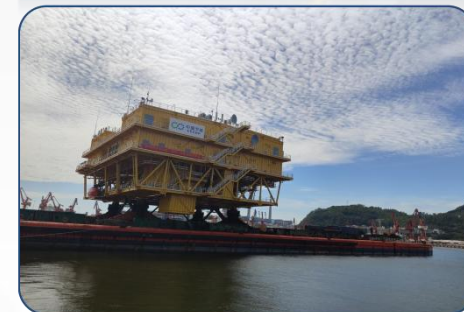


Clean Energy Offshore Wind Power



Offshore Wind Farm Solution

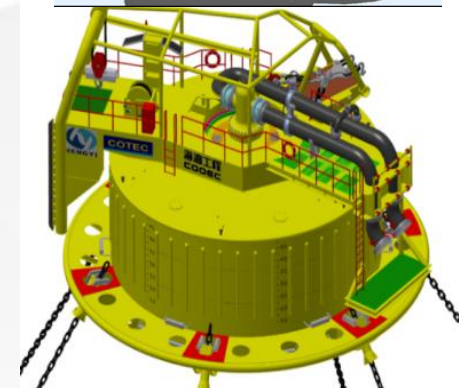
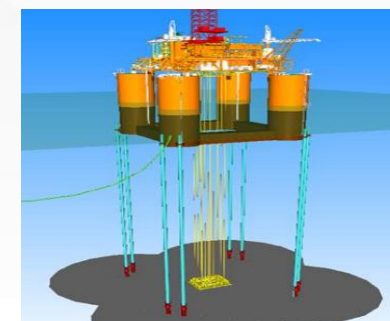
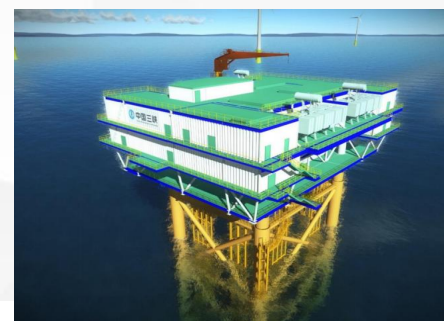
- ✓ **Fixed & Floating Offshore Wind Farm:** decades of experience in engineering design, EPCI of China's first deep-sea floating wind turbine, "CNOOC Guanlan" .
- ✓ 固定式和浮式海上风电场:数十年的工程设计经验, 中国首台深海浮式风机“观澜”的EPCI
- ✓ **Large Substation/Converter Station:** EPCI of extra-large offshore structures over 30,000 tons.
- ✓ 大型升压站/换流站: 超过30000吨的超大型海上结构物EPCI

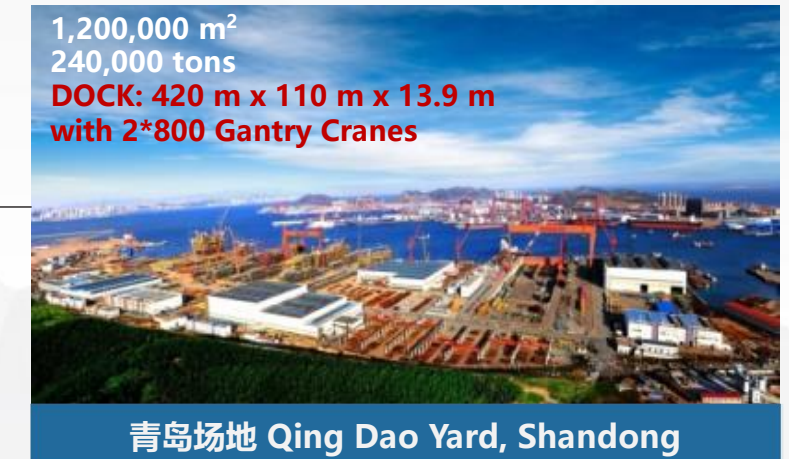
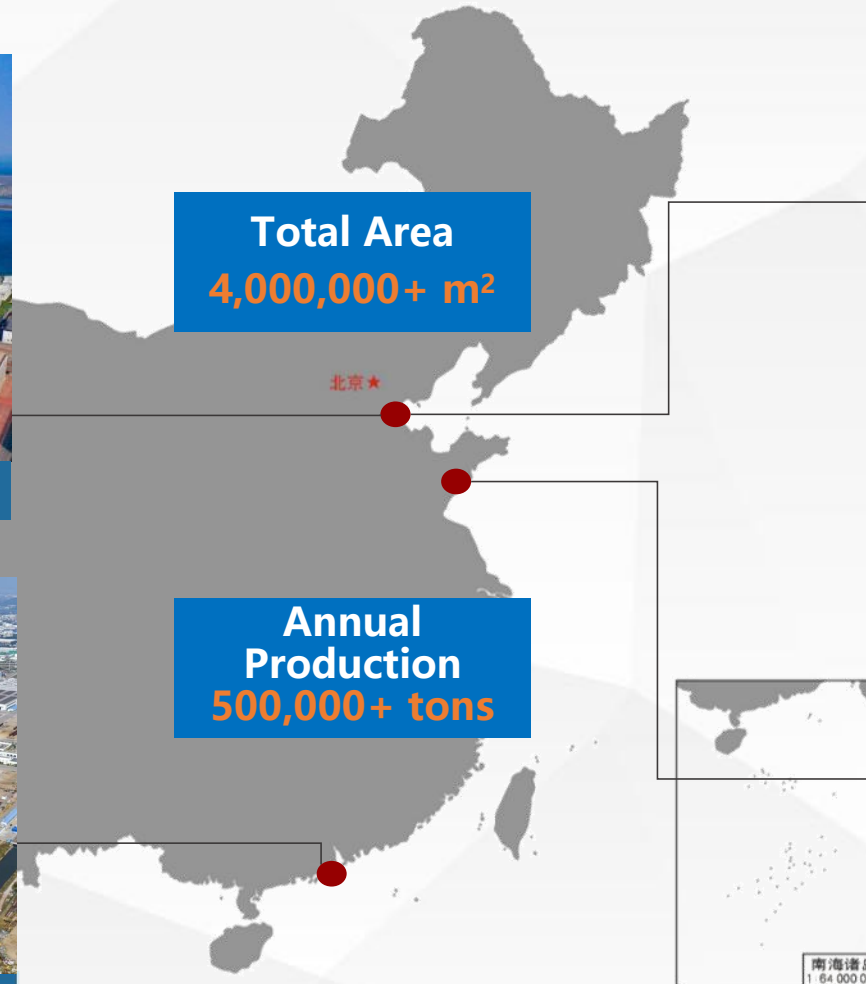


From fixed to floating wind turbine foundations, substation/converter station, submarine cable, etc., COOEC has a variety of offshore wind power facilities technical strength and original research results, and has relevant engineering design capabilities. 从固定式到浮式风机基础、升压/换流站、海底电缆等，拥有海上风电多种设施技术力量及原创性研究成果，具备相关工程设计能力。

Over 20 years of experience in designing floating oil and gas production facilities; Accumulated rich design and engineering experience in mainstream floating facility designs such as semi submersible, FPSO, single point, TLP, etc; The design capacity of deep-water floating facilities exceeds 1,500m water depth and can be quickly transplanted to the development of deep-sea floating wind power.

20+年浮式油气生产设施设计经验；在半潜、FPSO、单点、TLP等主流浮式设施设计中积累了丰富的设计与工程经验；**深水浮式设施设计能力突破1,500m水深，可快速移植到深远海浮式风电开发。**





1645米码头，水深13米，三个大型FPSO同时进行集成调试
1,645m Quay line, 13m depth, 3 Mega FPSOs for integration and commissioning at the same time.

海油工程拥有6大类19艘海上施工船舶，以及17台ROV（作业型及观察型）。作业能力达3000米水深
COOEC Owns 19 installation vessels in 6 types and 17 Rovers(Work & Observation). The capability of installation is up to 3,000m depth



Lanjing 7500 Derrick (7,500tons)



HYSY201 Derrick & Lay (DP3, 4,000tons)



Lanjiang Derrick & Lay (3,800tons)



HYSY202 Derrick & Lay (1,200tons)



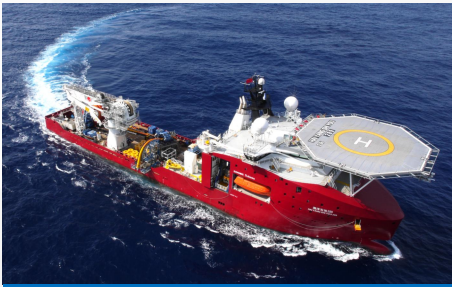
HYSY285 MSV (DP3, 3,000m)



HYSY286 MSV (DP3, 3,000m)



HYSY287 MSV (DP3, 3,000m)



HYSY289 MSV (DP2, 3,000m)



HYSY291 MSV (DP2, 3,000m)

19
Vessels

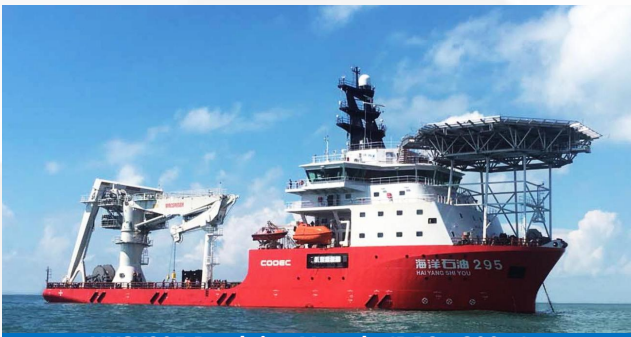
17
ROVs



HYSY278 Semi-Barge (DP2, 50,000tons)



HYSY229 Launching Barge(38,500tons)



HYSY295 Dredging Vessel (DP2, 300m)

4
Derrick & Lay

2
Heavy Lifting

7
Barge

6
Multi Service Vessel

海油观澜号 CNOOC Guanlan

Client: CNOOC **Location:** South China Sea

Schedule: 2021 to 2023

Scope of work: FEED + EPCI

Project characteristics:

- **First** “double hundred” FOWT in the world (more than 100km away from shore side, more than 100m in water depth)
- **First** semi-submersible supported floating wind turbine for offshore oil field in the world
- **First** EPCI for floating wind turbine in COOEC.

项目特点:

- 世界上第一艘“双百”浮式风机(距岸边100公里以上，水深100米以上)
- 世界上首台海上油田用半潜式支撑浮式风力发电机组
- COOEC首个浮式风力发电机EPCI

Water Depth 水深	120m
Displacement 位移	11,214 tons
Center-to-center distance between center column to side 中心柱到边立柱的距离	40 m
Diameter of the outer column 外柱直径	11.4m
Diameter of the center column 中心柱直径	8m
Draft :	20m
Wind turbine power 装机容量	7.25MW
Design life: 设计寿命	25 years

Challenges:

- An alternative for coupled development of FOWT and offshore oilfield for **low carbon emission**
- **Fully self-designed** by COOEC
- The turbine put into operation **40 days** in advance, the total EPCI period is **only 23 months**
- 挑战:
- 一种低碳排放的海上油田与海上油田耦合开发的替代方案
- 完全由COOEC自主设计
- 机组提前40天投运，EPCI总周期仅为23个月



英国Seagreen海上风力发电导管架建造项目 Wind Farm Jacket

	法兰Flange	过渡段 transition section	上部导管架upper jacket	下部导管架 lower jacket	吸力桶 suction bucket	汇总 Total
Weight/tons 重量/吨	11	308	274	780	215	2,000
Size/meter尺 寸/米	Ø6.572	18*18*6.5	24x24x24	36x36x45.8	Ø11.5x16.815 Ø10.5*16.815	Hight: 94m Water Depth: 53~58m

执行标准:

- 材料标准: BS/EN 10025, DNVGL-OS-B101
- 建造标准: DNVGL-OS-C401, ISO 19902, NORSOK M-101
- 焊接标准: DNVGL-OS-C401
- 表面处理: NORSOK M-501
- 无损检测: DNVGL-OS-C401, DNVGL-RP-C203



Patents

海上升压站建造项目 Offshore Booster Station

三峡响水升压站
Xiang Shui Project



业主: 中国三峡
项目地点: 江苏响水
容量: 200MW
工作范围: 海上升压站EPCI
Client: China Three Gorges Corporation
Location: Xiangshui, Jiangsu
Capacity: 200MW
Work Scope: EPCI

中节能阳江南鹏岛升压站
CECEP Nanjiang Yangpeng Island Project



业主: 中国节能投资有限公司
项目地点: 中国南海
容量: 300MW
整体高度: 22.6米
吃水重量: 2,924吨
工作范围: 海上升压站EPCI
Client CECEP
Location: South China Sea
Capacity: 300MW
Overall Height: 22.6m
Draft Weight: 2,924 tons
Work Scope: EPCI

华能射阳升压站
China HUANENG Sheyang Project



业主: 中国华能集团有限公司
项目地点: 江苏射阳
容量: 300MW
吃水重量: 3,950吨
工作范围: 海上升压站EPCI
Client: China Huaneng Group Co.,Ltd
Location: Sheyang, Jiangsu
Capacity: 300MW
Draft Weight: 3,950 tons
Work Scope: EPCI

青洲六升压站
QING ZHOU-6 Project



项目业主: 中国三峡
项目地点: 广东阳江
水深: 36-46米
重量: 16,000吨
容量: 1,000MW
工作范围: 海上升压站EPCI
Client: China Three Gorges Corporation
Location: Yangjiang, Guangdong
Water Depth: 36-46m
Draft Weight: 16,000 tons
Capacity: 1,000MW
Overall Height: 41m
Work Scope: EPCI

卓越工程 赋能未来

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THANKS

谢谢