इंडियनऑयल

IndianOil

The Energy of India

The Crown of Triumphs and Success


e-Charge

IndianOil

The Energy of India

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An Identity. A Value. A Passion

Embodying 'Nation First' in Every Breath | The Pulse of Every IOCian's Pride and Purpose

मेरा करम, मेरा ईमान है
मेरी आन, मेरी शान, मेरी जान है
आधार देश की प्रगति का
दुनिया में इतना सम्मान है
आगे बढ़ेंगे,
ऊंचे उड़ेंगे,
हम सबका यही अभियान है
इंडियनऑयल

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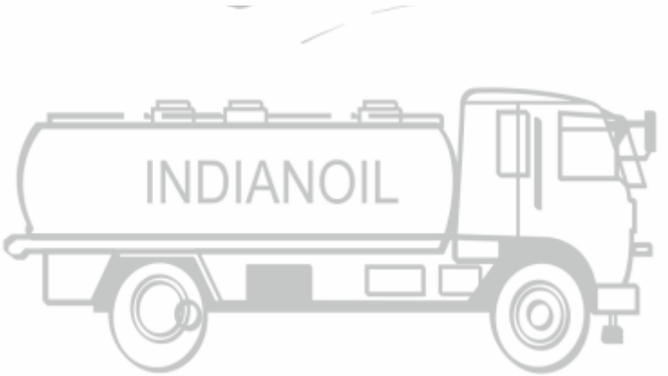

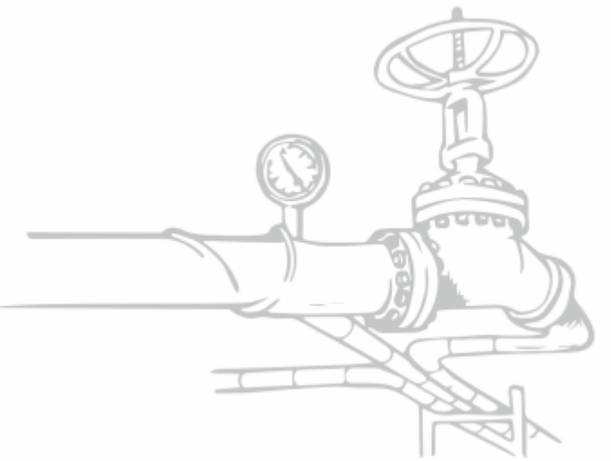

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PREFACE

The history of oil dates back to the dawn of civilisation many millennia ago. Today, oil is an indispensable commodity and is often viewed as a barometer of economic progress. Oil is the basic raw material for the manufacture of more than 5,000 varied goods used in every sphere of life. Oil and its availability have transformed the destiny of nations over the centuries. In fact, the enormity of the finances that flow through the hands of multinational oil companies' hands can dwarf the national budgets of many countries. The history of the petroleum industry in India can be traced to the world's oldest running refinery, at Digboi, in Assam in 1901. Till India's Independence from British rule, foreign oil companies ruled the roost and laid the ground rules on pricing and distribution.

This book, *IndianOil: The Energy of India* while elucidating the history of the global oil industry, highlights the role of IndianOil in post-independence India in ensuring energy equity, accessibility, and affordability. *IndianOil: The Energy* of India is more than just a book, it is a tribute to the unwavering commitment of IndianOil towards powering India's progress. From its humble beginnings to becoming a Fortune 500 company, IndianOil has always been at the forefront of the country's energy sector, providing fuel and energy solutions to millions of people across the nation.

The book highlights IndianOil's remarkable journey, its contribution to the nation's economy, and its vision for a sustainable future. As India continues to grow and evolve, IndianOil remains steadfast in its mission to meet the country's energy demands, and this book is a testament to its resolute dedication towards that goal. It is a must-read for anyone who wants to understand the integral role that IndianOil plays in powering India's growth and development.

In the year 2022, the company made the landmark pledge of Net Zero Operational emissions by 2046 and now aggressively promotes the use of biofuels, enhancing its share of renewable energy, setting up hydrogen and electric vehicle infrastructure, and increasing operational efficiency of its refineries to achieve this goal. In 2046, on the cusp of the hundredth year of India's independence, IndianOil will be creating a new landmark of Net Zero that would redefine India's energy landscape forever.

IndianOil is a colossal entity, resembling a vast family comprising over 31,000 employees and more than 3,00,000 channel partners, encompassing LPG delivery personnel and retail outlet customer attendants, who diligently work towards powering the nation.

The company operates the largest number of refineries in India with a group refining capacity of 80.55 MMTPA (Million Metric Tonnes Per Annum) the largest share among refining companies in India-and accounts for approximately 32 per cent share of national refining capacity. IndianOil has to its credit 50 years of pioneering research and technology. Scientists have registered more than 1,500 patents and finalised 120 grades of lubricants. There has been recent research in petro-chemicals, residue gasification, coal-to-liquid, gas-to-liquid, synthetic lubricants, nano-technology, new horizon technology to explore energy transition.

IndianOil's growth agenda and DNA is based on 'Pehle Indian Phir Oil'. To expand across new vistas and infuse new age dynamic growth of manpower, it is equipped with global technologies, cutting edge R&D and innovation. IndianOil employs the best global practices along with quality consciousness, affordability and transparency to all its customers through its strong marketing network.

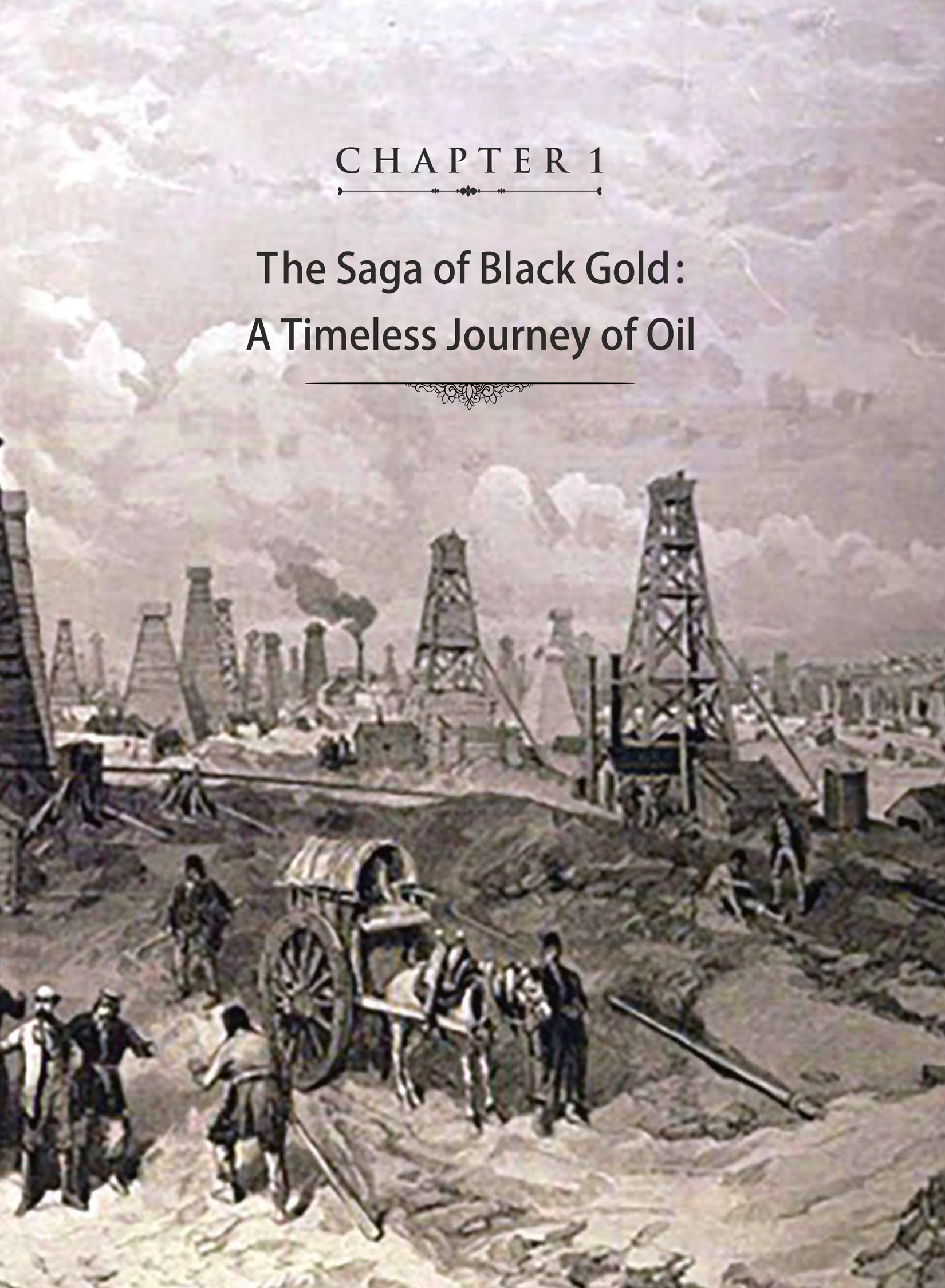
IndianOil is a responsible corporate that is transforming lives through impactful programmes to the society in which it operates. The company was involved in outreach programmes and community initiatives even before the CSR concept was introduced. Its programmes encompass projects across the length and breadth of the country and have been operational for decades. It supports and elevates the standard of living of the underprivileged sections of society through numerous initiatives in areas such as health, family welfare, education and skill development. It also takes a leading role in protection of India's biodiversity, preservation of cultural heritage sites, support to India's sporting landscape and community welfare by transforming the lives of prison inmates. IndianOil remained resilient, strong and agile even during the challenges posed by the Covid-19 pandemic and ensured access to energy in every corner of India in extremely challenging circumstances.

The foundation for India's public sector oil behemoth IndianOil was laid in the 1950s when Indian Refineries Ltd. was set up in 1958 and IndianOil Company came into existence in 1959. In 1964, the two companies merged to form Indian Oil Corporation Limited. This company had a clear mandate for fuelling the growth of independent India and ensuring self-sufficiency in petroleum refining and marketing.

Today, IndianOil has fulfilled the original mandate by serving millions of people through its nationwide refining, pipelines and marketing infrastructure, and has evolved into an integrated, diversified energy conglomerate. IndianOil which is often dubbed the Energy of India, has metamorphosed into an iconic brand. With the world going through an energy transition, IndianOil is steering India's green agenda.

CHAPTER 1

The Saga of Black Gold: A Timeless Journey of Oil



Crude oil, rightly known as black gold, has been used by humans since time immemorial. Dating back to the dawn of civilisation, it is among the few natural resources for which humankind's appetite has only increased over the years. Oil has found a permanent place in the lives of people across the world, serving a wide range of needs around the clock. Civilisation depends more heavily on oil than on any other commodity and the world, in fact, is ruled by oil. Its widespread availability and use rose during the first World War, and since then human beings have continued to depend increasingly on it for a multitudinous range of products and services.

This precious mineral astounded the world when the realisation dawned upon humankind that oil was not just a balm or saviour with inherent medicinal values; it could also illuminate their streets and homes; it could be used as a fuel to run machines, power vehicles, trains, ships and airplanes. Oil has, for most of the last century and to this day, been a great enabler, providing a vast range of products from one basic resource. The oil industry was the first modern business to operate on a global scale. Humankind has extracted several billion barrels of oil from the earth over the past 150 years, but its pre-eminence is such that it plays a key role in regulating the political and economic order of our planet. Almost half the world's energy requirements are met by oil and it has been used in numerous ways all over the world.

Pioneering geologists in search of oil sources. They studied the structure and history of rock layers below the earth's surface to locate areas that might contain deposits of oil and natural gas.

Facing page: Oil and gas are formed from organic material mainly deposited as sediment on the seabed and then broken down and transformed over millions of years.

Bitumen-coated boats on the banks of the Ganges 6000 years ago.

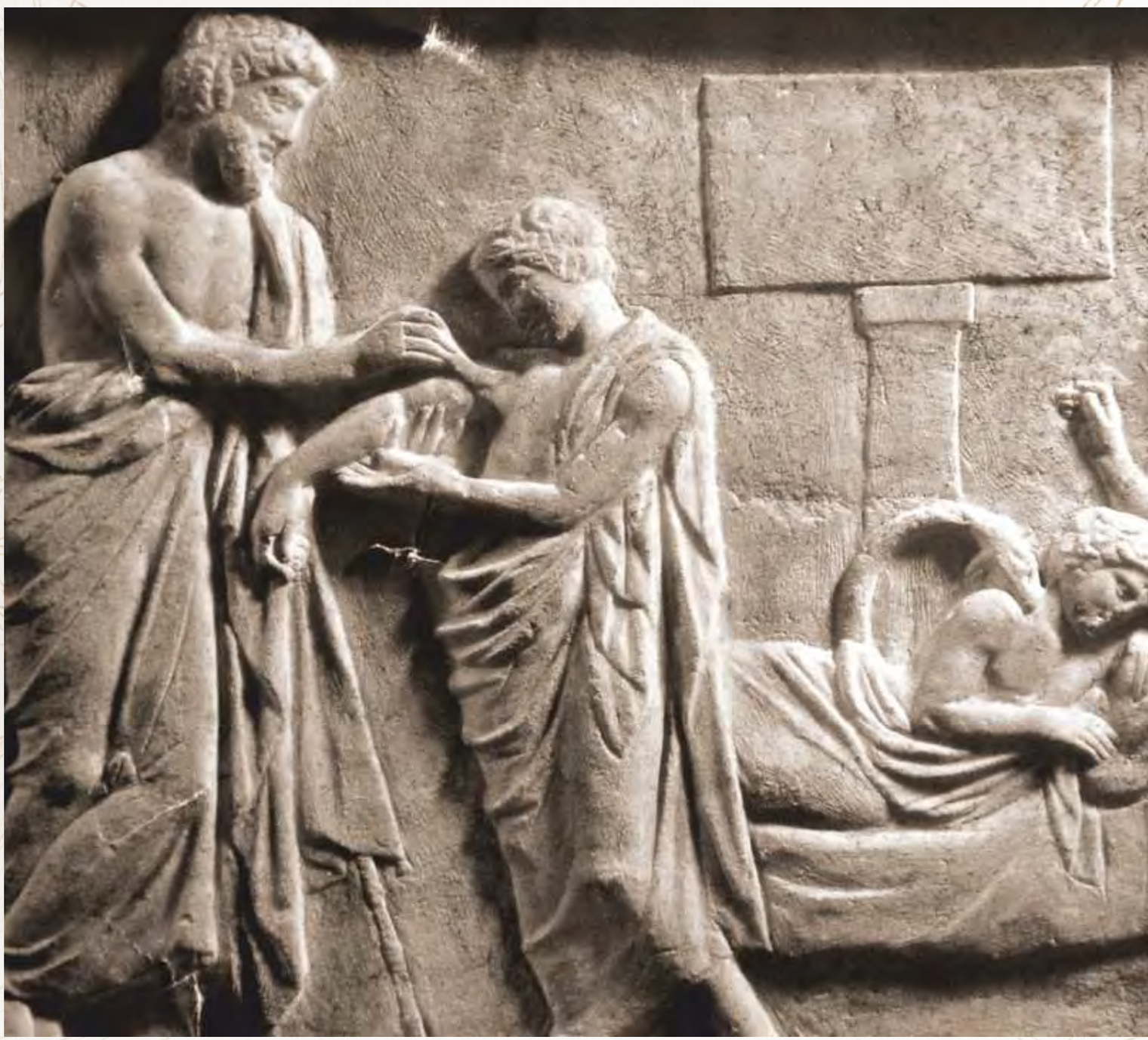
Facing page: Sir Walter Raleigh, an English explorer examining naphtha in Trinidad, which had the largest known natural deposit of asphalt in the world.

Origin of Black Gold

Whenever a new discovery is made, its origin is attributed to varying causes, which was the case with oil too. Some scientists claimed that it was obtained from inorganic matter through a chemical process. Though laboratory experiments proved that some oil could be made thus, they failed to explain the existence of oilfields beneath the earth's surface. The debate continued till eventually a unanimous viewpoint emerged.

Without attempting a highly detailed or academic explanation, it is important to understand how this extraordinary 'gift' came within humankind's reach. Nature has repeatedly that it is not a static force. Its many faces include rain, snow, frost, wind and vegetation. When the wind blows, it carries sand, eroding parts of the earth's surface. Frost cracks the rocks around it. Seeping water, combined with decomposed vegetable and plant matter decays, and solid rocks disintegrate into clay and sand. Rain washes away this soil, aided by the wind, to creeks, which in turn, carry it down to rivers. The rivers play their part by transferring this soil to the sea. The sediment carried to the sea includes leaves, twigs, tree-trunks and fish. Erosion and deposition of these materials does not take place overnight but continually and gradually over millions of years.

The carcasses of marine animals such as squids and whales are added to this sediment. Various, tiny vegetation forms known as algae that thrive in water and are almost invisible to the human eye add countless tons to the sediment that settles at the bottom of the sea. The sea also contains other tiny animals and plants known as plankton which derive energy from sunlight to survive and multiply. When they die, they too sink to the bottom of the sea and from there they are spread by the waves and tides across the ocean floor. Gradually, covered by soil, these deposits decompose and are acted upon by anaerobic bacteria. Pressure and heat transform the sediment into rocks and then convert the organic matter through various stages into oil and gas.



Left and right: Ancient Persian tablets and manuscripts indicate the use of petroleum for medicinal purposes. Crude oil was used as traditional medicine.

Prehistoric Past

The story of oil began in prehistoric times, before the invention of writing. About 40,000 years ago, Stone Age hunters used asphalt to 'glue' hand-worked stone points to the shafts of their spears and arrows. Ancient records describe 'eternal fires', which were caused by fossil fuels like natural gas seeps, probably set ablaze by lightning. Such fires shot fountains of flaming gas skywards for a thousand years. It is mentioned in the Bible how Nebuchadnezzar, King of Babylon, pushed three devout Jews into a 'fiery furnace' for refusing to worship his golden idol. That furnace still rages near the Iraqi city of Kirkuk amid one of the world's richest oilfields. Oil served both the living and the dead.

In *The Book of the Powers of Remedies* written in 683 CE, an Arab physician wrote: 'Warm naphtha (oil), especially water white naphtha, when ingested in small doses, is excellent for suppressing coughs for asthma, bladder discomfort and arthritis.' Some records suggest that as early as 3000 BCE, people in Mesopotamia used oil as tar to build ships and houses. Around 1000 BCE, crude oil was used in

small quantities in China for lighting lamps. The Byzantines made use of crude oil for flaming weapons. After the fall of the Roman Empire, archaeological findings in Iran, dating to 400 BCE, show that asphalt was used to set jewels, and Persian tablets indicate the use of petroleum for medicinal purposes and lighting.

In the book: *Oil: Lighting Up Our Lives*, states that the earliest historical and archaeological records of the use of oil in India coincided with the existence of humans in the Indian subcontinent. The Vedic period, i.e. 1500-600 BCE, is the period when the Vedas were composed, with the Rigveda, the oldest Vedic text, believed to have been compiled during the second millennium BCE. There is ample proof that oil was used in this period in different forms. At that time oil-soaked arrows were said to have been used as weapons of war and worshipped regularly in religious ceremonies. Historical records also mentioned that asphalt was quarried for use as mortar between building stones and as a waterproofing agent for baths, pottery and boats during this era. Even during the era of Mahavira, the twenty-fourth Tirthankara in Jainism, there was evidence of the use of oil.

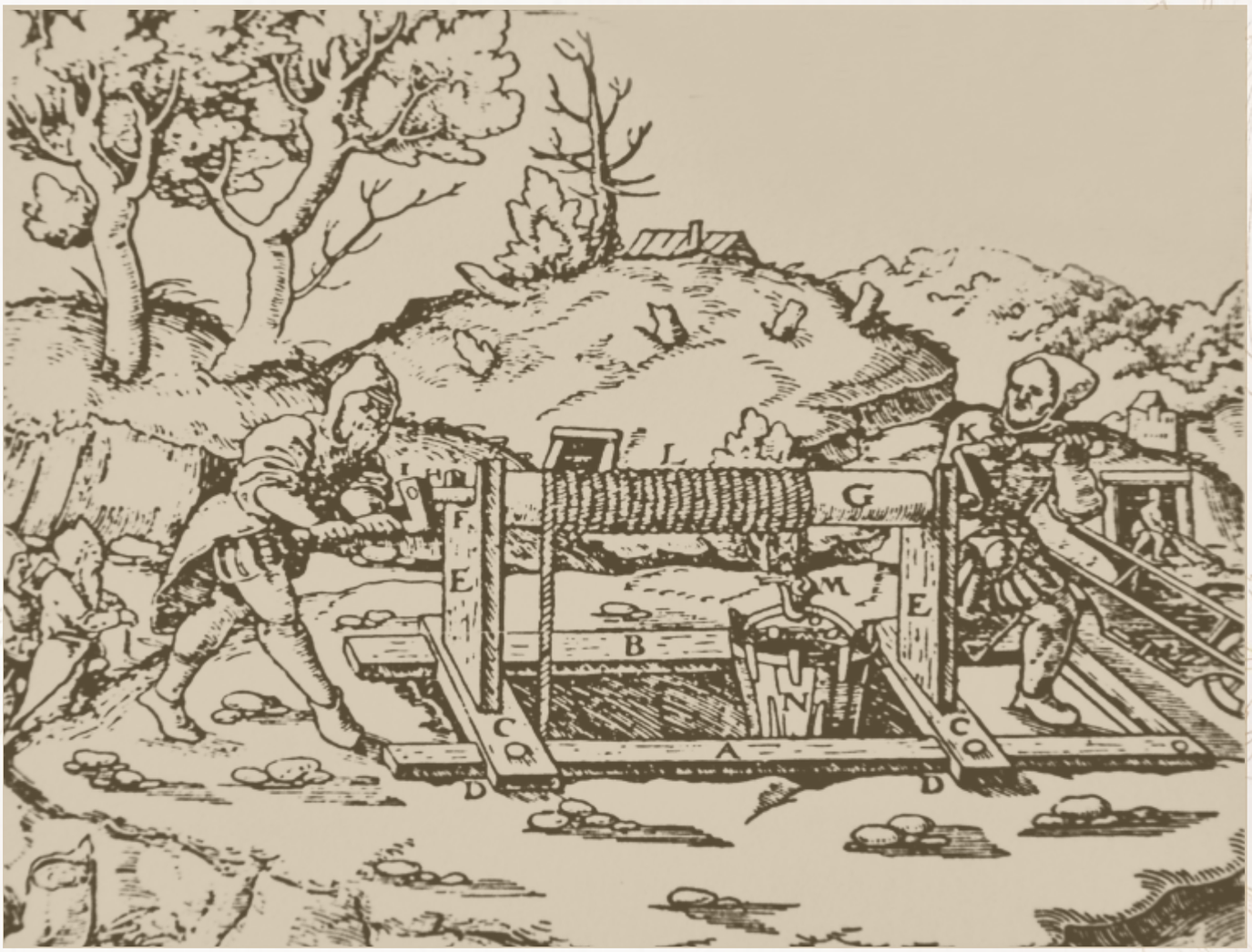
A painting of oil rigs and a traditional refinery.

Fishing 6000 years ago under the light of *mashaal* (torch). People had realised that bitumen was ideal for waterproofing boats.

The interaction of cultures facilitated visits to India by several Chinese travellers and monks. Most notable of them were Faxian, Yijing, Song Yun and Xuanzang. These travellers wrote detailed accounts of the Indian subcontinent covering political and social aspects. There are references to the use of oil most widely for lamps, to heal diseases, kill lice, preserve mummies, caulk ships, pave streets and buildings, waterproof tanks, therapy, aroma and as bitumen in old temples and buildings. Asphalt was used to set jewels which were exported widely. Even the Great Bath, which is one of the best-known structures among the ruins of the Harappan civilisation excavated in Mohenjo-daro in Sindh, bears an interesting association with oil. Archaeological evidence indicates that the Great Bath, known as the earliest public water tank, was built in the third millennium BCE. To make the tank even more watertight, a thick layer of bitumen was laid along the sides of the pool and presumably also on the floor. It is said that the Shah of Persia in the seventh century used iron horses with burning oil which were mounted on wheels to attack an Indian army led by elephants.

Asphalt was discovered in the best known structures among the ruins of the Harappan civilisation excavated in Mohenjo-daro in Sindh.

An ancient temple in India where asphalt/bitumen was used in its construction. The asphalt functions as the glue or binder.

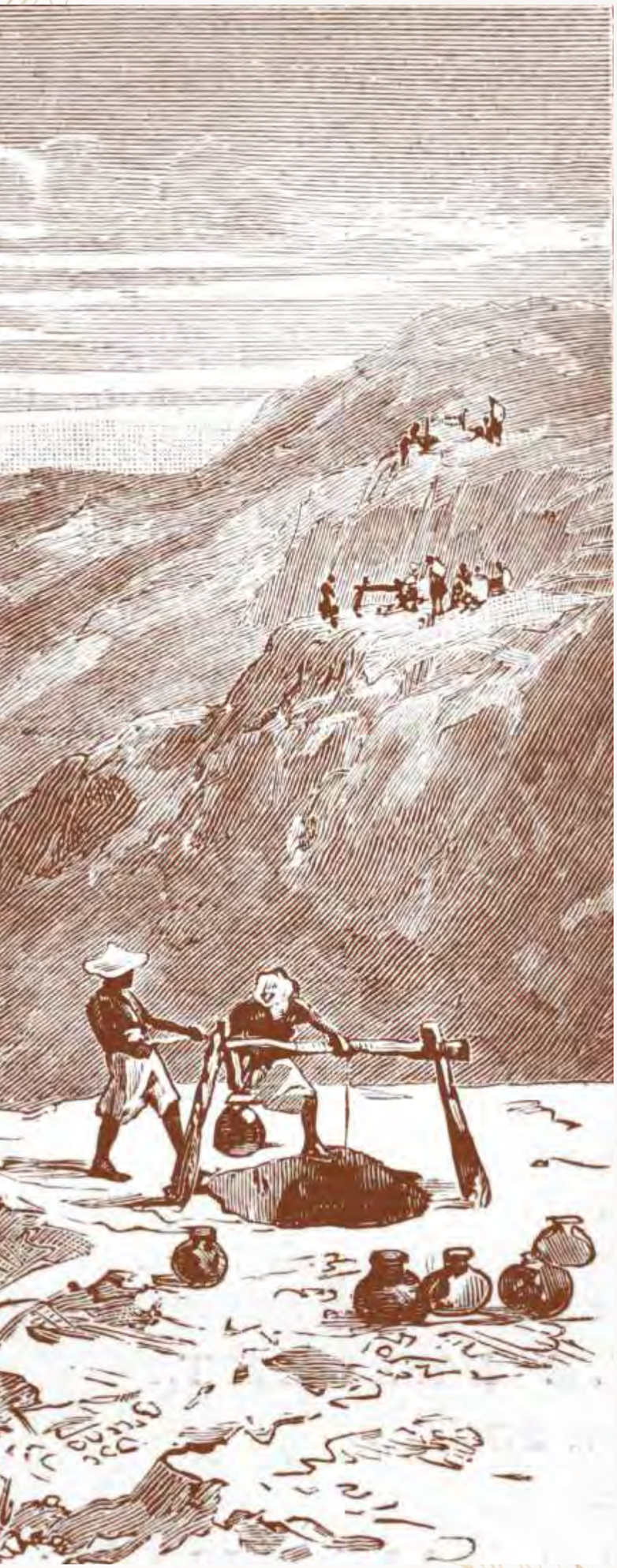


Two-manpowered common windlass, mid-1500s.

Bottom: Spring pole of the early 1800s which consisted of a tough, springy log, 40 to 50 feet long.

Facing page top: A Burmese hand dug well.

Facing page bottom: Hoisting digging or digger, Burmese hand dug well.



From Nature's Secret Spring

By the second century, the Romans used crude oil as a fumigant. The Arab nations had worked out that it could be distilled and in Cairo, torches were lit with the commodity. Oil wells were first drilled in China around 347 CE. The Chinese were pioneers in using bamboo pipelines to bring natural gas to their homes. Petroleum was rubbed as a preservative on the ropes of ships. Natural gas was used for lighting and heating. Petroleum was used by ancient Egyptians to apply on dead bodies before burying them. As early as 3,500 BCE, in what is now Iraq, the Sumerians, the Assyrians and the Babylonians used natural asphalt to serve as mortar for their buildings. The Byzantine commanders poured petroleum on enemy troops below the city walls or sprayed petroleum on enemy fleets through tubes mounted on the bows of their ships.

In 1272, passing through the town of Baku on the shores of the Caspian Sea, the great traveller, Marco Polo, noted that everyone used oil lamps, and that people travelled for miles to buy the commodity. Oil was first discovered in Ukraine in the fourteenth century, and it became the largest producer of oil in Europe by the nineteenth century. It was also the first country in the world to deliver natural gas to other countries. In North America, petroleum was discovered in 1543. In the sixteenth century, whales were used as a source of oil. It was used as a lamp fuel but as demand rose, the source could not keep up with the supply, leaving the journey of the hydrocarbon to flourish through experiments, innovations and refinements.

Christian defenders of Constantinople, capital of Turkey, invented a terrifying weapon, known as 'Greek Fire', from oil.

Bottom: Italian explorer and writer Marco Polo who travelled through Asia along the Silk Road between 1271 and 1295 CE.

Facing page: Earthen oil wells in Yanna Young, Upper Burma. In pre-colonial times, wells were dug by hand.

A petroleum geologist in the early years of oil exploration led a difficult life. The oil industry owes much to the adventurous spirit of the geologists who braved dense jungles infested with disease-bearing insects and dangerous animals of prey.

The Spirit of Pioneers

Peter the Great of Russia, in 1725, had oil sent from Baku by boat up the Volga River. In 1745, the first oil well and refinery was built in Russia. The 'rock oil' was distilled and a kerosene-like substance was procured to light lamps in Russian churches. During this time, paraffin wax was used for making candles. It was also used for lighting in Scotland. As early as the Middle Ages, Europeans used rotary drilling to sink artesian wells. In Grenoble, France, in 1784, an exceptional hole was sunk 1,840 feet deep by a combination of rotary and percussion drilling. In 1795, Britain's first ambassador to Borneo, an Asian island, wrote about the island flourishing with oil and that there were at least 500 wells dug by hand and supplying oil for lighting. Wells were dug by hand for oil extraction in Myanmar (Burma) as far back as 1795 in Yenangyaung. Almost sixty years later, the British undertook drilling.

In Baghdad, the first streets were paved with tar derived from petroleum. Persian chemists have described the distillation of petroleum and the production of kerosene. Arab and Persian chemists distilled crude oil to make flammable products for military purposes. When the Spaniards arrived in South America, they found that asphalt was being used as a waterproofing agent. In the eighteenth century the French began using oil as a lubricant and oil sands were mined in Alsace. The Pechelbronn oilfield became the frontrunner for companies such as Schlumberger in later years.

Oil prospectors use their knowledge of the manner in which geology creates oil traps to guide them to areas where oil is likely to occur. They know that oil is likely to be found in one of the 600 or so basins of sedimentary rock around the world. Once a target area has been located, oil hunters carry out geophysical surveys that use sophisticated equipment to detect clues such as variations in the earth's magnetic and gravitational fields created by the presence of oil.

In 1850, Kerosene Gaslight Company was set up at Long Island, New York. Demand for kerosene grew phenomenally and as it was produced from coal, it was popularly known as coal oil. The first rock oil mine was built in Bóbrka, near Krosna, in and around Poland/Ukraine in 1853. The following year, Benjamin Silliman, a science professor at Yale University in New Haven, became the first to fractionate petroleum through distillation. The Pennsylvania Rock Company, which later became Seneca Oil, had its first successful drilling in 1855 at Oil Creek.

The first oil well in Canada was dug by hand in 1858 by J. M. Williams at Oil Springs, Ontario. Oil and gas had been produced in East Canada since 1861. Later, in 1861, Samuel Kier became the first person in the United States to refine crude oil for lighting lamps. The first shipment of kerosene from the US to the UK took place in 1861, in a small sailing brig named Elizabeth Watts. In fact, the industry went through its first consolidation and was monopolised by John D. Rockefeller. He created Standard Oil Company which cornered 90 per cent of the US oil market.

Persians gazing with awe at the first street candle lamp.

Facing page top:
Oil extraction at a well in Van Slyke, Pennsylvania. The demand for petroleum as a fuel for lighting in North America and around the world grew rapidly.

Facing page middle:
Oil production in the Caspian Sea near Baku. As tank farms and pipelines were unknown at that time, petroleum was collected in basins closed in with earthen walls.

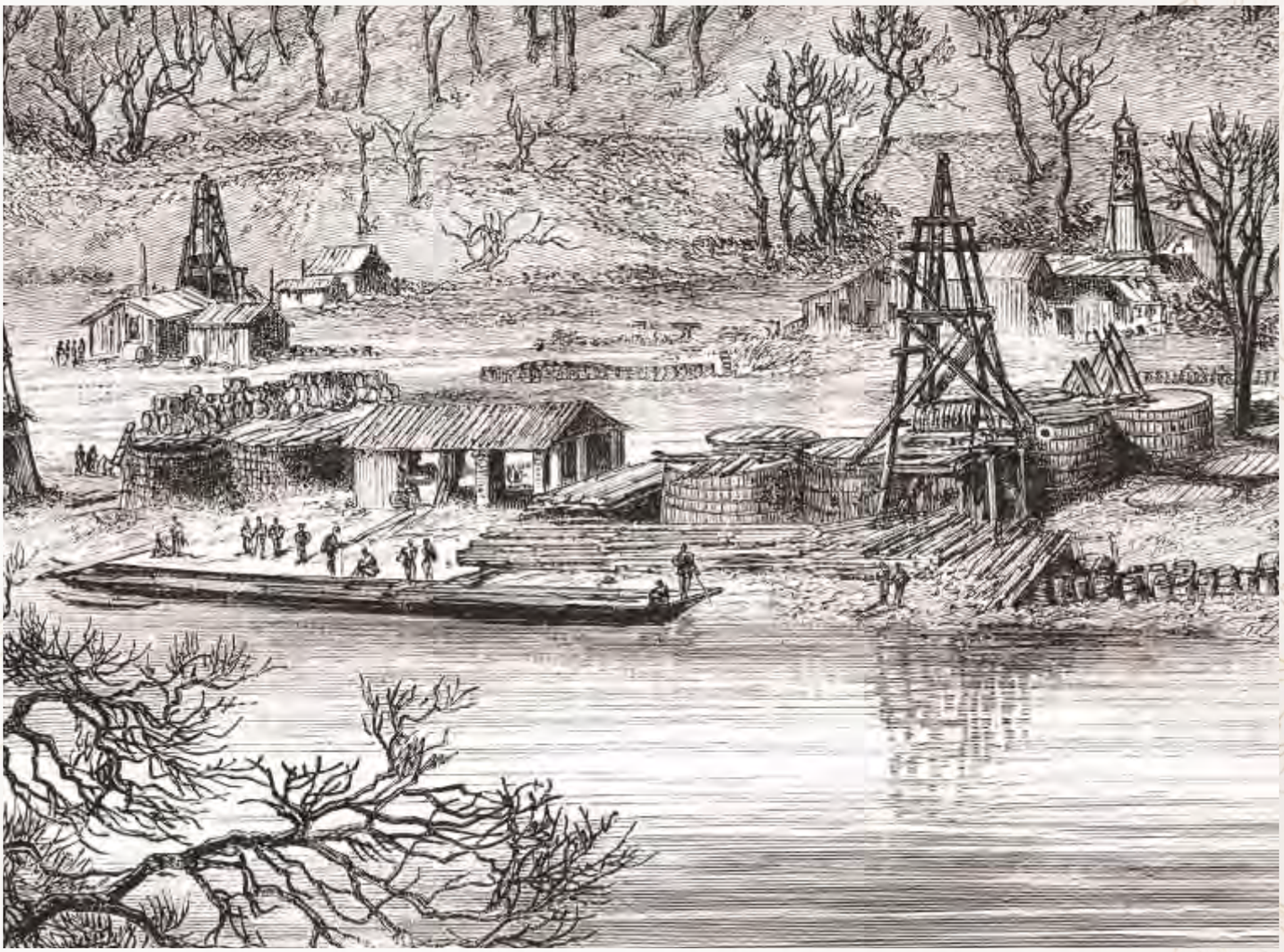
Facing page bottom:
A primitive method of distillation and treatment of lubrication oils.

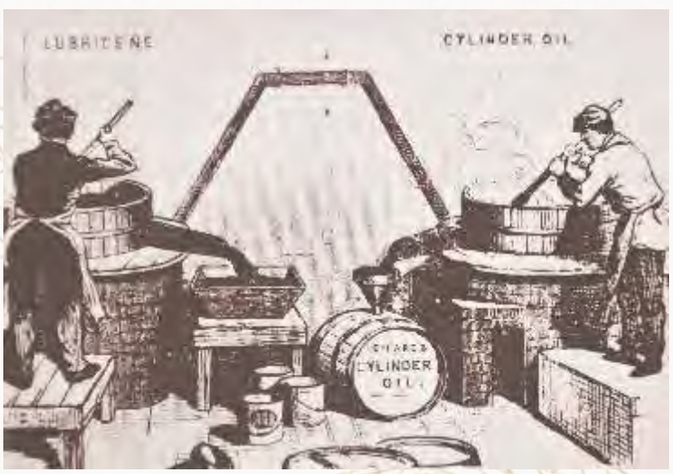
Facing page bottom right:
Filling kerosene in street lights.

Lighting Homes and Streets

By the middle of the nineteenth century, oil lamps were lighting the streets of Bucharest. Small oil businesses existed in Italy, Romania, Poland, Germany and Czechoslovakia due to the existence of oil springs. When in the early nineteenth century, the streets of Prague became dark as a result of a depleted oil supply; crude petroleum was refined to make oil and the streets were lit again. In some countries such as the UK, and in many parts of South East Asia and Africa, kerosene was the most important source of fuel oil for lighting homes.

Around the same time, a Canadian doctor and geologist, Dr. Abraham P. Gesner, developed a process to refine liquid fuel from coal, bitumen and oil shale. The idea was first mooted by the tenth Earl of Dundonald, the commander-in-chief of the British North American Naval Station at Halifax. One of his ancestors had actually distilled oil in Great Britain many years earlier and an Act of Parliament gave him and his heirs the right to own and use 'a method of extracting tar, pitch, oils,





acids, salts and cinders from coal pits throughout His Majesty's Dominions'. The tenth Earl used asphalt from Trinidad and patented a new kind of lamp to ignite the oil. As he and Dundonald were friends, the idea caught Gesner's interest and after a number of experiments, he was able to produce kerosene from coal. During the years that followed, he used Trinidad asphalt and albertite, a hard variety of asphalt from New Brunswick, in lieu of coal. Unfortunate circumstances deprived Gesner of the right to use the albertite deposits and he moved to the United States.

The original Drake oil well in 1861. Oil men discuss the prospects of drilling for oil. In the late 1850s, Seneca Oil Company (formerly the Pennsylvania Rock Oil Company) sent Col. Edwin L. Drake to begin drilling on a piece of leased land just south of Titusville near what is now Oil Creek State Park.

Drake's Milestone Discovery

The first commercial oil well is believed to have been drilled by Col. Edwin L. Drake near Titusville in Pennsylvania, USA, on 28 August 1859. He worked for the Pennsylvanian Rock Oil Company which was interested in using oil for lighting and establishing a rudimentary oil industry. However, some authorities claim that the first modern oil well was sunk in 1806 near Charleston in West Virginia. Peter Wilson, had endorsed a $500 bank loan for Drake to keep drilling. Later, it began producing 35 barrels a day selling for $20 a barrel.

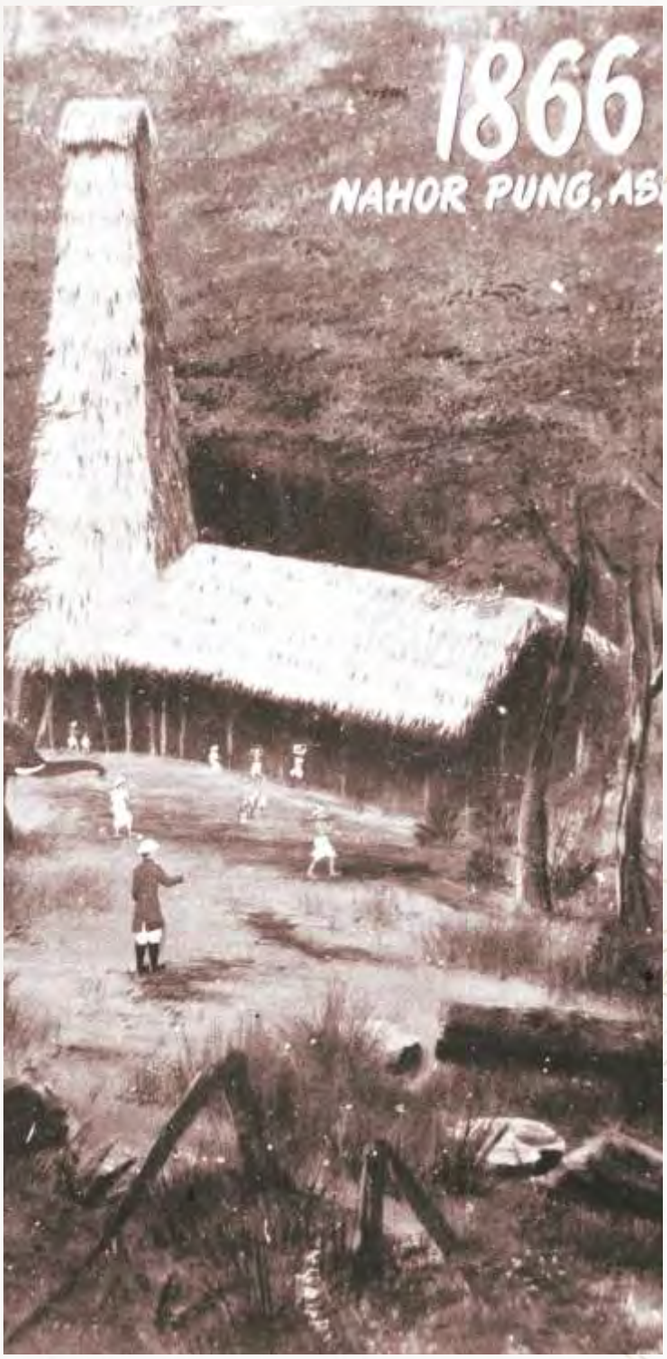
Immediately after Drake's discovery, thousands of strangers flocked to Titusville hoping to get rich quick. The Pennsylvanian region was flooded with explorers, exploiters, speculators, venturers, conmen and cathouses reminiscent of the California gold rush. The oil boom spread to Ohio, Texas and Oklahoma. Thousands of dollars were spent by the USA in exploration, which led to a swift growth of the oil industry. By 1860, one and a half million more oil wells had been drilled in the same area. Oil was found in many places and successful drilling of petroleum and its commercialisation began in different parts of the world.

Cleveland was rapidly becoming the USA's leading oil-refining centre. Rockefeller's Standard Oil Company became the number one refinery in Cleveland. Later, it emerged as the largest and richest manufacturing company in the world. In 1861, the first modern refinery was built in Baku by Meerzoeff. Baku produced 90 per cent of the world's oil and dominated the oil industry before 1914. After the two world wars, the focus moved to the Urals and western Siberia. By the end of the nineteenth century, the Russian Empire, especially the Branobel Company in Azerbaijan, was the leader in petroleum production. Later, the USSR became the world's largest producer of oil.

A sample of the share certificate issued by the Standard Oil Company.

Middle: An advertisement for Miga Axle Grease.

Bottom: An advertisement of birthday candles.



Top left: People undaunted, spirit indomitable. Well no.1 drilled with a wooden rig at Digboi, Assam, in 1889.

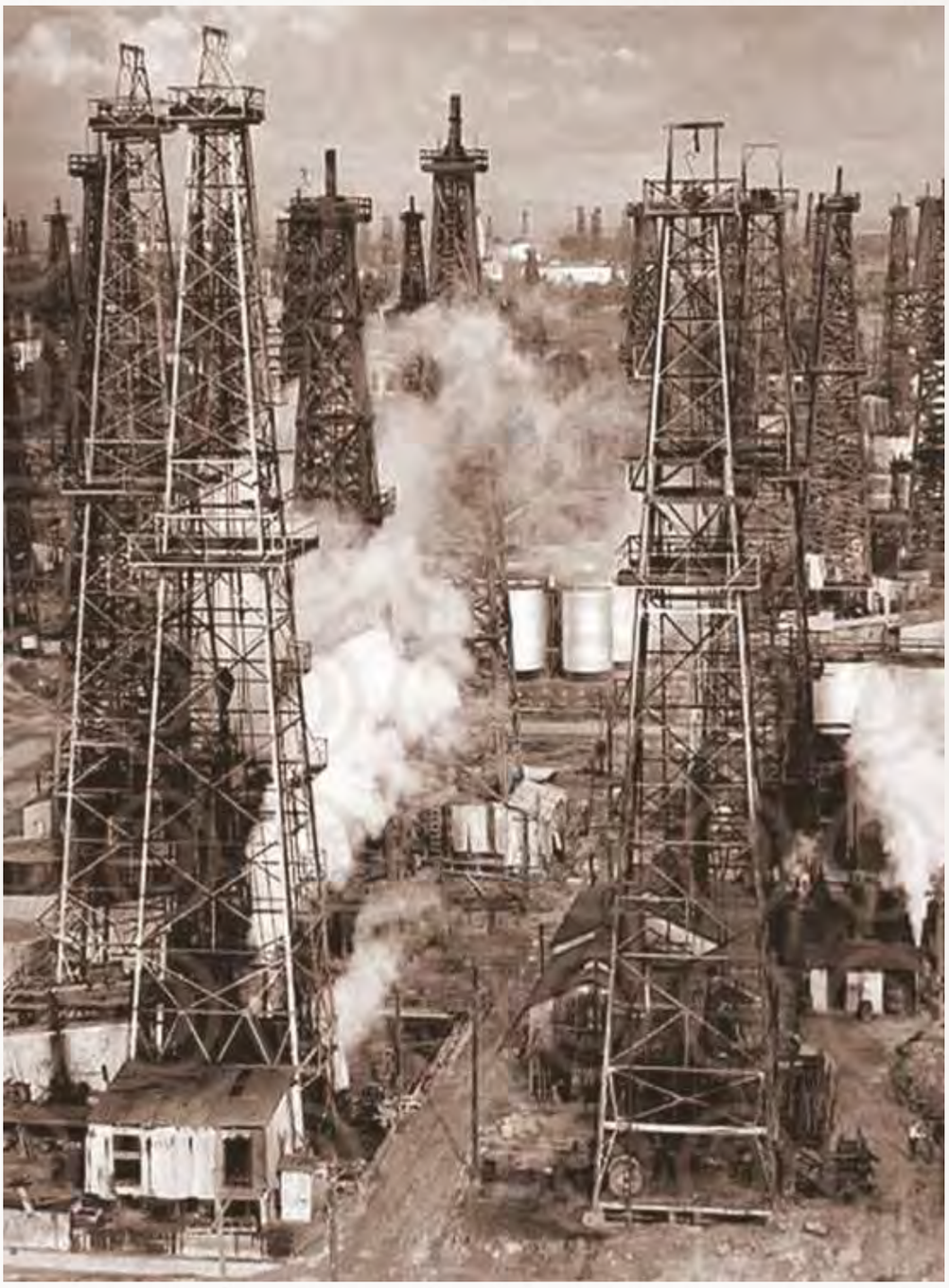
Top right: India's first commercial well drilled in 1866 at Nahorpung, about 30 miles from Digboi.

New Discoveries in Asia and Worldwide

Oil was produced in small quantities in Italy since the 1860s. The Digboi oilfield in India was drilled in 1889. The first commercially usable oil in Japan was discovered in 1892. In South-East Asia, Malaysia was globally the second largest exporter of liquefied natural gas. The first commercial oil well in Iran was discovered in Masjid-i-Suleiman in 1908. Major oilfields were discovered in 1910 in the Dutch East Indies, Persia, Peru, Venezuela and Mexico. Soon after, Mexico and Venezuela became the second largest oil producers in the world.

In fact, the largest gas field, Deleni, was discovered in 1912 in Mures County of Romania. During the world wars, Romania was one of the world's largest producers of oil, and this was fully exploited by the German armies. Oil was first discovered near Valona in Albania in 1928. Oil was found in Iraq in 1927 and in Saudi Arabia in 1938. . The Agha Jari field in Iran, discovered after the Second World War, remains one of the largest producers of oil.

More oil was discovered in the 1950s and 60s in Europe, Africa and the Middle East. New discoveries of gas were made after 1965 in Kazakhstan and Western Siberia.



Oil rigs seen from a distance. Several oil wells were drilled in Canada and Europe at about the same time as Drake's in the US.

Middle : Early traditional oil refinery to turn oil into usable forms. Here crude oil was separated into different components to produce gasoline and hundreds of other products. Nowadays, a typical refinery has scores of fractionating towers, hundreds of miles of pipes and huge clusters of storage tanks. It never completely shuts down.

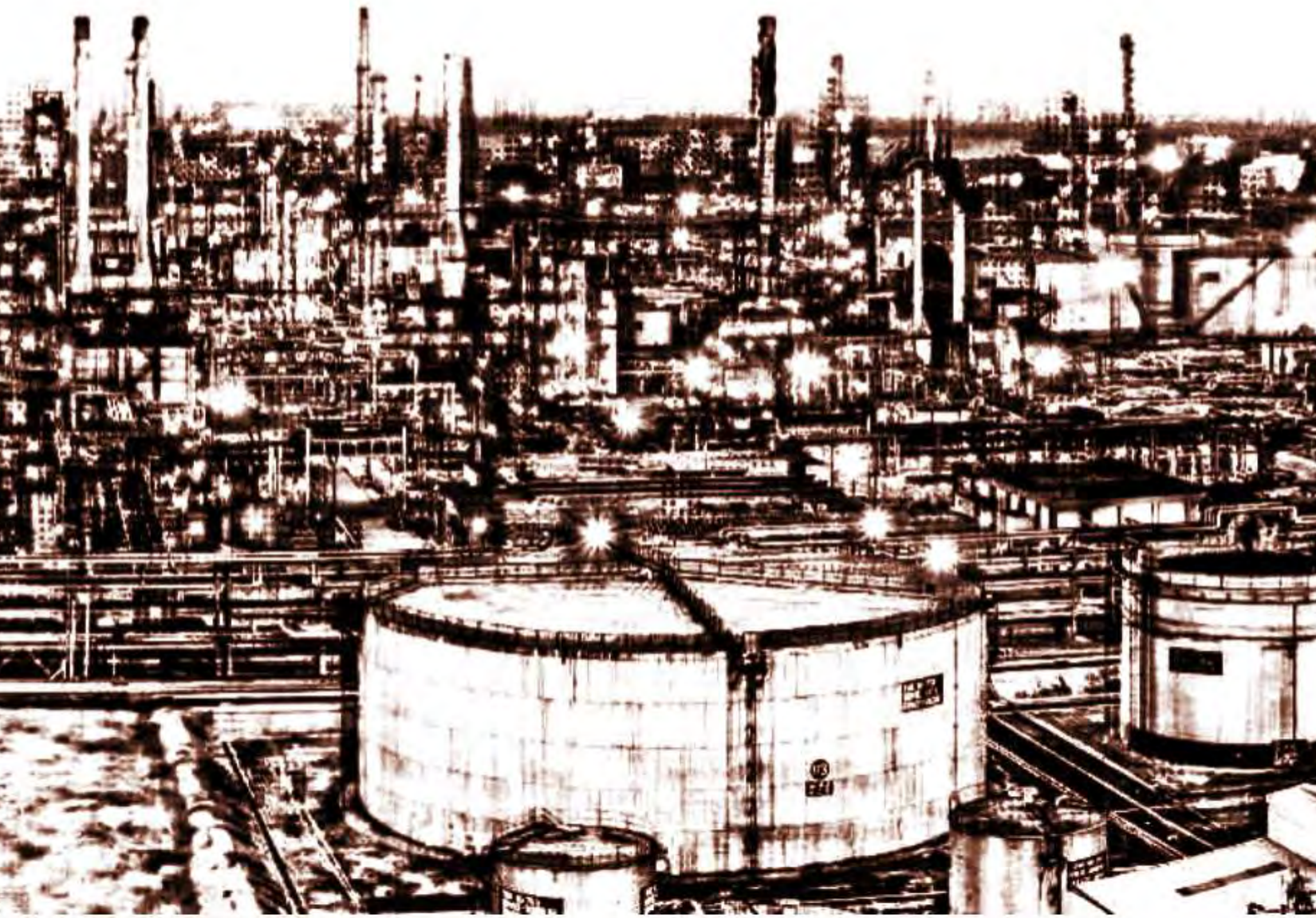
Bottom: One of the earliest oil wells drilled in the US.

Although Azerbaijan, in Eastern USSR, had produced 70 per cent of the nation's oil in 1939, its production fell to less than 4 per cent in 1970. During this period, Romania became the largest hydrocarbon producer outside the USSR.

In 1974, with the discovery of about 30 more accumulations in Iran, the consortium output from 19 of them provided 92 per cent of Iran's total output, which exceeded that of any other country in the Middle East barring Saudi Arabia. Oil production in Iran peaked in 1974 with a production of 6 million barrels per day.

Later new oil discoveries were made in peninsular Italy. Although most of the oil was produced in the region around Sicily, a decline set in towards the twenty-first century.

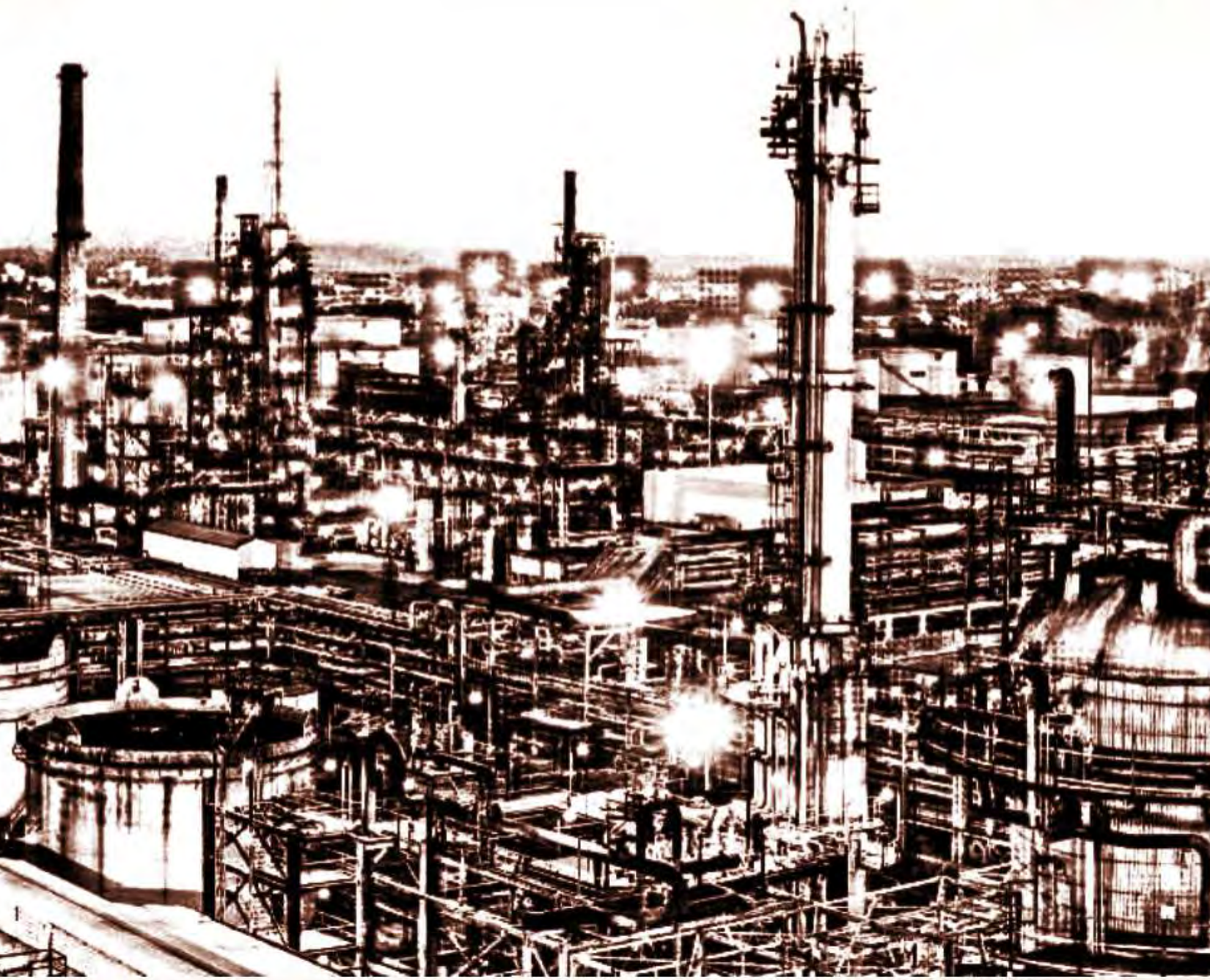
In 2005, large proven reserves of oil and gas were found in Kokdumalak and Ustyurt regions of Uzbekistan. In 2005, the Russian Ministry of Natural Resources was able to augment that amount by a substantial quantity from eastern Siberia. Western Siberian reserves supplied two-thirds of the Russian requirement of oil. Now Russia produces a substantial quantity of crude oil and is the world's largest exporter in the global oil market.



Energy Revolution

The petroleum caravan has had many pit stops in its journey. Petroleum refining entails the separation of crude oil into necessary fractions, and then treating and distilling them to convert them into petroleum products, which include cooking and heating fuels like LPG (Liquefied Petroleum Gas) and kerosene, transportation fuels like petrol, diesel and ATF (Aviation Turbine Fuel), lubricating oils, waxes, furnace oil and bitumen and by-products like pet-coke and sulphur.

Before crude oil is refined, it is analysed for its density. A standard scale such as the API Standard is used to measure how heavy or light the petroleum liquid is. The density of crude oil has a correlation with the type of refined petroleum fractions that can be produced and hence has a bearing on its price. Generally heavier crudes are cheaper. Also the sulphur content of crude oil is an important parameter to judge the quality of crude. Crude oil having sulphur more than 0.5 per cent weight is called sour crude or high-sulphur crude and that having 0.5 per cent weight sulphur or less is termed as sweet crude or low-sulphur crude. Generally sweet crude is costlier than sour crude as better quality products are obtained from sweet crude.



A night view of a modern refinery. Extensive research and development has been done over the years to find better ways of refining petroleum. The energy revolution has also played a pivotal role in the development of modern refineries.

Crude oil has limited use without refining which is why, often, non-petroleum materials are added to produce new by-products. For example, soap is added to lubricating oil to make grease. Chemical changes are undertaken to make aviation fuel, petrol for use in cars and petrochemicals. Petrol and diesel have remained the most important products that come out of a refinery, constituting around 60 per cent of the processed crude oil.

Extensive research has been done over the years to find better ways of refining petroleum. The greatest demand is of course for petrol used to run automobiles. Aviation fuel has a different chemical composition than automobile petrol and the quantity refined and manufactured for the former is far less than that for the latter. Other petroleum products, such as fuel oils, kerosene, diesel and asphalts need less and simpler refining. Petroleum, jet fuel, diesel, kerosene and petroleum coke are subsequently stored in large tanks till they are sent to gas stations, airports and chemical plants. Refineries are now highly automated and the technology employed is very advanced. They cost billions of dollars to build and provide employment to thousands of people throughout the year.

Top left and right: A few of the hundreds of everyday things that run on oil or which are made of oil products, partially or wholly.

Many Uses of Oil

Hydrocarbons are used in dry cleaning, textile printing and manufacture of tyres. They also form part of paints, varnishes, printing inks, weed killers, pesticides and waxes. As far back as the seventh century, painters suspended colour pigments in oil, making it a suitable supporting agent for their paints. Solvents are used to extract fats and oils from cottonseed, soyabean, wool, leather and any other fat-containing material. Metal parts are effectively cleaned with them. Petrol or gasoline is used in varying compositions as fuel. Diesel engines are primarily used in medium and heavy-duty locomotives, SUVs, trucks, buses, large ships and tractors. Bunker fuel, also known as heavy oil, is used to power ships. International Maritime Organisation (IMO) has stipulated sulphur content of less than 0.5 per cent in bunker fuels since January 2020 and IndianOil is the prime Indian manufacturer of this advanced grade of bunker fuel.

Oil sits at the heart of modern life and is often viewed as a barometer of economic progress. Petroleum is the basic raw material for lubricating machinery and equipment in industries, transportation and agriculture. One of the most important raw materials for the chemical industry, petroleum, yields more than 1,000 products which help in the manufacture of more than 5,000 goods used in every sphere of life. John D. Rockefeller rightly said, "What a blessing the oil has been to mankind." It would not be an exaggeration to state that after the Industrial Revolution, the 'energy revolution' was the next big boon.

The petroleum industry is classified into three sectors, each of these sectors requires various skills of expertise, innovation and market dynamics. Discovery of hydrocarbon-reserves and drilling is the first step which, in industry parlance, is called the upstream sector. In the second phase, which is called midstream sector, infrastructure facilities such as pipelines, storage and distribution networks are taken care of. Refining and distribution come under the downstream sector.

Myriad Products

Synthetic rubber, dry-cleaning agents, vinegar, chloroform, soap, rayon, cellophane and derivatives of Polypropylene and Polyethylene-varied as they are in properties and usage-are some of the important products manufactured with petrochemicals. Synthetic rubber, which is used in the manufacture of car tyres and shoe soles, exceeds the demand for natural rubber by almost four times. Oil is especially important in both developing and underdeveloped countries as it provides refrigeration for vaccines. Petrochemical glycerine is used to manufacture all soapless detergents.

Acetylsalicylic acid, the active ingredient in many pain-relieving medicines, is manufactured from petrochemicals. Interestingly, homoeopathy makes extensive use of petroleum-based products. The shelf life of canned foods can be increased by food additives derived from petrochemicals. Cosmetics containing oil, perfume, wax and colours are derived from petrochemicals, which are also used in shampoos, toothpastes, lipsticks, deodorants, hair colours and shaving foams.


Earliest Oil Ad

The Sunday Monitor dated 21 May 1845 carried the first known advertisement for an "Anti-Attrition Composition" or Lubricant. Which was, in all likelihood, tallow or something similar.

The Sunday Monitor

London

By His Majesty's patent

Royal anti-attrition composition, to prevent the effects of Friction in Steam-Engines, Machinery, Mills, Carriages, Coaches, Waggons, Carts, &c., and by the use of which the public save in all cases not less than three hundred per cent, exclusive of saving wear and tear, time and Labour.

Sold at No. 40 Charing Cross, Near the Admiralty, London;

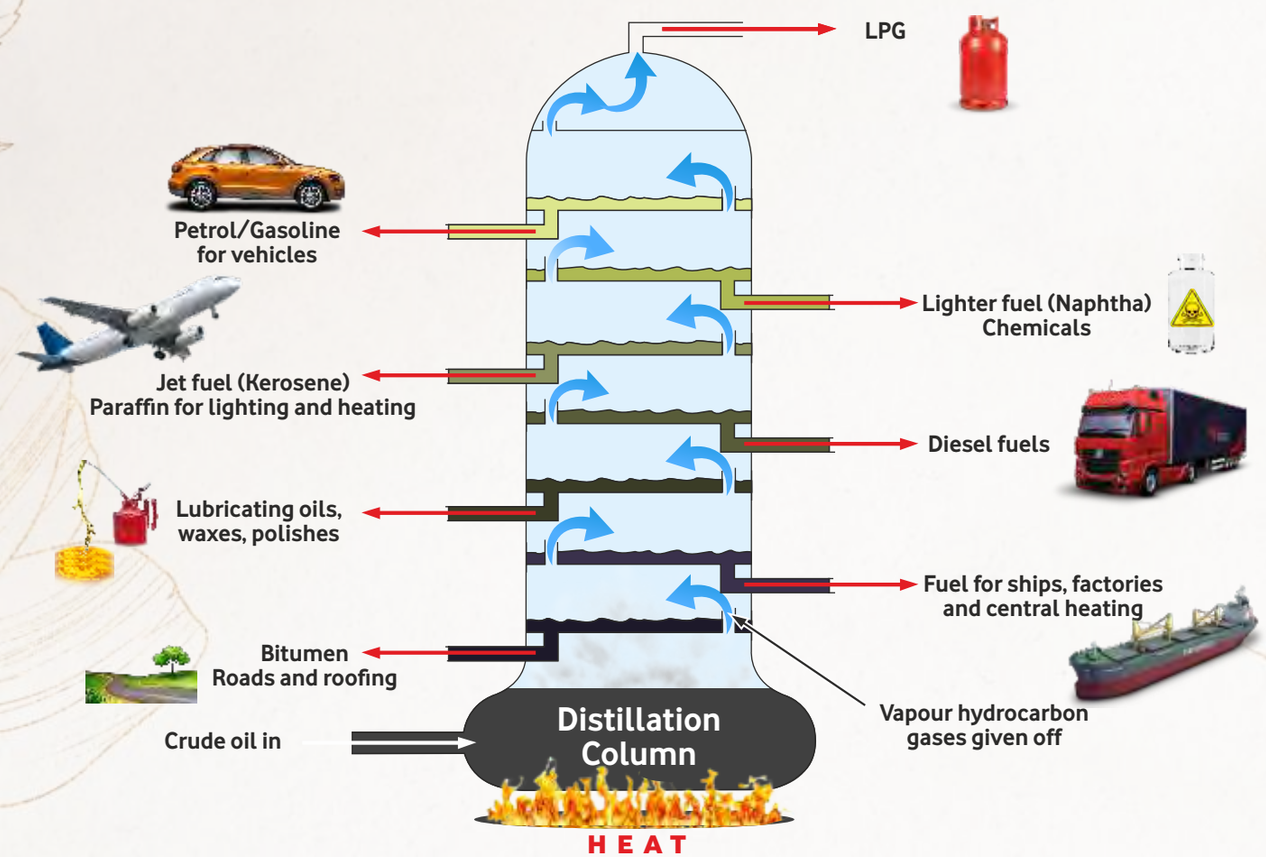
And, by appointment, at most Libraries, Medicine Warehouses, Ironmongers, Cutlers, Coachmakers, Sadlers, and Shopkeepers, in the United Kingdom, in Boxes. Price 2s. 6d.; 5s. 6d.; 10s.6d.; One Guinea and Two Guineas each.

The smallest Size Box contains a Quantity sufficient to Prime a Four-Wheel Carriage Four Times; with which it will run upwards of *Six Thousand Miles*, and it will answer in the same Proportion for all other Kinds of Work.

A sample of the earliest oil advertisement.

Plastic film is used for electrical and electronic insulation, while petrochemical ethylene is used for making photographic film. Oil is used in the manufacture of CDs, DVDs and guitar strings. It is an important ingredient in furniture-making and the manufacture of contact lenses. The toilet seats we use, the crayons that we loved to colour with as children, the soft pillow on which we place a tired head, and the artificial turf that is often mistaken for real grass are all by-products of petroleum.

Asphalt is a natural choice for road construction, waterproofing, cement, production of roofing materials, manufacture of black paints and anti-corrosive paints, tyre treads, battery casings, undercoating of automobiles and electrical insulation. It is used as protective coating for pipelines, as lining for canals, reservoirs, riverbanks, dykes, construction boards, floor coverings and tiles. Bitumen is also used for the construction of roads, runways and platforms, waterproofing to prevent water seepage, mastic flooring for factories and godowns, canal lining to prevent erosion, tank foundations and joint-filling material for masonry work. In industries, it is a component in electrical cables and junction boxes, battery manufacture as a sealing compound, ceramics, printing inks, waterproof paper, electrical capacitors and bituminous felts.



Crude oil is separated into fractions by fractional distillation. The fractions at the top of the fractionating column have lower boiling points than the fractions at the bottom. All the fractions are processed further in other refining units.

Facing page: Stamps released by several governments around the world underline the significance of oil in human progress.

The agricultural sector has received an astounding impetus with the use of mechanised tractors and other farm equipment that run on oil and natural gas. Petrochemicals are used in fertilisers, insecticides and herbicides. Hybrid seeds, enriched with fertilisers have given manifold outputs. Deficiencies in soil quality are remedied by adding liquid fertilisers. Virtually all commercial fertilisers are ammonia-based, and made from natural gas; the most common pesticides are made from oil. A path-breaking process called eco fallow tilling fertilises plants and replaces soil in a single step. With its use, Phillips Petroleum, working in tandem with the University of Idaho in the US, has succeeded in a significant reduction of man-hours. Even though insecticides have increased production yields, researchers are now working on making them non-toxic wherever there are associated harmful side-effects.


4 ПОЧТА СССР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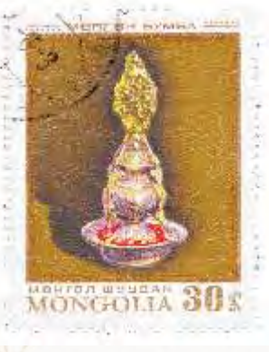
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Christmas/Noël


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U.S. POSTAGE
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PETROLEUM INDUSTRY


LEI 120
POSTA
R.P.ROMINA


MAGYAR POSTA


REPUBLICA ARGENTINA
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Mineral and Fuel
Maui Gas
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SYRIAN ARAB REPUBLIC
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SYRIAN ARAB REPUBLIC
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11p
NATURAL GAS


HASSI-MESSAOUD 095


AMERICA'S LIGHT FUELED BY TRUTH AND REASON
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New techniques and technologies discovered through R&D have been vital in enabling the industry to meet global energy demand.

The Magic of Technology

The future of the oil and gas industry depends largely on continual and progressive improvements in technology. After initial reluctance, most oil companies came around to adopting new technology and 3D seismic mapping has been a game-changer in the exploration process. Exxon first used it in 1967 but it was not till 20 years later that many seismic surveys employed 3D mapping in the Gulf of Mexico and the North Sea. Horizontal drilling has reduced the cost and improved the productivity and environmental impact of oil-producing wells. It did, however, take 30 years to achieve two specific breakthroughs: a down-hole, steerable motor controlled from the surface and the technology for measuring reservoir characteristics at the drill tip while drilling.

In most countries, governments own the major part of the world's oil and gas reserves. Government ownership of gas reserves is lower compared to oil reserves in both the United States and Canada, since a fairly substantial share of gas reserves is owned by private entities. Companies whose gas reserves are rising while their oil equivalent is falling are resorting to a standard unit of measurement called 'oil equivalent.' The general yardstick is that a billion cubic feet of natural gas is thermally equivalent to 1,90,000 barrels of oil. This does not, however, correctly equate the economic ratio.

Innovative Technologies

New technologies in the oil and natural gas sectors have enabled an explosion of production in the United States known as the Shale Revolution. A combination of hydraulic fracturing and horizontal drilling allows producers to access reserves of oil and gas from low-permeability geological formations that were previously too expensive to extract.

New developments in the US oil and gas industry have stimulated economic recovery from the 2008 financial crisis via new job growth, increased investment in

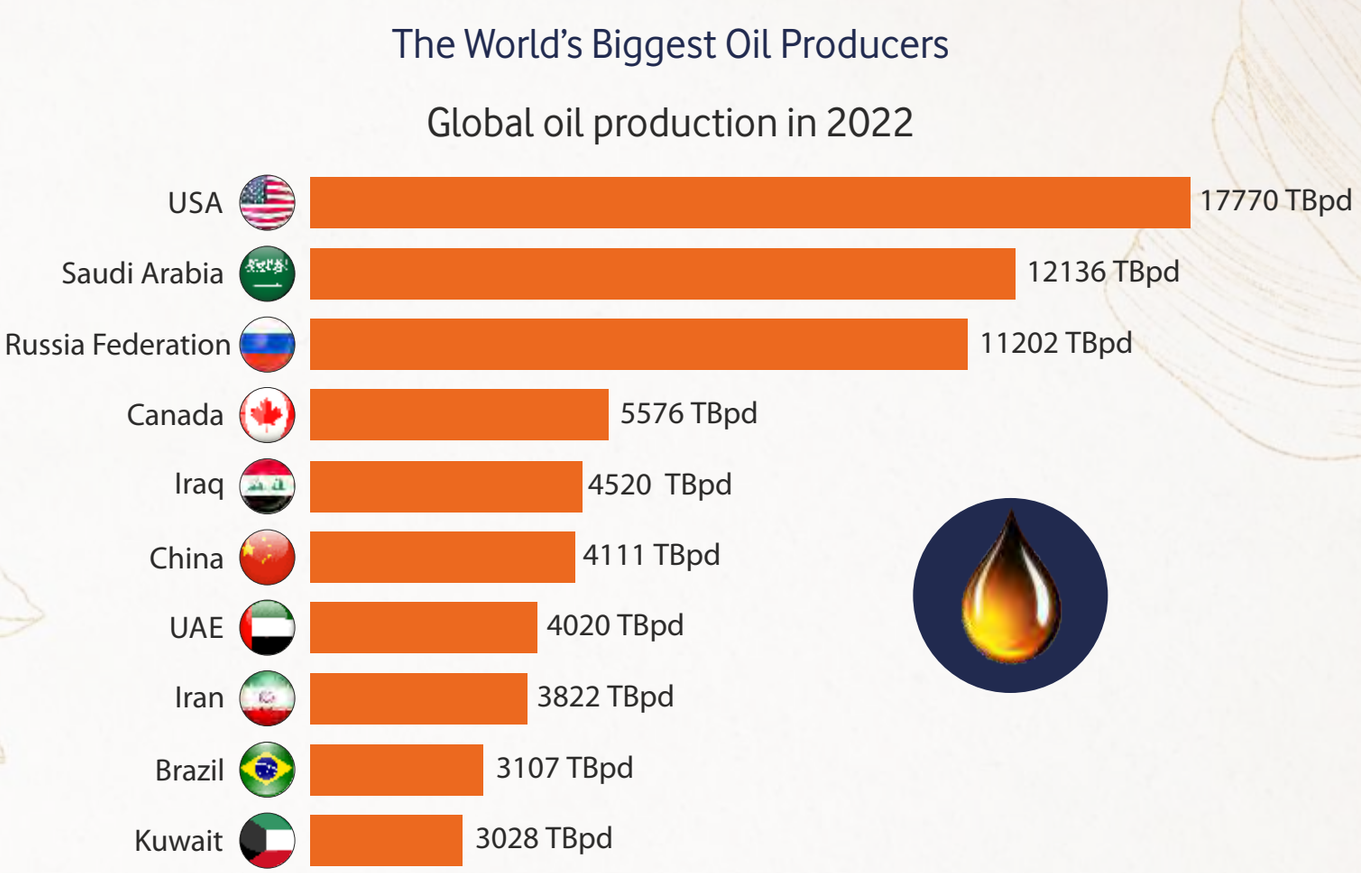
oil and gas-producing regions, and lower consumer prices of gasoline. With a consumption of around 20 per cent of the world's oil, the US is the largest oil consumer in the world. China consumes close to 16 per cent of the world's oil production, making it the second largest consumer in the world. With a consumption of around 5 million barrels per day, India is the third largest oil consumer in the world followed by Russia and Japan.

Pathfinders of Global Oil

According to BP Statistical Review of World Energy, the top five oil producing countries of the world in 2022 were: USA, Saudi Arabia, Russia, Canada and Iraq. The five biggest oil multinational companies as per Forbes global 2000 list 2023 are: Saudi Aramco, Exxon Mobil, Shell, Chevron, Petro China. As per data provided by Statistical Review of World Energy of the Energy Institute the largest countries by refining capacity in the world are: USA, China, Russia, India, South Korea, Saudi Arabia, Japan, Iran, Brazil and Germany.

There is a Saudi Arabian saying: "My father rode a camel, I drive a car, and my son rides in a jet plane. His son will ride again on a camel." It speaks about the end of the oil story in the near future. It is beyond doubt that humankind will have to urgently find alternatives to oil, but till that time it needs to be conserved and its use drastically curtailed.

While the twenty-first century will continue to use oil as its primary source of fuel, wasteful use will need to be dramatically reduced. Henry Rollins said: "We're at peak of oil, peak of water, peak of resources, and so either we figure it out and let science lead or we head down a very bad, dark trail to where a lot of people aren't going to make it." With this cautionary message in mind, let us preserve this nature's bounty for as long as possible, using it as the precious commodity it is.



**Thousand Barrels per day*

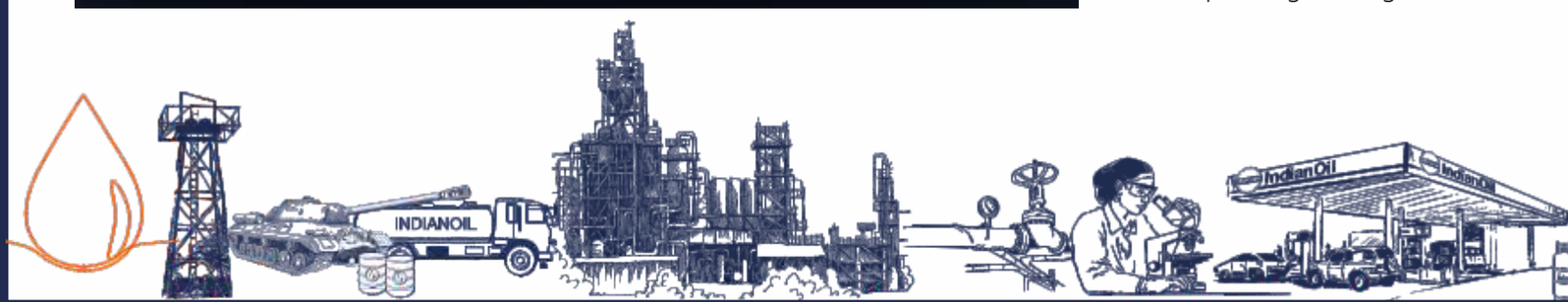
GEOPOLITICAL RAMIFICATIONS

David Suzuki, a Canadian academic, science broadcaster and environmental activist, has said that oil and petrol have affected world politics to an appreciable extent and in an objectionable way. Some people have earned great profits from oil which has led owners of oil companies in Europe and America to spread their influence and power in other lands. The global oil industry is vast and complex, and spread over a large geographical area. Oil influences every aspect of modern life and helps shape the history, society, politics and economy of every nation. Countries have fought wars for oil and gas and will do so in future too.

The first instance of such a war began when the King of Syria, hoping to profit from the trade, sent an army to occupy a nearby area. In retaliation, the Egyptians sent an army in 312 BCE, thus winning history's first war for oil. In the post-Second World War era, there have been two major oil crises. In 1973, Arab members of the Organisation of the Petroleum Exporting Countries (OPEC) imposed an embargo on supply to the US, Japan and Western Europe, for supporting Israel in the Yom Kippur war. These nations consumed more than half the world's energy. Oil prices quadrupled to almost $12 a barrel. Although the embargo was lifted in 1974, oil prices remained high. The Iranian revolution triggered the second oil shock in 1979 and the situation hit rock bottom with the outbreak of the Iran-Iraq War (1980-88). In 1981, the price of oil stabilised at $32 per barrel.

The scramble for oil wealth has been a journey of highs and lows: price wars, climate change resulting from destruction of biodiversity and damage to the ozone layer by noxious emissions, and socio-economic exploitation resulting in major geopolitical ramifications. The picture today, though not altogether gloomy, is certainly one where inspired international leadership is imperative to govern this juggernaut. The oil price movement typically depends on consumption in the Organisation for Economic Cooperation and Develop-ment (OECD) countries. But it is not always the economic conditions that move prices, be it upward or downward Geo-political reasons also play a seminal role in determining prices.

Russia's war in Ukraine has had a plunging effect on global geopolitics, further pushing a fragile



A chessboard depicting the global geopolitics of oil.

post-pandemic world order into a quagmire of uncertainties. One of the best regional examples of this stress is West Asia—a traditional security 'backyard' of the US where Russia has made steady strategic and tactical progress over the past decade, the effects of which are visible on the sidelines of the crisis.

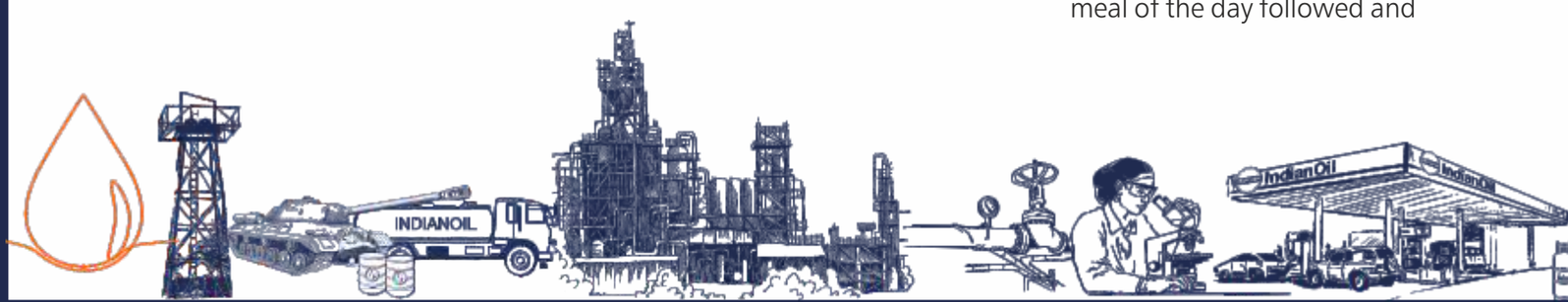
Russia arguably has a more restrained upper hand in West Asia today due to its manoeuvres against Ukraine. Moscow is part of OPEC+ —an expanded version of the cartel of oil producers, designed by Saudi Arabia's heir-apparent in 2018 to get a better grip on global oil pricing mechanisms with the US also coming up as a major energy producer and exporter. By association, this move swayed the geopolitical calculations as well, with oil becoming a central commodity of interest once again as inflation, food security and energy security all hurtled towards a crisis point across the world.

The recent crisis in Ukraine has amplified the importance of energy security, as governments worldwide scramble to secure affordable gas supplies. The European Union is attempting a strategic pivot away from Russia, looking instead to the US and the Middle East to satisfy its gas requirements. This shift has escalated the price of Asian Liquefied Natural Gas (LNG). Simultaneously, gas consumption in India, a market highly sensitive to price changes, has diminished. Committed to increasing the gas share in its energy basket from the present 6 per cent to 15 per cent by 2030, India is exploring various options. Given its insufficient domestic gas supply, these options include importing LNG and piped gas from regional countries. As the oil and gas industry continues its evolution and as alternative, environmentally-friendly energy sources are being developed, the geo-economic implications of the rising oil demand in the Asia-Pacific region become undeniable. These implications will influence geo-economics globally. The surge in consumption due to increasing industrialisation and subsequent urbanisation suggests that regional production will not match demand.

SALUTING THE
UNSUNG HEROES

This is a tribute to the pioneers of the oil industry. These great men braved various dangers in their extraordinary journey to success. History is replete with stories of people who displayed burning passion to achieve their goals. In the case of petroleum, it was the fires sighted in the midst of nowhere that beckoned man to explore and reach the depths of the earth to finally come upon something precious, which would forever light up lives. These were the gallant oilmen whose toil, persistence and determination in spirit have led to the ceaseless flow of oil in this country. These enterprising people had one motto which was 'to do or die'. They explored virgin lands, dense forests, always in search of what they believed they would find. Often they met with disappointment or failures but their indomitable, invincible spirit and perseverance kept them going. These were the unsung heroes whose sacrifices gave us the precious gift of petroleum. These men of tremendous courage, dedication and a daredevil spirit ventured into wild areas that were fraught with all kinds of danger. Some of them were from the army, some were civil servants and others were explorers searching for coal and timber or the tea leaf.

It was a struggle against nature and a tremendous challenge for these oilmen. After a hard day's work they would return to their huts or tents, which were often in a state of disrepair. They were bruised by thorns and had to deal with leeches in the undergrowth. There were scant infrastructure facilities. The drilling crew had to live close to the drill site in tents with rough brick floors. They worked for long hours without tea, food and sometimes water. The night shift in winter was the most taxing when the ill-equipped crew had to wrap newspapers under their pullovers to protect themselves from the icy winds. In spite of such adverse conditions, there was immense camaraderie among them. The teams were cohesive units whose members demonstra-ted mutual concern, unity, and harmony, irrespective of hierarchy. There were no means of communications in the areas where these oilmen ventured. Messages were brought by dak-runners once every 10 to 15 days. The day would begin early. Before dawn, the entire party would be up and the camp's kitchen fires would be burning. Camels, mules and elephants had to be fed and jeeps cranked to life. Then the main meal of the day followed and



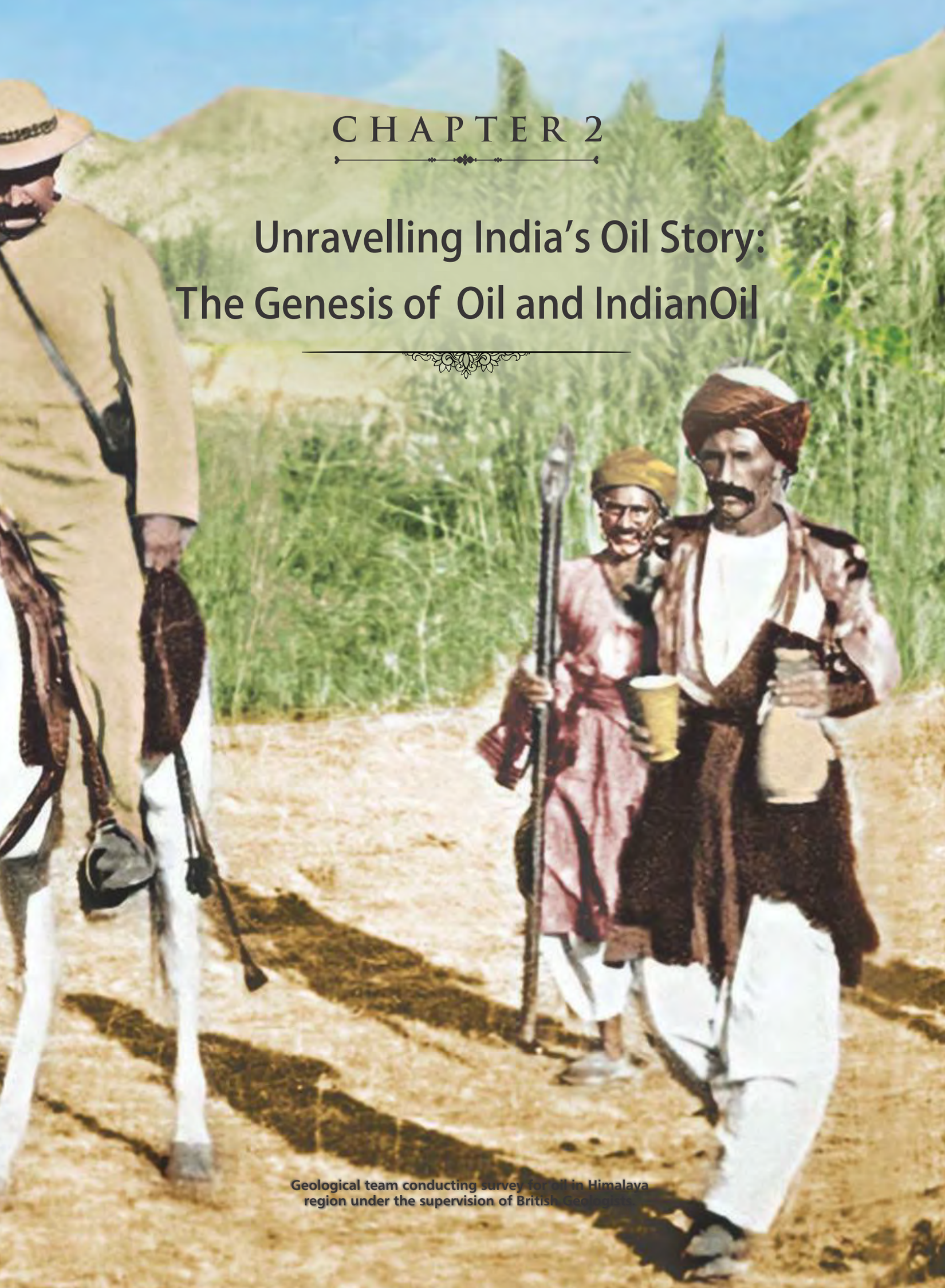
Early unsung heroes of the Indian oil industry whose toil, grit, and determination have kept oil flowing throughout the country for the greater benefit of humankind.

everyone had a heavy breakfast because there was no guarantee of lunch. Field work would take the party far into the dense jungles and deserts. They were armed only with their topographic sheets, hammers, compasses and some rudimentary geological equipment. They had to return by sundown to the relative safety of the camp. Strange encounters periodically occurred in the jungles. Bedtime was when they had to remain alert. The tents had to be carefully checked for snakes and scorpions, which favoured the snug interiors. Days and nights rolled on into weeks, then months; the youngsters, nomads far removed from the urban world, often lost count of time. Most of them were bachelors, but the married ones had to endure the ordeal of separation from their spouses for months on end. It was an equally anxious period for their wives who were obliged to care for their homes and families singlehandedly. Their children grew up without seeing their fathers for long intervals of time.

Under these dire circumstances, the pioneers who were totally cut off from civilisation, tried to make their lives interesting after a hard day at work. The presence of clubs at tea gardens in and around sites helped them enjoy a social life with the Europeans and planters, playing football, hockey, cricket and other outdoor games. They also enjoyed several festivals with different local communities. Riverside picnics and camping were popular when they had leisurely swims and a drink or two to relax with friends and colleagues. The nation owes a deep debt of gratitude to the committed endeavours of all these people from around the world who discovered energy resources in nature. It is their perseverance, dedication, indomitable spirit, patience and sincerity that has given us the precious gift of petroleum. Several pioneers died young struggling for their mission. They have left eternal imprints and will live forever as the true initiators of the Indian oil industry.

CHAPTER 2

Unravelling India's Oil Story: The Genesis of Oil and IndianOil



Geological team conducting survey for oil in Himalaya region under the supervision of British Geologists

Oil has been a companion to humanity since time immemorial, and its significance is deeply ingrained in the annals of India's history. From the earliest historical and archaeological records to the modern era, oil has woven itself into the fabric of Indian lives. In this chapter, we embark on a journey through time, tracing the integral role of oil in India's story. As we delve into the past, we encounter traces of oil's use in India that reach back to the very origins of human existence on the subcontinent. Building upon the insights from the previous chapter, we find compelling evidence of oil's presence throughout India's narrative—from the epochs of the Mahabharata and Ramayana to the accounts of Chinese travellers and monks who graced India's shores in the first and second centuries CE. The echoes of antiquity reverberate through the ages, as archaeological excavations at Mohenjo-daro, the cradle of the Harappan civilisation, unveil intriguing evidence of oil's application in construction and waterproofing. Beyond this, the pages of history unveil Firdausi's chronicles in the *Shahnama*, recounting the utilisation of oil by Alexander's army during his historic invasion of India.

In ancient times no celebration or festival was complete without oil *mashaals* (torches).

Bottom: In olden times most tunnels were equipped with hanging oil *mashaals* (torches) to light the way.

Oil floats on water as it is lighter and people used to collect it for lighting.

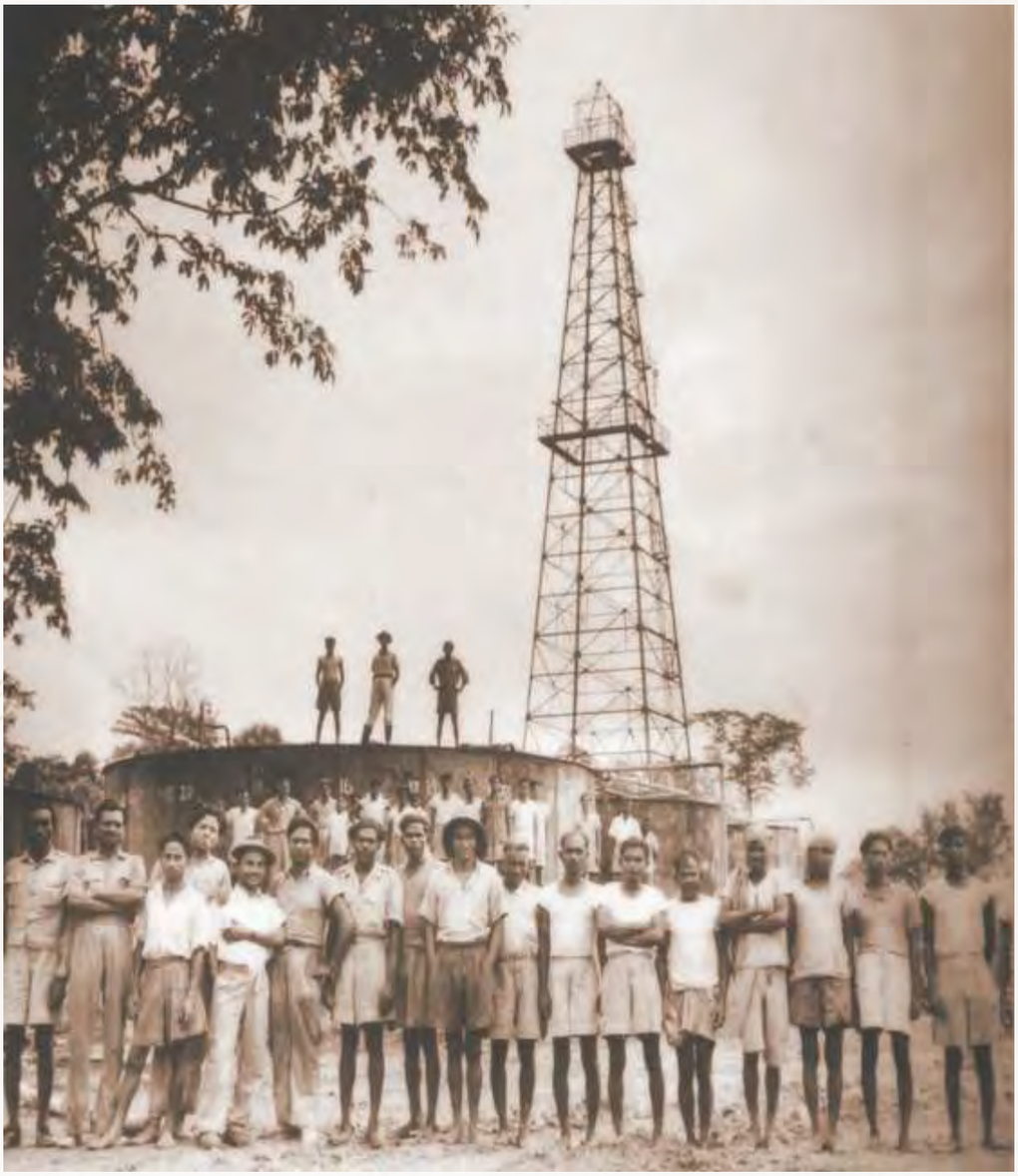
Bottom left: Dr. John Berry White, father of the petroleum industry in Assam.

Bottom right: David Sime Cargill, founder and first Chairman of The Burmah Oil Company Ltd.

Discoveries in the North East

The narrative of oil exploration in India commenced within the lush jungles, sprawling swamps, and meandering river valleys of the north-eastern frontier. The early records of petroleum usage lead us to the journals of S. E. Peal, a daring tea-planter, who, in the early months of 1879, embarked on a voyage up the Burhi Dihing River—an imposing tributary of the mighty Brahmaputra River in Upper Assam. His accounts brought to light the presence of oil springs near Margherita, a bustling town nestled in the heart of the Tinsukia district of Assam. Here, amidst the tranquil landscapes, he stumbled upon the extraction of kerosene from the native oil springs. In the annals of exploration, luminaries like Major A. White, Capt. Francis Jenkins, Capt. P. S. Hanny, W. Griffith, and W. Licut Bigge encountered intermittent traces of petroleum seepages along the banks of the Burhi Dihing. Amidst their journeys, figures such as C. A. Bruce, H. B. Medlicott, F.R. Mallet, T.H.D. La Touche, R.D. Oldhan, and H.H. Godwin-Austen from the Geological Survey of India chanced upon the Makum oil seepages as they charted the coalfields of Upper Assam.

It was in 1865 that Dr. James Young's ground-breaking distillation experiments marked the genesis of the petroleum refining industry. The turning point arrived in November 1866, as Goodenough from the Calcutta firm of McKillop Stewart and Company initiated the drilling of exploratory wells in Nahorpung, situated near the Jaypore enclave in Upper Assam. Simultaneously, efforts were directed towards the Makum-Namdang region. The climax of this endeavour materialised on the 26 March 1867, when at a mere depth of 118 feet, Asia's inaugural mechanically drilled well struck oil — a defining moment that unfolded in Makum, proximate to the Margherita expanse of Upper Assam. Remarkably, this feat transpired a mere seven years after Col. Drake's discovery of oil in Pennsylvania, USA. The north-eastern landscape had borne witness to a historic feat—one that echoed with the tales of daring, innovation, and the unearthing of a resource that would shape India's trajectory into the energy-rich future.



Charles Alexander Bruce, who commenced trial cultivation of tea in Assam, came across oil seepage in the tributaries of the Brahmaputra.

Top left: Early pioneers at a drilling well in the Digboi oilfield.

Bottom: The oil industry owes a deep debt of gratitude to the adventurous spirit of early, self-taught, pioneering geologists and geophysicists who had to rely on their intuition and skill to uncover the energy resources gifted to humankind by nature.

Following spread: In the early days, large oil companies started by employing geologists to map prospective structures. The oil industry owes much to the adventurous spirit of those early geologists. They had to hew their way through trackless jungles and impenetrable tropical forests, cope with disease and the threats posed by wild animals in pursuit of their goal of discovering oil.

Elephants were used in Assam for installing railway lines. Their use was also common in the oil industry. In fact it was an elephant with oil on its feet that led to the discovery of the Digboi oil well in Assam.

Middle and bottom : Geologists and oil pioneers who developed oilfields around the world. Many of those shown below have passed on, leaving a glorious heritage for humankind.

Birth of the Indian oil Industry

The inception of the Indian oil industry dawned amidst the lush expanse of Assam's swampy jungles and meandering river valleys, marked by a pivotal milestone — the triumphant drilling of Digboi Well No. 1 in 1889. In a tale woven with ambition and exploration, the British established the Assam Railway Trading Company Ltd. in London during 1881, envisaging a venture encompassing railways, mining, exploration, and trade. Amidst the laying of railway lines in 1883, a peculiar incident seized attention. An elephant, part of the construction efforts, returned to the camp bearing traces of oil on its feet. Following the trail, a sprawling expanse of oil seepage was uncovered at Borbhil, a quaint suburb of Digboi. This remarkable discovery ignited a fervour, as the tales of flames dancing from modest campfires for culinary purposes intertwined with the sight of the oil-smeared legs of the elephant. The culmination of these observations kindled an aspiration—the pursuit of a license to drill for oil in this promising locale.

In September 1889, the inaugural well was meticulously dug within the confines of the Digboi field in Assam. Engineered by the Assam Railway and Trading Company Ltd., the well reached a depth of 662 feet. Spearheading this ground-breaking endeavour was W. L. Lake, devoted enthusiast of oil and an employee of the company. These unsung pioneers carved the first steps along the path, igniting the legacy of oil in India. In a realm where scientific exploration intertwined with bravery, these trailblazers embarked on a mission that would shape the nation's energy narrative.

Guided by the command of the British officer-in-charge, determined labourers delved ever deeper, their cries of "Dig, boy, dig"

Cleaning out well bore of a waxy producer. The role played by earlier oilmen in Assam is a saga of courage, entrepreneurship and determination.

THE A STOCK IS ENTITLED TO A FIXED CUMULATIVE PREFERENTIAL DIVIDEND OF 6% PER ANNUM AND RANKS BOTH AS TO INTEREST AND CAPITAL AFTER THE 15,000 NEW 6% PREFERENCE SHARES AND IN PRIORITY TO THE B STOCK (SEE BACK OF THIS CERTIFICATE)

A

Nº 3148

The Assam Railways & Trading Company, LIMITED.

Incorporated in 1881 under the Companies Acts 1862–1880.

CAPITAL £1,160,000. DIVIDED INTO

8,000 PRE PREFERENCE "A" SHARES 1886 OF £10 EACH, NUMBERED 50,001 TO 58,000
15,000 NEW SIX POUNDS PER CENTUM PREFERENCE SHARES OF £10 EACH, NUMBERED 60,001 TO 75,000
£630,000 "A" STOCK, £300,000 "B" STOCK

This is to Certify that
of
is the holder of Pounds of the above mentioned A Stock in THE ASSAM RAILWAYS & TRADING COMPANY, LIMITED subject to the Memorandum and Articles of Association from time to time thereof.

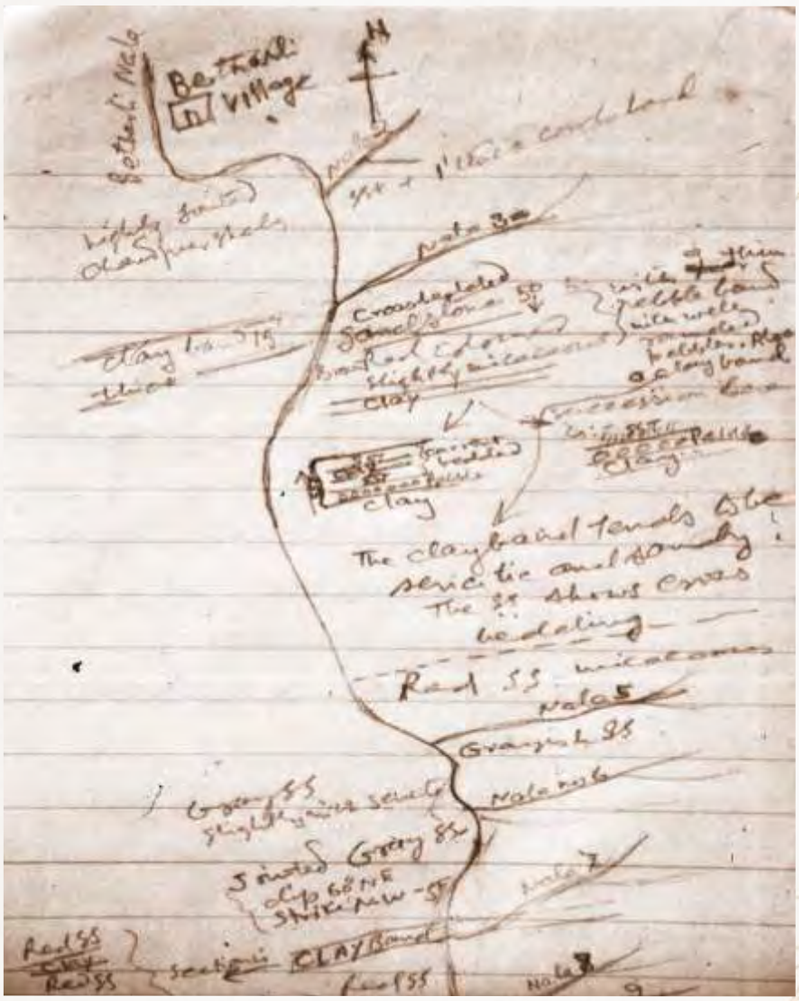
GIVEN under the Common Seal of the said Company this day of 19

THE COMMON SEAL OF THE SAID COMPANY WAS HEREUNTO AFFIXED IN THE PRESENCE OF

DIRECTORS

SECRETARY

A rare document of The Assam Railways & Trading Company.



Top left, top right and bottom: A geologist experimenting with his tools and taking notes in his diary. These notes proved quite helpful in searching for oil.

resonating till the ultimate reward — a flow of oil — was bestowed upon them. Thus, with a touch of humour, the locale earned its moniker, 'Digboi'. Over the ensuing three years, nine more wells punctuated the landscape of Digboi, and at Margherita, a modest refinery came to life, refining the oil and re-defining India's energy firmament. It was here that India's oil industry was christened—a tale of tenacity and transformation.

The torchbearers of this nascent industry, the Assam Oil Syndicate, secured a mining lease over the northern reaches of Digboi, nurturing the flame of exploration and achievement that illuminated the journey ahead.

Top and bottom:
The geologists in the early years of oil exploration led a difficult life. The work was labour- intensive, involving several different fields of science and the use of elaborate equipment.

Barely seven years after Edwin L. Drake drilled the world's first oil well in 1859 at Titusville, Pennsylvania, USA, in 1866, Goodenough of McKillop, Stewart and Company, Calcutta, drilled a hand-dug well at Nahorpung near the Jaipur area of Upper Assam but failed to establish satisfactory production. In his second attempt on 26 March 1867, oil was struck in Asia's first mechanically drilled well at Makum near the Margherita area of Upper Assam.

The Digboi Refinery under reconstruction following a fire. It was the first refinery east of Suez and the first in Asia. The Digboi Refinery laid the foundation for petroleum refining in India. It has produced generations of oilmen in the country who later rose to commanding heights in the petroleum industry. It is Asia's oldest functioning refinery and the oldest well in the world.

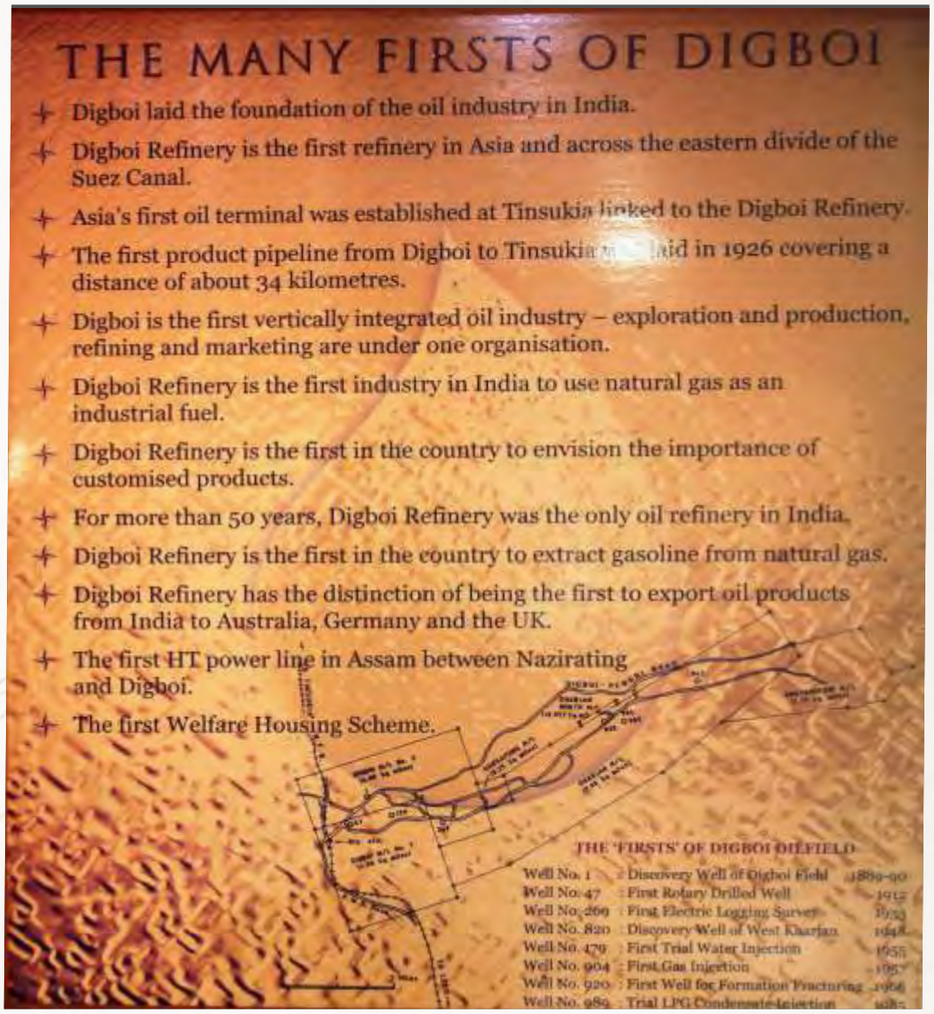
Middle : Railway station at Digboi.

Bottom : A typical 'Phakiyal' tribal house beyond Digboi oilfield which was used by oil labourers.

Assam Oil Company as a Leader

A pivotal moment in the saga of India's "black gold" unfolded in 1898 when Sir Henry Cotton, the Chief Commissioner of Assam, journeyed to Digboi. Gazing upon a splendid scene, he remarked, "The sight of four jets spouting black oil to a height of not less than seventy feet was a striking spectacle." This visual symphony heralded the emergence of a new era. In 1899, a significant decision was etched in the annals of Assam's history. The visionary Directors of the Board of Assam Railway Trading Company Ltd. determined to give wings to their oil interests by birthing a new entity—the Assam Oil Company. A constellation of fourteen wells, yielding a cumulative production of 2000 gallons daily, formed the initial bedrock of this enterprise. This marked the heralding of a fresh epoch.

A year later, in 1900, Digboi's landscape underwent a transformation, as a new and more capacious refinery took shape. This stronghold of innovation supplanted the earlier refinery at Margherita, accentuating the momentum of progress. The Assam Oil Company gracefully embraced the mantle of the Makum and Digboi concessions and rights, succeeding the legacy of the Assam Oil Syndicate. The edifice of this new refinery materialised through the diligent efforts of an industrious workforce, complemented by the might of trained elephants—a testament to the synergy between human endeavour and nature's grace. In a missive on 11 December 1901, S. S. Hawkins, the Agent and General Manager of the Assam Oil Company, inscribed an indelible mark in the company's history. Reporting from Digboi, he wrote to the company's London headquarters, "You will be glad to hear that we have our new refinery running steadfastly at Digboi. By the close of next week, the inaugural consignments of kerosene oil from our fresh refinery—fashioned beside a grand tapestry of 1001 dug wells—shall embark on their journey." This communique resounded with triumph. As the curtain lifted on a new chapter, the products of Digboi's refinery took flight under the emblem of the 'Assam Oil' brand, reverberating with the essence of pioneering leadership and an unwavering commitment to harnessing India's energy potential.



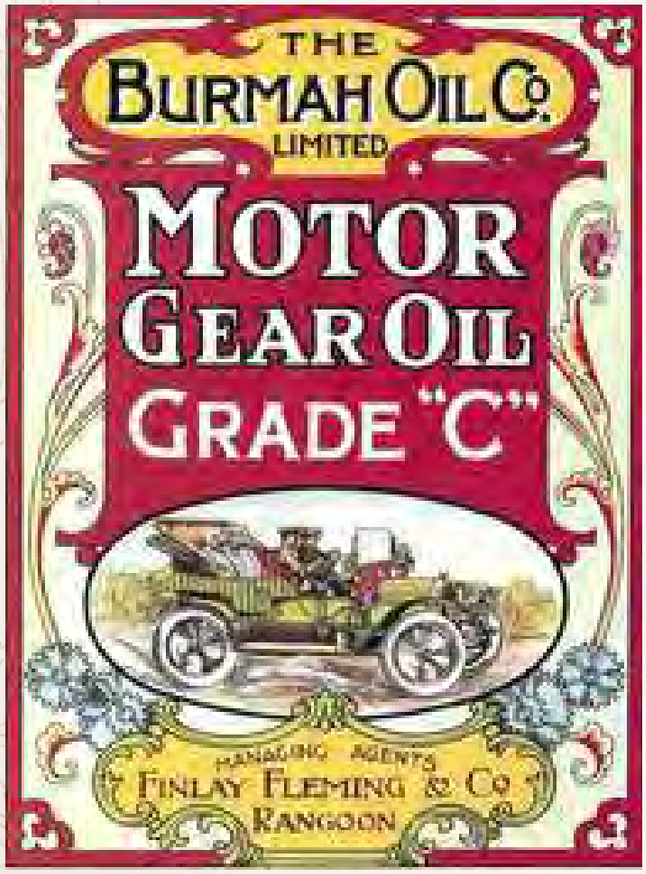
Many Firsts of Asia's First Refinery

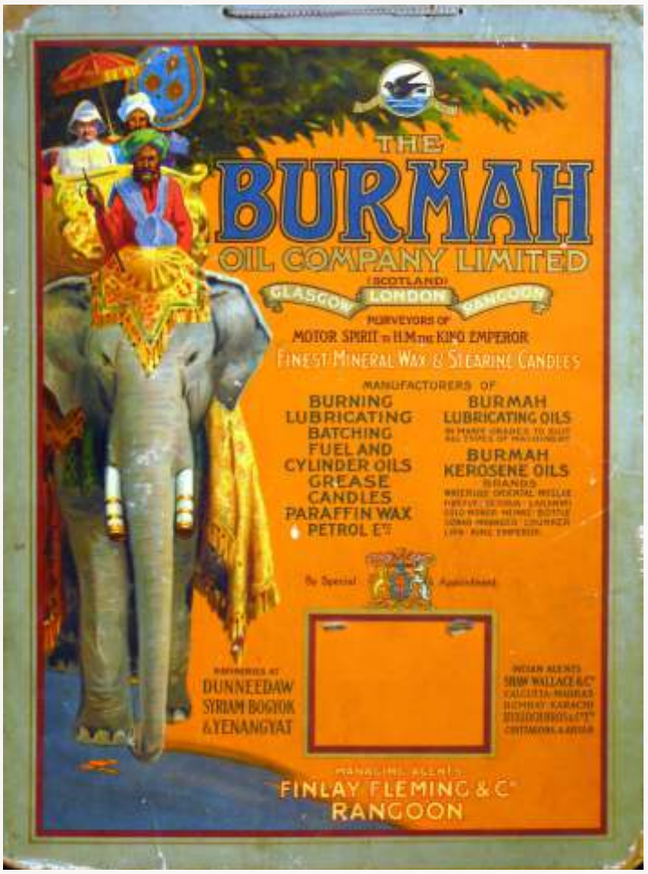
A defining moment arrived with the commissioning of the Digboi Refinery on 11 December 1901. In a remarkable stride, merely a month later, the inaugural batch of kerosene embarked on its journey for sale in January 1902. The orchestration of marketing responsibilities fell into the capable hands of business enterprises like Saligram Rai Chunilal Bahadur and Company, ensuring the transportation of products to the farthest corners via bullock carts and country boats. This marked the initiation of a journey of unprecedented significance.

The advent of the internal combustion engine in the 1870s precipitated an explosive surge in demand, propelling the consumption of gasoline and a multitude of other petroleum derivatives. As the sun set on one era, the Burmah Oil Company Ltd. took the reins of the Digboi oil field in 1921. This transition ushered in an era of renewal, with the refinery undergoing a comprehensive overhaul in 1923. This rejuvenation was underscored by the infusion of cutting-edge technology, setting the stage for a fresh crescendo of achievements.

With new-found reserves near Naharkatiya propelling the influx of crude, the refinery surged to a throughput of 0.50 million metric tons per annum. In 1925, the seeds of innovation took root as the first exploratory deployment of geophysics materialised through a Torsion balance survey in the Bordubi region. As the tapestry of progress unfurled, 1926 witnessed the establishment of two pivotal product pipelines, bridging the path from Digboi to Tinsukia.

The journey of petroleum products from the refinery to the consumers was handled by the distributors. Kerosene is a product that is a continuing testament of challenge and innovation since the first batch of kerosene was sent to the market on 2 January 1902.





Top left, right and bottom: Popular and old advertisements of products of the Burmah Oil Company. Advertisements used bright colours and stylish locations. Some of the best young artists of the day were hired to create wonderful posters.

In a testament to versatility, resilience, and innovation, 1928 saw the installation of a compact and robust wax extraction facility within the Digboi Refinery. This small yet powerful addition marked a new horizon, with the production of paraffin wax commencing in 1931. The echoes of this milestone resonated globally, as the first consignment of paraffin wax embarked on a journey to South Africa. This journey encompassed another monumental first for Digboi, an institution that would become the cradle of a generation of oil pioneers who would go on to shape India's petroleum landscape.

Further embarking on a trajectory of innovation, Digboi set the stage for the installation of its first lube oil distillation unit — a moment that heralded the dawn of integrated operations. The nexus of petroleum exploration, production, refining, and marketing merged seamlessly, crafting a legacy that resonates through time.

'Put a tiger in your tank' was an advertising slogan created in 1959 by Emery Smith, a young Chicago copywriter to boost sales of Esso Extra. The tiger was not Smith's invention. It had first appeared as a mascot for Esso in Norway around the turn of the twentieth century.

Bottom: Leading oil dealers in Assam, top left to right, Kishanlal Karwa, Premsukhdas Karwa and bottom left to right, Ramchandra Karwa and Rai Sahib Birdhichand Karwa.

Dr. Rajendra Prasad, India's first President, serveying Digboi Refinery products during his visit to Digboi in February 1954.

World's Oldest Operating Refinery

In the years preceding the tumultuous times of war, a landmark innovation graced the landscape—the inception of well logging. This revolutionary technique, pioneered by the Schlumberger brothers in Alsace, marked a turning point. At the helm was Schlumberger engineer Raymond Sauvage, assigned to the hallowed grounds of Digboi. Into the depths of Digboi Well 269, Sauvage lowered a seemingly unassuming resistivity tool, igniting a seismic shift in the trajectory of Digboi's advancement. The realms of science and exploration merged, paving the way for remarkable strides.

The field blossomed, giving birth to a multitude of wells—over a thousand in number—that etched the Digboi landscape with the essence of excellence in oilfield management and petroleum geology. In this convergence of intellect and endeavour, Digboi matured into a sanctuary of learning and accomplishment.

As the first refinery east of the Suez and the inaugural one in Asia, Digboi laid the bedrock for India's petroleum refining odyssey. A living testament to history, it retains its vitality, standing as the world's oldest operational refinery, affectionately christened the 'Gangotri' of the Indian oil industry. Here, tradition dances harmoniously with modernity—a symphony that transcends time.

On 14 October, 1981, through an Act of Parliament, the baton was handed over. Digboi Refinery, together with the marketing functions of the Assam Oil Company, found its new abode within the IndianOil Corporation Ltd. The Assam Oil Division emerged, seamlessly blending into the national mainstream. Digboi, a beacon of a luminous past, steps forward into the future with undying enthusiasm. It remains the inaugural cornerstone in the epic journey of India's petroleum industry—a legacy that beckons onward.

At the Mercy of Oil Companies

Following India's independence, a pressing scarcity of oil cast a shadow on the nation. Wartime rationing, especially of kerosene and motor fuel, persisted even as civilian consumption surged. A dearth of foreign exchange reserves coupled with a soaring import bill escalated the challenge. The journey towards economic advancement hinged on affordable petrol, diesel, paraffin, and lubricants. At this juncture, India found itself at the mercy of oil companies, who demonstrated little alignment with the nation's progress and instead imposed steep prices for the oil supplied to the government.

With the dawn of independence, the formulation of the industrial policy of 1948 positioned the development of the domestic petroleum industry at its forefront. While the existing foreign oil companies were allowed to continue operations, the establishment of new oil companies was restricted to state ownership. By 1949, India could only meet half of its oil demands through imports, a situation that left oil companies deprived of potential sales. A comprehensive study was undertaken to evaluate the viability of an indigenous refinery project, which, however, projected substantial losses for the Indian government.

Resistant to relinquishing their monopoly, the foreign oil companies proposed the construction of refineries in Bombay and Vishakhapatnam. Their offer came with a condition: they would be permitted to sell oil products at rates 10 per cent higher than the global average. The government declined this proposition. However, a turning point arrived two years later due to an international development—the Iranian government nationalised the expansive oil refinery at Abadan, following a dispute with the Anglo-Persian Oil Company that operated it. This disruption impacted India's oil supply, as 70 per cent was routed through the Burmah-Shell conglomerate, connected to the Abadan Refinery. In an attempt to compensate, Burmah-Shell tried supplying oil through US tankers, but the costs proved exorbitant.

The potential for India to secure more affordable oil from Iran or the Soviet Union existed, yet a missing link prevailed—a domestic refinery. This void cast the spotlight on a pivotal challenge—the dire need for indigenous refining capacity..

A storage fuel tank of the Anglo-Persian Oil Company Ltd. (India).

Middle and bottom : Petrol pumps of Caltex Company in India. These foreign companies had a complete monopoly and exploited the country by selling fuel at higher rates. Burmah-Shell, Stanvac and Caltex jointly controlled 95 per cent of the Indian oil market, which they would not surrender easily.


REGISTERED

NUMBER
XU 9496

REGISTERED

25000

STANDARD OIL COMPANY
(AN INDIANA CORPORATION)
7⅞% DEBENTURE DUE 2007

CUSIP 853700 AM 4

7⅞% DUE 2007

25000 XU 5456 .PITT & CO

*WCC1868

7⅞% DUE 2007

TWENTY FIVE THOUSAND

DOLLARS

TRUSTEE'S CERTIFICATE OF AUTHENTICATION
This is one of the Debentures described in the within-mentioned Indenture.
CITIBANK, N.A., As Trustee
By
Authorized Officer

Dated: AUG 12 1977
By
Standard Oil Company
By
H. V. Myers
President
J. E. Swearingen
Chairman of the Board

PAID

Succumbing to Pressure

In 1951, Standard Oil—one of the influential 'Seven Sisters' that held dominion over the oil realm, found itself engaged by the Indian government to conduct aeromagnetic surveys across Assam, West Bengal and Tripura. The prospect of oil deposits straddling the India-East Pakistan border piqued interest. Yet, the company's involvement came at a cost—a formidable price. The Indian government agreed to bear 25 per cent of the company's prospecting expenses and extend substantial tax concessions. However, after eight years, the verdict echoed—an assertion that no oil was found at depths of 3,500 metres. Curiously, this conclusion contradicted common knowledge, which dictated that oil required drilling to depths exceeding 5,000 metres.

Burmah-Shell, Stanvac, and Caltex—the triumvirate that held sway—reigned over 95 per cent of India's oil market. Their grasp was tenacious and they were not inclined to relinquish control without a struggle. A faction of the press rallied for the infusion of foreign capital investment into India's oil landscape. Eventually, under mounting pressure, the government consented. Agreements were inked with Stanvac and Burmah-Shell to establish refineries in Bombay, accompanied by a similar accord with Caltex for a refinery in Vishakhapatnam.

Precarious terms governed these alliances. Subsidiaries—Standard Vacuum Refining Company of India and Burmah-Shell Refineries—were formed. The parent companies retained absolute sway over their progeny, while the government extended them privileges akin to those enjoyed by Indian enterprises. A decade-long tax respite was

bestowed, complemented by transport, port and dock facilities. Water and electricity flowed at reduced rates; the lowest import duties adorned equipment; and oil duties were waived. A carte blanche was granted in selecting oil sources, and complete autonomy was granted in dealing with Indian-sourced oil.

As a bitter chalice, the deal crystallised further. A provision decreed that the government couldn't acquire or nationalise these plants for a quarter-century post-commencement of operations. Thereafter, it was mandated to provide reasonable compensation—a sum that the companies could repatriate to their home nations. Adding salt to this one-sided equation, these companies retained the power to vend oil in India at prices on par with those reigning in the US.

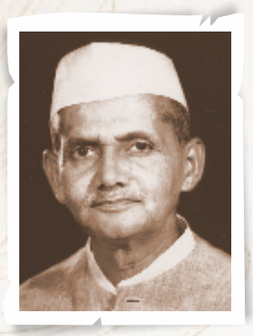
Thus, oil from the Middle East— primarily Iran—was peddled at US export rates, the zenith of global pricing. In the corridors of commerce, the complex interplay of interests sculpted an accord that was lopsided, its repercussions etched into the annals of India's oil history.

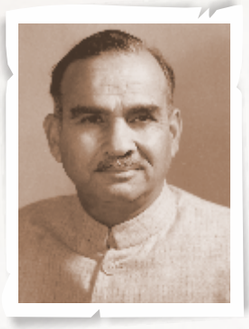
An advertisement of Burmah Oil Company. It became a household name by weaving itself inextricably into the social and economic fabric of the land.

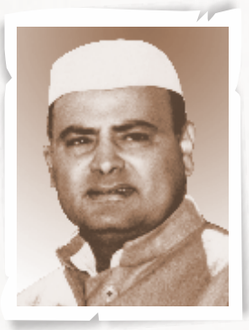
Facing page top: A vintage debenture certificate of Standard Oil Company.

Facing page bottom: An advertisement of Standard Oil Company to promote their products.

Former Chairman of IndianOil, P. Gopalakrishnan signing the supplementary agreement with the Soviet Union for importing petroleum products.







Bid to End MNC Domination

In the early years of independence, India's indigenous production of oil products barely registered on the spectrum. For the initial three years post-independence, local oil product production ranged from 5 to 10 per cent, which subsequently plummeted to below 5 percent. It wasn't till 1954 that a faint glimmer of progress emerged. The international oil giants showed little inclination to foster India's oil industry. Their profits flowed abundantly from oilfields across the Middle East, Venezuela, and Indonesia. Venturing into Indian oil exploration would entail substantial investments and uncertain outcomes. Curiously, the dearth of domestic oil suited their agenda perfectly, allowing them to levy monopoly prices, which the government was compelled to bear.

Jawaharlal Nehru, India's first Prime Minister, succinctly conveyed the gravity of the situation to the Parliament, asserting, 'A nation without self-sustaining oil production is vulnerable. The absence of oil poses a fatal weakness from both a defensive and economic perspective.' In 1955, the government established a dedicated Petroleum Division within the Geological Survey of India. Leading this charge was V. H. Boileau, a former geologist of the Anglo-Iranian Oil Company, entrusted with the pivotal role of exploration. Preliminary geological mapping was initiated in the Punjab sub-Himalayan region.

K.D. Malviya, who would go on to become India's first Deputy Minister of Natural Resources and Scientific Research, emerged as a fervent advocate for state control over the oil industry. On 13 December 1955, he said on All India Radio, 'The nation's

The first Prime Minister of India, Pandit Jawaharlal Nehru, observing a model of a rig and sample of oil. He said oil is of vast importance in the world. A country that does not produce oil is in a weak position, he averred.

economy, fiscal policy, and industrialisation pattern can only be steered with control over oil. True economic freedom and defence depend on state ownership and management of the oil industry. Oil exploration and development entail risks, yet they are risks worth undertaking.'

The tale of India's oil sector is incomplete without a recounting of Malviya's significant role. Handpicked by Jawaharlal Nehru himself, Malviya, a true nation-builder, was entrusted with the mission to develop India's nascent oil industry, in a landscape devoid of capable geologists. He convened eminent Indian scientists and geologists, invoking their insights to chart a course forward. Malviya's vision spurred the Geological Survey of India into action, with a focused five-year exploration blueprint drafted for the Jaisalmer region of Rajasthan. He was resolute in his belief that projecting the likelihood of discovering oil in Jaisalmer would facilitate the presentation of a compelling case to the Planning Commission for the establishment of an oil exploration department.

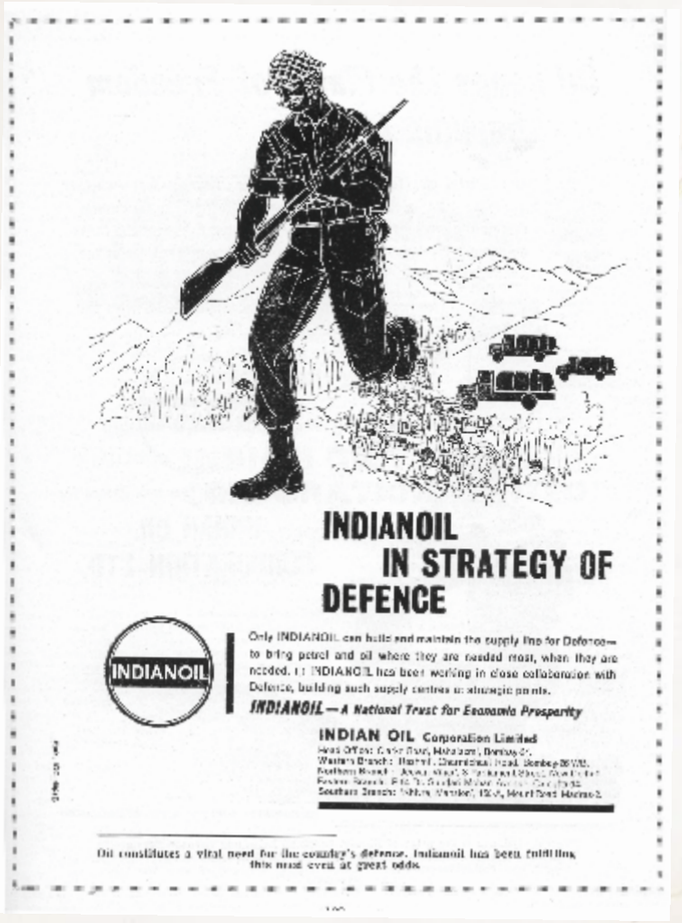
This strategy bore fruit as an Oil and Natural Gas Directorate took shape in 1955, with A.M.N. Ghosh assuming the role of its inaugural Director. M.B. Ramachandra Rao, Chief Geophysicist at the Geological Survey of India, was dispatched to Dehradun to identify a suitable headquarters for the Directorate. Amid this transformative phase, Burmah-Shell Refineries Ltd. contributed to the landscape by setting up a third refinery in Bombay, underscoring the concurrent shifts in India's oil landscape.

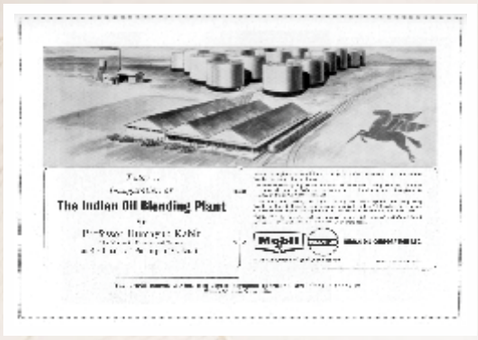
Bottom: K. D. Malviya, the father of the Indian oil industry, with a team of prominent IndianOil men.

Facing page middle left to right: Former Prime Minister Lal Bahadur Shastri and first Petroleum Minister K. D. Malviya.

Facing page bottom left to right: S. Nijalingappa, first Chairman of the IndianOil Company, and Firoze Gandhi, the first Chairman of Indian Refineries Ltd.


Oil keeps the Flame of Freedom burning bright
The strategy of defence to meet the threat on our borders—whether in sweltering jungles, snow-bound mountain ranges, sandy deserts or desolate marshes—is vitally linked with oil. Oil keeps the tanks and trucks moving, reaches arms and supplies, and maintains the lines of communication.
Working in close co-operation with Defence, INDIANOIL helps our gallant jawans to keep aloft the Nation's Flag.
INDIANOIL
A National Trust for Economic Prosperity
INDIAN OIL CORPORATION LTD.
Eternal vigilance is the price of liberty. Indianoil helps our Defence Services in keeping a constant vigil over our frontiers.


INDIANOIL IN STRATEGY OF DEFENCE
INDIANOIL
Only INDIANOIL can build and maintain the supply line for Defence—to bring petrol and oil where they are needed most, when they are needed. It INDIANOIL has been working in close collaboration with Defence, building such supply centres at strategic points.
INDIANOIL—A National Trust for Economic Prosperity
INDIAN OIL Corporation Limited
Oil constitutes a vital need for the country's defence. Indianoil has been fulfilling this need even at great odds.


The Indian Oil Blending Plant
Mobil


INDIANOIL


FIRE FIRE


INDIANOIL
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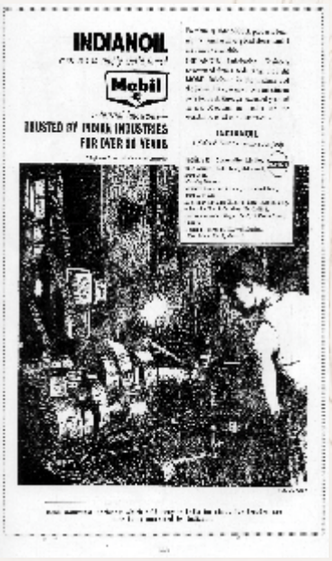
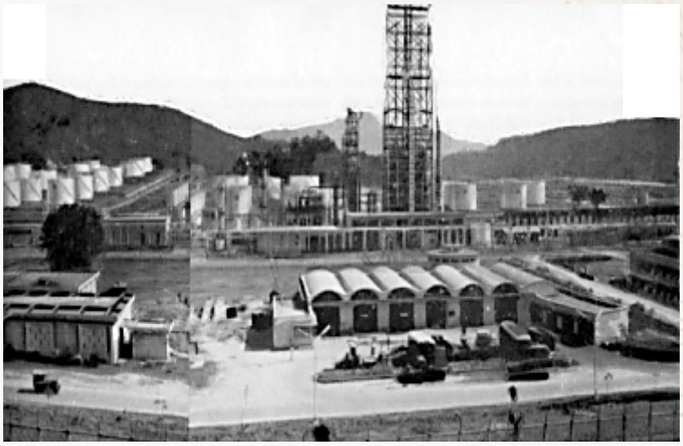
INDIAN OIL





Historical visuals and advertisements of IndianOil over the years.

Top left: Former IndianOil Chairman P. A. Gopalakrishnan signing the agreement on behalf of IndianOil Corporation with trade representatives of Romania.

Top right: An Indian delegation welcoming prominent Soviet geologist N. A. Kalanin who contributed appreciably to oil exploration in the country.

Bottom: First President of India Dr. Rajendra Prasad being received by W.P.G. Maclachlan, General Manager, AOC, and Dibeswar Sarma, MP from Assam, on the occasion of the Indian Industries Fair, New Delhi, 1955.

On a Quest for Knowledge

Soon after the establishment of the Directorate, K.D. Malviya, accompanied by A.M.N. Ghosh, H.R. Dewan, and M.B. Ramachandra Rao, embarked on a comprehensive tour of several western nations and the then USSR. Their goal was to gain first-hand insights into the functioning of the oil industry and to explore opportunities for procuring equipment, expertise, and training resources. A distinguished team of Soviet experts, led by prominent geologist N.A. Kalinin, visited India following Malviya's return. Kalinin spearheaded a five-year exploration strategy, working alongside an Indian team led by Ghosh and Ramachandra Rao. Their report highlighted India's potential exploration area of approximately one million square kilometres, harbouring prospects for 150-200 million tons of oil and one billion cubic metres of gas annually.

International collaboration further enriched India's knowledge base. Henry Carter Rea from the US and Wolfgang Schoff from West Germany studied Indian basins, concurring that significant reserves lay beyond Assam. During this period, countries like the USSR, Romania, Yugoslavia, and the US contributed to developing the necessary infrastructure for extensive exploratory endeavours.

The USSR played a seminal and key role in IndianOil's nascent years, aiding its establishment. Jawaharlal Nehru acknowledged this, stating, Oil is

T. Devherst, Senior Geological Advisor of the Burmah group of companies, Percy Evans, Chief Geologist, AOC, and Davies, BOC's Geological Advisor.

more precious than gold for India. We owe gratitude to Soviet engineers and specialists for their close collaboration, working for our country's welfare. Additionally, the USSR ensured a consistent supply of crude oil and essential products to bridge the deficit. Notably, in setting up refineries at Barauni, Koyali, and Mathura, Soviet assistance proved invaluable. It encompassed technology transfer, technical training for Indian personnel, and project execution. Indian engineers, in collaboration with their Soviet counterparts, honed expertise pivotal to founding the Central Design Organisation in Vadodara, which laid the groundwork for Engineers India Ltd.

Kalinin's report advocated exploration across all of India's sedimentary basins. He emphasised the urgent need for recruitment of geologist and geophysicists, along with comprehensive training for Indian personnel. The acquisition of equipment and drilling rigs was imperative. In 1956, the Assam Oil Company discovered the Moran oilfield in north-east India. Following the agenda, the first exploration project commenced in Jaisalmer with a budget of US $4.20 million. Malviya presented the plan to Jawaharlal Nehru, also the Chairman of the Planning Commission. Nehru and Morarji Desai promptly approved the proposal, propelling the project into action.

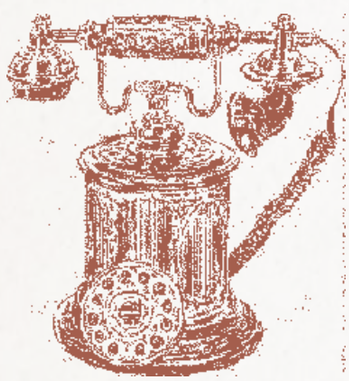
B. Arora, the first Managing Director of the IndianOil Company, opens the valve to commence the supply of the first cargo of 'red oil' from the MV Uzhgorod.

Facing page :
Certificate of change of name from IndianOil Company to IndianOil Corporation Ltd.

Exploration Dilemma

A compelling lobby, bolstered by the oil companies, contended that India's limited resources could not be squandered on expansive oil exploration. In response, the Government of India sought the insights of two eminent geologists from America and Germany to provide independent perspectives on the possibility of discovering oil and gas in India. Regrettably, they cast doubts on establishing an indigenous oil industry, citing a lack of qualified experts and deeming it a 'hasty' decision. However, such scepticism couldn't deter Kalinin, who remained resolute. He was supported firmly by the steadfast believer in Indian potential. Both of them successfully persuaded Nehru on the viability of his strategy.

With the endorsement of the New Industrial Policy Resolution in April 1956, Malviya recommended elevating the stature of the Oil and Natural Gas Directorate. The foundation for an oil exploration core team was laid. Positions were advertised through the Union Public Service Commission, and an accelerated selection process was conducted. In 1956, a pioneering group of 120 geophysicists and geologists, each equipped with an MSc degree, was appointed as apprentices, forming the inaugural technical cadre of India's oil industry. On 14 August 1956, the Oil and Natural Gas Commission was born, incorporating the Oil and Natural Gas Directorate of the Geological Survey of India. This unique entity commenced its journey without a single drop of oil, a cubic metre of gas, or even a solitary oil expert. Today's colossal institution was constructed from the ground up, nurtured by a small cohort of geoscientists. K. D. Malviya emerged as its founding Chairman and once proclaimed, 'Venturing into oil prospecting and development holds no certainties. Nonetheless, the risk is worth undertaking.' Backed by his unfaltering support, intensified exploration efforts yielded substantial results, most notably the offshore Bombay High field.



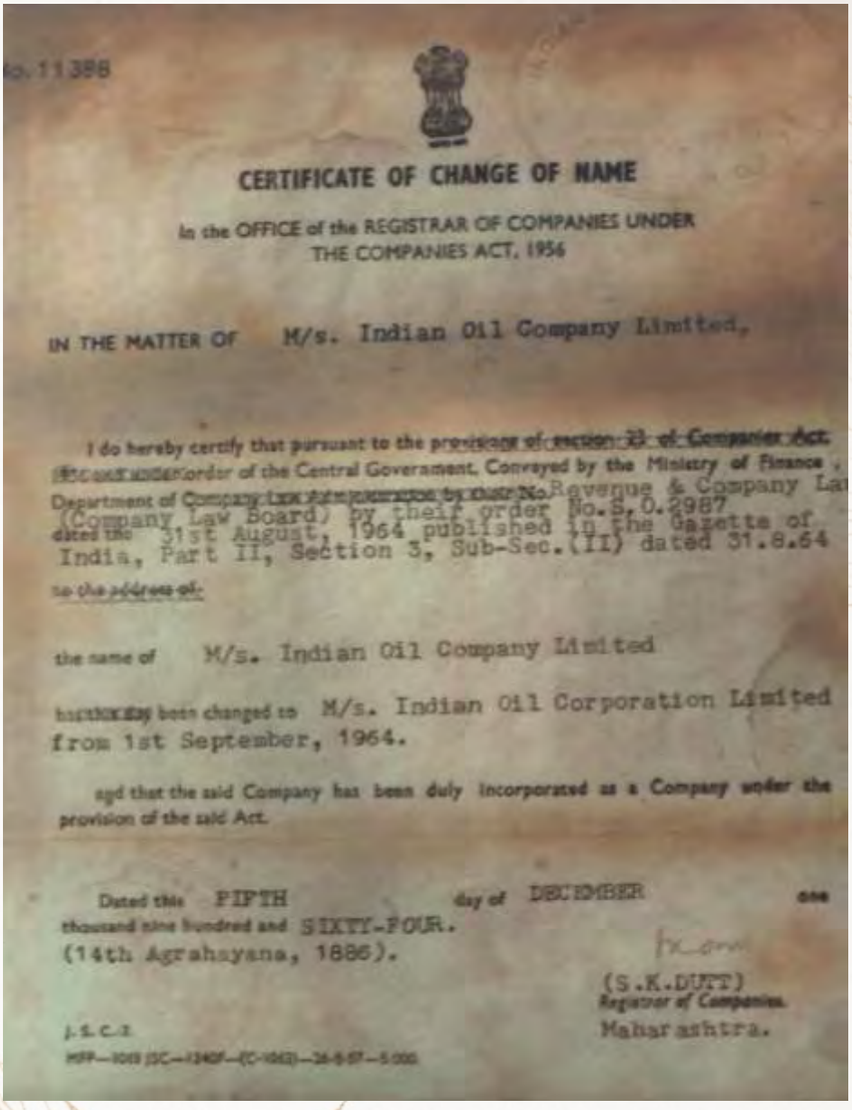
Working in the Cambay region of Gujarat, the geophysicists at the Oil and Natural Gas Corporation gathered data unveiling deep sedimentary deposits and intriguing subterranean geological formations hinting at oil and gas presence. While scepticism lingered, voiced even by a geophysicist from Standard Vacuum, a geologist from the Burmah Oil Company, and Kalinin himself, Malviya and L. P. Mathur, the Director of Geology at Oil and Natural Gas Corporation, remained steadfast in their conviction. With a rig from the USSR in place, drilling commenced. The well reached considerable depths without any signs of oil or gas. Upon a Member Technical's decision to halt drilling, L. P. Mathur chose to exercise patience.

Within two days, oil was struck at the Lunej well, defying doubts. Malviya acknowledged and fervently praised his team's triumph. His commitment to the Prime Minister's directive had been fulfilled well before the given deadline. In homage to his legacy, the Petroleum Research Institute in Dehradun was named after him.

Birth of a Star

Established as a statutory body on 30 June 1959, the IndianOil Company's inception marked a crucial moment in India's energy landscape. Its role centred on supplying oil products to state-owned enterprises. Subsequently, it undertook the responsibility of marketing products from refineries established by Indian Refineries Ltd. in Guwahati and Barauni. The refusal of foreign oil companies to refine Soviet crude led the government to secure Russian high-speed diesel and kerosene. When the first shipments arrived in Bombay in 1960, the foreign oil companies, who controlled terminal facilities, declined to receive them. In a display of ingenuity, IndianOil repurposed oil pipes from army stocks, established pipelines, and successfully received the supply. Concealed underground tanks constructed on Antop Hill during the Second World War were employed to store the oil.

By 1961, following a price battle with foreign oil companies amid increasing Soviet imports, IndianOil emerged as a dominant force in the nation's oil and gas export and import market. During this phase, retail outlets were absent, limiting sales to bulk consumers. The company persevered by offering even lower prices. Foreign oil companies faced setbacks as the government endorsed a policy granting IndianOil market supremacy, thereby securing the output share of government-owned or co-owned refineries. Foreign companies could only claim a market share proportionate to their refinery capacity. In 1960, the inaugural refinery of Indian Refineries Ltd. took shape at Noonmati near Guwahati, in collaboration with Romania. Approximately 50 young engineers underwent year-long training in Romania, grappling with intricate technology and monumental tasks. As an observer aptly noted, 'Everything, except sand and cement, was imported from Romania, even down to the manholes.' In 1964, a significant milestone transpired as IndianOil Corporation Ltd. was formed after merging with Indian Refineries Ltd., which had been established in 1958. Originally incorporated as IOCL in 1964, the government proclaimed that all forthcoming refinery collaborations would mandate product distribution through IndianOil. The historic merger received praise from Prof. Humayun Kabir, then Union Minister for Petroleum and Chemicals. Heexpressed hope that IndianOil would eventually manage half of India's petroleum product trade—a hope that remarkably materialised within a mere five years.



CERTIFICATE OF CHANGE OF NAME

In the OFFICE of the REGISTRAR OF COMPANIES UNDER THE COMPANIES ACT, 1956

IN THE MATTER OF M/s. Indian Oil Company Limited,

I do hereby certify that pursuant to the provisions of section 23 of Companies Act, 1956 and under order of the Central Government, Conveyed by the Ministry of Finance, Department of Company Law Administration by their No. Revenue & Company Law (Company Law Board) by their order No.S.O.2987 dated the 21st August, 1964 published in the Gazette of India, Part II, Section 3, Sub-Sec.(II) dated 31.8.64 to the address of:

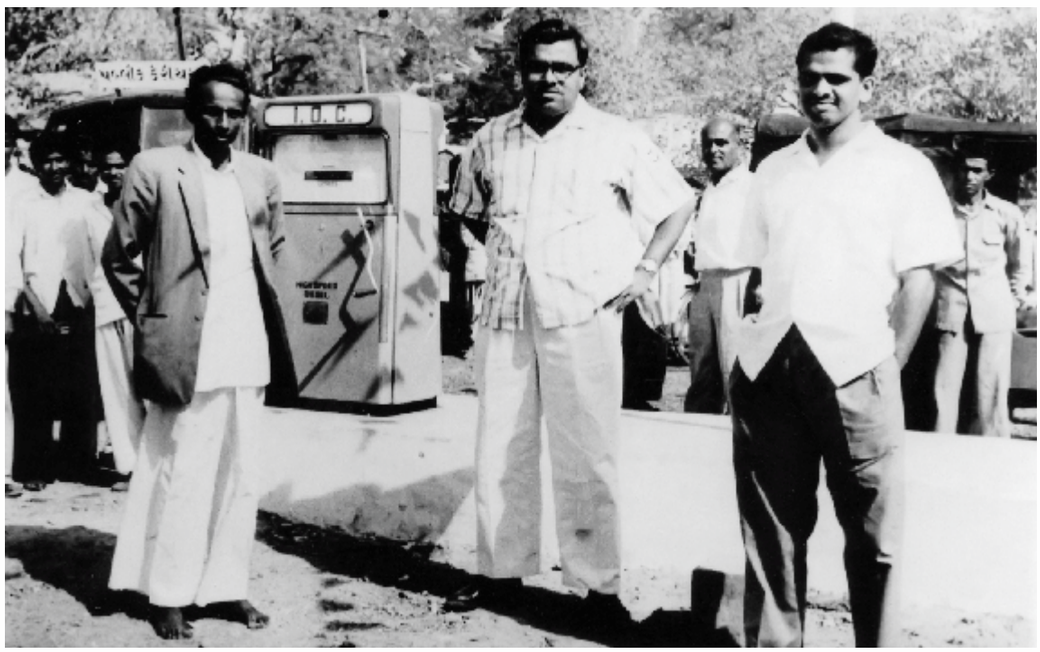
the name of M/s. Indian Oil Company Limited

has been changed to M/s. Indian Oil Corporation Limited from 1st September, 1964.

and that the said Company has been duly incorporated as a Company under the provision of the said Act.

Dated this FIFTH day of DECEMBER one thousand nine hundred and SIXTY-FOUR. (14th Agrahayana, 1886).

(S.K.DUTT)
Registrar of Companies,
Maharashtra.


I.O.C.

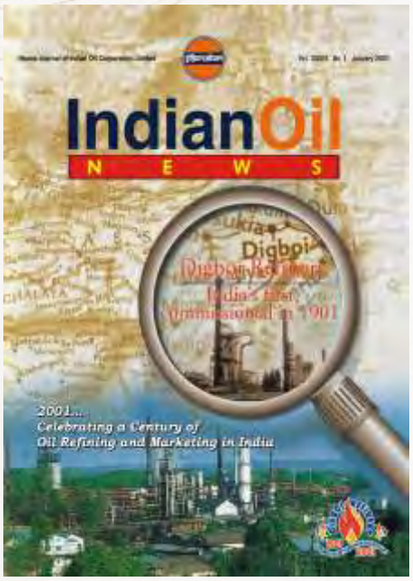
The first IndianOil retail outlet in Anjar, Gujarat and its modern avatar today.

Left top: A stamp released by the Government of India on the occasion of completion of 100 years of the Digboi Refinery.

Left bottom: *IndianOil News* is a popular house journal among IOCians.

Right top: M. Ramabrahmam, General Manager, Guwahati Refinery, explaining to the first Prime Minister of India, Pandit Jawaharlal Nehru, the panels of the control room.

Right bottom: Prime Minister Pandit Jawaharlal Nehru, who inaugurated the Guwahati Refinery, went round the crude distillation unit accompanied by the refinery officials.

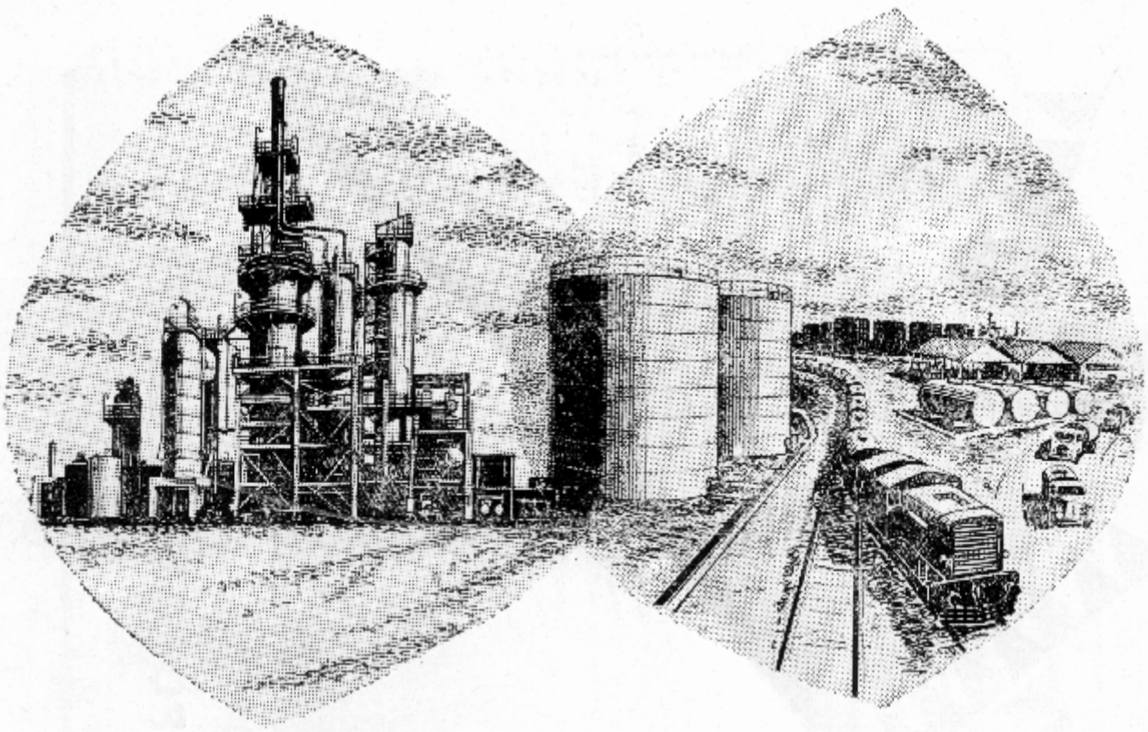


A Symbol of Resurgent India

Each year, 1 September is celebrated as IndianOil Day—a tribute to the enduring legacy and transformative impact of the company. Former Prime Minister of India, Lal Bahadur Shastri, observed in 1965, 'IndianOil is more than a mere venture; it embodies the spirit of a renewed and resurgent India. The oil industry holds boundless opportunities for expansion within the nation, demanding a combination of vigour and innovative thinking to navigate the challenges that accompany rapid growth in such a specialised domain.' During this transformative phase, IndianOil orchestrated the establishment of seven principal port installations, three significant inland installations, and a network of 91 upcountry depots. A landmark milestone was the inauguration of its hundredth depot in Jalgaon, Maharashtra, in 1965.

An iconic achievement of this era was the construction of the first petroleum product pipeline east of the Suez Canal. This remarkable feat, realised between 1961 and 1964, was a collaborative effort between Indian Refineries Ltd., Snam and Saipem of Italy, with technical expertise provided by Bechtel-USA. The pipeline facilitated the efficient transportation of products from the Guwahati Refinery to IndianOil Corporation's inaugural inland bulk storage terminal at Siliguri. This pivotal venture came up in 1964.

A milestone in IndianOil's journey was the strategic partnership formed with Mobil, USA, to initiate lubricant manufacturing in September 1964. This partnership led to the establishment of IndianOil Blending Ltd., with facilities located in Mumbai and Kolkata. Within a decade, this joint venture blossomed into the largest entity of its kind within India, standing as a testament to collaboration and innovation. The journey of IndianOil serves as a symbol of India's renaissance—a transformation driven by dedicated efforts, audacious vision, and a commitment to excellence.



Indian Refineries Ltd. merge with Indian Oil Co. Ltd.

to form INDIAN OIL CORPORATION LIMITED

The Indian Refineries Limited and Indian Oil Company Limited have merged to form the Indian Oil Corporation Limited. With an authorised capital of Rs. 75 crores, the Corporation will rank among the 10 biggest companies of the country, judged from the capital investment.

The Corporation has two divisions — Refineries Division and Marketing Division. The Refineries Division will manage the public sector refineries and the Marketing Division will distribute not only the entire production of public sector refineries but also the deficit products imported from abroad. Spurred by the increased tempo of industrialisation, mechanisation and growing defence requirements, India's demand for petroleum products is bound to grow and INDIANOIL will contribute its share towards meeting the nation's needs.

The Corporation will ensure that only such quantities and qualities of products as preferred by the market would be produced by the refineries. Better co-ordination and greater efficiency will result in economical operation and better service to consumers.

INDIANOIL — A National Trust For Economic Prosperity

INDIANOIL

Indian Oil Corporation Limited

Marketing Division:
Clarke Road, Mahalaxmi, Bombay-34.

Refineries Division:
Link House, Mathura Road, New Delhi.

mas. ICC. 42678

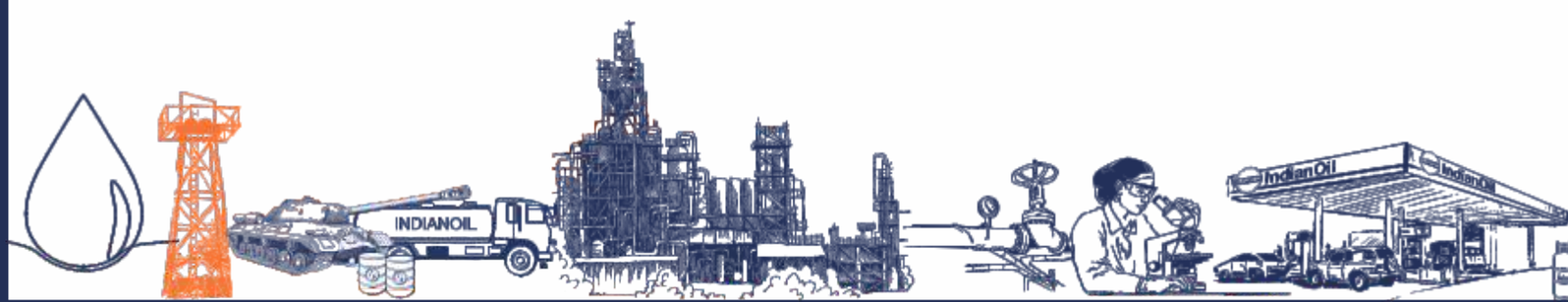
Refining and marketing of petroleum products in public sector have been brought under one roof in September 1964 towards better co-ordination and greater efficiency.

ELEPHANTS' TALE

Elephants hold a significant place in Indian culture and the Hindu religion, largely due to the reverence bestowed upon Lord Ganesh, the elephant-headed deity riding atop a diminutive mouse. In Hinduism, several animals, including elephants, are considered sacred, and the religion strictly forbids their harm—even when they inadvertently cause disruption to people and property. According to Hindu scholars, each element of the Ganesh deity carries symbolic meaning. His head signifies wisdom and knowledge, his large ears bestow the gift of attentive listening, and his small eyes can perceive truth and foresee the future. With his long trunk, he can discern between good and evil, while his ample belly symbolises the ability to digest life's dualities. Worshipping Lord Ganesh is believed to surmount all obstacles. Hindus often invoke his blessings at the outset of pilgrimages, ventures, and new undertakings.

Inextricably woven into Assam's oil industry is the narrative of elephants. Historical accounts celebrate the decisive role played by these majestic creatures—often referred to as 'employee' elephants—in the socio-economic evolution of the region. Engineers, contracted by the Assam Railways and Trading Company in the early twentieth century, harnessed elephants to haul tracks through the dense, swampy forests of north-eastern Assam. Amidst their toil, they discovered an elephant's foot stained with oil. Following these oily footprints, they uncovered oil seeping from the forest floor. W. L. Lake, one of the engineers, cried out "dig, boy, dig" as he witnessed elephants emerge from the forest with oil-laden feet. With assembled equipment, boilers, local labourers, and the help of elephants, Lake embarked on the journey of oil exploration. Initially, these gentle giants were instrumental in laying railway tracks through the jungle and replacing cranes. They eased the labour of hauling materials and goods to and from the site.

Assam's landscape frequently hosted elephants that found roles in various aspects of the oil industry. These creatures aided in tasks such as rolling logs and positioning mud and oil tanks. In the Margherita region of Assam, elephants were particularly abundant, their services widely engaged by the timber industry. Timber products were transported using barrels secured to the elephants' backs or floated on rafts down rapid rivers. Even the construction of new refineries owed their progress to the industrious efforts of an army of labourers and trained elephants.



From olden days elephants have played a significant role in laying railway tracks of Assam Railway & Trading Company. Later elephants were hired on the payroll by the oil industry for heavy labour.

These intelligent beings also shouldered the responsibilities of carrying provisions and supplies for traders and contractors.

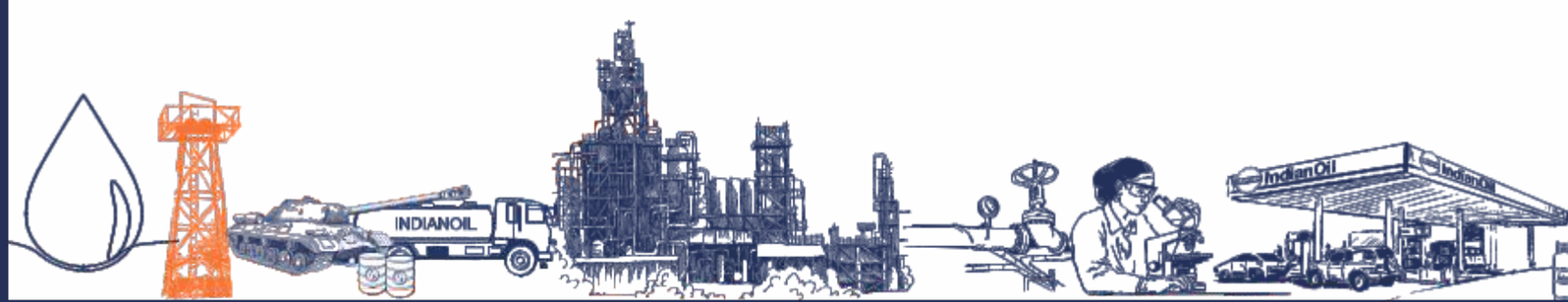
A captivating anecdote showcases how an oil industry senior field chemist owned a baby elephant named Heera, delighting children and the local milkman. This joy came with a cost, as the annual royalty fee of Rs. 1,100 to the Assam Government offset the happiness. Elephants were treasured assets in the Assam oil industry, evident in the intriguing contrast of a general manager's car being sold for Rs. 25, while a baby elephant commanded Rs. 800 a month later. The connection between elephants and the industry endured, with elephants even becoming part of the Assam Oil Division of IndianOil's work-force. Notably, Roopkali, a valiant elephant 'employee', was known for her indomitable courage and spirit.

Just 60 kilometres from Digboi lies the expansive Dibru Saikhowa Wildlife Sanctuary, which boasts diverse fauna including Royal Bengal tigers, cheetahs, Indian elephants, and an array of bird species. In the past, the British established their living quarters in Digboi to oversee the oil company. Today, elephants from the sanctuary occasionally grace Digboi with their presence, underlining the deep connection between these magnificent creatures and the town that laid the very foundation of India's oil industry.

A TRIP DOWN MEMORY LANE

Nestled in the iconic oil town of Assam, the Digboi Centenary Museum stands as a unique testament to history, both within India and abroad. Adjacent to the historic Digboi Refinery and the oldest operational oil well worldwide—the museum embodies the essence of a bygone era. Founded by the Assam oil industry as a tribute to Digboi Well No.1's centenary, the museum is a glimpse into Digboi's origins amidst the lush rainforests and marshy jungles of Assam. Within the museum's walls lies a treasure trove of Indian memorabilia. Preserved oil machinery, pumps, power station equipment, and relics from yesteryear's refineries and oilfields unveil the industry's evolution. Striking wall panels chronicle India's oil refining history, while a vast photo gallery showcases Digboi's global significance across diverse domains. This repository of time embraces Digboi's exceptional past, immortalising its golden legacy.

The century old Digboi Refinery's still, the equipment used for oil refining at the time.



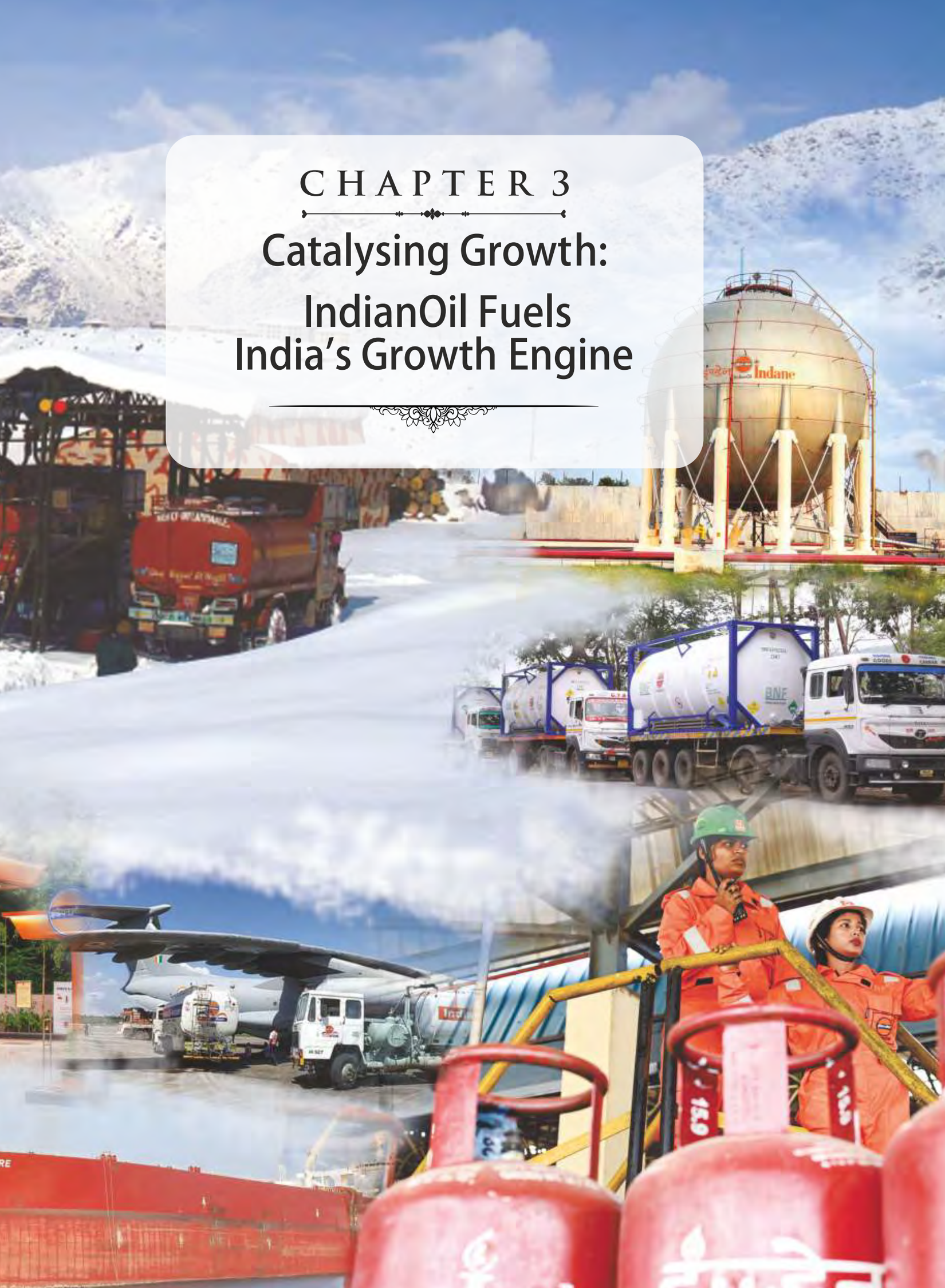
The museum is more than just artifacts—it is a tribute to the tireless oilmen who pioneered India's petroleum industry. Their unwavering determination in the face of adversity propelled them to success. The exhibits capture the oilmen's grit and spirit, who flourished under daunting circumstances. The museum also serves as a repository of knowledge, housing literature on Assam's oil production history, oil and natural gas facts, and the evolution of India's modern oil industry through rare photographs and historic machinery.

Immersive outdoor displays transport visitors to bygone eras. Inside, intricate models of Digboi Refinery's process units bring its operations to life. Notable among them is the multi-purpose lathe, recovered from the River Tarap on the Stilwell Road in Arunachal Pradesh. Witness to two world wars, this refinery emerged resilient even as it faced destruction to deter Japanese forces during the conflicts.

The open area of the museum boasts striking visuals of petroleum pipelines from India to China during the Second World War. Constructed by the Allied Forces, these pipelines spanned 928 miles, transporting fuel from Assam to China via the Stilwell Road. Pivotal during times of conflict, the refinery facilitated the movement of materials and soldiers through treacherous terrains. It bore witness to the exodus of Burmese refugees to India and the Chinese aggression, steadfast in its service to humanity.

The first rig of Digboi Refinery at the Digboi Centenary Museum.

Imagination meets reality in the Digboi Museum. A meticulously recreated office scene mirrors a bygone era, while a captivating mural immortalises the 1939 Assam Oil Company labour union strike. The museum's displays extend to early fire service equipment, uniforms, badges, and more from the Digboi Refinery's service staff. The Digboi Centenary Museum stands as a symbol of excellence, a homage to the Indian oil industry's remarkable journey through time. It mirrors the industry's unwavering commitment to progress and carries forward the spirit of those incredible oilmen whose legacy is etched into its every corner.



CHAPTER 3

Catalysing Growth: IndianOil Fuels India's Growth Engine

INDIAN OIL COMPANY LIMITED
(A Government of India Undertaking)

+

Indian Refinery Ltd.

IndianOil

The logos of the IndianOil Company Ltd. and Indian Refinery Ltd. before merger and the logo of IndianOil after merger.

In the echelons of the global energy sector, IndianOil stands tall—an emblem of excellence and the largest exporter of prestigious super brands. A testament built over six decades of experience, its story is not just that of a business entity, but an enduring Indian institution. It embodies a steady and firm commitment to quality, humanitarian values, and the power to transform. IndianOil isn't merely a corporation; it's a diversified, integrated energy powerhouse with a presence spanning oil, gas, petrochemicals, and alternative energy sources. True freedom emerges when barriers shatter, monopolies crumble, and mentalities transform. This pursuit of liberation from foreign oil monopolies was initiated in June 1959 with the birth of the IndianOil Company. A precursor, Indian Refineries Ltd., kindled the drive for self-sufficiency in petroleum refining when it was established in August 1958. The historic union of Indian Refineries Ltd. and the IndianOil Company on 1 September 1964 marked the birth of IndianOil Corporation Ltd.—a strategic move to enhance efficiency and counter the challenges posed by oil multinationals. IndianOil Day, observed on 1 September, honours the pioneers who laid the bedrock of this energy giant.

IndianOil's foundation was laid with meticulous care, sustained dedication, and unwavering efforts of its workforce. Driven by a sense of national duty, employees spared no toil in ensuring the fulfilment of vital needs. An official from the Ministry of Petroleum and Chemicals attested, "Their tireless dedication stemmed from knowing that their efforts were serving the nation. When the company thrives, the country prospers. They understood the profound impact of their service, securing a brighter future for their children with every contribution that expanded IndianOil's reach." The year 1973 marked two pivotal events — the OPEC embargo stemming from the Yom Kippur war and K. D. Malviya's return as Minister of Oil. As the embargo sent prices soaring due to Arab oil exports freeze, Malviya orchestrated the capitulation of multinational oil cartels in India. With his unwavering determination, he compelled them to engage in negotiations for nationalisation. On the IndianOil front, August 1973 witnessed the laying of the Mathura Refinery's foundation stone, alongside the approval of an expansion scheme for the Gujarat Refinery. IndianOil's journey embodies not just corporate growth, but a nation's progress. It's a narrative of forging ahead while upholding values, navigating challenges, and shaping the destiny of India's energy landscape.

Symbol of Economic Prosperity

The epic narrative of IndianOil, replete with its diverse characters, its ebbs and flows, its victories and setbacks, stands as a microcosm of the broader tale of oil and gas, both in our nation and across the globe. The company has embraced a profound truth: oil is more than a mere commodity — it's a way of life. This realisation fuels IndianOil's belief that sustainable growth hinges on the synergy of shareholders, workforce, labour and government. A beacon of economic prosperity, IndianOil has not only set the bar for ethics and values but has also become a harbinger of innovation.

Driven by an indefatigable desire to excel, its employees propel innovation, research, creativity, and frontier technology. The company forges enduring bonds with its customers, delivering prompt, gracious, and efficient service, coupled with top-notch products at competitive prices. It treats suppliers with equal respect — ensuring transactions are characterised by integrity, impartiality, and courtesy.

IndianOil's focus on nurturing its workforce's capabilities is evident in its commitment to training, career development and fostering healthy industrial relations. With an eye on the environment and community, the company consistently pioneers the development of techno-economically viable and eco-friendly products. Safety and occupational health are non-negotiable standards across all production units. This dedication to excellence, underpinned by innovation, passion, and trust, serves the greater good of humanity.

In the hearts of IndianOil employees beats an intrinsic pride — the pride of contributing to the organisation's mission to become the 'Energy of India.' This collective aspiration propels them to achieve greatness, both individually and as a cohesive unit. Their core values are not just words; they've been seamlessly woven into the fabric of the organisation's culture, forming the bedrock of sustained growth. IndianOil is an ever-evolving entity, ceaselessly working towards the betterment of the nation and the greater good of humankind.

Top and bottom: IndianOil's vision of being the 'Energy of India' motivates IOCians to excel. Their values are aligned with the organisation's culture which has laid the foundation for sustained growth. IndianOil's story is one of constant change and evolution for the betterment of the country.

Engineers of IndianOil overseeing the operational process. Teamwork is an integral part of the core values of IOCians which include care, innovation, passion and trust. These values have been nurtured over decades.

Unique Corporate Culture

IndianOil stands distinguished for its unparalleled corporate culture, a dynamic governance structure that is instrumental in driving its remarkable economic performance. The foundation of this culture, carefully cultivated by the human resource team, is firmly rooted in the belief that teamwork and motivation, grounded in fairness, are the cornerstones of triumph in the business world. These values, honed over decades, find their essence in Care, Innovation, Passion, and Trust.

At the heart of this corporate ethos lies a commitment to efficient business operations, fierce competitiveness and the generation of profits substantial enough not only for reinvestment but also for equitable returns to the diverse stakeholders. Moreover, IndianOil is steadfast in its dedication to support cultural, educational, and welfare initiatives throughout the nation. This commitment reverberates in the company's core value of Care, which extends to both fiscal and human dimensions of employees' well-being.

The fabric of IndianOil's culture is intricately woven, entwining the principles of product quality, productivity, a robust marketing network, customer satisfaction, and the optimal utilisation of resources—both human and material. Anchored in the overarching concept of community welfare, this corporate culture is a testament to the management's commitment to not only the growth of the company but also to the upliftment of society at large.

Core Values at Heart

In its quest to explore new horizons and infuse contemporary dynamism into its workforce, the company is armed with cutting-edge global technologies, innovative research and development. Boasting the title of India's largest operator, IndianOil commands a fleet of 10 state-of-the-art refineries with a collective refining capacity of approximately 1.6 million barrels per day. As a Maharatna integrated oil corporation, IndianOil is firm in its commitment to drive the resurgence of the Indian economy and contribute to the nation's digital socio-economic advancement. The company's unwavering pursuit of excellence has garnered it numerous awards and accolades, inspiring it to scale new heights of achievement each day. As it propels the nation's growth, IndianOil places at a premium its core values of care, innovation, passion, and trust at the forefront of its operations. These values serve as pivotal drivers in expanding its business and establishing itself as the preferred energy company of the nation. Its journey is

marked by an illustrious lineage of corporate milestones, solidifying its position as an entity endowed with an unparalleled network of physical assets. In a remarkable feat, IndianOil Corporation Ltd. (IOCL) secured a place on the global 500 list of the world's most valuable and resilient brands across sectors for the year 2020. Released at the World Economic Forum in Davos by Brand Finance, a renowned independent brand valuation consultancy, this prestigious list featured only 11 Indian brands, with IndianOil being the sole representative from the oil and gas sector. According to the Brand Finance Report in 2022, the brand's value was estimated at a staggering US $5.1 billion.

IndianOil's business interests span the entire hydrocarbon value chain, encompassing operations such as refining, pipeline transportation, and marketing of petroleum products, as well as exploration and production of crude oil and gas, marketing of natural gas and petrochemicals. The company has also ventured into alternative energy and globalised its downstream activities by integrating core refining with petrochemical endeavours. Notably, it has made significant investments in exploration, production import and marketing ventures for oil and gas both domestically and abroad. A historic moment arrived with the inaugural Values Day on 30 June 2023, as IndianOil introduced its fifth core value.

This significant milestone marked the culmination of Project Sattva, an extensive initiative aimed at delving into IndianOil's ethos and identifying the distinctive value that sets it apart in the corporate landscape. Project Sattva is a testament to the collective wisdom of the IndianOil family, engaging thousands of IOCians in a reflective endeavour to reinvigorate and redefine the core values that underpin the corporation's success. The unveiling of the fifth core value, 'Nation First,' was a defining juncture that encapsulated IndianOil's unwavering dedication to the nation. This value echoes the essence of IndianOil, which has consistently prioritised national interests above all else. From its inception, the company has been guided by the principle of 'Nation First,' a doctrine that has steered its endeavours, from ensuring energy security to propelling India's energy transformation journey. In addition to the introduction of 'Nation First,' Values Day provided an occasion to reassess and reaffirm IndianOil's existing core values of Care, Innovation, Passion, and Trust. These deeply ingrained values, interwoven into the corporation's DNA, were reinterpreted to align with contemporary challenges and future aspirations.

IndianOil Petroleum Management Institute at Gurugram, an apex learning and development institute that aims to create a strong pool of knowledge managers to lead Indian energy companies. IIPM has grown from strength to strength and helped IndianOil to develop the leadership required to steer it to the future with clarity, confidence and courage. IIPM's business management programmes are benchmarked to global standards.

Following spread left:
IndianOil's vision statement.

Following spread right:
IndianOil's Vision Value Tree.

VISION

Ethics

Setting high standards for ethics and values

Customers

Fostering relationships for a lifetime

People

Leading with passion to excel

Technology

Harnessing frontier technology

Innovation

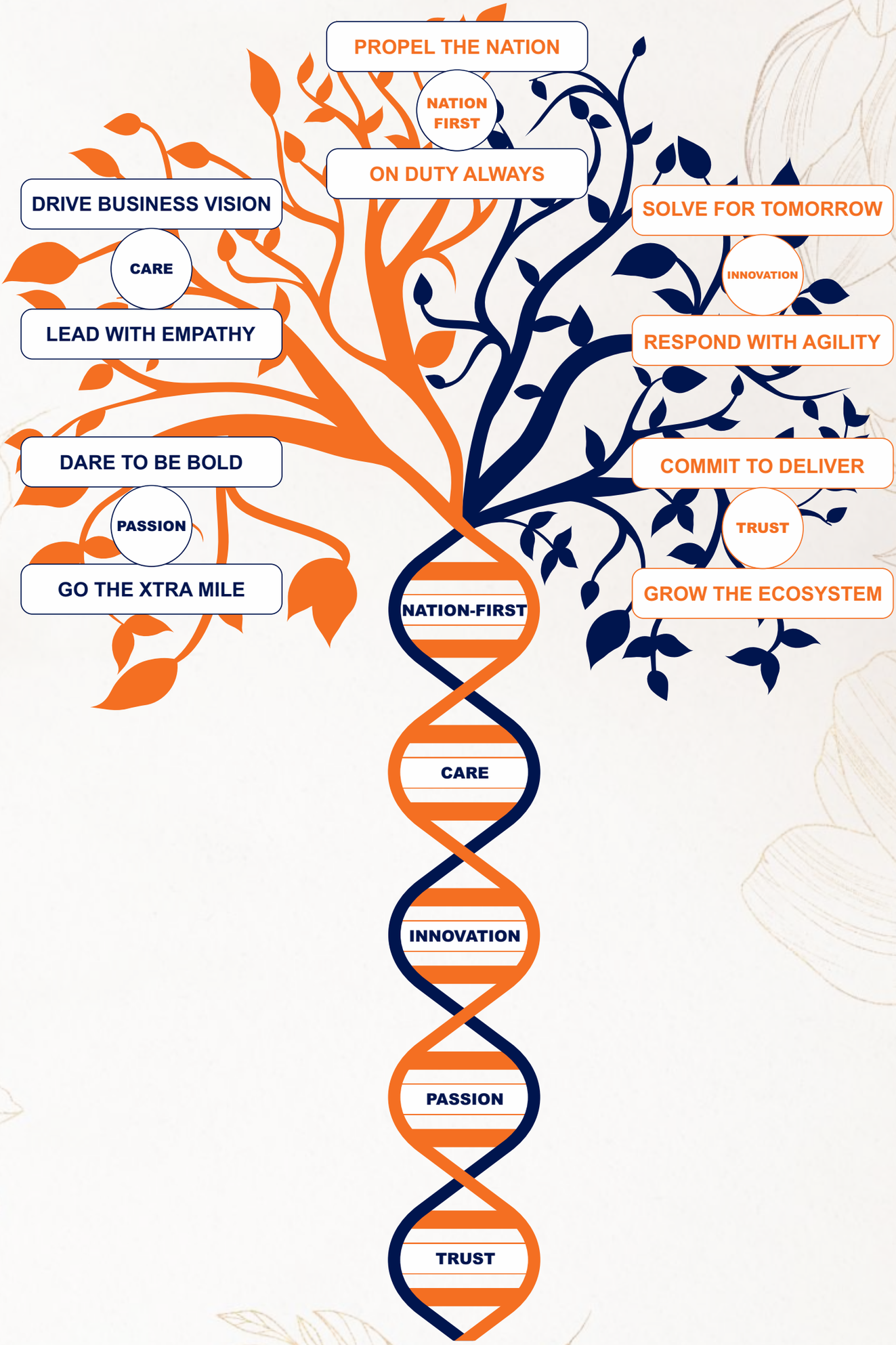
Pioneering the spirit of creativity and research

Environment

Caring for the environment and community

VALUES

Nation First • Care • Innovation • Passion • Trust


PROPEL THE NATION
NATION FIRST
ON DUTY ALWAYS
DRIVE BUSINESS VISION
CARE
LEAD WITH EMPATHY
DARE TO BE BOLD
PASSION
GO THE XTRA MILE
SOLVE FOR TOMORROW
INNOVATION
RESPOND WITH AGILITY
COMMIT TO DELIVER
TRUST
GROW THE ECOSYSTEM
NATION-FIRST
CARE
INNOVATION
PASSION
TRUST

IndianOil Board launching the 1 Trillion Dollar target for 2047.

IndianOil's Trillion-Dollar Journey: Steering India Towards Global Eminence

As India approaches its centennial celebration of independence, a grand vision unfolds, marking the dawn of a new era filled with promise and global recognition. This period signifies a pivotal chapter for IndianOil, where the magnitude of its responsibilities expands, and its ambitions reach new heights. The announcement of a transformative endeavour by IndianOil's leadership sets the stage for a journey that promises to redefine the company's path and make a substantial contribution to India's economic resurgence.

With a declaration filled with pride, the leadership of IndianOil has set forth an audacious goal for the company to ascend to the ranks of a 'One Trillion Dollar Giant by 2047.' This vision is a call to action that echoes with the aspirations of the nation, compelling IndianOil to architect the future envisioned for India.

The pursuit of this monumental milestone is in harmony with India's ambitious plan to evolve into an economy surpassing US$ 30 trillion by 2047. IndianOil's projected contribution, accounting for over 3% of the national GDP, highlights its critical role in driving India's economic growth. Achieving such a feat would not only place IndianOil among the global elite but also underscore its commitment to excellence and innovation.

With global energy demands on the rise, and India's primary energy consumption expected to double by 2050, IndianOil positions itself at the vanguard of this shift. The company's strategy encompasses a comprehensive transformation into a diversified energy powerhouse, aimed at supplying 12.5% of India's future energy needs, an increase from its current share of 9%.

This visionary goal embodies a pledge to the nation, a promise to leverage collective strength, creativity, and unwavering commitment to forge a future that not only propels IndianOil to new heights but also positions India at the forefront of economic prosperity and global esteem. United in this bold journey, the team at IndianOil is prepared to face challenges head-on, innovate, and push boundaries, thereby inscribing their indelible mark on India's illustrious path on the global stage.

Pioneering Self-Reliance in the Energy Sector

In the grand narrative of India's ambitious stride towards self-reliance, IndianOil stands as a cornerstone, merging the streams of innovation, sustainability, and technological advancement. This saga, rich with endeavours that span the spectrum of energy needs, illustrates IndianOil's pivotal contributions to Aatmanirbhar Bharat, each chapter a testament to its pioneering spirit.

The STORM Revolution in Global Motorsports

IndianOil's venture into the electrifying world of international motorsports through its partnership with the Federation Internationale De Motocyclisme for the Asia Road Racing Championship is a narrative of bold ambition and strategic innovation. The introduction of 'STORM-Ultimate Racing Fuel', distilled in the technological crucibles of IndianOil's Gujarat refinery, represents not merely a product but a symbol of India's burgeoning prowess on the global stage. This specialized fuel, tailored for the high-octane demands of racing circuits, stands as a beacon of IndianOil's commitment to excellence, driving home the strength of the 'Make in India' and 'Make for World' initiative. As 'STORM' fuels the pulsating heart of motorsports, it transcends its physical form to become a narrative of India's indomitable spirit in the realm of international competition, marrying innovation with the relentless pursuit of perfection.

IndianOil partnered with FIM Asia Road Racing Championship (ARRC) as the 'Official Fuel Partner' for 3 years.

IndianOil launched India's 1st ever Reference Fuel for Petrol and Diesel across multiple grades.

Reference Fuels: A Symbol of Perfection

In the dynamic landscape of India's energy sector, IndianOil has embarked on a groundbreaking journey, marking its foray into the production of Reference Gasoline and Diesel Fuels. This pioneering initiative, set within the sprawling complexes of its Paradip and Panipat refineries, represents a significant leap towards bolstering the nation's self-reliance and technological autonomy. With this stride, IndianOil not only underscores its commitment to the Make in India mission but also aligns seamlessly with the vision of Aatmanirbhar Bharat envisaged by the Hon'ble Prime Minister.

The inception of Reference Fuel production in India heralds a new era of indigenous innovation and expertise. These fuels, crucial for the calibration and testing by automobile manufacturers and testing agencies, are now being developed in line with stringent international standards, showcasing IndianOil's prowess and dedication.

The Green Revolution: Pioneering with ETHANOL 100

The launch of ETHANOL 100 by IndianOil is a watershed moment in India's journey towards sustainable energy solutions. The launch of ETHANOL 100 by IndianOil is a testament to India's commitment to sustainable and clean energy. This revolutionary fuel aligns with the vision of transforming 'Annadatas' (food providers) into 'Urjadatas' (energy providers), highlighting the government's efforts in boosting the agricultural sector and reducing import dependency. ETHANOL 100 stands as a symbol of India's stride towards greener alternatives, showcasing IndianOil's role in fostering a sustainable future. By offering a cleaner, greener fuel option, IndianOil not only contributes to reducing the carbon footprint but also champions the cause of sustainable mobility, thereby steering the nation towards a future where sustainability and self-reliance walk hand in hand.

ETHANOL 100 has been launched by IndianOil at 183 outlets across India and will be extended to more fuel outlets soon.

Elevating India's Skies: The Aviation Gasoline Endeavor

IndianOil has marked a significant milestone in the aviation sector with its foray into the production of aviation gasoline, a high-octane fuel designed to meet the rigorous performance and quality standards required by piston-engine aircraft, predominantly used in flying schools across the country. This strategic move not only caters to the domestic needs of around 35 flying schools but also sets the stage for India to enhance its defence preparedness, especially considering the rising utilization of Unmanned Aerial Vehicles (UAVs) in modern warfare scenarios globally. The commencement of aviation gasoline production at IndianOil's Vadodara facility in September 2022 heralded a new era for India's aviation industry, transitioning from reliance on European imports to self-sufficiency in this critical fuel. As the sole producer of aviation gasoline in India, IndianOil has not only fortified the nation's aviation fuel supply chain but also showcased its capability to meet and exceed international quality standards, with the Directorate General of Civil Aviation (DGCA) certifying the fuel for use.

Top, bottom left and bottom right: For IOCians in every nook and corner of the country 'Nation First' is the abiding motto as exemplified by their heroic feats in the face of daunting challenges and adversity. Victims of natural calamities such as earthquakes, floods and cyclones have always received a helping hand from IndianOil which has never failed to rise to the occasion.

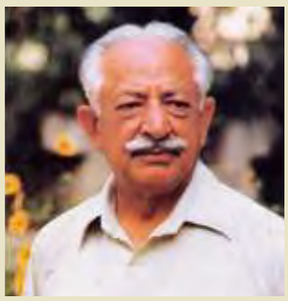
Nation First: A Priority

IndianOil stands as an epitome of the public sector, with the principle of 'Nation First' deeply embedded in the very fabric of its workforce. The motto "Pehle Indian Phir Oil" (First Indian, Then Oil) is brought to life by the heroic endeavours of IndianOil employees, who confront daunting challenges and adversity with unwavering determination. In the face of natural calamities such as earthquakes, floods, and cyclones, the company consistently extends a helping hand to the afflicted, embodying its commitment to societal welfare. It has resolutely supplied petroleum without interruption to the defence forces during times of both conflict and peace, overcoming harsh terrains and extreme weather conditions to support the guardians of the nation.

From its inception, the company has aligned its corporate strategies with the greater good of the nation and its citizens. Leveraging its robust presence in various segments of the downstream hydrocarbons industry, it ardently executes the government's developmental initiatives. Through vertical integration, oil exploration, petrochemicals, diversification, green gas, and fuel marketing, IndianOil has witnessed exponential growth.

As it generates wealth and value, fosters employment and entrepreneurship, the company simultaneously ushers in new capacities and opportunities within the oil and gas sector. With sustained support from its expansive retail marketing network, stakeholders, vendors, suppliers, and service providers, it has remained steadfast in its commitment to its origins

First Sales Manager



On his retirement in 1963, Brigadier Raja Inder Nath Luthra, IndianOil's inaugural Sales Manager, earned recognition as a "soldier-salesman" who vigilantly led the Sales department for three years. Reflecting on his journey, Brig. Luthra shared his insights during an interview with A.M. Prabhakar, Manager (PR) of the Northern Region, who visited him at his residence in Defence Colony, New Delhi. He fondly recounted the nascent days of IndianOil, revealing that when he joined in 1960, the company merely existed on paper. He recounted the challenges the company faced at the time, highlighting the scarcity of manpower and resources.

He recollected, "The first consignment of High-Speed Diesel (HSD) was en route. While we possessed a few storage tanks at Antop Hill in Bombay, originally discarded by the Army, we lacked the means to offload the tankers into the storage tanks. Yet, through resourcefulness, a military principle, we managed the task." Brig. Luthra elaborated, "But then came the dilemma of what to do with it? With no established market or retail outlets, and lacking bulk customers, we faced uncertainty. Learning that another tanker carrying kerosene was headed to Bombay, we employed improvisation once more. We transferred HSD from Wadala to Cochin after acquiring an army oil installation there, thereby making room for kerosene."

When queried about the dynamics of selling petroleum products during that era, Brig. Luthra remarked, "It was a buyers' market. We encountered fierce competition from international oil cartels, whose substantial resources and embellished salesmanship posed significant challenges. Our offerings were limited to HSD, Kerosene, Furnace Oil, and Light Diesel Oil." He recounted the scepticism that surrounded IndianOil's viability, even quoting the General Manager of Northern Railways who expressed doubt regarding the company's survival. Despite such scepticism, Brig. Luthra took up the challenging role at the behest of K. D. Malviya, the Union Minister for Natural Resources at the time. It was under these circumstances that he embarked on his impactful journey with IndianOil.

as a public sector enterprise. Economic considerations have never superseded its core ethos. Guided by the philosophy of 'country-before-business,' its vision encompasses building an incredibly competitive enterprise that contributes equally to the realms of people, planet, and profits. Throughout the years, IndianOil has crafted innovative business models and invested judiciously to construct strategic national assets in line with the spirit of 'Atmanirbhar Bharat' (Self-reliant India).

Its endeavours are harmoniously aligned with the nation's 'Make in India' and 'Digital India' initiatives. Rapidly establishing a portfolio of world-class Indian brands, IndianOil's accomplishments in a short span underscore its consumer-centric approach, agility, innovative prowess, and adeptness at digital transformation.

A team of IOCians in the control room performing their duty with care and caution. Their efforts and dedication are leading the company to perform to its optimum potential through digital transformation technology.

Top left, middle and right: During war and peacetime, IndianOil has always stood at the forefront. It provides uninterrupted fuel supply even while traversing inhospitable terrain and braving extreme weather conditions to reach the customer's doorstep.

Bottom: During the second wave of the Covid-19 pandemic, IndianOil went beyond its usual business imperatives by providing medical oxygen supply when the nation was in dire need of the life saving gas.

Energy Warriors During the Covid Challenge

IndianOil demonstrated remarkable resilience in the face of the Covid-19 pandemic. It established a high-level corporate committee with the aim of providing relief to fellow citizens, raising awareness, formulating guidelines, and overseeing employee welfare initiatives. Through these challenging times, Team IndianOil persevered and continued to combat the pandemic by dedicating resources, time, and efforts to address the global crisis.

During the second wave of Covid-19, IndianOil extended its efforts beyond conventional business priorities by providing crucial support for medical oxygen supply. At a critical juncture, the company supplied high-purity oxygen from its refineries and repurposed numerous LNG tankers into carriers of medical-grade oxygen, thus reinforcing the medical oxygen logistics network within the country. Faced with surging demand, IndianOil redirected oxygen from the mono ethylene glycol (MEG) unit to produce medical-grade liquid oxygen at the Panipat Refinery and Petrochemical Complex. Multiple tankers and ISO containers were deployed nationwide for transporting liquid oxygen, with ten tankers manufactured at the cryogenic plant in Nashik. To manage and monitor oxygen supply logistics, IndianOil established a dedicated control room.

In a year marked by the pandemic's far-reaching effects—nationwide lockdowns, supply-demand disruptions, and economic slowdown—IndianOil achieved a historic milestone by recording its highest-ever profit in the fiscal year 2020-21. This success was a testament to uninterrupted fuel supplies, the

dedication of frontline workers, and the consistent operation of essential processes. The higher management stressed the importance of maintaining safety and health while ensuring the seamless functioning of assets to provide uninterrupted product and service supplies across the nation. True to their roles as energy warriors, IndianOil's employees worked tirelessly during lockdown, putting in extended hours to meet the energy demands of the country.

Energy Lifeline

IndianOil, the energy lifeline of a nation comprising nearly 1.4 billion people, stands as a testament to its high-calibre employees, cutting-edge technologies, and advanced research and development endeavours. It has garnered renown for its global best practices, resolute commitment to quality, and transparent operations, all while conscientiously harnessing energy in all its diverse forms and ensuring its affordable delivery to consumers.

Being a significant contributor to both central and state exchequers, the company has followed a path of pragmatic approaches and sustainable profitability. As a public sector enterprise entrusted with public funds, it exercises meticulous caution in managing its financial resources, a practice that has earned it a distinguished credit rating among both domestic and international bankers. IndianOil has played a key role in propelling the nation's growth, assuming the mantle of a national custodian for economic prosperity, with its triumphs attributed to the absolute dedication and commitment of its workforce.

Bottom: IOCians working at a manufacturing unit of the popular Propel brand. IndianOil has built up a number of super brands to fuel the growth of the country.

Top and bottom: IndianOil's Kaza Filling station is the world's highest altitude fuel outlet and works round the year, even in sub zero temperatures.

Straddling the Nation's Map

IndianOil boasts one of the most extensive petroleum marketing and distribution networks, not only within India but across Asia. The company's accomplishments encompass an impressive array of over 58,000 touch points. These fuel stations are strategically positioned throughout the vast expanse of the country, navigating diverse and often challenging terrains. Among these, the world's highest petrol pump, perched at a height of 12,500 feet from sea level, is located in Kaza at Himachal Pradesh. Remarkably, this outpost remains operational throughout the year, even enduring sub-zero temperatures. IndianOil has indeed etched its presence into every heart and every corner of the nation, ensuring an uninterrupted supply of vital petroleum products across India's expansive map.

The company has meticulously cultivated a robust marketing infrastructure, encompassing a network of petrol and diesel stations, Indane (LPG) distributorships, SERVO lubricants and greases outlets, along with various consumer pumps. This comprehensive framework encompasses 34,559 fuel stations, which include Kisan Seva Kendra (KSK) outlets strategically positioned in rural markets. Notably, these stations are meticulously automated to guarantee both quality and quantity assurances. Recognising the unique needs of significant consumers such as the defence services, railways, state transport entities, airlines, hydel and thermal power plants, industrial facilities, agricultural enterprises, and marine sectors, IndianOil has deployed approximately 7,000 dedicated fuel pumps. This strategic measure ensures the prompt and reliable delivery of essential products.

Top: A woman employee of IndianOil at work at an LPG Bottling Plant.

Bottom: IndianOil has built up an impressive portfolio of LPG products keeping in view requirements of its diverse range of customers.

Brand Building Over the Years

To ensure a consistent supply of the extensive range of IndianOil products, the company operates bulk storage terminals and installations, inland depots, aviation fuel stations, LPG bottling plants, and lube blending facilities. These operations span the country, and their coordination is overseen by various offices. IndianOil stands as a predominant energy brand within the nation, recognised for its exceptional quality petroleum products and services—a reputation honed meticulously over time.

IndianOil takes pride in delivering Indane LPG cooking gas directly to households through a network of 101 LPG bottling plants and an expansive array of over 12,813 distributors. The company fervently promotes LPG as a clean cooking fuel, transcending socio-economic boundaries.

The aviation service of IndianOil commands a significant market share in aviation fuel, serving both national and international flag carriers, private airlines, and the Indian defence services with equal proficiency. With a presence in 126 aviation fuel stations spanning the length and breadth of India, IndianOil asserts its leadership in the aviation market. It stands as the preferred choice for millions of customers hailing from diverse segments.

The company's portfolio boasts esteemed energy brands such as Indane LPG cooking gas, SERVO lubricants, XP95, XP100, XTRATEJ, and PROPEL petrochemicals. Notably, Servo and Indane, with over 50 years of legacy, have earned the esteemed designation of 'Superbrand.' With a strong commitment to quality, IndianOil operates 10 Lube blending plants across India, further solidifying its reputation.

The Legacy Maker

IndianOil comprehends and lives by the principle that, ultimately, the quality of its products stands as an eloquent testament to the well-being and collective endeavours of all involved in their production. Across the years, the company has intentionally woven itself into the lives and challenges of its employees and neighbouring communities. By employing its resources, skills, and talents, IndianOil actively contributes to the development of human capital within its projects and assets. Additionally, the company ardently strives to conserve natural resources, leaving behind a better world for generations to come.

India, characterised by its youthful populace with an average age of 29, stands as one of the world's youngest demographics. IndianOil has consistently played a role in the nation's advancement since its inception. Beyond its domestic engagement, the company harbours global aspirations, evidenced by its commitment to establishing overseas subsidiaries in Sri Lanka, Mauritius, the UAE, Sweden, the USA, Singapore, and the Netherlands. Furthermore, IndianOil has formed a 50-50 joint venture with Total (France), aimed at manufacturing and marketing premium bitumen derivatives and specialty products to cater to India's

A beautiful view of IndianOil's POL terminal in Mauritius.

Bottom: IndianOil's subsidiary Lanka IOC's fuel outlet in Sri Lanka.

burgeoning road construction industry. This collaboration expands upon the existing business relationship between the two companies, particularly in LPG and fuel additives. The joint venture plans to establish manufacturing units throughout the country. IndianOil's exploration and production attempts to encompass nine domestic upstream blocks within India and an additional eleven overseas projects, signifying its broadened horizons and commitment to energy exploration on a global scale.

Recruiting the Best

The backbone of any thriving business is its people power. As eloquently stated by Elbert Hubbard, a single machine might match the output of fifty ordinary individuals, yet it falls short compared to the capabilities of one extraordinary individual. IndianOil stands as a paragon of the industry, not only for its exceptional workforce but also for its employee-centric policies. Anchored by a robust workforce of approximately 32,000 individuals, the company has sculpted an enterprise over the past six decades that bolsters India's foundational sectors of economic growth. With a well-defined human resource budgeting process, IndianOil has cultivated a time-honoured tradition of handpicking the finest talents for enduring career cycles. Nurturing this talent, the company employs a blend of strategic mentoring, job rotation, continuous training, and invigorating assignments focused on skill enrichment. This holistic approach sharpens and expands their array of conceptual, interpersonal, and leadership competencies.

Across its divisions and major units, the organisation boasts a network of 22 fully equipped training centres. These centres cater to both executives and non-executives, offering coaching in functional as well as behavioural domains. In a bid to foster comprehensive well-being, IndianOil extends an array of welfare facilities to its employees, aiming to bolster their health, efficiency, economic prosperity, and social stature. From its inception, IndianOil has sow the seeds of a participatory culture, fostering an environment conducive to industrial harmony and elevated productivity. The organisation fervently promotes personal interactions between management and employees, underscored by a commitment to equality in growth opportunities and a policy of transparent promotions.

IndianOil's 32,000-strong skilled workforce contributes substantially to India's core sector that is crucial for its economic development. The organisation constantly hones its employees' potential through programmes at its training centres.

Top and bottom: Well-being and safety of its employees is the key for IndianOil. The company regularly organises training and mock drill programmes as per the guidelines for safety and security of its personnel and plants. Compliance with safety systems, procedures and environment laws is monitored at the unit, division and corporate levels. Emergency Response Disaster Management Plans are in place for all IndianOil installations.

Expansion and Integration

IndianOil's expansion programme is guided by a crystal-clear vision, with the collective aspirations of the people igniting its forward momentum. Positioned as India's premier enterprise, it ardently embraces the challenge of ascending as a global energy frontrunner. Fuelled by this ambition, the company is amplifying its refining capacity while meticulously harmonising its existing refinery processes to achieve heightened yields.

The contours of its business landscape have undergone a profound transformation through strategic acquisitions, mergers, and the nurturing of an array of subsidiaries and joint ventures.

IndianOil infuses novel capacities and prospects into the oil and gas sector. This metamorphosis is made possible by the firm backing of its substantial retail marketing fraternity, stakeholders, vendors, suppliers, and service providers.

Premium on Well-Being and Safety

The cornerstone of workplace productivity lies in the well-being of its employees. Not only company staff but also contract workers and security personnel stationed at various locations undergo continuous training led by experts.

A comprehensive approach ensures that all individuals engaged in safe operations, whether employees, contract labour, or security personnel, are well-versed in safety protocols. Given the socio-economic dynamics and the transient nature of contractor personnel, a significant emphasis is placed on their training.

To uphold the integrity of procedures, operating manuals are subject to regular updates. Stringent enforcement of proper Personal Protective Equipment (PPE) usage is upheld. Vigilant oversight by fire and safety personnel, alongside site supervisors, ensures adherence to permit conditions.

An inside view of IndianOil's R&D centre which shows personnel busy in research activities. The centre has to its credit several super brands and has earned a reputation for quality, consistency and innovative professionalism.

Every job contract entails a commitment from the contractor to align with stringent health, safety, and environmental parameters. Safety guidelines integrated into the tendering stage, including within general and special contract conditions, establish a robust foundation for maintaining safety standards throughout the execution phase.

Tradition of Excellence in Quality

Innovation, expansion, and modernisation stand as cornerstones of corporate triumph. These principles have propelled continuous research within the energy sector. The IndianOil workforce takes immense pride in curating numerous superbrands, maintaining vigorous quality consistency—a hallmark etched into the company's identity for decades. Echoing John Ruskin's words,

"Quality is never an accident. It is always the result of intelligent effort. There must be the will to produce a superior thing." IndianOil has cultivated a culture where innovative professionalism garners both respect and rewards.

Across the years, IndianOil has not only upheld stringent quality standards but has also pioneered a continuous stream of new innovations and technologies. The vast knowledge and expertise amassed in the energy sector are harnessed to design, develop, and implement integrated quality improvement programmes.

A vigilant senior workforce oversees the entire process, meticulously attending to even the minutest details. Regular monitoring of quality performance remains a priority, facilitated through thorough evaluation reports authored by subject matter experts.

A view of the lubricant plant in which lubricant is being filled in containers by an automatic filling and packing system.

At Par with Global Players

IndianOil stands as a premier downstream petroleum company in Asia, fully dedicated to national targets and commitments. The success of IndianOil and the well-being of its employees are intertwined, necessitating ongoing investments to ensure contemporary skills among its talent pool. Despite its status as a public sector entity, the company has consistently performed on par with global players in the oil and gas industry. It has adeptly harnessed foreign technologies to forge ahead and establish itself as a trailblazing leader.

Throughout the years, IndianOil has strategically fostered partnerships with both national and international industry leaders, resulting in mutual benefits. It sets formidable benchmarks and diligently strives to achieve them, placing strong faith in the active participation of all stakeholders in decision-making.

Sizeable Portfolio of Assets

Over the past decade, IndianOil has elevated its new ventures in petrochemicals and natural gas marketing to a level where they have seamlessly integrated with core verticals. The company's explorations in upstream activities, spanning exploration and production, have yielded substantial results, expanding its portfolio of oil and gas assets within India and abroad. Proudly exporting its Indian brands to over 70 countries, IndianOil figures as the second-largest player in the domestic petrochemicals market.

IndianOil's world-class petrochemical plants at refineries in Gujarat, Panipat, and Paradip, constructed over the past two decades, stand as testimonials of excellence. Collaborations with Danish, French, and US firms equipped these facilities with state-of-the-art technology. The Panipat Naphtha Cracker Complex, a vital component of its petrochemicals ventures, has etched a golden chapter in the annals of the Indian oil industry.

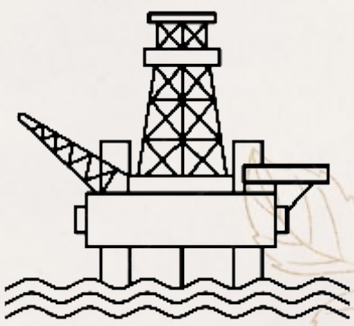
Staunchly committed to environmental sustainability and carbon footprint reduction, IndianOil employs renewable energy for refinery operations. With plans to meet substantial power requirements for new projects through renewable resources, the company has embraced numerous green initiatives. These encompass increased natural gas usage in refineries, ethanol-blended motor spirits, the sale of Compressed Biogas (CBG), and biodiesel sales, among others.

Future Foresight

IndianOil's commitment to pollution prevention and waste disposal adheres not only to regulatory requisites but also surpasses industry best practices. Amidst the global battle against escalating global warming and its associated water stress, IndianOil is taking proactive measures to enhance water use efficiency within its operations. Equipped with effluent treatment plants, the company's refineries employ treated water for diverse purposes, curbing the demand for fresh water. Rainwater harvesting systems and watershed projects have been seamlessly integrated into all refineries and townships.

IndianOil strides ahead with determination to invigorate the nation and fortify the four cornerstones of India's development, as envisaged by the Prime Minister: energy access, energy efficiency, energy sustainability and energy security. Concurrently, the company is dedicated to ensuring energy justice, with the ultimate aim of providing safe, affordable, and sustainable energy for every citizen.

IndianOil draws pride from its past accomplishments and it stands poised to meet the forthcoming challenges with unfaltering readiness. The company acknowledges that change devoid of purpose can be as perilous as unswerving allegiance to the past. By harmoniously weaving together continuity and innovation, IndianOil distinguishes itself as more than a conventional corporate entity. It is an organisation driven to achieve heightened performance while consistently exceeding expectations, all the while upholding its mantle as a conscientious corporate citizen.



Zakum Central Supercomplex - An overseas Exploration & Production asset of IndianOil

LADIES LEADING THE WAY

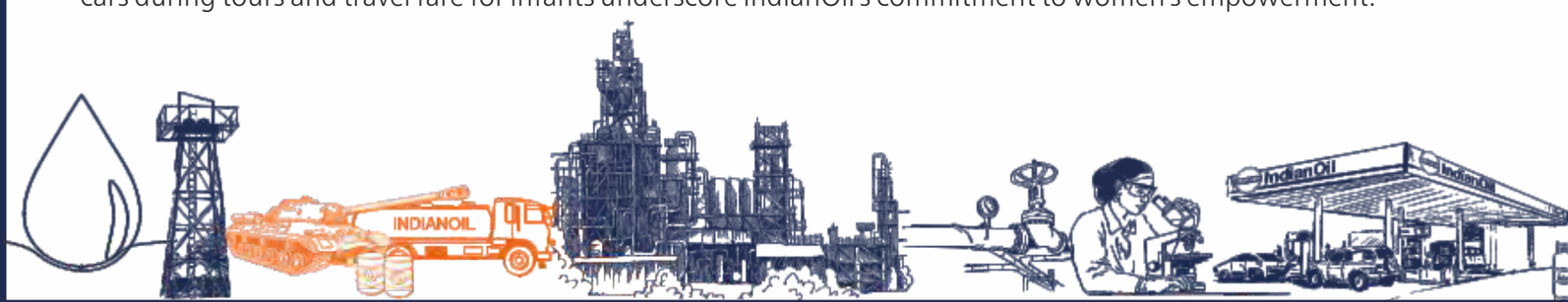
IndianOil's ethos is deeply rooted in fostering a progressive and inclusive work environment for all its employees, driven by the belief in the power of people. The company recognises that women within its ranks are catalysts for transformation, not only within the organisation but also on a broader societal canvas. Displaying unwavering dedication, ladyIOCians have embraced roles in challenging, sensitive, and remote locations, emerging as leaders in their own right. A surge of millennial women has joined the workforce, with many assuming the mantle of business managers at IndianOil-owned COCO retail outlets across India. In their capacity, they have adeptly navigated challenges, enhancing outlet profitability and championing the IndianOil brand at every juncture.

7 February 2022, etched a defining milestone in IndianOil's corporate journey—a day that marked the induction of its first woman functional director, Ms. Sukla Mistry. With over 35 years of multifaceted experience in the refineries division, Ms. Mistry is an ardent advocate of women's empowerment. Her elevation to Executive Director and Refinery Head of two company units—Digboi Refinery and later, Barauni Refinery—resounds as an epochal moment for women not only within IndianOil but also across the energy industry. Ms. Mistry's journey epitomises dedication, with her total unequivocal commitment to both the company and the nation.

Following the strides made by pioneering leaders within IndianOil, Ms. Rashmi Govil's ascension to Director of Human Resources represents a transformative milestone in the company's commitment to inclusive leadership. Her elevation not only amplifies IndianOil's dedication to diversity at the highest levels of management but also highlights the evolving influence of women in directing the strategic pathways of major entities within the energy sector. Since joining IndianOil in 1994, Ms. Govil has cultivated a deep reservoir of expertise and a robust track record in innovative human resource management. Her leadership is poised to propel IndianOil's goals in workforce development, fortify employee relations, and nurture an organizational culture that champions diversity and inclusivity.

Numerous women IOCians have etched their names in the annals of IndianOil's history. Among them, Lieutenant Leena Orpe holds the distinction of being the first woman from the marketing division to be enlisted in the Territorial Army. IndianOil has unfailingly championed the career advancement of its women employees, cultivating an enabling environment through initiatives encompassing health, safety, gender sensitisation, and empowerment. Their remarkable contributions across the organisational hierarchy affirm IndianOil's firm belief in progressive gender inclusivity.

In a traditionally challenging sector for both genders, women IOCians have shattered barriers and stereotypes, leaving their mark across the hydrocarbon value chain—be it refineries, pipelines, terminals, retail functions, or LPG delivery teams. The company is actively engendering new opportunities for women through leadership programmes like Aarohi, supported by empowering HR policies. Measures such as provision for official cars during tours and travel fare for infants underscore IndianOil's commitment to women's empowerment.



The company has always supported the career progression of its women employees by building a conducive environment through various efforts and initiatives. There are several examples of women IOCians who have created history in the company.

IndianOil has pioneered a unique initiative aimed at nurturing a select group of women leaders at the middle management level. This comprehensive programme fosters enhanced leadership capacities, instils self-confidence, and directs passion towards contributing to the organisation. Regular workshops foster awareness of workplace rights and provisions, with gender sensitisation programmes catering to male employees.

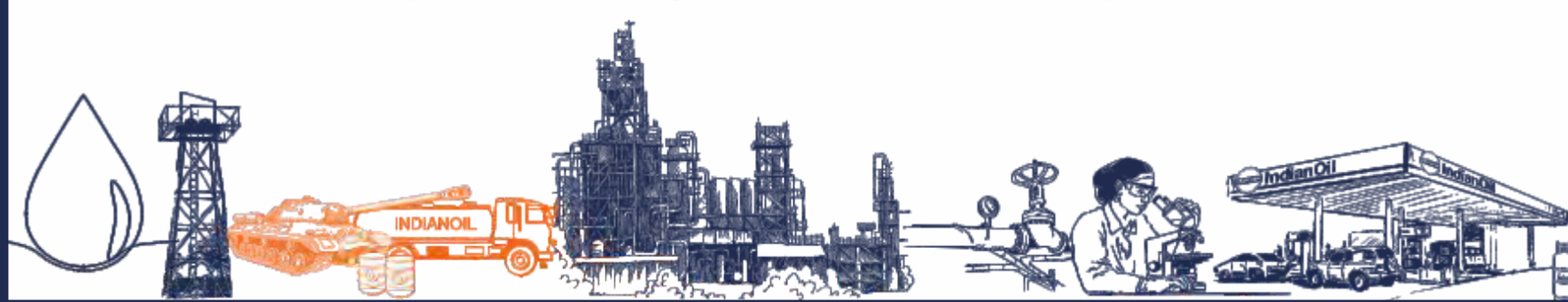
IndianOil's commitment extends to empowering economically and socially disadvantaged women. Recognising tailoring as a sought-after skill, the company initiated sewing centres, imparting stitching and tailoring skills through six-month courses. Graduates receive sewing machines, enabling them to earn up to Rs. 4,500 per month, thereby elevating family incomes. IndianOil has even inducted nine women hockey stars into its fold, establishing India's first full-fledged women's hockey team. In collaboration with the Ministry of Youth Affairs and Sports, 'IndianOil Shakti' is a programme designed to comprehensively support young, talented female athletes, setting a precedent for transformative empowerment.

LEADING FROM
THE FRONT IN CRISES

IndianOil, a prominent flagship entity in India's public sector landscape, has seamlessly woven its commitment to corporate social responsibility into its core business aspirtations. A consistent trailblazer, the company consistently stands at the forefront during moments of national turmoil. Its dedication is evident in its resolute support for those affected by natural calamities, ensuring an unbroken supply of essential petroleum products and extending valuable contributions for relief and rehabilitation efforts, both in monetary and material forms. Beyond this, IndianOil's far-reaching initiatives extend to remote rural landscapes, challenging terrains, and encompassing community welfare programmes across the nation, garnering widespread appreciation for its compassionate and proactive approach.

In times of both conflict and harmony, IndianOil's committed workforce emerges as vital contributors to the defence forces, vividly illustrating the extraordinary potential when collective national pride meets global adversities. Throughout the Indo-Pakistan wars of 1965, 1971, and the Kargil conflict, the company admirably

IndianOil's history is replete with numerous stories of heroic efforts by its employees displaying the indomitable 'IndianOil Spirit'. The company provides relief to victims of natural calamities like floods, earthquakes, cyclones, etc. Uninterrupted fuel supply has been ensured for the Indian army and air force even during times of war which has won the company warm appreciation.



ensured an uninterrupted supply of crucial petroleum resources to the armed forces. This enduring partnership has been forged over decades, encompassing shared challenges and operational intricacies. IndianOil remarkably caters to over 95 per cent of the fuel and lubricant requisites of the Indian armed forces, boasting a robust supply chain that efficiently manages their needs. Over time, the company has made significant strides in bolstering strategic logistical capabilities and infrastructure, thereby ensuring an elevated level of reliability crucial for successful execution of the Army's operational strategies. Moreover, IndianOil undertakes the vital responsibility of establishing strategic storage and enhancing infrastructure in challenging regions, thereby facilitating the safeguarding of the nation.

Left: Indian Air Force's Kiran trainer jet being refulled at Dundigal near Hyderabad (1985). With a mandate to lend full support to defence and other para-military service at all times, the company specially developed fuels, lubricants and greases for vehicles of armed forces operating in extreme conditions.

Even amidst global upheavals, IndianOil's operational continuity remains unwavering. Notably during the Iranian Revolution and subsequent Iraq-Iran war, the company adeptly maintained equitable and judicious distribution of petroleum products, working closely with central and state governments. This resolve was sustained despite additional workload and heightened operational expenses. The turbulent Gulf War of 1990-97 posed yet another formidable challenge, but IndianOil continued to ensure seamless supplies of crude oil and finished products. This uninterrupted flow of resources was balanced through a structured demand management process, harmonising with the policies of the Government of India. Throughout its history, IndianOil has continually underscored the commitment of its employees, portraying a unique ethos that seamlessly unites people, their dedication, and their optimistic outlook in the face of adversity.

The aftermath of the severe cyclonic storm that struck Kandla on 9 June 1998 stands as a testament to IndianOil's indomitable spirit. Characterised by fortitude and courage, this event reaffirmed the company's resolve in the face of adversity. Beyond this, the company has proactively responded to natural calamities such as floods, earthquakes, and cyclones, ensuring continuous fuel supply for Indian Army and Air Force relief teams. Notable instances include the response to Cyclone Fani in Odisha and Cyclone Vayu and Cyclone Biparjoy in Gujarat. In the face of torrential rains inundating Tripura, IndianOil once again demonstrated its commitment to service by promptly rendering assistance.

Similarly, the unprecedented flash floods in Jammu and Kashmir in September 2014 prompted IndianOil teams to mobilise a contingency plan. Overcoming challenges, aviation teams worked tirelessly to refuel rescue missions undertaken by the armed forces. The Vishakhapatnam Aviation Fuel Station admirably weathered Cyclone Hudhud in October 2014, maintaining uninterrupted supplies for rescue and relief efforts. During the floods of 2018 in Kerala, IndianOil's seamless supply line of petroleum products, including ATF and LPG, underscored its commitment to serving the nation during times of crisis.

The Covid-19 pandemic posed an unprecedented challenge, testing IndianOil's resilience. However, the company emerged triumphant, exhibiting fortitude and unity in a time of national crisis. In a laudable show of solidarity, IndianOil pooled resources, time and effort to bridge crucial gaps. Notably, during the second wave of the pandemic, the company played a pivotal role in addressing the severe shortage of medical oxygen, exemplifying its reputation as a public sector trailblazer dedicated to making a meaningful difference. In every instance of crisis, IndianOil's resolute commitment to national welfare remains constant, embodying unity, resilience, and steadfast support as core tenets of its corporate ethos.

CHAPTER 4

Refining the Future:

IndianOil Reshapes India's Energy Landscape

The refining sector in India has traversed a long journey since the first refinery was set up at Digboi in 1901. Now refineries form the backbone of the Indian economy as the demand for petroleum products increases in the country. India's first public sector refinery was established by Indian Refineries Ltd. (IRL) at Noonmati, near Guwahati in 1962. It was built in collaboration with Romania.

The Indian petroleum refining sector has come a long way since crude oil was discovered and the first refinery was set up at Digboi in 1901 which until 1947 was the only refinery with a capacity of 0.50 million metric tonnes per annum. The present Mumbai refinery of Hindustan Petroleum Corporation Ltd. was the first modern refinery to be set up after independence by Esso in 1954. The first decade after independence witnessed the establishment of two coastal refineries by multinational oil companies—Burmah Shell and Caltex—operating in the country at that time; in Bombay and Vishakhapatnam. By then indigenous crude production had significantly increased in Assam. After that, refineries were established by the government, private sector and in joint ventures.

Today refineries form the backbone of the Indian economy and cater to the increasing demand for petroleum products in the country. While the Indian Oil Company Ltd. was established in 1959, the Indian Refineries Ltd. (IRL) was set up in 1960 to build and operate its own refineries in India. They were born with a vision to achieve self-reliance in oil refining and marketing. The two companies merged in 1964 to form Indian Oil Corporation Ltd in a bid for greater efficiency and to combat the challenge from oil multinationals and provide energy self-reliance to the nation.

IRL established its first refinery at Noonmati, near Guwahati, which was built in collaboration with Romania. About 50 young engineers from various disciplines received training for a year in Romania. The technology was extremely complex and the work was arduous. In the words of a senior official, "Except for sand and cement, everything else had to be brought in from Romania, including manholes."

A beautiful view of Digboi Refinery, India's oldest operating refinery and one of the oldest operating refineries in the world. It is termed the 'Gangotri of the Indian Hydrocarbon sector'.

Oil was discovered in Gujarat and production progressively increased there. Three inland refineries were set up by IndianOil essentially to process indigenous crude—Guwahati and Barauni for Assam crude and Koyali for Gujarat crude—with the help and cooperation of friendly countries. Till the Barauni Refinery was set up in 1964, refinery technology, construction drawings, all essential equipment and materials were imported. Construction supervision and start-up was done by expatriates who were also included in the operation of the plants for a considerable amount of time after commissioning. Indigenisation began in the petroleum sector in 1962, when the Central Design Organisation was formed in connection with the setting up of the Gujarat Refinery. A few off-site facilities were designed by the Central Design Organisation. Setting up of the Guwahati, Barauni and Koyali Refineries independent of foreign multinationals and their operation by Indian engineers became the stepping stone for self-reliance in the critical energy sector for India.

Cradle of India's Oil Heritage : Digboi Refinery

The journey of refineries in India is intriguing and marked by innovative products and services. There is a continuous endeavour for product quality upgradation, energy conservation and environment protection. The refineries have focused on the social welfare of the communities around them as well. The historic Digboi Refinery, located in the remote north-eastern corner of the country, is the birthplace of the oil industry in India. Earlier, it was owned and operated by the Assam Oil Company Ltd. and Burmah Oil Company but came into the fold of the Indian Oil Corporation Ltd. on 14 October 1981 and became the Assam Oil Division of IndianOil. Commissioned on 11 December 1901, it is one of the oldest operating refineries in the world. It has been termed the 'Gangotri' of the Indian hydrocarbon sector. Digboi Refinery with its

The picturesque and lush IndianOil's Guwahati Refinery.

Bottom: Digboi Refinery has a wax moulding unit and wax pelletisation unit for production of finished wax in slab and pellet form respectively.

vastly modernised operations and facilities is an ISO-9001, ISO-14001 and BS OHSAS-18001 certified refinery. It has a crude processing capacity of 0.65 metric million tonnes per annum and processes wax crude extracted from oilfields operating in areas near Digboi. It became IndianOil's first refinery to roll out 100 per cent BS VI fuel on 1 September 2019. It also has ISO-50001 certification in recognition of its efforts to manage its energy usage in an efficient manner for development and implementation of effective safety, health and environment management systems and procedures.

The refinery also has a wax moulding unit and wax pelletisation unit for production of finished wax in slab and pellet form respectively. It installed and commissioned a CRMB+ unit in 2018 for production of crumb rubber modified bitumen using technology developed by IndianOil. Its current product portfolio includes LPG, environmentally compatible motor spirit and high-speed diesel (HSD), fuel wax, RPC and sulphur. IndianOil's marketing network has also been upgraded and strengthened. The Assam Oil Division's logo of the charging red rhino has continued to dominate the marketing network in all the north-eastern states. It is doing commendable social welfare work in and around refineries.

Serving Mother Earth

The motto of most IndianOil refineries is to be in harmony with nature by protecting Mother Earth and nurturing wildlife. With this guiding principle, the company has committed to protecting and preserving the environment for a better future for succeeding generations. It conducts business in a manner that is compatible with the environmental and economic needs of the communities in which it operates. In the course of refinery operations, waste water, flue gases, fugitive emissions and solid wastes are generated and the priority is to contain them. Refineries are also significant consumers of scarce resources like water and energy. Refineries are energy providers and water is required for their operations which can affect other water users. Using water efficiently has been part of IndianOil's environmental standards and the company strives for conservation of fresh water by reducing consumption and increasing reuse and recycling. Thus, pollution control and resource conservation activities are a priority area for environment management at IndianOil. The company's refineries continuously strives to minimise adverse environmental impact from refinery activities, products and services by using processes, practices, materials that avoid, reduce or control pollution.

A lush green view of Panipat Refinery, the technically most advanced public sector refinery of the country. It is the largest integrated refinery and petrochemical hub in India and third largest in South East Asia. IndianOil refineries believe in coexistence with nature by nurturing wildlife and protecting mother earth.

Bottom: Refineries are significant consumers of the scare resource of water but well-designed effluent treatment facilities ensure minimal waste and clever re-use of the precious liquid.

Use of water and quality of effluent discharged are carefully monitored. IndianOil refineries are equipped with a network of underground sewers for segregated collection of various wastewater streams, which are subjected to precise treatment in well-designed effluent treatment (ETP) facilities involving physical, chemical and biological processes. Advanced treatment systems like ultra-filtration, reverse osmosis, etc., are used to convert treated effluent to de-mineralised water or for use in cooling towers as make-up water.

Rainwater harvesting structures have been put up in all refinery townships, marketing and pipeline installations and R&D Centre for recharging groundwater. Utmost attention is given to control/reduce emissions in IndianOil refineries. Major sources of air emissions are flue gases from boilers and heaters, FCC regenerators and sulphur recovery units. Hydrocarbon leaks and evaporation during storage, handling and transportation of petroleum products and crude oil are sources of fugitive emissions. IndianOil is continuously striving to lower emissions of nitrogen oxides, sulphur oxides and volatile organic compounds from its operations and has adopted several measures to control emissions and effectively disperse pollution from flue gases.

Green Belts Galore

IndianOil's ecological parks at various refineries are blessed with lush greenery. Large varieties and a wide range of trees and plants are found there. The areas are also havens for butterflies. Many refineries are home to the rich biodiversity of that particular state. First-time visitors to these refineries are inevitably struck by the verdant green belts in their surroundings. There are several reserve forests and sanctuaries in the vicinity of the refineries which are home to rare species of flora and fauna. The company's scientifically designed green belts serve as pollution sinks and enhance aesthetics. Over 54 lakh trees already adorn the green belts. The ecological parks serve as a natural habitat for numerous birds. More than 300 species of resident and migratory birds thrive in these parks. Over 285 species of native and exotic plants and trees grow there.

A lush green ecological park at IndianOil Guwahati Refinery which is home to rich biodiversity. There are a number of reserve forests and sanctuaries around the refineries. Besides this, green belts designed by IndianOil serve as the natural habitat for various species of fauna and flora.

प्रकृति के साथ, प्रगति की ओर - Guwahati Refinery

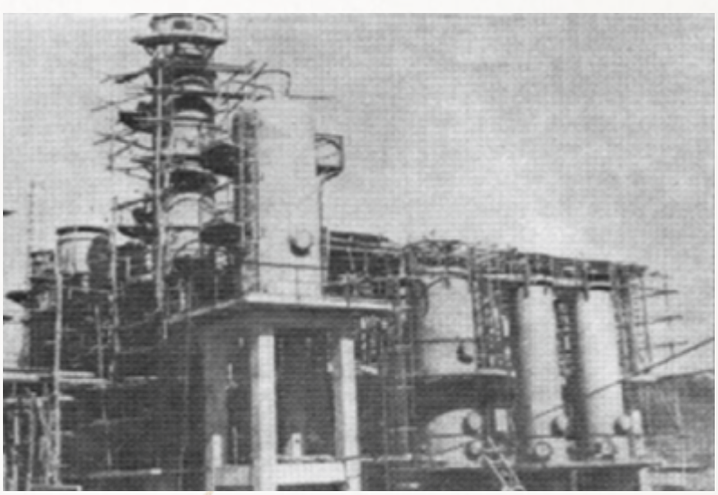
Guwahati Refinery — India's first public sector refinery—was built with Romanian collaboration. Capacity enhancement and various modernisation schemes have been implemented to keep up with the latest technology and product requirements. LPG, naphtha, motor spirit, aviation turbine fuel, low sulphur low aromatic- superior kerosene oil, HSD, raw petroleum coke and sulphur are produced by this refinery. An INDMAX unit—in-house technology developed by R&D Centre of IndianOil—was installed for increased production of LPG and gasoline from heavy ends like reduced crude oil and coker fuel oil.

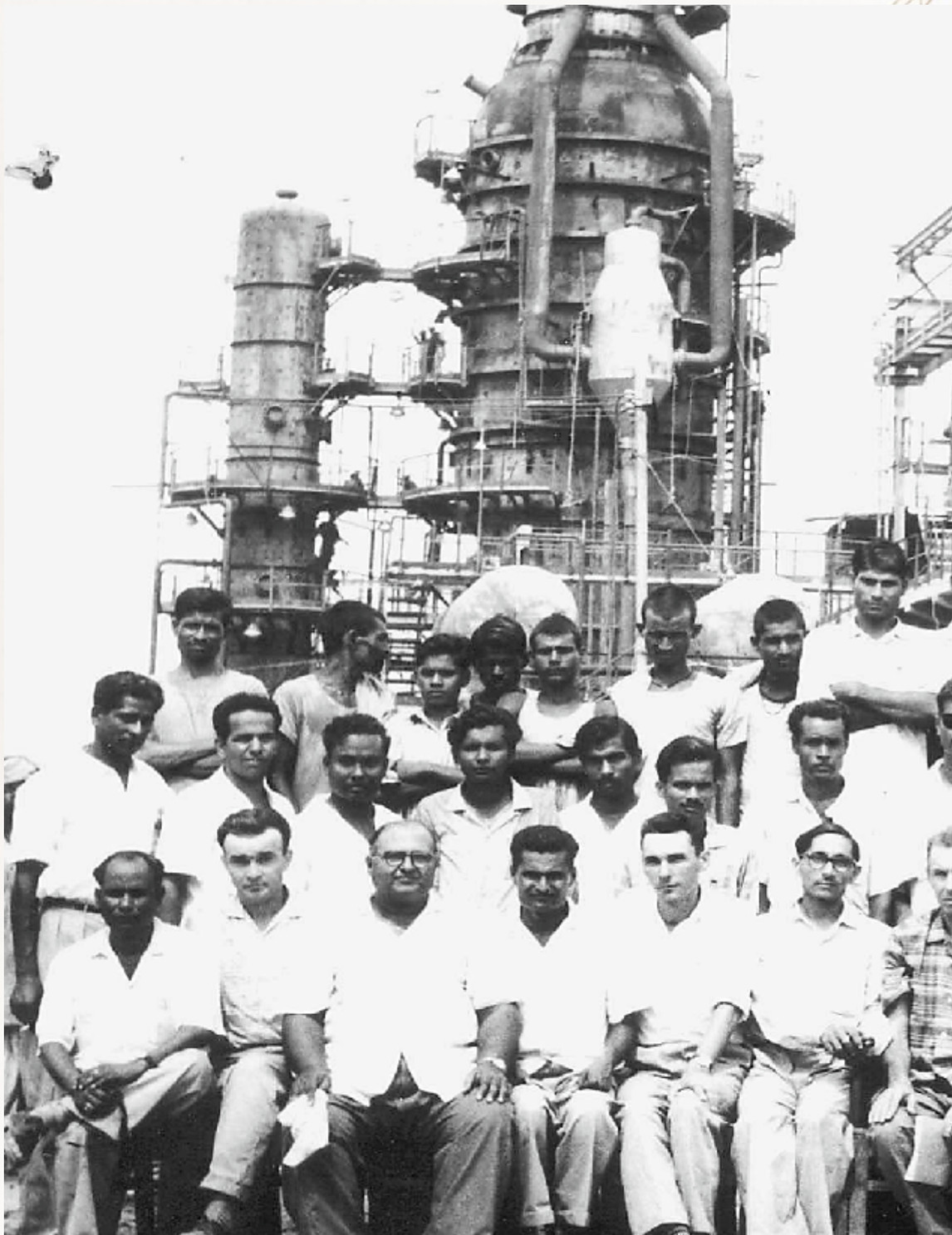
The INDMAX unit works on the Fluid Catalytic Cracking process. Apart from installing indigenous technologies, the refinery is also equipped to produce BS-VI grade fuel. It is setting the pace for industrial development in the Northeast, and has heralded India's energy independence. It was conferred with the National Safety Award, 2018, by the Government of India. At the inauguration of this refinery, 60 years ago, Prime Minister Pandit Jawaharlal Nehru said, "The new year is beginning with an auspicious ceremony, which will usher in a new era in India and its industrial life."

Top and bottom: Guwahati Refinery is the country's first public sector refinery which was built with Romanian technology. It is known as a hub of innovation and the epitome of efficiency.

With its tagline 'Prakriti Ke Saath, Pragati Ki Or', the Guwahati Refinery is a hub of innovation and the epitome of efficiency. It is actively involved in various environment conservation initiatives. Over 1,15,000 trees have been planted to reduce greenhouse gas emissions. The refinery uses plastic waste to prevent water pollution.

It follows a solid waste management protocol, has reduced water consumption, installed organic waste converters, eight rainwater harvesting systems, effluent treatment plant, mobile oil spill recovery unit, biogas plant, etc. It carries out several CSR initiatives to benefit the local community.



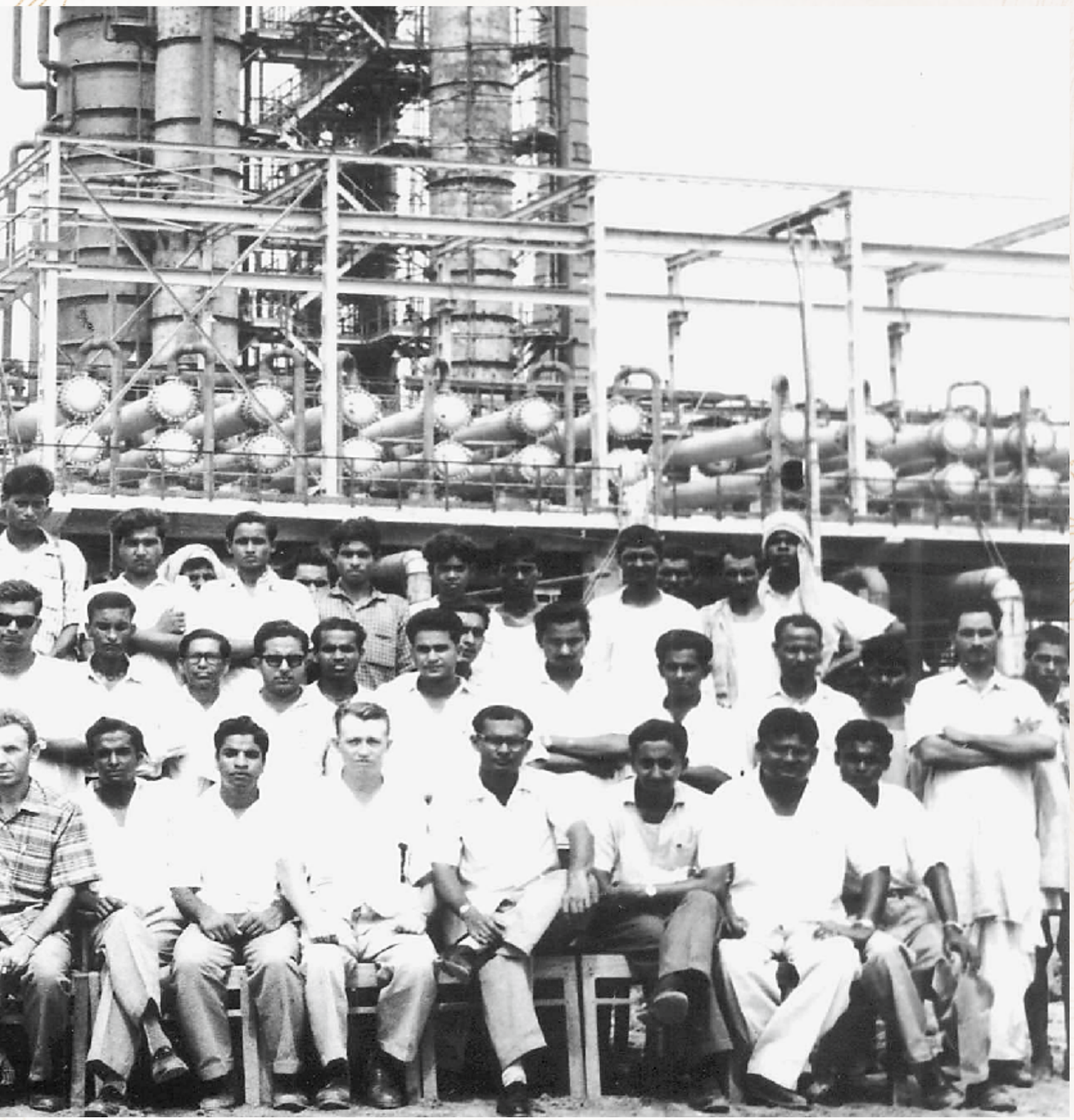


IndianOil's Barauni Refinery in Bihar was dedicated to the nation in 1965. State-of-the-art, eco-friendly technologies enable this refinery to produce green fuels complying with international standards. Its motto is 'In harmony with nature'. A group photo of employees of Baruani Refinery at the time of commissioning of the first crude distillation unit.

In Harmony With Nature: Barauni Refinery

Barauni Refinery in Bihar is the second public sector refinery of the country which was built in collaboration with the Soviet Union in 1964. It was commissioned with a refining capacity of 1 million metric tonnes per annum to process Assam crude oil. In its continuous endeavour to improve performance, an additional coker unit and LPG recovery unit were commissioned in 1986.

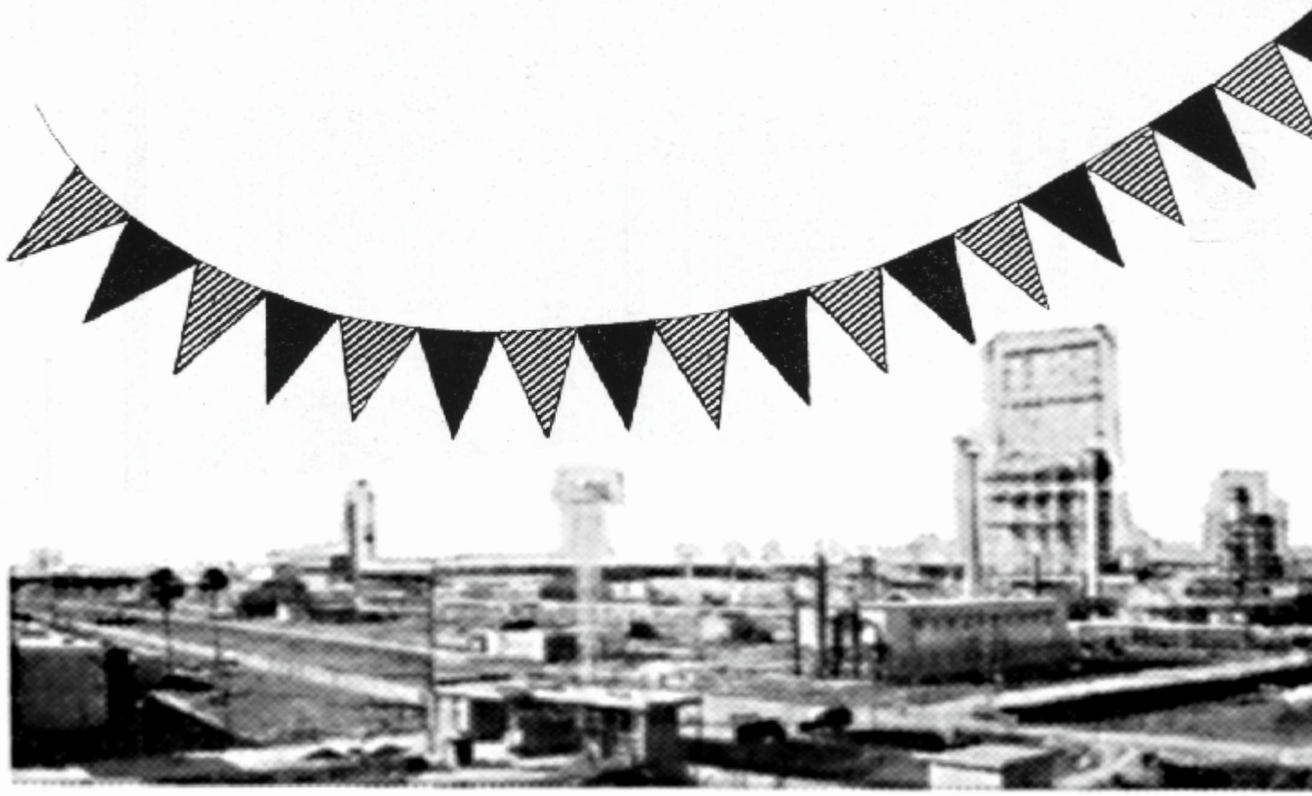
These provided a boost to the LPG yield of the refinery and increased the distillate yield. It was accredited with ISO-14001. The Barauni Refinery was earmarked for its operational excellence in 2009 after winning the TPM Excellence Award in category A. State-of-the-art, eco-friendly technologies enable the refinery to produce green fuels complying with international standards.



It is primarily a diesel producing refinery with over 54 per cent of its product mix as HSD. Other products include kerosene, ATF, petrol, LPG, naphtha, raw petroleum coke, sulphur and bitumen. It caters to fuel demands of Bihar, West Bengal, Uttar Pradesh, Jharkhand and Madhya Pradesh. Nepal Oil Corporation also sources its fuel, including LPG, from the Barauni Refinery. Currently, over 42 per cent of dispatch of products at Barauni Refinery is through road followed by pipelines and rail. The motto of the Barauni Refinery is 'In harmony with nature'.

It is committed to protect and preserve environmental sustainability for future generations. Through its welfare schemes and community development initiatives, it has undertaken a number of activities around the refinery. A merit certificate was conferred on the refinery for its commendable energy conservation performance. India's first green cooling tower was commissioned at Barauni Refinery in May 2022 which is an energy-efficient and environment-friendly alternative to the conventional cooling tower.

BARAUNI REFINERY



INDIANOIL

INDIAN OIL

Barauni Refinery spells economic prosp
North Bihar but to

On the placid banks of the Ganges, a vast area measuring over 830 acres, was cleared of the shrubs and bushes in the Begusarai Sub-divison in Bihar, to locate this refinery. The refinery is designed for a processing capacity of two million tonnes per year and will produce a whole range of products from liquefied petroleum gas and aviation gasoline to lubricants, bitumen and coke. Its processing plant has all the units necessary for the manufacture of a wide range of petroleum products for a developing economy.

The Refineries Division of the Indian Oil Corporation manages the refineries in public sector whose products are distributed by the Marketing Division.

The Barauni Refinery processes the crude obtained from indigenous sources.

Indian Oil Corporation helps build the national economy and for a regional development with consequent benefits to the people.

Prof. Humayun Kabir, Union Minister of Petroleum and Chemicals, inaugurates the refinery today.

CORPORATION LIMITED

erity not only to the under-developed the entire country.

Where Growth is the Essence of Life: Gujarat Refinery

The Gujarat refinery is the premier refinery of IndianOil. It was dedicated to the nation in 1966, transforming the landscape of a town, a state and the country. The expansion of the Gujarat Refinery took place in phases and in the process the city of Vadodara has witnessed phenomenal growth. It has about 40 operating units, and over five decades the refinery has developed with the latest technological advancements, boasting modern units and technology. The country's first riser fluidised catalytic cracking unit and the first hydrocracker plant were set up in the Gujarat Refinery. In 2004, the world's largest single train Linear Alkyl Benzene (LAB) plant was set up in the refinery, marking IndianOil's big-ticket entry into the petrochemicals field. Today, the refinery holds the second largest market share of LAB in India and exports to over 20 countries.

The refinery is known as the mother industry of Vadodara and is creating energy demand due to the economic prosperity of Gujarat. It is committed to ensure greater self-reliance in supplying vital energy products. The refinery had a catalytic role in encouraging over 200 small, medium and big industries over the course of five decades. It became a centre for industrialisation of the state. Many downstream industries sprang up around the refinery. The giant petrochemical complex, Indian Petrochemicals Corporation Ltd. and the Gujarat State Fertilisers Company were built based on feedstock supplied from the refinery. The Gujarat refinery is known for environmental sustainability and several public welfare programmes in the nearby villages and communities. Gujarat Refinery became the first Indian refinery to produce low sulphur furnace oil complying with the International Maritime Organisation specifications in 2019.

In a historic moment for the Indian aviation and energy sector, IndianOil emerged as the first oil marketing company to produce and market AVGAS 100 LL indigenously from the Gujarat Refinery. At present, AVGAS 100 LL is a completely imported product. The domestic production of AVGAS 100 LL produced by IndianOil at its Gujarat Refinery will make flying training more affordable in India. This product, which fuels aircraft operated by FTOs and defence forces, had been imported for decades. Its domestic production is a move towards Aatmanirbhar Bharat.

Left and right : The Gujarat Refinery is the mother of many industries. It has played a key role in encouraging numerous industries in and around. Many downstream industries have sprung up around the refinery that is also known as the world's largest single train Linear Alkyl Benzene plant.

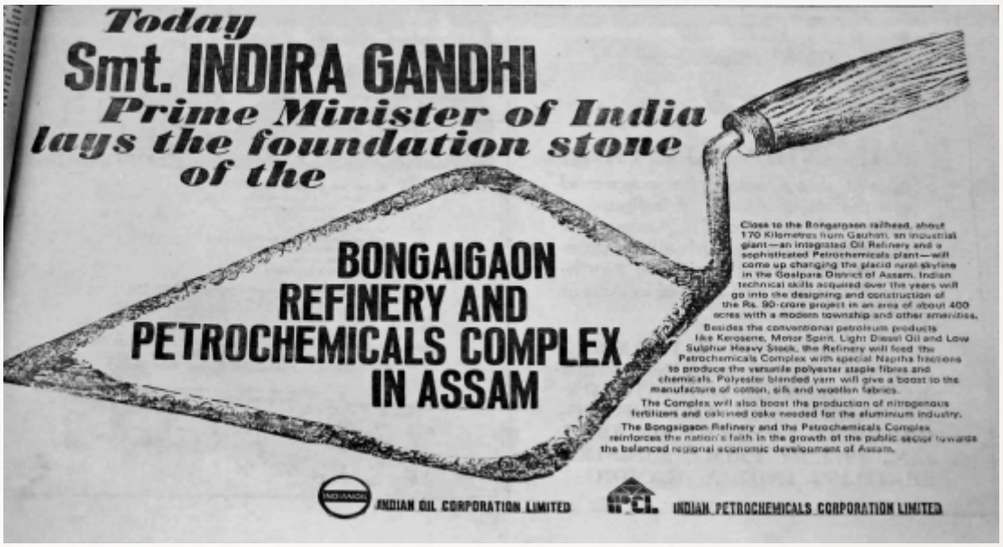
Energising Lives.. Igniting Minds.. : Haldia Refinery

The Haldia Refinery was set up with technical collaboration from Romania and France. Engineers India Ltd. and BHEL were also involved in this project. Haldia Refinery is the fourth in the chain of ten operating refineries of IndianOil. It is one of the two refineries of IndianOil producing lube oil base stocks. The refinery was commissioned in January 1975 near the confluence of river Hooghly and Haldi. Its journey from a fledgling refinery in the 1970s to being the first producer of micro-crystalline wax in India is breathtaking; it went from a technology absorber to a provider of technological knowledge in lube oil base stock production, maintenance in oil industry, and motor spirit quality improvement process. Petroleum products from this refinery are supplied mainly to eastern India through rail, road, pipelines and coastal transit.

The Haldia Refinery is the sole producer of jute batching oil. Currently it produces BS-VI MS/HSD and eco-friendly bitumen emulsion. A catalytic dewaxing unit was installed and commissioned in 2003 for production of superior quality lube oil base stocks. Spread over an area of 500 acres, the Haldia Refinery consists of four blocks of process units called the Fuel Oil Block, the Lube Oil Block, the OHCU Block and the DHDS Block. The oil movement, storage and utility sections cater to storage and movement of crude oil and products along with provision to generate and to distribute steam, power, air and other utilities.

Top and bottom: The Haldia Refinery is the fourth refinery of IndianOil located in East Midnapore district of West Bengal which was set up in technical collaboration with Romania and France and produces superior quality lube oil base stocks.

In 2019 the Haldia Refinery commissioned delayed coker unit, coker gasoil hydrotreater and associated units for upgradation of residue to high value distillates under Distillate Yield Improvement Project. A sulphuric acid unit of 375 TPD was commissioned in the Haldia Refinery in June 2022. This plant is the first of its kind to be integrated in an oil refinery in India. The prime objective of the sulphuric acid plant is to recover a minimum of 99.9 per cent of sulphur from H2S-rich acid gases from the refinery and produce 98.5 per cent (by wt) sulfuric acid which will add value through downstream integration.



An advertisement for laying the foundation stone of the Bongaigaon Refinery of IndianOil by then Prime Minister late Indira Gandhi.

Bottom: A night view of the Bongaigaon Refinery.

Achieving Excellence Through Teamwork: Bongaigaon Refinery

Bongaigaon in Assam is a 43-year-old refinery which was set up as a self-reliant India's first integrated crude oil to petrochemical company in 1979, and later amalgamated with IndianOil in 2009. It became the eighth largest refinery of the company and has scripted a glorious industrial success story in Assam. It is committed to achieve excellence in product quality and customer satisfaction. It has earned many firsts to its credit and has continued this pioneering streak in over four decades. It has successfully fulfilled the energy needs of the state and the people's aspirations with utmost commitment and dedication. It has been conferred with excellence in consistency TPM commitment award by the Japan Institute of Plant Maintenance. This refinery has achieved LEVEL 8 and was among the top five refineries in the world to achieve this extraordinary level in the ISRS eighth edition PSM protocol. In October 2020, Bongaigaon Refinery commissioned 740 MTPA of INDMAX FCC Unit. With the commissioning of the INDMAX unit, LPG production of BGR is expected to be enhanced more than four times, making up for the short supply of LPG in the region and increasing MS production for enhancement of refinery GRM through elimination of surplus Naphtha and black oil components.

The refinery flagged off its first batch of ethanol blended motor spirit, marking it as the first amongst north-eastern refineries to achieve this milestone. It has several other firsts to its credit like the first grassroots refinery integrated with a petrochemical complex under one roof, designed and engineered indigenously. It is credited with being the first refinery in the country to produce and market lead-free motor spirit. Cradled in lush greenery, the Bongaigaon Refinery Township is an excellent example of a home away from home. It has taken various environmental management initiatives such as an ecological park inside the refinery premises, Parivesh Udyan, a natural pond, and Nandan Kanan Herbal and Orchid Garden. The Bongaigaon Refinery has a unique way of treating industrial storm water which is one of its many innovative eco-initiatives. The refinery is also known for its various socio-economic upliftment programmes in the fields of health, education, youth and women's empowerment through its CSR programmes.

Top, facing page top, middle and bottom: The Mathura Refinery is the first refinery in Asia and the third in the world to receive the coveted ISO-14001 certification for environment management system and safety management. It is also known for reusing the city effluent from a sewage treatment plant for refinery operations.

Its Octamax unit and gasoline storage tank are seen.

Clean Refinery, Green Refinery- Mathura Refinery

Mathura Refinery, the sixth refinery of IndianOil was commissioned in 1982 to meet the demand for petroleum products in the north western region of the country, including the National Capital region. At Mathura Refinery, technology and ecology go hand in hand. It is the first refinery in Asia and the third in the world to receive the coveted ISO-14001 certification for Environment Management System in 1996. It is also the first in the world to get OHSMS certification for Safety Management in 1998 and 50001 certification for Environment Management System in 2018.

The Mathura Refinery was the first to undergo environmental impact assessment even before it was made mandatory under the EIA Act. In a further push to its greening efforts, IndianOil has forged a partnership with the 'National Mission for Clean Ganga' at Mathura refinery for reusing the city effluent from a sewage treatment plant for refinery operations. This project is close to completion, and once implemented, nearly 20 million gallons of

Yamuna water will be conserved every day. The Mathura Refinery will be the first refinery in the world to achieve such a green breakthrough. IndianOil will replicate this model in other refineries gradually, starting with the Gujarat refinery, where treated sewage water will fulfil the refinery's industrial requirements.

The Mathura Refinery has planted 3,23,000 trees in surrounding areas, including the refinery and township, and 115,000 trees in Agra around the Taj Mahal. The ecological park which is spread across 4.45 acres is a thriving green oasis in the heart of the sprawling refinery and is a haven for winged visitors from far and wide. The refinery witnessed a progression in its production capacity and, keeping pace with the new government policy on clean fuels, it became the pioneer in introduction and supply of Bharat Standard VI MS and HSD to Delhi/NCR.

The refinery also follows the vision of 'Make in India' and has commissioned a new unit OCTAMAX—the breakthrough technology developed by the R&D centre of the company that converts C-4 streams for catalytic cracker units to high-octane gasoline blending streams. This enables compliance with stringent fuel quality norms. Adding another feather to its cap, the Mathura Refinery bagged the prestigious refinery of the Year Award, 2021, from the Federation of the Indian Petroleum Industry.

Top and facing page top: The Panipat Refinery houses India's largest naphtha cracker plant. It has a state-of-the-art production application development centre.

Driver of Petrochemicals Business: Panipat Refinery

The Panipat Refinery was commissioned in October 1998. It was built with inputs from Danish, French, the Netherlands and US firms with state-of-the-art technology. It is the seventh most technically advanced, public sector refinery complex of the country and is known for its capacity to process a wide range of indigenous and imported grades of crude oil. India's largest cracker plant—the Panipat naphtha cracker complex—is a major driver of IndianOil's petrochemical business.

The world class naphtha cracker plant, built at a cost of Rs. 14,439 crore was commissioned in January 2010, in a record time of 46 months. The plant is designed to synergise with the existing Panipat Refinery.

Panipat Refinery launched the first ever BS-VI compliant winter grade HSD with maximum 30 degrees Celsius pour point for the high-altitude region of Leh on 17 November 2019. India's first tertiary amyl methyl ether unit commissioned at the Panipat Refinery in March 2022 produces high octane MS component having RON 120 with nil aromatics which aids in increasing XP-95, XP-100 MS production, a specialty high premium grade motor spirit.

It was a red-letter day in the history of IndianOil and India's green journey when Prime Minister Narendra Modi dedicated IndianOil's second Generation Ethanol Plant in the Panipat Refinery and Petrochemicals Complex to the nation on World Biofuel Day, 10 August 2022. The first of its kind in Asia, this new bio energy plant is based on state-of-the-art indigenous technology that will be a game-changer in India's waste-to-wealth initiatives.

Apart from the positive impact on the environment, the plant will also revitalise the local economy and enhance the potential of 'green jobs' in rural India. Parali (stubble) once farmers' liability will now be a source of employment and livelihood

for them. With the Indian government developing the National Green Hydrogen and Green Ammonia Policy, which aims to increase green hydrogen production in the country and make India an export hub of this clean fuel, IndianOil is undertaking efforts to produce green hydrogen at its refineries and the first green hydrogen plant of 10 KTPA is coming up at Panipat.

Bottom: A View of IndianOil's 2G Ethanol plant entrance.

Located in the vicinity of the sprawling naphtha cracker complex in Panipat, the state-of-the-art production application development centre promotes commercial application and customer oriented development of niche grades and new applications, quality monitoring, technical support and customer relationship management. This historic refinery meets the demand for petroleum products not only in Haryana, but in the entire north-western region including Punjab, Jammu & Kashmir, Himachal Pradesh, Chandigarh, Uttarakhand and parts of Rajasthan, UP and Delhi. The Panipat Refinery bagged the prestigious Refinery of the Year Award, 2021, under the category of large refineries.

Top and facing page bottom: The Paradip Refinery in Odisha was commissioned in 2016. It exports petroleum products to South East Asian countries. It has adopted the INDMAX technology which catapulted IndianOil into the global league of technology licensors.

The Energy Gateway to Eastern India: Paradip Refinery

The Paradip Refinery is a sunrise project for Odisha's bright future. It overlooks the sea on the eastern coast of the state, and is located on a piece of sandy, wet and marshy land. Also known as 'Vikas Deep for Odisha', it is configured to process high sulphur crude oils with major secondary processing units. It is equipped with a captive power plant to meet the power and steam requirements of the complex. It has adopted the INDMAX technology, indigenously developed by IndianOil's research and development centre. This has marked a major milestone in the history of Indian refining, and catapulted the company into the global league of technology licensors. It has several unique technological features which can process 100 per cent high sulphur crude oil to produce various petroleum products such as LPG, propylene, BS-VI compliant petrol, diesel, kerosene, aviation turbine fuel, sulphur and petroleum coke. The products from the Paradip Refinery meet the energy demands of the domestic market and are partly exported.An elaborate infrastructure is in place for pumping crude oil to the Paradip Refinery and for smooth, safe and efficient movement of the finished products. A world-scale polypropylene plant was commissioned at the refinery to nurture the downstream plastics processing industry in the region.


INDMAX

Spectacular Growth

India has witnessed a spectacular growth in the refining sector over the years. From a deficit scenario in 2001, the country achieved self-sufficiency in refining and today is a major exporter of quality petroleum products. IndianOil has played an important pivotal role in the country's journey to become a refining hub. Its strength springs from its experience of operating the largest number of refineries in India and adapting to a variety of refining processes along the way. It has commissioned several grassroots refineries and modern process units. IndianOil refineries have an ambitious growth plan for capacity augmentation, de-bottlenecking, bottom and quality upgradation. On the environment front, all IndianOil refineries fully comply with the statutory requirements. Several Clean Development Mechanism projects have also been initiated. IndianOil's expansion plans include an approved project for augmenting Barauni Refinery from 6 to 9 MMTPA. It includes expansion of distillation capacity, secondary units along with petrochemical units. The Panipat Refinery expansion to 25 MMTPA is under execution.

The Gujarat Refinery expansion (J-18) from 13.7 to 18.0 MMTPA along with integration with LOBS and Petrochemicals is in progress and proposed to be commissioned in FY 2024-25. Capacity expansion of the Digboi Refinery from 0.65 MMTPA to 1.0 MMTPA is in progress. Additional products after expansion will include polypropylene, and lube oil base stocks of different grades. IndianOil accounts for nearly half the market share of India's petroleum products, 32 per cent of its national refining capacity, and 71 per cent of its pipeline capacity. It has a luminous legacy of more than 100 years of accumulated experience in all areas of petroleum refining by including into its fold the Digboi Refinery in Assam commissioned in 1901.

The diligence and dedication of IOCians have played an important role in the country's journey to become a refining hub. Today IndianOil accounts for nearly half the market share of the country's petroleum products, 32 per cent of its national refining capacity and 71 per cent of its pipeline capacity.

Refineries Expansion Projects			
Project	Incremental Capacity Addition (MMTPA)	Approved Cost (Rs. Cr.)	Completion Schedule
Panipat Refinery Expansion Project (P-25)	10.00	34,627	2024
Cauvery Basin Refinery Project (CBR9)	9.00	31,580	June 2026
Petrochemical and Lube Integrated Project, Gujarat (J18)	4.30	18,936	August 2024
Barauni Refinery Expansion Project (DR-9)	3.00	14,810	December 2024
Digboi Refinery Expansion Project (DR-1)	0.35	768	October 2025
Guwahati Refinery Expansion Project (GR-1.2)	0.20	412	October 2023
Total	26.85	1,01,133	

The Bongaigaon Refinery Expansion from 2.7 to 5 MMTPA will be taken up based on land availability.

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Petrochemicals: A Sunrise Sector

India is one of the rapidly advancing markets in the global petrochemical industry. Recognising this potential, IndianOil is strategically enhancing its footprint in the domestic and international petrochemical sectors through systematic expansion of its customer base and innovative supply logistics. Petrochemicals have been earmarked as a key catalyst for future growth by IndianOil. The Corporation is planning an investment of Rs. 30,000 crore in the petrochemicals sector over the coming years. Its projects will leverage product streams from IndianOil's existing refineries, thereby optimising the exploitation of the hydrocarbon value chain. IndianOil has established a world-class Linear Alkyl Benzene (LAB) plant at the Gujarat Refinery and an integrated Paraxylene/Purified Terephthalic Acid (PX/PTA) plant at Panipat. A Naphtha Cracker complex with downstream polymer units is also operational at Panipat. IndianOil recently inaugurated a Polypropylene plant at Paradip, Odisha. These strategic initiatives are set to propel IndianOil into the top three petrochemical players in South East Asia over the long term.

To effectively penetrate the petrochemical market, IndianOil has established a separate Strategic Business Unit (SBU) dedicated to the marketing of petrochemicals. This SBU comprises five exclusive sub-groups, classified by product (LAB, Aromatics & Chemicals, Polymers) and function (Logistics & Exports), along with regional/field setups to ensure reliable customer service. This SBU has successfully established IndianOil's LAB business domestically and internationally. Today, IndianOil is a significant supplier to major players in the detergent industry, both nationally and internationally. Similarly, in the PTA business, all major domestic customers are catered to by IndianOil. It also exports the polymer industry at both domestic and international levels. This SBU exports products to 76 countries. A robust logistics model has been instrumental in IndianOil's success story, with facilities in place for seamless product dispatches to customers by rail, road and sea.

The brand name Propel implies propulsion or impetus with promise of growth to customer business. It denotes 100 per cent trust and value. It is known for the commitment of IndianOil's quality. Under this brand IndianOil offers a full range of products covering all segments of petrochemicals.

IndianOil LAB plant was commissioned at Vadodara in August 2004 as a venture into petrochemicals downstream segment. Its products are predominantly used as a raw material in the manufacture of Linear Alkyl Benzene Sulphonic Acid by reaction with Sulfuric Acid in liquid phase or by Sulfur Trioxide in gaseous phase.

Bottom: A view of IndianOil's Purified Terephthalic Acid plant at the Panipat Refinery. It is predominantly used as a raw material in manufacture of Polyester Staple Fibres, Polyester Filament Yarns and Polyethylene Terepthalate which also finds use in small quantities in the manufacture of paints.

Gujarat Refinery: Linear Alkyl Benzene Plant

IndianOil marked its significant entry into petrochemicals with the inauguration of the country's largest Linear Alkyl Benzene (LAB) plant at the Gujarat Refinery in August 2004. This plant is also the world's largest grassroots single train Kerosene-to-LAB unit, with an installed capacity of 1,20,000 metric tonnes per annum (MTPA). Currently, two grades of LAB - HMW (high molecular weight) and LMW (low molecular weight) are being produced for the manufacture of environmentally friendly biodegradable detergents. The quality of the LAB produced here has been widely accepted in the domestic and overseas markets.

Constructed at a cost of Rs. 1,248 crore and commissioned in a record 24 months, the plant produces superior quality LAB for manufacturing environmentally friendly biodegradable detergents. The key raw materials for the plant, catering to domestic as well as export market requirements meeting the latest and most stringent quality standards, are kerosene and benzene produced at the Koyali Refinery. The LAB unit was revamped in 2022 at a cost of Rs. 403 crore and capacity increased to 1,62,000 MTPA.

Panipat: Paraxylene / Purified Terephthalic Acid

The PX/PTA plant at Panipat, the most technologically advanced plant in the country, signifies IndianOil's major step towards forward integration in the hydrocarbon value chain by manufacturing Paraxylene (PX) from captive Naphtha and subsequently converting it into Purified Terephthalic Acid (PTA). The PTA Plant is the single largest unit in India with a world-scale capacity of 5,53,000 MTPA, achieving economy of scale.

The Paraxylene plant is designed to process 5,00,000 MTPA of heart-cut Naphtha to produce about 3,60,000 MTPA of PX. Naphtha is sourced from IndianOil's Panipat and Mathura refineries, for which Naphtha splitter units are set up at the respective refineries. The PTA unit produces 5,53,000 MTPA of Purified Terephthalic Acid from Paraxylene.

IndianOil Petrochemical Projects							
Sl. No.	Petrochemical Plant	Refinery	Feedstock	Product	Capacity (KTA)	Year of Commissioning	Copex (Rs. crore)
Revamp of Existing Units (Under Implementation)							
1	PX-PTA complex revamp, Panipat refinery	Panipat	Aromatic naphtha	PTA	147	2022-23	1255
Total					147		1255
New Units (Under Implementation)							
2	Acrylics/Oxo alcohol	Gujarat	Propylene	Butyl Acrylate	150	2023-24	5221
3	Polypropylene Unit*	Barauni	Propylene	PP	200	2023-24	1200
4	PX-PTA Complex	Paradip	Aromatic naphtha	PTA	1200	2023-24	13805
				Toulene	50		
5	Polypropylene Unit*	Panipat	Propylene	PP	475	2024-25	2416
6	Polypropylene Unit*	Vadodara	Propylene	PP	500	2024-25	2450
7	Poly Butadiene Rubber at Panipat	Panipat	Butadiene	PBR	60	2024-25	1459
					2929	2024-25	26581
Project Under Detailed Feasibility Study							
8	Textile Project (Polyester Yarn)	Bhadrak	PTA & MEG	Polyester Yarn	300	2023-24	1971
9	Styrene Unit at Panipat	Panipat	Ethylene & Benzene	Styrene	387	2025-26	5142
10	C4 Derivative Project at Panipat	Panipat	Butane	Mafeic Anhydrided 1-4 Butane Diol (BDO) & Tetra Hydrofuran (THF)	160	2026-27	3681
11	PVC Project at Gujarat Refinery and PVC block at Dumad	Gujarat	Ethylene	PVC	200	2027-28	4766
12	Paradip Petrochemical Complex	Paradip	Naphtha, C3, C4, ROG (Chlorine from third Party)	Ethylene	1500	2029-30	61077
				Phenol	334		
				IsoPropyl Alcohol	208		
				PP	529		
				LLDPE/HDPE swing	650		
				HDPE	500		
				PVC	600		
13	Phase II Expansion of Napththa Cracker Unit of Panipat Napththa Crocker Complex	Panipat	Paraffinic Napththa, Propylene	Compounded HDPE	200	2026-27	5595
				PP (Incremental)	125		
				Butadiene (Incremental)	32		
Total					5725		82232
Grand Total (A + B + C)					8801		110068

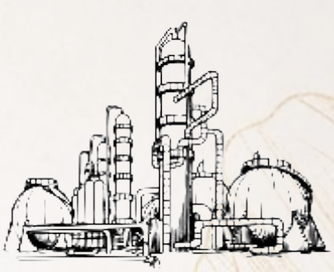
A view of the world class naphtha cracker plant, Panipat. This plant produces high quality and high value niche grades, including high speed Bi-axially Oriented Polypropylene, high clarity random co-polymers and super impact co-polymer grades.

Panipat: Naphtha Cracker Plant

In line with the Make in India initiative and horizontal integration in the Hydrocarbon value chain, IndianOil has established a world-class Naphtha Cracker plant. One of India's largest, the world-class Panipat Naphtha Cracker, built at a cost of Rs.14,439 crore, was commissioned in January 2010. The dedicated and determined team at IndianOil completed the construction and commissioning of the project in a record time of 46 months. Its flawless commissioning is on par with the best in the world.

The plant is designed to synergise with the existing Panipat Refinery. The feed for the unit is sourced internally from IndianOil's Koyali, Panipat, Barauni and Mathura Refineries. The Panipat Naphtha Cracker complex comprises the following downstream units-Polypropylene Unit (Capacity: 600 KTA), High-Density Polyethylene Unit (HDPE) (capacity: 300 KTA), Swing Unit (350 KTA, Linear Low-Density Polyethylene with HDPE), Mono Ethylene Glycol (MEG) plant (capacity: 300 KTA), Butadiene Unit (138KTA) and Butene Unit (20 KTA). KTA is a thousand tons per annum. The cracker plant produces over 800 KTA per annum of ethylene, 600 KTA of Propylene, 117 KTA of Benzene, and other products, viz. Pyrolysis fuel oil, components of MS, LPG, Diesel etc. MEG and Benzene Units revamp were done in December 2022 and capacity increased to 425 KTA and 205 KTA respectively.

The Polypropylene (PP) unit is designed to produce high quality and high value niche grades including Bi-axially Oriented Polypropylene (BOPP) (used for food packaging and laminations), high clarity random copolymers (used for food



Bottom: Polypropylene & MEG plant will support plastic and fertile industries in Odisha.

containers and thin-walled products) and super impact copolymer grades (used for batteries, automobile parts, luggage and heavy-duty transport containers). Polyethylene is used for making injection moulded caps, heavy-duty crates, containers, bins, textile bobbins, luggage ware, thermoware, storage bins, pressure pipes (for gas and water), small blow-moulded bottles, jerry cans, etc. Butadiene is used for making synthetic rubber.

Paradip: Polypropylene and MEG Plant

IndianOil has established a world-class 700 KTA Polypropylene Plant based on standard propylene from the Indmax (high severity FCC) unit at a cost of Rs. 3150 crores at Paradip, Odisha, to support the plastic industry of the eastern region. Commissioned in June 2019, the Paradip PP plant is designed to produce Homopolymer grades for Injection Moulding, Raffia, Biaxially Oriented PP, TQ Film, Fibre & Filament, and Extrusion Coating, among others.

A mono ethylene glycol (MEG) plant of 332 KTA capacity was commissioned in February 2023 at Paradip at a cost of Rs. 5654 crores. It is a key driver for the textiles industry in the region, especially for polyester fibre.

The Product Application Development Centre is the Centre for Excellence in IndianOil's research related to the thrust area in plastics technologies. The laboratory building is designed to take on an iconic position in the refinery complex, signifying the focus on research and the future.

Panipat: Product Application Development Centre

Situated in close proximity to the expansive Naphtha Cracker Complex in Panipat, the state-of-the-art Production Application Development Centre (PADC) fosters the commercial application and customer-oriented development of niche grades and new applications, quality monitoring, technical support, and customer relationship management. Serving as a liaison between the company's Polymer plants at Panipat, its marketing setup, and end-use customers, PADC develops new applications, formulations and grades that align with market needs. It is recognised by the Department of Scientific and Industrial Research (DSIR), Ministry of Science & Technology, Government of India, and certified by M/s. ICS.

Paradip: Product Application Development Centre

IndianOil came up with another state-of-the-art PADC near the Polypropylene plant at Paradip refinery in 2019 to cater to the requirements of customers in the region and strengthen the already available similar facility at Panipat. This facility will also be a support system to upcoming Plastic Park at Paradip and Textile Park at Bhadrak. In March 2023, the IndianOil Board accorded 'Stage-I' approval for setting up Paradip Petrochemical Complex at an estimated cost of Rs. 61,077 crore.

This mega project will be the largest-ever investment of IndianOil at a single location. The petrochemical complex will include a world-scale cracker unit along with downstream process units for producing several petrochemical products including Polypropylene (PP), High Density Polyethylene (HDPE), Linear Low-Density Polyethylene (LLDPE), Poly Vinyl Chloride (PVC) etc.

It will also facilitate production of niche chemicals and petrochemicals like Phenol and Iso Propyl Alcohol. This mega project will significantly improve the Petrochemical Intensity Index of IndianOil. It will be a growth driver in making the company a major player in the petrochemical industry, while strengthening India's self-reliance in the petrochemical sector.

This project will catalyse the growth of PCPIR and Plastic Park at Paradip. On commissioning of this project, domestically available petrochemicals are expected to provide feed and vitalise industrial growth in key downstream industries like plastic, pharma, agrochemical, personal care, paints, etc. It is also expected to create employment opportunities in eastern India, especially Odisha.

Numerous Milestones

Today IndianOil, the premier energy company of India operates the largest number of 10 refineries, strategically placed across the country, catering to the growing energy requirements. These include the CPCL Refinery in Chennai. The company's journey from the world's oldest refinery Digboi to Paradip is a story of consistent efforts, sustained hard work, patience, innovation, research and development and several milestones by IOCians with a spirit of 'Pehle Indian Phir Oil' spirit.

The marketing network is augmented by 80.55 million metric tonnes per annum of group refining capacity. IndianOil has fuelled the vision of the Government of India to achieve self-reliance in oil refining. It has a plan to expand the refining capacity to 107 million metric tonnes per annum by 2025 with capacity expansion under implementation at various refineries. The research and development department of IndianOil has established a prominent footprint in refining technology.

Indigenisation Efforts

When Indianoil set up its first refinery at Guwahati in 1962, it was totally dependent on foreign technology and expertise. In a determined effort by 1982, when Mathura was commissioned, the foreign component was reduced to a mere 14 per cent. Today the company is capable of exporting expertise to other developing countries.

The consumption of petroleum products in India during 1947, when the country attained independence, was merely 2.5 million tonnes per annum (MMTPA). The present demand is around 40 MMTPA. Till the mid-1950s, except for the Digboi Refinery, the entire demand of the country was met by imports and marketed by transnational companies.

IndianOil's refineries have achieved many milestones in different spheres of life. They are the nucleus of regional development and bring smiles to local communities in and around their projects.

Facing page bottom: In a bid to facilitate the growth of the polymer industry in Odisha and eastern India, IndianOil has set up a Product Application and Development Centre in Paradip. The centre reforms a pivotal role in developing new materials and innovative applications and also providing support to investors in setting up manufacturing units in the plastic and polymer sectors.

Lighting a New Path

IIndianOil's refineries have achieved many milestones. They have successfully leapfrogged towards cleaner and greener fuels and are known as 'Mother of Several Industries'. Their income has grown manifold and living standards have increased. The refineries are actively involved in the Swachh Bharat Abhiyan launched by the Government of India and have built a number of educational institutions.

These refineries serve as the nucleus of regional development and have always endeavoured to bring smiles to the communities in and around them. They contribute to the development of various states and usher a dawn of hope for the youth.

BLENDING TECHNOLOGY WITH ECOLOGY

The Mathura Refinery, located along the Delhi-Agra National Highway at a distance of 154 kilometres from Delhi, was commissioned in 1982 with the objective of meeting the demand for petroleum products in the north-western region of the country, including the National Capital Region. It has now achieved the distinction of being among IndianOil's greenest refineries.

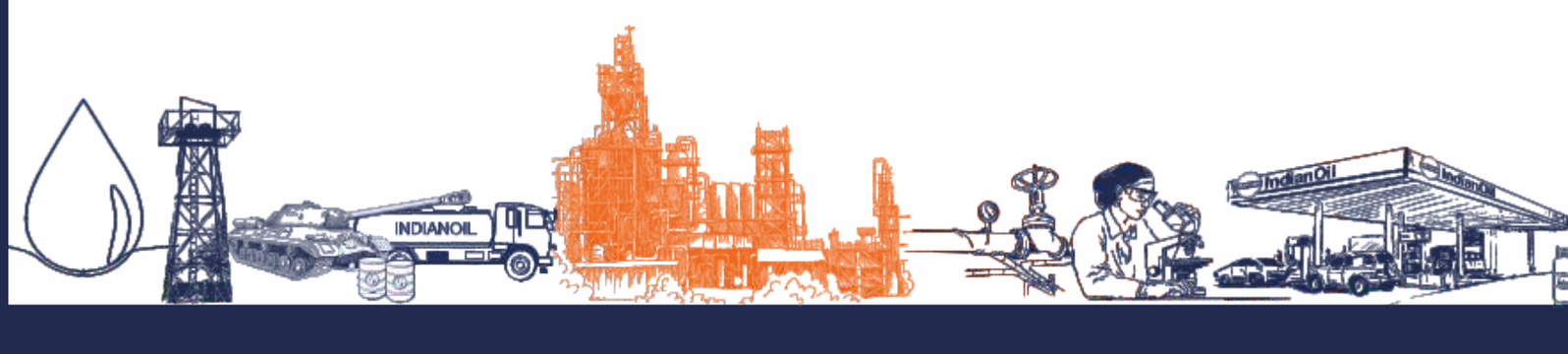
Technology and ecology go hand in hand at Mathura Refinery with a continuous endeavour for product quality upgradation, energy conservation and environment protection. Owing to its proximity to the magnificent Taj Mahal, one of the Seven Wonders of the World, there is an added sense of responsibility towards a cleaner environment. For upgrading environmental standards, old sulphur recovery units (SRU) were replaced with new SRU with 99.9 per cent recovery.

An additional SRU was implemented as a standby and commissioned by 2011. The refinery also set up four continuous ambient air monitoring stations far beyond the working area before commissioning in 1982 as a mark of its concern towards the community and archaeological sites. It was one of the first refineries in the country to produce BS VI grade fuels, and has supplied the National Capital Territory of Delhi with BS VI fuels since 1 April 2018.

One of its pioneering contributions towards environmental protection is the creation of an ecological park. Spread over 18,000 square metres inside the refinery, the eco park has become a habitat for a variety of local and migratory birds. The increasing arrival of winged visitors to the refinery is the measure of effective environmental management. Other refineries of IndianOil have also set up ecological parks where a wide variety of flora and fauna are found. A residue upgradation project is being considered at the refinery to improve the distillate yield and quality keeping in mind the environmental effects.

The major secondary processing units initially were the fluidised catalytic cracking unit (FCCU), vis-breaker unit (VBU) and bitumen blowing unit (BBU). The original technology for these units was sourced from the erstwhile USSR. The soaker drum technology of EIL was implemented in VBU in 1993. For producing unleaded gasoline, a continuous catalytic reforming unit (CCRU) was commissioned in 1998 with technology from IFP, France. A diesel hydro desulphurisation unit (DHDS) was commissioned in 1999 for production of HSD with low sulphur content of the 0.25 per cent wt (max). With the commissioning of once through hydrocracker unit in 2000, the capacity of Mathura Refinery was increased from 6.0 to 8.0 MMTPA. FCCU revamp was undertaken in 2014 to increase the processing capacity of the unit from 1.3 to 1.5 MMTPA.

In a bid for community outreach, IndianOil's 50-bed Swarna Jayanti Samudaik Hospital at Raunchi Bangar village in Mathura was established in 1999 to provide medical assistance to residents of areas near the refinery. This hospital also operates two mobile dispensaries to provide primary medical care in the neighbouring villages. The hospital provides free treatment to the destitute and offers subsidised treatment to others. It has facilities such as out-patient department, in-patient department for general medicine and surgery, emergency services, physiotherapy, trauma centre, ICU, burns centre, diagnostic services, blood bank, etc. Out of 50-beds, 10 are designated to provide free treatment to destitute patients. Annually, about 55,000 people are treated in the OPD and 3500 are treated as in-patients.



The Mathura Refinery, which was commissioned in 1982, has achieved the distinction of being rated as one of the greenest refineries. It is the first refinery in the country to produce BS VI grade fuels and is known for its pioneering role in green hydrogen with significant contributions towards environmental protection through its ecological park. A view of a bird flying in the Mathura Refinery eco park.

The Mathura Refinery has won a number of awards. It is the first oil refinery in Asia, and third in the world, to receive the ISO-14001 certification. Salaya-Mathura and Koyali-Ahmedabad pipelines are among the 15 green pipelines in the world with ISO-14001 certification. It has implemented revamps, systems and maintenance audits to enhance its energy conservation efforts. Over the years, IndianOil has consciously woven its intent to spread its green footprint in its operations. It has forged a partnership with the National Mission for Clean Ganga at the Mathura Refinery to reuse the city effluent from a sewage treatment plant for refinery operations.

Acknowledging the contribution of the Mathura Refinery to the nation, a commemorative postal stamp was released by the government. It was a historic moment for the refinery as a reaffirmation of its commitment to a clean and green environment, whereby it coexists in harmony with the ecosystem and its operations are safe and eco-friendly.

CHAPTER 5

The Energy Veins of India: IndianOil's Pipeline Network

The process of lowering pipelines for transportation of petroleum products. IndianOil operates a more than a 15,000 kilometre long network of crude oil, petroleum products and gas pipelines. It is a pioneer in the country, managing one of the world's largest oil pipeline networks.

If refineries are the heart and lungs of IndianOil, then pipelines are like the arteries and veins running across the length and breadth of the country. They are vital for the growth and development of the nation as they play a significant role in the transportation of oil and gas over long distances swiftly, conveniently, and economically. Pipelines are rivers of growth and development. They are the distribution backbones of the oil and gas industries, fuelling industries and the lives of people. Globally, cross-country pipelines are accepted as the safest, the most cost-effective, energy-efficient and environment-friendly mode for transportation of bulk crude oil and petroleum products such as jet fuel, natural gas, LPG, butane, anhydrous ammonia, coal, mineral and solid waste.

Significance of Pipelines

The advantages of pipelines are noteworthy. They consume minimal energy compared to any other mode of transportation and transit losses are minimal. The operating cost of transporting petroleum products through pipelines is very low. Pipelines can be laid through difficult terrains as well as underwater which is not possible in any other mode of transportation. Pipeline transportation has proved to be the most convenient and reliable mode for transportation of high volumes of petroleum products over long distances compared to other modes, viz. rail, road, tankers, etc., due to its inherent advantages like reliability, safety, flexibility, low energy consumption, low transit losses and negligible impact on the environment. Product reaches the destination with minimum chances of interruption in the supply. Pipelines are not affected by seasonal variations and climatic hostilities like floods, snowfall, rainfall, etc., which disturb the surface transport system.

Constructing pipelines is not an easy task and a lot of hard work, time and patience are required. Pipelines play a significant role in the transportation of oil and gas over long distances as they are convenient and economical.

Environmental impact of a pipeline system is negligible as energy requirements are lower in case of pipeline transportation. Pipelines are an important asset in the oil and gas value chain, used primarily in bulk transportation of hazardous hydrocarbons. The oil and gas pipelines network in the country runs into thousands of kilometres and is expected to increase as companies augment energy infrastructure to improve accessibility to energy at an affordable cost.

Pipelines and the products, they carry help to provide economic growth for communities across the country. Not only are people employed to maintain current and existing pipelines, direct and spin-off jobs are created when new pipelines are built or need servicing. There are also myriad ancillary and supply chain jobs that are created through production and end-use demand that helps the country sustain a steady energy supply. Many of the investments made in new, multi-billion dollar petrochemical facilities or new liquefied natural gas terminals being planned currently would be impossible without a steady and reliable supply of feedstock provided by pipeline infrastructure. IndianOil is a pioneer in crude oil and product pipelines in India. It operates a network of about 18,650 kilometres long crude oil, petroleum product and gas pipelines with a throughput capacity of 124.40 million metric tonnes per annum of oil and 48.73 million metric standard cubic metres per day of gas. IndianOil's gas pipelines network too is set for phenomenal growth. The company aspires to be a major player in natural gas, with leadership in the R-LNG segment, and is taking steps to enhance its share in LNG sourcing, import terminals, cross-country pipelines, city gas distribution networks and bulk supplies by road-tankers.

A view of a tank lorry filling pump house which operates round-the-clock and plays a vital role in distribution of oil and gas.

Bottom left and right : Pipeline lowering activity is a job that requires care and is generally performed by specific heavy machinery. Laying of pipelines for transporting refined petroleum products involves cumbersome operations. Trained elephants were used in Assam to ferry pipelines across the rivers.

Fascinating History

The use of pipelines for oil transportation started soon after the drilling of the first commercial oil well in 1859 by Colonel Edwin Drake. The pipelines used in the early years of the oil industry were short in length and quickly assembled to get oil from drill holes to nearby tanks or refineries, often fabricated from logs or wood planks. These were developed to replace transport in wooden barrels loaded on wagons drawn by mules. As the oil and pipeline businesses grew, the type of material for pipes improved from wood, to wrought iron and then steel. The first successful metal pipeline was completed in 1865 and transported 80 barrels per hour of crude oil over an eight kilometres route in Western Pennsylvania.The transportation of oil in India was mostly through road and rail in drums. Over a period of time, transportation of bulk quantity of petroleum products by rail and road became quite cumbersome due to heavy traffic. The industry was hungry for an efficient and cost-effective transportation system and pipelines were found to be the most economical and environment-friendly mode. India's first

pipeline was laid to transport crude oil discovered in the Digboi oil fields to the Digboi Refinery in Assam in 1901. The first major cross-country crude oil pipeline, stretching from the Nahorkatiya and Moran oilfields in Assam to the Guwahati Refinery, was commissioned by Oil India Ltd. (OIL) in 1962 and was later extended to the Barauni Refinery in 1964. The first multi-product petroleum product pipeline of India was constructed from Guwahati Refinery in Assam to Siliguri Terminal in North Bengal by Indian Refineries Ltd. Bechtel International Corporation of USA was appointed as the consultant for the pipeline project who submitted the study report in February 1962. The journey along the 427 kilometres pipeline route from Guwahati to Siliguri was through evergreen meadows, rivers and valleys amidst beautiful hills in the difficult terrain of north-eastern India. The experience during the construction of pipelines was unique and tough. The construction engineers would often have close encounters with wild animals like tigers and elephants in the thick forests.

Bottom: Construction of the Naharkotiya-Barauni crude oil pipeline. In olden times, transportation of bulk quantity of petroleum products was by rail and road which was quite cumbersome. There was need for an efficient and effective transportation system and pipelines were found most suitable. India's first pipeline was laid in the Digboi oilfields till the Digboi Refinery.

The construction challenges involved 29 submerged river crossings, 25 rail bridges and two aerial crossings, through inhospitable terrain. However, the project was completed in exactly 18 months on 31 August 1964. The Guwahati-Siliguri Pipeline put India on the world map of hydrocarbon pipelines as it was the first of its kind project east of the Suez Canal. Its construction and commission opened up a new chapter in the history of petroleum pipelines in India.

Top left and right: Welding in progress at the Naharkotiya -Digboi pipeline which went through jungle country. In the past manpower was used to lay pipelines safely as heavy machines were not available. The employees had a tough time during the construction of pipelines and they had many close encounters with wild animals.

Major Crude Oil Pipelines

The Salaya-Mathura Pipeline is a crude oil pipeline of 2,660 kilometres beginning from Salaya near Vadinar in Jamnagar district on the coast of Gujarat which is a small coastal town located in Devbhumi Dwarka district of Gujarat. This pipeline brings crude oil to IndianOil's refineries at Koyali in Gujarat, Mathura in Uttar Pradesh and Panipat in Haryana. The company has a vast crude oil tank farm at Vadinar with 18 tanks. The SMPL system also has crude oil storage tank farms at Viramgam in Gujarat with nine tanks. There is another one at Chaksu in Rajasthan which has six tanks.The pipeline system also includes 14 kilometres long offshore and online pipeline from 2 single point mooring systems (SPMs) to the tank farm in Vadinar.

The Paradip-Haldia-Barauni pipeline is a 1,965 kilometres long crude oil pipeline originating from Paradip in Odisha. It takes crude oil to IndianOil's refineries at Haldia in West Bengal, Barauni in Bihar, Bongaigaon in Assam (through Oil India Ltd. pipeline from Barauni) and meets part requirement of the Guwahati Refinery by rail from Barauni. The pipeline system also includes 92 kilometres long offshore and online pipeline from three single point mooring systems (SPMs) to the tank farm in Paradip. The Mundra-Panipat pipeline was commissioned to transport crude oil from Mundra on the Gujarat coast to the Panipat Refinery in Haryana. The

length of this pipeline is 1,194 kilometres. There is a 74 kilometres long pipeline from Mundra to Churwa. This is the hook-up point of MPPL to the existing system of the Kandla-Panipat section of the Kandla-Bhatinda pipeline near Gandhidham. This pipeline makes use of Gujarat's Adani Port's SPM offshore crude oil terminal facilities and associated offshore and onshore pipelines.

The Guwahati-Siliguri 435 kilometres long pipeline that was commissioned in 1964 was the first product pipeline to be built east of the Suez. It was designed by Bachtel, USA, and constructed by SnamProgetti, Italy. Originating at Guwahati Refinery, it runs through the Bongaigaon Refinery. A view of the commissioning of the Koyali Ahmedabad pipeline.

A view of the modern TLF pump house which is an integral part of petroleum products pipelines. It requires considerable engineering expertise and a vast network.

Hydraulic Engineering Expertise

The Haldia-Barauni pipeline, which was commissioned in 1967, is 526 kilometres long; originates at Haldia in West Bengal and ends at Barauni in Bihar. This pipeline is an example of expertise in system modifications and pipeline hydraulic engineering. Although the pipeline was commissioned as a petroleum product pipeline, initially it was used to transport imported crude oil to Barauni. A few years later, the pipeline started pumping petroleum products from the Barauni Refinery to Haldia and is currently engaged in transportation of indigenous and imported petroleum products from the Haldia Refinery.

The 1,227 kilometres long Barauni-Kanpur pipeline was commissioned in 1966, and transports petroleum products from Barauni Refinery and Haldia Refinery. A branch pipeline was taken out from Gawria to Amousi in Lucknow. This has a parallel line between Barauni and Patna. Another branch pipeline originates at Patna taking products to Baitalpur in Uttar Pradesh and Amlekhganj in Nepal.

Vast Network

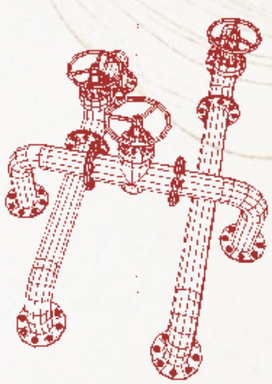
The Haldia-Mourigram-Rajbandh pipeline is 277 kilometres long, built in early 1972. It is used for transportation of petroleum products from IndianOil's Haldia Refinery to Mourigram (Howrah) and Rajbandh (Burdhman) in West Bengal. The Mathura-Delhi pipeline was earlier a section of the Mathura-Jalandhar pipeline which was commissioned in 1984. This was designed by IndianOil with in-house construction supervision. This 147-kilometres-long pipeline transports petroleum products from the Mathura Refinery to Bijwasan in Delhi. The Panipat-Ambala-Jalandhar pipeline was earlier a part of the Mathura-Jalandhar pipeline and was later connected to the Panipat Refinery in 1997 so that petroleum products could be transported from the refinery there. This pipeline is 495 kilometres long and has a branch line from Kurukshetra to Najibabad via Roorkee in Uttar Pradesh. It has another branch line from Jhugian in Punjab to Una in Himachal Pradesh.

The Panipat-Delhi pipeline was earlier a section of the Mathura-Jalandhar pipeline. Petroleum products are transported from the Panipat Refinery through

Foundation work of laying a new pipeline is under progress.

this pipeline which is 189 kilometres long and has a branch line from Sonipat to Meerut. The Mathura-Tundla pipeline was commissioned in 2003, is 56 kilometres long and transports products from the Mathura Refinery to the Tundla (Agra) Terminal. The Panipat-Bhatinda pipeline was earlier a part of the Kandla-Bhatinda pipeline. Petroleum products are transported through this 219 kilometres long pipeline from Panipat Refinery to Sangrur and Bhatinda. This pipeline was commissioned in 1996. The Panipat-Rewari pipeline was commissioned in 2004 and is 155 kilometres long; it transports products from the Panipat Refinery to Rewari Terminal. Koyali-Sanganer pipeline, commissioned in 2003 is 1,664 kilometres long covering various sections and also has many branch lines. Koyali-Dahej product pipeline was commissioned in 2007. This is a 197 kilometres long product pipeline which goes from Koyali Refinery to Dahej Terminal of Gujarat Chemical Port Terminal Company Ltd. A branch line of this runs from Amod to Hazira (Surat). The Koyali-Ratlam product pipeline was commissioned in 2009. The length of the pipeline is 265 kilometres which goes from the Koyali Refinery to Ratlam marketing terminal.

The Mathura-Bharatpur Spur pipeline was commissioned in 2010. This is a 21 kilometres long product pipeline from Mathura Refinery to Bharatpur. The Paradip-Raipur-Ranchi pipeline is 1,073 kilometres long having many sections such as Paradip-Jatni, Jatni-Sambalpur and Sambalpur-Saraipalli-Raipur. This pipeline also has branch lines from Sambalpur to Ranchi from Jharsuguda and from Saraipalli to Korba. The Paradip-Jatni section was commissioned in 2016. The other sections were commissioned in 2017. The Chennai-Trichy-Madurai product pipeline was commissioned in 2005. It consists of a 683 kilometres long pipeline from Chennai to Madurai and a branch pipeline to Sankari. It transports the products of Chennai Petroleum Corporation Ltd. [CPCL], which is a subsidiary of IndianOil, to Trichy, Madurai and Sankari. The Chennai-Bangalore pipeline was commissioned in 2010. This is a 290 kilometres long petroleum product pipeline from Chennai to Bengaluru which carries petroleum products from CPCL, Manali Refinery, to Chittoor and Bengaluru.

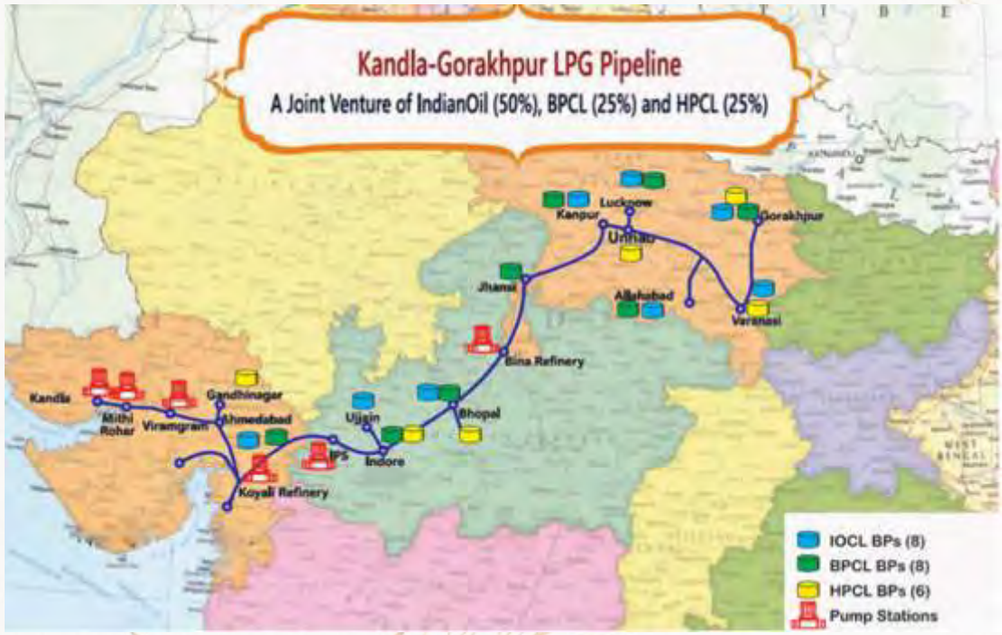


A view of IndianOil's pipeline control room where IOCians monitor day-to-day pipeline operations.

Bottom: A map depicting the 2,805 kilometres long Kandla-Gorakhpur LPG pipeline project. This is the longest LPG pipeline in the world conceived so far and is being built with an investment of Rs. 10,888 crore. A joint venture company of IndianOil, BPCL and HPCL called IHB Ltd. will implement the project.

Making LPG Accessible

The 2,805 kilometres long Kandla-Gorakhpur LPG pipeline project—the longest LPG pipeline in the world conceived so far, Gujarat-1,076 kilometres, Madhya Pradesh-621 kilometres, Uttar Pradesh-1,108 kilometres—is being implemented through a joint venture company of IndianOil, Bharat Petroleum Corporation Ltd and Hindustan Petroleum Corporation Ltd. called IHB Ltd. The pipeline has been authorised by Petroleum and Natural Gas Regulatory Board under Common Carrier Category. Being constructed at an investment of Rs. 10,088 crore, the pipeline will source LPG from the LPG import terminals on the western coast located at Kandla, Dahej and Pipavav and also from two refineries at Koyali and Bina. The pipeline



An aerial view of a pipeline station

would be directly linked with 22 LPG bottling plants, three in Gujarat, six in Madhya Pradesh and 13 in Uttar Pradesh.

IndianOil's other LPG pipelines include the one from Panipat to Jalandhar which was commissioned in 2008. This 274 kilometres long pipeline from Kohand (Panipat) traverses through Nabha and terminates at Jalandhar. It has hook-up facilities with existing bottling plants at Kohand, Nabha and Jalandhar. The Paradip Haldia Barauni Muzaffarpur pipeline, commissioned in 2017 and augmented in 2022, has a length of 1,598 kilometres and transports LPG from the Paradip Refinery, Haldia Refinery and IPPL Haldia to bottling plants at Balasore, Kalyani, Budge Budge, Durgapur, Banka, Patna and Muzaffarpur.

Transporting ATF

The Chennai aviation transport fuel (ATF) pipeline was commissioned in 2008. This is a 95 kilometres long ATF pipeline which goes from CPCL, Manali, to Chennai aviation fuel station (AFS). The Panipat-Bijwasan ATF pipeline was commissioned in 2010. This 111 kilometres long pipeline transports aviation fuel from Panipat Refinery to Bijwasan in Delhi to meet ATF requirements of Delhi. It transports naphtha from the Mathura Refinery to Panipat Refinery.

The Devanagonthi-Devanahalli pipeline was commissioned in 2008. The 36 kilometres long pipeline transports aviation fuel from Devanagothi in Bengaluru to the aviation fuel station at the airport in Devanahalli. Aviation fuel of IndianOil and other public sector oil companies is transported through this pipeline. Kolkata ATF pipeline was commissioned in 2018. This 27 kilometres long pipeline transports aviation fuel from Mourigram to the AFS at the Kolkata airport. The aviation fuel is received at Mourigram through the Haldia-Mourigram-Rajbandh pipeline. Recently IOCL has won the PNGRB bid for the 22 kilometres long ATF pipeline from JNPT to Navi Mumbai International Airport, which is under implementation.

Laying an aviation turbine fuel pipeline at Chennai airport.

Facing page top and bottom: View of intelligent pig equipment

Ensuring Safe Pipeline Operations

IndianOil's 18,500 kilometres plus pipelines that run across the country serve as underground energy highways of India. These are assets of crucial national importance. Their safety cannot be undermined. These pipelines carry highly inflammable material at high pressure. Pilferage or pipeline intrusion incidents may result in accidents of a grave nature. Lives can be lost and property destroyed besides the interruption of energy supplies. An act of pilferage is a grave offence, punishable under the law.

IndianOil follows many regulations and procedures to monitor and ensure the safety of its pipelines which have to work non-stop with high efficiency, safety and security. The company is also committed to public safety and protection of its environment. All its pipelines adhere to the regulatory framework of the Petroleum and Mineral Pipelines Act, 1962, with all the latest amendments. They are also governed by safety standards of Petroleum and Explosives Safety Organisation and Oil Industry Safety Directorate . Above the ground there are pipeline markers and boundary pillars which are displayed along the right-of-way. These are made to alert the public and contractors about the existence of the pipeline. There are visual inspections of the entire right-of-way on a daily basis through foot patrolling by pipeline security guards.

Digital Vigil

Personnel in control centres monitor the pipeline operating conditions 24 hours a day, seven days a week. This is done using the Supervisory Control and Data Acquisition system. This system gathers data such as pressures, volume and flow rates and the status of pumping units and valves. Whenever operating conditions change, an audio visual alarm goes off. This warns the operator on duty who then investigates. There are automated and manual valves which are strategically placed along the pipeline route. These enable the pipeline to shut down immediately and sections are isolated quickly as and when the need arises.


WD-40

Left and right: IOCians keep constant vigil and monitor pipelines through the global positioning system enabled devices including the latest drone technology to ensure uninterrupted supply of crude oil.

Pipelines Division is also implementing Centralised Process Information Management System (CPIMS) Project for monitoring and storing of critical pipeline data at central level at the pipeline head office. The stored data parameters such as RPM, flow, pressure, current, etc. will be used for analytics.

For all round protection and monitoring of large pipeline networks, the pipeline locations are equipped with RTTM and NPW based leak detection systems. To further boost the security of its pipelines, IndianOil has undertaken focused digital initiatives like the optical fibre based pipeline Intrusion Detection and Warning System (PIDWS). It is a technology to detect and alert operators about potential unauthorised activities or intrusions along oil and gas pipelines, enhancing safety and preventing incidents.

IndianOil is progressively implementing PIDWS in its entire pipeline network. PIDWS works on the principle of coherent reflection technique called Coherent Optical Time Domain Reflectometry (C-OTDR) in which a pulse of light is transmitted into an optical fibre which gets reflected back from points (impurities) along the entire length of the fibre. These reflections are caused by a phenomenon known as 'Rayleigh backscatter'. The reflected pulses are then received at the source end by an OTDR detector and analysed.

The company is also moving towards aerial survey via drones for total elimination of this threat. It will be implementing PIDWS along with AI-based drones and Quick Reaction Teams as a defence mechanism for achieving nil intrusions in the company's pipeline system.

To enhance the effectiveness of this constant vigil, the movement of line patrolmen and DGR guards (Director General Settlement consisting of ex-servicemen) are monitored through Global Positioning System enabled devices. Such GPS-tracked, physical inspections also help spot and identify abnormalities like loose soil, the smell of leaked petroleum products or suspicious vehicle tyre marks in the vicinity of the pipelines. IndianOil teams, along with local police, also undertake periodic joint-patrolling of vulnerable locations to track any unauthorised activities.

Based on previous experience fighting the menace of pipeline intrusion, IndianOil has also identified the most vulnerable sections of pipelines to ensure better surveillance. Such locations are monitored through CCTVs, and pipeline routes are shared with local administration for better supervision. Moreover, to ensure swift recourse, the issues related to pilferage are undertaken at various levels of the state government and police department.

Awareness Programmes

Village awareness programmes are held regularly to sensitise villagers about pipeline safety. They are made aware of what action should be taken in case of any emergency so that they can act as first responders. To keep the villagers engaged as well as to be in touch with IndianOil, other activities are also carried out. These are free medical check-up camps, tree plantation drives, provision of drinking water facilities, street lighting, construction of school buildings and other such activities. IndianOil CSR activities of the Pipelines Division are centred around villages which are near the right of way.

IndianOil has several public awareness programmes which are designed to prevent third party damage to its pipelines. Pipeline accidents can occur by various types of digging and excavation activities. The company has well designed emergency preparedness and planning measures in place to handle any untoward incidents. The company has a well-documented emergency response disaster management plan for each station and pipeline section.

Briefing sessions are being conducted with villagers along the right-of-way under the company's Southern Region pipeline region.

Bottom: Mock drills are an integral part of the company's safety and security regulations for any emergency during day-to-day operational work.

PIM Advantage

To ensure safety and reliability of pipeline operations, Pipeline Integrity Management (PIM) deploys a cradle-to-grave approach, comprising all stages of the pipeline life cycle, from conception to engineering and design, construction, operation, inspection and finally, to repair and replace when necessary. PIM addresses key areas related to both integrity issues (mechanical failure, corrosion and cracks) and flow assurance issues (water content, solids deposition, wax and hydrate precipitation, two-phase flow conditions and cavitation, etc.).

Due to the submerged and buried or insulated nature of pipeline installation and sometimes difficult terrain (river beds, deltas, open ocean, etc.), monitoring of incipient damage becomes challenging, making pipelines vulnerable to accidents. Pipelines pass through myriad terrains, including desolate, far-flung areas. This poses several challenges not only during the construction phase but also in day-to-day operations.

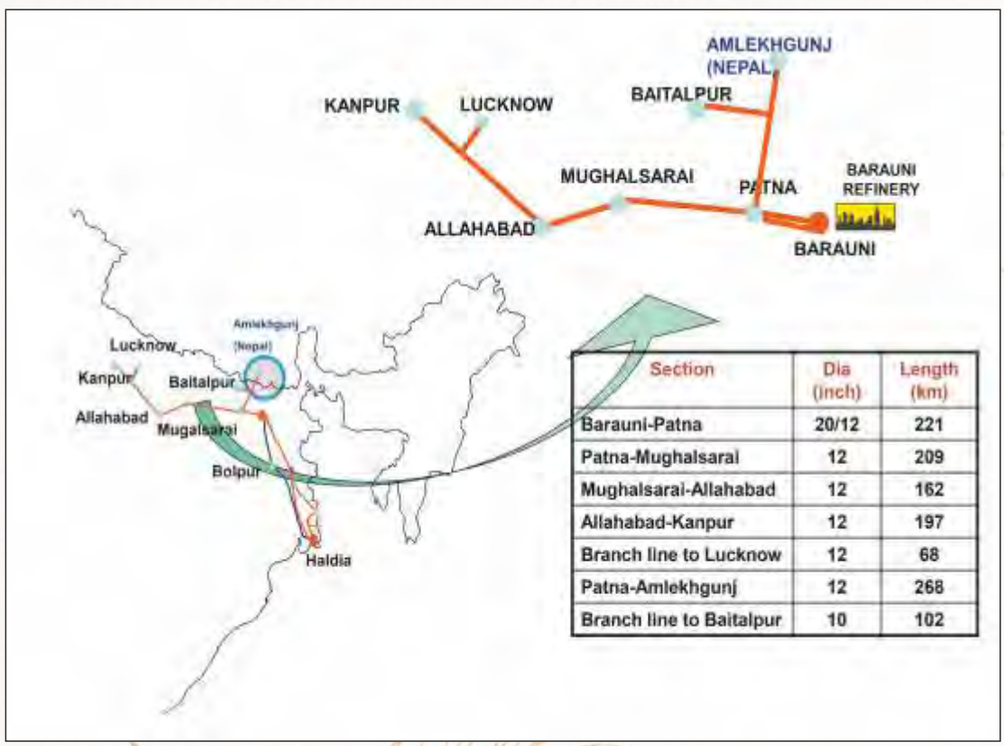
IndianOil has framed a strategy to ascertain integrity of its assets by leveraging the latest technologies. It has been carrying out extensive In-Line Inspection (ILI) of pipelines through high precision instrumented PIGs. IndianOil's first smart pig run was in year 1984-85 in HMRPL. The technology was primitive and was only able to indicate metal loss in terms of percentage of pipe wall thickness without discriminating between external or internal corrosion. Later in the 90s, relatively advanced versions of smart pigs were run in 12"HMR, 24" VC(SMPL) and 42" Vadinar offshore pipeline. IndianOil's first smart pig developed indigenously by its R&D team was run successfully in12" BKPL in year 2007.

The Pipelines Division has adopted a multi-pronged strategy including technological leverages and operational excellence to ascertain integrity of its assets. It has been carrying out extensive in-line inspection (ILI) of pipelines through high precision instrumented PIGs and rehabilitation of distressed assets. The company completed ILI of 2,887 kilometres of pipeline length in 2022-23. Pipelines Division aim to carry out the intelligent pigging using IPigs developed in-house in the recent future. It is planning to shift from service receivers to service providers in the intelligent pigging business scenario.

The Pipelines Division introduced the centralised integrity management system (CIMS) in 2019 to store, integrate and analyse all pipeline integrity related data in a

Left: Pipelines are constructed amidst tough working conditions that include crossing rivers, rail bridges and cutting through inhospitable terrain. Mainline pipe coating refurbishment.

Right: A map showing the layout of the India-Nepal pipeline system.



Section	Dia (inch)	Length (km)
Barauni-Patna	20/12	221
Patna-Mughalsarai	12	209
Mughalsarai-Allahabad	12	162
Allahabad-Kanpur	12	197
Branch line to Lucknow	12	68
Patna-Amlekhgunj	12	268
Branch line to Baitalpur	10	102

software-based system. To analyse the data, a software system with various assessment modules was introduced. A risk assessment model was developed with a foreign consultant. The model evaluates the probability and consequence of failure along the pipeline.

Top and bottom: Inauguration of the Motihari-Amlekhganj pipeline by Prime Ministers of India and Nepal.

Environment-Friendly Steps

Transportation of petroleum products through pipelines is environment-friendly and energy-efficient compared to other means of transportation and leads to substantial saving in greenhouse gas (GHG) emissions. IndianOil's pipeline installations have planted thousands of trees. To reduce consumption of fossil fuels and associated GHG emissions, the company is adopting significant steps towards creating renewable energy infrastructure.

To monitor the effectiveness of systems for conservation of environment, ISO:14001 Environment Management System certification has been obtained for all pipeline installations. Use of variable frequency drives for motor operated mainline pumping units, maintaining power factor, specific fuel consumption monitoring and exhaust monitoring of all diesel and crude oil-driven pumping, use of LED in high mast towers, etc., are some of the energy conservation measures taken at installations. On the water conservation front, most of the pipeline installations have rainwater harvesting systems.

As far as renewable energy is concerned, IndianOil has wind power projects: one of 21-MW capacity at Kutch, Gujarat, commissioned in 2009, and one each of 48.3 MW at Vajrakarur and Gandikota in Andhra Pradesh, commissioned during 2013-14. In addition, a 5MW SPV Plant was also commissioned in Rawra, Rajasthan in January 2012.

IndianOil's pipeline division has a control room from where pipeline activities in different regions are controlled and coordinated.

Bottom: A view of a welded section of the Paradip Hyderabad pipeline at Vijayawada.

Milestones and Records

IndianOil's Pipelines Division has achieved many milestones and set several records in the course of its journey. The first transnational pipeline of the country, Motihari-Amlekhganj pipeline, was completed in July 2019, eight months ahead of schedule. It is worth mentioning that Pipelines Division of IndianOil Corporation Ltd. has commissioned 2,454 kilometres of cross-country petroleum pipelines in 2022-23, which is also the highest ever during a financial year.

The Pipelines Division is also making concreted efforts to commission around 2,500 kilometres in the current financial year 2023-24. There are many projects under implementation, which would further increase the length of the pipeline network to about 21,000 kilometres and a throughput capacity to about 160 million tonnes per annum.

Top: Single point mooring system that received the 6000th tanker at Vadinar.

Bottom: The first oil tanker at Vadinar.

Expansion and Growth

The IndianOil Board has also approved the setting up of a 1,033 kilometres new Mundra-Panipat crude oil pipeline. This has a huge capacity of 17.5 million metric tonnes per annum which is required to meet the enhanced crude oil requirement of the Panipat Refinery, set for an expansion from 15 to 25 million metric tonnes per annum.

The pipeline grid has grown proportionately to connect with the main consumption centres in almost all major states to maintain a balanced development of the economy. The existing pipeline network provides connectivity to about 48 per cent of IndianOil marketing depots, 40 per cent of LPG bottling plants and 5 major airports apart from feeding crude oil requirement of all refineries.

The pipeline network transports about 60 per cent of refinery outputs that are likely to increase to 65 per cent post commissioning of ongoing pipeline projects.

To increase this share to 80 per cent, about 7,000 kilometres of product pipelines with 25 MMTPA capacity are planned during the next 10 years. Considering expected growth in the aviation sector, dedicated ATF pipelines to connect major airports are also planned.

A view of IndianOil R-LNG plant at Ennore.

Focus on Natural Gas

IndianOil ventured into natural gas marketing business in 2004 and has established itself as the second largest player in imported natural gas business in India. The Corporation has been investing continuously into the Natural Gas value chain verticals, viz. scaling up LNG sourcing, participation in LNG import terminals, developing cross country natural gas pipelines, laying CGD networks and supplying LNG through road tankers. IndianOil proposes to increase natural gas pipelines. It plans to lay a 1,264 kilometres pipeline to connect customers in south India with Ennore LNG terminal and some domestic gas fields. Out of 1440 kilometres it has already commissioned 386 kilometres of pipeline. IndianOil, along with its JVs, is laying five other gas pipelines, viz. the Mallavaram-Bhopal-Bhilwara-Vijaipur Pipeline, the Mehsana-Bhatinda pipeline, the Bhatinda-Gurdaspur pipeline, the Hazaribagh-Ranchi pipeline and North-East-Gas-Grid. All these together would give IndianOil a remarkable presence in the gas transmission business.

Other natural gas pipelines that have been commissioned by IndianOil on standalone basis are Dahej-Koyali Pipeline which is 106 kilometres long with a capacity of 5 MMSCMD to connect Dahej LNG terminal of Petronet LNG Ltd. to the Gujarat Refinery in Vadodara and the Dadri-Panipat Pipeline which is 132 kilometres long with a capacity of 9.5 MMSCMD to connect the Panipat Refinery and Naphtha Cracker Plant, NTPC Dadri and other customers. IndianOil's self-sufficiency in pipeline operations has been enhanced by these moves, giving it an edge over its competitors.

Pipeline Research and Development

The research and development unit of IndianOil has undertaken pioneering research on pipeline transportation and development of pipeline inspection tools. These include magnetic flux leakage based IPIG technology, gas pipeline inspection tools, advanced sensors for liquid pipeline inspection, artificial neutral network-based data analysis software and integration of inertial measurement unit to obtain GPS coordinates.

Transportation of neat biofuel and its blends compressed biogas as well as carbon dioxide through cross-country pipelines are identified for research in the near future. The R&D unit and the Pipelines Division of IndianOil are working together to create in-house operational expertise for large-scale deployment of these technologies. IndianOil has also embarked on the journey of making pipelines ready for transportation of green hydrogen. Collaborations with technology partners are being entered in to create new vistas on the energy landscape.

City Gas Supply System at Arwal Naubatpur.

Bottom left : First PNG customer of Dehri Sub Division, District Rohtas.

Bottom right : First PNG customer at Aurangabad GA.

Making a Mark in City Gas Distribution

IndianOil's journey into the realm of City Gas Distribution (CGD) is a testament to its commitment to providing cleaner and greener energy solutions. Since 2004, Natural Gas has been a significant part of IndianOil's business, aligning with the Government of India's commitment to increase Natural Gas in the energy mix to 15 per cent by 2030. Petroleum and Natural Gas Regulatory Board (PNGRB) authorises CGD entities to lay, build, operate or expand City Gas Distribution network in the authorised Geographical Areas (GA). CGD projects aim to supply natural gas to households, commercial customers, and to transport sector through supplies of CNG at retail outlets across the country.

IndianOil entered CGD business for the first time in 2005 by forming a Joint Venture (JV) company with GAIL (India) Ltd., namely Green Gas Ltd. (GGL) to implement CGD network in the Geographical Areas of Lucknow and Agra. Since then, the company has bagged 2 more GAs and thereby 4 GAs are being operated by GGL.

IndianOil formed another Joint Venture Company with M/s Adani Gas Ltd., i.e. IndianOil-Adani Gas Private Ltd., (IOAGPL). IOAGPL has received authorisation in 19 GAs so far. Out of the 19 GAs, 5 each are in Kerala and Uttar Pradesh and 1 each in Bihar, Punjab, Uttarakhand, Karnataka, Haryana, Goa, West Bengal and UTs of Daman and Diu and Chandigarh.

Realising the potential of CGD business, IndianOil, on standalone basis, entered into CGD business in 2018 by participating in the 9th Round CGD bidding for 86 GAs announced by PNGRB. IndianOil secured authorisation for 8 GAs. In the 10th

A view of Coimbatore city gas supply station.

Bottom left : A view of IndianOil's CNG retail outlet.

Bottom right : A view of Aurangabad city gas supply station.

and 11th Round of CGD bidding thereafter, IndianOil emerged as a successful bidder in 18 GAs on standalone basis. With these IndianOil has received authorisation for 26 GAs on its own and along with its 2 JVCs is now present in 49 GAs and 112 districts spread across 21 States and UTs, making it one of the largest CGD players in the country. IndianOil has a pan-India presence in CGD business covering 69 districts from Medinipore GA in the East to Jalna GA and Sikar GA in the West and Jammu and Pathankot GAs in the North to Kanyakumari GA in the South.

Within a short period of entering CGD business on a standalone basis, IndianOil has commenced sales in 24 out of 26 GAs despite challenges of non-availability of operating gas pipeline in many of the GAs. Business in the remaining 2 GAs is also expected to start by December 2023. IndianOil has till date installed about 13,247 inch – kilometres of steel network for making gas available to cover major spreads in the GAs, 179 CNG stations for CNG dispensing and about 78,500 PNG connections in domestic, commercial and industrial segments. Total PE network length of approximately 4,400 kilometres have also been laid across all GAs to ensure PNG connectivity. IndianOil sees huge growth potential in CGD business and is actively pursuing an increase in its footprint by setting up a large number of CNG retailing facilities, PNG connections and Steel/PE Network.

In GAs where pipeline connectivity is delayed considerably, LNG hubs are being set up to ensure that natural gas is made available to customers at the earliest. In this regard, IndianOil's first LNG hub has already been commissioned in Salem GA in May 2023. By expanding its CGD network, IndianOil aims to extend its reach and offer a wider choice to the customers. The journey in the CGD sector is a story of growth, innovation, and commitment to providing cleaner energy solutions. As it continues to make its mark in the CGD sector, IndianOil remains committed to its core values and its mission to propel the nation towards a sustainable energy future thereby cementing its position as a leader and flag bearer of the energy sector in India.

Saving Mother Earth

Many people have concerns and misperceptions about natural gas and oil pipelines, not realising how vital this infrastructure is to the foundation of the country. Today, large quantities of petroleum products are moved every day in pipelines that have been designed to safely move them. Like any other infrastructure, improvements and upgrades are necessary.

The efficient transport of oil from production wells to oil refineries would be impossible without the use of an elaborate network of pipelines. This important midstream oil and gas component is also critical to the transfer of finished petroleum products to end users or dependent industries. The use of expansive networks of pipelines ensures that domestic and industrial users have access to an uninterrupted flow of vital, energy-generating gases and liquids.

To quote a senior official of IndianOil, 'Let us not rest on our laurels but re-dedicate ourselves for the cause of environment protection in all spheres of pipeline operations and strengthen the global concern for saving mother earth.' The company made commendable efforts to achieve this. It continues its tradition of excellence and moves into the future with the same enthusiasm in all spheres of its work.

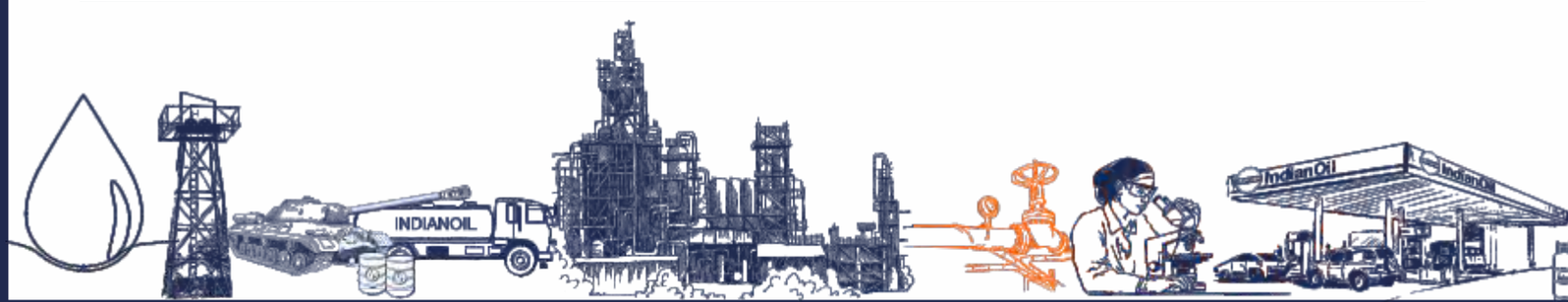
India has emerged as a flag-bearer of environmental proactiveness among the developing countries. The sustainability momentum got a massive push when the Government of India announced India's resolve to attain net-zero by 2070. As the nation's leading energy company, IndianOil is placed uniquely to steer India's journey towards a greener tomorrow. It will play a pivotal role to strike the right balance between the need to fuel India's economic ambitions and sustainability goals.

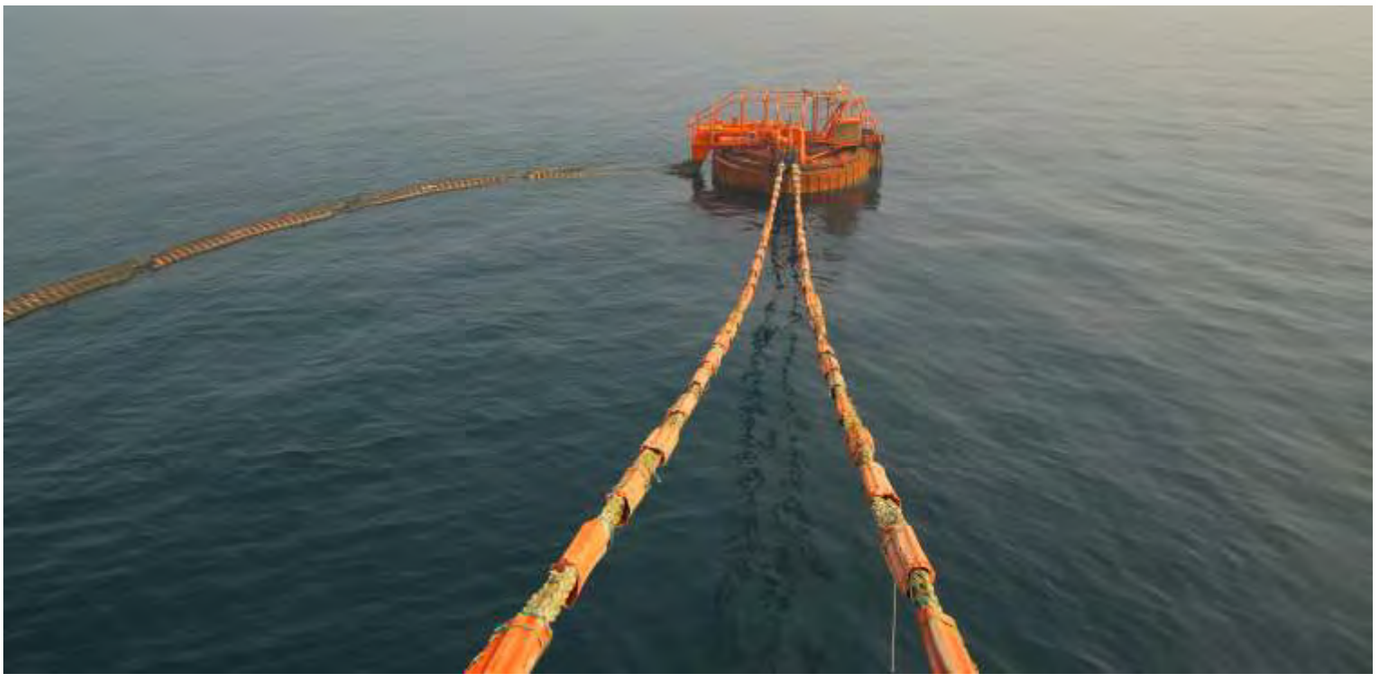
A crude oil tank farm at Vadinar.

PARADIP SINGLE POINT MOORING (SPM)
WEATHERING THE WAVES IN THE SEA OF CHALLENGES

On the East Coast, IndianOil owns and operates one of the largest offshore oil terminals in India, comprising three Single Point Mooring Systems (SPMs), for unloading crude oil tankers for supplying of crude oil to IndianOil refineries in the eastern part of the country. The first SPM was commissioned on 28 December 2008. Around 40 per cent of annual requirement of crude oil for its refineries is being met through this energy gateway of Eastern India. The crude oil unloaded through the system is being stored in 20 tanks of 60,000 kilolitres each at pipeline terminal for further transportation and processing at refineries in Haldia, Barauni, Bongaigaon and partly for the Guwahati Refinery through the 30 inch Paradip Haldia Barauni pipeline. The crude through the SPM system also meets the requirement of IndianOil's most modern and complex Paradip Refinery using 18 tanks of 60,000 kilolitres each at Paradip Refinery.

The SPM at Paradip, a crucial component of India's oil infrastructure, faces several challenges in receiving crude oil, primarily due to the berthing of tankers. The first challenge is the unpredictable weather conditions in the Bay of Bengal, where Paradip is located. The region is known for its high monsoon winds and rough seas, which can make the berthing process extremely difficult. The tanker has to be precisely manoeuvring to connect to the SPM, a task that becomes significantly more challenging in adverse weather conditions. The safety of the crew and the risk of oil spills are paramount concerns during this process.





A view of IndianOil's Paradip Single Point Mooring Terminal.

The second challenge is the size and design of the tankers. The SPM at Paradip is designed to handle very large crude carriers. These vessels are massive, and manoeuvring them requires highly skilled pilots and tugboats. Any miscalculation can lead to a collision with the SPM or other vessels, leading to potential environmental disasters.

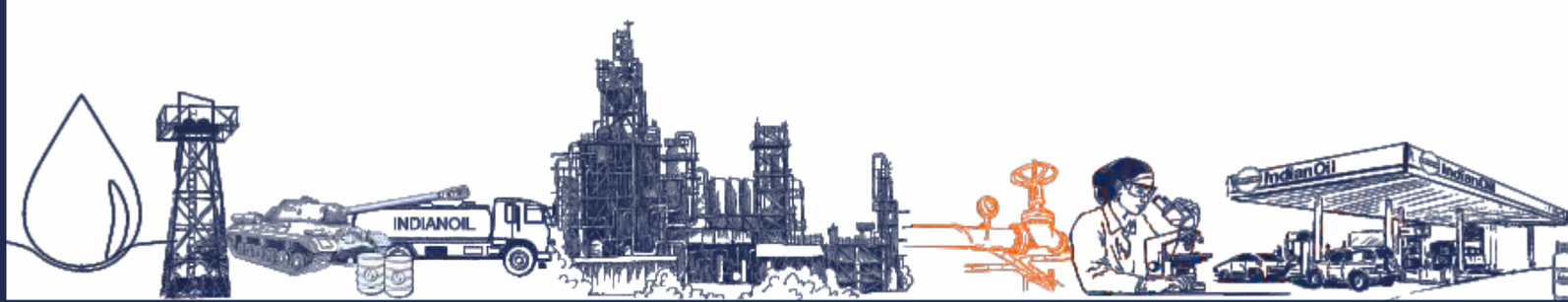
THE PHPL WONDER

The Rs. 3,800 crore Paradip-Hyderabad Pipeline Project (PHPL) of IndianOil that links Paradip Refinery in Odisha to Hyderabad in Telangana via Andhra Pradesh is augmenting fuel supplies in the three states. The PHPL pipeline starts its journey from the Paradip Refinery, negotiates many tributaries, canals, thoroughfares, roadways, and at Rajahmundry, meets the Godavari gushing in all its fury. It was at this juncture that the mother of all challenges in the history of pipeline construction—not just in India, but across Asia—was encountered. At the same location, near Rajahmundry, to cross the Godavari, other oil companies like HPCL and GAIL, in the past, laid their pipeline crossings but took the easy way out.

They built a slender above-ground bridge rather than resorting to the immense challenges and uncertainties of the trenchless method of Horizontal Directional Drilling (HDD). IndianOil, on the other hand, to ensure environmental protection and to execute a flawless job, adopted the sophisticated HDD technology.

Considering the mammoth size of the river, with a bank-to-bank width of 2,800 metres, the Godavari-PHPL intersection is the most critical and pivotal crossing in the entire PHPL project. To initiate an HDD, the actual width of 3,100 metres needed to be deftly positioned and crossed with high-precision heavy equipment on either side of the river with pinpoint alignment.

Bottom and facing page bottom: A mainline lowering is in progress at Paradip Hyderabad pipeline at Vijayawada.



Many opposed the idea saying there were chances of the pipeline getting exposed and snapping during heavy floods. All possibilities and probabilities were explored considering the huge risks and high stakes involved. A detailed engineering survey of the location was done by referring to historical data pertaining to strata, profile, high flood level and contours of the meandering river. Based on the available data, it was decided that the 3.1 kilometres crossing can be done in two sections, measuring 2.2 kilometres and 900 metres, respectively, with a tie-in joint in the middle at a depth of five metres from the ground level at a strategic location.

Eventually, IndianOil executed the challenging proposal of laying the pipeline across the mighty Godavari by the HDD method, at a depth of 15 metres. HDD is a trenchless technology, involving a drilling path under the river or any other obstacle for laying an underground pipeline without affecting aquatic life or the river course, and to ensure the protection of fertile river banks. Welding and coating of a petroleum pipeline is a multifaceted procedure where strict rules are followed to ensure that the quality of welding two or more pipelines and their respective protective coating is appropriately executed as per international standards. At an appropriate distance from the banks of the river, the HDD machinery was strategically positioned to conduct the highly complex and precision job. This HDD by IndianOil pipelines is the longest and most difficult ever attempted in Asia.

CHAPTER 6

The Crucible of Innovation: IndianOil's R&D Centre

Dr. J. S. Ahluwalia finalising the R&D Centre blueprint with Dr. G. J. Rao, P. K. Goel and other founding fathers.

Bottom left: Dr. J. S. Ahluwalia (extreme left) with Petroleum Minister K. D. Malviya (1975).

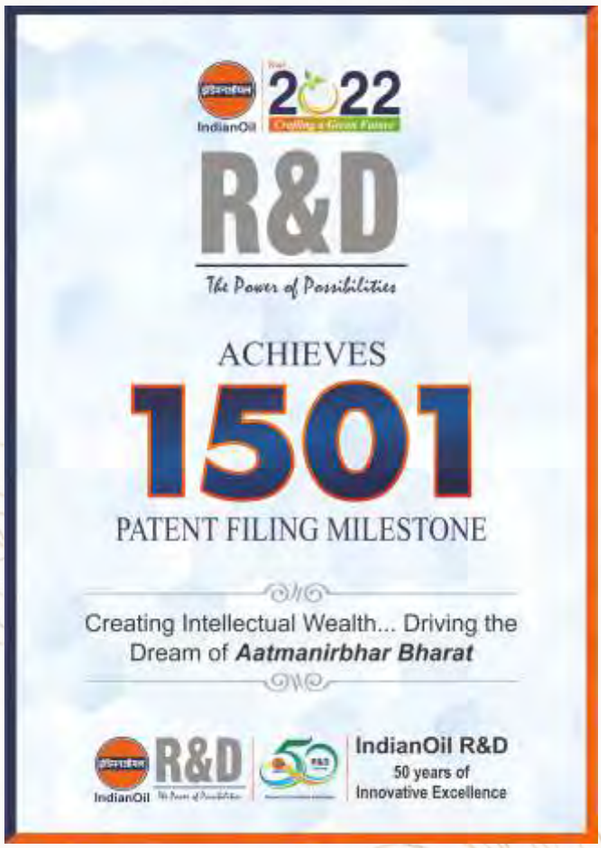
Bottom right: A group photo of IndianOil's R&D team.

India's indigenisation drive in the field of petroleum coincided with the Indo-Pakistan war of 1971. Major multinational oil companies of that time such as Mobil, Caltex and Shell that were present in India were not always dependable and sometimes refused to meet crucial petroleum needs. Amidst an outpouring of nationalistic sentiments, there was a strong desire to free the country from its perennial dependence on MNCs by indigenisation of petroleum, oil and lubricant technologies for the defence establishments.

Such patriotic fervour prompted IndianOil to set up its first Research and Development Centre at Faridabad in the National Capital region in 1972, starting with a budget of less than Rs. 2 crores. Dr. Joginder Singh Ahluwalia, who worked, at that time, in Chevron Technology Centre in Richmond, USA, was assigned to head the Centre. Since then, its progress has been phenomenal.

IndianOil's state-of-the-art Research and Development Centre in Faridabad. With over 1,600 effective patents to its credit, the R&D Centre is the hub of innovation and a catalyst for IndianOil's continued progress.

Today, IndianOil's state-of-the-art Research and Development Centre is considered one of Asia's finest R&D centres in downstream petroleum. In order to attain self-reliance in the field of energy and allied areas, it focuses on developing multiple products and technologies for both core and sunrise areas. It offers competitive advantage to the company through world-class technology, processing solutions and innovative products.



It has to its credit over five decades of pioneering work in lubrication technology, refinery processes, catalysts and crude and product pipeline maintenance. The centre is the first among Indian O&G PSUs to have over 1,600 effective patents which play a key role to protect the business interests of the company while working towards developing economical, environmentally and socially responsible technology solutions steadfastly supporting the business verticals of the company.

It is also focused on research and innovations in the Sunrise areas of Nano technology, petrochemicals, polymers, solar energy, bio-energy, hydrogen, fuel cell, and battery technology.

INDMAX is IndianOil's indigenous flagship residue upgradation technology to enable refineries to produce higher yields of light olefins/LPG and high octane gasoline. A view of an INDMAX unit of IndianOil.

Single-Minded Drive Towards Innovation

For the first ten years since inception in 1972, the Centre primarily worked towards the indigenisation of lubricants, first for the defence establishments and later for the civilian sector. In 1982, a new division called the Chemical Engineering Division, catering to the refining process domain, was founded with an objective to offer technical support to existing refineries.

One of its the earlier research ventures was to develop a process by which more petrol and LPG could be produced from residues. That led to the birth of IndianOil's indigenous flagship INDMAX residue upgradation technology to enable refiners produce higher yields of light olefins/LPG and high-octane gasoline from various resid /non-resid feedstocks. INDMAX also enables seamless integration of the refineries with petrochemicals complexes.

The efficacy of this technology was first demonstrated by setting up a one lakh tonne per annum unit at IndianOil's Guwahati Refinery in 2003 which was followed by the mega INDMAX unit of over 4 lakh tonnes per annum at Paradip Refinery in 2015 which put IndianOil in the same bracket as world class refinery process licensors.

The company has now achieved the status of refining technology exporter in this very competitive field by licensing the flagship INDMAX technology to global customers besides existing units in domestic refineries.

Top: A third INDMAX unit of 0.74 million tonnes per annum at the Bongaigaon Refinery was dedicated to the nation by Prime Minister Narendra Modi on 22 February 2021.

Bottom: A view of the flag-off ceremony of INDMAX Catalyst-Make In India.

The company firmly believes that innovation is the key to becoming the global market leader in the oil and gas sector. It has transcended to the gold standard for industry innovations like compressed biogas technology as an alternative for industrial and commercial usage in the coming years to help combat global warming and mitigate climate change. The world-class research and development centre is focused to develop, demonstrate and deploy novel, innovative, environment-friendly and customer-centric products and process technologies to attain self-reliance. It has won recognition in the fields of lubricant formulation, refinery processes, pipeline transportation/maintenance and alternative fuel technologies.

Since its inception, IndianOil's key R&D activities focussed on innovation and providing technical services associated with lubricant technology, fuel and additives, refining technology and catalysts, pipelines maintenance, nano-technology, Alternative & Renewable energy, Petrochemicals and polymers, etc. In the past two decades, it has been conducting extensive research in petrochemicals, residue gasification, coal-to-liquid, gas-to-liquid, synthetic lubricants, nano-technology, etc. To further expand its footprint, it plans to set up a net-zero power and water neutral research centre conforming to global standards. It will consist of four dedicated centres of excellence in alternative and renewable energy, corrosion research, nanotechnology and synthetic biology.

An IndianOil scientist working on improving fuel specifications at the R&D Centre.

Nation First Attitude

IndianOil has always endeavoured to supply world-class lubricants and fuels to the Indian Defence forces which trust its technological prowess explicitly. This is evident from the fact that many grades of SERVO lubricants deployed for use in defence operations enjoy exclusivity even today. IndianOil was the first company to develop engine oil for the high altitude fleet of the Indian Army, including snowmobiles. The company came up with an indigenous answer to Bofors gun hydraulic oil that was being imported earlier. When the Indian Army upgraded their main battle tanks with imported fuel from Russia, the company's R&D unit was the first to produce an indigenous equivalent. Special gasoline for unmanned aircraft of Indian Air Force and special winter grade diesel for use at high altitude locations during extreme months are just some of the products developed by IndianOil R&D for the defence forces. The R&D Centre has developed HFHSD- IN 512 fuel required for Indian naval ships. The upgraded fuel now exceeds the MIL DTL16844M specifications which are considered the benchmark standard across the world. The fuel possesses the best rheological and detergent characteristics validated against most stringent military specifications. It has less environmental impact due to low sulphur content and better performance of engines. This fuel will facilitate the Navy to enhance its global footprint and allow India to cater to the vessels of friendly foreign countries at places where fuel conforming to NATO grade is required. During the Covid-19 pandemic, the centre undertook in-house production of hand sanitisers and distributed them to the district administration and law enforcement personnel.

Top: IndianOil is known for its sustained efforts to supply world-class fuels to the Indian defence services. It has developed several grades of SERVO and engine oil for the Indian army.

Bottom left: SERVO Brand Ambassador and popular Indian film actor, John Abraham, launching SERVO Hypersport F5 fully synthetic 4T Engine Oil for motorcycles at a function in New Delhi.

Bottom right: Launching of upgraded HFHSD- IN 512 fuel specifications exceeding MIL DTL16844M for Indian Navy.

Multi-sensor based non-destructive robotic crawler-commercially deployed at Paradip and Guwahati Refineries.

Bottom left and right: 24" Instrumented PIG.

Leadership In Technology

Today, IndianOil scientists have filed more than 1600 patents. A special citation of these was presented to the Government of India as a symbol of intellectual wealth created by the R&D centre during its Golden Jubilee Celebration in March 2022. With the largest patent portfolio among oil and gas PSU companies and various indigenously developed, fully proven, commercialised and globally licensable technologies, IndianOil R&D has proved its worth. The R&D Centre acts as a solution provider to the rising demand for innovative lubricants for better fuel economy and energy efficiency. IndianOil's extensive research in the lubricant field resulted in replacement of many imported niche grades thus furthering the spirit of "Make in India" programme.

It encompasses every conceivable application to provide complete lubrication solutions for automotive, industrial and marine segments. Several grades of lubricants developed at the R&D Centre are marketed under the super brand 'SERVO'. IndianOil developed for the first time in India an innovative marine oil technology and introduced it in 1995, which was earlier available with only a handful of multinational companies. IndianOil played a pivotal role in satisfying the diverse needs of Indian railways by developing new innovative energy efficient and environment-friendly lubricating oils based on the INNOVA indigenous package in the late 1990s. Earlier additive packages from different vendors were used to blend railroad oils.

In general, the R&D unit is focused on the development of long life, energy-efficient lubricants and greases to meet customers' needs and provide import substitution. Working towards carbon optimisation with focus on energy efficient solutions, the R&D Centre has developed a unique green combo lube offering for automotive sector, which has been established to provide a percent increase in fuel economy. Efforts are also underway to extend the same concept for the industrial lube segment. IndianOil R&D has demonstrated its innovative prowess in the development of a basket of refinery technologies, highly relevant in the emerging scenario and their successful commercialisation. Most of these technologies have been demonstrated at the company's refineries and currently are in regular operation contributing to the gross refining margin.

The centre has also been working with the pipelines division of the company to create in-house operational expertise for large scale deployment of new technologies in the areas of pipeline transportation and development of pipeline inspection tools (an area hitherto dominated by foreign companies) like MFL (magnetic flux leakage) based IPIG technology, gas pipeline inspection tool, advanced sensors for liquid pipeline inspection, artificial neural network-based data analysis software and integration of inertial measurement unit for obtaining GPS coordinates.

IndianOil focused its attention on strengthening its petrochemicals business in the early 2000s' by venturing into downstream polymer units and world-class naphtha cracker and polymer units became operational at the company's Panipat Refinery, manufacturing products ranging from commodity to niche grades of polymers. Since polymer emerged as the integral modern-day packaging material of choice, Packaging Research Group was initiated at the R&D Centre in 1999. This group already had strong expertise in research and development of polymeric

Polymers are one of the most important and vastly used materials in modern society. IndianOil's scientists and researchers keep on improving this material via their studies and research.

packaging materials and concepts and became the hotbed for initiation of the Petrochemical and Polymer Department.

IndianOil R&D engaged itself in indigenisation of catalysts, drag reducing agents, additives, packaging materials, etc. It also renders technical support in the field of petrochemicals and polymers to enhance product quality and reduce production costs. Today, to increase the petrochemical intensity with an aim to increase domestic availability of niche products, IndianOil R&D Centre is working on many fronts for development of polymers and production catalysts. As a major milestone towards achieving "Aatmanirbhar Bharat" vision, IndianOil R&D Centre successfully developed and commercialised indigenous Drag Reducing Agent (DRA) technology, resulting in saving of precious foreign exchange. IndianOil received FICCI's 'Product Innovator of the Year-2022' award under the petrochemical category for development of this DRA.

R&D Centre also developed in-house PP catalyst which was successfully scaled up for undertaking a commercial trial at Panipat naphtha cracker unit and resulted in higher activity than the in-use commercial catalyst. The Product Application Development Centre on the premises of the Panipat naphtha cracker unit carries out cutting-edge R&D in developing innovative commercial applications of polymers. As an interface between the company's polymer plants at Panipat, its marketing setup and end-use customers, the PADC develops new applications, formulations and grades that are in sync with market needs.

Green Forays

The IndianOil R&D unit works consistently to enhance the quality of fuels by incorporating novel additives to improve engine efficiencies and to reduce environmental impact with improved quality and cost effectiveness. New patented process technologies and novel chemistry additives are developed to improve quality of existing fuels and to produce next generation high performance products such as Indane Nanocut, premium automotive fuels, MARPOL 2020 compliant Fuel Oil for marine applications and many special fuels for defence forces. IOC-R&D Centre was identified as the nodal agency by the government for taking up

IndianOil's HCNG demonstration plant at Rajghat, New Delhi.

hydrogen research activities within the oil and gas sector in India since 2001. The country's first major hydrogen dispensing and mobility project was kick started at IndianOil R&D Centre in 2004 when hydrogen mixed with natural gas was used to propel vehicles for road trials.

In keeping with the Biofuel Policy, 2018, which identified ethanol blending as a potent solution to the stubble burning issue, IndianOil has developed a new and economical enzymatic pre-treatment process at a pilot level using agricultural waste and is now scaling it up in the demo plant at Panipat. IndianOil R&D is also working on a bio-route to convert the CO2 from refinery flue gases to ethanol by installing India's first of its kind CO2 to ethanol production plant at Panipat in collaboration with M/s Lanzatech, USA. The company has developed a two-stage, anaerobic process to convert various types of organic wastes to biogas with an ability to produce higher gas yields and 20 per cent more methane than other contemporary technologies.

IndianOil R&D initiated a Masterplan for R&D in Solar Energy in 2011 encompassing relevant areas of solar PV, solar thermal and solar hydrogen. The Masterplan was synergistic with the company's existing and future path of progression well in line with global oil and gas industry directions. Short, medium and long-range goals in areas of Solar Hydrogen, Solar Thermal and Solar Photovoltaics, revolving around the three-pronged approach of infrastructure creation and expertise development; product development and technology evaluation; and areas of basic research were envisaged.

IndianOil R&D recently developed an innovative indoor Solar Cooking System as a stationary, rechargeable and always kitchen connected indoor cooking solution for collecting energy from the sun, converting it into heat through a specially designed heating element, storing thermal energy in a scientifically proven thermal battery and recovering the thermal energy for use in indoor cooking The product gets charged and discharged simultaneously while performing its function of indoor cooking of food items involving boiling, steaming, frying and making "roti" sufficient for a family of four.

World's first pilot plant that converts carbon dioxide to High Value Lipids at IndianOil R&D Centre in Faridabad.

IndianOil's R&D Start Up scheme. Round 3 face-to-face meeting.

In pursuit of climate change mitigation and achieving net zero objectives, IndianOil's R&D efforts have yielded substantial progress in carbon capture and utilisation. A noteworthy achievement of this endeavour is development of an innovative enzyme-assisted amine-based in-house carbon capture technology. This innovative technology, having undergone rigorous validation within a pilot plant setting, subsequently underwent real-world evaluation within a commercial carbon capture facility situated in the southern region of the country in a fertiliser company. The operational efficacy and performance metrics of this proprietary process evidenced substantial energy saving at commercial scale trial run. The envisaged trajectory towards the commercialisation of this cutting-edge technological breakthrough holds the potential to substantially fortify the company's pursuit of its net zero aspirations. Furthermore, in complement to the strides made in carbon capture, endeavours have also engendered diverse avenues for the utilisation of captured CO2 such as mineralisation, conversion into nutraceutical compounds, higher alcohols, etc.

Fuelling Start-Ups

In line with the vision of Aatmanirbhar Bharat, IndianOil launched its Startup initiative, in January 2016 with the aim to support innovative ideas that have significant business potential, social relevance and/or are focused on environment-protection, in addition to the ideas related to technical or business re-engineering of processes to resolve O&G sector pain-points. Key differentiator for the Startup Scheme were-dedicated Internal Process Owners/domain experts, multi-functional/divisional selection process and support from concept till commercialisation, facilitating Start up eco-system in the Oil & Gas sector and development of products and processes for New India. Thirty-six Startup projects were on-boarded through three rounds (Round 1-11, Round 2–13, Round 3-2). All the projects of Round 1 were successfully completed after validating their Proof of Concept and are now scaling-up through the commercialisation process. Round 2 and 3 projects are also progressing well as per mutually agreed milestones. In the past three rounds, IndianOil has so far committed Rs. 62 crores.

IndianOil Startup scheme has the best strike rate in terms of fund disbursement, employment generation, and success rate, with 80 per cent of committed fund released to the incubated startups in Rounds 1 and 2, high PoC completion success rate way ahead of global experience, generating 75 IPRs so far, providing employment to 500 people with an average of 16 jobs per startup with total valuation of Rs. 2600 crores till date.

A New Era of Fuels

The year 2020 ushered a new dawn for IndianOil R&D with the launching of a slew of differentiated and superior products. Signalling a new era of focus on customer aspirations, IndianOil scientists exhibited ingenuity and flexibility in introducing several new fuels to the market. With the launch of XP100, India's only 100 octane premium petrol, the country zipped into an elite league of nations that offer such high-tech fuel to their customers. IndianOil R&D, working towards development of efficient and environmental-friendly differentiated fuels and additives has taken an extraordinary step by developing XTRAGREEN diesel and Green Combo Lubricants to reduce air pollution and a fuel economy benefit of 8-10 per cent thus underlining its unwavering commitment to provide niche and specialised solutions while working to enhance user experience.

IndianOil R&D has developed indigenous component-based Gasoline and Diesel Multifunctional Additive (GMFA & DMFA) for premium fuels. Another achievement has been commissioning of an Octamax unit at the Mathura Refinery to produce high-octane fuel for BS-VI gasoline pool with technology conceptualised by R&D. A BS-VI emission test facility has been recently commissioned for testing all types of fuels such as petrol, diesel, ethanol-blended petrol, bio-diesel, CNG, LNG, hydrogen-CNG, 2G-ethanol blends, etc., as per superior BS-VI norms.

Octamax technology developed by IndianOil R&D enables refiners to produce high octane stream from cracked C4 thus providing greater flexibility in achieving BS-VI/Euro-VI MS specifications.

Innovations and trials are the core part of IndianOil R&D.

Facing page top, bottom and following spread: Marvellous view and design of IndianOil's new R&D Centre.

In the case of institutional customers, innovation continues to be the mainstay of IndianOil for progress in this sector. Several initiatives have been taken to differentiate products and be known as a solution provider. 'Winter grade HSD' and 'Low Sulphur/Low Aromatic SKO' were developed for the Army and IndianOil commenced dispatches of Winter Grade HSD from Leh and Kargil including for the retail market as well.

Aatmanirbharta the Motto

IndianOil's thrust on innovation and research is of paramount importance in reinforcing the company's operational efficiency and resource optimisation drive. The company has been focused on addressing energy-related issues of national importance with emphasis on rendering the technical support to its divisions to achieve business goals. In accordance with its corporate vision of being 'The Energy of India', IndianOil is actively pursuing research in alternative energy and clean technologies in partnership with the government, academia and private industry to be future ready. The company provides a dynamic and challenging environment to its employees by creating an atmosphere of optimism, team work, creativity and resourcefulness with an aim to create a centre of excellence in the country that is admired as a benchmark petroleum downstream R&D Centre.

The Government of India's clarion call to the nation to become Aatmanirbhar is mobilising Indians across the country to become 'Vocal for Local'. The birth of IndianOil R&D and many other initiatives—past and present—are aligned to the revolutionary Aatmanirbhar Bharat Abhiyaan, as the company sets out to broad base its basket of energy offerings, which includes low-carbon solutions. The company's research is all set to enter a new phase with its new 60-acre R&D Centre campus-2, in Faridabad. It will provide a fillip to the alternative and renewable energy areas, so critical to the company's business plans. Apart from its core research goals, the new campus will also develop technologies to the commercial deployment level with pilot plants, scale-up plants/process units, demonstration-scale plants/process units, as well as semi-commercial scale plants.

It will have labs, pilot plants, and demonstration units for full-scale research and technology development involving hydrogen, fuel cells, solar power, gasification, bio-energy, carbon capture and utilisation and energy storage technologies. Dedicated zones are being created for start-ups for quick prototype

development and validation along with in-house mentors. The new campus is envisaged as the world's largest and the most sustainable net-zero campus—a next generation facility that meets top quality standards of research, occupational health and safety and sustainability. The campus aspires to have GRIHA-5 and LEED Platinum ratings along with net zero and water neutrality.

New R&D Campus Design: Inspired by the "Peepal Leaf"

The new R&D centre at Faridabad to be known as the Technology Development and Deployment Centre will focus on the development of a wide range of energy technologies and solutions involving refining technology, petrochemicals, applied metallurgy, biotechnology, pipelines, catalysts, carbon nanotechnology, batteries, and alternative energy. The campus has been designed in a unique fashion. A central nexus divides it into two major sections. At the nexus is the Centre's central administrative facility, which will host a large shaded area and send forth two wings of raised, curving solar panels. These wings form the spine of the complex.

The shape of the campus will replicate the leaves of a peepal tree, also known as the sacred fig tree. The peepal leaf symbolises the flow of movement within the campus, emphasising integration with central and peripheral circulation. As a central spine runs down the course of a peepal leaf, a central, curving line will dominate the built-area of the new campus—the same raised, curving platform that protrudes in two directions from the central administrative facility. Veins branch out from the spine of the leaf to a unified periphery.

Likewise, individual components and blocks of the campus will stretch to the periphery of the campus. This will connect the building blocks. Centuries ago great thinkers have meditated, attained enlightenment, learned and taught under the peepal tree in India. The peepal leaf design ushers in the concept of a functional and beautiful space, integrated to facilitate collaboration. It symbolises a commitment to connect with nature and harness energy from renewable and clean sources.


BASKET
PARKING

FIFTY YEARS OF EXCELLENCE

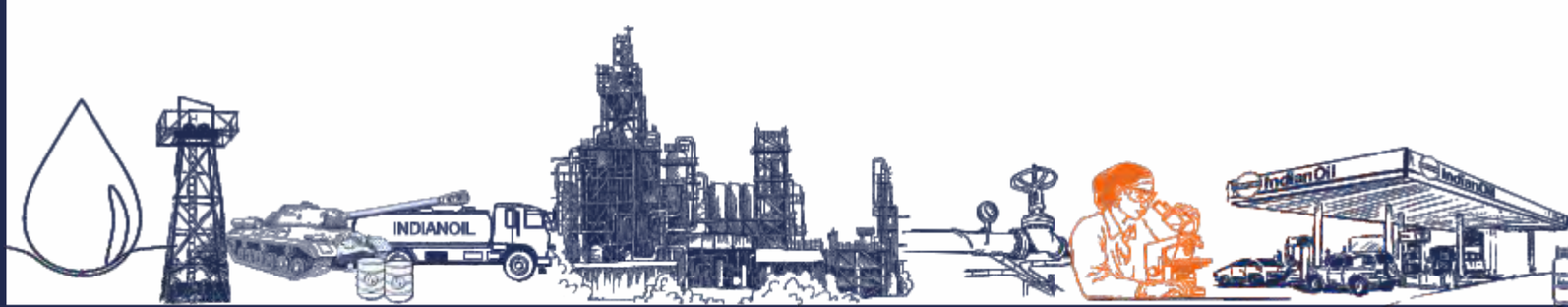
Circa 1972 on a hot summer afternoon, a group of young men headed by Dr. J. S. Ahluwalia sat under the shade of a banyan tree on a desolate plot of land in Faridabad, Haryana. They were given the responsibility to build independent India's first commercial research centre in the downstream petroleum industry called IndianOil R&D. Fast forward to 2022, the banyan tree still stands tall, beaming with pride, on the sprawling 65-acre campus of Asia's finest R&D centre, engaged in world-class research. With all the expansion work, substantial emphasis was laid on preservation of nature and today the campus is a Platinum Green certified sustainable campus.

Even today, out of 65 acres, the Centre has a total building footprint of 7.5 acres, 29 acres of vegetation and 28 acres of hard, paved area, of which 10 acres is constructed with material of 29 solar reflective indexes. It recycles 100 per cent of the organic waste generated inside, owing to massive rooftop solarisation and switching to 100 per cent LED lights. Twenty-five per cent of the campus building lights are powered by solar energy and 65 per cent of the campus external infrastructure and lights can be powered later by solar energy. There are 48 trees per acre in the campus against the world standard of 24 trees per acre. The Centre also has world class safety, health and well-being amenities within the campus. An impressive array of the most advanced equipment is at the disposal of its experienced researchers and scientists round-the-clock. Moreover, 50 glorious years later, the foundation stone of a second campus has also been laid. It is testimony to its indispensable contribution to the dynamic growth of the company and the nation. The new campus will be a net-zero, power and water-neutral facility boasting of new research centres of excellence.

The dramatic transformation of the R&D Centre was engineered by a team of pioneering, dedicated scientists infused with an intense passion for creation and innovation. Their spectacular achievements, within a short time, were the crowning glory for IndianOil. By May 1973 this temporary laboratory became a beehive of activity and the first batch of India's own lubricants soon hit the market. Hailed as the birthplace of SERVO—the lubricant Superbrand—IndianOil R&D started with a meagre manpower of just over 25 employees in 1972. This escalated to over 225 within a span of five years. Scientists fetching their daily drinking water from far-flung places, encountering several deadly and poisonous animals, working amidst the harshest of weather conditions without fans and coolers are some of the oft-recited tales that generations have heard and shall continue to hear in future as well. People who came from all walks of life, with varied expertise and skills, worked unhesitatingly in an initially inhospitable environment and converted this piece of land into a fine temple of knowledge of modern India.

For the past five decades, R&D Centre has leveraged technology and innovation to create and improve processes and products meeting customer demand—the quintessential factor for harmonious growth of IndianOil's core business and created a strong portfolio of IP wealth of over 1600 effective patents. IndianOil R&D has always challenged the status quo of the proprietary offerings by multinational suppliers. As an apex seat of research in the oil and gas sector, the R&D Centre is now expanding its footprint through a second campus as a new impetus to the alternative and renewable energy areas.

When the Centre was benchmarked against the standards of Indian Green Building Council, a consolidation of all the best practices was carried out, and for the first time in the country a 50-year-old campus could obtain the



Platinum Green Rating from IGBC. In 2021, the Centre obtained the first prize in the state for energy efficiency from Haryana Renewable Energy Development Authority and national level third prize for water conservation in the campus. Such recognition is a befitting testimony to the transformation of the Centre from a little-known obscure barren piece of land to a reputed facility having a positive impact at a global level. The Centre, in order to attain self-reliance in the field of energy and allied areas, focuses on developing multiple products. It offers competitive advantage to the company through superlative technology and processing solutions and innovative products. The state-of-the-art R&D unit also acts as a solution provider for the rising demand for innovative lubricants in order to achieve fuel economy and energy efficiency. The Centre's forte includes alternative energy programmes in bio-energy, solar energy, hydrogen energy, H-CNG blends, synthetic fuels and shale oil. It is also focusing on cutting-edge research in nanotechnology, petrochemicals and polymers, coal gasification/liquefaction, and gas to liquid technologies. Most of these technologies are successfully applied at IndianOil refineries and beyond as well.

The old Banyan tree at the campus of Asia's finest R&D Centre in Faridabad.

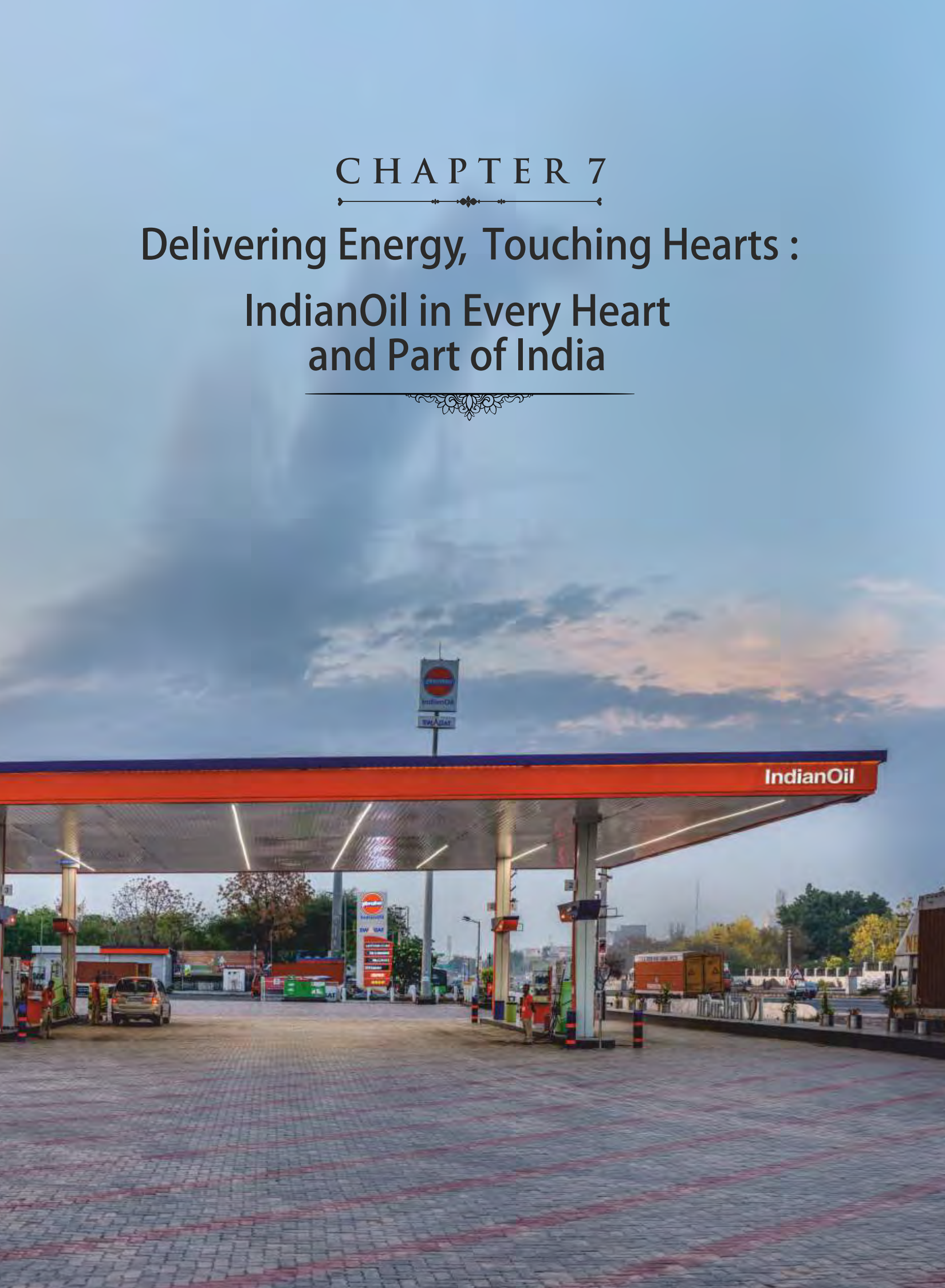
The Centre has achieved a significant breakthrough in the demonstration and commercialisation of some refinery technologies developed in-house. With hundreds of patents to its credit, more than half of them registered overseas, including the US, the Centre is a world-class technology solutions provider in the petroleum sector. Its petrochemicals and polymers vertical conducts research in polyolefin catalysts, drag reducing agents, new grade development and post-reactor modification, additives, trouble-shooting and developing packaging materials, mainly polymeric and benchmarking besides rendering technical support in customer trials to enhance product quality and reduce production costs. It leverages the core technologies of general chemistry such as material design, synthesis and analysis technologies for developments that meet the latest needs as well as those of future technologies. While many refinery process technologies and catalysts developed by the Centre have been adopted by various IndianOil and non-IndianOil refineries in the country, its INDMAX technology was recently licensed to NIS, Serbia, a group refinery of Gazprom Neft, Russia.

In its nearly five decades of R&D, the Centre has addressed several issues of national importance. Now it is set for the future with its upcoming second 60 acre campus nearby, the world's largest net-zero (power and water) facility with GRIHA-5 star rating, LEED platinum standards. The second campus, titled IndianOil Technology Development & Deployment Centre, is slated for commissioning in 2024. This centre will have four centres of excellence and will focus on non-conventional energy domains besides the conventional ones and will aim at indigenisation of several frontline and sunrise technologies such as batteries/energy storage devices, bio-energy, greenhouse gas (CO_2) capture, novel nano materials for catalysts or fuel cells, hydrogen production pathways and fuel cells for both mobility and stationary applications with India and the world market in mind.


COCO
SERVOXPRESS
SERVOXPRESS
ATRAPOWER

CHAPTER 7

Delivering Energy, Touching Hearts : IndianOil in Every Heart and Part of India



An IndianOil waterfront outlet in Kerala. The company has over 60,000 marketing touch points and 35,000 fuel stations spread over different regions of the country, some in extremely difficult terrain.

IndianOil, which stands out as one of the largest petroleum marketing and distribution networks in Asia, is truly in every heart and every part. It has over 60,000 marketing touch points and its 36,285 fuel stations are located across different terrains and regions of the Indian subcontinent. From the icy heights of the Himalayas to the sun-soaked coast of Kerala, from Kutch on India's western tip to Kohima in the verdant north-east, IndianOil is a ubiquitous presence. The company's vast marketing infrastructure of fuel stations, Indane (LPG) distributorships, SERVO lubricants, greases outlets and large volume consumer pumps is backed by bulk storage terminals and installations, inland depots, aviation fuel stations, LPG bottling plants and lube blending plants. The countrywide marketing operations are coordinated by 16 state offices and over 100 decentralised administrative offices.

Robust Supply Logistics

IndianOil guarantees complete fuel management solutions to customers who require fuels in bulk and have dedicated facilities for storage and handling. These customers benefit from IndianOil's efficient sourcing and supplies matched to their usage patterns and inventory. The optimisation of supplies is especially relevant in light of high-energy input costs in the recent past, which is expected to continue in the future. IndianOil's tankages are strategically located across the country and are custom designed to maintain low-cost supplies that can rapidly transport almost 22 crore litres of petrol and diesel daily through a sophisticated supply chain management system.

IndianOil's marketing operations network of storage, distribution and supply hubs is backed by on-time logistics and round-the-clock after-sales service. Many institutional customers like the railways, steel plants, thermal power plants, textile mills, power plants, state transport undertakings, large corporates and fleet and logistics companies tie up for long-term contracts backed by IndianOil's comprehensive fuel and lubricants consultancy-a formidable expertise that the company has built over nearly five decades of working with a cross-section of customers from a wide range of industrial sectors. Not to forget the Supply Agreement between IOC and NOC started in 1973 which was the starting point of a very long history of cordial and long-lasting association and business relationship between the two organisations which is continuing even today. Through this agreement, 15 MMT of petroleum products, valued at approximately Rs. 1,29,855 crores is likely to be supplied to Nepal, which is the largest India-Nepal bilateral agreement. IndianOil's bulk liquid fuel supply covers the complete gamut of fuels-auto fuels, light diesel oil, low sulphur heavy stock, special products and much more.

IndianOil Marketing Installations Across India	
Terminals & Depots	126
LPG Bottling Plants	109
Aviation Fuel Stations	132
Lube Blending Plants	10

Bottom and facing page bottom: The Indane brand of liquefied petroleum gas is available in every nook and corner of the country. IndianOil operates the world's highest LPG bottling plant situated 3500 metres above sea level at Leh. Indane was conceived in 1964 to bring modern cooking to Indian kitchens and the first Indane LPG connection was released on 22 October 1965 in Kolkata. It has proved to be a boon especially for women, replacing chulha with LPG stoves, resulting in major health benefits and pollution-free kitchens.

Top and facing page bottom: As part of its unwavering commitment to providing top-notch service to its customers, IndianOil's retail outlets offer top of the line products.

Setting High Standards: Premium Fuels

Automotive gasoline and gasoline-oxygenate blends are used in internal combustion spark-ignition engines. These fuels are primarily used for passenger cars. They are also used in off-highway utility vans, farm machinery and in other spark-ignition engines employed in a variety of service applications. In view of the auto fuel policy issued by the Government of India, stringent specifications are being applied for the gasolines which are marketed in India, leading to reduction of environmentally polluting factors. Dream vehicles with higher compression ratio engines require high octane gasoline for inspiring, superior performance. IndianOil's XP100 is an innovative achievement through intense and sustained efforts of its world-class R&D, harnessing indigenously developed technology. Adorning a feather in the crown of Aatmanirbhar Bharat, IndianOil has empowered India to join the league of select advanced nations like Germany and the USA that offer 100 octane high performance fuel. IndianOil's XP100, with superior anti-knock properties, improves engine power with faster acceleration, enhances fuel economy and offers better drivability with increased engine life. It also contributes towards a healthy and cleaner environment with reduced carbon emissions.

IndianOil expanded its bouquet of differentiated offerings with the introduction of its all-new high-performance diesel brand - XtraGreen. One of the cleanest diesel fuels across the globe, XtraGreen offers higher fuel economy and reduced noise. The higher cetane number of XtraGreen has led to better combustion and longer

इंडियनऑयल
IndianOil
XP100
100 octane premium petrol

durability as compared to conventional fuel, while particulate matter (PM) emissions have decreased by about seven per cent. The diesel multi-functional additive (DMFA) added in XtraGreen reduces carbon monoxide emissions by 5.29 per cent, while a five per cent decline has been observed in emission of nitrogen oxides.

IndianOil continues to lead the way in meeting India's growing energy needs, with the launch of XP95 - the country's first 95 octane petrol, developed entirely in-house. XP95 delivers impressive benefits, depending on the vehicle model: up to 3.95 per cent improved fuel economy, a reduction in carbon monoxide emissions by up to 44 per cent, hydrocarbon emissions by up to 13 per cent, as well as increased power by 4 per cent, and acceleration ability by 20.15 per cent. With XP95, engines remain clean and corrosion resistant. Unlike the market-standard 91RON petrol, XP95 boasts a higher 95RON octane level. This lowers the fuel's tendency to knock, leading to superior thermal efficiency and clean combustion. As a result, XP95 has quickly become a popular fuel choice for India's drivers on the move, demonstrating IndianOil's unwavering commitment to providing top-notch service to its customers.

Top bottom left and bottom right: IndianOil's LPG delivery personnel and women working in harsh conditions amidst the sand dunes of Rajasthan or the icy heights of hilly areas such as Leh, to provide customers uninterrupted services throughout the year.

More Than Five Decades of Indane

IndianOil has played a key role in India's transition to cleaner fuels from the time it started marketing Liquefied Petroleum Gas (LPG) in 1965. The brand Indane was conceived in 1964 to bring modern cooking to Indian kitchens and the first Indane LPG connection was released on 22 October 1965, in Kolkata. From a consumer base of around 2,000 in 1965, the brand has grown into a superbrand that rules nearly 15 crore kitchens. As a matter of fact, every second cooking gas connection in India is an Indane one. It has now become one of the largest packed-LPG brands in the world with IndianOil the second largest marketeer of LPG globally. Indane is a consumer superbrand as conferred by the Superbrands Council of India. It is a brand synonymous with safety, reliability and convenience.

Indane LPG is sold and delivered in several pack sizes. The 5 kilograms and 14.2 kilograms cylinders are largely meant for domestic use and comprise more than 90 per cent of all gas distributed while the 19 kilograms, 47.5 kilograms and 425 kilograms Jumbo cylinders are marketed for industrial and commercial consumption. The recently launched composite cylinders of 5 kilograms and 10 kilograms made of fibre composite with a trendy and translucent look are the latest

addition in the domestic category. Besides supplying domestic Indane LPG cylinders to households, IndianOil also offers cost-effective, reticulated LPG systems for large residential apartment complexes and establishments. Since these gas pipelines are laid in individual homes, drawn from a bank of LPG cylinders stored safely in a dedicated place in the building, it provides relief from booking for refills and storage of additional cylinders for individual customers. Indane LPG is also supplied in bulk to large volume consumers in the manufacturing and engineering sectors.

Indane LPG has evolved into a fuel of choice for various commercial and industrial applications, including commercial kitchens, heating, steam generation, and as a foaming agent, to name a few. It is widely used for heating applications such as cooking for commercial purposes; maintaining warm temperatures for poultry farming/chicken brooding; hot air drying of seeds/pulses/crops; drying coffee beans; roasting tea leaves; heating in heavy industries for ladle; pre-heating in foundries; manufacturing of glass bottles and aluminium beverage cans; metal cutting in manufacturing and construction industry; steam humidification and steam distillation in pharma industries; steam generation for power laundry, iron presses; drying in paper industry; steam generation for application in textile units for finishing; food industry; and frying and baking confectionery. Indane is also used in various non-fuel applications such as aerosols (pest repellents, deodorants, etc.) and physical foaming agents in mattresses and packing material.

To improve LPG penetration in the country and help the lives of the rural masses better, IndianOil played a pivotal role in bringing LPG penetration to near saturation in the country. Vyachakurahalli village in Chikkaballapur district of Karnataka became the country's first smokeless village in December 2015, entering the *Limca Book of Records, 2017*, after all households switched from conventional fuel to LPG. Indane is available in every nook and corner of the country, be it Ladakh or the border areas of the North-East or Andaman.

IndianOil holds the world record for selling domestic LPG at the highest place in the world in Komic (a small village in Spiti, Himachal Pradesh), besides operating the world's highest bottling plant at Leh.

IndianOil is the second largest marketer of LPG globally. Indane LPG is sold and delivered in several sizes through different modes of transport. Indane is one of the most digitally accessible and customer-friendly brands in the country. The missed call facility for Indane is in sync with IndianOil's commitment to a digital and energy secured future as this initiative simplifies the procedure even for those who are not tech-savvy.


Indane
JUMBO
एक्स्ट्रा तेज
एक्स्ट्रा तेज
इण्डेन


इण्डेन
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A view of IndianOil's LPG Bottling Plant with automated filling of LPG cylinders.

Embracing Technology

The LPG cylinder bottling operations have evolved in terms of technology, a transformation that helped IndianOil improve the production and safety aspects of the bottling process. Indane adapted the best of both indigenous and global technology for use in its bottling plants to streamline various stages of the bottling process. Electronic carousels were introduced from 2000 replacing the mechanical UFMs (Unit Filling Machines) in a phased way. As on date our bottling plants are covered by this technology which ensures accurate measurement of LPG quantities in each cylinder. This improves customer satisfaction, as they receive the intended quantity of LPG without any discrepancies.

Phase-wise introduction of automated quality control procedures, capping and sealing led to a complete transformation from the mechanical check scale and manual CVT (Compact Valve Tester) used in earlier days. These systems detect and address potential safety concerns such as leaks, faulty valves, and improper sealing, ensuring that only cylinders meeting stringent safety standards are distributed.

Similarly, there has been a transition from traditional queue / phone based refill booking to digital booking for Indane LPG cylinder refills which has brought about significant convenience and efficiency for customers. Digital booking platforms, such as mobile apps and online portals, offer customers the convenience of booking LPG cylinder refills from the comfort of their homes. This eliminates the need to physically visit the distributor's office, saving time and effort for the customers. Digital booking platforms of Missed Call, IVRS, Whatsapp, BBPS are

accessible 24/7, allowing customers to place refill orders at their convenience. The facility of Preferred Time Refill Delivery gives flexibility which is particularly valuable for working professionals and those with busy schedules. Customers also receive notifications or emails confirming their booking and providing estimated delivery dates. Digital platforms of Indane also allow customers to make online payments, eliminating the need for cash transactions during delivery. This promotes cashless transactions and adds another layer of convenience.

With the optimisation of the supply chain and distribution process through integration of smart technology and also knowing the real time demand in the market, IndianOil able to meet the requirements of customers more efficiently. Gone are the days of long waiting time. Today, customers not only get their cylinder in less than two days but also get refill reminder sms prompting them to book their cylinder on time.

PAHAL

LPG was integrated with the government's Unique Identification Project (UIDAI). In 2014, by virtue of the PaHaL scheme, consumers could link their LPG connection number with their bank account through Aadhaar to receive the LPG subsidy to their bank accounts. Initially launched in 54 districts of the country and then extended in the remaining districts, the Direct Benefit Transfer for LPG (PaHaL) scheme was designed to help consumers and in turn help in better subsidy management.

PaHaL ensures direct deposit of refill subsidy into bank accounts and selling LPG at market prices. PaHaL won the coveted title in the *Guinness Book of World Records*—recognised holder of the "Largest Cash Transfer Programme (households)", Pratyaksha Hastaantarit Laabh (PaHaL)on 12 August 2015, after meeting stringent parameters with respect to such cash transfer programmes in countries like USA, China, etc. The project was executed in a very short span of four months, more than 92 per cent LPG consumers have joined the scheme. IndianOil played a pivotal role in implementation of this programme and has brought more than fourteen crore Indane customers under PaHaL.

West Bengal's former Finance Minister S. K. Mukherjee, lighting the first burner to mark the introduction of Indane in Calcutta. Looking on, IndianOil's former Chairman P. A. Gopalakrishnan. On the Minister's left are A. N. Das, former Sales Officer, Eastern branch and B. S. Nangia, former Branch Manager, Eastern branch (Marketing Division).

Kitchen Revolution

With the launch of LPG marketing in the mid-1960s, IndianOil has been credited with bringing about a kitchen revolution, spreading warmth and cheer in millions of households with the introduction of clean and efficient cooking fuel. It has led to a substantial improvement in the health of women, especially in rural areas by replacing smoky and unhealthy chulhas with clean cooking gas.

Indane today is an ideal cooking gas for modern kitchens, synonymous with safety, reliability and convenience. To cater to the evolving demands of LPG users and improve customer convenience, IndianOil launched the 5 kilograms FTL (free trade LPG) cylinder, thus becoming the first PSU Oil company in the country to replicate the international model of making cooking gas cylinders available at corner stores for the convenience of its customers. The same cylinder has recently been rebranded as Chhotu to make the product more appropriate and appealing to the target segment.

It caters to migrant populations in urban and semi-urban areas who do not have local address proof, people with lower gas consumption and commercial establishments with limited space. Customers can avail of their Chhotu gas cylinder through the extensive network of Indane distributorships and other points of sale like IndianOil retail outlets, select kirana stores and some local supermarkets. Only proof of identity is required to avail the new Chhotu gas connection. The cylinders can be used in any city.

Automatic filling and packing machine packing SERVO 4T engine oil in containers. SERVO is India's no. 1 lubricant brand which was launched by IndianOil in 1972.

Lubes and Grease Market: SERVO Factor

The lubes and grease market is a complex amalgam of commercial and passenger vehicles, two and three-wheelers, agricultural equipment, stationary engines, marine and industries that range from steel, cement, power, mining, railroads, textiles, automobiles and glass. In this market of opportunities, it is a heated race between brands to capture the imagination of the stakeholders. SERVO, India's No. 1 lubricant brand, was launched by IndianOil in 1972, the same year the company set up its R&D centre at Faridabad. SERVO is a genuinely Indian brand of lubricant, with a formulation crafted using IndianOil's own specifications.

Over the decades, SERVO has evolved to produce and market an extensive range of 1,800 lubricant grades and has established an international footprint, with a presence in 37 countries. SERVO has more than 6000 formulations and 1800 grades of lubricants available in more than 3000 stock keeping units (SKUs) that it markets in the country. SERVO is an iconic homegrown brand that has completed an impressive journey of 50 years, built on trust and reliability. Supported by IndianOil's world-class R&D Centre in Faridabad, SERVO represents the epitome of the Make in India initiative, embodying the spirit of a self-reliant nation. Since its establishment in 1972, SERVO has consistently fulfilled the lubricant requirements of various sectors, maintaining its leadership position in the Indian lube market. With a focus on continuous product development and innovation, SERVO has expanded its presence to 37 countries, serving diverse user segments.

SERVO's impact extends to all types of machinery, including vital assets such as the Main Battle Tanks T90 and T72 used by the army, Indian Navy submarines, aircraft carrier INS Vikrant and INS Vikramaditya, as well as vehicles like BEML Tatra and EMD locomotives. The brand's steadfast and resolute dedication to quality and performance has earned recognition and trust across a wide range of industries. The oil and lubes business was one of the many industries that benefited with the opening of the Indian economy. The market witnessed resurgence as restrictions were lifted on the import of base oils, additives and finished lubricants. Over the years, SERVO has established its authority and, on the strength of its proven quality, has built exceptional relationships with automobiles and specialty engine manufacturers. With recommendations from leading companies such as Maruti,

Different products of IndianOil's SERVO brand, the undisputed leader with a very strong presence in the market. It has made inroads into highly competitive global markets too.

Hyundai, TATA, Mahindra & Mahindra, Ashok Leyland, Force Motors, Endurance TAFE, Swaraj Tractors, Eicher Tractors, International Tractors Ltd., Dalian Locomotives, Gabriel, Volvo-Eicher (VECV), Timken, Renault-Nissan, Volkswagen, Skoda, Bentley, Bugatti, Lamborghini, Porsche, Ducati, Audi, Seat, VST Tillers, Honda (2W), etc. it is the brand of choice and an original equipment supplier to most of them.

Market Leader

In the field of industrial lubricants too, SERVO is the undisputed leader. It offers a wide range of lubricants for use in all core industries such as the railways, defence services, state transport undertakings, power, coal and mining, automobile, steel and cement amongst others. With recommendations from leading companies such as Flender, Elecon, Hansen, Danieli, FLS Smith, KHD Humboldt, Walchand, BEML, Hitachi, RDSO, Bosch Rexroth, Eaton, Cincinnati, Parker, Demison, MHPS, BHEL, Buchard Clark (UEC Lab), etc. SERVO has a very strong presence in the Indian lube market.

IndianOil has launched four new premium green lubricants - SERVO Greenmile, SERVO Raftaar, Servo 4T Green and Servo Tractor Green specifically designed for the stringent specifications meeting BS-VI vehicles requirement to help reduce emissions and improve engine performance. These novel and eco-friendly lubricants will help reduce carbon footprint and meet the stringent specifications for the most advanced petrol and diesel vehicles. SERVO Greenmile is a premium engine oil for new generation petrol cars and SUVs, meeting the latest national and international standards.

The oil is tailor-made for BS-VI vehicles and is suitable for BS-IV and older model vehicles as well. SERVO Raftaar is a premium engine oil for new generation diesel vehicles. Currently, BS-VI diesel vehicles employ after-treatment devices such as Diesel Particulate Filters (DPF) and Selective Catalytic Reduction (SCR), to reduce Particulate Matter (PM) and nitrogen oxides (NOx). These after-treatment devices contain catalysts that can be poisoned if the engine oil contains higher amounts of sulphated ash, phosphorous and sulphur (SAPS). Thus, engine oils with very stringent specifications have been mandated for BS-VI vehicles.

SERVO Raftaar is one such product from IndianOil, meeting the requirements of API CK4, the most stringent standard for diesel engine oils. SERVO

A SERVO XPRESS, quick lube oil changing centre at an IndianOil fuel outlet.

Raftaar also provides excellent protection against wear and deposits leading to excellent engine cleanliness. Servo 4T Green is a premium engine oil for new generation four-stroke motorcycles, scooters and auto rickshaws running on petrol. The oil is suitable for all classes of 2/3 wheelers including Bharat Stage VI. With 2-wheelers having much smaller air-cooled engine compared to that of the 4-wheelers (which is cooled by a circulating coolant) and with the need to lubricate engine, clutch and gear with a single oil, the 2-wheeler engine oil undergoes great stress and therefore requires features like excellent oxidation stability, wear and friction control etc. Servo 4T Green is designed to provide improved high temperature deposit protection for pistons, more stringent sludge control, increased power output and protection of engines operating on ethanol blended fuels.

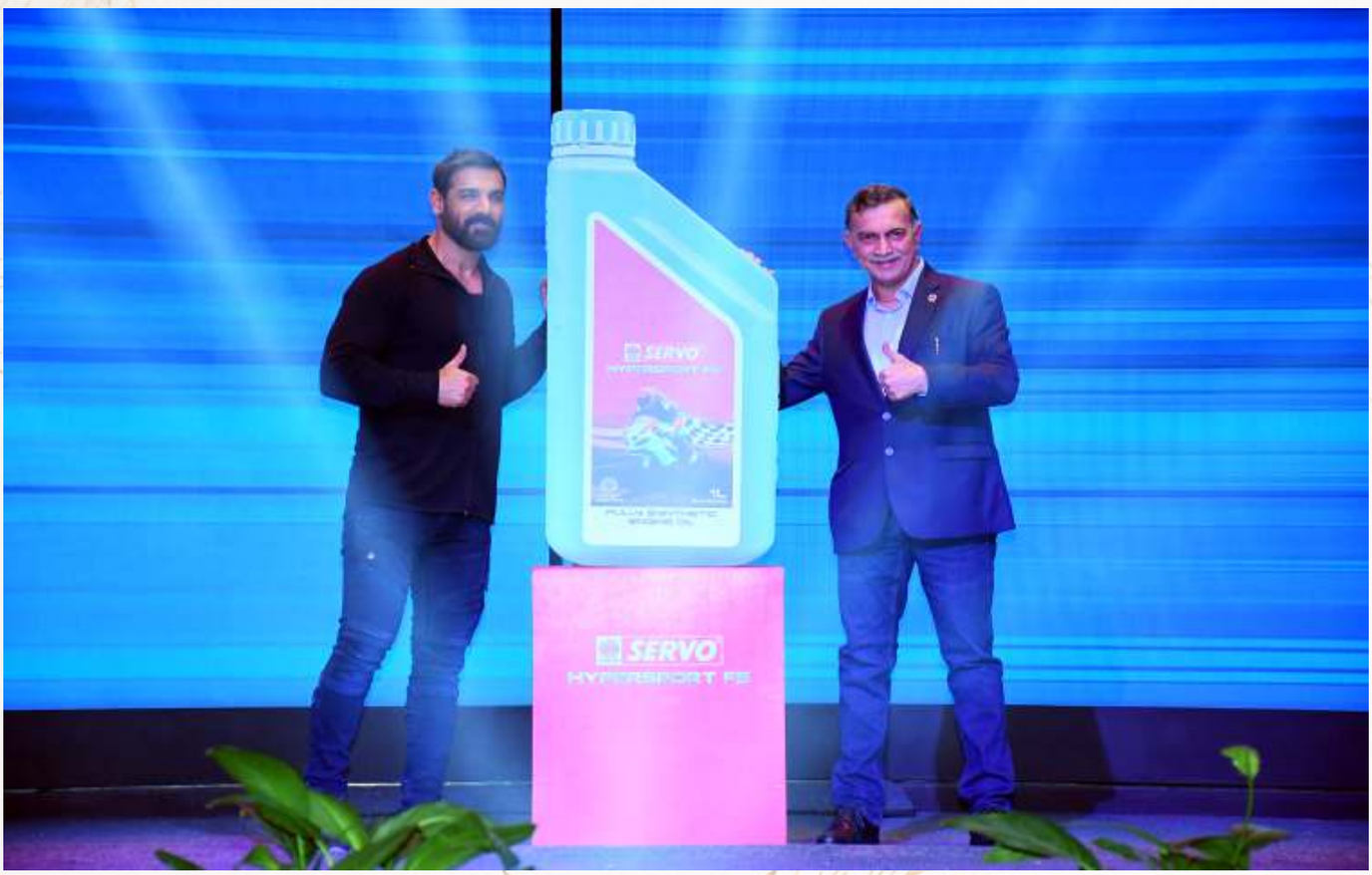
Servo Tractor Green is an eco-friendly premium multigrade tractor engine oil

specifically formulated to meet engine lubrication requirements of API CI-4 Plus for tractors. It has a high detergency level and excellent oxidation stability properties. These oils are formulated to sustain engine durability where Exhaust Gas Recirculation (EGR) is used and are intended for use with diesel fuels ranging in sulphur content up to 0.5 per cent weight. The oil is suitable for use in Bharat TREM III Tractors as well as upcoming TREM IV tractors (without SCR). IndianOil has also launched Servo Hypersport F5 which is a fully synthetic 4T Oil, formulated with fully synthetic base oils and synergistic additive systems meeting latest international standards, for use in all types of motorcycles including the latest bikes meeting BS VI-2 (On Board Diagnostic System) regulations as well as mid-to-high displacement bikes. Servo Hypersport F5 is designed to be used in extremely cold climates as well as very hot regions, making it a true biker oil. SERVO HYPERSPORT F5 is the latest technology product from IndianOil.

The company has recently launched Servogrease Miracle which is a versatile novel patented soap-based grease specially formulated to meet the demand of EP grease for boundary lubrication conditions to prevent excessive wear, localised welding or seizure often associated with severe operating conditions. Most greases prevailing in the industry are based on Lithium or Lithium complex soap. Due to limited availability and soaring prices of Lithium, the entire grease industry was looking for an alternate solution to Lithium. IndianOil R&D made a breakthrough with a patented soap-based grease suitable for automotive, industrial and defence applications. This novel development has the potential to disrupt the entire grease industry and garner additional volume for IndianOil. This India-centric grease is a sustainable solution with the end consumer also reaping the benefits.

A New Brand Ambassador

Started during the Golden Jubilee year of SERVO, John Abraham's role as the brand ambassador for IndianOil's SERVO lubricant brand brings an interesting dynamic to the partnership. John Abraham's persona aligns well with the qualities associated with SERVO lubricants, such as reliability, performance, and trustworthiness. His



Launch of SERVO Hypersport F5 by IndiaOil's brand Ambassador John Abraham and Chairman S.M. Vaidya.

active involvement in fitness and passion for automobiles further reinforces the brand's positioning in the minds of consumers. SERVO also enjoys a commanding position in hot and cold rolling oils sector for steel mills. The oils are well accepted by customers like JSW, SAIL, JSL. IndianOil has also developed NTM oil indigenously for the wire rod mill. In the marine oils segment, SERVO has the distinction of being the only Indian lubricant brand to receive approvals for its oils from marine engine builders like MAN B&W and Wartsila-Sulzer.

SERVO has made inroads in highly competitive global markets, establishing its footprint in more than 30 global destinations. It has successfully captured significant market shares in Bangladesh and Nepal and with IndianOil's fully owned subsidiaries in Sri Lanka, Mauritius and the Middle East, is seen as a growing brand in the UAE, Oman, Qatar, Bahrain, Indonesia, Thailand, Vietnam and in African countries. A spin-off of SERVO's research is a non-toxic, biodegradable, residue free, non-pesticide spray oil with no side-effects. SERVO agro spray oils are a viable alternative for toxic chemical pesticides. A mosquito larvicidal oil developed by IndianOil and conforming to WHO specifications for controlling Anopheles, Culex and Aedes larvae is used by many municipal corporations.

Touchpoints for Highway Travellers and Farmers

SWAGAT retail outlets, set up on major highways over an area of around 1.5 acres are positioned as a one stop solution for highway travellers. Equipped with state of the art fuelling facilities and dispensing premium fuels like XP95 and XTRAGREEN in addition to normal fuels, they provide the highway traveller an opportunity to rest, relax, rejuvenate and refuel. Amenities like the dhaba/restaurant, hygienic toilets, dormitory, bathing facilities, purified drinking water, secured parking, laundrettes and nitrogen air facility are mandatory at all Swagat outlets. The name SWAGAT emerged as the preferred name as per market research for Highway Flagship ROs and is an extension of the Jubilee outlet concept introduced in 1997 and are synonymous with consistent delivery of high quality facilities and services across the network.

A view of IndianOil's Swagat retail outlet.

IndianOil's venture in rural areas, Kisan Seva Kendra outlets, have opened up a new growth field in the retail business. They provide agro inputs like seeds, fertilisers and pesticides along with petroleum products. Owing to this multiple award winning measure, villagers do not have to travel to distant highway retail outlets for their fuel requirements.

As a new growth area in retail business, IndianOil unveiled small-format Kisan Seva Kendra (KSK) outlets for rural markets. The KSK outlets primarily market petroleum fuels, SERVO lubricants and agro inputs like seeds, fertilisers, pesticides, vegetables, stationery and other items. The KSK outlets have emerged as dominant players in the rural markets, riding on the rapid growth of upcoming second and third-tier roads in the rural areas. This multiple award-winning innovative measure has obliterated the need for villagers to travel to distant highway retail outlets to meet their fuel requirements.

Aviation Fuel

IndianOil Aviation is the leading aviation fuel solution provider in India and the most-preferred supplier of jet fuel to major international and domestic airlines. Between one sunrise and the next, IndianOil Aviation Service refuels over 2,300 flights from the bustling metros to the remote airports linking the vast Indian landscape, from the icy heights of Leh to the distant islands of Andaman and Nicobar.

Jet fuel is a colourless, combustible, straight-run petroleum distillate liquid. Its principal uses are as jet engine fuel. The most common jet fuel worldwide is a kerosene-based fuel classified as JET A-1. IndianOil is India's first oil company conforming to stringent global quality requirements of aviation fuel storage and handling. IndianOil Aviation also caters to the fuel requirements of the Indian defence services, besides refuelling VVIP flights at all airports and remote helipads/heli-bases across the Indian subcontinent. It is the only oil company in India to market the widest possible range of fuels used by the aviation industry - JP-5, Avgas 100LL, Methanol Water Mixture, Jet A-1 and aviation lubricants, etc.

Top and bottom: IndianOil's aviation service commands an enviable market share in the aviation fuel business and successfully services the demands of the Indian defence sector, domestic and international flag carriers as well as private airlines. Aviation service stations have the most modern gadgets and storage facilities.

Avgas 100LL is designed for use in turbo-charged reciprocating piston engine aircraft, mainly used by FTOs (Flying Training Organisations) and defence forces for training pilots. Avgas 100LL, produced for the first time in India by IndianOil's Vadodara Refinery, has been tested and certified by the Directorate General of Civil Aviation (DGCA). Launched in September 2022, it is a higher-octane aviation fuel meeting the product specifications with superior performance quality standards as compared to imported grades. Before this launch, Avgas 100 LL was a completely imported product. The domestic production of Avgas 100 LL by IndianOil will make flying training more affordable in India. This will also benefit more than 35 FTOs across India. Given India's rising aviation traffic, the requirement for trained pilots is expected to increase. With the domestic availability of this product, the Ministry of Civil Aviation is considering opening more training institutes in the country. The indigenous availability of Avgas 100 LL will help reduce dependence on imports and address the associated logistical challenges. It is another step on the journey towards an Atmanirbhar Bharat. The country will be able to save precious foreign exchange with the in-house availability of this product.

Opening new frontiers in the energy landscape, IndianOil flagged off its first export consignment of 16 KL AVGAS 100 LL packed in 80 barrels to Papua New Guinea from Nhava Sheva Port, Mumbai on 28 January 2023. IndianOil Aviation regularly organises international aviation conferences that act as a vital information facilitator with participation from over 35 countries comprising leading international and all domestic airlines, allied industries, statutory aviation authorities and government agencies. IndianOil's 132 Aviation Fuel Stations follow specific quality audits based on a Quality Control Index System benchmarked to global standards. In addition, 19 DGCA approved Quality Certification Laboratories provide complete specification tests round-the-clock. Ensuring that these standards are always upheld, there is a backup of a highly skilled, qualified and dedicated team of officers and refuelling crew.

A view of IndianOil's cryogenic plant in Nashik.

IndianOil Cryogenics: Where Expertise Meets Innovation

IndianOil, the market leader with more than four decades of experience in cryogenic and vacuum engineering, has carved a niche for itself in providing advanced solutions for various industries. With specialised and custom-built product lines, they serve sectors including refining, chemicals, aviation, animal husbandry, gas, livestock, LNG, and more. The company's unparalleled expertise is showcased through its state-of-the-art manufacturing unit located in Nashik, spread over an expansive area of 36,000 square metres. This facility is equipped with sophisticated machinery, enabling the production of large and heavy-pressure vessels with precision and efficiency.

IndianOil's BG (Cryo) Nashik Plant is the only facility certified by PESO for manufacturing under SMPV rules as well as Petroleum rules. This certification ensures that the company adheres to the highest safety standards in their manufacturing processes. With this stamp of approval, customers can trust in the reliability and durability of IndianOil's cryogenic products.

Unparalleled Range of Cryogenic Solutions

The range of cryogenic solutions include: Cryocan double-walled non-pressurised aluminium containers for storage and transportation of liquid nitrogen. Widely used for preserving bull semen, embryos and stem cells, it holds a major market share in India and is exported globally. Cryovessels are pressurised containers for storage and transportation of liquefied gases such as liquid nitrogen, liquid oxygen, liquid argon, Liquified Natural Gas (LNG), etc. Built to international standards, they ensure reliability

Aviation equipment: IndianOil's aviation solutions include containerised aviation fuel tanks and refuellers, bringing efficiency and reliability to aviation fuelling stations. With a legacy built on expertise and innovation, IndianOil drives progress in the field of cryogenic and vacuum engineering. It remains dedicated to serving its customers and pushing the boundaries of what is possible in cold storage, transportation and specialised applications.

Interface with Customers

Technology has repeatedly proved its efficacy as a business enabler and offset multiple disruptions. IndianOil had launched one of India's largest and most ambitious digital transformation programmes—Project i-DRIVE. The groundwork for technology-aided automation has helped to maintain smooth supply chains and a quick scale-up of the digital interface with customers during critical times. The individual and collective efforts of IOCians in leveraging the power of digitalisation to serve their billion-plus customers, despite the stringent lockdown during the pandemic, were commendable. Scoring another success, IndianOil's key digitalisation mission, Project ePIC, has achieved stability and is transforming the experience for millions of LPG, lubes and institutional business customers. The company is revamping its IT landscape to create a robust IT infrastructure and a digital Centre of Excellence. Digitalisation has infinite potential to be leveraged and can be a game changer for the company.

Moreover, IndianOil was the first in the industry to declare its Chittoor Terminal a 'SMART TERMINAL' in 2015. Leveraging technology, the department has implemented several digital interventions such as e-locking of tank trucks, vehicle Tracking System (VTS), Geo-RTD, Digital Signature and cash less toll transactions. These initiatives have optimised systems, increased transparency, and enhanced customer-centricity. The company is working on mainstreaming digital technologies like automation, connectivity, artificial intelligence, Internet of Things as well as big data analytics. Talent readiness is of utmost importance, and therefore, it becomes imperative to focus on continuous learning and development as well as leadership competency building. Intelligent technologies can help IndianOil improve its competitive position, eco-systems of resellers, vendors and service-providers, and even the business model itself, where needed.

A view of tank lorry filling shed at Una Terminal in Himachal Pradesh.

Zakum West Supercomplex, UAE.

Global Presence

Despite being a net importer of crude oil, India is a net exporter of refined petroleum products thanks to its large refining capacity. India produces significantly more diesel and gasoline than needed for domestic consumption, which contributes to its exports of oil products. The top five countries that imported India's petroleum products were the United States, United Arab Emirates, the Netherlands, Brazil and Turkey in 2022. However, India is still import-dependent on certain petroleum products. It stands as the world's second-largest importer of LPG after China.

IndianOil is metamorphosing from a purely sectoral company with dominance in downstream in India to a vertically integrated, transnational energy behemoth. The company is already on the way to become a major player in petrochemicals by integrating its core refining business with petrochemical activities, besides making large investments in E&P and import/marketing ventures for oil and gas in India and abroad.

Charting the Course in Exploration and Production

IndianOil, the beacon of India's energy sector, continues to chart its course towards a future of boundless possibilities. Guided by its vision to be "The Energy of India" and a globally admired company, IndianOil's strategic focus remains steadfast on expanding its footprint across the hydrocarbon value chain, both within India and beyond its borders. In a bid to fortify its upstream integration, IndianOil has embarked on exploration and production (E&P) ventures both domestically and internationally. The company has substantially expanded its portfolio of oil and gas assets, holding participating Interests (PI: 3.5-100 per cent) in 18 domestic and 11 overseas blocks. These overseas blocks are strategically located in the USA, UAE, Oman, Canada, Libya, Gabon, Nigeria, Venezuela and Russia.

IndianOil has also taken operatorship in two domestic blocks and one overseas block, while also serving as a non-operating partner in 16 domestic and 10 overseas blocks. The overseas blocks include exploratory blocks in Libya, Gabon,

and Abu Dhabi, a development block in Nigeria, and producing assets in the USA, Canada, Venezuela, Russia, Oman, and UAE. The exploration efforts in these blocks have borne fruit, with hydrocarbon discoveries in Assam-Arakan onshore and Gujarat-Kutch shallow water blocks within IndianOil's domestic portfolio, and in onshore Libya, Nigeria, and Gabon assets under its overseas portfolio.

In its jointly operated assets, development drilling preparations are underway in Assam while the Petroleum Exploration License for the commencement of block activities in Tamil Nadu is eagerly awaited. In IndianOil's first overseas jointly operated block in Abu Dhabi, drilling and testing of two appraisal wells have been completed, and the Development Plan for the appraised area has been approved in principle. The plan is being formalised through execution of a Production Concession Agreement, negotiations on which are in progress. Further, the consortium has successfully completed initial exploration period and entered into the second exploration period to ascertain conventional as well as unconventional resources in the block.

A state-of-the-art data interpretation centre, "ANWESHAN", has been set up duly equipped with advanced hardware and software for in-house data interpretation. This centre functions as the backbone of the team, facilitating the prospect identification for entry worthiness evaluation and also in-process analysis, validation, monitoring and control of exploration and development activities. In a bid to reduce import dependency by increasing Upstream Integration Ratio, IndianOil has set an ambitious target to achieve its own share of production of 11 MMTPA by 2029-30. To this end, IndianOil actively pursues acquisition opportunities through participation in domestic and overseas licensing rounds or seeking farm-in opportunities in producing, development, and exploratory acreages to add significant assets to its E&P portfolio. These opportunities are being pursued either solely or in consortium with experienced E&P companies and are based on techno-economic feasibility and viability.

A drone view of drilling rig in Vankor, Russia.

Exploration and Production - Overseas Projects:

1. Block Onshore 1, Abu Dhabi: IndianOil's latest and most ambitious upstream venture, is located west of the prolific Bab and Bu Hasa oil fields in the Rub Al Khali Basin, spanning an area of 6,162 sq. kilometres. The license area includes two oil discoveries - Ruwais and Mirfa. As part of carrying out its exploration commitment, IndianOil recently witnessed its first ever discovery in the operated block in one of its exploratory wells in the Habshan formation. The discovery has been duly notified to ADNOC and requisite assessment for appraisal of this discovery is in progress.

   With the first oil expected in early 2024, this will mark IndianOil's first overseas operated commercialised upstream asset, with many more to follow to meet its upstream aspirations.

2. Lower Zakum Concession, UAE: A giant offshore field situated around 65 kilometres North West of Abu Dhabi City (area 1125 sq. kilometres). In 2018, IndianOil acquired 3 per cent Participation Interest in Lower Zakum Concession, from Abu Dhabi National Oil Company (ADNOC) as part of a consortium of Indian PSUs. The field currently produces an average of 380,000 barrels of oil per day (bopd) from 299 active wells, with production expected to reach 390 MBD by 2024, 415 MBD by 2025 and 450 MBD by 2027.

3. Mukhaizna Oil Field, Oman: This is the single largest producing oil field in Oman, covering an area of 694 sq. kilometres and producing 9 per cent of Oman's total crude oil production. In April 2018, IndianOil acquired 17 per cent PI in the Mukhaizna Oil Field, Oman. The field currently produces 85,000 bopd from around 3550 producing wells.

4. Taas field, Russia: In 2016, IndianOil, as part of a consortium, acquired 10.01 per cent share in LLC TYNGD, Russia from Rosneft Oil Company. The licenses comprise an area of 1387 sq. kilometres, with the field currently producing 105,000 bopd from around 352 producing wells.

5. Vankor field, Russia: A giant oilfield located in the prolific west Siberian basin, Russia. In 2016, IndianOil, as part of a consortium, acquired an 8.0065 per cent share in JSC Vankorneft, Russia from Rosneft Oil Company. The field currently produces 190,000 bopd from around 613 producing wells.

6. Pacific Northwest Project, Canada: An unconventional Shale Gas project located in British Columbia, Canada. IndianOil acquired a 10 per cent working interest in the project in 2013, with the field currently producing 142,928.4 barrels oil equivalent per day (boepd) from 769 producing wells.

7. Niobrara Shale Oil Project, USA: An unconventional Shale Oil project located in Weld, Morgan, and Adams Counties in the State of Colorado, USA. IndianOil acquired a 10 per cent working interest in the project in 2012, with the field currently producing 260 boepd from around 428 producing wells.

Exploration and Production - Key Domestic Projects:

1. Dirok field, Assam: IndianOil's first domestic project to successfully transition from an exploratory to development and producing asset, covers approximately 75.94 sq. kilometres in the geologically complex Assam-Arakan basin. IndianOil holds a 29.032 per cent PI in the asset. The field commenced production in August 2017, with a current production rate of 40 MMscfd of gas and 900 Bbls/d of condensate from 6 producer wells, with a plan to further ramp up production up to 55 MMDCFD gas with additional wells from 2024.

2. CBM Blocks, Jharkhand: IndianOil holds 20 per cent PI in two Coal Bed Methane (CBM) blocks. The combined area of the two blocks is around 346.5 sq. kilometres. Gas production from the blocks is likely to start by the end of 2023.

Being the second largest player in the domestic petrochemicals market, IndianOil exports to over 70 countries, offering the complete portfolio of petrochemical products under the brand name PROPEL.

Preparing to be Future-Ready

As the leading refiner in the country and a dominant player across a diverse portfolio of offerings in energy, IndianOil focuses on all emerging opportunities for organic and inorganic growth through vertical integration and strategic diversification, besides pursuing value-creating research areas. The company is focused on offering a bouquet of eco-friendly energy options other than liquid fuels to its customers. These would include natural gas, LNG, CNG, PNG, autogas, biogas, hydrogen and electricity. Among the company's low carbon offerings are green fuels such as XtraGreen, one of the cleanest diesel fuels across the globe with higher fuel economy and reduced noise, and XP100, 100 octane petrol that is designed to propel faster acceleration, significantly boost engine performance, provide better drive ability, enhance fuel economy and engine life.

Aligned with the government's initiatives to promote renewable and sustainable energy sources, IndianOil acknowledges the importance of ethanol-blended fuels (EBF), also known as E10 or E20. To support this transition, IndianOil has taken significant steps to increase the production and distribution of ethanol-blended fuels. The company is rapidly expanding its EBF storage infrastructure to provide greener and more sustainable fuel options to consumers across the country. Twenty-severn lakh MT of carbon emission has been reduced with achievement of 10.5 per cent ethanol blending Pan India by March 2023.

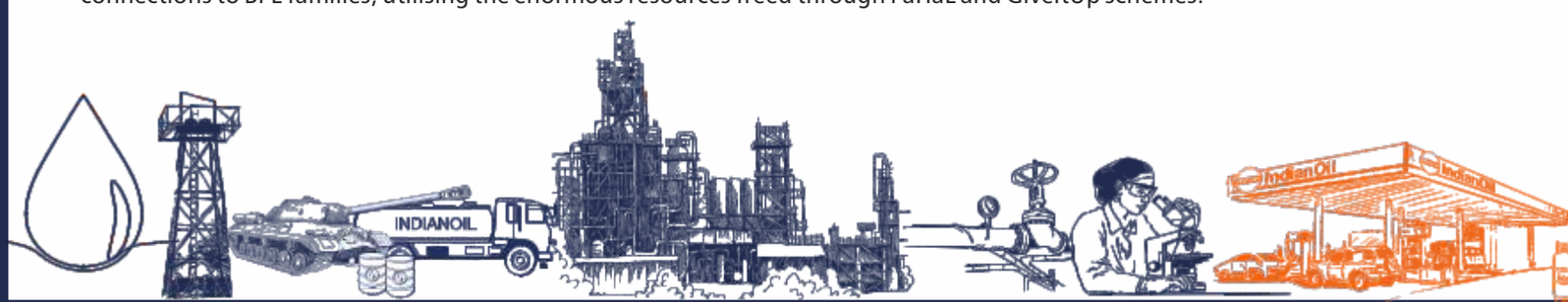
In its bid to enhance the customer experience, the company has rolled out the Indane Tatkal service in some cities whereby for a minimal additional cost LPG cylinders will be delivered on the same day. The service will soon be available nationwide. Besides pump-locator maps, mobile apps and SMS services for retail customers, an integrated portal, mobile app and MIS system were developed for institutional/bulk consumers. IndianOil is in the process of setting up an ambitious customer portal designed to deliver next-generation customer experience and offer service/support across any line of its business. While technology will be a significant enabler in its business strategy, the key differentiator will continue to be human resource. The company's flagship leadership competency development programme, Project Saksham, has a ripple effect to make learning an ongoing process in the organisation, besides regular, need-based, developmental interventions at transition points. With its mandate of being the 'Energy of India', IndianOil has its work cut out amidst the fast-paced energy transitions. Creating innovative ways to leverage key strengths and tapping its potential beyond the core business it will forge ahead of the competition.

PMUY: A REVOLUTIONARY INITIATIVE

The Pradhan Mantri Ujjwala Yojana (PMUY) is a Government of India's initiative and much more than an instrument of charity or philanthropy. It has created a revolution which is as simple in its approach as it is effective. The endeavour infuse new energy to the term 'social inclusion' by acting as a socio-economic equaliser. With a presence in every nook and corner of the country, among oil marketing companies, IndianOil is leading the Ujjwala implementation as it builds on a scalable business model to provide clean cooking fuel to millions of common people. The company has released crores of LPG connections under the scheme.

This flagship scheme's objective is to make clean cooking fuel, such as LPG, available to the rural and deprived households which were using traditional cooking fuels such as firewood, coal, cow-dung cakes,

The Pradhan Mantri Ujjwala Yojana (PMUY) has been launched in a big way across the country to provide free LPG cooking gas connections to BPL families, utilising the enormous resources freed through PaHaL and GiveItUp schemes.



etc. Use of traditional cooking fuels had detrimental impacts on the health of rural women as well as on the environment. As per a World Health Organisation study, about one million people die every year in India due to diseases related to indoor air pollution. India is progressing at a slow speed towards the second Sustainable Development Goals (SDG) 7.1 objective—access to clean cooking. The PMUY initiative is extensive and ambitious in its scope as it spans the entire nation. It is a benevolent programme that encompasses the poorest of the poor. It is an innovative scheme that achieves multiple goals in a single sweeping move, tapping a host of synergies. Realising the need to counter the growing health hazard to women and children and offering a clean fuel option through the experience of owning an LPG connection, PMUY has established itself as one of India's most successful schemes implemented for the BPL women population.

The PMUY was launched in Ballia, Uttar Pradesh, on 1 May 2016, as a nationwide scheme to provide LPG connections to economically underprivileged families living below the poverty line (BPL). The target under the scheme was to release eight crore LPG connections. This target was achieved seven months in advance. The release of eight crore LPG connections under the scheme also helped in increasing the LPG coverage from 62 per cent to 99.8 per cent in less than five years. In the Union Budget, provision for release of an additional one crore LPG connections under the PMUY scheme made, with special facility for migrant families.

During implementation of the scheme, the field units encountered many problems related to mismatch of demographic details like name, age, gender in SECC data vis-à-vis Aadhaar card and non-availability of supporting documents and Aadhaar cards of beneficiaries and other family members. The MoP&NG expanded the scheme in April 2018 to include women beneficiaries from seven categories. They were Scheduled Caste/Scheduled Tribe households; beneficiaries of Pradhan Mantri Awas Yojana (PMAY-Rural); beneficiaries of Antyodaya Anna Yojana (AAY); forest dwellers; Most Backward Classes (MBC); tea and ex-tea garden tribes; and people residing in islands/river islands. Also, the target was revised to eight crore LPG connections to be released by March 2020 using an additional financial assistance of Rs. 4800 crore. This scheme was named as Expanded PMUY (EPMUY). To provide universal coverage of LPG, PMUY was further expanded in December 2018 to include women beneficiaries from all poor households as per the 14 exclusion criteria of SECC. This scheme was named Expanded PMUY 2 (EPMUY 2) and was launched on 20 December 2018.

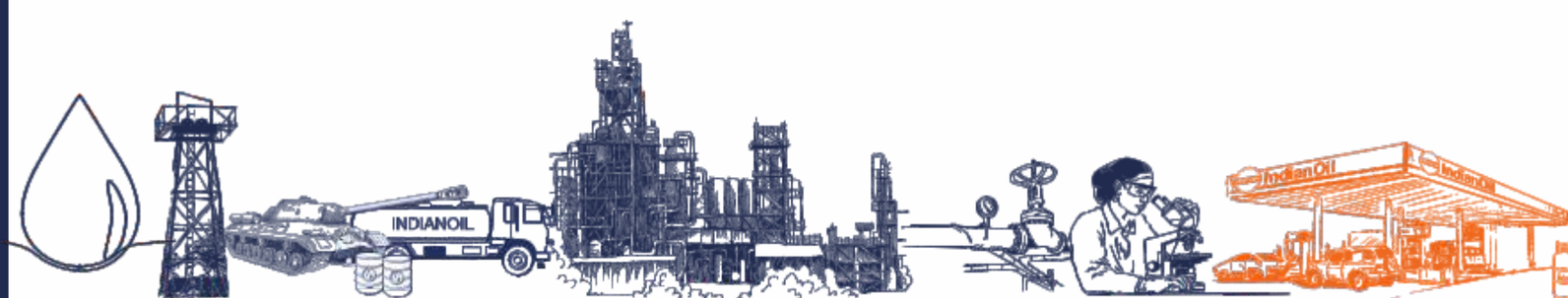
With the resounding success of improved LPG penetration, in order to achieve universal LPG coverage, in the Union Budget 2021-22, provision for release of an additional one crore LPG connections under the PMUY scheme was made. This scheme was named Ujjwala 2.0 with special facilities for migrant families.Ujjwala 2.0 was launched in the Mahoba District of Uttar Pradesh on 10 August 2021 on a pan-India basis to provide an additional one crore LPG connections along with free first refill and stove. The government extended Ujjwala 2.0 in January 2022 to release an additional 60 lakh LPG connections. As on 1 January 2023, a total of 1.60 crore LPG connections had been released under Ujjwala 2.0 scheme. The three public sector oil-marketing companies, IndianOil, HPCL and BPCL have played a pivotal role in the physical execution of the scheme. IndianOil's energy soldiers have successfully steered the globally acknowledged scheme to provide LPG to one crore rural and economically underprivileged households.

NATION FIRST: SACRIFICE AND RESILIENCE
IN THE FACE OF DISASTER

On a seemingly ordinary day on 24 December in 2004, Mr. Stephen, the location in-charge of Car Nicobar AFS, was filled with the holiday spirit as he prepared to celebrate Christmas in his hometown of Port Blair. He handed over the reins of the station to Aviation Officer Ravi Bhushan Kumar, a handover as routine as the tides that washed the shores of Car Nicobar, the northernmost of the Nicobar Islands. Ravi, along with his Junior Operator E. Harish Kumar, went about their duties, refuelling Indian Air Force planes, blissfully unaware that the world as they knew it was about to change irrevocably. Two days later, on 26 December, the earth shook, and the sea roared. An undersea earthquake of staggering magnitude struck off the coast of Sumatra, sending a wall of water across the Indian Ocean. The tsunami that followed was a cataclysm so devastating that it claimed nearly 2,28,000 lives across 14 countries. Car Nicobar was not spared. The island lost 865 souls that fateful day, among them were Ravi and Harish. Their residential quarters, like those of many Indian Air Force personnel, were close to the sea and stood no chance against the tsunami's might.

In the aftermath, a team of IOCians arrived at Car Nicobar AFS, their hearts heavy but their resolve unbreakable. They slept in the Aviation Fuel Station office, which had miraculously survived due to its distance from

IndianOil Aviation's Car Nicobar AFS Station.

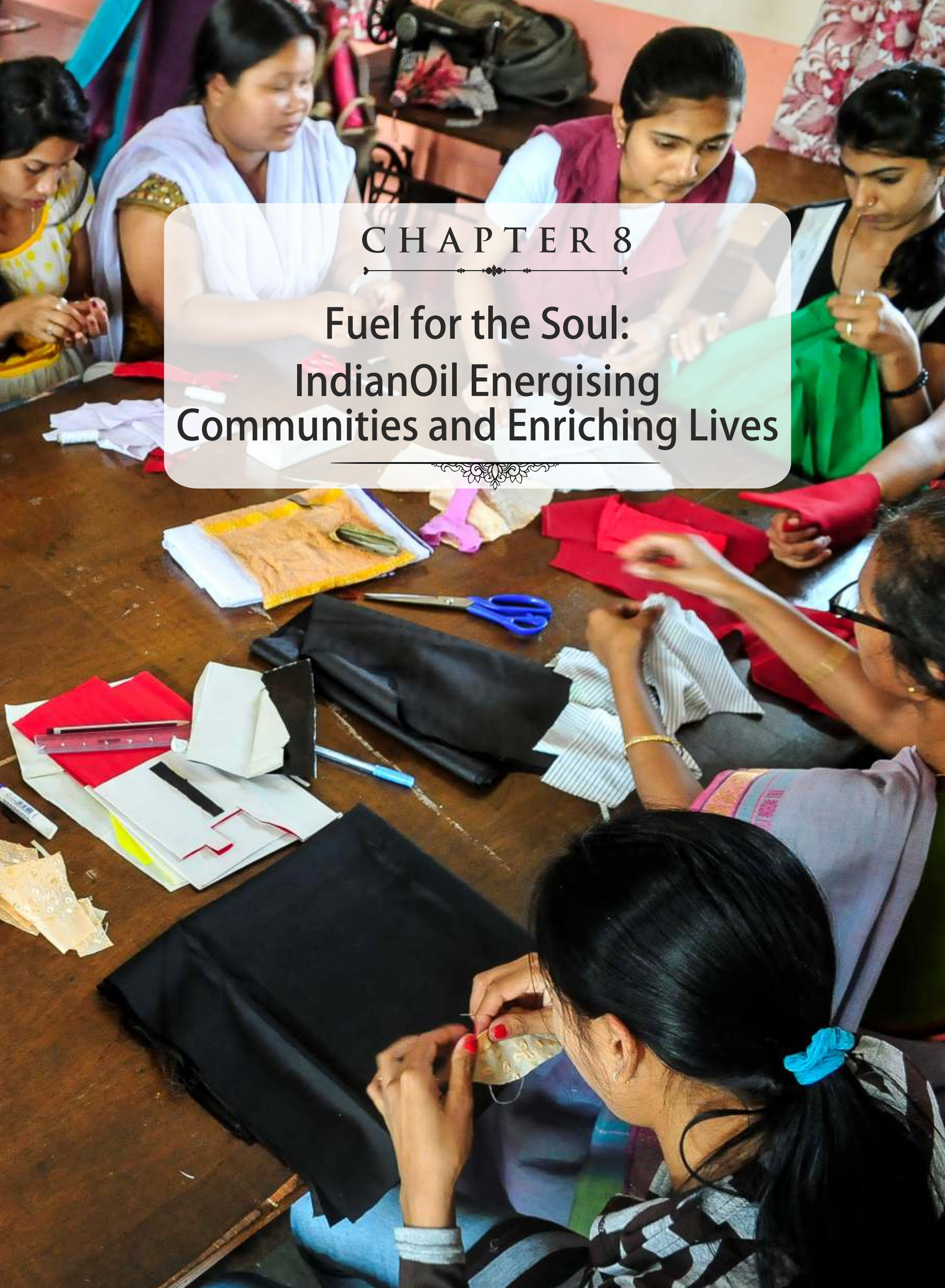


the sea. Day and night, they refuelled rescue and relief aircraft, becoming the lifeline for the islands further south of Car Nicobar. It was a stark reminder of the critical importance of fuel, but more importantly, of the indomitable human spirit. Their dedication embodied the principle of 'Nation First,' as they became the linchpin for the islands further south of Car Nicobar, ensuring that help could reach those who needed it most.

The tsunami was a grim reminder of nature's unpredictable fury, but it also brought to light the invincible spirit of individuals who put the nation above themselves. IndianOil stood as the backbone of relief and rescue operations in the Andaman and Nicobar Islands, but the true heroes were men like Ravi and Harish. Their sacrifice was not in vain; it served as a beacon of hope and resilience, illuminating the path for others in times of darkness.

In their sacrifice, we find the most potent expression of 'Nation First.' They may have lost their lives, but their legacy endures, a powerful testament to the resilience and commitment that define the human spirit in the face of unimaginable adversity. It is this legacy that IndianOil holds dear, a legacy that serves as a poignant reminder: when we prioritise the nation even in our darkest hours, we ignite a beacon of hope that illuminates not just our path, but also touches the hearts of every Indian.

A homage to IndianOil officers who lost their lives in the devastating Tsunami that such on the morning of 26 December 2004.



CHAPTER 8

Fuel for the Soul: IndianOil Energising Communities and Enriching Lives

Under the Scheme of IndianOil the Aarogyam facility of ambulance services are provided.

Embracing the wisdom of the Vedas and the Bhagavad Gita, the Indian ethos celebrates altruism and the universal welfare of humankind. This philosophy esteems a life devoted to the well-being of others as the pinnacle of virtue. Mirroring this ancient wisdom, the concept of Corporate Social Responsibility (CSR) emerges in the modern corporate sphere, advocating for businesses to harmoniously incorporate social and environmental considerations into their core operations and stakeholder engagements, aiming to give back to the community. However, even before CSR came under the ambit of the Companies Act, 2013, in India it has traditionally been seen as a philanthropic activity. In keeping with the country's tradition, it is believed that every company has a moral responsibility to fulfil social obligations. CSR is a concept influenced by family values, traditions and the culture of India. It is also closely linked to equity and sustainability.

A Company That Cares

IndianOil has been actively engaged in a gamut of social welfare activities across the nation. The company's CSR thrust areas include safe drinking water and protection of water resources, healthcare and sanitation, education and employment-enhancing vocational skills and empowerment of women and socially/economically backward groups. IndianOil's CSR legacy started much before the CSR legislation came into force in 2014–15. Its CSR projects are undertaken mostly to improve the quality of life in various communities, which invariably include marginalised/underprivileged sections of society, such as Scheduled Castes, Scheduled Tribes, other backward castes, physically handicapped, etc. IndianOil undertakes CSR activities across the country, from Leh in J&K in the North to Tamil Nadu and Kerala in the South and Gujarat in the West to the North Eastern States. The company has patronised many life-changing community development projects and has positively impacted numerous stakeholders with about 500 projects each year across the length and breadth of the country.

IndianOil's CSR initiatives are guided by its corporate vision of caring for the environment and community. It believes that CSR is a commitment to conduct business in a responsible and sustainable manner and contribute to the economic well-being of the country. The company's Sustainability and Corporate Social Responsibility vision is to operate its activities in providing energy solutions to its customers in a manner that is efficient, safe and ethical, while minimising the

impact on the environment. At the same time it is committed to enhancing the quality of life of communities, especially those living in the vicinity of where the company operates. IndianOil enhanced its CSR allocation beyond the prescribed CSR budget as required under the provisions of the Companies Act, 2013. It has exemplified its commitment by using 100 per cent of its CSR budget allocation for the past several years.

Top and bottom: The students of Vidushi, a flagship CSR project of IndianOil, are celebrating their success.

Promoting Women's Education

Aiming to help girls from the under-privileged sections of society to gain admission in prestigious engineering institutes such as IITs, NITs, IIITs, and other central and State engineering colleges, IndianOil initiated a unique programme 'IndianOil Vidushi' in July 2018 at two residential centres in Bhubaneswar (Odisha) and Noida (Uttar Pradesh). While the Bhubaneswar centre caters to students of Odisha, Jharkhand and Chhattisgarh, the Noida centre primarily caters to students from Jammu and Kashmir, Uttarakhand, Himachal Pradesh and Punjab. In 2019-20, this project was further expanded to two more centres in Jaipur (Rajasthan) and Patna (Bihar). The students are provided specialised coaching and mentoring after Class XII to succeed in JEE Main, JEE Advanced and other central and state engineering entrance examinations. A maximum of 30 girl students are selected for each centre through written tests and personal interviews on

IndianOil presenting cheques to inspire meritorious girl students under its Medha Chatravriti Yojna.

merit-cum-means basis. The entire cost for specialised coaching study material, boarding, food and other consumables, blankets, hygiene kits, dress sets, health insurance, etc. is borne by IndianOil. Since the outbreak of Covid in 2020, classes have been running on virtual mode. From its inception, out of the total enrolment of 413 girls in four centres, 54 students were selected in IITs, 93 were selected in NITs and 153 students were selected in various other engineering colleges. About 119 girl students were enrolled for the financial year 2022-23, out of which 68 girls qualified in JEE mains. Scholarships are also provided to the students after getting admission into IITs/NITs/Government Engineering Colleges for their graduation in engineering for four years (Rs. 5,000 per month for IITs/NITs; Rs. 4,000 per month for other government engineering colleges).

"If you educate a man, you educate an individual. But if you educate a woman, you educate a nation." This famous African proverb of James Emman Kwegyir Aggrey truly depicts the objective of 'IndianOil Vidushi'. Another programme that aims to promote education among girl children is IndianOil's Medha Chhattravritti Yojna that targets a reduction in school dropout cases. The project that started in 2021-22, includes distribution of one time educational scholarships of Rs. 10,000 each to the top 75 girl students of Class X from 30 Boards across the country. A total 3,680 scholarships were distributed to the girl students, who have topped in Class X (academic sessions 2020 and 2021), from 29 Boards across the country.

Skills and Opportunities

The Skill Development Institute, Bhubaneswar, was established on 9 May 2016, to afford opportunities to grant to the unemployed and underprivileged youth of Odisha and to provide skilled manpower to the industry. The SDI-B's main campus was inaugurated by Union Minister of Petroleum and Natural Gas and Steel on 24 February 2019. The multi-skilling institute (green campus), offers international standards of training, imparts world class skill development courses, supported by industry experts. SDI-B prepares students with adequate abilities to pursue careers as industrial electricians, welders, fabrication fitters, instrumentation technicians and pipe fitters (city gas distribution). Courses in computer data application (only for girls), solar PV installation and LPG mechanics are also available.

The course duration ranges between three and six months. During 2022-23, 638 youths were skilled and certified. Since inception, 2,407 youths have been trained and certified under various trades. Various Centres of Excellence have been established in collaboration with internationally reputed institutions/industry partners such as Schneider Electric, CISCO, Siemens, Lixil, Tata Strive, KEMPPI and Institute of chemical technology (for skill development course) to provide relevant skill development training with high potential for generating employment. The institute is expected to impart skill development training to over 40,000 students over a period of 10 years, in approximately 25 trades pertaining to the Hydrocarbon sector as well as other industries including future skills related to the industry 4.0, in line with the National Skill Development Mission for the Government of India.

Top and bottom: The Skill Development Institute, Bhubaneswar, provides livelihood skill development training to unemployed and underprivileged youth. Various Centres of Excellence have been established in collaboration with internationally reputed institutions to provide training with high potential for generating employment.

SDI-B also plans to offer skill courses in advanced technology areas such as Artificial Intelligence, Internet of Things, Robotics, Machine Learning, Virtual/Augmented Reality, 3-D Printing, etc. IndianOil, under the aegis of the Ministry of Petroleum and Natural Gas, is steering SDI-B as a 'Greenfield Mega Model Multi Skilling Institute' and has till date contributed about Rs. 257 crores for setting it up.

IndianOil Gyanodaya scheme started in 2017-18, provides scholarships on merit-cum-means basis to students pursuing two-year regular courses in Government ITIs and three-year regular courses in Government Polytechnics, incentivising them to perform well. The scheme covers 36 government institutes (18 ITIs and 18 Polytechnics) near nine IndianOil Refinery locations. Fifty students per batch are selected from each institute every year. Each student is provided a scholarship of Rs. 1,000 per month for the entire duration of the course. During the last five financial years, more than 5900 students have benefited from the Indianoil Gyanodaya Scholarship Scheme. The scheme has offered a new ray of hope to the aspiring youth of the country.

The stigma attached to the transgender community leads to their facing discrimination in education, employment and generally being deprived of basic human rights. To provide opportunities to this community so that they can join the mainstream and live dignified lives, IndianOil launched a scheme to impart drone operations and maintenance training to transgenders.

Skill Training for Transgenders

Transgender persons' lack of social recognition has excluded them from the mainstream, as they face ostracism from their own families, siblings and the public throughout their lives. They have few means of livelihood as businesses do not hire them. This results in transgenders getting into begging and prostitution. With an aim to provide opportunities to transgenders to join the mainstream and live dignified lives, IndianOil in association with the Madras Institute of Technology (MIT), Chennai, imparted drone operations and maintenance training to transgenders.

The project included short-term English and personality development programmes for 24 transgender persons. Out of them 15 were taken on board for the prestigious DGCA approved remote pilot training programme. Drones are being used for mosquito control in stagnant water, spraying of insecticides, surveillance and other works for the municipal corporation. Four transgenders have already been engaged as trainees in the Centre for Aerospace Research, MIT, for drone operation activities.

Health Initiatives

IndianOil has taken significant steps towards improving public health in the country. The company has launched various initiatives such as TB elimination accelerated programme to eradicate tuberculosis (TB) in four states, the provision of medical equipment to various hospitals, comprehensive cancer care, providing primary healthcare services in rural areas and running its own hospitals for public well-being. Through these initiatives, IndianOil contributed to the larger goal of building a healthier India.

As per a WHO report: every year 10 million people fall ill with TB. About one-quarter of the world's population has TB infection and one-fourth of the global incidence of TB cases is in India annually. In line with the vision of the Prime Minister, the Government of India is committed to end TB by 2025, five years ahead of the Sustainable Development target.

IndianOil in financial year 2022-23 collaborated with the Central TB Division (CTD), Ministry of Health & Family Welfare and the states of Uttar Pradesh, Chhattisgarh, Maharashtra and Uttarakhand are working towards achieving the TB elimination goal of the Government. Under the project, IndianOil has planned to provide 251 molecular diagnostic machines, 49 handheld X-ray machines, 18 mobile medical vans for diagnosis of TB in four states. This ground-breaking initiative makes IndianOil the first corporate to plan a large-scale active case finding campaign across all 75 districts of UP, covering about 10 per cent of the population annually in the next three years. The project aims to aid in the diagnosis of TB in rural and remote areas of these states. So far, IndianOil has handed over 251 Truenat Machines (Duo/Quattro) to the state health department of four states. With these all eight aspirational districts of Uttar Pradesh, all tribal areas/districts of Chhattisgarh and Maharashtra and all the districts of Uttarakhand will be saturated till block level.

Top and bottom: IndianOil contributes significantly to the health initiatives of India, whether it is in the battle against TB or treatment of other diseases.

Healthcare for Community

With the objective of providing primary healthcare at people's doorsteps, particularly in rural and under-served areas, IndianOil started a flagship CSR project called 'IndianOil Aarogyam' in financial year 2018-19. Twelve mobile medical units, each with a four-member medical team consisting of a doctor, a nurse, a nursing attendant and a driver-cum-community mobiliser have been operating in the catchment areas of three refinery units—Mathura (Uttar Pradesh), Bongaigaon (Assam) and Paradip (Odisha). The MMUs conduct health screening, basic diagnosis and provide medical treatment. They cover more than 140 villages near the three refineries. Since inception, patient footfall in the target areas is around 12.74 lakhs.

IndianOil's 200-bed Assam Oil Division Hospital, Digboi, established in 1906, caters to the population residing near Digboi and other nearby areas of the North East. Every year, about one lakh patients are treated at this hospital. The hospital registers about 4,000 inpatients and conducts operative procedures on about 2,000 patients every year. Health camps of general and specialised nature are also organised regularly by the hospital to reach out to the poor villagers in the vicinity, who have no access to medical consultations or treatment. This multi-specialty tertiary care hospital has a 24 hours emergency centre, well-equipped operation theatres, a burn unit, diagnostic services, telemedicine centre, substance abuse and treatment centre, blood bank, medical stores, morgue, etc. During the last five financial years, more than 30,000 non-employee patients were treated at the hospital.

The Assam Oil School of Nursing at Digboi Refinery township, Digboi, District Tinsukia, Assam, was established in 1986 to provide professional training in the field of nursing and midwifery to unemployed and under privileged girls from poor socio-economic background via diploma in General Nursing and Midwifery (GNM) and B.Sc. in the Nursing course. India has an average of 1.7 nurses for every 1,000 people, 43 per cent less than the World Health Organisation norm (3 per 1,000). India needs 20 lakh nursing personnel to fill this wide gap. The Covid-19 pandemic has only increased the requirement for qualified nursing personnel. The Assam Oil School of Nursing, Digboi, was established with the dual objective to provide stable career and livelihood opportunities to young underprivileged girls and to ensure availability of qualified nurses in the country. IndianOil was awarded the National CSR award in 2019 instituted by the Ministry of Corporate Affairs. Till date, 671 students have successfully completed their courses with 100 per cent placement record.

Top and bottom: The Assam Oil School of Nursing, Digboi, caters to the population residing in and around Digboi. It organises regular health camps so that poor villagers can access medical treatment. Unemployed girls are given professional training in the field of nursing and midwifery, opening up job prospects for them.

The Swarna Jayanti Samudayik Hospital at Mathura, established in 1999, provides medical treatment to residents near IndianOil's Mathura Refinery in Uttar Pradesh. The 50 bed hospital provides free treatment to the destitute and offers subsidised treatment to others. The hospital provides facilities like IPD for general medicine and surgery, emergency services, physiotherapy, trauma ICU, burns department, etc. During the second wave of Covid-19, within a short span of 15 days, the hospital was converted into a 104-bedded Covid hospital with oxygen facility. Two mobile dispensaries also operate in nearby villages to provide free medical care to the villagers. During the last five financial years, more than 2.5 lakh patients were treated at the hospital, out of which surgical procedures were conducted on 2670 patients.

Unique Concept of Welfare

Every year about 35,000 babies are born with cleft lips or palates and there are over ten lakh cases of untreated clefts in India. Most parents either do not know that a cleft can be fully corrected at the early stage itself or are too poor to afford the costs of surgery. In addition to being a medico-economic issue, a cleft is often associated with social stigma, especially for girls, who find it very tough to lead a normal life with facial deformities. IndianOil undertook an initiative in the financial year 2016-17 to bring back smiles on the faces of people affected with cleft lips in the north-east by entering into a partnership with Mission Smile, Guwahati for conducting surgeries. Mission Smile has set up a state-of-the-art comprehensive Cleft Care Centre at Mahendra Mohan Choudhury Hospital in Guwahati, where they provide comprehensive treatment to the cleft patients. Since 2016, IOCL has supported over 1000 corrective surgeries of such patients under CSR. The all expenses covered programme helps children of Assam and Meghalaya to lead a normal life. Considering the overwhelming results, the project has been replicated at Ranchi, Jharkhand, where 170 corrective surgeries have been conducted during the financial year 2022-23.

IndianOil also took a massive initiative since 2017-18 to support and empower Divyangjans across the country. The beneficiaries were selected, and their disabilities were assessed through assessment camps organised in association with Artificial Limbs Manufacturing Corporation and local administration, in the target villages. Accordingly, assistive devices like tricycles, wheelchairs, crutches, walking sticks, Braille kits for visually impaired, hearing aids, artificial limbs, etc. were provided to select Divyangjans at the distribution camp by IndianOil. During the last five financial years, about 50,000 Divyangjans across 23 states of India have been benefited through this initiative.

Top and bottom: A team of doctors operating a child's cleft lip under the 'Madhur Muskan' initiative. The view of a child before surgery and after surgery.

Top and bottom: For the first time in the country, Indian prison teams consisting of inmates, were selected to represent India in an International Sports tournament "Chess for Freedom" and the Indian inmates team of Yerwada Jail secured the bronze medal. Truly a historical first-and all due to IndianOil's very successful and unique prison rehabilitation sports project named-Parivartan Prison to Pride.

Prison to Pride

IndianOil's successful social outreach programme, Parivartan- Prison to Pride was launched on 15 August 2021. It is aimed at transforming the lives of people working in or incarcerated within the criminal justice system. It teaches sports skills that reduce stress, heal trauma and provide practical knowledge of how to handle negative emotions in order to live one's life to one's highest potential and contribute to society in a positive way. IndianOil employs prison inmates and people who have finished their prison terms as customer attendants at retail outlets in several states including Tamil Nadu, Kerala, Telangana, Andhra Pradesh, Madhya Pradesh and Rajasthan.

Parivartan Prison to Pride project is now in its fourth phase. This project has touched the lives of 2,600 inmates across 52 prisons in 25 states. The phenomenal impact of the campaign came to the forefront when the chess team of inmates from Pune's Yerawada Prison emerged as the first Indian team ever to secure a Bronze Medal at the Intercontinental Chess For Freedom Online Championship for Prisoners, organised by FIDE (World Chess Federation) in 2022.

The Nai Disha- Smile for Juvenile's project extends benefits to over 250 young inmates at three Juvenile Correction Centres in Delhi, Mumbai and Chennai. The Nai Disha project would leverage the medium of sports to impart critical life lessons while infusing joy in young inmates.

The infrastructure augmentation at Sun Temple in Konarka, Odisha is one of the flagship efforts of IndianOil Foundation. The foundation was formed in collaboration with the Archaeological Survey of India and Union Ministry of Culture to protect, preserve and promote the nation's priceless heritage.

Preserving India's Heritage

The charm of India's past lies in its regal palaces, ornate temples, historical places of learning and discovery, its people, cultural traditions and a wide variety of languages. Wherever you go, East, West, North or South, India is replete with heritage monuments, some of which have been accorded the World Heritage Status by United Nations Educational, Scientific and Cultural Organisation (UNESCO). To protect, preserve and promote the nation's priceless heritage, IndianOil created a non-profit trust in 2000 called the IndianOil Foundation (IOF) in collaboration with the Archaeological Survey of India and the National Culture Fund of the Union Ministry of Culture. Exclusively funded by IndianOil with an initial corpus of Rs. 25 crores and an annual contribution of Rs. 10 crores, the foundation aims to promote awareness, knowledge and involvement in the national heritage and culture in association with the government and non-governmental organisations of repute. Its mission is to help enrich the quality of life of the community and preserve ecological balance and heritage through a strong environmental conscience.

So far, ten projects have been completed, five are in progress and eight projects are scheduled to start soon. In addition to these, nine more projects have been adopted by the foundation, which are at the Concept stages. The completed projects are Swatantrya Jyot at Cellular Jail, Port Blair; Veer Savarkar Jyot at Cellular Jail, Port Blair; Sun Temple at Konark; Kanheri Caves in Mumbai; Ashokan Pillar at Kolhua, Vaishali, Brihadeshwara Temple in Thanjavur; Khajuraho Group of Temples at Chhatarpur, Madhya Pradesh; Bhoganandishwara Temple in the Nandi Hills; Namo Ghat in Varanasi (Phase 1); and Khajekhalan Ghat in Patna, Bihar. The foundation embarked on its important journey beginning with the creation of "Swatantrya Jyot" in the premises of the Cellular Jail in Port Blair, which was unveiled in 2004. Subsequently, a replica of Swatantrya Jyot, "Veer Savarkar Jyot" to commemorate the 133rd birth anniversary of 'Swatantra Veer' Vinayak Damodar Savarkar was provided by the foundation in Cellular Jail in Port Blair which was unveiled on 28 May 2016. Both the Jyots, having a permanently lit flame, are a tribute to the revolutionary freedom fighters' contribution to India's struggle for independence.

The Sun Temple in Konark, Odisha, is a thirteenth century temple attributed to King Narasingha Deva I of the Eastern Ganga dynasty around 1250 CE. In 1984, the Sun Temple, Konark was declared a UNESCO world heritage site. IOF has developed world class tourist infrastructure facilities at Konark which were inaugurated on 1 April 2018. It has a state-of-the-art interpretation centre with five display galleries and an auditorium for screening films. The foundation also organises visits of school students to create awareness and interest about national heritage amongst the younger generation.

Preserving India's Gl

Swatantrya Jyot &
Veer Savarkar Jyot

Sun Temple, Konark, Odisha

Interpretation Centre, Odisha

Pattadakal Group of Temples,
Dharwad

Warangal Fort, Telangana

The Ashokan Pillar
Kolhua (Vaishali), Bihar

Singorgarh Fort, Madhya Pradesh

Kala Aamb, Panipat, Haryana

orious Heritage

इंडियनऑयल फाउंडेशन
The IndianOil Foundation

Kanheri Caves, Mumbai

Namo Ghat, Varanasi

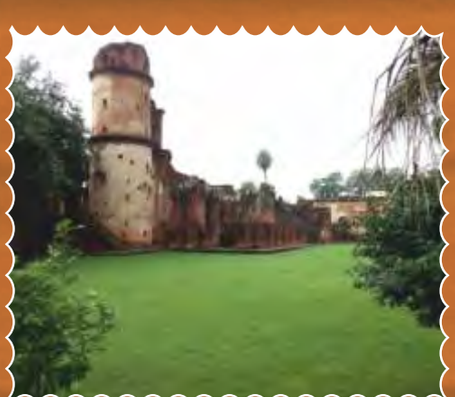
Mahadev Temple- Kurdi, Goa

Khajuraho Group of Temples
Madhya Pradesh

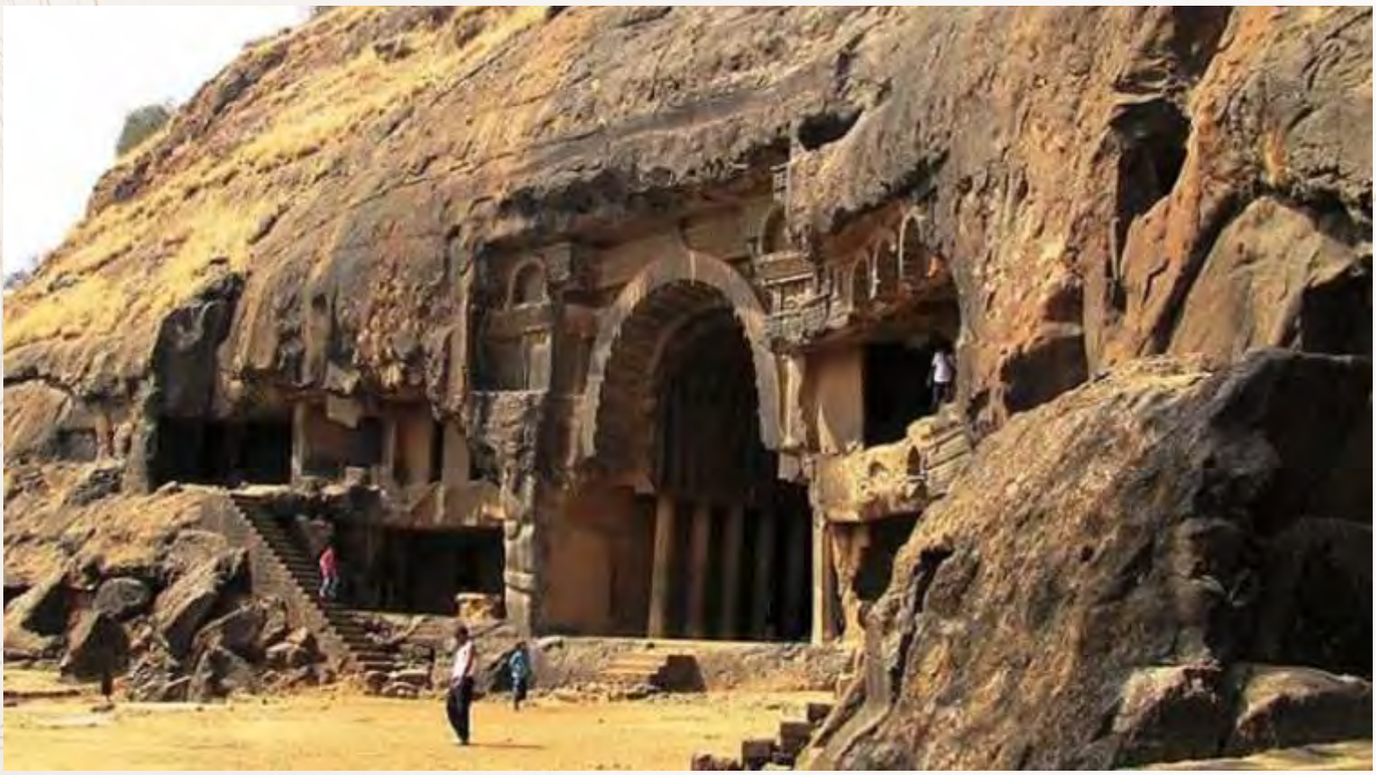
Brihadeshwara Temple
Thanjavur, Tamil Nadu

Bhoganandishwara Temple
Karnataka

Golconda Fort, Hyderabad



Lucknow Residency, Uttar Pradesh



The Kanheri caves in Mumbai carved from basalt rock, which date from the first century BCE to the tenth century CE, have received a facelift, courtesy the IndianOil Foundation. Many facilities have been developed for tourists.

Reviving the Buddhist Trail

The Kanheri Caves in Mumbai are a group of caves and rock-cut monuments cut into a massive basalt in the forests of the Sanjay Gandhi National Park. They contain Buddhist sculptures and relief carvings, paintings and inscriptions. The cave complex comprises 109 caves, carved from the basalt rock and dates from the first century BCE to the tenth century CE. Kanheri comes from the Sanskrit word 'Krishnagiri', which means black mountain.

The tourist-friendly facilities provided by the IOF include an entrance gate, modification of stairways with additional ramp for the differently-abled, ticket counter and luggage room building, interpretation centre, display gallery, cafeteria with facilitated viewing platform on top, multipurpose hall, installation of deep tube well, DG sets, 20 KW solar power system, toilet block, signages, pathways, sit-outs and landscaping.

The Ashokan Pillar in Kolhua, Vaishali, Bihar, locally known as Bhim Sen Ki Lathi is about 12 metres high. It is built of a monolithic sandstone column surmounted with a lion capital. It is one of the earliest six monolithic pillars erected by Ashoka. Buddha is said to have delivered his last sermon at Kolhua. There are about 330 votive stupas around the main stupa with variant shapes and designs. The facilities developed by the foundation there include a ticket counter and publication counter building, interpretation centre with audio-visual auditorium, display galleries, cafeteria, toilet block, DG set and solar system, signages, sit-outs, landscaping, pathways, etc.

Defining Architectural Symbolism

Built between 950 CE and 1050 CE by the Chandela dynasty, the Khajuraho group of temples, a UNESCO world heritage site, features a unique collection of 20 Jain and Hindu temples that are famous for their nagara-style of architectural symbolism. A brand new main entrance, parking facilities cafeteria and visitor facility centre with an audio-visual auditorium and display gallery are some of the tourist facilities developed by the foundation. IOF has also upgraded the surrounding areas by desilting and beautifying the Shiv Sagar Lake and improving the Bundha Road to facilitate a smooth approach, and setting up wide pathways for battery-operated vehicles.

Bhoganandishwara Temple at Nandi Hills is one of Karnataka's oldest temples, with a history stretching back to the early ninth century. Dedicated to Lord

Shiva, newly-weds often seek out the Uma-Maheshwara shrine which depicts Shiva's marriage to Parvati to seek blessings for their marriage. IOF has set up a viewers' gallery, drinking water kiosks, toilet block, cafeteria, parking area and a beautified landscaped area.

The Brihadeshwara Temple at Thanjavur, Tamil Nadu, another Shiva temple and UNESCO World Heritage Site, has a hallowed history. It was likely one of the tallest structures at the time of its construction between 1003 and 1010 CE and is today one of the great living Chola temples, a marvellous example of Dravidian architecture. IOF has undertaken an extensive illumination project of the entire temple complex and associated structures, in addition to pledging comprehensive maintenance of the illumination system for three years.

The Namo Ghat at Varanasi is one of the ancient ghats famous for its Chatth Puja, Panchkosi yatra and now for its Dev Deepawali. In order to make Namo Ghat, a new centre of attraction for people visiting Varanasi from all over the world, IOF has renovated and redeveloped with various tourist infrastructure facilities. Phase 1 of the project involving development of the Ghat from Raj Ghat to old Namo Ghat a stretch of around 500 metres, has been completed. Public facilities developed include, approach road, promenades at three levels with access for differently-

Top, bottom left and bottom right: Among the sites that have been renovated by the IndianOil Foundation is the Khajuraho group of temples, a UNESCO world heritage site, known for the Nagara style of architecture. Two other heritage sites, the Bhoganandishwara Temple in Karnataka and Rock Cut monuments at Mamallapuram, have been provided with various facilities by the IndianOil Foundation.

The historical British Residency in Lucknow that bears the marks of cannon balls fired by Indian soldiers during the siege of Lucknow as part of the 1857 uprising, also considered the first Indian War of Independence. The IndianOil Foundation has provided illumination and other facilities for this site.

Bottom: The IOF has developed extensive tourist facilities at this UNESCO world heritage site.

abled persons, open area theatre, tree jetties to help visitors board the boats, food court, public conveniences, viewing deck and gazebo, sit outs, etc. A Namaste statue consisting of a male hand, a female hand and a child's hand in Namaste position has also been installed which has become a major attraction point.

Similarly, Khajekhalan Ghat is one of the three registered cremation ghats in Patna's Sahib Area city under Patna Nagar Nigam. The Ghat is regularly used to take a dip in the Ganges besides Chhath celebrations, cremation activities, etc. IOF has developed a modern ghat having steps with safe access to Ganga Ghat throughout the year, public conveniences, drinking water, dress changing rooms, etc., besides soil conservation/environmental protection activities.

Giving Back to Nature

Due to unnatural exploitation, excessive hunting for sport and lack of the present day's Wildlife Protection Law, the last three cheetahs went extinct in India in 1952. Under the species recovery programme of the Government of India, species which become extinct are restored in their historic natural habitat. To restore the cheetah in its historic habitat, Kuno National Park, Madhya Pradesh, is the first site in India selected by the Ministry of Environment, Forests and Climate Change for Cheetah introduction project. IndianOil is the first corporate to partner with the National Tiger Conservation Authority for restoration of cheetahs to their historic habitat, Kuno National Park, Madhya Pradesh. It involves creating a 500-hectare predator proof enclosure for soft release of the feline.

The major components considered under the project include, cheetah introduction, cheetah habitat management, cheetah protection, eco development, community support and veterinary healthcare. Under the project, a source population of five male and three female cheetahs were flown in from Namibia in September 2022 and 12 cheetahs were flown in from South Africa to the Kuno National Park. The cheetahs are gradually being released into larger enclosures for acclimatisation to the landscape of Kuno National Park. The initiative will facilitate the restoration of grassland, scrub, and open forest ecosystems, enhance associated ecosystem services and result in the conservation of several threatened and endangered species in lower trophic levels of such ecosystems.

Water is the most precious, life-sustaining natural resource. The conservation and availability of clean water has, therefore, become a necessity. To ensure steady supply of water and to maintain ecological balance, cleaning of water bodies is essential. IndianOil in collaboration with the Institute of Chemical Technology, Mumbai and IndianOil Campus, Bhubaneswar, undertook the project for cleaning the Bindusagar Lake in Bhubaneswar, Odisha. Bindusagar is one of the largest water bodies in Bhubaneswar located to the north of the famous Lingaraja Temple. Due to waste water and sewage from the surrounding buildings, flowers and offerings from the temples, and other waste from the ghats, the lake was polluted and had lost its self-purifying capacity. ICTM-IOCB used the patented hydrodynamic cavitation technology to reduce biochemical oxygen demand, chemical oxygen demand and microbial population in the water body.

The Bindusagar Lake in Bhubaneswar is the largest water body in the city situated near the Lingaraja Temple. The lake's pollution levels had risen alarmingly when IndianOil stepped in with its patented hydrodynamic cavitation technology to clean up the water body.

A cellar containing potatoes at Nang village in Leh district. These cellars are useful for local inhabitants as they can store essential commodities during the freezing winter months.

IndianOil has implemented another innovative project by providing a remote operated water drone or floater boat to clean the Bhalswa Lake at Jahangirpuri, Delhi. It helped to remove the floating garbage from the lake on a regular basis. It cleaned plastics, micro-plastics, alien vegetation, floating debris, etc., from the water body. The floater boat is an unmanned, garbage collection, marine surface vessel, designed for round-the-clock waste collection. It also scans and monitors the environment, sending necessary data to the central command. The project has not only benefited the flora and fauna dependent on the water body but has also been a boon for residents of neighbouring areas.

Refineries essentially consume large quantities of water for industrial use. Taking a conscious call, the company has taken a unique step for minimising its water footprint substantially. IndianOil has set-up a pioneering Sewage Treatment Plant (STP) at Laxmi Nagar, Mathura, which is a first-of-its-kind endeavour. The Refinery is currently drawing treated sewage water from this STP, thus reducing the freshwater intake from the Yamuna river. Gujarat Refinery too plans to draw treated water from the soon-to-be-commissioned Rajiv Nagar STP. Other IndianOil refinery units are also preparing to replicate these successful initiatives.

Investing in Community

IndianOil perceives sustainable growth as an opportunity to enhance its business processes and practices, enabling it to positively impact its entire scope of business. The company's values drive the belief that responsible businesses can be profitable, leading to investments in technologies and products and new energy infrastructure that will help shape a low carbon future. IndianOil sees sustainable business practices as a defining element of competitiveness to maintain its status, equity and standing, both in the market and in society in the coming decades.

Its attention is on what it produces, how it buys and sells, how it affects the environment, how it invests in the community and respects the rights of people. IndianOil's societal obligations stood out even in its formative years, while it supported the mission of the defence forces to preserve the integrity of the nation, kept the home fires burning in rural India, fuelled major transport undertakings and worked on being a 'national trust for economic prosperity'. The same obligations continue with renewed vigour, as the corporation strives year after year, to grow its business to meet the nation's energy needs, exploring the prospect of alternative fuels and engaging people for optimum utilisation of energy.

Top and bottom left:
S. M. Vaidya, Chairman, IndianOil with Olympic hockey players and winners of Thomas Cup 2022 championship.

Rejuvenating India's Sporting Landscape

Support to sports is yet another area where IndianOil has achieved many milestones. In line with the sports policy adopted in 1985, the company has, over the years, recruited many promising sportspersons who have excelled at national and international levels and brought laurels to the company and the country. IndianOil introduced a Sports Scholarship Scheme in 2006–07 for young, promising sports persons representing states in team games and national rank holders. Many of its sporting stars have shone at international tournaments. The men's hockey team's spirited performance in Tokyo, resulting in a podium finish after more than four decades, will be etched in golden letters in India's sporting history. The team had four IndianOil employees.

The company recognises sports as a tool for holistic development. IndianOil has identified ten games as its thrust area: cricket, hockey, badminton, tennis, table tennis, golf, billiards/snooker, athletics, chess and carrom. for encouragement to sports through CSR, IndianOil was conferred the 'Rashtriya Khel Protsahan Puraskar' for 2021. Over the years, IndianOil has recruited over 100 sportspersons including cricketers Rohit Sharma, Cheteshwar Pujara, Ajinkya Rahane; shuttlers P. Gopichand, K. Shrikant, P. Kashyap, paddlers Sharath Kamal, Manika Batra; hockey players Devesh Chauhan, Deepak Thakur, Prabhjot Singh; tennis players Rohan Bopanna, Divij Sharan, Sumit Nagal and many more. Three hockey stars of the company and Tokyo Olympic medal winners, Simranjeet Singh, Hardik Singh and Dilpreet Singh won the Arjuna Award while IndianOil's chess genius and Grandmaster Abhijit Kunte was awarded the Dhyan Chand Award for Lifetime Achievement, during the event.

IndianOil also became the first corporate ever to power the Indian women's hockey team. Fifteen players of the team have been inducted into the company's rolls under its new sports policy, which promotes women's hockey. The players are Suman Devi Thoudam, Rajwinder Kaur, Rashmita Minz, Sharmila Devi, Ishika Chaudhary, Bichu Devi Kharibam, Deepika, Baljeet Kaur, Akshata Dhekale, Jyoti, Mahima, Udita, Ajmina Kujur, Beauty Dungdung and Ajmina Kujur. In 2022, IOCian sports star, A. Sharath Kamal was conferred the Khel Ratna Award. IOCian stars, Lakshya Sen also conferred the Arjuna Award.

IndianOil has signed an MOU with the Paralympic Committee of India to nurture and uplift India's para atheletes.

Fuelling Aspirations: IndianOil's Commitment to Para Athletes

In a step that advances the cause of inclusive sports promotion and corporate social responsibility, IndianOil has entered into a Memorandum of Understanding with the Paralympic Committee of India (PCI). This partnership serves as a heartfelt commitment to nurture and uplift India's para athletes, giving wings to their dreams and aspirations.

The MOU outlines IndianOil's support for three pivotal upcoming events that hold immense promise for the future of para sports in India: the Para Asian Games 2022 in Hangzhou, the Para Shooting World Cup 2024 in New Delhi, and the Paralympic Games 2024 in Paris. This initiative underscores IndianOil's belief in the transformative power of sports and its potential to create a more inclusive society. The initiative aims to fill a critical gap, recognising that the responsibility for nurturing sports and athletes should not rest solely with the government. Corporate entities have a vital role to play, and IndianOil is stepping up to set an example. This corporate commitment becomes even more meaningful when viewed through the lens of individual journeys, such as that of Dr. Deepa Malik.

A name synonymous with resilience and empowerment in the world of sports, she exemplifies what can be achieved with the right support and opportunities. Her journey, which began at the age of 40, has been one of overcoming numerous challenges, including those related to gender, age, and disability. In this context, IndianOil's partnership with PCI takes on special significance, promising to pave the way for many more stories of triumph and transformation.

IndiaOil's support promises to be a catalyst, accelerating the journey towards achieving greater heights in the international sports arena. It is a significant stride on the 'Road to Paralympics,' a journey filled with challenges but also immense possibilities.

World No. 1 Para-Archer Sheetal Devi Joins IndianOil Family

Ms. Sheetal Devi, the World No. 1 para-archer, was welcomed into the IndianOil family on the International Day of Persons with Disabilities, making her the first para-athlete to join IndianOil sports fraternity. Sheetal Devi's story is one of unwavering determination and extraordinary achievement. At just 16 years old, she has etched her name in the annals of para sports, securing two gold medals and a silver at the recent Asian Para Games and becoming the world's top para-archer.

Sheetal's courage and resilience and her journey as the world's first armless archer in the world is truly inspiring. IndianOil has committed to steadfastly support to her in realising her dreams and win more laurels for the nation.

As part of its scholarship scheme, IndianOil continues to identify and support young talents below the age of 19, ensuring they receive the necessary resources to evolve into future sports stars. Ms. Sheetal Devi's induction into IndianOil's sporting family is a testament to the company's commitment to recognizing and nurturing exceptional talents.

Sheetal Devi has been awarded the Arjuna Award for her exceptional performance in Archery at the International level

SPORTING SPIRIT

IndianOil is among the top leading corporates of the country which promotes sports persons in all fields through scholarships and employment opportunities. They have won several international and national awards for their significant contribution and bought laurels for the country. Some of IndianOil's sports person are shown here:

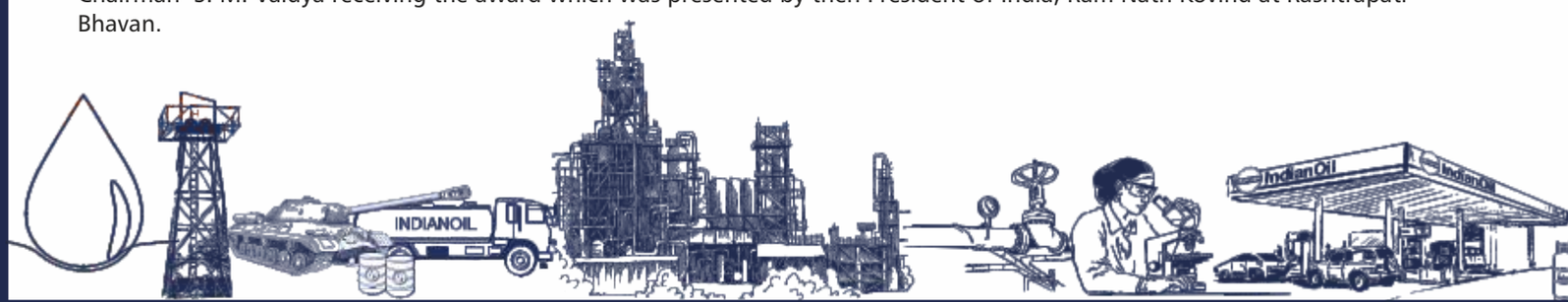
1. Gopichand Pulella, Badminton Player, IndianOil
2. P. Kashyap, Badminton Player, IndianOil
3. Abhijit Kunte Chess Player, IndianOil
4. Abhinn Shyam Gupta, Badminton Player, IndianOil
5. Lakshya Sen, Badminton Player, IndianOil
6. D. Hardika, Chess Player, IndianOil
7. Sharath Kamal, Table Tennis Player, IndianOil
8. Aparna Balan, Badminton Player, IndianOil
9. Sikky Reddy, Badminton Player, IndianOil
10. Hardik Singh, Hockey Player, IndianOil
11. Manika Batra, Table Tennis Player, IndianOil
12. Mannu Atri, Badminton Player, IndianOil
13. Ashmita Chaliha, Badminton Player, IndianOil
14. Chirag Shetty and Satwiksairaj Rankireddy, Badminton Players, IndianOil

SPORTING SPIRIT

Promoting sports has been the cornerstone of IndianOil's achievements. The 'Energy of India' has powered Indian sports not only by supporting budding talent but by being an integral part of various sporting tournaments. For the company, sport is an instrument to develop its future leaders besides building brand equity for the corporation. IndianOil's longstanding commitment to the development of sports has spanned several decades. Its mantra for development of sports is to provide opportunities to outstanding sportspersons with a view to facilitate their performances and to bring laurels for India as well as the company. The first sports person to join IndianOil way back in 1966 was the legendary badminton player Dinesh Khanna. After joining the company, he became national champion and won Bronze Medals in the Commonwealth Games of 1966 and Asian Games of 1974. The company introduced a sports scholarship scheme in 2006-07 for promising young sports persons representing states in team games and national rank holders. During 2021-22, 243 sports persons benefited from the scheme out of which 121 were girls. Since its inception, more than 1,000 sports persons have availed the scholarship. Many of the company's leading sports stars have excelled at international tournaments, bringing laurels for India and IndianOil. Business and sports are very similar. Both involve stiff competition and tough challenges but fabulous victories. They also require virtually the same set of abilities: strategy, focus, determination, hard work, perseverance, endurance, planning and preparation.

The company's current pool of sports persons includes a mix of experienced sports personalities, rising stars and young performers who jointly make an impact on the big stage. Another unique programme by IndianOil under its

IndianOil was conferred the Rashtriya Khel Protsahan Puraskar for 2021 for encouragement to sports through CSR. IndianOil Chairman S. M. Vaidya receiving the award which was presented by then President of India, Ram Nath Kovind at Rashtrapati Bhavan.



Chairman IndianOil with IndianOil Sport Stars

sports promotion policy is the 'Dronacharya' programme which aims to give the best back to the nation. Pullela Gopichand, Bikramjeet Singh, Arun Vishnu, Jaseel Ismail, Murcose Bristow, Didar Singh, Deepak Thakur, Prabhjot Singh and others are now coaching and grooming budding sporting stars of the nation. India is creating waves in the field of badminton as it finds its way to the international centre-stage. 15 May 2022, turned out to be a red-letter day for Indian badminton as the national team scripted history by lifting the coveted Thomas Cup for the first time defeating 14 times champions, Indonesia, by an unbelievable 3-0 margin in the final. Leading India's charge at the 2022 edition of the Thomas Cup were IndianOil's leading badminton stars- four in all- singles ace and bronze medallist at the 2021 World Championships, Lakshya Sen, the dangerous doubles duo and Thailand Open 2019 champions, Chirag Shetty and Satwiksairaj Rankireddy and the fast-rising doubles player, M. R. Arjun, a bronze medallist at the 2020 Asia Team Championships.

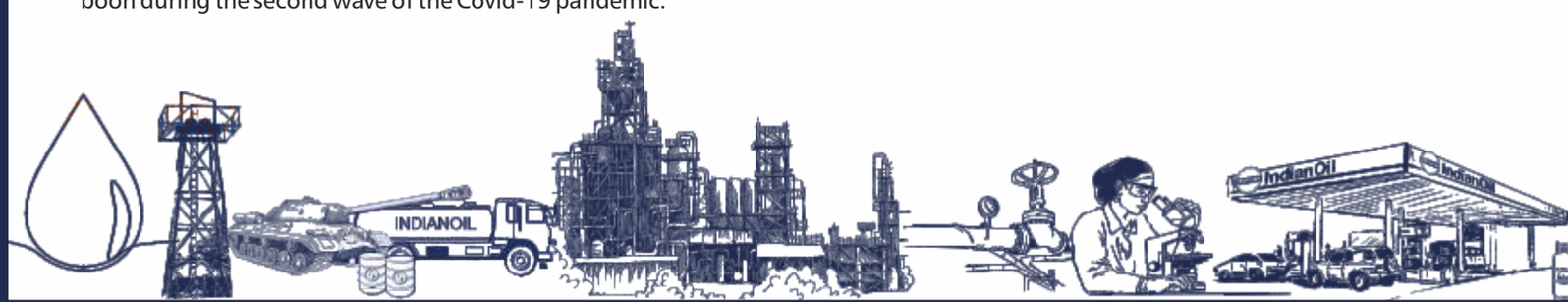
On International Women's Day in 2022, the company as part of its new sports policy, inducted into its ranks nine players of the Indian women's hockey team giving a new meaning to women's empowerment. Out of the 15 players in IndianOil ranks, nine players come from various states including Haryana, Punjab, Manipur, Odisha and Maharashtra UP, MP, Jharkhand and six players joined in the month of May-June 2022. These women sports stars have participated in international tournaments, including the Tokyo Olympics and Asian Championships. IndianOil collaborated with the Ministry of Youth Affairs and Sports to extend all-round support to young girls who want to take up sports as their career. Calling it 'IndianOil Shakti', the company is investing around Rs. 7 crores in this project. IndianOil's remarkable sporting contributions were acknowledged at the highest level when the corporation was bestowed with the prestigious 'Rashtriya Khel Protsahan Puraskar 2021'. The company also received the 'Sportstar Aces Award 2022' under 'Best Corporate/PSU' to promote sports. IndianOil sports persons have moved from strength to strength and have time and again given stellar performances at the highest levels bestowing the nation and the company with pride.

TACKLING THE COVID CRISIS

IndianOil is among the frontline organisations that led the charge in the fight against Covid-19 in 2020. True to its motto 'Pehle Indian, Phir Oil', IndianOil remained resilient, strong and agile and took several initiatives amidst all the challenges posed by the pandemic to fulfil customer needs. IOCians came together as one to ensure unhindered supply of essential products across the country, ably supported by employees of the channel partners while following the necessary safety protocols advised by the government. IndianOil's terminals and depots, LPG distributorships and fuel stations maintained adequate stocks of petrol, diesel and LPG to prevent any fuel shortage. Emergency aviation fuel supply for the Vande Bharat Mission evacuation flights provided relief to citizens stranded across the world during the pandemic. Corporation employees and business partners ensured last-mile delivery of petroleum products and services, even to remote locations despite lockdown-related obstacles. They fearlessly rendered their duties.

In the face of a massive surge in demand for medical grade oxygen during the second wave of the Covid-19 pandemic, IndianOil leveraged its strong end-to-end logistical capabilities to supply 152 MT liquid medical oxygen to various hospitals in Delhi, Haryana and Punjab. Under the aegis of the Government of India, the company also supported Vietnam and Indonesia in their battle against Covid-19 by supplying 200 MT LMO.

A batch of liquid medical oxygen tankers of IndianOil manufactured at Nasik. The supply of oxygen by the company proved to be a boon during the second wave of the Covid-19 pandemic.



IndianOil's Covid hospital in Odisha.

The company supported installation of 12 PSA based medical grade oxygen generation units of capacity 960LPM based on the technology developed by India's Defence Research and Development Organisation in 5 hospitals of Odisha, 4 in Uttar Pradesh, and 3 in Madhya Pradesh. In addition, 2 numbers of 500 LPM PSA based Medical grade Oxygen Generation Units were also installed by IndianOil in Lucknow, Uttar Pradesh. IndianOil contributed to the procurement of 2000 oxygen concentrators and 4000 oxygen cylinders to meet the demand during the peak of the second wave. The company showed its remarkable humanitarian spirit during the pandemic by exporting life-saving medicines and medical equipment to over 150 countries during the initial phase. It exported more than 65 million doses of Covid vaccines to nearly 100 countries. IndianOil transformed the crisis into an opportunity and functioned on a three-pillar foundation of agility, adaptability and alignment to business to cater to the challenges of the pandemic.

IndianOil contributed Rs. 265 crores to the PM CARES fund to fight the first and second wave of Covid 19 pandemic in financial years 2020-21 and 2021-22. In addition, it extended support to set up Covid care centres, quarantine centres, etc., and provided 27 ambulances, 111 ventilators, 172 ICU cots, 5,400 IR temperature guns, more than 15,000 testing kits, more than 34 lakh masks, more than 43 kilo litres of sanitisers, more than 18.5 lakh food packets, more than 40,000 grocery packets, three lakh gloves, 21,000 PPE kits, more than 1,57,000 soap/liquid hand wash bottles, etc. across the country.

As a major CSR initiative, under Karmayogi Swasthya Bima Yojana, IndianOil provided health insurance coverage (for 1 year) to more than three lakh personnel, who worked round the clock in maintaining essential services at various customer touch points, viz., Retail Outlets, LPG Distributors, various other service providers, etc., during the lockdown.

IndianOil during the pandemic in collaboration with the District Administration extended support to set up a Covid care centre and 100-bedded ICU Ventilator facility Covid-19 hospital at Medical College and Hospital building of District Headquarters Hospital, Bargarh, Odisha. IndianOil augmented the country's Covid-19 vaccination programme by providing more than 500 cold chain equipment infrastructure such as Ice Line Refrigerator 283, Deep Freezer 229, Walk in Cooler five, Walk in Freezer four, Refrigerated Truck one, etc., in four states, i.e. Jammu & Kashmir, Tamil Nadu, Manipur and Bihar.

CHAPTER 9

Nurturing Biodiversity: IndianOil's Commitment to Conservation

IndianOil's efforts to protect the environment with serious conservation measures have continued for more than a century. IndianOil's Bongaigaon Refinery is a green oasis. It has an eco park with a large water body, and a thriving green belt that houses rich biodiversity.

According to Nobel Prize winner and legendary American writer Ernest Hemingway, "The earth is a fine place and worth fighting for, if you truly love nature, you will find beauty everywhere." Love for nature and preservation of the environment have been part and parcel of Indian culture. For centuries Indians worship trees, animals, reptiles, etc., believing them to be sacred. Ancient scriptures and epics teach us to respect nature. The Atharvaveda says, "O pure Earth, may we utilise your soil well, without causing you injury or harm or disturbing any vital element in you." These words should inspire everyone to use the precious resources of planet Earth in prudent and fruitful ways.

Strong Environmental Conscience

Climate change is a matter of global concern as future generations will feel the impact of this phenomenon in the form of shrinking habitats and acute scarcity of precious resources. As a national oil and gas major, IndianOil bears the onus of mitigating its ecological footprint and helping its supply chain to lower its environmental impact. The company's conservation efforts to protect ecosystems and environment have continued since its inception. Its environmental consciousness is reflected in the flora and fauna, preserved by IndianOil around its refineries and other projects. It has a unique environment policy which guides the IndianOil family to care for nature. The company's belief in a strong environmental conscience is well known throughout the country with its focal point being giving back to nature. IndianOil has committed to achieving Net Zero Operational Emissions by 2046. The decarbonisation journey of the company is marked by significant increase in investments in low-carbon solutions.

Most of IndianOil's projects are surrounded by greenery and water bodies. These ecological parks are lush green with carefully planted trees which attract colourful migratory birds. They are mini bird sanctuaries.

Supporting the SDGs

The Sustainable Development Goals, adopted by the United Nations member states in 2015, provide a blueprint to tackle the world's biggest challenges and to achieve a better and sustainable future for all. While the primary responsibility to achieve the targets laid down in the SDGs lies with the governments, there is a consensus on the critical role of companies in realising the 2030 agenda.

IndianOil aims to identify solutions to the social and environmental challenges and to create an inclusive, peaceful and prosperous world for all. The company is proud to contribute to the advancement of SDGs. IndianOil targets all 17 goals directly or indirectly in its day-to-day operations, community development and initiatives to protect the environment. However, it prioritises ten SDGs where it can create the maximum impact.

The ten SDGs are further grouped into three themes: climate, nature and human resources. The company follows an approach to provide sustainable energy to all. It has created the Alternate Energy and Sustainable Development group at corporate level to focus on the environmental aspect of sustainable development. All IndianOil refineries fully comply with statutory requirements in keeping with its policy of environmental sustainability. To tackle climate change, IndianOil has adopted advanced technology for energy conservation. Carbon footprinting is undertaken for all its establishments in the country. Research and development expertise is used to develop clean fuels and innovative products that cause less pollution. The company has developed green belts around all its refineries that house varied species of birds and trees.

Tourists enjoying boating in the lake situated in the Digboi eco park.

As the 'Energy of India', IndianOil recognises its responsibilities to balance conventional energy forms and the efforts to restore the ecological equilibrium. Today, IndianOil is a model energy behemoth, seamlessly synchronising petroleum refining, socio-economic development and environmental management. The company has carefully crafted the blueprint of its journey with constant upgraded technologies and processes to protect and preserve the environment, while ensuring the country's energy security.

Sustainability for IndianOil is more than a buzzword. The company has a long-term vision to develop a direct correlation between its performance on environmental, social and governance parameters, and the enduring success of its business. The natural coexistence of biodiversity alongside key energy installations is unique to the company's network of refineries, pipelines and other assets across India. It reflects the company's approach towards a strong business and healthy work environment.

Green Belts and Ecological Parks

IndianOil regards ecological and environmental protection as the focal point of its conservation programmes. As part of its responsibility towards giving back or restoring to nature, large-scale tree plantation activities are carried out at all installations. Scientifically designed green belts have been developed, which serve as pollution sinks and enhance aesthetics. Over 50 lakh trees have been planted to adorn these green belts. Ecological parks have been developed at refineries with lush green cover that serve as a natural habitat for numerous birds. More than 300 species of resident and migratory birds thrive in these eco parks. Over 285 species of native and exotic plants and trees grow over there.

A herbal and fruit garden has been developed and maintained at IndianOil's Bongaigaon Refinery township in Assam. The residents take pride in the sheer variety of herbs, plants and trees in these gardens. The region of Bongaigaon watered by the mighty Brahmaputra river, stands tall as the mythical land of Zion.

Nestled amidst rolling hills, verdant greenery and rich biodiversity, the region surrounding the refinery truly reflects land in harmony with nature. Bongaigaon is also a haven for butterflies that act as important indicators of environmental health. They serve as plant pollinators in the local environment, help to spread the diaspora of plants and preserve the lush greenery.

Taking its green initiatives further, IndianOil has launched e-portals through which paperless payments and data transfer are done. This results in considerable saving of paper, thereby preventing cutting of trees.

Top, bottom and following double spread: Ecological parks of IndianOil's refineries have a lush green cover which serve as natural habitats for several species of resident and migratory birds.

Top and bottom: Refineries, terminals and housing complexes of IndianOil are all equipped with rainwater harvesting systems as part of the company's drive for water conservation. Effluent treatment plants in the refineries ensure that waste water is reused for various purposes.

Water Conservation

Refineries essentially consume large quantities of water for industrial use. With a conscious call, the company has taken a unique step to minimise its freshwater footprint substantially. IndianOil's Mathura Refinery typically uses about 20 million litres of water for plant operations every day. The refinery has started using recycled water from the sewage treatment plant installed in Mathura city instead of fresh water from the Yamuna. Similarly, Gujarat Refinery in Vadodara, will use recycled water from industrial effluents for its operations. This model will be replicated at other IndianOil refineries as well.

Treated effluent streams are reused/recycled for various purposes in refineries like make-up for fire water, cooling towers, coke cutting in delayed cokers, etc. Sour water generated in various units is stripped of contaminants such as ammonia and H2S and recycled in de-salters besides using it for process flushing requirements. Advanced treatment systems like ultra filtration, reverse osmosis, etc., are used to convert treated effluent to de-mineralised water or for use in cooling towers as make-up water. All these measures have led to recycling of 90 per cent of effluent water, resulting in around 30 per cent reduction in fresh water consumption.

Rainwater harvesting systems have been installed at refineries, terminals, depots, bottling plants and even residential complexes of the company. Currently, the rainwater harvesting systems cover 2,900 hectares of area across the company's

locations. The annual rainwater harvested from these systems is estimated to be around 7 billion litres.

Utmost attention is given to control/reduce emissions in IndianOil refineries. Major sources of air emissions are flue gases from boilers and heaters, FCC regenerators and sulphur recovery units. Hydrocarbon leaks and evaporation during storage, handling and transportation of petroleum products and crude oil are sources of fugitive emissions. IndianOil has adopted some measures to control emissions and effectively disperse pollution from flue gases such as using tall stacks for effective dispersion of pollutants and use of low sulphur fuel oil/sweet natural gas/de-sulphurised refinery gas in boilers and heaters to minimise SO2 emission.

Stringent Environmental Standards

As an active partner of the Global Compact Programme of the United Nations, IndianOil is fully focused on 'sustainable development'. The company recognises protection of environment as a core commitment of its business. All operating units and installations of IndianOil have a comprehensive safety, health and environment management system in place. The facilities are periodically reviewed and upgraded for better performance.

All IndianOil refineries fully comply with the prescribed environmental standards and incorporate state-of-the-art effluent treatment technologies. Sustained and concentrated efforts are being adopted to improve the standards by introducing new technologies All refineries are also rated under the International Safety Rating System. Panipat and Gujarat Refineries are rated 'Level 9' on a scale of 1 to 10. All refineries have been provided with full-fledged effluent treatment plants consisting of physical, chemical, biological and tertiary treatment facilities. The treated effluent far exceeds the stipulated MINAS quality standards for water discharges. Treated effluents is being reused to the extent of 90 per cent in the refinery units.

The sulphur dioxide emissions at IndianOil refineries are well below the limits prescribed by the Ministry of Environment and Forests and State Pollution Control Boards. Ambient air monitoring stations with automatic, continuous, monitoring instruments are provided at all the refineries. In particular, the Mathura Refinery has

A beautiful view of IndianOil's Panipat Refinery eco park with its lush greenery.

Bottom: IndianOil is supporting Elephant rehabilitation in Mathura by partnering with Wildlife SOS and developing elephant enclosures.

Facing page top: IndianOil is working on conserving endangered species like Olive Ridley, turtles to preserve .

Facing page bottom: Corals are a vital part of the marine ecosystem. IndianOil recognises the need to translocate these living coral structures and protect them from harm.

set up three ambient air quality monitoring stations between the refinery and the city of Agra and a fourth one at Bharatpur. Utmost care is taken to minimise the impact of refinery operations in the surrounding areas so that the ambient air quality remains within the stipulated limits prescribed for sensitive areas.

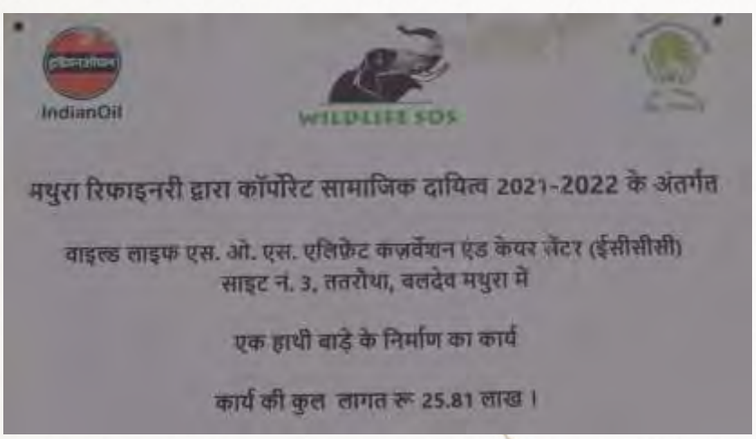
Most IndianOil refineries have commissioned secondary processing units to improve fuel quality and reduce emissions from the hydrogen unit. Along with these initiatives, diesel hydrotreater unit at Mathura Refinery and motor spirit quality projects have also been set up at Mathura and Haldia Refineries. Sulphur recovery units have been installed at all the refineries.

Having embraced rigorous environmental standards and implemented sophisticated technologies to minimise its environmental footprint, IndianOil's commitment to sustainability extends beyond its operational practices. Understanding that environmental stewardship also involves conserving biodiversity, the company has embraced initiatives that champion the cause of endangered wildlife. It is within this broader commitment to environmental responsibility that IndianOil's initiatives for Rhino and Cheetah Conservation find a natural place.

Saving the Ridleys and Elephants

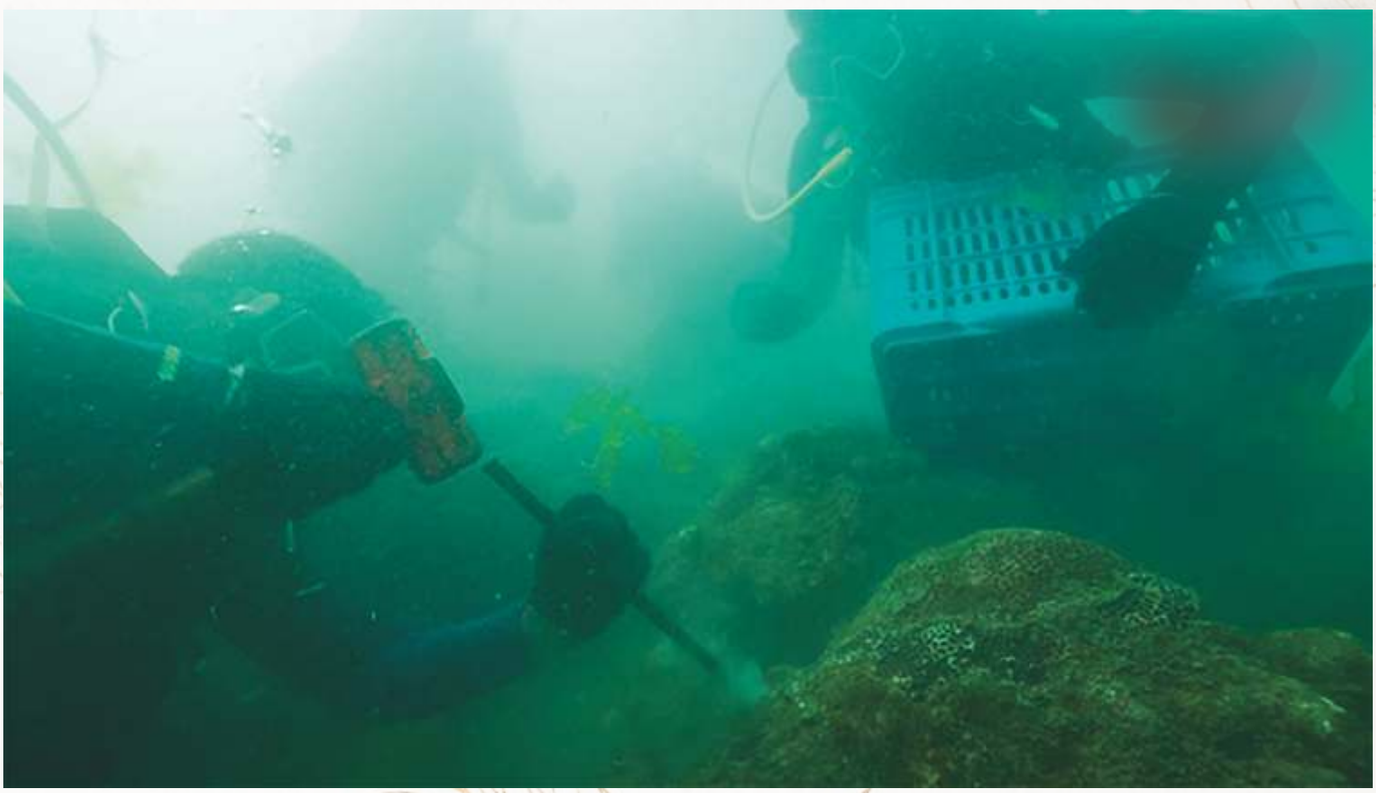
Olive Ridley turtles are categorised as 'vulnerable' in the International Union for Conservation of Nature (IUCN) list. IndianOil has undertaken efforts to secure their population by partnering with the wildlife departments in Odisha and Tamil Nadu to safely release the turtle hatchlings into the sea. The turtle eggs are protected and allowed to hatch in artificial hatcheries along the coast.

Another key area of species conservation has been towards protecting elephants which have suffered due to habitat destruction or in their interaction with humans. IndianOil has partnered with Wildlife SOS to set up an elephant rehabilitation centre in Mathura, Uttar Pradesh under its CSR activities. The centre has been set up to provide veterinary care, nutritious diet and a clean environment to the elephants, away from the tortures of circuses or bearing heavy loads.



Protecting Marine Biodiversity and Coastal Ecosystem

Coral reefs are a great indicator of underwater biodiversity. The reefs are under significant threat due to climate change and pollution. The coral reefs offshore at Gujarat have been identified as being particularly vulnerable to these threats. With the requirement to change the four-decade-old pipelines laid offshore in Vadinar, Gujarat, IndianOil undertook a challenging task of trans-locating the corals with minimal impact on the sensitive ecosystem. The project was successfully completed with the help of the Zoological Survey of India. The eastern coast of India is prone to cyclonic storms which are an immense threat to humans and other flora and fauna.



IndianOil's Chairman S.M. Vaidya gifting a light blue sleeveless jacket made of material recycled from plastic bottles to Prime Minister Narendra Modi.

In 2021-22, over 20 lakh saplings were planted in a land area spanning 122 hectares at Beliarichar Island and at Balughata and Rairaychak Mauza in the Purba Medinipur district with the help of the Forest Department of West Bengal. The plantations include mangroves and casuarinas which help break high cyclonic wind-speeds, thus helping to protect the coastal ecosystem. Mangrove plantation was also previously carried out in 100 hectares of marine national park and marine sanctuary area near Narara belt (Vadinar).

Creating a Plastic Pollution Free World

IndianOil has embarked on a transformative journey to reshape the narrative around plastic waste. Plastic, a material often demonised for its environmental impact, has seen an estimated 79 per cent of all produced since the 1950s being mismanaged, ending up in oceans, landfills, and the environment. The real challenge lies not in the plastic itself but in our capacity to manage its waste effectively.

In response, IndianOil has introduced Cycloplast—a pioneering initiative marking a significant stride towards sustainable development. Cycloplast is not merely a product but a revolution, spearheading a shift from the linear 'take-make-dispose' model to a circular economy, emphasising resource efficiency and waste minimisation.

By harnessing the potential of mechanical recycling, IndianOil aims to transform the largely fragmented and unorganised recycling industry in India.

IndianOil Chairman S. M. Vaidya presented an eco-friendly jacket made from recycled PET bottles to Sri Lanka President Ranil Wickramasinghe.

Cycloplast serves as a conduit, integrating disparate recyclers and aggregators into a formalised system, standardising recyclates, and ensuring quality making them more widely usable and valuable. Cycloplast represents IndianOil's commitment to plastics neutrality. It echoes the company's resolve to promote an environment-friendly ecosystem by acting as the vital link that provides market access of recyclates to plastic processors and brand owners.

IndianOil's influence and reach in the polyolefin industry will help bring quality and traceability to the recycled polymers market, meeting demands made by consumers, brand owners, and Original Equipment Manufacturers (OEMs). Cycloplast has already begun to make a tangible impact. More than 35 technical trials across the country have validated the viability of its recycled polymers in diverse applications.

The positive feedback and encouraging demand underscore the product's potential in various sectors, from rigid packaging and furniture to caps and closures and lubricating oil packaging. The launch of Cycloplast is not just an addition to IndianOil's product portfolio; it is a testament to the company's resolve to protect the environment and preserve ecological balance.

IndianOil envisages a future where plastic waste is not a menace but a valuable resource, contributing positively to the economy while reducing environmental harm. With Cycloplast, IndianOil is pioneering a sustainable path, setting a precedent for others in the industry to follow.

IndianOil Chairman S. M. Vaidya presented an eco-friendly jacket made from recycled PET bottles to Bill Gates.

Unbottling a New Future of Plastics

About 8 million metric tonnes of plastic enter the ocean annually, and about 150 million metric tonnes circulate in our marine ecosystems. At this pace, by 2050, there will be more plastics in the sea than fish. As a responsible corporate with a strong environmental conscience, IndianOil has launched a special 'sustainable and green' uniform exclusively designed for nearly 3 lakh IndianOil fuel station attendants and Indane LPG gas delivery personnel. The dress material for these uniforms has been extracted from recycled polyester derived from the processing of used and discarded PET bottles.

Under an initiative titled 'Unbottled', uniforms will be made, with each uniform supporting the recycling of around 28 used PET bottles. Altogether 100 million PET bottles will be recycled annually under the 'Unbottled' initiative. This project is based on the government's pledge to phase out single-use plastic. For this green initiative of IndianOil, used plastic bottles are shredded into flakes which are washed and extruded into fibre. These micro-pellets are then converted into yarns for weaving this environmentally-friendly clothing.

The green impact of this fabric goes even beyond the recycling benefits. The clothes match virgin polyester in quality, but the manufacture takes significantly fewer resources. Its production requires almost 60 per cent less energy, and CO2 emissions are reduced by nearly one-third compared to virgin polyester. Even when these clothes wear out, the used polycotton uniforms can be mechanically recycled and converted into low-end quilts, blankets or even high-end denim fabric.

'Unbottled' Gets a Boost

The 'Unbottled' initiative got an enormous boost when Prime Minister Narendra Modi wore a light blue sleeveless jacket made of material recycled from plastic bottles to Parliament which was the cynosure of all eyes. The jacket was presented to him by IndianOil during India Energy Week in Bengaluru between 6-8 February 2023 when he launched the company's uniforms under the 'Unbottled' brand for sustainable garments.

The conversion of plastic bottles into fabric is an apt example of how diligent handling of problems opens doors to new opportunities. IndianOil has been at the forefront of cashing in on such opportunities for a more sustainable, greener future.

IndianOil Chairman S. M. Vaidya presenting an eco-friendly jacket made from recycled PET bottles to renowned Indian Industrialist, philanthropist and legendary Ratan Tata.

Bottom: IndianOil Chairman S. M. Vaidya welcoming Ratan Tata.

CONSERVING ENDANGERED SPECIES

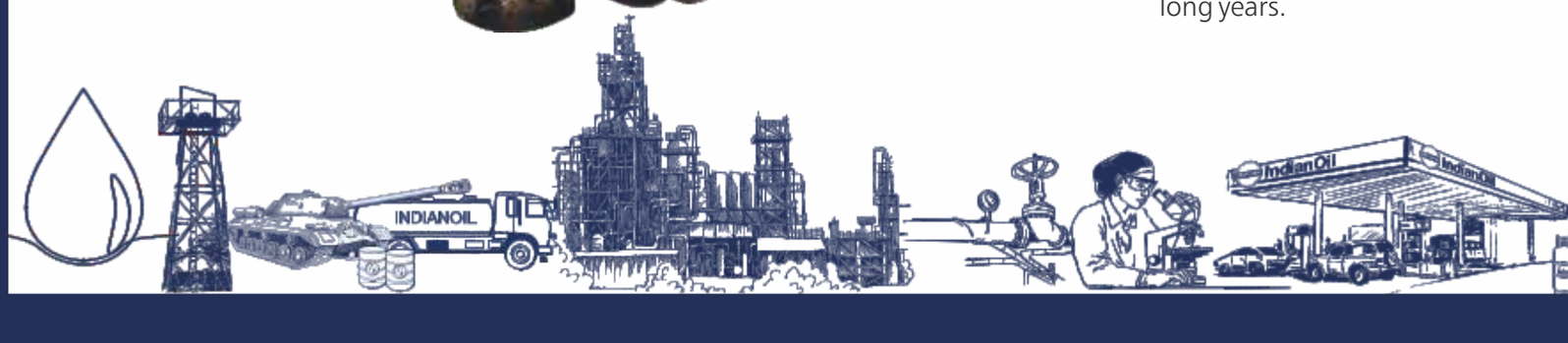
The great Indian one-horned rhino is a symbol of strength, resillence and power in India. Having been on the brink of extinction due to hunting and agricultural conflict, its numbers have seen a remarkable resurgence. This recovery is primarily attributed to vigorous protection measures, leading to a notable increase in the rhino populations in India and Nepal. It holds its own characteristics alongside the majestic tiger and the popular elephant. This shy natured, magnificent creature is now among the critically endangered species in India. Currently rhinos thrive in Pobitora Wildlife Reserve, Rajiv Gandhi Orang National Park, Kaziranga National Park, Manas National Park, Dudhwa National Park and Jaldapara National Park.

IndianOil realises how important this animal is to the ecosystem of Assam and the people of India. The company shares a deep connect and responsibility towards the well-being of the rhino as IndianOil and Assam have been inextricably linked for over a century, since India's first refinery was started at Digboi in 1901.

It is for this reason that the great Indian one-horned rhino was selected as the mascot and storyteller of IndianOil. It represents the strength and power that the company occupies as the flagship energy company of the country. As the rhino is a critical cog in the ecology to which it belongs, IndianOil has taken on the mantle to protect it through numerous adoptions in various zoological parks across the country. Funds provided by the company are used for the rehabilitation and upkeep of the rhinos.

The company launched its official brand mascot, IndianOil Rhino, on 1 September 2021, during the 62nd IndianOil Day celebrations. The affable IndianOil Rhino is now an integral part of the company's brand communication strategy and adds vibrancy to all the customer-centric messages. The mascot forges a strong emotional connection with IndianOil customers.

The oil industry in India traces its history to Digboi. With IndianOil's strong presence in Assam—the land of the rhino—it only seemed appropriate to associate with the majestic animal. The silhouette of the charging red rhino, which was adopted as the logo of Assam Oil in 1965, was a familiar sight all over the region then and continues even today. IndianOil's conservation efforts extend much beyond the rhino. The company can be proud of its role in facilitating the return of cheetahs to India after 70 long years.



IndianOil conserves endangered species like the rhino and cheetah and has made special contributions towards these projects.

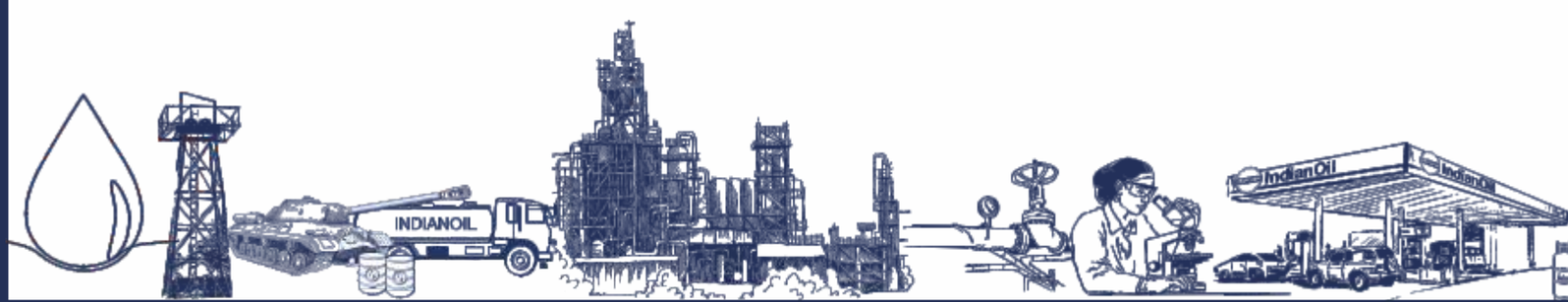
In an ambitious endeavour to reverse extinction, IndianOil contributes to the reintroduction of cheetahs to the wild in India. Due to reckless exploitation, excessive hunting and inadequate protection laws, the cheetah was driven to extinction in India seven decades ago, in 1952. To reintroduce the cheetah to its natural habitat in India, IndianOil collaborated with the National Tiger Conservation Agency to undertake a historic project which involves transcontinental relocation (from South Africa/Namibia) of cheetahs to Kuno National Park in Madhya Pradesh. IndianOil will contribute funds under its corporate social responsibility commitments for cheetah introduction, habitat management, protection, eco-development, staff training and veterinary healthcare. This cheetah restoration project is a transformational step to provide a home to this highly endangered animal while conserving open forests, grasslands and scrub ecosystems. Under this prestigious project, a precious foundational population of five male and three female cheetahs has been flown in from Africa. Another batch of 12 cheetahs from South Africa was flown into Kuno in February 2023. The existing cheetahs are adapting well to their new environment.

SPREADING
WINGS OF JOY

Birds beautify life, adding sound and colour to nature. IndianOil refineries have long hosted some of the rarest winged denizens of the world. Flourishing eco parks with acres of green spaces in IndianOil locations have become mini bird sanctuaries, which serve as a bio-indicator and stand testimony to the fact that industry and ecology can coexist in perfect harmony. During the monsoon season, birds rush to nest in large spaces of green-belts and eco parks. More than 300 species of resident and migratory birds thrive in the eco parks and green belt areas of the company.

In a land renowned for rich plant life, varied wildlife ranging from insects, reptiles to large predators, the bird population in Bongaigaon is abundant and diverse. The thriving avian inhabitants enhance the spirit of comfort, joy and upliftment to the local populace. The mellifluous sounds of the birds and myriad coloured feathers add a layer of aesthetic enjoyment. Housing diverse winged creatures, Bongaigaon is truly in harmony with nature.

First-time visitors to the Bongaigaon Refinery are inevitably struck by the verdant tree belts in its surroundings. There are several reserve forests and sanctuaries in the vicinity of the refinery which are home to rare species of flora and fauna. The world famous Manas National Park which is located at a distance of 50 kilometres from the refinery, at the foothills of the Eastern Himalayas, is one of them. The ecological park of IndianOil's Mathura Refinery is the first of its kind developed by any industry in India. The park was planned and groomed in consultation with Dr. D. N. Rao, former professor of Banaras Hindu University, as part of IndianOil's green initiatives for sustainable development.



Mini bird sanctuaries have come up at IndianOil locations. During the monsoon season birds nest in these green belts and eco parks. That the company's refinery operations are safe and in harmony with nature is evident from the huge influx of birds.

Located on the outskirts of the historic Mathura city in Uttar Pradesh, the Mathura Refinery was commissioned in January 1982. Spread over an area of 38,000 square metres, the ecological park consists of a well manicured lawn on one side and polishing ponds on the other. Polishing ponds form the last stage in the effluent treatment process. The consistent good quality of treated effluent amidst the green vegetation and the tranquil and undisturbed atmosphere has developed the park into a natural habitat attracting different varieties of winged visitors to the refinery. The polishing ponds were gradually transformed into a mini bird sanctuary by systematically planting several varieties of trees, shrubs and bushes that serve as perches for the birds.

In the green belt of the Mathura Refinery, the senses are mesmerised by the symphonic twitter of hundreds of species of birds. This park serves as a peaceful habitat for a large number of birds, including migratory birds like Black Headed Ibis, Painted Stork (near threatened species) and beautiful local birds like the Cormorant, Darter, etc. The huge influx of migratory birds testifies to the fact that refinery operations are safe and in harmony with nature. This has been appreciated by Government of India and a postal stamp highlighting the eco-friendly steps undertaken by the Mathura Refinery was released. The refinery's strong ecological ethos has turned it into a mini bird sanctuary hosting more than 100 species of birds.

Some of the exquisite birds found in Mathura include Snake Birds, Large Cormorant, Spot Bill Ducks and Pintail Ducks. Today, IndianOil's other refineries, like Panipat, host birds from across the world, reflecting the fact that all the company's refineries operate with stringent environmental safety norms.

CHAPTER 10

Crafting a Greener Future: IndianOil's Green Odyssey

The move towards a greener future has become inevitable and IndianOil is playing an important role in helping India achieve its sustainability targets.

The future of energy, like the future of the human race and the planet, remains uncertain. Amidst this growing realisation, there is determined action by different stakeholders to protect the earth and humanity from these disruptions. India has become the world leader in environmental protection and combating climate change by reducing its import dependency and transitioning towards cleaner, affordable energy. The country has realised that a move towards a greener future is inevitable and IndianOil is playing an important role in this change by incorporating the latest global practices and working towards environmental sustainability. It is committed to contribute to protecting people and the planet by delivering on its promise of crafting a green future.

The company continuously develops new, cutting-edge technologies for cleaner fuels to offer sustainable solutions for the energy challenges of today. It is geared to meet the rising energy demand, diligently grafted and aligned with the 'nation's mandate' to build a prosperous and self-reliant India with a greener future. In recent times, there has been a shift from the use of conventional fossil fuels to new and renewable sources of energy that are cleaner, safer and inexhaustible. Against the backdrop of a widening gap between supply and demand, it becomes imperative to diversify energy sources and explore alternative ways to meet the country's energy needs and sustain economic growth. Growing environmental concerns pose a serious challenge for energy companies, underlying the urgency to usher in cleaner and sustainable energy resources.

Net Zero by 2046

IndianOil has resolved to achieve net-zero operational emissions by 2046. Its decarbonisation plans encompass both Scope 1 and 2 emissions. The year 2046 coincides with India completing 99 years of independence and the launch of celebrations for its 100th Independence Day. This historic declaration by the country's energy major aligns with India's net zero commitment by 2070 announced as part of the Panchamrit goals by the Government of India at the COP-26 Summit. IndianOil already has a well-crafted blueprint in place.

It will adopt a multi-pronged approach to take it towards the net zero destination by 2046 and an investment of over Rs. 2 lakh crore has been envisaged to achieve the target. The company is already working on several emission mitigation pathways like ENCON (energy conservation) projects at refineries, energy efficiency, green hydrogen, biofuels, renewables, carbon offsetting through ecosystem restoration, among others. IndianOil's greenhouse gas emissions (Scope 1 and 2) in 2021-22 stand at around 21.5 million metric tonnes of carbon dioxide equivalent. Of the total emissions, 96 per cent are on account of processes like direct fuel burning for deriving energy from heat, steam, electricity and cooling, that are part of operations. These constitute the Scope-1 emissions. The remaining approximately four per cent are on account of sourcing electricity from the grid which constitutes Scope-2 emissions.

The IOT biogas plant which provides oxygen-free conditions for anaerobic digestion to occur. Simply put, it's an artificial system where you can turn waste into sustainable energy and fertilisers, with positive effects on the environment.

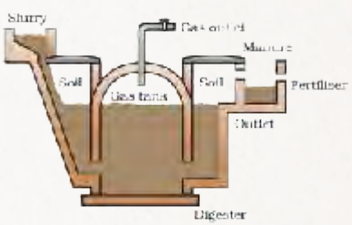
Bottom: IndianOil is building green energy solutions, including wind, solar, biofuels and hydrogen. The company has wind power projects in Kutch, Gujarat, and Vajrakarur and Gandikota in Andhra Pradesh.

Pathways to Net-Zero

On the route to achieve net-zero, many steps have to be taken. These include energy conservation measures; increasing boiler/furnace efficiency; shifting from fuel oil, gas oil and naphtha to natural gas; maximising grid power import; moving towards green hydrogen; bitumen maximisation; carbon capture utilisation and storage; renewable energy; natural gas to compressed biogas (CBG); tree plantation; and purchase of carbon credits. IndianOil has successfully avoided/mitigated 3.36 MMT carbon emissions in financial year 2021-22. For other environmental aspects, the company adheres to various national norms. Some of the key targets which contribute significantly to the nation's environmental aspirations are ensuring availability of cleaner natural gas/compressed biogas and establishing footprint in the electricity business. Though transmission efficiency is 50 per cent more than diesel engines, issues regarding charging infrastructure and lithium-based battery technology with no recycling option are causing slow progress in the EV segment. IndianOil is focusing on India-centric battery technology (without lithium to introduce an available and environmental-friendly option.

Top and bottom: The bio-methanation plant of IndianOil which treats over 200 MT/daily of mixed organic wastes and generates electric power from biogas.

Responsible energy use, especially oil and gas, are pivotal to achieve national and global net-zero aspirations. IndianOil remains committed to meet India's growing energy requirements while reducing its emissions and carbon footprint. The company has rolled out initiatives to develop green energy solutions, including wind, solar, hydro, biofuels and hydrogen. It invests in technologies crucial to achieve net-zero, like carbon capture and storage (CCS) and ecological restoration through aggressive afforestation. Going forward, it will focus on reducing greenhouse gas emissions, leverage partnerships to reduce value chain emissions, and introduce products to help customers bring down their environmental footprint. Refining activities and petrochemicals production are primary contributors to IndianOil's emissions. As the company expands its capabilities to meet the growing energy requirements of the country, it understands that the associated emissions cannot increase in proportion. Thus, it invests in systemic improvements and R&D, pursuing efficiency improvements with technology providers and forging partnerships to reduce its emissions from existing operations and those from anticipated expansions.



Building a Gas Based Economy

As India searches for new sources of energy, IndianOil is turning to a range of options including CNG, autogas, ethanol-blended petrol, bio-diesel, Sustainable Aviation Fuel (SAF), Compressed Bio Gas, Waste to Energy and hydrogen energy. One promising option is Compressed Bio Gas (CBG), which is made from waste and biomass sources such as agricultural residue, cattle dung, sugarcane press mud, municipal solid waste, sewage treatment plant waste, etc. After it is purified, CBG is compressed and has a high methane content. It is similar to natural gas in terms of its composition and energy potential, and can be used as a clean renewable fuel for vehicles, industries, and commercial purposes.

In order to increase the availability of CBG and provide additional income for farmers, the government has launched the Sustainable Alternative Towards Affordable Transportation (SATAT) initiative. This programme invites entrepreneurs to set up CBG production plants and make the fuel available for use in the transportation, industrial and commercial sectors. The SATAT initiative not only benefits vehicle users, but also helps farmers and

A beautiful view of IndianOil's R-LNG Plant at Ennore.

Bottom: IndianOil's IOTL compressed Biogas Plant in Namakkal, Tamil Nadu.

entrepreneurs. Production of biofuels is in alignment with Swachh Bharat Mission, Climate Change Mitigation, COP-26 commitments, Atmanirbhar Bharat, Make in India, etc. IndianOil leads the SATAT programme as an Industry Coordinator to promote the production and sale of CBG throughout the country. IndianOil commissioned the first retail outlet under the SATAT scheme in September 2019 and sells CBG under the brand name "IndiGreen". In the medium term, IndianOil will play a key role in achieving the national goal of increasing the share of natural gas in India's energy mix from the current level of 6 per cent to 15 per cent by 2030.

Achieving BS VI Standards in Record Time

Green fuels (petrol and diesel) conforming to BS-IV emission norms were introduced across the country since 1 April 2017. IndianOil helped in the implementation of the Government of India's target to switch over to BS-VI fuels across the country by 2020.

The Mathura Refinery became the first refinery in the country to produce BS-VI compliant petrol and diesel and supply it to automobile manufacturers for their annual requirement.

Ethanol Blending in Petrol

The Ethanol Blended Petrol Programme is aimed at addressing environmental concerns, reducing import dependency and providing a boost to the agriculture sector. IndianOil has plans in place to meet the Government of India's mandate for increasing ethanol blending in petrol from around 10 per cent at present to 20 per cent by 2025. The company has set up a 100 KL/day, 2G ethanol production plant at Panipat (Haryana), utilising paddy straw as feedstock. This can be instrumental in solving the crop stubble burning issue in Punjab and Haryana.

The public sector oil marketing companies, with the support of ethanol suppliers have been blending ethanol in petrol under the Ethanol Blended Petrol Programme, a flagship scheme of the government. On the occasion of World Environment Day on 5 June 2022, Prime Minister Narendra Modi announced that India has achieved the milestone of 10 per cent ethanol blending in petrol. Incessant coordinated efforts between IndianOil, Bharat Petroleum and Hindustan Petroleum made it possible to achieve this milestone five months ahead of the targeted timeline of November 2022. IndianOil is also pioneering a new era in sustainable energy with the world's first refinery gas-to-bioethanol (3G) production facility. The facility is designed with a capacity to produce 100 tons per day, or 33.5 KTPA, of ethanol.

The revolutionary gas fermentation-based 3G ethanol technology employs PSA off gas from the hydrogen generation unit. This ground-breaking plant is on the verge of completion, promising a transformative approach to produce ethanol.

India is amongst the fastest growing aviation markets and sustainable aviation fuel (SAF) use will be a key element to achieve the targets of carbon reduction and net zero target of the country by 2070.

India plans to initiate SAF blending in ATF starting from 1 per cent and take it up to 5 per cent by 2030. Incidentally, India's first commercial flight powered by indigenously produced SAF was operated in May 2023. SAF was produced by Praj and blended by IndianOil. An 86.8 TMTPA SAF Plant at Panipat based on LanzaJet alcohol to jet technology, to be ultimately vested and operated through a JV company, is also being planned.

Greening IndianOil's Product Basket

As a leading provider of fuel in India, serving approximately 30 million customers daily, the company recognises the need to offer environmentally-friendly products like SERVO Raftaar, XtraTej, XP95, Xtragreen, and IndiGreen. As part of its goal to become an integrated energy solutions company and make India an energy secure country while reducing its carbon footprint, IndianOil is working to transition to a more sustainable product mix.

Hydrogen holds the potential to provide a clean and reliable source of energy that can be used in a wide range of applications, including the transport sector. Besides ensuring energy security to the nation, the environmental benefits of using hydrogen in a fuel cell vehicle could be significant. The National Hydrogen Mission announced by the Government of India aims to make India a hub to produce and export green hydrogen.

This mission validates the passion with which IndianOil has been leading India's foray to leverage hydrogen power. The company is building the nation's first green hydrogen plant at its Mathura Refinery. While IndianOil has worked on various hydrogen production pathways including Compressed Bio Gas to Green Hydrogen, the current project at Mathura Refinery will pioneer the introduction of green hydrogen in India.

IndianOil has set up 2G ethanol bio-refinery project with capacity of producing 100 KL of Ethanol per day using rice straw as feedstock at Panipat, Haryana.

Facing page top: IndianOil has set up a 3G ethanol plant of 128 KL/day based on the gas fermentation technology at Panipat which would be the world's first refinery off gas-to-ethanol production facility.

Facing page bottom: Hardeep Singh Puri on the occasion of receiving India's first commercial passenger flight powered by indigenously produced sustainable aviation fuel.

Flagging India's First Green Hydrogen Fuel Cell Bus.

Bottom: In India's quest to promote hydrogen as a clean fuel for the mobility sector, hydrogen-blended HCNG is emerging as an excellent interim technology for achieving emissions reduction and import substitution. Refuelling of HCNG blends in vehicles can be performed with minimum modifications in the infrastructure that is currently under use for dispensing CNG.

Hydrogen Economy

IndianOil will produce green hydrogen in stages at the Panipat Refinery. As a pioneering step, it will be implementing a 10 KTA green hydrogen plant at Panipat Refinery. To synchronise with the entire hydrogen value chain, IndianOil has forged crucial collaborations to develop green hydrogen production assets, associated renewable assets and manufacture electrolysers. This will be a game changer as electrolysers contribute to approximately 30 per cent of the overall cost of green hydrogen. IndianOil is also exploring multiple hydrogen production pathways, including solar electrolysis, biomass gasification and biomethanation. IndianOil teams are working diligently to craft greener energy solutions. After the successful commissioning of the HCNG plant in Delhi, the trial results for buses are quite encouraging. The company is now planning to scale up the HCNG initiative across the mobility and industrial sectors. The R&D team is also pioneering the development of the fuel cell technology system.

Recently, India's first Green Hydrogen Fuel Cell bus developed by IndianOil was flagged off from India Gate. The company will produce close to 75 kg of green hydrogen by splitting water using electricity from renewable sources. This hydrogen will be used to power two buses which will ply across the national capital region for trial runs. The target is to scale up the buses on trial to 15 in a short time. In addition, it will commission a hydrogen dispensing station at the Gujarat Refinery to enlarge hydrogen-based mobility coverage. The company has also started working towards integrating hydrogen production facilities with carbon capture and utilisation technology to produce Blue Hydrogen. It is setting up a carbon capture plant at its Gujarat Refinery for enhanced oil recovery (EOR) of crude at the Oil and Natural Gas Corporation Ltd. oilfields in Gujarat, leading to permanent sequestration of CO2. Similarly, IndianOil and Oil India Ltd. (OIL) are also exploring the possibility of EOR application in the oilfields of OIL in the Assam region with CO2 captured from IndianOil's Digboi Refinery. In addition, IndianOil is setting up food and beverage grade CO2 production facilities at its Panipat and Paradip Refineries from atmospheric vent stream of MEG plants.

Fuelling Green Energy Quest

India has committed to reduce the carbon intensity of the economy by 45 per cent over 2005 levels by 2030 and has set an ambitious target of 500 GW of non-fossil energy capacity. In support of this, IndianOil is working to raise its renewable energy portfolio from the current 240 MW (both wind and solar).

In India, where bright sunshine is available for about 300 days a year, solar power is a clean, sustainable and viable energy option. Seeking a new source of sustainable energy, Indane bottling plant, Cochin, has created a unique solar panel which floats on water. The panel consists of an array of solar panels installed on floating structures. It capitalises on the unique rainwater collection pond, which has enough water available throughout the year. The capacity of the installation is 10 KWh, producing 1,200 units of electricity per month. This solar generation results in reduction of approximately 0.8 metric tonnes of CO2 emission every month, which is equal to the emissions from an average passenger car travelling for about 2,000 miles.

IndianOil's LPG bottling plant in Leh, one of the world's highest such facility, will now be run on solar power. The plant in Phey village is situated at 11,800 feet and supplies LPG to the Indian Army and far-flung areas of the region. The company has commissioned a 100 kilowatt solar power plant at the location to run the plant's operations.

IndianOil has also setup battery swapping stations at its fuel outlets to promote the use of Electric vehicles across India.

For a Greener Tomorrow

The refinery sector is an emissions-intensive sector, accounting for three per cent of the global carbon emissions. IndianOil as a refining major is working on making its processes more efficient and greening the fuel intake to reduce process emissions. Among its ongoing and upcoming initiatives are using clean energy sources and setting up natural gas integration projects at the refineries which are already in various stages of implementation. Three of the northern refineries are connected to the gas pipeline grid. With expected commencement of LNG import facilities on the eastern coast (Dhamra), along with gas pipeline connectivity, the eastern refineries (Barauni, Haldia and Paradip) are also likely to get connected shortly. This is to be followed by connectivity through the North-East Gas Grid to the north-eastern refineries.

The company's renewable energy plants currently produce electricity equivalent to 5 per cent of its electricity consumption. It proposes to increase the use of green power in its refineries, for which plans are already underway in collaboration mode to cater to the incremental energy demand of refinery expansion projects.

Electric Mobility Solutions

Electric vehicle adoption is gathering momentum in India with the policy focus at both the Centre and the state levels. With the entry of global and domestic auto players, sales are picking up, especially in the two-wheeler segment. IndianOil has plans to provide electric mobility solutions through its vast network of retail outlets. The company currently has over 5,500 charging stations with more than 76 battery

swapping stations and plans to scale this up to 10,000 to capture the opportunities in the EV space. The company is also exploring the much talked about Battery or Energy as a service business model, with it already having established a few battery-swapping stations.

In the domain of battery technology, the company has a joint venture 'IOC Phinergy Private Ltd. (IOP) which is working on aluminium-air batteries — an upcoming battery technology which has the potential to revolutionise the space, especially in Indian conditions, with plans to commercialise the technology in India. IndianOil is looking forward to significantly expand its footprint in the renewable power space from the present level of about 240 MW capacity.

Future Ready in its quest to achieve net zero greenhouse gas emissions from its operations by 2046, IndianOil has carved out a more than two lakh crore roadmap that envisages investing in technology, research and development on alternative energy, carbon capture and use projects as well as purchasing carbon credits to offset unavoidable emissions due to technological limitations at this point in time. The measures will include making processes more energy efficient, producing and using new-age fuels such as green hydrogen, use more power from the grid and renewable sources and replacing liquid fuels with alternatives such as natural gas and CBG in plants. The oil behemoth is all set on its journey for a more sustainable, greener future that will benefit the generations to come.

IndianOil is fuelling the EV revolution in India. It has 5500 EV charging stations and 76 Battery Swapping Stations across the country as of 1 May 2023. The company is targeting 10,000 EV charging stations by the end of 2024.

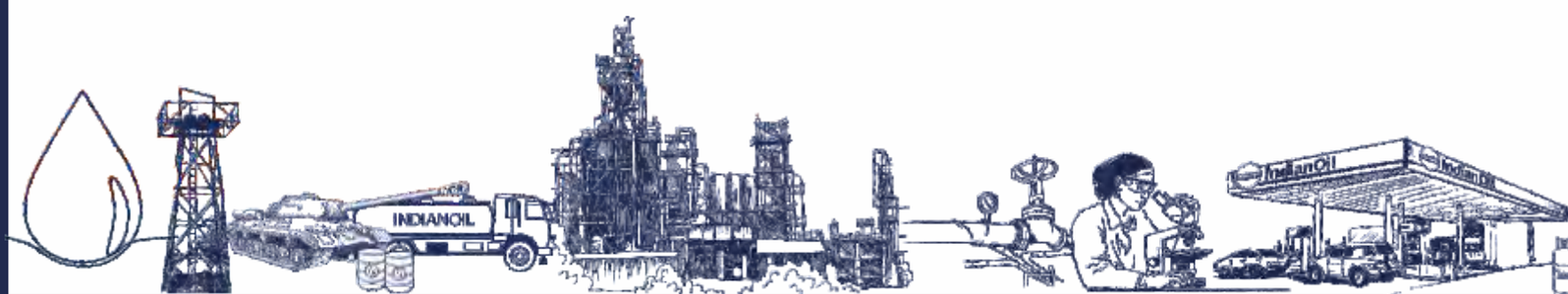
NET ZERO FOR
A BRIGHTER FUTURE

IndianOil is committed to drive India's net-zero journey, and the blueprint of this green vision is actively steering India's energy transition. From green hydrogen and biofuels to powering India's electric vehicle revolution, IndianOil has envisioned it all in line with India's dream to become an 'Energy Independent Nation' by 2047. The world is constantly in a state of flux. Climate change has become a defining crisis of our times, with rising temperatures, shifting climate, depleting ice cover, disappearing species, increasing forest fires, desertification, water scarcity and diseases. As the leader of India's energy transition, IndianOil is crafting the roadmap for India's green growth. It is walking the talk with a wide range of green products such as the eco-friendly diesel XtraGreen and the green engine oil, SERVO Greenmile. Ultra-modern grades of petrol, including XP95, XP100 and IndiGreen CBG not only boost the performance of vehicles but also reduce emissions, thereby protecting the environment.

India is one of the fastest growing economies in the world. The development objectives focus on economic growth, equity and human well-being. Energy is a critical input for socio-economic development. The energy strategy of a country aims at efficiency and security and to provide access while being environmentally friendly and achieving an optimum mix of primary resources for energy generation. Fossil fuels will continue to play a predominant role for several more decades but their use has to be prudent as resources are limited, non-renewable and polluting. Renewable energy resources, on the other hand, are inexhaustible and non-polluting.

As India is endowed with abundant renewable energy resources, their use should be encouraged. Biofuels are derived from renewable biomass resources and, therefore, provide a strategic advantage to promote sustainable development and to supplement conventional energy sources to meet the rapidly increasing requirements for transportation fuels associated with high economic growth, as well as to meet the energy needs of India's vast rural population.

A nation's energy policy is the cornerstone of its national security policy, which requires a strong pool of domestic energy sources. Towards this end IndianOil is scaling up its portfolio of renewable energy with solar, wind power, etc., for refinery operations. The company hopes to meet 85 per cent of the power requirement for new projects in its refineries primarily from renewable sources in the near future. IndianOil is also well poised to leverage India's sustainable commitments through multiple green initiatives, including increased use of natural gas in all refineries, ethanol-blended motor spirit, sale of compressed biogas (CBG) and production of biodiesel using cooking oil as feedstock. IndianOil's R&D team has undertaken various pilot projects in the field of solar power, solar thermal and solar hydrogen.



IndianOil is leading the nation's energy transition. It is fuelling India's growth so that it becomes an energy independent nation by 2047. The company's portfolio of green fuel products will go a long way in protecting the environment.

Hydrogen is observed as the fuel of the future, and the corporation is taking concrete steps to boost production. Hydrogen holds the potential to provide a clean and reliable source of energy that can be used in a wide range of applications, including the transport sector. Besides ensuring energy security to the nation, the environmental benefits of using hydrogen in a fuel cell vehicle could be significant. IndianOil R&D in collaboration with the Society of Indian Automobile Manufacturers and other vehicle manufacturers undertook extensive field validation exercises to arrive at the optimal hydrogen percentage to be spiked in CNG for deriving maximum benefits in fuel economy and emissions reduction. With its commitment to provide cleaner and greener energy solutions, IndianOil is also now fast expanding in the City Gas Distribution business by expanding its natural gas infrastructure across India. IndianOil along with its two joint venture companies is now present in 49 Geographical Areas in 105 districts across 21 States and UTs, making it one of the most significant CGD players in the country. CGD networks are an interconnected system of underground Natural Gas pipelines for supplying Piped Natural Gas and Compressed Natural Gas to domestic-commercial and industrial customers.

The performance of IndianOil refineries is extensively monitored and benchmarked against global best practices in energy management, to incorporate the latest technological developments. Measures have been taken for refineries' upgradation. There is a shift from crude-based engines to motor-driven engines for pipeline transport with a thrust on natural gas and electricity. LED lighting is being implemented across the company and solar plants have been installed. Electric vehicle adoption is gathering momentum in India and recognising that EVs are the future, IndianOil is ramping up its electric mobility solutions. With the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) entering its mandatory phase from 2027, biomass and waste-based Sustainable Aviation Fuel adoption is gathering interest globally. In view of this, IndianOil is working to create its capabilities in SAF production through collaboration with technology providers. Amidst the stark reality of the perils of climate change and the need for urgent action to offset them, IndianOil is taking the lead in planning for a sustainable future by adopting green solutions. As an oil major with a conscience, it is trailblazing various steps to achieve net-zero operational emissions by 2046 and fulfil the country's dream to become an energy independent nation.

IndianOil

TIME

1859
Col. L. Edwin Drake drills the first commercial oil well near Titusville, Pennsylvania, USA.

1889
Digboi Well No.1 spudded by Assam Railways & Trading Co. Ltd., marking the start of commercial oil drilling in India. Name 'Digboi' inspired by Mr. W. L. Lake's phrase "Dig boy, dig."

1901
Asia's first oil refinery established in Digboi by Burmah Oil Company Ltd. becomes the world's oldest operating refinery with a capacity of 500 barrels per day.

1958
Indian Refineries Limited incorporated.

1959
IndianOil Company Ltd. setup on 30th June to supply petroleum products manufactured by Indian Refineries Limited (IRL).

1961
- IndianOil's retail marketing begins with the opening of Rasiklal Ashok Kumar & Co. outlet near Kandla, Gujarat.
- Kandla Terminal Setup.

1962
Guwahati Refinery, India's first public sector refinery, inaugurated by Prime Minister Pt. Jawaharlal Nehru. Established in collaboration with Romania.

1964
- Indian Refineries Ltd. merges with IndianOil Company, forming IndianOil Corporation Limited (IOCL) on 1st September.
- IOCL enters aviation business with its first supply to Indian Airforce.
- Barauni Refinery and Guwahati-Siliguri product pipeline commissioned.

2000
- IndianOil Foundation established.
- Company enters exploration and production sector.
- Turnover crosses ₹ 100,000 crores and IndianOil becomes the corporate to do so.
- BD&CS renamed as 'Planning and Business Development'.

2001
- CPCL & BRPL become subsidiary companies.
- IndianOil acquired equity in Chennai Petroleum Corporation Ltd. (CPCL), Bongaigaon Refinery & Petrochemical Ltd. (BRPL) and IBP Co. Ltd. (IBP).
- IndianOil Mauritius Ltd. Incorporated on 24th October.

2022
IndianOil enters Sri Lanka's downstream petroleum sector; Lanka IOC (P) Ltd. incorporated on 29th August.

2003
- First INDMAX Installation at GR 26th June.
- BD-Gas group formed.

2005
- India's first HCNG dispenser established at R&D.
- Green Gas Ltd. – JV between IndianOil and GAIL (India) Ltd. Incorporated for CGD in Lucknow & Agra.
- BD-LNG Group formed.

2006
- Panipat Refinery capacity enhanced to 9 MMTPA.
- India's largest PX/PTA Plant set up as mother plant for polyester industry at Panipat.
- Marketing of PX/PTA commenced.

2007
IBP Co. Ltd. merged with IndianOil.

2009
- IndianOil celebrates Golden Jubilee.
- BRPL/Bongaigaon Refinery amalgamated with IndianOil.
- Bongaingaon Refinery & Petrochemical Ltd. (BRPL) merged with IndianOil.
- The first Wind Power project (21 MW) of IndianOil commissioned in Kutch, Gujarat.

2010
- IndianOil receives Maharatna status.
- Bharat Stage-IV grade petrol introduced.
- Dadri-Panipat R-LNG pipeline commissioned.
- Panipat Naphtha Cracker unit commissioned.

2011
- Bio-energy Research Centre established.
- RO solarisation project launched.
- Indane supply commenced to Asia's highest village-Komic in Lahaul-Spiti district, Himachal Pradesh.
- SERVO becomes India's largest lubricant brand by volume.
- Petrochemical brand PROPEL launched.
- PADC Panipat Commissioned.

2012
- Guwahati Refinery celebrates golden jubilee.
- Retail outlet network surpasses 20,000.

2013
- IndianOil entered niche product segments like Styrene Butadiene Rubber (SBR), Butene-1, and Butadiene. In 2014, the Corporation's JV Company, became the first in the country to produce SBR, a 100% import substitute product.
- The first well was successfully spud by IndianOil in its 1st domestic operated asset in Cambay Basin, Gujarat
- Formation of IOAGPL (IndianOil Adani Gas Pvt. Ltd)- IOAGPL- IndianOil further expands its CGD footprint with Adani Gas limited by forming Joint Venture in 2013.

2015
First LNG spot cargo imported by IndianOil on its own on 11th June.

2016
- Paradip Refinery in (Odisha) dedicated to the nation PM.
- IndianOil's retail network crosses 25,000.
- Mathura Refinery produces BS-VI compliant fuels for the first time in India.
- 100th AFS at Rourkela setup.

2018
- IndianOil formed a JV, Indhradhanush Gas Grid Ltd., with ONGC, OIL, GAIL and NRL to develop a gas pipelines grid connecting all the State Capitals of the northeast.

2019
- IndianOil commissioned world's highest solar facility in its LPG bottling plant in Leh in July 2019.
- Ennore Terminal - IndianOil set up the 5-MMTPA LNG Terminal at Ennore (commissioned on Mar 2019), through JV 'IOLPL' (IndianOil LNG Pvt. Ltd).
- Polypropylene Plant at Paradip commissioned on 6th Februray.
- Motihari – Amlekhgunj Pipeline (MAPL) Phase I commissioned in September ,19 under G2G MoU Executed between India and Nepal.
- First Polypropylene dispatch ex-PP Terminal, Paradip through road on 5th August, 2019 and through coastal mode on 4th September, 2019.

LINE

1965

- Koyali Refinery commissioned with Soviet collaboration.
- Indane cooking gas introduced in Calcutta.
- IndianOil Aviation begins servicing Civil Aviation sector.
- Three divisions came into being with the formation of the Pipelines Division. Other divisions were Marketing and Refineries.

1966

IndianOil's First product pipeline Guwahati-Siliguri Pipeline commissioned.

1967

Haldia-Barauni and Barauni-Kanpur Pipelines commissioned.

1969

Madras Refineries Ltd. commissioned, later CPCL.

1972

- IndianOil's Research and Development Centre established at Faridabad.
- SERVO, the first indigenous lubricant brand of India launched.

1975

- Haldia Refinery commissioned.

1979

Bongaigaon Refinery established in Assam.

1981

- Assam Oil Co. Ltd. and Digboi Refinery merged with IndianOil.
- Salaya-Mathura crude oil pipeline system commissioned.

1982

Mathura Refinery commissioned as India's first green refinery.

1985

Corporate Planning group formed.

1986

IndianOil supplies expedition in Antarctica, becoming the first Indian company on the continent.

1993

India's first hydrocracker unit commissioned at Gujarat Refinery.

1994

- IndianOil's Research and Development Centre earns ISO-9001 Certification.
- First overseas office opened in Dubai.

1995

- IndianOil shares listed on Bombay Stock Exchange.
- BD-Exploration and Production (E&P) group formed.

1996

- State-of-the-art LPG import terminal commissioned at Kandla.
- IndianOil Institute of Petroleum Management inaugurated.
- Modernisation of Digboi Refinery completed.

1997

- IndianOil gets Navaratna status.
- Business Development gains renewed focus with a new functional group.

1998

- Panipat Refinery with 6 MMTPA capacity commissioned as the first integrated refinery-cum-petrochemical complex in the public sector.
- IndianOil Board reconstituted as Navaratna Board.

1999

BD-Petrochemicals group formed.

2020

- 30,000th fuel station commissioned.
- 100 Octane petrol XP100 launched.
- IndianOil becomes largest bulk explosives manufacturer in India.
- IOC Phinergy Pvt. Ltd. JV formed with Phinergy to commercialise Aluminium-Air Battery technology in India.
- High purity oxygen diverted from Mono Ethylene Glycol unit at Panipat Refinery to produce medical grade liquid oxygen and play key role in COVID crisis.
- IndianOil pipelines set a record by laying 1,14,595 kilometres of pipelines in a single day.
- BS VI fuels launched pan-India before the deadline.
- IndianOil TOTAL Pvt. Ltd. (ITPL), 50:50 JV between IndianOil and Total Energies, incorporated.
- IndianOil's 2nd Product Application & Development Centre (PADC) commissioned at Paradip 25th June

2021

- INDMAX Unit at Bongaigaon Refinery dedicated to the nation.
- Ramanathapuram-Thoothukudi Natural Gas Pipeline commissioned.
- One-Horned Rhino adopted as Brand Mascot.
- IndianOil becomes first corporate to power a women's hockey team.
- Rashtriya Khel Protsahan Puraskar awarded to IndianOil.
- Bharat Energy Office opened in Russia.
- Fuel Supplies to Sri Lanka from Paradip Refinery for first time.

2022

- 2G Ethanol plant dedicated to the nation by Hon'ble Prime Minister on World Biofuel Day.
- IndianOil Guwahati Refinery celebrates its Diamond Jubilee.
- Bongaigaon Refinery becomes the first refinery in Northeast India to supply Ethanol blended fuel.
- IndianOil R&D Centre and Bongaigaon Refinery completes 50 years.
- Lube brand SERVO completes 50 years.
- Dahej-Koyali natural gas pipeline commissioned.
- IndianOil inks an MoU with NTCA for transcontinental relocation of 'Cheetah' and the first batch of eight Cheetahs, flown in from Namibia, released into the Kuno National Park in Madhya Pradesh.
- IndianOil committed to achieve Net-Zero emissions by the year 2046.
- Landmark 6000th tanker berthing takes place at Vadinar.
- IndianOil launch its new brand of polymer recyclate, Cycloplast.
- First batch of AVGAS 100 LL produced by Gujarat refinery for consumption at Hindon and Fursatganj AFS.

2023

- First parcel of 16 Kilolitre AVGAS 100 LL exported to Papua New Guinea. Second parcel exported to Sri Lanka.
- Launch of 'Unbottled' campaign and jacket made from recycled PET Bottles by Hon'ble Prime Minister at India Energy Week.
- IndianOil achieves record turnover; and jumps 48 places to rank 94 in Fortune 500 Rankings. Listed in the rankings for the 28th consecutive year.
- India's first Green Hydrogen based fuel cell bus launched by IndianOil.
- Mono-Ethylene Glycol (MEG) Plant at Paradip Refinery successfully commissioned.

2024

- IndianOil sets 1 Trillion Dollar Company Target by 2047.
- STORM- The Ultimate Racing Fuel powers the FIM Asia Road Racing Championship 2024.
- ETHANOL 100 fuel launched at 183 IndianOil fuel outlets across India.

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Details of Group Refineries

REFINERY (LOCATION)	CAPACITY IN MMTPA (as on 31st March, 2022)
Digboi	0.65
Guwahati	1.00
Barauni	6.00
Gujarat (Koyali)	13.70
Haldia	8.00
Bongaigaon	2.70
Mathura	8.00
Panipat	15.00
Paradip	15.00
CPCL (Subsidiary) Refinery	
Manali, Chennai	10.50
Total	80.55

Operating Pipelines

S. No.	Liquid Pipelines		Length (km)	Installed Capacity (MMTPA/ MMSCMD)
A	Product Pipelines excluding LPG			
1	KAPL	Koyali Ahmedabad Pipeline	79	1.10
2	KJPPL	Koyali Jaipur Panipat Pipeline	1644	5.00
3	KDPL	Koyali Dahej Pipeline	197	2.60
4	KRPL	Koyali Ratlam Pipeline	265	2.00
5	BKPL	Barauni Kanpur Pipeline	1227	3.50
6	HMRPL	Haldia Mourigram Rajbandh Pipeline	277	1.35
7	HBPL	Haldia Barauni Pipeline	526	1.25
8	GSPL	Guwahati Siliguri Pipeline	435	1.40
9	PBPL	Panipat Bhatinda Pipeline	219	3.00
10	PRPL	Panipat Rewari Pipeline	155	2.10
11	PAJPL	Panipat Ambala Jalandhar Pipeline	495	3.50
12	PDPL	Panipat Delhi Pipeline	189	3.00
13	MDPL	Mathura Delhi Pipeline	147	3.70
14	MAGPL	Mathura Agra Gawria Pipeline	311	4.00
15	MBPL	Mathura Bharatpur Pipeline	21	1.20
16	CTMPL	Chennai Trichy Madurai Pipeline	683	3.90
17	CBPL	Chennai Bangalore Pipeline	290	2.45
18	PRRPL	Paradip Raipur Ranchi Pipeline	1073	5.00
19	PHPL	Paradip Hyderabad Pipeline	958	4.50
20	PBAPL	Panipat Bijwasan ATF line	111	1.00
21	CMPL	Chennai Meenambakkam ATF Pipeline	95	0.18
22	DDPL	Devangonthi Devanhalli Pipeline	36	0.66
23	Kolkata ATF	Kolkata ATF Pipeline	27	0.20
24	Lucknow ATF	Lucknow ATF Pipeline	5.9	0.21
25	PSHPL	Paradip Somnathpur Haldia Pipeline	165	4.60
26	KASPL	Koyali Ahmednagar Solapur Pipeline	352	5.00
	Product Pipelines excluding LPG (Total)		9983	66.40

Operating Pipelines

A2	LPG Pipelines			
1	PJPL	Panipat Jalandhar Pipeline	280	0.70
2	PHBMPL	Paradip Haldia Barauni Motihari Pipeline	1468	3.50
	LPG Pipelines (Total)		1748	4.20
	Product Pipelines (Total)		11731	70.60
B	Crude Oil Pipelines			
1	SMPL	Salaya Mathura Pipeline	2660	25.00
2	MPPL	Mundra Panipat Pipeline	1194	8.40
3	PHBPL	Paradip Haldia Barauni Pipeline	1447	15.20
	Crude oil Pipelines (Total)		5301	48.60
	Total IOCL Pipelines (Liquid)		17032	119.20
C	Gas Pipelines			
1	DPPL	Dadri Panipat RLNG Pipeline	141	9.50
2	ETBPL	Ennore-Tuticorn-Bengaluru RLNG Pipeline	285	34.00
3	DKPL	Dahej Koyali RLNG Pipeline	106	5.23
	Gas Pipelines (Total)		532	48.73
	Total IOCL Pipelines		17564	119.20 MMTPA + 48.73 MMSCMD

Pipeline Projects

S. No.	Pipeline	Length (km)	Capacity (MMTPA)
	Ongoing Products Pipelines Projects Excluding LPG		
1	Vijayawada- Hyderabad section of PHPL	254	0.00
2	Manmad-Ahmednagar-Solapur section of Koyali Ahmednagar-Solapur Pipeline	395	0.00
3	Conversion of 18" HBPL Crude oil Pipeline to Product Pipeline	517	3.40
4	Somnathpur - Haldia Section of PSHPL	179	0.00
5	Product pipeline from CBR to Asanur	139	4.50
6	ATF Pipeline Jatni terminal to Bhubneswar AFS	19	0.12
7	POL Pipelines in Common Corridor Pipelines-Chennai	48	0.00
8	Re-routing of BKPL for connectivity to proposed terminal at Mirzapur	12	0.00
9	Branch pipeline on PRRPL to Meramandalli CUF	37	0.00
10	ATF Pipeline from JNPT to Navi Mumbai International Airport	22	4.45
11	Extension of Asanur-Sankari Section of CTMPL up to Irugur	120	0.00
	Total Product Pipelines excluding LPG	1742	12.47
	Ongoing LPG Pipelines Projects		
1	Hathidah- Muzaffarpur section of PHBMPL	128	0.00
2	Muzaffarpur Motihari section of PHBMPL	107	0.00
	Total (LPG Pipelines)	235	0.00
	Ongoing Crude Pipeline Projects		
1	Augmentation of PHBPL and laying of 30" Haldia- Barauni Crude Oil Pipeline	517	5.20
	Reduction in length after Conversion of 18" Crude oil Pipeline to Product Pipeline	-499	0.00
2	Augmentation of SMPL crude oil pipeline systems for J-18	0	10.00
3	New Mundra Panipat Crude Oil Pipeline for P-25	1033	17.50
	Total Crude Pipelines	1051	32.70
	Ongoing Gas Pipelines Projects		
1	Ennore-Tuticorn-Bengaluru R LNG Pipeline	1158	1 MMSCMD
2	Hazaribagh-Ranchi R LNG pipeline	65	1 MMSCMD
	Total Gas pipelines	1223	2 MMSCMD
	Pipeline Projects Under Consideration		
1	Guwahati-Silchar Imphal Pipeline	551	1.50
2	Devangonthi-Chitradurga Pipeline	234	2.60
3	Extension of PJPL from Jalandhar to Goindwal Sahib BP	85	0.50
	Summary		
	Ongoing Liquid and Gas Pipeline Projects		
1	Total Crude Oil Pipeline	1051	32.70 MMTPA
2	Total Products Pipeline including LPG	1977	12.47 MMTPA
3	Total Gas Pipeline Projects	1223	2 MMSCMD
	Cumulative	4251	45.17 MMTPA 2 MMSCMD

Map not to scale

Map not to scale

Locations are indicative

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The Energy of India

ENERGY BRANDS

That make a difference

XP100 — 100 octane premium petrol

Indane XTRA TEJ

XTRAGREEN — New-age high performance diesel

Indane — SAFE-RELIABLE-CONVENIENT

KISAN SEVA KENDRA

IndianOil Aviation — Our groundwork takes you sky high

PROPEL — 100% TRUST. 100% VALUE.

RHINOWAX — PREMIUM PARAFFIN WAX

SERVO — WORLD-CLASS LUBRICANTS — THE SCIENCE OF EXTREME

NANOCUT — HI-THERM INDANE CUTTING GAS

SWAGAT

Fuel@Call

Chhotu — from Indane

CRYOGENICS — For New-Age Industrial Excellence

autogas — EXPERIENCE THE ECO-DRIVE

CLEARBLUE — Diesel Exhaust Fluid — Superior Emission Control

LNG — AT DOORSTEP

INDOGEL — EXPLOSIVES - 100% SAFE, 100% VALUE.

XP95 — 95 OCTANE PREMIUM PETROL

IndiGreen

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