CIMC RAFFLES

Heading to Offshore Energy Islands

- **Who We Are**
- **Track Records**
- **Renewable Energy**

CIMC Raffles Overview

Corporate Structure

- CIMC Group 83.3%，Yantai Government 16.7%
- CIMC Group 8 Industry sector

Airport Facilities	Offshore	Transportation Vehicles	Module Building
Energy& Chemical	Containers	Logistics	Finance

What We Do

Offshore Engineering

- Five engineering centers- Yantai, Shanghai, Shenzhen, Goteborg(Sweden), Brevik (Norway)
- Engineering team: > 1100 engineers
- Provide creative offshore integration turn-key solution

Construction

- 3 Yards in Shandong: Yantai, Longkou, Haiyang
- Total area 1,500,000 ㎡
- 20,000 Tons gantry crane
- -18M deep wharf
- 15 large projects can be carried out simultaneously
- Max manpower: 13,000 workers

Products and Serves

- Drilling rig, Production unit & Modular, Special Vessels, RORO, Ocean Aquaculture/Fish Farming, Marine tourism, Repair & Conversion …

Construction Bases

Engineering Capability – Synergy Between China and Europe

5 ENGINEERING CENTER

1169 Engineers - Basic and Detail Engineer: 315; Production and Site Support Engineer: 854.
Synergy Between China And Europe
Full Life Cycle Design capability, Concept/FEED/Basic/Detail/Production Design, On-site technical support


Offshore Engineering Institute


Shanghai Engineering Center


National Engineering Laboratory


Sweden Bassoe Technology


Norway Brevik Engineering


Offshore


CNG Ship


Floating Wind


Semi-submerged Platform


FPSO

What We Do Overview

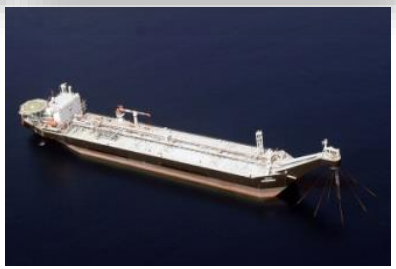
CIMC Raffles has accumulated rich experience in offshore engineering technology and performance, and is a global mainstream supplier of drilling platforms and production platforms.

Drilling Rig




FPSO Modules





Special Veseel

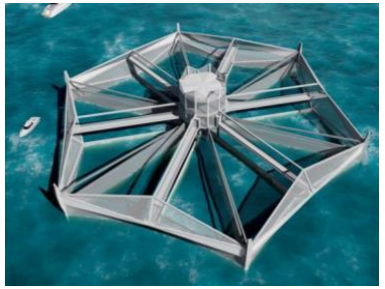


Offshore Wind



Ocean Farming





Ocean Tourist





- Who We Are
- **Track Records**
- Renewable Energy

Drilling Rigs – Global Leading EPC Capability on Semi-sub Rigs

4 UNITS

3 UNITS

2 UNITS

1 UNIT

Production Unit-FPSO/Cylindrical FPSO/FPU/MOPU

CIMC Raffles could supply various types of production unit from shallow water to ultra deep-water

FPSO/FSO

7

- Petrobras P71 FPSO
- Mero 3 FPSO (Under Construction)
- P78 FPSO (Completion)
- P80/P83 FPSO(Under Construction)
- MODEC FSO EPC (2 Sets)

FPU

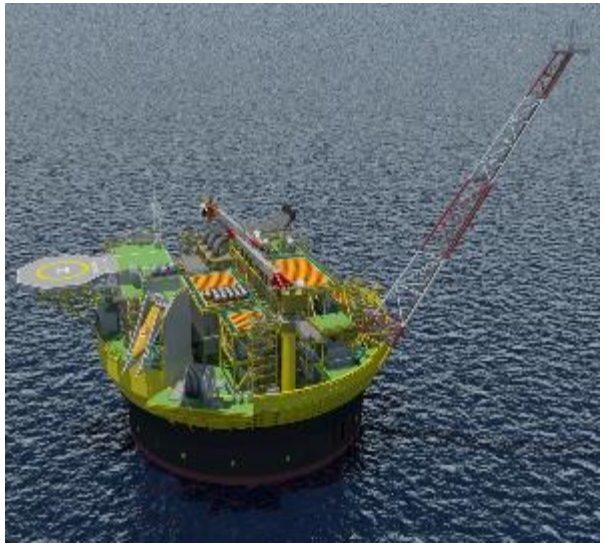
1

Lingshui FPU Hull

MOPU

3

HYSY 162
HYSY 165
Pemex Gas Plant

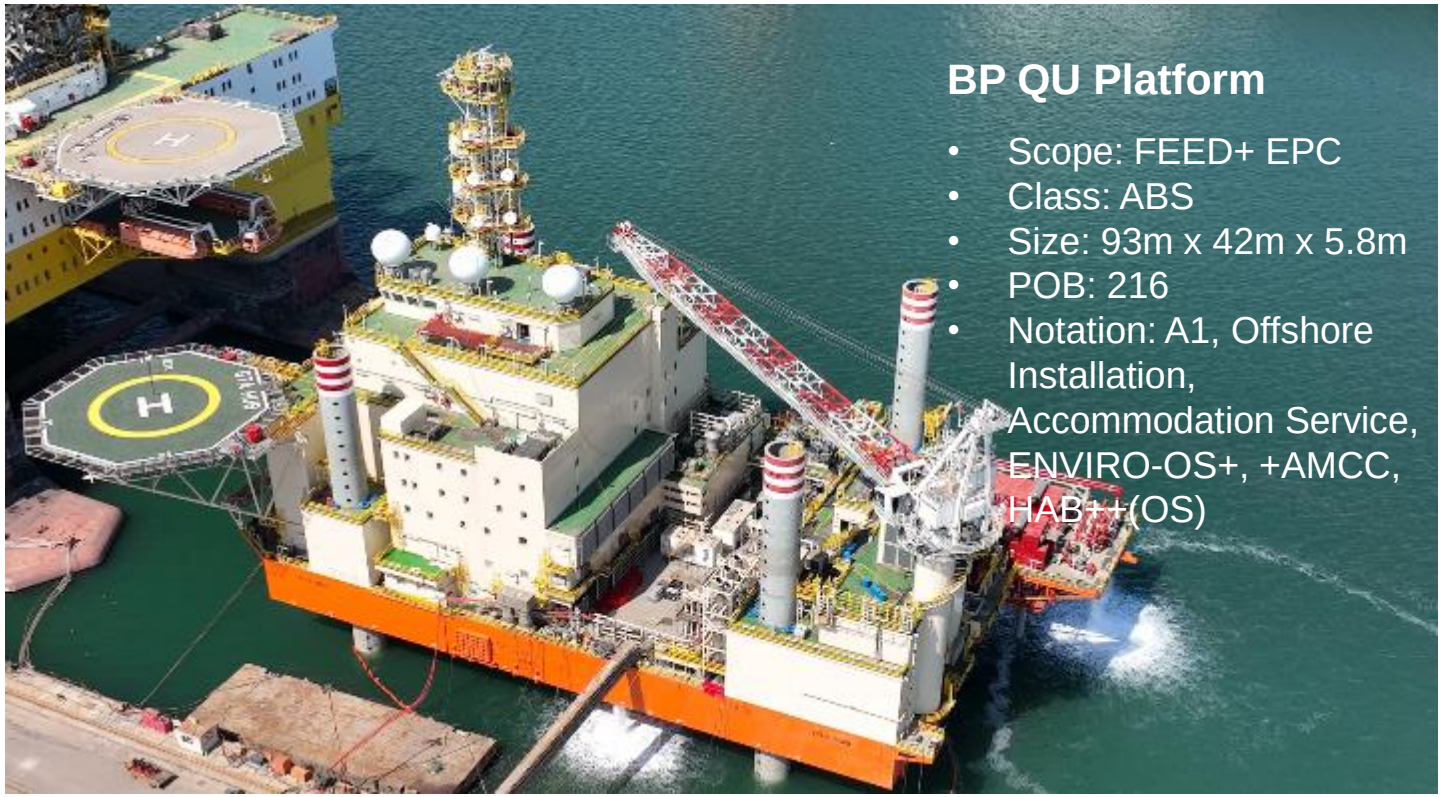


Cylindrical FPSO

5

Shell Penguins FPSO Hull
Sevan SSP FPSO Hull (3)

High-End Special Vessels



BP QU Platform

- Scope: FEED+ EPC
- Class: ABS
- Size: 93m x 42m x 5.8m
- POB: 216
- Notation: A1, Offshore Installation, Accommodation Service, ENVIRO-OS+, +AMCC, HAB++(OS)

VanOord Stone Dumping Vessel

SSCV

Y-type Yacht Carrier

Ultra Deep-water PLV

SSCV

RORO Vessel

CIMC RAFFLES

PCC/PCTC RORO Vessel，15 RORO vessels under construction, production plant is scheduled for 2026

Wallenius 5,800 LM series MegaRoRo vessel

6500 CEU PCC


7000 CEU PCTC


2,700LM LM RORO

- Who We Are
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- **Renewable Energy**

The Start Point - CIMC Group's Strength for Offshore Wind Supply Chain

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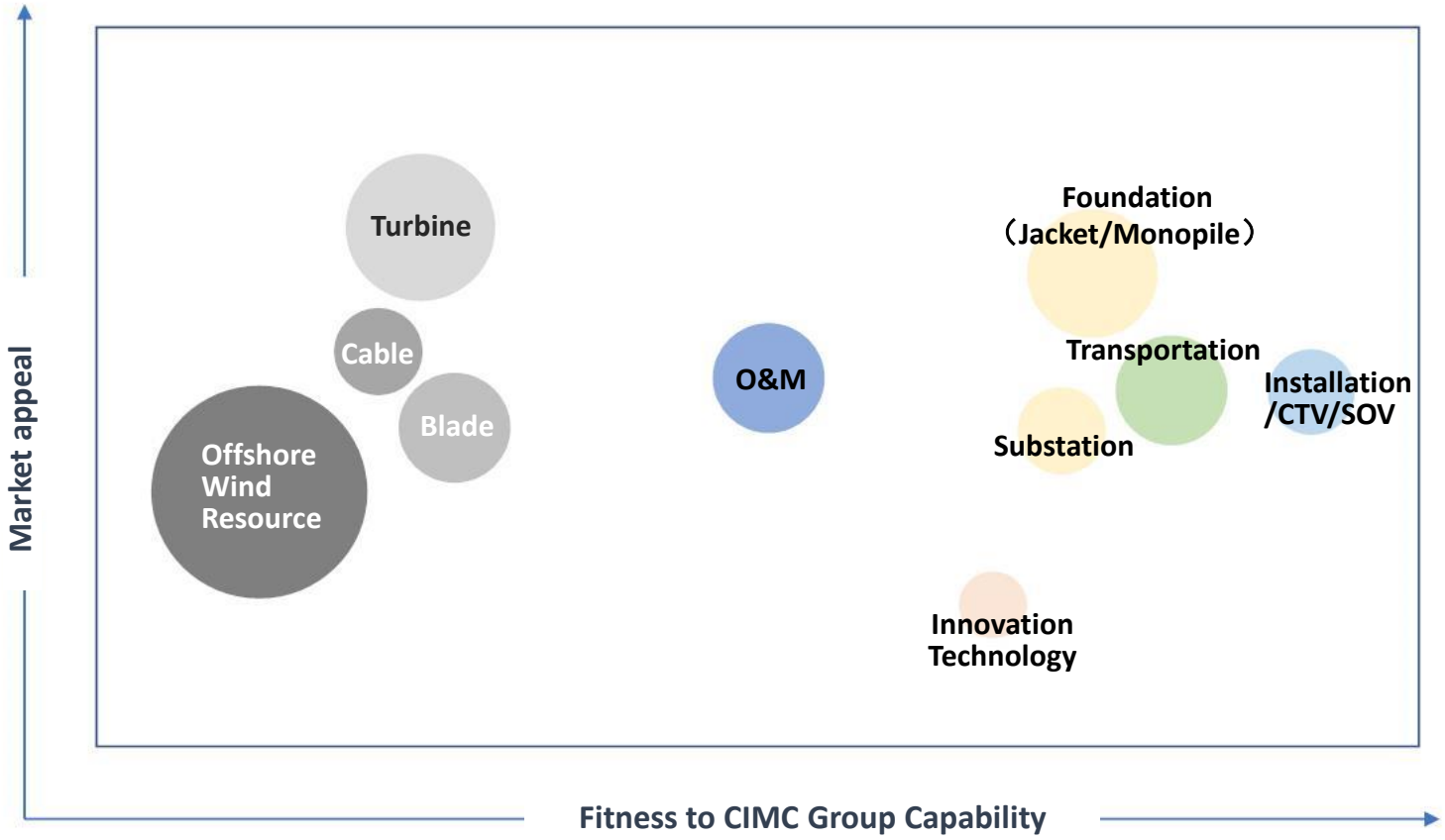

Market Appeal:

Market Scale（40%）; Growth Rate（30%）; Price/Profit（30%）

Fitness to CIMC Group Capability :

Fitness to Fabrication Capacity（40%）; Fitness to Supply chain Stucture（40%）; Fitness to Client Base（20%）

CIMC Current Strength for Offshore Wind Supply Chain

Facility Fabrication & Construction

Foundation and Substation Fabrication

Large offshore equipment and facility manufacturing capacity

Excellent Yard; Efficient Port and Sufficient track Records

Offshore Wind Vessel Fabrication

WTIV/SOV

Large vessel fabrication capability and experience

WTIV fabrication track records

Offshore Logistic for Offshore Facility

Offshore transportation capability for offshore facilities

Jacket and Monopile transportation experience

Offshore O & M Service

Subsea facility O&M experience;

O&M Service

Vessel Leasing

Innovation Technology

Power to X solution

Offshore Wind + Aquaculture

Floating Wind Solution

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Strategic Pathway for Offshore Renewable Energy

Offshore Wind

Innovative facility development for Grid Parity including 3060 series WTIV, modulization HVAC/DC, floating wind, Offshore wind &Fishery ;to develop offshore wind O&M Hub; and to facilitate the pilot projects

Offshore PV

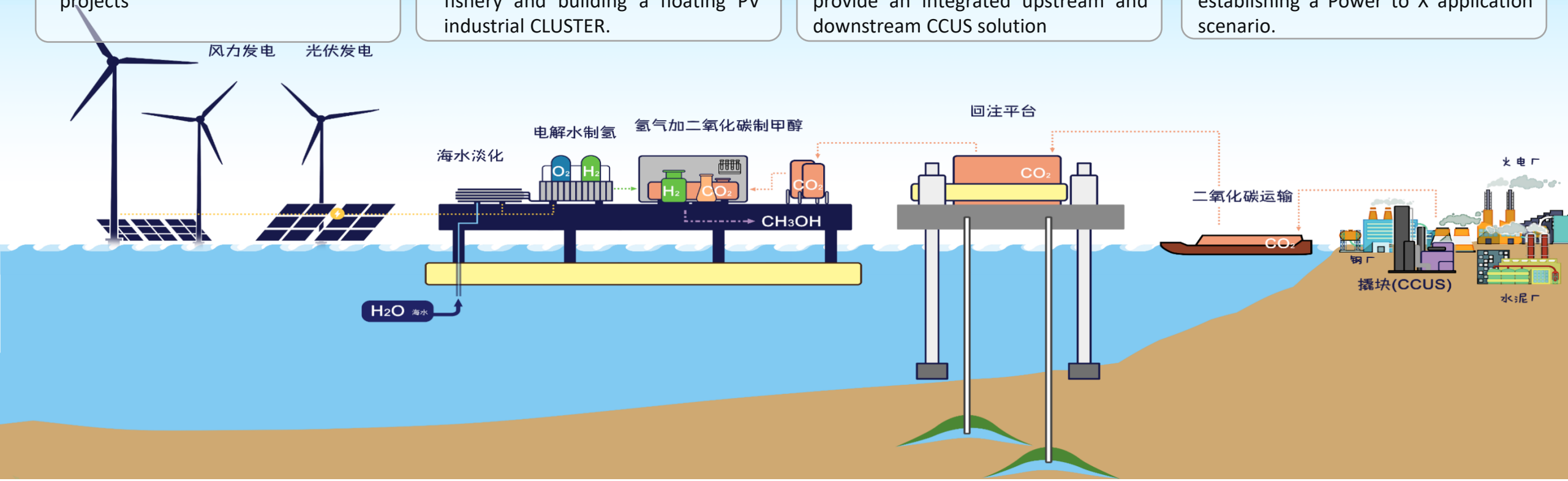
The "Offshore Floating Photovoltaic Test Center" initiated by CIMC Raffles was established on June 13 this year, aiming to verify the solution of floating PV in offshore wind farm, while integrating the fishery and building a floating PV industrial CLUSTER.

CCUS

Relying on the offshore oil and gas experience, develop CCUS, develop modular carbon capture facilities, carbon dioxide transport vessels, and downstream carbon dioxide re-injection and storage facilities, and provide an integrated upstream and downstream CCUS solution

Power to X

Corporate Yantai government to facilitate green synthetic fuel business, using Yantai renewable energy to produce hydrogen, and combining with renewable carbon dioxide or nitrogen to synthesize green fuel, and establishing a Power to X application scenario.



绿色甲醇与氢能密不可分

甲醇制氢及氢+CO_2制甲醇技术结合，形成以甲醇为核心载体的氢产业链，实现“用氢不见氢“。

甲醇CH3OH共有4个氢

甲醇是大自然的储氢载体，可从多个途径获得

变压吸附技术制取纯氢和富含CO2的混合气体，**经处理同时得到氢气和二氧化碳**

甲醇蒸汽重整制氢

CO_2

H_2

碳捕捉技术

CO_2输入/碳循环

甲醇成为氢的储运载体

加氢站内甲醇制氢

解决氢远距离运输问题
降低氢到站价格
降低加氢站运营成本

甲醇制氢+燃料电池

解决车内储氢问题
解决燃料电池车续航问题
适用于船舶远距离航行
成为船舶新燃料最佳选择
降低加注站风险

可再生能源

电解水

绿色H_2

催化剂

CO_2+H_2制甲醇

绿色甲醇产能

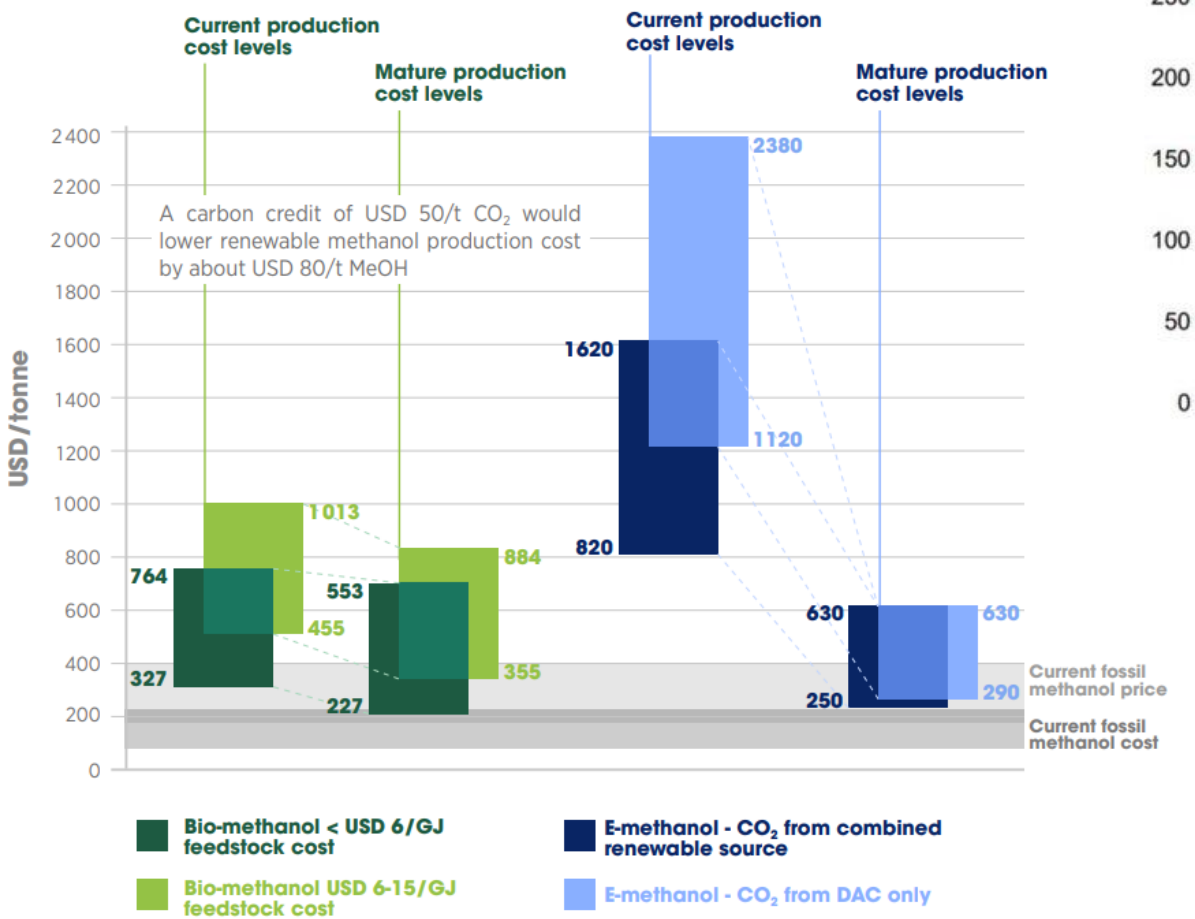
满足甲醇需求增量的同时，解决甲醇生产碳排问题；

为碳税做准备；

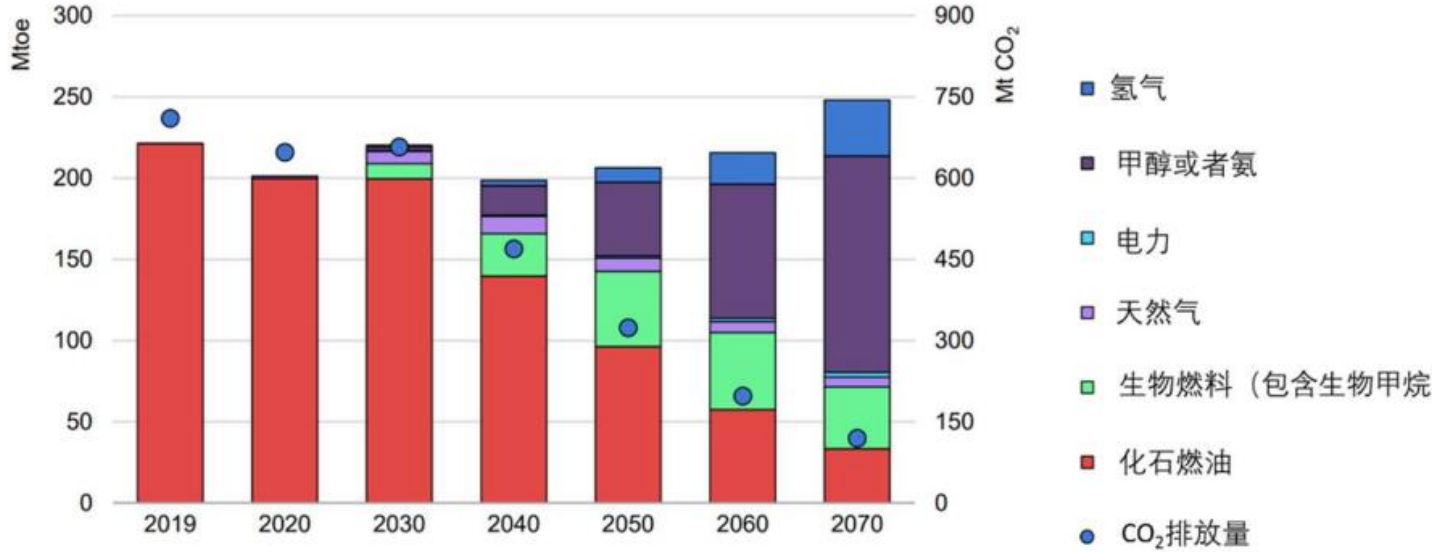
是解决新能源制氢终端消纳的有效方案（如海上风电制氢后制甲醇）；

完全的碳循环闭环

Figure 3. Current and future production costs of bio- and e-methanol



航运业可持续发展中燃料的变化以及碳排放



燃料类型	优势	局限性/可能的危险	备注
生物柴油	直接利用现有基础设施 从生产到运输	• 如何原料获得 • 运输半径 • 与常规的其他工业竞争	生物柴油可以外购
甲醇（生物甲醇或者电导向甲醇）	已经有作为海工燃油的案例有相应的引擎 在常规条件下是液体 处理条件温和	• 生物甲醇生产过程中原料如何稳定获得 • 电导向甲醇生产中需要的获得高质量的CO_2 • 电解产氢技术的成熟度和价格	甲醇船建设中
纤维素燃料	可以存在和常规的石油基燃料油竞争的价格	开发过程中，需要解决过程放大问题和基础设施建设 引擎前捕集燃油中的颗粒	技术在开发中
合成氨（绿色合成氨）	完全零排放的燃料 可以从电完全出发得到	安全性和毒性 港口基础设施建设 电价和电解水技术的成熟度	引擎问题
天然气（生物基天然气）	已经有技术和现存设施	原料来源 燃烧排放问题 与其他工业和民用领域竞争	
燃料电池 核能 在线CO_2捕集	开发中	开发中	

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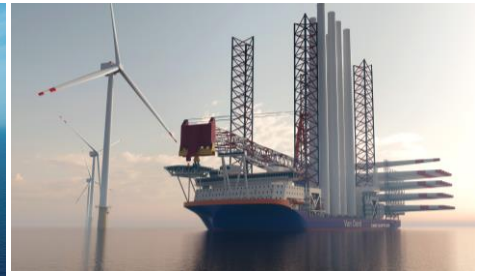
Offshore Wind Overview in CIMC Raffles

Offshore Wind Vessel Fabrication

WTIV “ De Jian”
Delivered: March 2021
Working in Shandong (Near shore)



Van Oord WTIV
Delivered: 2024
For 20MW turbine installation
The largest Green WTIV in the world

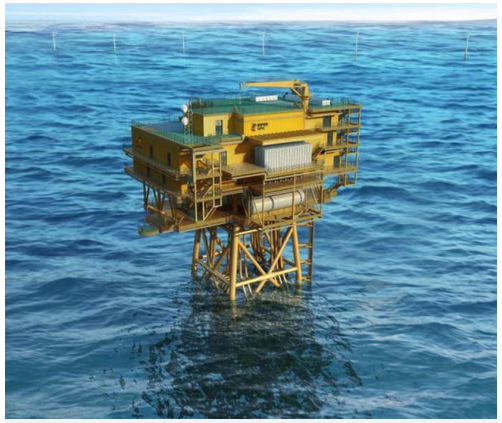
WTIV “ 3060”
Delivered：2023
CIMC Own IP
For 20MW turbine installation

SEMI Conversion to WTIV
Delivered：2021
Capacity: Huisman 1800t *2
Working in South China Sea

Jackup Conversion to WTIV
Delivered：2021
Working in South China Sea

Offshore Wind Facility Fabrication

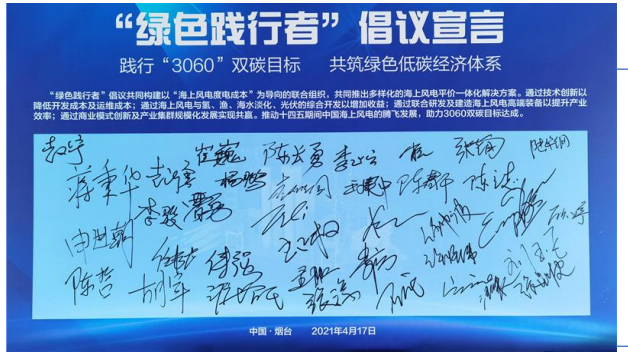
Jacket Foundation



Substation

Facility Innovation

Work frame of CIMC Raffles for Offshore Wind



CIMC Raffles inked an initiative called the Green Industry Partnership (GIP) with a view to building a “new framework of offshore wind power cooperation” globally.

The **Green Industry Partners** will actively invite domestic and foreign upstream and downstream companies in the offshore wind power industry to form a joint organization oriented on "offshore wind LCOE" to jointly launch diversified offshore wind grid parity solutions which consists of reducing CAPEX and OPEX by technological innovation; integrated development of offshore wind combined with hydrogen, fishery, desalination, and photovoltaics to increase revenue as Offtake Arrangement; joint research and delivery of high-end offshore wind power facilities to improve working efficiency. Through business model innovation and the large-scale development of industrial clusters to achieve a win-win situation to jointly promote the development of China's offshore wind power during the 14th Five-Year Plan period.

Offshore Wind Facility

6 WTIV vessels are under Construction

Successfully Installation 1st Offshore Wind Turbine In Shandong

- Lifting：1200 t
- Turbine：4-7MW
- Deck Area：2800㎡

CIMC Raffles 100% independent design 20MW WTIV

- Lifting：2200t
- Turbine：12-20MW
- Deck Area：4800㎡

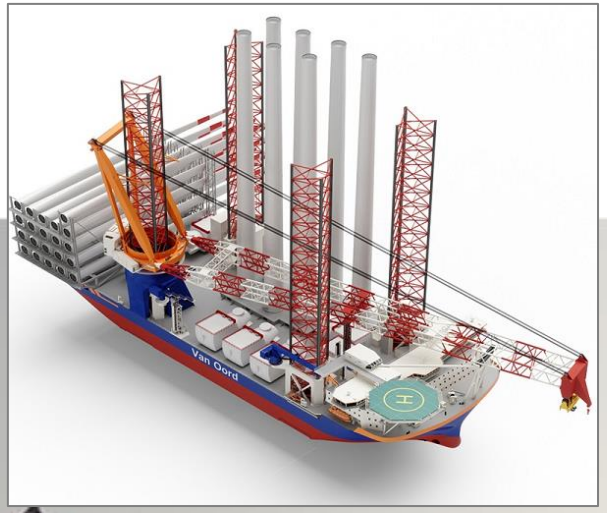
Green Methanol Powered 20MW WTIV

- Lifting： 3000t
- Turbine： 12-20MW
- Deck Area ： 7000㎡

Van Oord WTIV

The New Vessel reduces the ship's CO2 footprint by more than 78.Installed 5,000 kWh battery pack;

Is equipped 5 sets Methanol engines with **3000 cubic meters of methanol tanks.**



Length	: 175.1m
Deck area	: over 7000 m^2
Accommodating	: 135 persons onboard
Main crane	: more than 3,000 tons
Leg	: 4 triangular legs
Delivered	: Within 2024

Service Operation Vessel (SOV) for the offshore wind industry in China

- Diameter：70.50*17.00*7.10m
- Draft:4.7 m
- Accommodation: 60 POB
- Dynamic Positioning: DP2
- Max sustainable days：30d
- Hybrid battery propulsion and prepared for methanol fuel

HVAC/HVDC Substation Design

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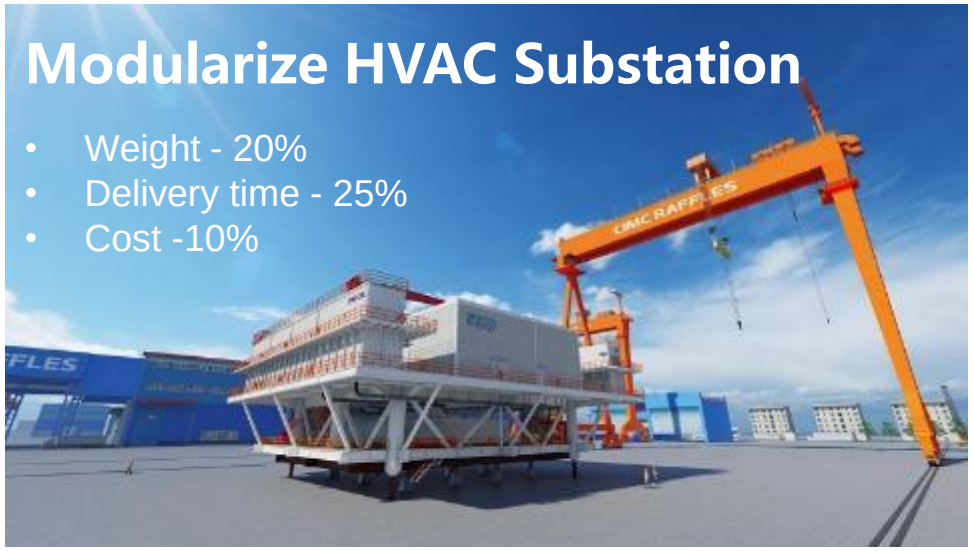
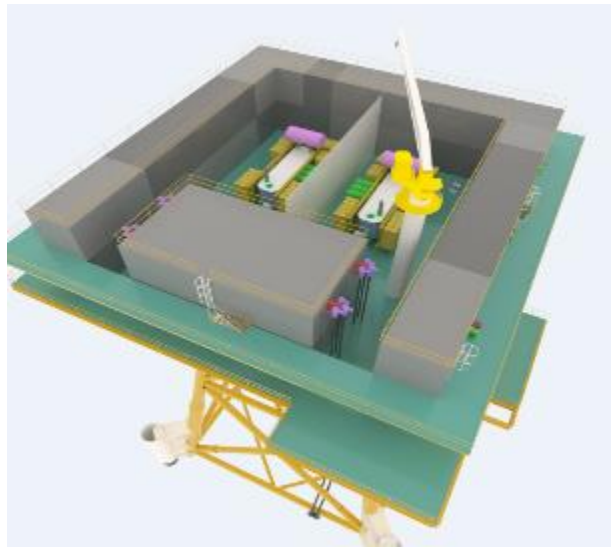
Traditional

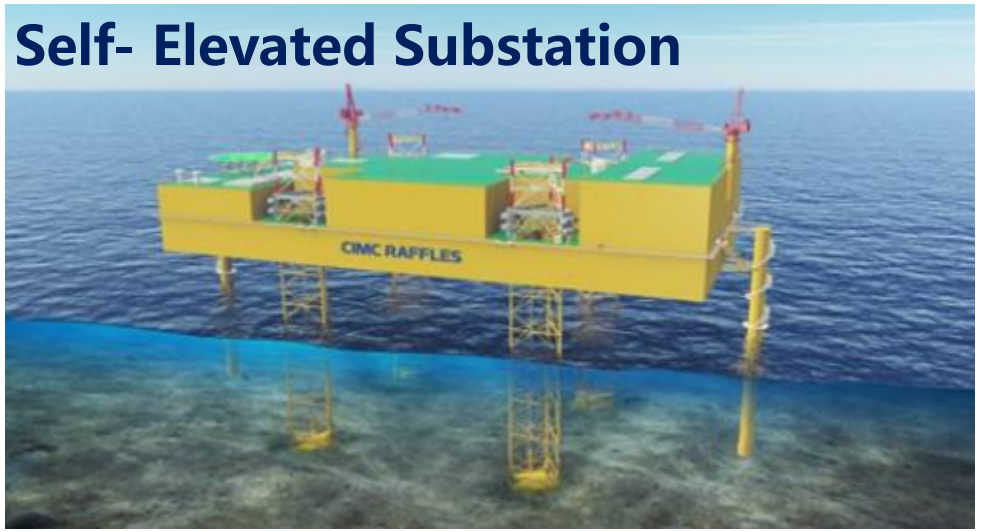
Delivered

300-400MW HVAC

Innovation



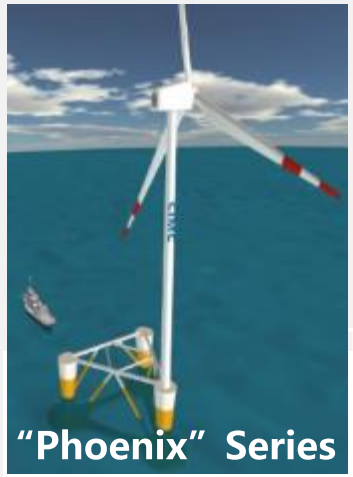


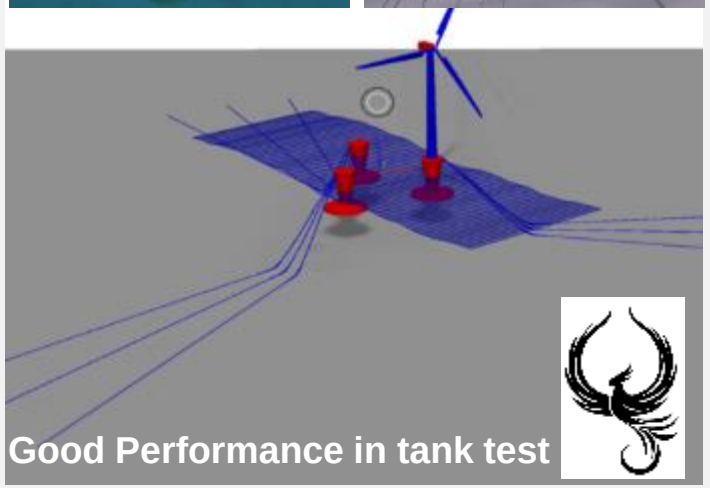


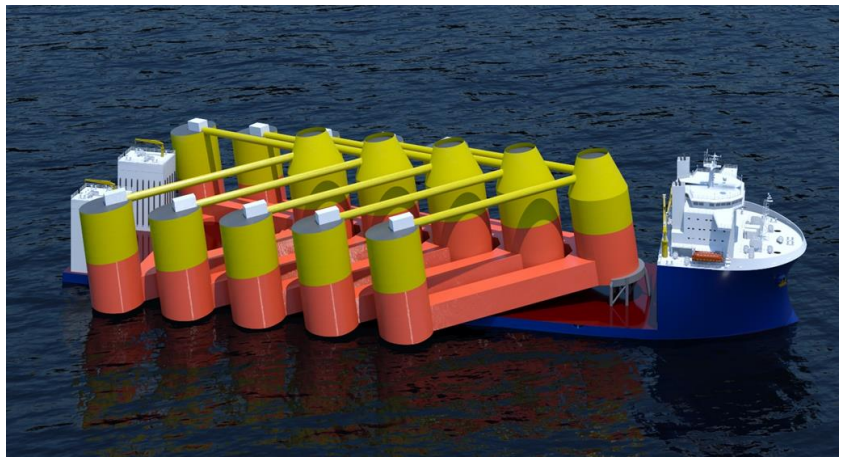
Offshore Wind：Sino-Europe Floating Wind Turbine Design

“Phoenix” Series Floating Offshore Wind

Domestic Market







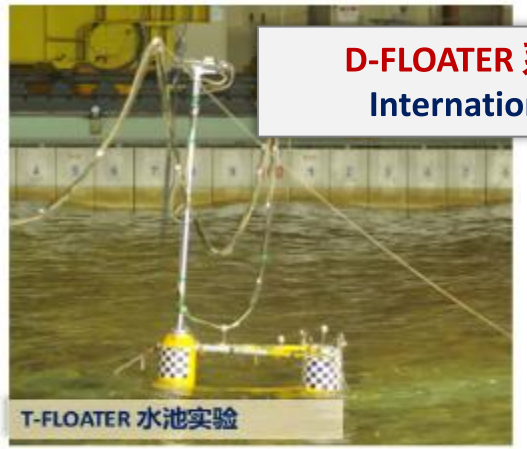
“D-FLOATER” Series Intercontinental production capacity cooperation

Lower Cost batch manufacturing

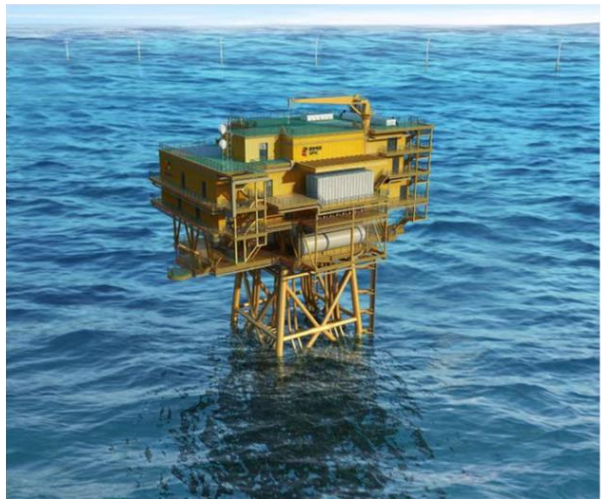
- Suitable for automatic manufacturing
- The main structure is composed of four modules.
- No need for large dry docks
- Take up less construction space than other designs

Efficient Transport：

- One ship can take multiple foundations once time



Substation Fabrication



Project : Jieyang-Shenquan

Water Depth: 33-39m

Total Weight: 7100 tons

Delivered : 2020

Largest HVAC Substation in Asia

400MW HVAC substation for Jieyang (South China Sea)

Project : #3 Peninsula South, Shandong

Total Weight: 5200 tons

Delivered : 2021

HVAC substation Shandong/Peninsula South

CIMC RAFFLES

The 1st delivered WTIV in CIMC Raffles

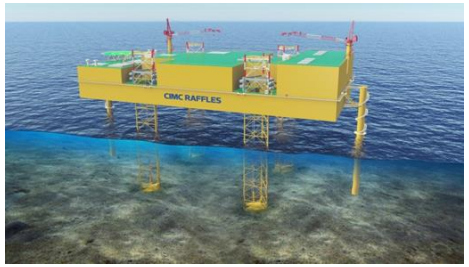
CIMC Raffles is continuing to diversify amid the **Fast-paced Energy Transition**...

29 March 2021, Delivered "De Jian" to Yantai Salvage Bureau, with 11.8 knot and DP2; 1200T crane and Hook height workable for 6MW WTG. De Jian will work as WTIV and support vessel for nearshore offshore wind farm.

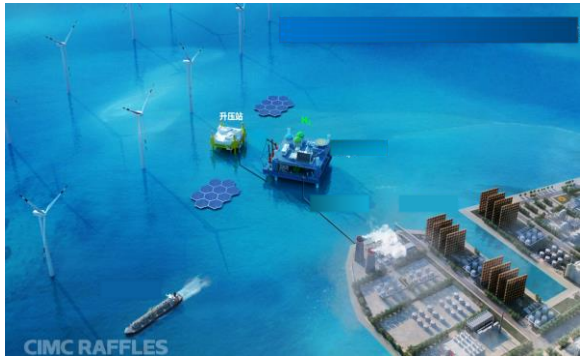
CIMC RAFFLES KNOW-HOW

Always in Preparation for the Coming Challenge of Grid Parity

Industrial Cluster



Facility Innovation



Reduce Cost & Boost Revenue

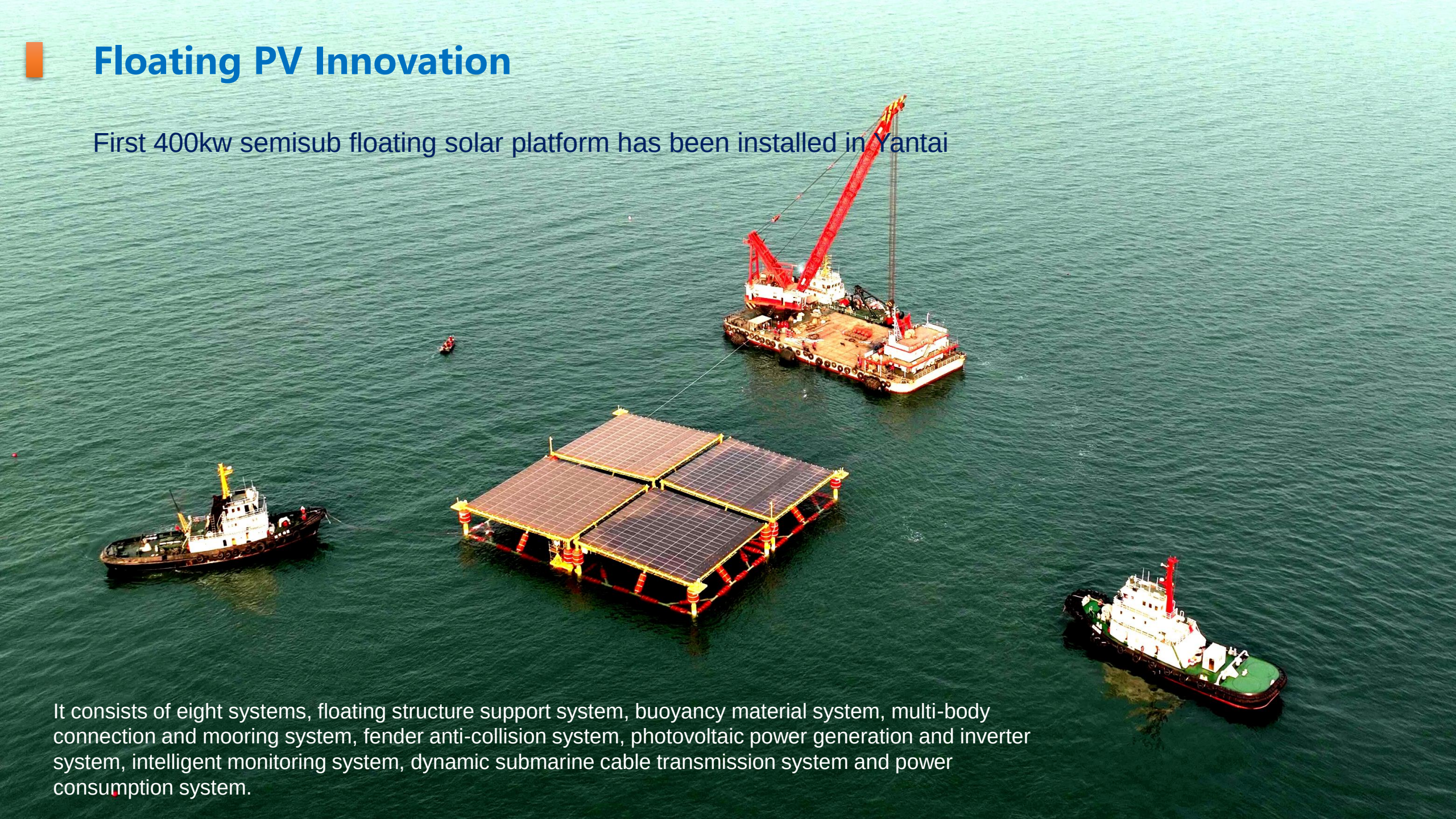
Offtake Arrangement

Power to X

Offshore PV （集光）- 400KW Floating PV in Construction

Floating PV Innovation

First 400kw semisub floating solar platform has been installed in Yantai

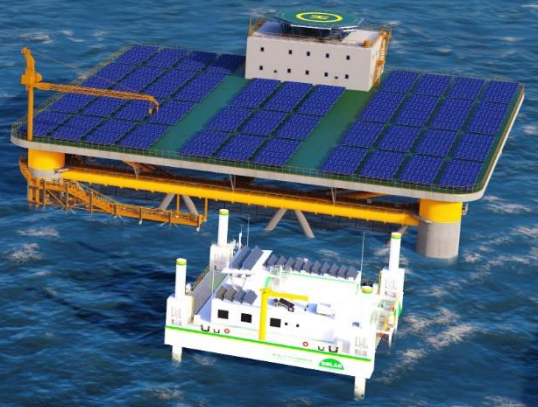


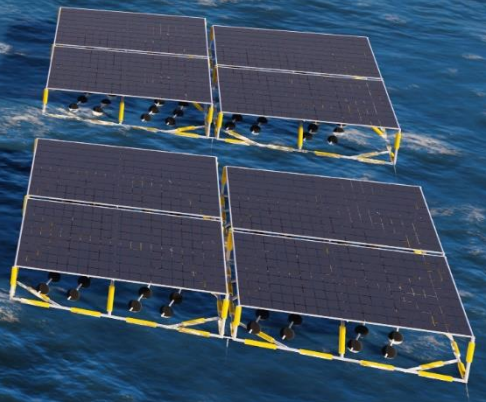
It consists of eight systems, floating structure support system, buoyancy material system, multi-body connection and mooring system, fender anti-collision system, photovoltaic power generation and inverter system, intelligent monitoring system, dynamic submarine cable transmission system and power consumption system.

Offshore Floating Photovoltaic Test Center

CIMC RAFFLES

Build an Offshore public service platform integrating “technology research and development, achievement transformation, product incubator, inspection and testing”, and build an offshore science and technology innovation center with important international influence.

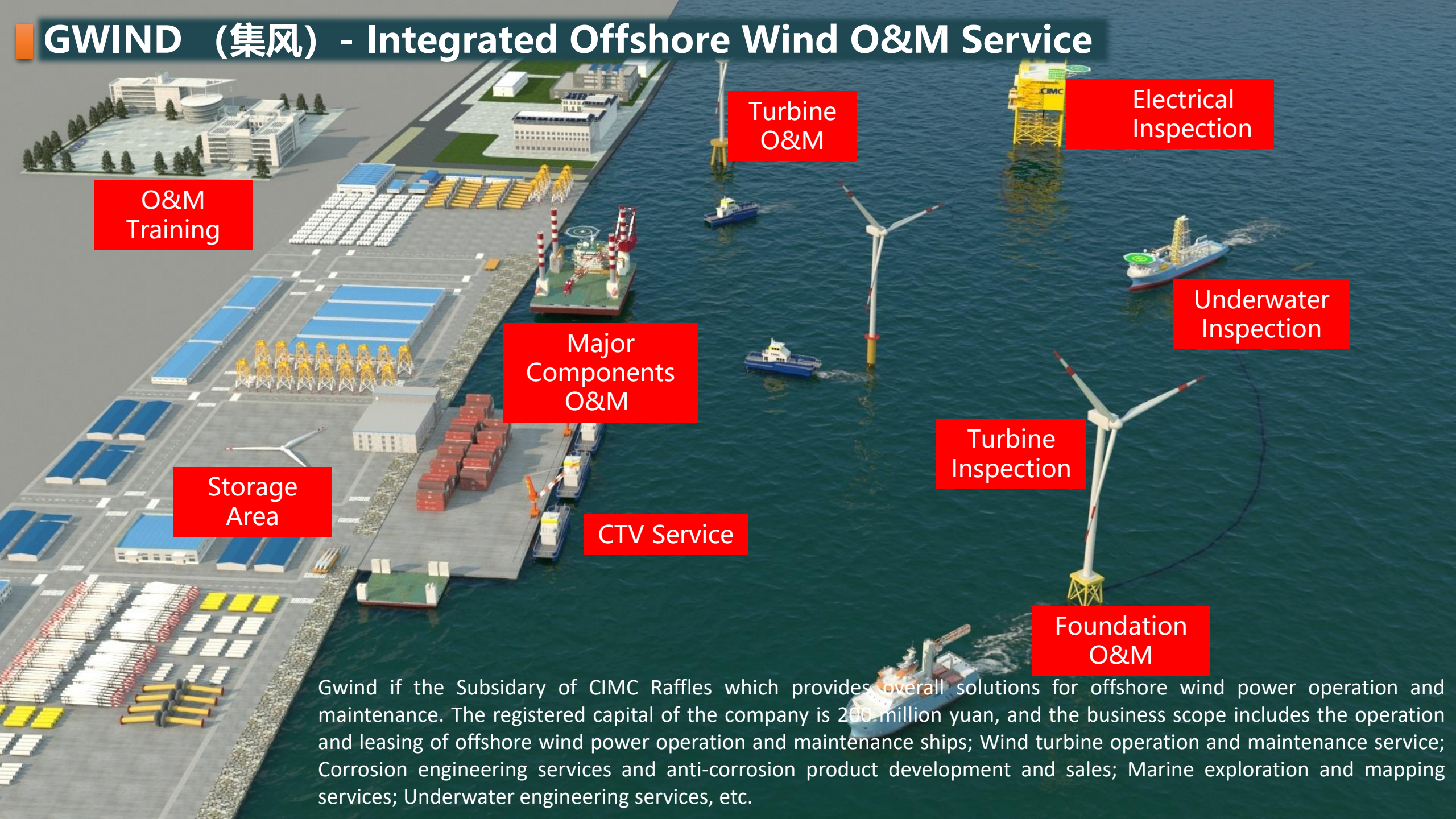




Scope of Service

- Provide test plan formulation
- Test preparation
- Transport assembly and debugging
- Test layout and test process
- Device and data recycling
- Test data analysis and evaluation of the whole process services
- Provide real-time Marine environmental data, Marine communication transmission, real-time video surveillance and other support capabilities

GWIND （集风）- Integrated Offshore Wind O&M Service



Gwind if the Subsidary of CIMC Raffles which provides overall solutions for offshore wind power operation and maintenance. The registered capital of the company is 200 million yuan, and the business scope includes the operation and leasing of offshore wind power operation and maintenance ships; Wind turbine operation and maintenance service; Corrosion engineering services and anti-corrosion product development and sales; Marine exploration and mapping services; Underwater engineering services, etc.

CIMC GH2 (集电) Technology Business Scope

vision

The world's leading supplier of green hydrogen equipment and solutions

Core Business

Electrolyzer	Hydrogen production unit	Offshore Wind Power Hydrogen Production Overall Solution
• ALK Electrolyzer • PEM/SOEC/AEM • Standardization and Modularity • For Offshore	• ALK for large scale • Containerized ALK/PEM Electrolyser • For Offshore	• Design and construction of offshore platforms • Offshore wind power hydrogen production engineering design and implementation

Core capability

Equipment

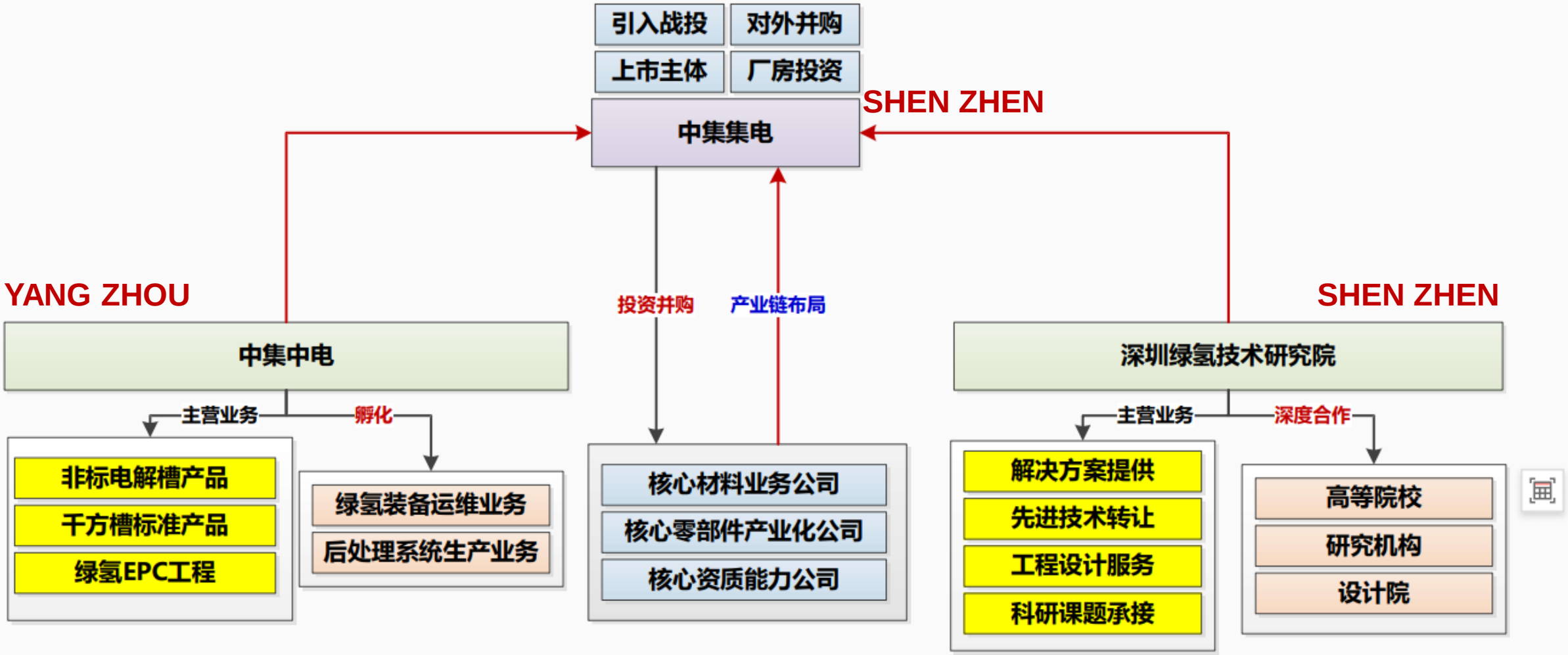
- Establish large-scale, standardized and lean electrolyzer manufacturing capabilities
- research and development of ALK/PEM/SOEC/AEM
- R&D and manufacturing of offshore hydrogen production equipment

Solution

- Offshore Hydrogen Production Industry Standard
- Provide customers with customized green hydrogen equipment solutions

key initiatives

Markting | **manufacturing** | **R&D** | **Demonstration project** | **Capital**


引入战投
对外并购
上市主体
厂房投资
SHEN ZHEN
中集集电
YANG ZHOU
SHEN ZHEN
投资并购
产业链布局
中集中电
深圳绿氢技术研究院
主营业务
孵化
主营业务
深度合作
非标电解槽产品
千方槽标准产品
绿氢EPC工程
绿氢装备运维业务
后处理系统生产业务
核心材料业务公司
核心零部件产业化公司
核心资质能力公司
解决方案提供
先进技术转让
工程设计服务
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设计院

Scaled hydrogen production solutions：Lightweight large electrolytic

CIMC RAFFLES

Performance features :

1.Lightweight: The current density is 4000A/m2, and the number of cells is about 230. The weight of electrolytic cell body is only about 40 tons.

Lower CAPEX

2.High stability: The electrode frame is thicker than other similar products in the industry, the internal circulation section area of the electrolytic cell is large, and the electrolyte circulation cooling is sufficient, so that the cell temperature of each electrolytic cell is consistent, and the thermal expansion and cold contraction are uniform. The temperature of individual cells will not be too high, resulting in deformation and failure of electrolytic cells.

Lower OPEX

3.Long lifetime: The weight of the cell is light (less than 30 tons), and the load of the sealing gasket is light, making the overhaul cycle of the cell longer and more stable than ten years.

The CIMC-GH electrolyzer has successfully lightened the weight and effectively reduced system operating costs. The hydrogen capacity is 1200Nm^3/h. The post-treatment system of CIMC-GH was also optimized in order to make it much more workable and effective for the power fluctuation produced by renewable energy. The DC current drain reaches the national first-level energy efficiency standard of 4.3kwh/Nm^3 at the hydrogen capacity 1000Nm^3/h; Which, significantly reduces the operating costs by 10-20%, allowing the system to have a dynamic adjustment capability of 10%-120%.

CIMC-GH has delivered 1000Nm^3 hydrogen production equipment to client in the first half of 2022, which is used for the natural gas hydrogenation project.

CIMC's Innocative Lightweight Large Electrolyzer Successfully Rolled Off the Production Line

January 10, 2023, the flagship product of innovative lightweight 1000N^3/h electrolyzer “CIMC-GH series” produced by "CIMC GH2 Technology", the new subsidiary brand established by CIMC Offshore Engineering, which focus on the green hydrogen sector, has been off the assembly line successfully, and meanwhile, the green hydrogen equipment manufacturing base of CIMC GH2 Technology located in Yang Zhou was officially announced to be put into operation on the same day. A grand ceremony was held in YangZhou manufacturing base to celebrate the meaningful day of CIMC GH2 Technology.

This alkaline electrolyzer is CIMC's first green hydrogen production equipment to hit the market, marking the company's official entry into the green hydrogen production equipment sector.

CCUS：10000m³ LCO2 Carrier

10000m³ LCO2 Carrier

- Diameter：147.7*139.6*23.6m
- Draft：8.0m
- Tank：4* 2500m³ Type-C Tank
- Tank Pressure：18Bar
- Tank Temperature：-35℃
- Dynamic Position：DP2
- Power：LNG Dual Fuel，Green Methanol Design Ready

CIMC RAFFLES


样，我也不说不能。
CIMC中集
鹏飞郑旺制氢
施工区域: 1号电解槽集装箱
施工内容:
拍摄时间: 2023.06.16 17:21
天气: 晴 31℃
地点: 仪征市·扬州金博通科技园
施工单位:


施工内容:
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CIMC中集
鹏飞郑旺制氢
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施工单位:


地点: 扬州仪征金博通产业园
施工单位:
CIMC中集
QSNY


Set A Goal, Never Say No.
设定一个很高的目标，哪怕像梦一样，我也不说不能。
CIMC 中集
CIMC中集集电
深耕精作
激扬氢云
CIMC 中集集电


CIMC 中集
成为所进入行业的受人尊重的全球领先企业
Take the lead in the globle industry
CIMC 中集
自强不息 追求卓越
To be optimized to be excellent
INOVANCE


CIMC
中集绿氢装备产业园
CIMC 中集


Set A Goal, Never Say No.
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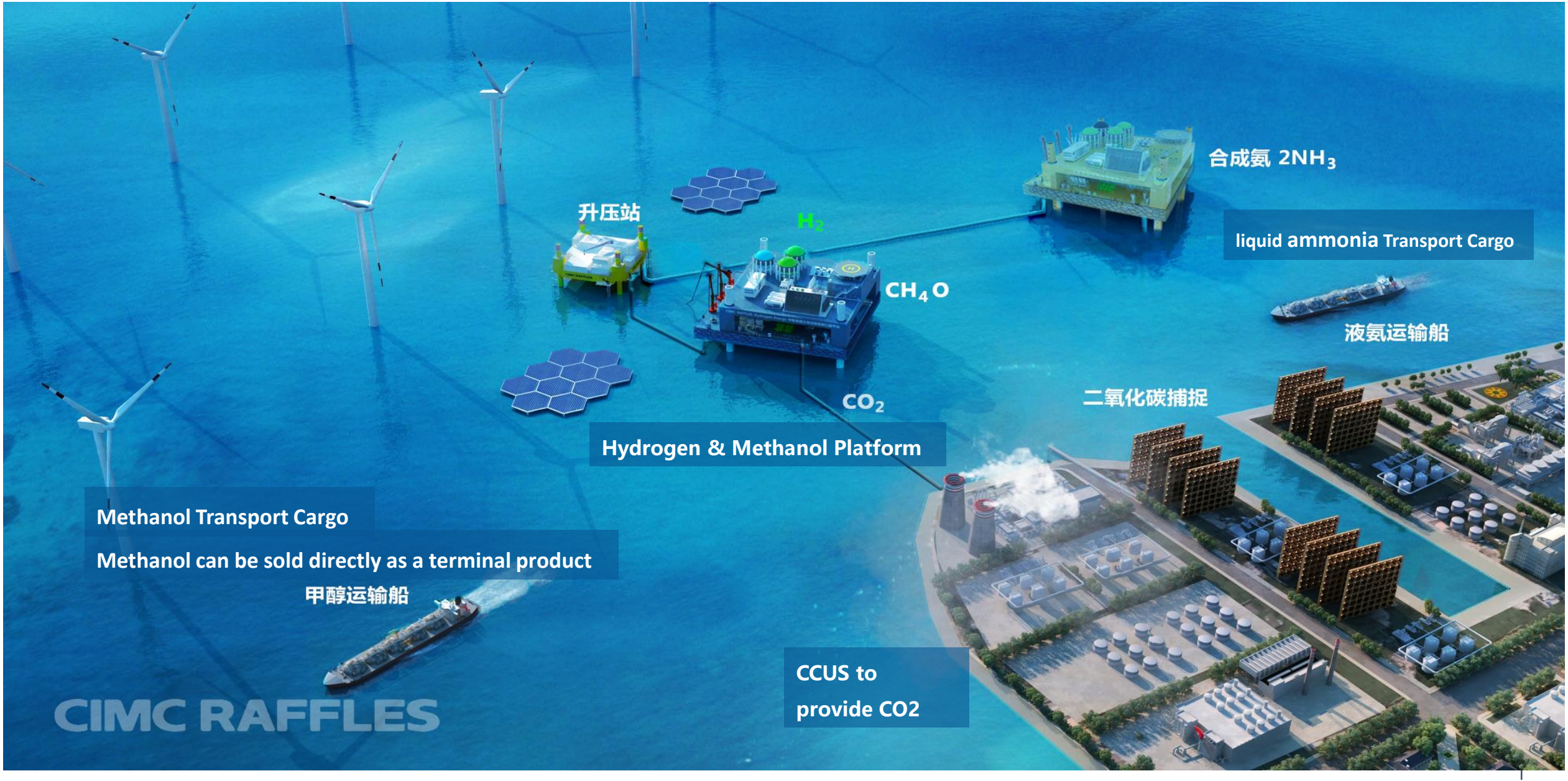
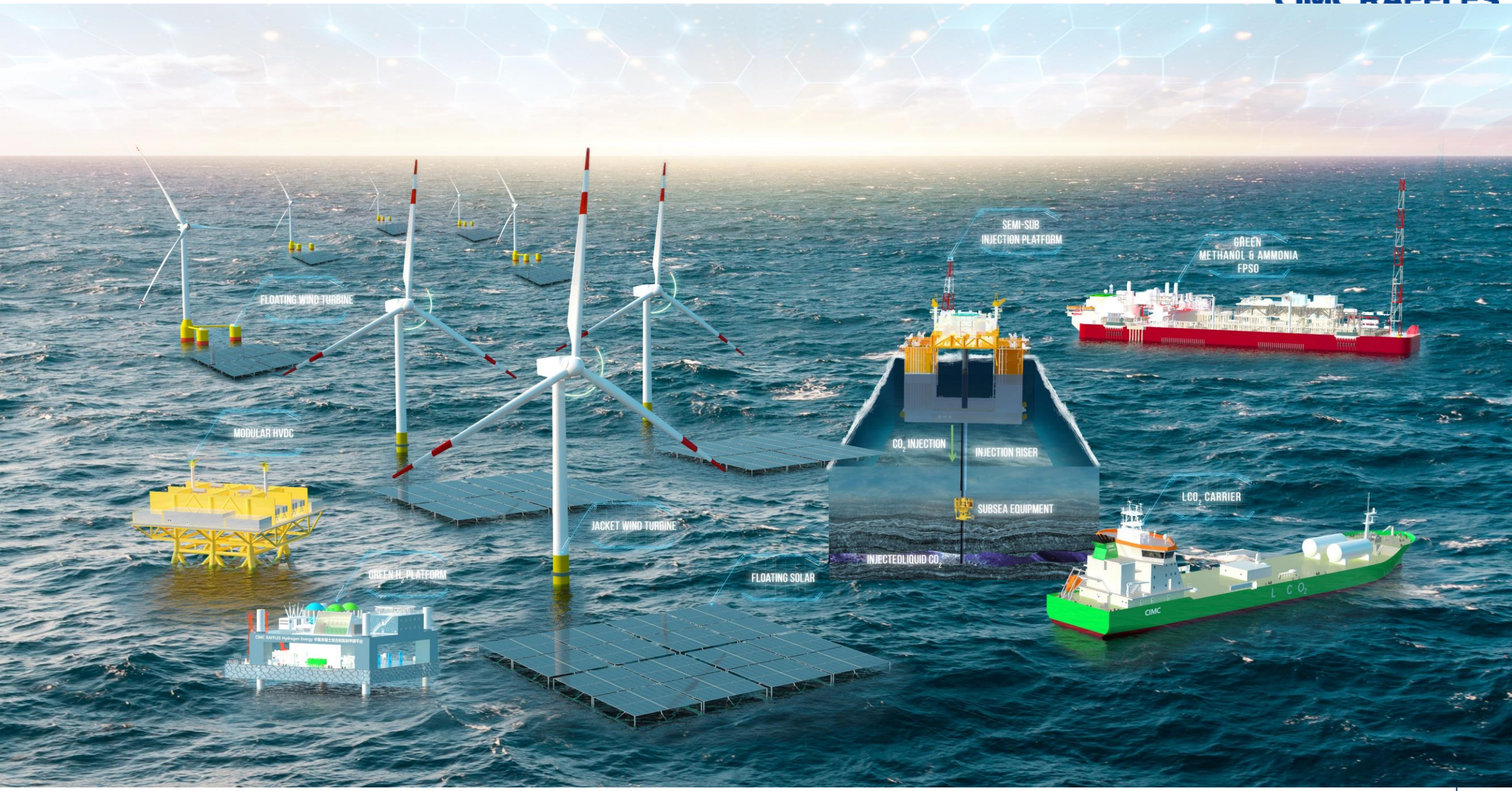
CIMC
中集集电

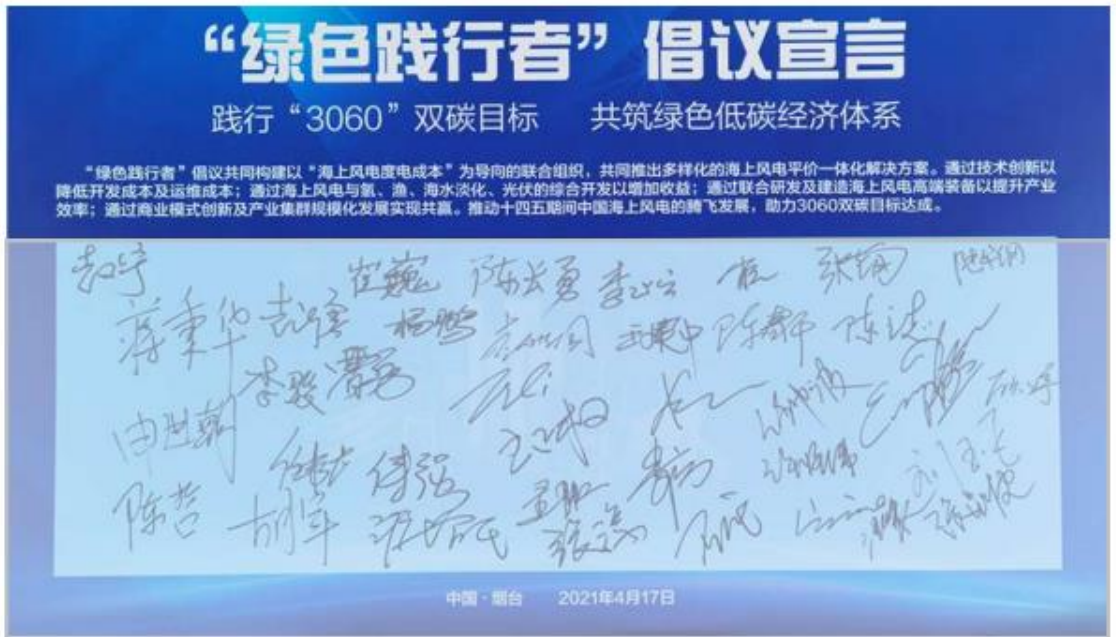
The overview of Offshore Hydrogen Producing Solution of CIMC GH2




FLOATING WIND TURBINE
MODULAR HVDC
JACKET WIND TURBINE
GREEN H_2 PLATFORM
FLOATING SOLAR
SEMI-SUB
INJECTION PLATFORM
CO_2 INJECTION
INJECTION RISER
SUBSEA EQUIPMENT
INJECTEDLIQUID CO_2
GREEN
METHANOL & AMMONIA
FPSO
LCO_2 CARRIER
CIMC
L C O_2

CIMC RAFFLES

Question / 我们的思考
我们如何在新的海上风电发展竞赛中胜出
How to Win in the New Round of Offshore Wind Development



GIP/绿色践行者

looking forward to

Working with You

Think big and act fast/往大里思考并迅速行动:

Wind farms larger than 1GW is the way to achieve economical efficiency, which will be the new standard for future offshore wind farm cost competition.建设超过1GW的大型风电场，从而获得规模经济，是未来海上风电场成本竞争的新标准。

Choose good partners and strengthen cooperation

选好合作伙伴，加强协作:

We need to work with strategic alliances and strengthen collaboration in the full Supply chain, which will ensure efficient delivery, such as wind turbine production and installation; And accelerate the industry technology development, including offshore wind technology and Kon-how. 要想获胜，需要与战略联盟一起努力，并加强全产业链的协作。这有助于确保交付能力的建设，如风机的生产、安装等，并发展出行业最优秀的各种技能，包括海上风电相关技术和知识等，同时加快创新等。

—— 风能委员会 CWEA

《如何在新的海上风电发展竞赛中胜出？》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