

CCS Offshore Wind Power Services

CCS
CHINA CLASSIFICATION SOCIETY
中国船级社

Safety, environmental protection and creating value for clients and society





Overview

Since the early 1970s, CCS has been authorized by the Chinese government and other countries and regions to independently perform statutory survey, classification survey, certification survey and notarial survey for offshore installations, equipment and materials engaged in exploration, development and production operations in China seas. These offshore installations are distributed in the area from Liaodong Bay to South China Sea and from shallow sea to deep sea, covering various offshore installations.

CCS continuously improves and maintains relevant technical rules and guidelines, enhances its capability of drawing approval, calculation, analysis and verification, survey, project management and information service, and builds up a professional team of talents to serve the domestic and international offshore engineering industry and contribute to the global sustainable energy development.





Offshore Wind Power Services

【Client Types】

- Owners of wind farm
- Owners of wind turbine installation units
- Manufacturers of wind turbines
- Insurance companies

【Service Scopes】

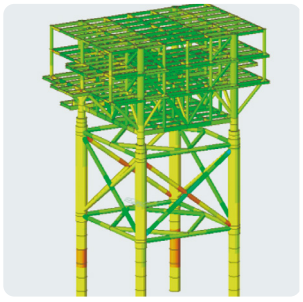
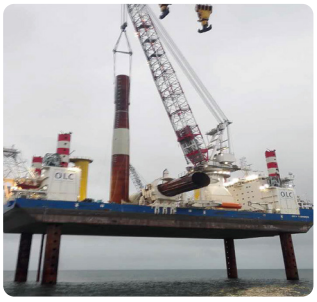
- Offshore substations
- Offshore wind turbines
- Offshore anemometer towers
- Wind turbine installation units

【Service Products】

- Technology service for wind farm facilities
- Verification survey for wind farm facilities
- Supervision survey for wind farm facilities
- Inspection for wind farm facilities
- Marine warranty survey for wind farm facilities
- Classification and statutory survey for wind turbine installation units
- Certification for offshore wind turbines
- Metocean conditions Technology service and analysis for wind farm

Life-Cycle Service

We aim to provide reliable and comprehensive services throughout the full life cycle for offshore wind farm facilities and equipment.

Design	Construction and installation	Operation	Decommissioning
			
Design review Technology service Structure analysis	Verification survey Supervision Inspection Marine warranty survey	In-service survey Emergency response service Condition assessment	Asset regeneration/ replacement Site survey Concept evaluation



Our experiences

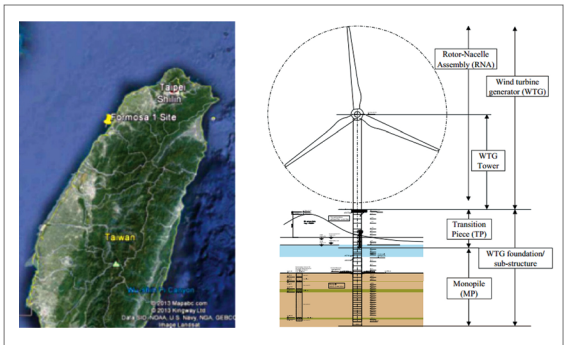
CCS has established a complete system of technical rules for offshore wind farms, providing all-round technical services such as survey, certification and Technology service for safety and environmental protection and continuously creating value for our clients.

【Management Technology Service for Offshore Wind

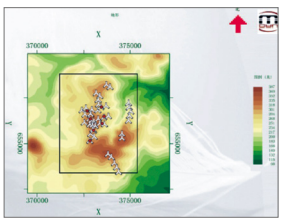
- Post-evaluation for wind farms
- Site assessment
- Technical due diligence
- Differential allocation for wind farms
- Standardized management for wind farms

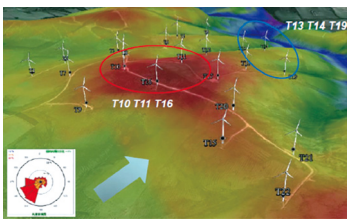
【Evaluation and Technology Service for Offshore Wind Farm】

- Design evaluation for wind turbines
- Analysis for soil-pile interaction in wind turbine support structures
- Dynamic characteristics analysis for wind turbine support structures
- Wind turbine support structures optimization and material sensitivity analysis
- Fatigue, earthquake and redundancy (RSR) analysis for wind turbines
- Conformity verification for design documents of offshore substations
- Independent review and assessment for static, earthquake, fatigue and collapse of offshore substations
- Evaluation of installation design for offshore wind farm facilities
- Independent analysis of overall performance, mooring system and structures for Offshore floating wind turbines

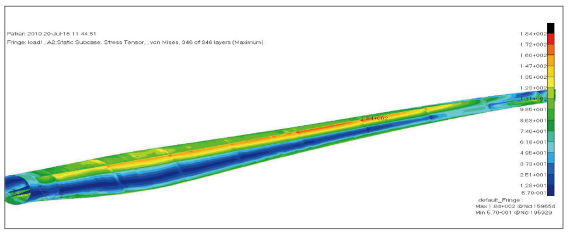


Offshore wind farm development project in Taiwan

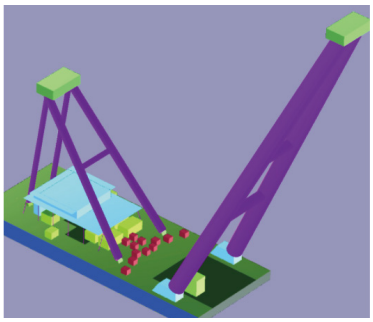




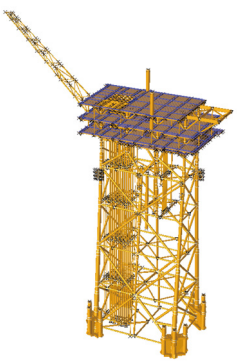
◎ Management Technology Service for Offshore Wind Farm



◎ Analysis of wind turbine blade



◎ Analysis of installation stability



◎ Overall strength analysis

【Verification survey for wind farm facilities】

CCS provides verification services for offshore wind farms. At present, it has completed more than 50 offshore wind power facilities in China, including offshore substations, offshore converter stations and offshore floating wind turbines.

- ◎ Design Review
- ◎ Construction, Installation and Commissioning Survey
- ◎ Operation and Maintenance Survey
- ◎ Decommissioning Survey



◎ Provided third-party survey for far-reaching floating offshore wind turbine "Hai You Guan Lan Hao".(Capacity : 7.25 MW/unit)



◎ Verification survey for Qidong H3# 300MW substation



◎ Verification survey for offshore converter station (CTG Leader)



◎ Verification survey for Jiangjiasha H2# 300MW substation

【Marine Warranty Survey】

Our services for offshore wind power installation projects include:

- Meeting attendance
- Plan/Progress/Technical Document Review
- Vessel and Equipment survey
- Loading/Transportation/Installation On-site surveillance



MWS for wind turbine installation



MWS for jacket installation

【Supervision services for wind farm facilities】

CCS provides supervision services for offshore wind farms , including offshore substations, wind turbine installation units, wind turbine support structures, etc.



Supervision for wind turbine installation units



Supervision services for Jiangjiasha substation

【Offshore Wind Power Inspection Service】

Relying on our technical strength and extensive experience in ship and offshore engineering survey and inspection service, CCS can provide the following inspection services for offshore wind power construction and maintenance:

- ◎ NDT of Offshore Wind Support Structures and substations
- ◎ Detection and analysis of blade
- ◎ Inspection Service for in-service offshore wind turbines
- ◎ Inspection of Bolts, Gears and Rotary Shafts
- ◎ Verification of Wind Turbine Power Curve



◎ Tower inspection



◎ Rotor-nacelle assembly inspection



◎ Structure inspection

【Classification and statutory survey services for wind turbine installation units】

So far, CCS has provided classification and statutory survey services for more than 60 wind turbine installation units.





【Certification service for offshore wind turbines】

CCSC has issued more than 1300 certification certificates for wind turbine units, from 1.5MW to 10MW models.

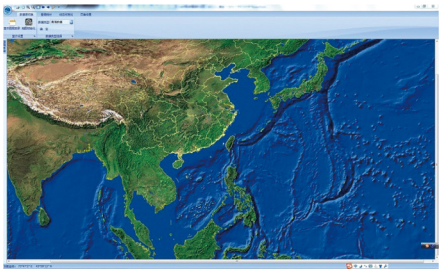
- Offshore wind turbines design evaluation certification
- Offshore wind turbines type approval
- Offshore wind turbine unit components certification



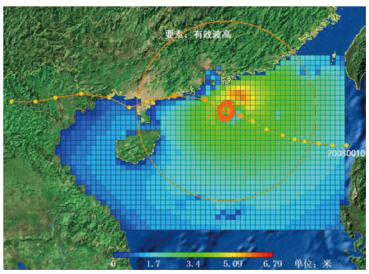
【Metocean Conditions Technology Service and Analysis for Wind Farm】

Relying on CCS Metocean database display and analysis system, we can provide technical technology service, analysis and design data check in relations to wind, wave and current required by wind farm facilities:

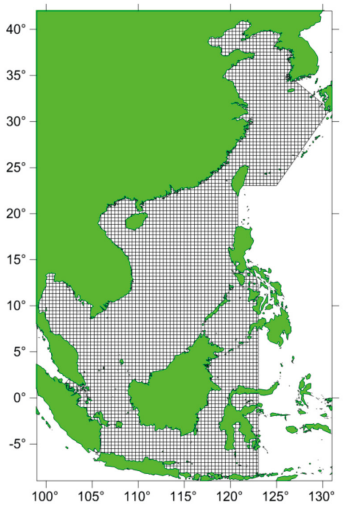
- Offshore substations
- Foundation structures of offshore wind turbines
- Offshore anemometer towers
- Wind turbine installation units



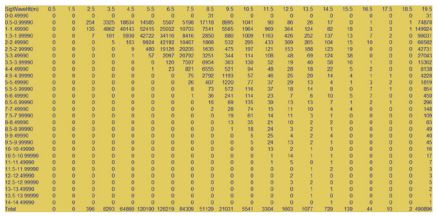
CCS Metocean database display and analysis system



Typhoon Process in South China Sea



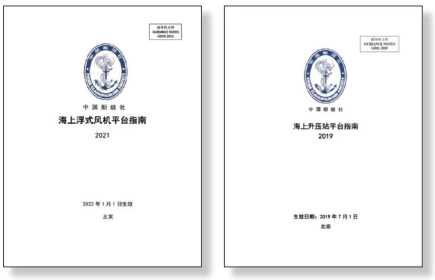
CCS Metocean database



Scatter diagram for fatigue analysis

Rules Development and Research

The "system of rules for offshore wind farm facilities" relies on CCS's complete system of rules for offshore engineering, combining the characteristics of offshore wind power facilities, and focusing on risk control for the entire life cycle of offshore wind farm facilities and forming a system of rules covering the entire life cycle of facilities.



The system of rules for offshore wind power equipment is based on CCS's *Rules for Classification of Offshore Mobile Units* and other rules, covering offshore wind power construction platforms and related important construction equipment to provide complete technical standard system, classification and certification services for construction equipment of offshore wind farm.

Offshore wind farm facilities

• Design、Construction and Installation

- *Rules for the Classification and Construction of Fixed Offshore Platforms*
- *Guideline for Survey of Offshore Wind Farm Facilities*
- *Guidelines for Survey of Offshore Substations*
- *Guidelines for Installation of Offshore Wind Farm Facilities*
- *Guidelines for Quality Acceptance of Fire Engineering Construction of Offshore Substation*
- *Guidelines for Floating Offshore Wind Turbine Facilities*
- *Guidelines for Certification of Offshore Wind Turbine*
- *Guidelines for Survey of High Voltage Power Systems for Offshore Fixed Facilities*
- *Recommended Practices for Infrastructure Design and Analysis of Offshore Wind Turbine Units*

• Operation and maintenance

- *Guidelines for Structural Survey of Jacket Platforms in Service*
- *Guidelines for Assessment of Offshore Platform*

• Decommissioning Guidelines

- *Guide for Certification and Survey of Decommissioning of Offshore Fixed Facilities and Submarine Cables and Pipelines*

Offshore wind power equipment

• Design, construction and installation

- *Rules for Classification of Offshore Mobile Units Guidelines for Offshore Wind Turbine Platform*
- *Guidelines for Structural Simulation and Hydrodynamic Load of Cylindrical Pile Legs*

• Operation and maintenance

- *Guidelines for Dynamic Evaluation and Emergency Response of Structural Condition of Offshore Mobile Units*



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Service Network



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