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AT THE SHOW

cippe 2024

China steps up offshore energy security drive

Country seeking to strengthen presence in vast expanse of South China Sea and beyond. Pages 2&3

中国加快海洋能源安全进程，中国海油持续加快上产步伐，全年实现油气净产量678百万桶油当量，同比增长8.7%。 P2&3

Photo: COOEC

Modec gets to grips with Chinese yard strategies

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China's yards in drive to expand FPSO services

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CNOOC Ltd weighs up Gabon FLNG plans

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China steps up offshore energy security drive

Country seeking to strengthen presence in vast expanse of South China Sea and beyond

XU YIHE
Singapore

CHINA'S offshore oil and gas industry has embarked on a journey entwined with digitalisation and decarbonisation, and marked by resilience, discovery and the promise of a future rich in energy resources.

China's offshore crude production in 2023, as reported by the China National Offshore Oil Corporation (CNOOC), is a testament to industry prowess, reaching 678 million barrels of oil equivalent, up 8.7% year on year.

The addition of around 26.5 million barrels of oil from new offshore fields contributed more than 60% to China's incremental oil production last year.

Last year saw the operational debut of five new production projects offshore China, three of them on stream by the third quarter's close and two entering the commissioning stage. At the forefront of this offshore renaissance stands CNOOC, which has augmented its investment in oil and gas exploration and development.

A financial voyage marked by an investment surge of 129.6 billion yuan (US$18 billion), with a substantial portion — more than 50% — dedicated to field development.

Noteworthy among these projects is the Bozhong 19-6 field, commissioned in Bohai Bay offshore northern China, boasting proven natural gas reserves of 200 billion cubic metres and 100 million cubic metres of proven condensate reserves.

Other projects, such as the Lufeng 12 oilfield and the Siqian 23 oilfield, have commenced production, aiming to achieve a peak crude oil production of 29,500 bpd.

In mid-November last year, CNOOC ushered in the $2.4 billion gas and condensate Bozhong 19-6 development in the shallow waters of Bohai Bay. Bozhong 19-6 phase one, a cornerstone of CNOOC's offshore portfolio, is designed to produce at a peak of 37,000 barrels of oil equivalent per day.

The field's vast reserves — more than 200 Bcm of gas and a similar volume of condensate — are a testament to the offshore bounty.

The development concept includes one large offshore central processing platform in water depths of about 20 metres, three smaller wellhead platforms and one gas processing terminal.

There are 65 development wells to be commissioned, including 42 production wells. There will be 20 gas injection wells and three water wells.

In October, Enping 18-6, located in the South China Sea's Pearl River Mouth basin achieved commercial operation.

The field, which lies in an average water depth of approximately 99 metres, is being produced by facilities that include a wellhead platform.

The operator envisages 15 development wells to be brought on stream and peak production of some 9300 bpd of crude in 2024.

China's offshore natural gas production reached 23.8 Bcm in 2023, a year-on-year increase of 8.7%, constituting approximately 15% of the country's natural gas production.

The flagship Lingshui oilfield in the deep waters of the South China Sea is now producing 10 million cubic metres per day. Concentrating on key areas, including the Huanbaodao trough, Bozhong trough and the southern subsag of Baiyun trough, CNOOC drilled 215 exploration wells and conducted 13,300 square kilometres of 3D seismic data surveys in the past year.

These efforts resulted in several new discoveries, enhancing the company's resource portfolio.

Among the significant finds are Qinhuangdao 27, confirmed as a large oil and gas structure, and Huizhou 26 North, a medium-sized commercial discovery contributing to the expansion of medium-deep reserves.

Other discoveries, such as Panyu 10-6 and Kaiping 18-1 in the Pearl River Mouth basin, each hold over 147 million barrels of proven reserves.

CNOOC is exploring innovative development approaches, including the potential construction of a Sevan-type cylindrical floating

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Up and running: The Hai Yang Shi You 118 FPSO at the Enping oilfield in the South China Sea. Photo: CNOOC

production, storage, and offloading vessel for Kaiping 18-1 and the sister field Kaiping 11-4 development.

These fields, situated approximately 28 kilometres apart and 295 kilometres south-east of Hong Kong, present promising opportunities for further development.

Both fields are situated about 100 kilometres from existing production facilities, including the Enping 23-1 and Panyu 34-1 complexes.

Three development options are being considered, a CNOOC source said, one of which involves deploying a cylindrical FPSO connected to a new jacket-supported drilling and production platform (DPP) equipped with 24 drilling slots and a modular drilling rig for water injection and production wells.

An alternative option would have the floater linked to a subsea production system. Yet another concept involves connecting the DPP to the existing Hai Yang Shi You 118 floater, which is currently at the Enping 23-1 oilfield. This option would require building an 85-kilometre subsea pipeline connecting the two facilities.

Kaiping 18-1 was discovered in the first half of last year and is estimated to hold 146 million barrels of proven oil reserves, according to the operator, with Kaiping 11-4 thought to host 220 million barrels of proven oil reserves.

The Kaiping 11-4-A discovery well was completed in July 2021, hitting the reservoir in the Enping sands.

Well log interpretation confirmed 33 reservoir zones within a 164.3-metre section, while the well flowed 955 bpd of light oil.

These endeavours underscore China's commitment to expanding its offshore oil industry and securing its energy future.

CNOOC continues to welcome foreign investors to explore hydrocarbons offshore China, recently offering eight blocks in the East China Sea and the northern waters of the South China Sea, totalling approximately 18,500 square kilometres, to foreign companies.

In its offshore pursuits, China must tread cautiously to avoid unsettling diplomatic waters and infringing on neighbouring countries that also claim sovereignty in the contested deepwater blocks of the South China Sea.

In recent block offerings, CNOOC has refrained from provoking nations such as Vietnam and the Philippines, opting instead for a more diplomatic approach that steered clear of disputed blocks.

This strategic move reflects a nuanced understanding of regional sensitivities, highlighting China's commitment to maintaining stability and fostering amicable relations in the complex geopolitical landscape of the South China Sea.

中国加快海洋能源安全进程

目前，中国海洋油气行业正开启一场数字化与脱碳之旅，秉持一贯韧性，积极推进深入探索，致力于创造能源富足的美好未来。

去年，中国海油持续加快上产步伐，全年实现油气净产量678百万桶油当量，同比增长8.7%，连续五年刷新历史记录。新海上油田增产约2,650万桶石油，占中国去年增产采油量的逾 60%。

中国海油坚持价值勘探、精准施策，全年共获得9个新发现，成功评价22个含油气构造，净证实储量达67.8亿桶油当量，储量替代率达180%，储量寿命连续7年保持在10年以上。公司获得并评价多个大型油气田发现，领域性勘探取得战略突破。在中国，成功评价渤中26-6和开平南等亿吨级大油田，并探获首个陆上深煤层千亿方大气田。在海外，圭亚那项目再获亿吨级油田。

公司进一步夯实成本竞争优势，桶油主要成本28.83美元，同比下降5.1%。得益于净产量大幅上升、成本管控有力，公司全年实现总收入人民币4,166亿元，归母净利润达人民币1,238亿元，保持了强劲的盈利能力。

去年，五个新海上生产项目实现初运营，其中三个于第三季度末投产，两个即将进入调试阶段。

值得一提的是，位于华北地区渤海中部海域的渤中19-6气田探明天然气地质储量达2,000亿立方米、探明凝析油地质储量达1亿立方米。

位于南海东部海域的陆丰12-3油田开发项目已运营投产，峰值产量约 29,500 桶/日。

去年11月中旬，中海油渤中9-6浅水凝析气田开发项目投产，总投资额为24亿美元。渤中19-6一期是中海油海上能源投资组合的中流砥柱，旨在实现约 37,000 桶油当量/日的峰值产量。

该项目油气田储量惊人，天然气储量达2,000亿立方米，凝析油储量与之相当，表明海洋能源极为丰富。

主要生产设施包括新建1座水深约 20 米的中央处理平台、3座无人井口平台和1座天然气处理终端。

计划投产开发井 65 口，其中采油气井42口，注气井20口，水源井3口。

10月，中海油位于南海珠江口盆地的恩平18-6油田发项目投产。项目平均水深约99米，主要生产设施包括1座井口平台。计划投产开发井15 口。预计 2024 年将实现约 9,300 桶/日的峰值产量。

2023年，中国海上天然气产量达238亿立方米，同比增长8.7%，占中国天然气产量的约15%。

中海油的旗舰项目陵水油田位于南海深水区，当前产量为 1,000 万立方米/日。

中海油聚焦重点区域，包含环保岛凹陷、渤中凹陷和白云凹陷的南部坳陷，去年钻了215口勘探井，三维地震数据勘探面积高达13,300平方公里。

受益于这些重大举措，中海油能源资源更具多元化。

中国海油扎实推进科技自强自立，关键核心技术攻关能力不断增强，数智化转型进展顺利。中国首套500米级深水国产化水下生产系统稳定产气超亿方，“深海一号”成为世界首个具备远程遥控生产能力的超大型深水平台，流花油田首次实现台风模式远程生产，秦皇岛32-6智能油田核心业务数字化覆盖率达90%。

公司董事长汪东进先生表示：“2023年，中国海油锚定目标、笃行实干，储量产量再创历史新高，圆满完成全年各项生产任务。展望未来，中国海油将加快打造高质量发展新动能新优势，不断提升能源供给能力、科技创新能力和价值创造能力，奋力谱写创建世界一流能源公司新篇章。”

Milestone: China's DSIC delivered the hull and living quarters for Modec's first M-350 floater, destined for Equinor's Bacalhau pre-salt field offshore Brazil. Photo: DSIC

Modec gets to grips with Chinese yard strategies

Floater specialist reassessing options as it looks for stronger position in the country

XU YIHE
Singapore

JAPANESE floating production specialist Modec is reassessing its supply chain in China to gain a better understanding of the country's evolving yard contracting and fabrication strategy.

Recent years have seen a significant internal reshuffle within China's offshore supply chain, and the country's yards have been transformed, each carving out a distinct product line based on its unique location, engineering capacity and client base.

A primary concern for Modec is comprehending the priorities of Chinese yards, particularly whether their focus is on international projects or domestic endeavours considered to be in the national interest.

The restructuring of Chinese yards following the rig-building boom of the last decade has seen some shift away from offshore projects in favour of non-oil and gas vessels.

To navigate the current global market pressures impacting project competitiveness, Modec says it is reinforcing partnerships with existing high-performers. The company is also prioritising direct communication with suppliers, vendors and yards, with a focus on delivering value to all parties involved.

As one company official told a recent industry conference: "Modec formulates a procurement strategy per equipment or category to realise lifetime customer value maximisation, taking into account market conditions, business plans and technical standards."

This strategic supplier relationship aims to minimise costs and schedules while containing escalation risks after a contract is agreed.

The competition among international FPSO contractors, including Modec and SBM Offshore, has manifested in their choices of preferred yards.

SBM has established its FPSO supply chain in China, predominantly selecting yards for FPSO hulls in southern China.

This has left limited opportunities for Modec, prompting the company to shift its focus to yards in northern and north-eastern China.

Looking ahead: Modec chairman Takeshi Kanamori. Photo: MODEC

Recent discussions with Hengli Heavy Industry in Dalian, formerly known as STX Dalian, mark a strategic move for Modec.

An underestimation of national interest priorities at Chinese yards recently impacted Modec's project involving the FPSO for Equinor's BM-C-33 (Pao de Acucar) pre-salt development in Brazil's Campos basin.

Modec had signed a contract with Dalian Shipbuilding Industry Company (DSIC) for two FPSOs — Equinor's BM-C-33 and ExxonMobil's Uaru field offshore Guyana.

DSIC eventually withdrew from the BM-C-33 FPSO due to drydock constraints, reallocating the space to a priority project of top national interest.

Modec then awarded the BM-C-33 FPSO hull and living quarters contract to Cosco Shipping Heavy Industry, using Modec's M350-design.

DSIC had previously delivered the hull and living quarters engineering and construction for Modec's first M-350 floater, destined for Equinor's Bacalhau pre-salt field offshore Brazil.

The challenges of supply chain constraints and tight drydock capacity highlight the complex dynamics at play in China — and the adaptive strategies required by international heavyweights such as Modec.

Modec正深入整合中国海工供应链

日本浮式生产专家三井海洋开发株式会社（Modec）正在重新评估其在华供应链，深入了解中国不断发展变化的船厂签约与建造战略。

近年来，随着中国海洋项目供应链内部进行大规模调整，中国各大船厂已实现转型，致力于根据自身地理位置、工程能力及客户群体来打造独特的产品线。

Modec正积极研究中国各船厂的业务重心，尤其是甄别各大船厂重心是国际项目还是以国家利益为重的国内项目。

过去十年，钻井平台建造量暴增，中国船厂的业务结构随之调整，一定程度上暂缓海上项目，转而支持非油气领域船舶。

Modec表示，为应对当前全球市场压力，将进一步深化巩固现有优质合作伙伴关系。

公司还将优先与供应商、供货商及船厂开展直接沟通，致力于为所有相关方创造价值。

公司一位高管在近期举行的行业大会上表示："Modec根据设备或品类制定独立采购策略，帮助客户实现价值最大化，同时将市场状况、商业计划及技术标准纳入考量。"

这项战略供应商关系旨在降低成本并缩减交付时间，同时降低合同议定后的各种风险。

Modec和SBM Offshore等FPSO国际承包商之间竞争激烈，也体现在对首选船厂的选择上。

SBM目前在中国建立了FPSO供应链，主要选择华南地区船厂建造FPSO船体。这限制了Modec的选择余地，因此转战至华北和中国东北地区的船厂。

近期，Modec实施战略举措，与大连恒力重工（原STX大连船厂）多次开展磋商。

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TUESDAY 26 MARCH 2024

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cippe2024 Gold Innovation Award goes to the New Energy Automated Workover Equipment

The 24th China International Petroleum and Petrochemical Technology and Equipment Exhibition (cippe) is being held in Beijing as scheduled.

The organising committee invited academicians from the Chinese Academy of Sciences and the Chinese Academy of Engineering, as well as the most influential senior experts in the industry to form a review committee, which selected "New Energy Automated Workover Equipment" as the cippe Innovation Gold Award" from nearly 10,000 exhibits of more than 10,000 exhibitors.

This "New Energy Automated Workover Equipment" was accomplished by **Sinopec Oilfield Equipment Corporation** (SOFE), and was assessed by academicians and experts invited by Sinopec Science and Technology Management Department to reach the international advanced level as a whole, with the "DC Micro-grid Energy Balance Control and Full-Electric Drive Technology for the Workover Equipment" achieving an international leading level.

The total number of oil and gas wells in China has exceeded 350,000 and is still on the rise.

Efficient and green workover operations are an important means to ensure energy security, and there is a huge demand for high-end and intelligent equipment.

Currently, most active-service workover equipment in the world is of diesel engine drive, featuring high energy consumption, high emission, high noise, low working efficiency and high working intensity, so there is an urgent demand for automated electric drive equipment.

The "New Energy Automated Workover Equipment Development and Application" project has been under way for 10 years, and has developed some core technologies such as energy management and control technology for new energy workover operations, workover string automatic handling and whole-process control technology, and development and integration technology for high-efficiency workover equipment and components.

Four major categories and seven series of electric drive automatic workover equipment have been developed and put into operation in major domestic oilfields and in more than 30 countries and regions in the overseas market, meeting the requirement for low carbon, environmental protection, safety and cost reduction, efficiency and other essential requirements for workover operation.

The promotion and application of these technologies are remarkable, establishing the SOFE workover equipment and technology as the global leader in the market, and promoting the automation and green revolution of workover operations, boosting continuous stable oil and gas production, high efficiency and green development, and providing solid support for ensuring national energy security.

This technology has been granted 47 patents and 12 software copyrights, leading to the revision of nine industry standards and publication of seven theses.

From 2013 to 2024, this project's technologies have been applied in 703 sets of equipment in the domestic and overseas markets.

In the past three years, 120 electric drive energy storage automatic workover rigs have been promoted and applied, achieving zero emissions in the operation process, reducing energy consumption by more than 68%, lowering the labour intensity and reducing by two-or-three the number of operators per shift.

Safety and reliability are improved, and the promotion prospect is broadening.

New energy automated workover equipment is a new milestone in the field of workover equipment development, laying a solid foundation for China to achieve world-leading workover operation technology.

中石化石油机械股份有限公司新能源自动化修井作业装备荣获cippe2024展品创新金奖

第二十四届中国国际石油石化技术装备展览会如期在北京举行，组委会特邀中国科学院院士、中国工程院院士及行业内最具影响力的资深专家组成评审委员会，展会从10000多家参展商近万种展品中评选出"新能源自动化修井作业装备"为"cippe展品创新金奖"。

"新能源自动化修井作业装备"由中石化石油机械股份有限公司完成，经由中国石化科技部组织院士专家评审鉴定为整体技术达到国际先进水平，其中"修井装备直流微网能量均衡控制和全电驱技术"达到国际领先水平。

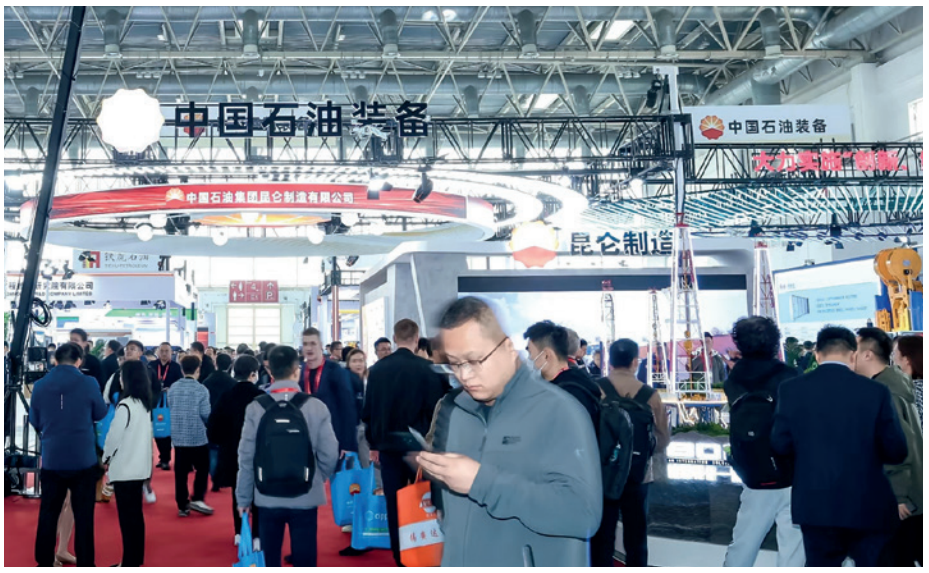
我国油气井总井数已突破35万口并呈上升趋势，高效、绿色修井作业是保障能源安全的重要手段。国内外在役修井作业装备以柴驱为主，能耗高、排放高、噪音大，作业效率低、作业强度大，对设备电动化、自动化提出迫切需求。"新能源自动化修井作业装备研制与应用"项目历时十年，取得修井作业新能源能量管理与控制、修井管柱自动化处理及全流程控制、高效修井作业装备部件研制与集成等关键核心技术，率先研制出4大类、7大系列电驱自动修井作业装备，推广应用至国内各大油田，以及30余个国家和地区，满足修井作业绿色、环保、安全和降本增效等本质需求。

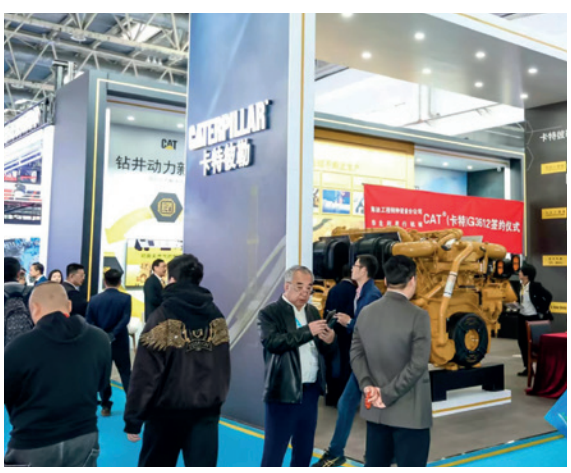
cippe2024 同期活动日程安排
cippe2024 Concurrent Events Schedule

	时间 TIME	地点 VENUE	主题 EVENT TOPICS	主讲企业 SPEAKER
26 March	09:00-12:00	E-201会议室 Conference Room E-201	防爆论坛 Explosion-proof Forum	国家防爆检验中心 National Explosion-proof Inspection Center
	09:00-12:00	W-201会议室 Conference Room W-201	第二届石油技术与装备院校长论坛暨第十六届国际石油天然气产业大会 分论坛一：深地、深水和油气勘探开发关键技术 The Second Presidents Forum of Petroleum Technology and Equipment Institutes & The 16th International Petroleum & Natural Gas Conference Sub-Forum 1: Key Technologies for Exploration and Production of Deep Ground, Deep Water Oil and Gas	中国国际石油石化技术装备展览会 (cippe) 组委会 石油技术与装备院校长论坛暨国际石油天然气产业大会组委会 西南石油大学 China International Petroleum & Petrochemical Technology and Equipment Exhibition (cippe) Organizing Committee Presidents Forum of Petroleum Technology and Equipment Institutes Organizing Committee Southwest Petroleum University
	09:00-12:00	W-103会议室 Conference Room W-103	第二届石油技术与装备院校长论坛暨第十六届国际石油天然气产业大会 分论坛二：石油天然气工具、仪器、装备和新能源技术 The Second Presidents Forum of Petroleum Technology and Equipment Institutes & The 16th International Petroleum & Natural Gas Conference Sub-forum 2: Technologies on Oil and Gas Tools, Instruments, Equipment, and New Energy	中国国际石油石化技术装备展览会 (cippe) 组委会 石油技术与装备院校长论坛暨国际石油天然气产业大会组委会 西南石油大学 China International Petroleum & Petrochemical Technology and Equipment Exhibition (cippe) Organizing Committee Presidents Forum of Petroleum Technology and Equipment Institutes Organizing Committee Southwest Petroleum University
	09:00-12:00	W-104会议室 Conference Room W-104	第二届石油技术与装备院校长论坛暨第十六届国际石油天然气产业大会 分论坛三：自动化、数字化暨智能化信息技术 The Second Presidents Forum of Petroleum Technology and Equipment Institutes & The 16th International Petroleum & Natural Gas Conference Sub-forum 3: Automation, Digitization, and Intelligent Information Technology	中国国际石油石化技术装备展览会 (cippe) 组委会 石油技术与装备院校长论坛暨国际石油天然气产业大会组委会 西南石油大学 China International Petroleum & Petrochemical Technology and Equipment Exhibition (cippe) Organizing Committee Presidents Forum of Petroleum Technology and Equipment Institutes Organizing Committee Southwest Petroleum University
	09:00-16:00	W-102会议室 Conference Room W-102	天然气与燃气产业发展论坛 压缩机技术创新与应用发展大会 Natural Gas and Gas Industry Development Forum Compressor Technology Innovation and Application Development Conference	北京振威展览有限公司 Beijing Zhenwei Exhibition Co., Ltd.
	09:20-15:40	展馆 Exhibition Hall	cippe 2024企业新产品新技术推介会 cippe2024 Enterprise New Product and New Technology Promotion Conference	中国国际石油石化技术装备展览会 (cippe) 组委会 China International Petroleum & Petrochemical Technology and Equipment Exhibition (cippe) Organizing Committee
	09:30-16:30	展馆 Exhibition Hall	探馆直播 cippe Discoveries Livestream	中国国际石油石化技术装备展览会 (cippe) 组委会 China International Petroleum & Petrochemical Technology and Equipment Exhibition (cippe) Organizing Committee
	09:30-16:30	W4 馆展区 W4580 Hall W4-W4580	巴西氢能专场活动 国际绿色能源及装备合作高级别论坛 Brazil Session on Hydrogen High-level Forum on International Cooperation on Green Energy and Equipment	中国智慧能源产业联盟 北京振威展览有限公司 China Smart Energy Industry Alliance Beijing Zhenwei Exhibition Co., Ltd.
	13:00-17:00	二层东花园会议室 East Garden Conference Room, 2nd Floor, E2-E3 Corridor	CITTE 2024中国（北京）国际非开挖发展交流论坛 CITTE 2024 China (Beijing) International Trenchless Development Exchange Forum	中欧联合非开挖技术研究中心 北京国际地下工程建设及非开挖技术装备展览会组委会 北京振威展览有限公司 China Europe Joint Trenchless Technology Research Center CITTE Organizing Committee Beijing Zhenwei Exhibition Co., Ltd
	13:00-17:00	W-201会议室 Conference Room W-201	海上风电装备产业链发展论坛 Forum on Offshore Wind Power Equipment Industrial Chain	中国船舶工业行业协会 北京振威展览有限公司 China Association of the National Shipbuilding Industry (CANSI) Beijing Zhenwei Exhibition Co., Ltd.
	10:00-16:30	W2馆 Matching 区 W2501 W2 Matching Zone W2501	cippe 2024采购对接会 cippe2024 Business Matchmaking Meeting	中国国际石油石化技术装备展览会 (cippe) 组委会 北京振威展览有限公司 China International Petroleum & Petrochemical Technology and Equipment Exhibition (cippe) Organizing Committee Beijing Zhenwei Exhibition Co., Ltd.
	10:00-16:30	W4馆 Lucky 区 W4266 W4 Lucky Zone W4266	鲤跃龙门 cippe Lucky Draw - Liyue Longmen	中国国际石油石化技术装备展览会 (cippe) 组委会 北京振威展览有限公司 China International Petroleum & Petrochemical Technology and Equipment Exhibition (cippe) Organizing Committee Beijing Zhenwei Exhibition Co., Ltd.
	13:00-16:30	W-105会议室 Conference Room W-105	API 标准与认证更新研讨会 API Standards and Certification Updates	美国石油学会 API Americian Petroleum Insititute (API)

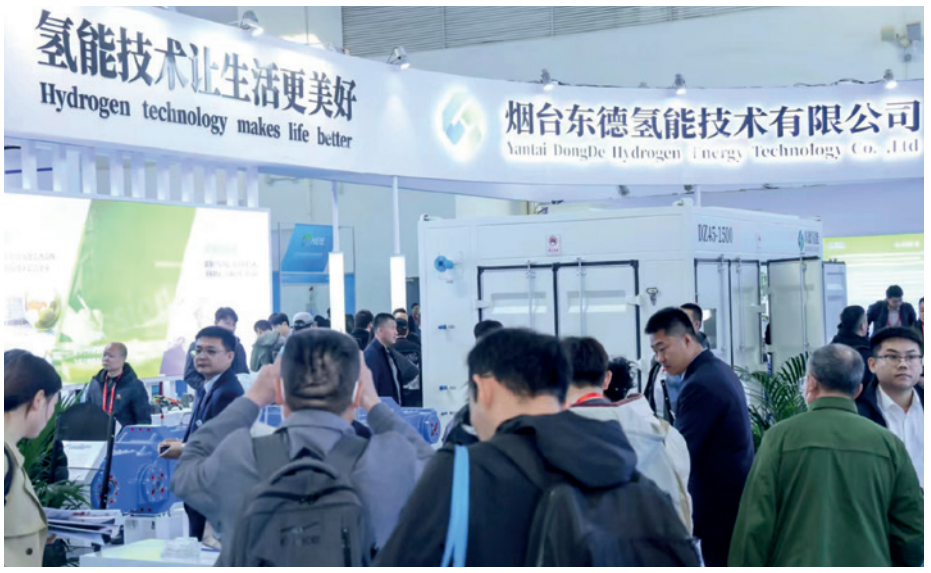
注：以上活动日程或有调整，以展会现场公布为准。 Note: The final agenda will be announced by the Organizing Committee on-site

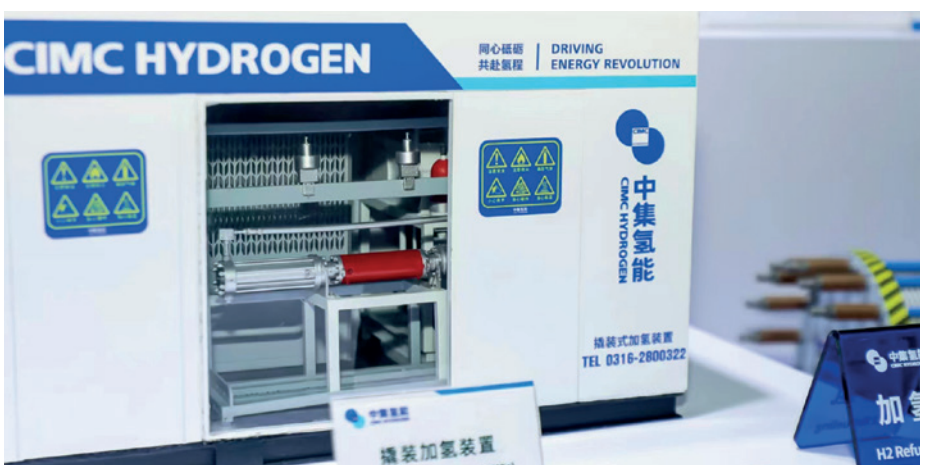
Pictures from the show

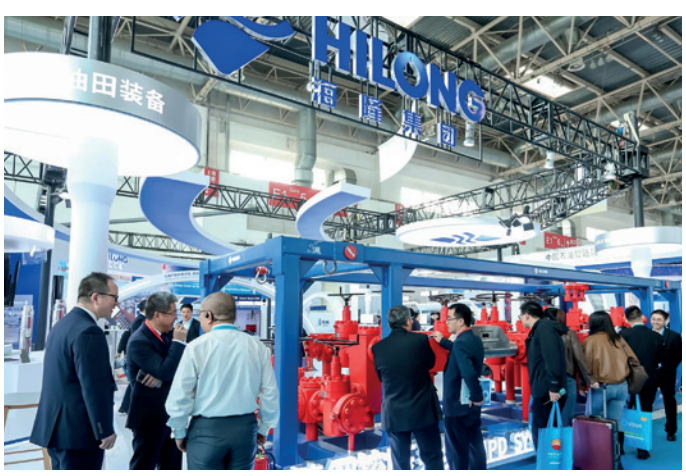


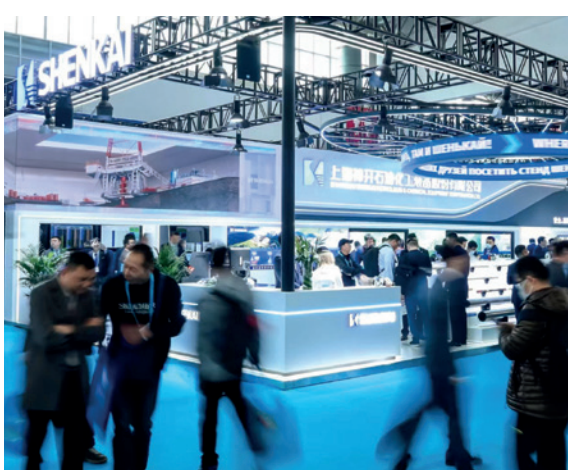


Pictures from the show









Aerospace Hydrogen leads in China's hydrogen liquefaction and hydrogen refueling stations equipment

Aerospace Hydrogen Energy Technology Co. Ltd. boasts strong capabilities in the fields of cryogenic technology and equipment, as well as system engineering solutions.

It is a leading supplier of hydrogen liquefaction equipment and complete sets of gas/liquid hydrogen refuelling stations in China, providing services in areas such as LNG plant construction, LNG-BOG helium extraction equipment, and separation and purification of rare gases (helium, neon, krypton, xenon).

The company has made outstanding achievements in addressing the production and manufacturing of large-scale deep cryogenic equipment, and realising the localisation and industrialisation of equipment.

Its research and development team adhere to the innovative concept of rapid iteration in research and development and ultimate improvement in products, striving to enhance the research and development capabilities of "multiple iterations in the digital world, one success in the physical world".

Significant progress and breakthroughs have been made in areas such as cryogenic high-speed rotating thermodynamics and structural mechanics, continuous and efficient para-ortho hydrogen conversion technology, deep cryogenic high-vacuum precision measurement and control and conduction technology, multi-stage heat exchange flow matching and thermal management process optimisation, as well as efficient receiving, transportation, and storage technology with low flash evaporation of liquid hydrogen.

Aerospace Hydrogen Energy is committed to safeguarding the construction of the "source-grid-load-storage" new energy system, providing important technologies and equipment foundations for promoting the transformation and upgrading of the national energy structure, and vigorously promoting the development of China's hydrogen energy industry.

Booth: W4501

航天氢能–中国领先的氢液化装备与加氢站成套设备供应商

航天氢能科技有限公司(展位号：W4501)在低温技术与装备、系统工程解决方案等领域拥有强大实力，是中国领先的氢液化装备与气/液态加氢站成套设备供应商，提供LNG工厂建设、LNG–BOG提氦装备、稀有气体(氦氖氪氙)分离纯化领域的服务。公司在解决大型深低温装备生产制造，实现装备国产化、产业化方面做出突出成绩。研制团队按照研发极速迭代，产品极致改进的创新理念，着力提升"数字世界多次迭代，物理世界一次成功"的研发能力，在低温高速旋转热力学和结构力学难题、连续型高效正仲氢转化技术、深低温高真空精密测控与传导技术、多级换热流动匹配与热管理流程优化，以及液氢的低闪蒸高效接收输送储存技术等方面取得了重大进展和突破。

HOUPU provides integrated solutions to clean energy equipment

HOUPU Clean Energy Group Co. Ltd. was founded in 2005 and went public on the GEM board of the Shenzhen Stock Exchange in 2015 (Stock Code: 300471).

The company has set up five major R&D and production bases for clean energy equipment in the Chengdu-Chongqing area and possesses over 20 subsidiaries domestically and internationally, progressively building a full industry chain development ecosystem for clean energy equipment.

Through constant strategic upgrading and industrial expansion, HOUPU has developed into an integrated industrial group. It covers a range of sectors including intelligent manufacturing services of natural gas extraction/refuelling equipment and components, intelligent manufacturing services of hydrogen energy production, storage, and refuelling equipment/components, energy engineering EPC, R&D of instruments and apparatus/key components for clean energy and aviation industries, intelligent station operation and all-weather technical services, as well as clean energy refueling and power fuel supply systems for vessels.

HOUPU has earned many national accolades, including recognition as a National Enterprise Technology Center, a National High-Tech Enterprise, and a national specialised, sophisticated, distinctive, and innovative "little giant" enterprise.

The company's products enjoy strong sales in the domestic market and are also exported to various international markets, including Europe, Central Asia, Southeast Asia, the Americas, Africa, and Oceania.

As a leading company in China's clean energy refuelling equipment industry, HOUPU has made significant achievements in the burgeoning hydrogen energy sector, with its hydrogen refueling stations' performance ranking at the forefront in the domestic market.

Furthermore, HOUPU relentlessly advances its R&D in hydrogen production and storage technologies, as well as refuelling equipment and key components, actively promoting its products to construct a reputed national brand.

HOUPU steadfastly contributes to maximising the efficiency of clean energy sources like natural gas, hydrogen, and methanol, while remaining committed to advancing the development of green energy in the country and tirelessly working toward the global objective of achieving "carbon neutrality".

Booth: W4666

厚普股份–清洁能源装备整体解决方案

厚普清洁能源（集团）(展位号：W4666)股份有限公司成立于2005年，2015年于深交所创业板上市（股票代码：300471），先后在成渝地区建立起五大清洁能源装备研发生产基地，拥有国内外20余家子公司，逐步构建起清洁能源装备全产业链发展生态圈。

经过不断的战略升级与产业拓展，厚普股份现已构筑成涵盖天然气开采/加注装置及部件智造、服务，氢能制储及加注装置/部件智造、服务，能源工程EPC，清洁能源及航空仪器仪表/核心零部件研制，站点智慧运维及全天候技术服务，船舶清洁能源加注及动力燃料供应系统等为一体的产业集团。

公司荣获国家企业技术中心、国家高新技术企业、国家专精特新"小巨人"企业等多项国家级认定，产品畅销国内市场，远销欧洲、中亚、东南亚、美洲、非洲等海外市场。作为国内清洁能源加注装备的龙头企业，公司在新兴氢能领域取得显著成绩，加氢站业绩名列中国前茅。此外，公司不懈努力自主研发氢能制储技术，以及加注设备及核心零部件，积极行销并打造民族品牌。

Youjiete provides overall solution to comprehensive energy stations

优捷特-综合能源站整体解决方案供应商

优捷特公司(展位号：W4310)于2011年在北京成立，2017年将总部设立于杭州，是一家集成生产、研发、销售、服务为一体的新兴科技环保型企业，主营产品及服务涉及加油站、加氢站、加气站、储油库等领域。公司是中国石油、中国石化集团正式入围企业，与中国石油、中国石化集团总部及各省市公司有良好的长期合作关系。

Youjiete was founded in Beijing in 2011 and set up its headquarters in Hangzhou in 2017.

It is a high-tech environmental protection enterprise engaged in production, R&D, sales, and service, with primary products and services spanning across petrol stations, hydrogen refuelling stations, natural gas stations, and oil depots.

It is an officially recognised enterprise of PetroChina and Sinopec Group, maintaining a robust long-term partnership with their headquarters and their branches.

The company also serves renowned domestic and international oil companies such as CNOOC, Sinochem, TotalEnergies, Shell, and BP, offering them top-tier products and services. Its products enjoy industry-leading coverage and market share.

The company is composed of six major business units: Clean Energy Business Unit, Intelligent & IoT Business Unit, Environmental Protection New Materials Business Unit, Environmental Monitoring Business Unit, Image Packaging Business Unit, and Optical Storage and Charging EPC Business Unit.

Youjiete's main products and services involve gas stations, hydrogen refuelling stations, gas refuelling stations, oil storage depots, comprehensive energy stations, and other fields.

Over the years, Youjiete has laid out multiple industrial tracks, and as one of the few brands in the industry, its products involve refuelling, gas refuelling, hydrogen refuelling, and optical storage and charging, and it has independent research and development capabilities. It stands out in the overall solution of comprehensive energy stations.

In the context of dual carbon, Youjiete will continue to focus on the clean energy field, strengthen research and development investment, promote the localization of core components, specialise and refine products, continuously create social value in the field of clean energy applications, and contribute enterprise strength to Blue Sky and White Cloud!

Booth: W4310

cippe

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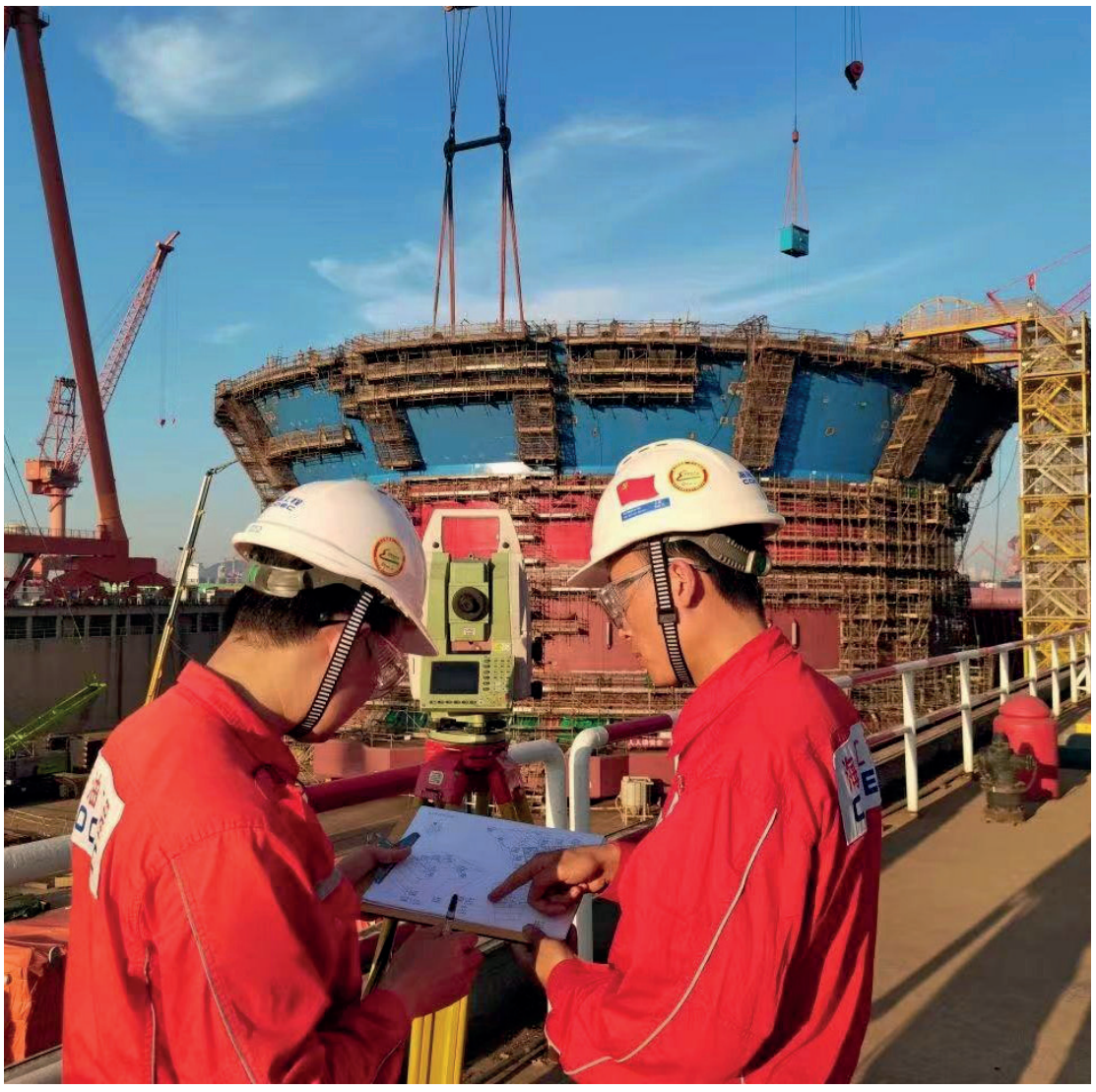
Contact: +86 10 5617 6968 / 5617 6958 cippe-global@zhenweiexpo.com

China's yards in drive to expand FPSO services

Fabrication yards want to be known for full engineering, procurement and construction services, but there are hurdles to be overcome

XU YIHE
Singapore



Key role: COOEC works on Asia's first cylindrical FPSO. Photo: COOEC

HAVING built a commendable track record in delivering hulls and topsides for floating production, storage and offloading vessels, Chinese shipyards are now poised to offer total production system solutions.

Graduating from subcontractor roles for global giants such as Modec and SBM Offshore, these yards are venturing into handling the entirety of engineering, procurement and construction for floater projects independently.

Despite their ambitions, Chinese yards, led by Offshore Oil Engineering Company (COOEC), face challenges in breaking the stronghold of the global FPSO contracting market, particularly in bidding for FPSO EPC work assigned by Brazil's state controlled Petrobras.

Constraints such as engineering intricacies, inadequate supply chains and stringent local content requirements have emerged as the top concerns, presenting a formidable uphill battle for Chinese yards.

Petrobras has qualified COOEC and CIMC Raffles to compete for full EPC or charter contracts, opening avenues for competing with prominent shipyards in South Korea and Singapore.

The recent yard yard selection for the provision of two large FPSOs for the Petrobras-operated Atapu and Sepia pre-salt fields in Brazil's Santos basin could encounter unexpected twists and turns.

The result of the last-minute de-risking process casts uncertainty on the continued participation by COOEC, which submitted a bid for the P-84 FPSO, while Singapore's Seatrium presented offers for both the P-84 and P-85.

One industry insider told Upstream that COOEC was not able to cope with local content requirements and has therefore unexpectedly withdrawn its bid, as Petrobras was very close to awarding letters of intent for both FPSOs.

COOEC, facing challenges as an engineering, procurement and construction contractor for the first time in its offshore EPC ventures, is grappling with the potential of cost overruns and delivery delays.

The challenges for Chinese offshore engineering companies extend beyond domestic borders, with the complexities of overseas FPSO projects involving rising raw material and labour costs.

For Petrobras' FPSO projects, the challenges are compounded by a localisation requirement of up to 40%.

Although COOEC has previously delivered the P-70 and P-67 FPSOs to Petrobras, those projects were not on a turnkey basis.

The availability of bulk materials such as steel, piping, and cabling in China contrasts with the necessity of sourcing key equipment like engines and processing systems from overseas suppliers.

Local content requirements persist as a challenge, compelling Chinese yards to establish partnerships with Brazilian counterparts.

CIMC Raffles, cognisant of the economic challenges, has refrained from participating directly in Petrobras' recent bids for two giant FPSOs, P-84 and P-85, in the Atapu and Sepia oil fields of Brazil's Campos basin.

Instead, the yard adopted a unique strategy as a subcontractor for Singapore's Seatrium, whereby if Seatrium secures the P-84 and P-85 FPSO general contracts, CIMC Raffles will handle the hull construction.

Even major contractors such as Modec acknowledge the difficulty of making FPSO EPC a consistently profitable business.

Over the past three years, Modec built seven FPSOs in China, with company officials admitting that not every project could be deemed a financial success.

Cosco Shipping Heavy Industry, having built 30 FPSOs, is yet to apply for Petrobras qualification as an EPC contractor.

According to Chinese yard sources, the negligible margins as subcontractors for Brazil-bound FPSO hulls and topsides make it necessary to share utilities and overheads with non-industry construction projects to sustain the FPSO contracting business in China.

China's offshore industry, represented by Cosco and Bomesc Offshore Engineering, commands a substantial share of the global shipbuilding business.

Chinese shipyards currently build nearly half of the world's FPSO hulls and 46% of topside modules, and handle 35% of hull and topside module integration.

Looking ahead, four Chinese yards — COOEC, CIMC Raffles, Cosco and China Merchants Heavy Industry (CMHI) — are poised to compete either as EPC contractors or subcontractors for global FPSO projects.

While SWS and Dalian Shipbuilding Industry Company (DSIC) will continue to operate in the industry, their focus may shift to other offshore products.

SWS will continue to collaborate with its partner SBM to pursue floater projects under the Fast4Ward hull design, while DSIC intends to prioritise projects of national interest.

COOEC, operating under the umbrella of the China National Offshore Oil Corporation (CNOOC), takes pride in its status as a business under the auspices of the central government. Notable projects, such as Shell's Penguins FPSO in the UK's North Sea and the potential award of tthe P-84, showcase COOEC's commitment to flagship ventures in the industry.

The aspiration to become global FPSO EPC contractors arises amidst a period when Chinese shipyards are disposing of offshore rigs through chartering operations and sales.

Freed from the financial burdens of repaying bank loans, these yards now have the luxury of elevating their expertise to a level commensurate with international contracting giants. Five years ago, during their heyday, up to 90 rigs, predominantly jackups, were stacked at Chinese yards, constraining yard officials' options and discouraging them from pursuing more technically sophisticated endeavours.

Yards have gleaned valuable lessons from the rig boom and now demonstrate more measured approaches when selecting floater projects — and exercising more caution, especially in matters of project financing.

However, CMHI may be an exception. Supported by its sister company, China Merchants Financial Leasing (Hong Kong) Holding Company (CMFL), CMHI has the ability to engage in discussions with clients about project financing — a luxury not afforded to other yards.

CMFL has already committed to investing in SBM's Cidade de Ilhabela FPSO, currently at work in the Petrobras-operated Sapinhoa pre-salt field offshore Brazil.

中国海工业开拓FPSO新领域面临诸多挑战

目前，中国船厂在FPSO船体和上部模块交付方面已取得了傲人成绩，现已做好准备提供全套生产系统的解决方案。

这些船厂正逐步摆脱作为Modec和SBM Offshore公司等全球巨头的下级承包商这一角色，开始准备接手FPSO项目的EPC总包全流程项目。

尽管中国船厂志向高远，但是在突破全球FPSO承包市场壁垒方面仍面临诸多挑战，尤以巴西国家石油公司（Petrobras）FPSO的EPC总包项目竞标方面为甚。

鉴于错综复杂的工程、不完善的供应链，加之严苛的本地化要求等掣肘因素，中国船厂所面对的无疑是一场鏖战。

海油工程和中集来福士已经通过巴国油资质认证参与竞标EPC总包或租赁合同，开辟了与韩国和新加坡知名船厂同台竞技的道路。

在迈向国际市场的进军之旅中，来自中国的海洋工程公司可谓路途坎坷，还需要应对FPSO海外项目的各类复杂问题，包括原材料和劳动力成本上涨等因素。

就巴国油FPSO项目而言，中国厂商所面对的挑战更为艰巨，其中包括高达40%的本地化要求。

尽管海油工程此前曾向巴国油交付FPSOP–70和P–67，但这些项目并非交钥匙工程。

今年初，公司作为意大利塞班的分包商还交付了为开发Petrobras Buzios盐下油田所需P–79 FPSO的第一批模块。

公司负责该FPSO 的13个模块的详细工程、生产计和建造，总重达30,000吨。P–79 是计划Buzios油田安装的11 艘FPSO 中的第 8 艘。

虽然中国可以提供钢材、管道和电缆等大宗材料，但发动机和处理系统等关键设备则仍须从海外供应商采购。

On call: The Stena Icemax drilled offshore Gabon for CNOOC Ltd. Photo: STENA DRILLING

CNOOC Ltd weighs up Gabon FLNG plans

Operator wants clearer picture of reserves base before committing to floating production scheme

XU YIHE
Singapore

INSUFFICIENT reserves may derail Chinese offshore operator CNOOC Ltd's plan to deploy a floating liquefied natural gas vessel to a deep-water block in Gabon.

At least three people familiar with the latest development plan for Block BCD-10, located 145 kilometres off the Gabon coast, told Upstream that the economics currently do not justify the deployment of an FLNG vessel.

They cited the reserve size as insufficient to warrant immediate development, suggesting that the operator may drill additional appraisal wells before reassessing the plan.

When reached by Upstream, a CNOOC Ltd spokesman said the exploration is still ongoing and more appraisal is needed.

"The project is still under exploration and appraisal stage," he said.

Recent drilling activities by CNOOC Ltd involved two wells at BC-9 and BCD-10, conducted using the drillship Stena IceMax.

While the official results are yet to be announced, sources indicate that China Oilfield Service Ltd chartered the Stena IceMax for drilling the Tigre 1 and Seal-1 wells in the blocks.

The drillship, which embarked on its journey in late December 2022, arrived at the Tigre-1 well location in Gabon on 24 January 2023 and commenced drilling on 27 January 2023.

The Tigre-1 ultra-deepwater well, in water depths of 1971 metres and with a well depth of 4032 metres, and the Seal-1 well on Block BCD10, in water depths of 477 metres and with a well depth of 2832 metres, saw completion on March 11, 2023.

Over the past two years, CNOOC Ltd engaged several engineering companies, including CNOOC Research Institute, CNOOC Gas & Power, and China Offshore Engineering, to formulate schemes centred on an FLNG vessel to exploit the discoveries on Block BCD-10.

China Offshore Engineering has submitted a scheme that emphasises meeting the environmental conditions of a 100-year return event, with an operating water depth of not less than 1000 metres.

The proposed vessel would employ the Mark III Flex membrane containment system, featuring LNG pretreatment and liquefaction process modules boasting an annual liquefaction capacity of 3 million tonnes.

With a tank capacity of approximately 300,000 cubic metres, the vessel design incorporates an internal turret system alongside the LNG, with an external transmission system and condensate tail transmission system that employ slow-wave steel catenary risers.

The FLNG vessel is designed to have a total length of 374.5 metres, a moulded width of 68 metres, a moulded depth of 38 metres, and a structural draft of 18 metres.

It is projected to have an annual output of 2.1 million tonnes of LNG, 300,000 tonnes of liquid petroleum gas, and 600,000 tonnes of condensate.

An official from an engineering firm involved in the Gabon FLNG project affirmed that these FLNG research endeavors are collaborative and geared towards a common goal.

He said: "FLNG technology is already ready to serve the project. There are particularities between FLNG and FPSO technologies. A lot of research has been done in this area, and the remaining challenges need to be addressed through engineering applications."

In 2019, CNOOC Ltd took over as operator from Shell, acquiring 100% ownership of BC-9 and BCD-10. The transition involved an investment of $30 million in exploration activities.

CNOOC Ltd initially acquired a 25% stake in the blocks from Shell in 2012, with Shell retaining a 75% operating interest.

Two years after the partnership was formed, exploration bore fruit with the discovery of 200 metres of net gas pay during the drilling of the Leopard-1 wildcat in the south of BCD-10.

Sources suggested that Leopard-1 held a resource potential of approximately 10 trillion cubic feet of gas.

The well, located about 145 kilometres off the Gabonese coast, west of Gamba, was drilled in water depths of 2110 metres to a total vertical depth of 5063 metres.

中海油继续评估加蓬FLNG项目

由于区块储量不足，中国海洋石油有限公司在加蓬深水区块部署浮式液化天然气船的计划恐生变。

至少三名熟悉加蓬海岸145公里处BCD-10区块项目的消息人士告诉Upstream，目前各项经济指标并不理想，恐难以支撑FLNG 船部署。

他们表示，区块储量规模不足导致难以保证尽快启动开发项目，意味着中海油可能会在重新评估前，需要钻探更多评估井。

中海油发言人在接受Upstream采访时表示，勘探依旧在进行中，但需要更多评估井。

"此项目仍处于勘探和评估阶段，"他说。

中海油最近的钻探活动涉及BC-9和BCD-10的两口井，由钻井船Stena IceMax执行。

虽然官方结果尚未公布，但消息人士称，中海油服租赁了Stena IceMax轮，用于钻探区块的Tigre 1和Seal-1井。

该钻井船于2022年12月下旬启航，于2023年1月24日抵达加蓬Tigre-1井位，并于2023年1月27日开始钻井。

Tigre-1超深水井，水深1971米，井深4032米；BCD10区块Seal-1井，水深477米，井深2832米，两口井钻探工作于2023年3月11日完成。

两年来，中海油联手中海油研究总院、中海石油气电集团、海洋石油工程等多家工程公司制定了以FLNG船为核心的BCD-10区块发现开发方案。

中国海洋工程装备技术发展有限公司提交的一项方案强调可应对百年一遇的环境条件，作业水深不低于1000米。

拟建船舶将采用Mark III Flex薄膜围护系统，配备液化天然气预处理和液化工艺模块，液化能力达300万吨/年。

储罐容量约为30万方，搭载内部转塔系统，并配备了采用慢波钢悬链线立管的外部传输系统和凝析油尾部传输系统。

FLNG船型长374.5米，型宽68米，型深38米，结构吃水18米。

预计年产液化天然气210万吨、液化石油气30万吨、凝析油60万吨。