

# Support for the Development of the Petroleum Industry

- ☑ Restoring and Increasing Production Capacity
- ☑ Enhancing Crude Oil Transportation Capability
- ☑ Promoting Local Economic Recovery

CNPC participates in the construction of Iraq's energy infrastructure by bringing its advantages in integration into full play, and works with its partners to overcome difficulties, so as to help Iraq recover and boost oil and gas production and revitalize the oil industry. These efforts have helped Iraq become a major oil exporting country again and promoted its local economic recovery.



**Projects CNPC has invested in with its partners**

**6** million tons/year

Phase II delivered an annual capacity of six million tons three years ahead of schedule

**70,000** barrels/day

The Halfaya project met the contracted production target of 70,000 barrels/day 15 months ahead of schedule

**10** %

The Rumaila project achieved the goal of a 10% increase in production two years ahead of schedule and registered the highest production the oilfield had ever seen over the past 30 years

## Restoring and Increasing Production Capacity

CNPC has leveraged its technological advantages and years of extensive experience to help resume local oil production and revitalize the oil industry. The Company has built a total of more than 1,000 kilometers of pipelines and participated in the construction of wellhead & pipelines and stations in eight oilfields, playing an important role in the reconstruction of oilfield facilities and restoration of oil and gas production in postwar Iraq. We have, together with our partners, brought our elite personnel as well as advanced and applicable managerial and technical experience and equipment to Iraq, in an effort to build sustainable and modern oilfields for the country.

The capacity building of all the three major projects in which CNPC co-invested was completed ahead of the contract schedule. This has accelerated the pace of revitalization of the Iraqi oil industry and helped build up the confidence of the local oil industry and the Iraqi people.

Specifically, we carried out pilot tests of water flooding in giant carbonate reservoirs in the early stage, and effectively applied advanced technologies for cluster wells, multi-branch horizontal wells, deep acidification and sand control, achieving remarkable results and ensuring efficient development and rapid production growth of oilfields. The Al-Ahdab project, the first oilfield to become operational in postwar Iraq, saw its Phase II deliver an annual capacity of 6 million tons three years in advance; the Halfaya project met the contracted production target of 70,000 barrels/day 15 months ahead of schedule; the Rumaila project achieved the goal for a 10% increase in production two years ahead of schedule and registered the highest production the oilfield had ever seen over the past 30 years.

CNPC urges local contractors to establish a construction operation system compliant with international standards during oilfield development and construction. They have become indispensable players in the development of the oil industry in Iraq.



<b>Rumaila Oilfield</b>
<ul style="list-style-type: none"> <li>▶ Achieved the Initial Production Target (IPT) of increasing production by 10% two years ahead of schedule</li> <li>▶ Registered daily production of over 1.4 million barrels, nearly half of Iraq's total daily crude oil production, and a record high for the oilfield over the past three decades</li> <li>▶ Achieved an increase of 32% in production compared with the year of takeover</li> </ul>
<b>Al-Ahdab Oilfield</b>
<ul style="list-style-type: none"> <li>▶ The first newly-built oilfield capacity project in Iraq over the past 20 years</li> <li>▶ Phase I was put into operation with a 3-million ton capacity half a year ahead of schedule</li> <li>▶ Phase II was put into operation with a 6-million ton capacity three years ahead of schedule</li> </ul>
<b>Halfaya Oilfield</b>
<ul style="list-style-type: none"> <li>▶ "The fastest and best executed international bidding project" in Iraq</li> <li>▶ Achieved the highest performance in production increase, cost control and construction period among the same type of oilfields in Iraq</li> <li>▶ Phase I was put into operation with a 5-million ton capacity 15 months ahead of schedule</li> </ul>
<b>West Qurna-1 Oilfield</b>
<ul style="list-style-type: none"> <li>▶ Achieved daily crude oil production of 400,000 barrels</li> </ul>

## Joint Efforts to Revive Rumaila Oilfield

Case

Rumaila Oilfield is Iraq's largest oilfield and the fourth largest oilfield in the world with a development history of 50 years. It is plagued by production problems, and further research needs to be done on the reservoir, aging oilfield facilities, frequent pipeline leakage incidents, and seriously inadequate production support equipment. In March 2011 alone, the maximum loss of output caused by equipment reached 150,000 barrels per day.

In partnership with BP and SOMO, CNPC took a variety of measures and implemented a series of control programs to build Rumaila into a safe, efficient and modern oilfield, realizing a substantial production increase and contributing huge amounts of fiscal revenue to the country.

**We have renovated existing equipment, introduced new equipment, and improved processes.** In the past few years, we have carried out repair and maintenance work at the oilfield for tens of thousands of times, built more than 800 kilometers of well-connecting pipelines, and drilled a total of 165 new wells. Our operating capacity was doubled through the implementation of geological plans for new wells and stimulation wells, and the wide application of horizontal well technology. In 2018, all production wells across the 1,600 square kilometers of the oil province were monitored by wireless remote sensing, and digital oilfield technology has enabled a great leap in the modernization of the oilfield.

**We have adopted safety standards and used internationally advanced production management software.** Nine key safety standards and more than 1,000 international standards and specifications have been effectively implemented in Rumaila Oilfield. Safety concepts and technical knowledge have greatly benefited both companies and employees dedicated to the operation of the oilfield.

**We have carried out large-scale training.** In the second half of 2010, we launched extensive training covering health and safety, engineering technology, and plan management in Rumaila Oilfield. In 2011, the Rumaila Oilfield College was established. In 2012, nearly 900 frontline operators from the oilfield attended core training on operations control in Edinburgh, UK. In 2013, HSE training was provided to all contractors. By the end of 2018, local employees received training 11.5 times per person, with a total of 1.5 million man-hours of training provided.

The Rumaila project has provided 22,000 job opportunities to the local area, and a great number of Iraqi technicians and managers have become the backbone of the construction of the oilfield. Local contractors were granted USD 3 billion worth of contracts. Moreover, thanks to the extensive training guided by international standards, the contractor team has seen substantial improvements in production safety and quality, construction efficiency, and technical skills. Local communities have fully benefited from the knowledge and skills training and social welfare support provided by the Rumaila project for oilfield development. Basra Governorate, where the oilfield is located, is being gradually positioned as the main oilfield service center in Iraq.



"The achievements that we made in the past five years have shown BP and its partners' dedication to revitalize and modernize this large-scale oilfield. We are committed to turning it into a true world-class oilfield."

——Mark, Deputy Manager of Rumaila Oilfield

"We are extremely proud that Rumaila Oilfield has become a part of the resources of Basra and Iraq."

——Sabah al-Bazouni, Chairman of Basra Provincial Council

"In the past five years, Rumaila Oilfield has had a huge impact on the Iraqi oil industry. We are ready to meet future challenges with the help of the technical expertise and support of BP and CNPC."

——Salah Mohammad, former General Manager of SOMO & Rumaila Oilfield

## Enhancing Crude Oil Transportation Capability

While Iraq is rich in oil resources, it is plagued by very weak domestic oil infrastructure due to years of war and economic sanctions. It is necessary to update its infrastructure in the fields of oil, natural gas and energy from scratch, which presents a huge potential for rebuilding the market. Through active participation in the reconstruction of Iraq's energy infrastructure, CNPC has guaranteed the stable supply and export of local energy, created a large number of jobs, and brought peace and hope to the local area. We have completed a series of major projects, such as Al-Ahdab Oil Pipeline and Missan Crude Oil Pipeline.

We have completed Missan Crude Oil Pipeline, the first fully automated strategic transmission channel in postwar Iraq, with high standards and high quality. This pipeline is connected with the KRG trunk line and the DNO/Tawke Pipeline to form a backbone pipeline network system which traverses from north to south. Playing a pivotal strategic role and with far-reaching influence, the pipeline has further optimized the layout of Iraq's national strategic pipeline network, strengthened crude oil export security, driven oil and gas development and production in the regions along the pipelines, and promoted local as well as national overall economic development. This strategic project has been hailed by the Iraqi government as a model project for deepening friendship and win-win cooperation in the history of pipeline construction in Iraq.



Al-Ahdab project is the first newly-built oilfield to become operational in Iraq in the past 20 years

## Helping to Improve Energy Supply in Baghdad

Case

Baghdad was troubled by power and fuel shortages due to a long-standing insufficient oil supply. To meet local energy demand and in response to the local government's request, the Al-Ahdab Project has helped to build energy infrastructure in addition to what was included in the contract. This includes a crude oil loading station and a 200-km crude pipeline.

The crude loading station, with a total of eight loading platforms and a daily loading capacity of 40,000 barrels, was built within two months by overcoming various difficulties to supply crude oil to refineries and power plants in Baghdad. On October 1, 2011, the crude loading station was handed over to Iraq's Midland Oil Company. It met the existing normal production needs of refineries and power plants in Baghdad, alleviated the pressure on refined oil and electricity demand from local residents, and provided a solid guarantee for the supply of feedstock oil to refineries and the production of power plants in Baghdad.

Since the station became operational, it has supplied a total of 20.95 million barrels of crude oil to the Baghdad region. Making a positive contribution to regional stability, it was highly praised by the Ministry of Oil of Iraq.

The 200-kilometer crude oil pipeline, in addition to the three pipelines as stipulated by the contract, has ensured the smooth delivery of crude oil and the stable production of the oilfield. Moreover, a significant allowance was considered during the pipeline construction, which can be used for the development of other oilfields in the future.



Petroleum tank trucks are dispatched from Al-Ahdab oilfield every day

## Investment in Construction of Missan Crude Oil Pipeline

Case

**6,000+** unexploded ordnance and mines

A professional mine clearing company was hired to clear more than 6,000 unexploded ordnance and mines for the entire pipeline. The Missan project implemented HSSE international management measures and delivered excellent performance of “zero accidents, zero injuries and zero pollution”.

**4** kilometers

During pipeline construction, the floating pipeline technique was applied in an innovative manner to 4 kilometers of the pipeline, successfully addressing challenges for construction in the rainy season in swamps and making history in pipeline crossing in Iraq.

**99** %

The Missan Crude Oil Pipeline, an EPC project contracted by CPP, had a one-time welding pass rate of 99%.

“This pipeline is of strategic importance to Iraq’s long-term development. It will help southern Iraq enhance its oil export capacity by leaps and bounds and will rapidly promote the economic development of Maysan Governorate and Iraq.”

——Jabbar Alluaibi, Minister of Oil of Iraq

“The pipeline helped rationalize the crude oil transportation system of Iraq, for it was designed to ‘stretch both southwards and northwards’. It has been integrated into the Iraqi national strategic pipeline network, exerting profound influence on Iraq’s long-term strategy for distributed production, storage, transmission and marketing.”

——Liu Weimin, CNPC Pipeline Expert and Technical Consultant of Missan Crude Oil Pipeline Project

In August 2014, the Missan Crude Oil Pipeline was fully put into operation, opening a new chapter in Iraq’s oil transportation.

### Enhancing crude oil transportation capacity and promoting local economic development

Previously, the 28-inch pipeline constructed in the 1970s had been severely damaged during the Iran-Iraq War. With a daily delivery of only 200,000 barrels, it could not help increase the production of the oilfields in Maysan Governorate.

In order to enhance the capacity of crude oil transportation in southern Iraq, CNPC and CNOOC jointly invested in the construction of Missan Crude Oil Pipeline, with China Petroleum Pipeline Engineering Co., Ltd (CPP) acting as the constructor. It is the first fully automated strategic pipeline in postwar Iraq. This 42-inch and 272 km pipeline runs across Maysan and Basra into the Port of Fao and the Persian Gulf. With a designed annual capacity of 50 million tons, it is hailed as the “lifeline of crude oil transportation” in Maysan Governorate.

With nearly 1/4 of the pipeline crossing the swamp, the Missan Crude Oil Pipeline also runs across more than 300 medium and large-sized rivers, 16 highways and railways, nearly 200 meters of dense high-pressure oil and gas pipeline clusters, and 30 kilometers of minefields and unexploded ordnance areas. Additionally, under the extreme local weather conditions and going through prolonged political turbulence and other challenges and risks in Iraq, the pipeline was successfully put into operation on schedule against all odds.

### Fulfilling social responsibilities

The construction of the Missan Crude Oil Pipeline has created more than 1,000 jobs for local people, and over 60% of the employees were locally hired. Nearly 40 local subcontractors in the fields of civil engineering, transportation and services were involved in the construction, which has created tens of millions of dollars worth of business opportunities. Through standard international management, the project helped local subcontractors achieve substantial improvement in their HSE management.

Wherever the pipeline passed through the farmland, the project built canals, dams and bridges free of charge, directly benefiting the people living along the pipeline. After the pipeline crossed rivers, the project restored river channels in time, and purchased and released more than 10,000 fish fry in the river. Such efforts in protecting the local ecological environment was highly praised by the local people.



## Promoting Local Economic Recovery

CNPC strives to produce more oil for Iraq, and puts great efforts into building everlasting prosperity and stability in Iraq. We actively work with our partners to generate oil revenue and create local employment opportunities, and promote local procurement and local economic recovery.

Based on Iraq's local material supply and service market, we give top priority to local enterprises and social resources, and actively cultivate local engineering subcontractors, material suppliers and service providers, promoting the development of relevant SMEs in the country.

Since its initiation, the Halfaya project has provided nearly 5,000 jobs for Maysan Governorate. Many local people previously living abroad or working in Baghdad have returned to Maysan to work at Halfaya Oilfield. The development and construction of the oilfield has brought about USD 100 million worth of business opportunities to local contractors. Halfaya Oilfield Airport, the first oilfield airport in Iraq which was completed in 2012, has provided strong security and convenience for employee mobility as well as production and operation of the oilfield. It has become an important part of the construction of an international oilfield base.

In the early power station project for Rumaila Oilfield undertaken by CNPC, local employees accounted for 70% of the workforce, and at the peak period of construction, a total of 1,126 employees worked on site, nearly 800 of them were locally employed.

The Al-Ahdab project pioneered in the adoption of the wellsite contracting system to promote local employment, and always followed the policy which favors local employment. The project has maintained stable production since it was put into production in 2011, and the oil dollar has become the most stable source of income for the local government. Wasit Governorate, where the project is located, has turned from an agricultural province into an industrial province. With great improvements in local living standards, Wasit will become a modern petroleum industry city in the future.

"Many Iraqi university graduates used to do odd jobs, and it was very hard to find a full-time job. It is our Chinese friends who have given us the opportunity, and they personally helped us start from scratch. Through smooth communication, we have built profound mutual trust. The involvement of Chinese partners has brought great impetus to local development, indicating that Iraq does not lack in resources, but enjoys potential for development. We should draw on our Chinese partners' capabilities in management and execution to rebuild our nation."

—— Ali Hamed Salam, Project  
Manager of MFCU, a local partner and  
civil construction company



CPF2 of Halfaya Oilfield

## Al-Ahdab Project Shares Oilfield Development Achievement with the Local Area

Case

Retaining the economic dividends of oilfield development for the local people and sharing development opportunities as much as possible are the path to and fundamental purpose of sustainable development. We are glad to see that the development and construction of the Al-Ahdab oilfield is invigorating new vitality into local economic development and the improvement of people's livelihoods.

As the first foreign cooperation oil project and the first oilfield project to be put into operation in postwar Iraq, Al-Ahdab Oilfield has made an important contribution to rebuilding the country, restoring public confidence and promoting local economic growth. As the largest oilfield in Wasit Governorate, the Al-Ahdab project was put into operation three years ahead of schedule with an annual production of 7 million tons, which is equivalent to an additional USD 10 billion in revenue for the Iraqi government as compared to the amount stipulated in the contract.

Since the beginning of the development and construction of the project, we have worked with our partners to actively carry out localized operation, providing more than 5,000 jobs in the local area. In addition, we gave priority to local enterprises and urged local contractors to establish a construction operation system of international standard. Therefore, we have become an indispensable player in the development of the Iraqi oil industry.

### Hussein's shop

Hussein's shop is on the roadside in Al-Ahdab oil province. In 2012, when the road was rebuilt by the Al-Ahdab project, the original dirt road was turned into a spacious asphalt road, which provided convenience to the local residents. Today, there are more and more shops with booming business on both sides of the road, such as appliance stores, auto parts stores and car wash shops.

Hussein's shop has been around for seven years. It has grown in step with the oilfield, and like the oilfield, it is changing with each passing day. At first, the shop simply sold some cigarettes and cold drinks. Today, it has become the largest shop in the local village.

Besides running the shop, Hussein also works as a watchman. The household contract system has been adopted by the Al-Ahdab project for the wellsites to bring direct benefits to local farmers. Five of Hussein's family members work in the oilfield, four of them as watchman and one as an oil police officer.

Through the household contract system, security at each wellsite and oil gathering manifold (OGM) outside the station of Al-Ahdab Oilfield was assigned to the family of the landowner (landlord). Each family assigns two members as the watchman of the wellsite contracted by the family, and enters into a service agreement with the Company. In June 2011, the first batch of 42 watchmen started to work with certificates. Since then, there are two watchmen working at every new well put into operation in the Al-Ahdab Oilfield.

The project ensured smooth implementation of this innovative initiative through management and training. In terms of management, the work systems, job responsibilities and assessment mechanism were defined. Meanwhile, experienced local employees were assigned as patrollers to address difficult problems encountered by the watchmen; oilfield brochures were distributed to each family to equip them with relevant knowledge; hydrogen sulfide emergency drills were organized on a regular basis for local residents, and meetings were held every week for village heads and local tribal elders to brief on the performance of the wellsite watchmen, so as to enhance information exchange and mutual understanding and trust.



A shop at the oilfield

The project has promoted local prosperity and brought benefits to the local residents. Therefore, it has been widely praised by the local community.

"Oilfield development has really made a difference here, as it has increased our wages and jobs"

— Hussein

"This system has brought tangible income to the villagers. The monthly payment has given hope to many villagers in need."

— Kamil, Head of Eshibiliya Village

"This household contract system was pioneered by Al-Ahdab Oilfield. It has brought tangible benefits to the local people, for it has not only helped people solve problems in employment and difficulties in life, but also guaranteed the safety of oilfield facilities."

— Mohammed S. Abood, Government Representative and Director of Oilfield Department of Wasit Governorate

"As the first oilfield to be put into operation in postwar Iraq, Al-Ahdab Oilfield is of great symbolic significance. It has turned Wasit Governorate from an agricultural province to an oil-producing province and has provided a large number of employment opportunities."

— Malik, Governor of Wasit Governorate