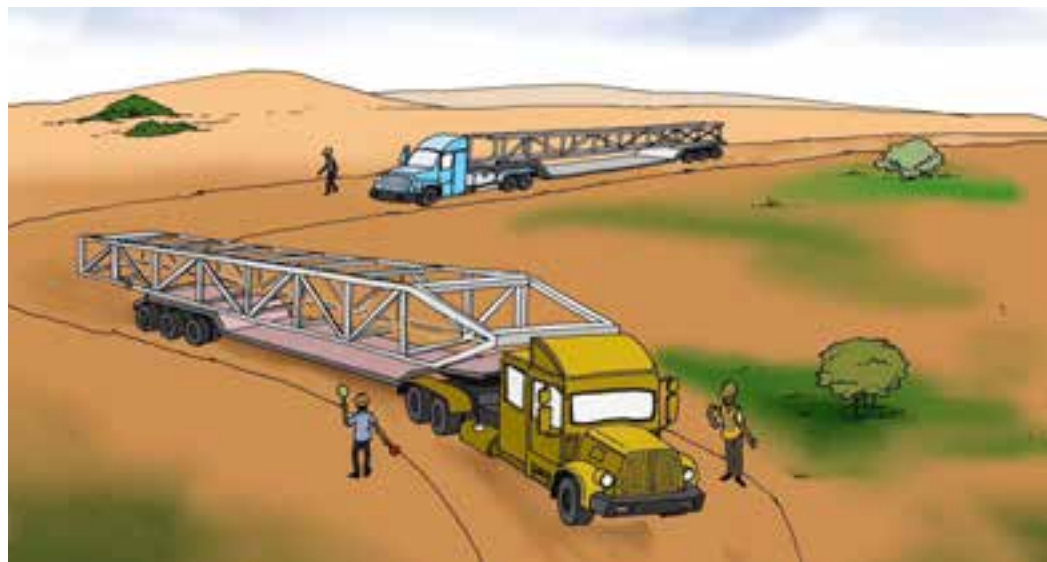


### Movement of Rigs and other Equipment

In order to move the drilling rig, access roads will be built. Moving the rig, equipment and accommodation involves 100–150 truckloads. During this period there is a lot of traffic with heavy trucks on the road. The road is also used for daily deliveries of supplies to the drilling site. The companies always need to work with the local communities to increase road-safety awareness.



**CAUTION:** Do not stand close to the main road when heavy trucks are moving. Do not graze animals near the road, to avoid accidents.



*The movement of the rig and other equipment to the site involves many trucks; local communities should not get too close to the road, in order to avoid accidents.*



**INFO:** Drilling activities continue day and night and therefore local communities will hear noise and see bright lights from the drilling site at night. These lights are not harmful to people.

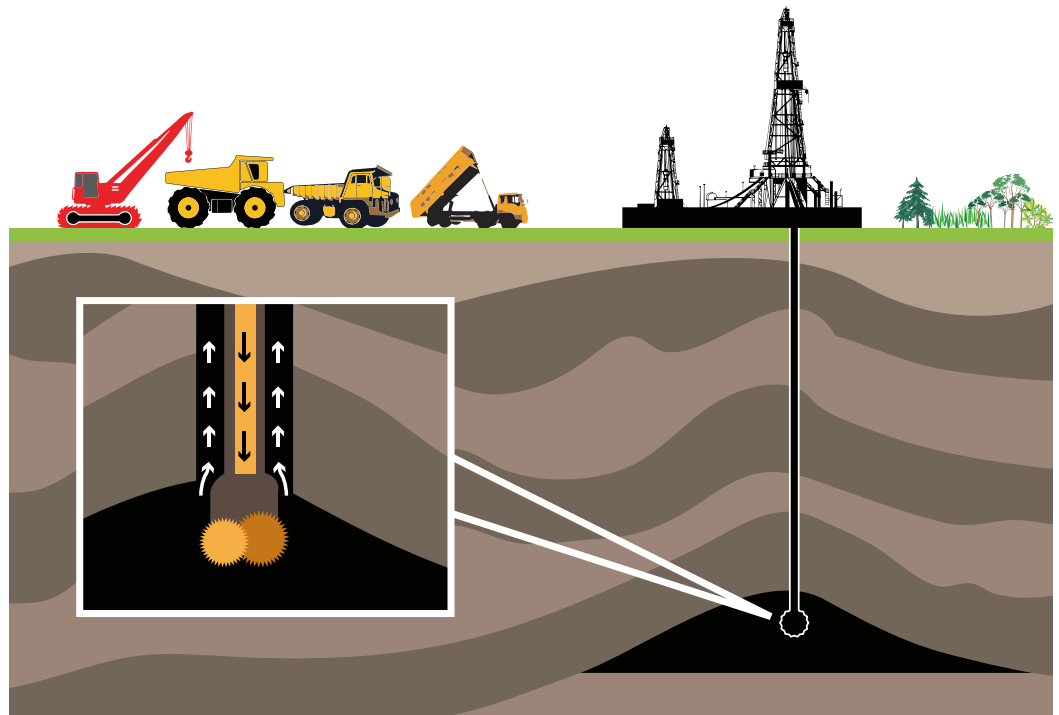


*A drilling site; security personnel will be deployed at the site to provide protection for the equipment and personnel. The site consists of offices, cabins for workers, power generation, etc. The massive structure with a metal tower several dozens of meters high is the drilling rig.*

### The Drilling Process

A drilling rig sends a rotating cutting tool called a drill bit, which cuts through rock layers underground. The drill bit is attached to a steel pipe and more pipes are added as drilling goes deeper into the earth.

Usually, drilling is started with a large hole using a large cutting tool. The hole is secured with a steel pipe and the next section is drilled with a smaller tool and secured by pipes as well. The process is repeated until the target reservoir is reached which may be several hundreds or thousands of meters deep into the earth. Typical wells are 2,000–4,000 meters deep into the earth (on the surface, this would be a distance of about 2–4km).



*How an oil and gas well is drilled: the drill bit is attached to the pipe and cuts through the rock layers below the surface of the earth. Fluid such as water is pumped from the surface to the bottom to cool the cutting tool and also to bring cut rock pieces out to the surface.*



**INFO:** The burning of gas, known as flaring, may last from half a day to a couple of days.

### Testing the Well

If the drilling has been successful in finding oil, the big question is how much oil is found and how fast will it flow. This is calculated by flowing the oil or gas to the surface. The gas is highly flammable – in other words, it can burn easily – and it needs to be burned when it comes to the surface. This produces big flames and very loud noise, often the same noise as from a jet plane. However, technology is available to reduce the noise and to shield the burning area.



*Burning of associated gas brought to the surface produces big flames and noise.*





**INFO:** Well testing is very important for the oil company to decide whether they are going to develop the oil or gas field.

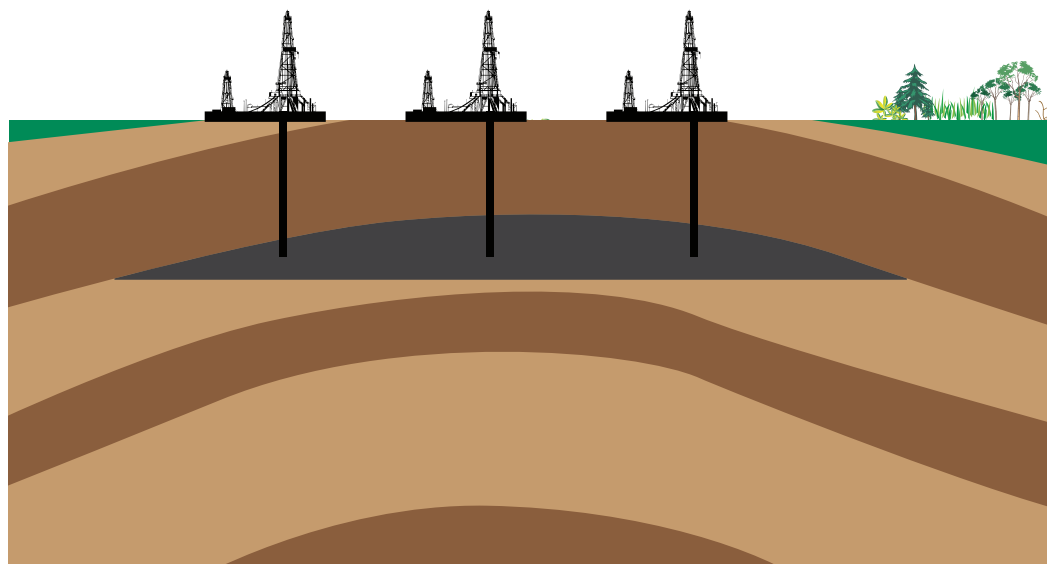
If there is oil, it may be burned the same way as the gas. Although the noise is not as bad as with the gas, the burning of oil creates a thick black smoke. To avoid burning the oil there is technology to collect the oil in tanks.

### Appraising – Finding out more

Usually the information gathered from drilling one well is not enough; the company needs to drill more wells. This is called appraisal drilling. After drilling a well and finding oil, more wells have to be drilled to ascertain the size of the reservoir.



**INFO:** If the company finds a reasonable amount of oil, it then proceeds to the next stage, which is development, i.e. preparing the site for getting the oil out of the ground.



*Appraisal: drilling more wells to determine the size of the reservoir.*

### Abandonment

After finishing the drilling of an exploration well, the well is usually abandoned; it may be plugged so that the companies can return to it later if required, or it may be permanently abandoned. In the latter case, the equipment is taken away from the site. The rig location and access roads are demolished and the site is reinstated to almost its original state.

In some cases, after drilling a well, no oil or gas is found; the well is called a dry well. However, even if no oil or gas is found in the well, it may still provide valuable information for further exploration of the area.



**INFO:** The search for oil and gas is very expensive and usually all the exploration costs are borne by the oil companies.

# STEP 3

## UPSTREAM ACTIVITIES DEVELOPMENT

### Development of an Oil and Gas Field

If the company determines there is enough oil and gas for the field to be commercially viable – that is, to make money – the next stage is ‘development’. At this stage the company builds infrastructure that will allow it to produce and transport the oil and gas.

Deciding to develop an oil and gas field is a big investment decision for companies and governments. The company has to submit a plan to the government for approval. Through a stakeholder consultation process, the impact of the oil and gas activities on the environment and society will be carefully analyzed and all measures to reduce harmful impacts should be agreed upon. The approval process can take several months. Once the government is satisfied with the plan, the company will be issued with a production license to proceed to carry out development of the field and produce oil and gas.



**INFO:** The Social Aspects Guide provides more details on issues regarding local community compensation, resettlement, etc. during oil and gas activities.

### Compensation and Resettlement of Local Communities

The development of an oilfield on land requires a certain area of land and therefore, consultations should be carried out with local communities living on and using that land. Some of the affected local communities may have to be relocated to enable development to take place. In this case they should receive compensation in cash or, preferably, in kind for assets lost, e.g. ‘land for land’.

### Construction

During the development phase, many pieces of heavy equipment will be moved into the area – far more than during exploration drilling. The site is cleared and graded for installation of equipment. Pipelines, processing facilities, permanent accommodation for oil field workers, etc. will be constructed.



**INFO:** The construction phase provides the greatest employment and business opportunities (in the oil and gas life cycle). However, this boom in employment only lasts for a certain period of time – generally about 12 months and mainly benefits skilled workers.



*Site preparation for the production of oil and gas.*



*Construction of processing facilities in preparation for oil and gas production.*



**CAUTION:** Keep away from the main road during movement of heavy equipment.



*Heavy machines and other equipment are brought to the site during the construction and development phase. In this phase, local communities will see many trucks along the road.*

## Infrastructure

The development of the oil and gas fields will involve the movement of heavy equipment and, therefore, the government has to build new roads and sometimes railway lines and airports; existing roads may also be improved to meet the expected heavy traffic.



**INFO:** The development of infrastructure should attract investors to the region and this may lead to increased business activities.

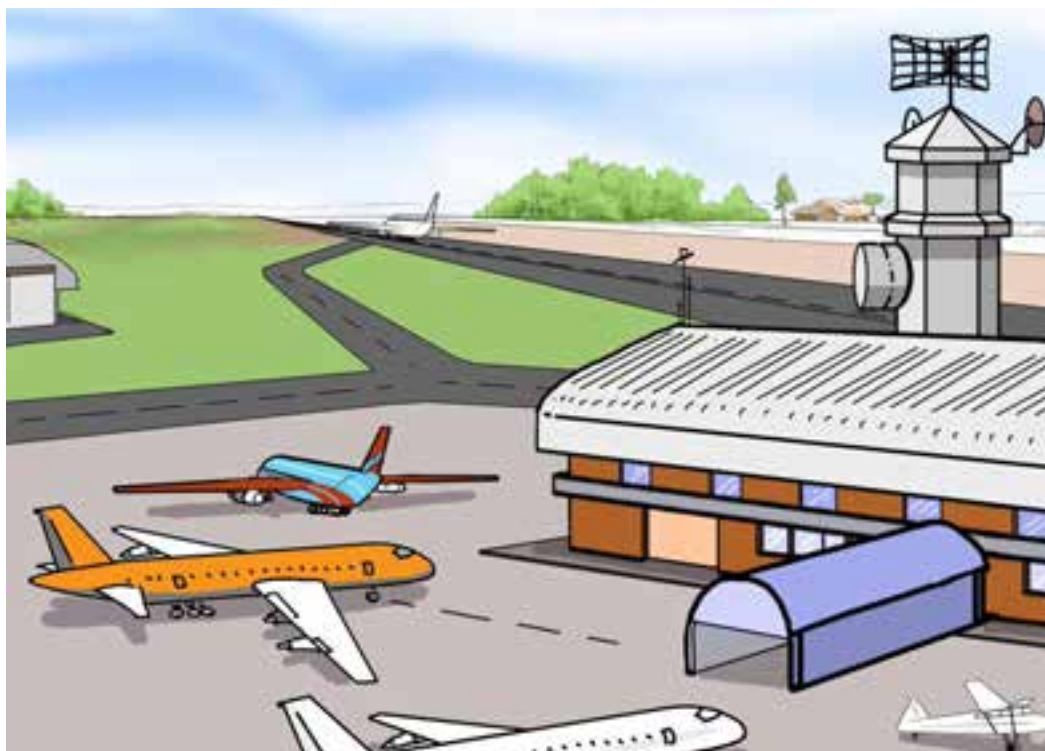


*Construction of new roads or improvement of existing roads; the roads may connect to major towns. A road network is also created within the oilfield.*



*Construction of railway lines; the railway may be used for transporting crude oil and other commodities.*





*Construction of an airport in the oil producing region; this is to enable fast movement of people and goods to and from the oilfields.*

## **Pipelines**

Pipelines are often constructed for exporting the crude oil. They may also be used for transporting the crude oil to a refinery for further processing.

Pipelines may be buried underground or may be visible on the surface. For safety reasons, an exclusion zone called a buffer zone is created around the pipeline, where nobody is allowed to carry out any activity.



*Workers laying pipelines for transporting oil and gas.*

### Development of Towns and Supply of Water and Electricity

Towns and business opportunities are likely to grow through ancillary (support) activities such as the supply of goods and services. The demand for services may grow; such services could include schools, hotels, office buildings, banks, houses and recreation centers. Electricity is required by the industry and the government may connect the area to the national grid. Alternatively, electricity may be generated locally from the crude oil produced. The government may also supply piped water in the area. Supply of electricity and water is likely to facilitate the growth of other industries in the area.



*The availability of water and electricity will attract other businesses and services to the area, leading to the growth of towns within the oil producing region.*



# STEP 4

## UPSTREAM ACTIVITIES PRODUCTION

Production is the process of extracting crude oil, in fact a mix of oil, gas and water, from the underground reservoir and pumping it to the processing facility. Here the oil, gas and water are separated from each other, and the oil and gas may be exported or transported for further processing.

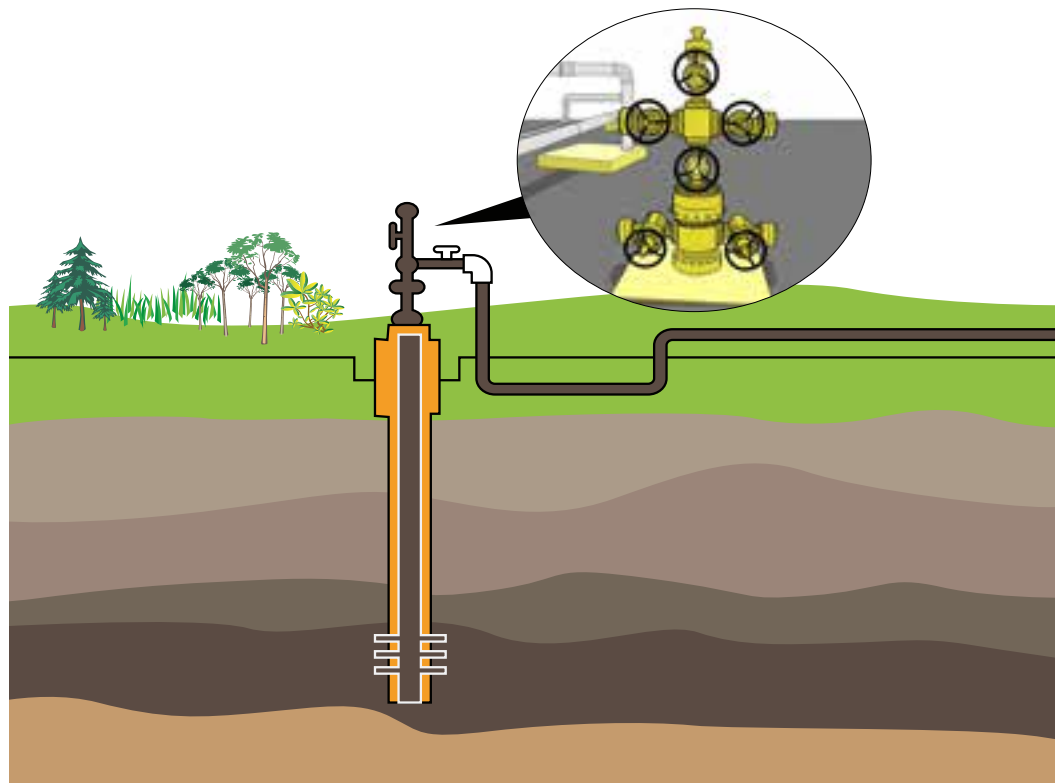


*Production: getting the oil out of the ground.*



**INFO:** Not all the oil discovered underground can be extracted.

Depending on the size of the reservoir, a number of wells may be drilled to produce oil and gas. These wells are then connected to the processing facility by pipelines. The flow of oil and gas from underground is controlled by a set of valves called a Christmas tree.



*A set of valves is used for controlling the flow of oil and gas from underground to the surface.*

## Processing of Oil and Gas

In the processing facility, the mixture of oil, gas and water is separated. The crude oil may be stored in tanks before transportation to a refinery by pipeline, road or railway. The gas is compressed and transported using pipelines, while the water is treated and disposed of safely.



*A central processing facility where the mixture of oil, gas and water is separated*

---

# STEP 5

## UPSTREAM ACTIVITIES TERMINATION AND RESTORATION

After years of producing oil and gas from a field, the production will decline and eventually come to an end. This may take about 20–50 years. After the completion of production, the company will seal all the wells it had drilled, remove equipment and return the site to almost its original state. This process has to be conducted in a manner agreed with the government during the initial stages of the project in the Environmental Impact Assessment. Even after closure, the site is monitored for any negative impacts that may occur.



*Closure of the project; the wells are sealed, the camp is demolished, equipment removed and the land is restored to almost its original state. Workers planting trees and grass after closure of activities.*

## DOWNSTREAM ACTIVITIES



*Crude oil in a container;  
it has to be processed to become  
a useful product.*

Once the oil and gas are out of the ground, they need to be transported and treated downstream, i.e. away from the location where they were found.

### Crude Oil

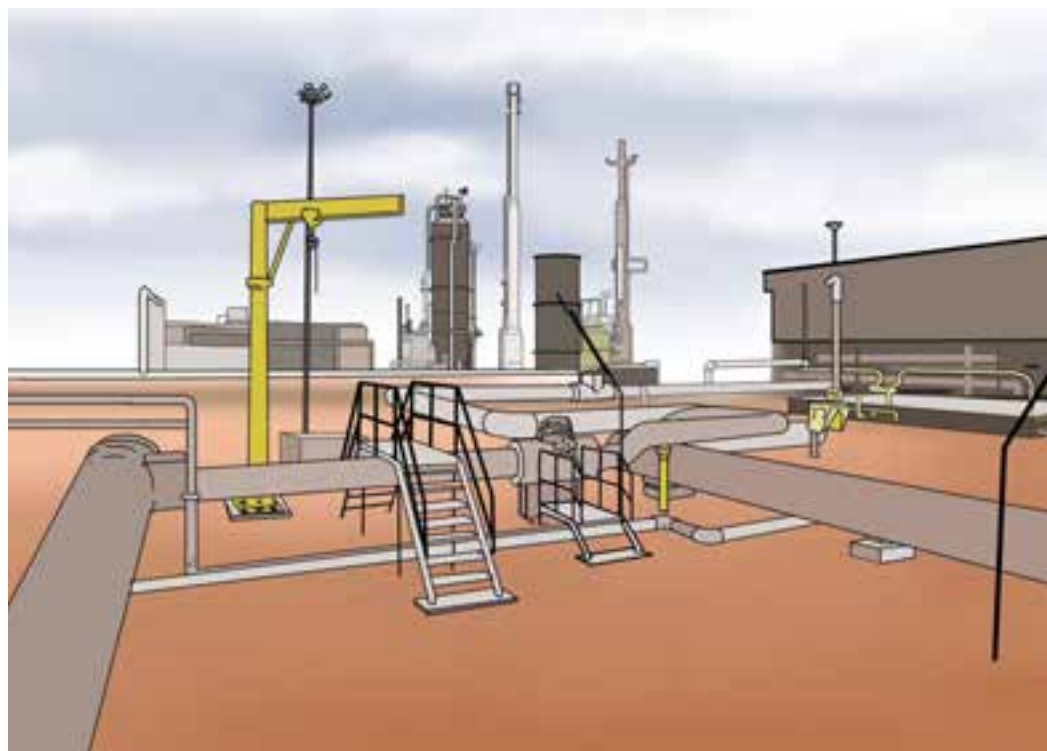
Crude oil is dark but the colour may vary from typically black to brown, green, yellow or orange. It is usually oily or waxy and sticky. Generally, the composition and appearance varies greatly depending on the type of reservoir. Crude oil needs refining before it can be used.

### Natural Gas

Natural gas is gaseous petroleum and is extremely flammable. It is usually purified before being transported by pipelines.

### Transportation of Crude Oil

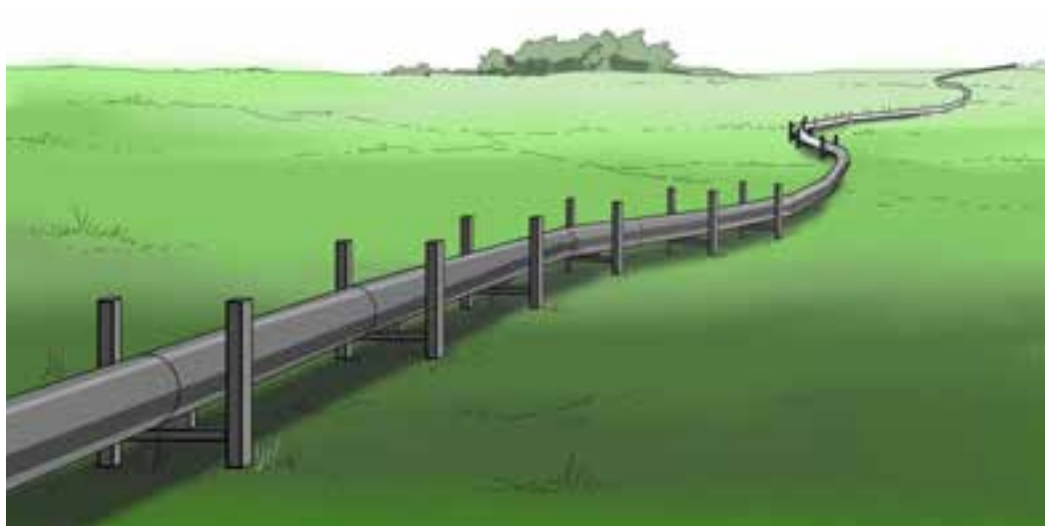
From the processing facilities, crude oil is usually transported by pipelines or train to a refinery or for export. Tankers may be used for transportation if production is in the sea. In South Sudan, and most likely also in Kenya and Uganda, crude oil is transported by pipelines to the sea where it is loaded on to tankers for export to countries where it will be refined.



*Pipelines for transporting crude oil from production wells to the processing facilities in an oilfield.*



**CAUTION:** Keep away from pipelines; animals should not be grazing near pipelines.



*Pipelines for transporting crude oil from processing facilities to a refinery or for export; these pipelines can be above or below the ground surface.*



**CAUTION:** Be careful when crossing railway lines to avoid accidents.



*Transport of crude oil by railway and trucks.*



## Refinery

An oil refinery is used to process crude oil into more useful forms such as petrol (gasoline), diesel, etc. This is done by separating the crude oil into its various components.



*An oil refinery for processing crude oil; it consists of large sprawling tanks and extensive piping.*

---

The refined products are sold on international and local markets.



*Refined products such as diesel and petrol (gasoline) are commonly sold at local fuel stations.*

---



## COMMON PETROLEUM PRODUCTS

Petroleum products have several uses in modern society.



Petroleum products are used as fuel in transportation by air, road, railway and water.



Fuel is also used for cooking and lighting at home.



Fuel is used to power generators at home, in offices, etc.



Petroleum is also used in the production of fertilizers that can be used on farms and in gardens for improving crop yields.



Plastic materials, which are petroleum products, are used for making chairs, buckets, cups, plates, etc.



And finally, bitumen, a petroleum product, is used in road construction.

# ENVIRONMENTAL IMPACT OF OIL AND GAS ACTIVITIES

Oil and gas activities may have negative impacts on the environment and therefore need to be properly planned and managed. The right technology also needs to be used. The question is, what are some of these impacts on the environment and local communities?

During the development phase, there is a lot of construction; heavy machines are used for constructing roads and preparing the well pad. The road and well pad location requires land and the activity creates noise and traffic. The traffic creates dust and may represent danger to the population.



**INFO:** Spraying water on the roads, introducing speed limits and the use of alternative routes are some of the measures that can be put in place to reduce the traffic and dust.



*Heavy trucks and increased traffic during development and construction produce dust and noise.*

Drilling of the well produces effects such as noise, fumes, smells, light during the night, garbage and run-off to land and water. The high noise level and fumes could in some cases be a health hazard to the local communities. The bright lights at night might affect wild animals. The community needs to be given information about these harmful effects, which must be brought down to acceptable levels.



**INFO:** With the use of modern technology, the high noise level may be reduced.



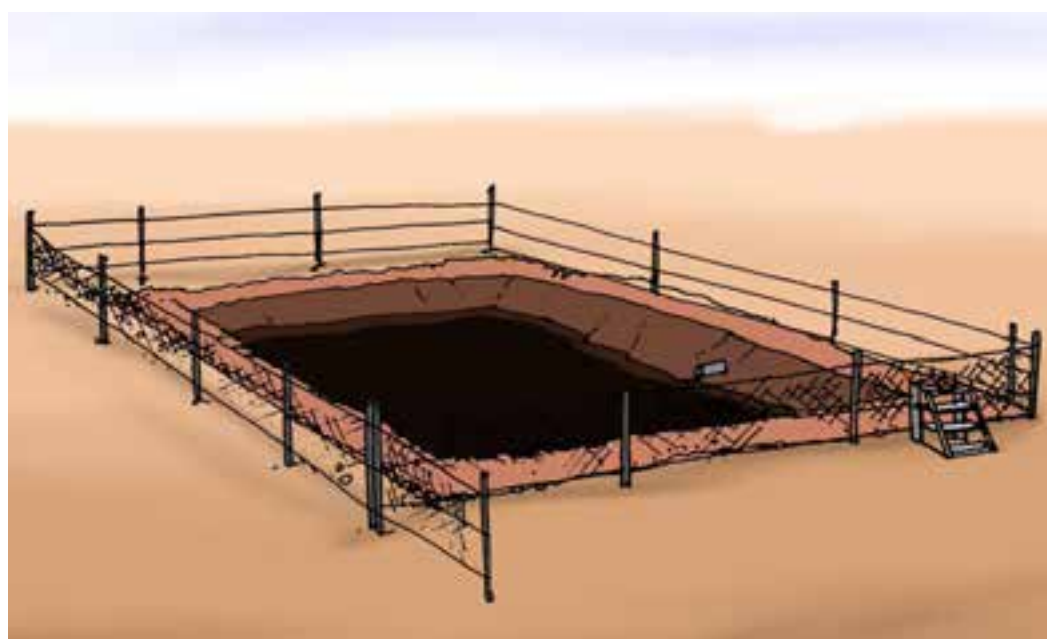
*The high noise level from drilling activities may affect local communities.*

Workers at each well pad or camp can total more than 100 people, all creating traffic and producing garbage and sewage, which has an impact on the local community. The foreign workers may affect the culture and other social aspects of the community. The separate guide on social aspects provides more details on the potential impact of the oil and gas industry on culture/society.

The waste from drilling activities, such as fluids used in drilling and pieces of rocks removed from the well, may contain chemicals which are harmful to people and animals. The waste can pollute the environment if not properly managed. Companies should follow guidelines for the treatment and disposal of wastes.



**CAUTION:** Do not break the fence around the pond and do not take animals to drink produced water – it is harmful.



*Waste water from the well, referred to as produced water, is usually kept in a protected area, and fenced with barbed wire to keep animals and people away. This water has to be treated to prevent pollution of the environment.*

In some cases, oil may leak from pipelines and such leakages can easily catch fire, which could result in deaths. Oil leaking from pipes pollutes the environment and should be contained immediately.



**CAUTION:** It is dangerous to get close to leaking pipelines, fire can break out! In case you see oil leaking from a pipeline, please immediately report this to local authorities.



*It is very risky to siphon oil from a leaking pipe; there can easily be a fire outbreak.*



Oil may spill as a result of leakages from pipelines, equipment failure, the destruction of facilities (especially during war), oil truck being involved in accidents, etc. An oil spill pollutes the environment and should be controlled and managed immediately.



**CAUTION:** Do not collect oil or fuel from spills – the place can catch fire and kill you.



*Oil spills: it is dangerous to rush to and collect oil from spills; there might be a fire outbreak which could kill all the people around.*

### Impact on Plants and Animals

Plants and animals may be affected by changes in their environment such as soil removal, lights shining during the night, increase in noise, etc. These impacts can be reduced through careful management of the oil and gas activities based on approved plans and the use of modern technology.



*Animals should not be grazed near oil and gas facilities even if there is drought; the fence should not be broken for animals to graze inside.*

Plastic or metal containers used in drilling activities contain chemicals that are harmful to people and animals and should never be used for any domestic purposes.



**CAUTION:** Do not use any container from drilling sites at home – they contain dangerous chemicals.



*Steel barrels, plastic containers, bottles and any other container from a drilling site should never be used at home; they contain chemicals that are harmful to people and animals.*

The government, the World Bank and the UN's World Health Organization have regulations and guidelines on what are acceptable levels for the various effects caused by oil industry activities. The oil companies are required to operate within these regulations. At a minimum, companies should have an emergency spill plan with clear response procedures that are reviewed regularly and that local communities in the area know about.



**INFO:** Companies have a responsibility to ensure that the wastes are properly managed.



*Drilling waste should be transported to designated sites for treatment and management.*

## BENEFITS FROM OIL AND GAS ACTIVITIES

There are several potential benefits which the oil and gas industry brings to the local community and the country at large. Such benefits include taxes and royalties, foreign income from the sale of crude oil or refined products, employment of citizens, business opportunities, improved roads, electricity supply, etc.

**INFO:** Oil and gas companies have to meet certain standards concerning health, safety, technical knowledge, and specific equipment, so it may not be realistic for local communities to expect to supply all items and services needed by the companies.



Oil companies may support training and development of local communities to improve their ability to participate in and benefit from oil and gas activities. They may build schools and hospitals and provide water supply, etc., as a form of corporate social responsibility to the local communities where they operate.

**INFO:** A more detailed overview of the social impacts and potential benefits arising from the oil and gas industry are discussed in the Social Aspects Guide. In case you have any further questions, please contact a knowledgeable NGO or government agency or the oil company in your area. For more information or training on how to inform and prepare your community, please contact Cordaid: [info@cordaid.nl](mailto:info@cordaid.nl)



## ABOUT RTENN

Rtenn Petroleum is the regional representative in East Africa of the Norwegian Petroleum Academy (NPA), a leading competence provider for the oil and gas industry in Norway. Rtenn has delivered several training programmes for government officials, oil companies and civil society organizations in the East African region. NPA is a member of the International Association of Drilling Contractors (IADC) and of the Energy Institute-UK. It is part of Vett & Viten Group.

## ABOUT CORDAID

Cordaid is based in the Netherlands and has country offices in 12 countries. It has been fighting poverty and exclusion in the world's most fragile societies and conflict-affected areas for over a century. It delivers innovative solutions to complex problems by emphasizing sustainability and performance in projects that tackle security and justice, health and economic opportunities. Cordaid is deeply rooted in Dutch society with more than 300,000 private donors. Cordaid is a founding member of Caritas Internationalis.

## MORE INFORMATION

### Cordaid

Jeroen de Zeeuw  
Extractives Associate  
[jeroen.de.zeeuw@cordaid.nl](mailto:jeroen.de.zeeuw@cordaid.nl)

Elly Rijnierse  
Senior Extractives Advisor  
[elly.rijnierse@cordaid.nl](mailto:elly.rijnierse@cordaid.nl)

### RTENN

Karidewa Nyeinga  
Regional Programme Coordinator  
[nyeinga@rtenn.com](mailto:nyeinga@rtenn.com)

## CONTACT

### Cordaid Kenya

5th Floor, New Rehema House  
Rhapta Road, Westlands  
Nairobi, Kenya

### Cordaid the Netherlands

Lutherse Burgwal 10  
2512 CB The Hague  
+31(0)70-31 36 300  
[www.cordaid.org](http://www.cordaid.org)

### RTENN

Makerere University  
Department of Physics  
Building  
P.O Box 26367  
Kampala, Uganda  
[www.rtenn.com](http://www.rtenn.com)

**CARE.  
ACT.  
SHARE.  
LIKE CORDAID.**