離岸風電海事工程船舶溝通平台會議

Offshore Wind Farm Marine Coordination Communication Meeting

Hai Long
PROJECT OVERVIEW
海龍風場專案說明

May 2019

CDWE
台船環海風電工程公司

PRESENTATION CONTENT / 目錄

I. Safety moment / 安全宣導

II. Project description / 專案說明

III. CDWE as BOP contractor / BOP統包架構說明

IV. Preliminary Pre-FID schedule / 最終投資決定時程規劃

V. Preliminary specialised vessels requirements / 專業船隻需求

VI. Preliminary Offshore support vessel requirements / 離岸海事工程支援船規格需求

VII. Q&A and AOB / 問題及其他事項

PRESENTATION CONTENT / 目錄

Safety doesn't rest | 安全永不妥協

- Within CDWE there is a focus on **continuous improvement**
  台船環海將致力於**持續精進**相關職安衛標準
- Actions plans will be developed on a **yearly** basis
  每年也將更新相關計劃
- Based on input from all relevant **processes** and **stakeholders**
  並依據所有來自相關**流程**與**利害關係人**之經驗持續優化
- **All parties** affiliated to CDWE asked to **contribute** in achieving the yearly goals
  台船環海將致力於達成年度目標，並要求相關承包商符合相關要求。


2019-2020

QHSE-S

YEAR ACTION PLAN

For Quality, Health, Safety, Environment and Security

Activity Line
Offshore

1. **Quality** - Do it right the first time
   - 1.1 Inspection and test plans during (de)mobilisations
   - 1.2 Project document control standardisation
   - **1.3 Digitalisation of induction**
   - 1.4 Alignment of subcontractor & supplier selection and management

2. **Health** - A sound mind in a sound body
   - 2.1 Healthy food campaign
   - 2.2 Ergonomic workplace guidance booklet
   - **2.3 Health topic communication**
   - 2.4 Working in cold environments

3. **Safety** - Safety from the start is your best award
   - 3.1 Hot works awareness and guidelines
   - **3.2 Working at height**
   - 3.3 Dynamic positioning operations program
   - **3.4 Lifting management 2.0**
   - **3.5 Transfer of People – on land, at sea and in the air**

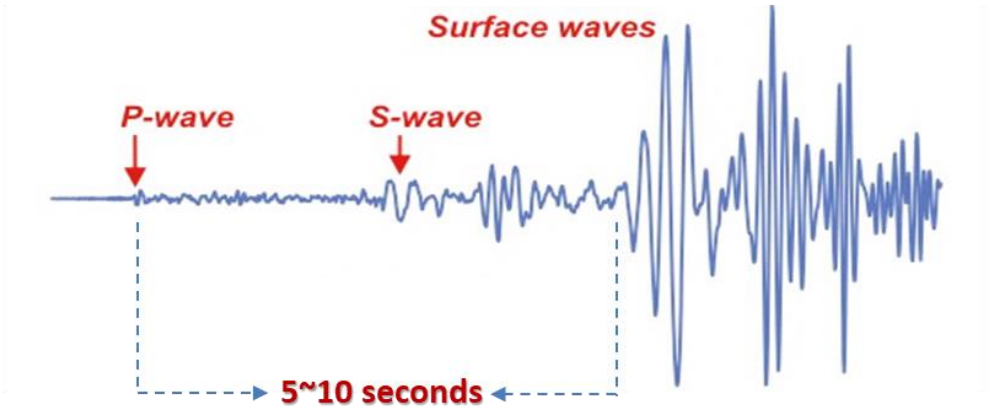
4. **Environment** - A better environment starts with yourself
   - **4.1 Taking Green Initiatives to the next level**
   - 4.2 Hydraulic mission equipment
   - 4.3 New chain analysis for CO2 performance

5. **Security** - Sec_rity is not complete without U
   - 5.1 Digitalizing ISPS control
   - **5.2 Information processing guidance**

Quality
Health
Safety
Environment
Security

Hugo Bouvy
Managing Director
DEME Offshore

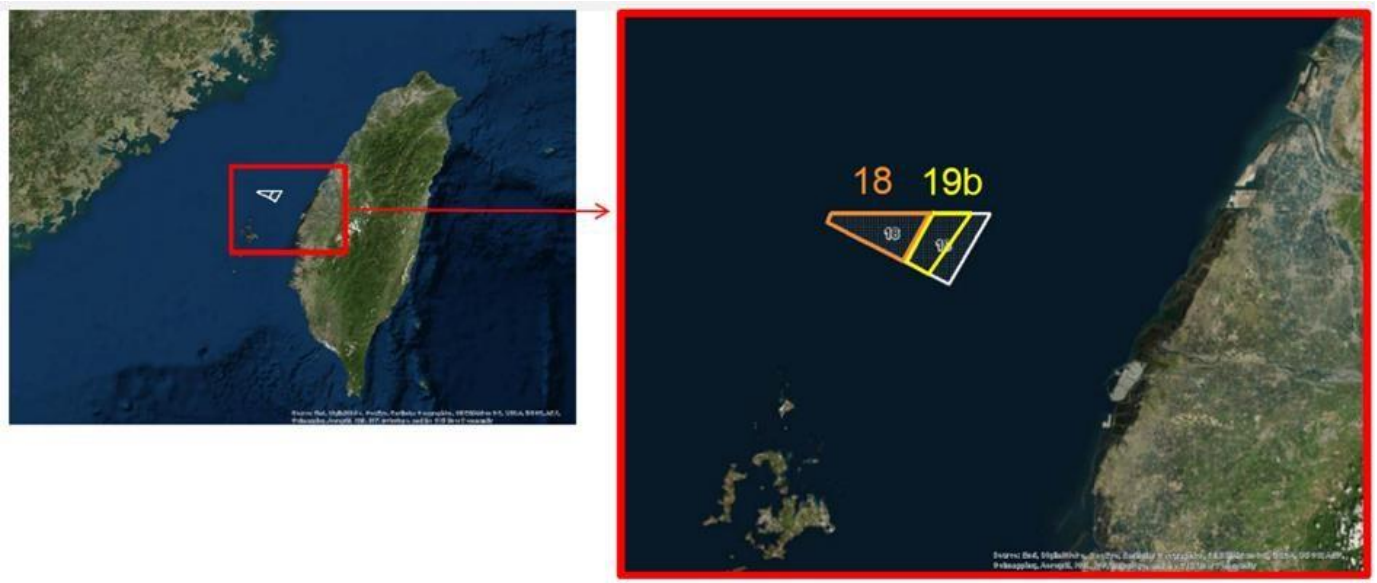
口 地震防護/Earthquake Protection



- 感應到垂直震動時候約有5~10秒的時間尋找一個安全避難地點。
  You have 5~10 seconds to find a safety space from the vertical vibration you felt.
- 地震時間約為30秒~100秒
  EQ duration=30s~100s or more
- 主震後還有餘震。
  Need to pay attention to the aftershocks
- **Need help Call 119**

PRESENTATION CONTENT / 目錄

PROJECT DESCRIPTION | 專案說明

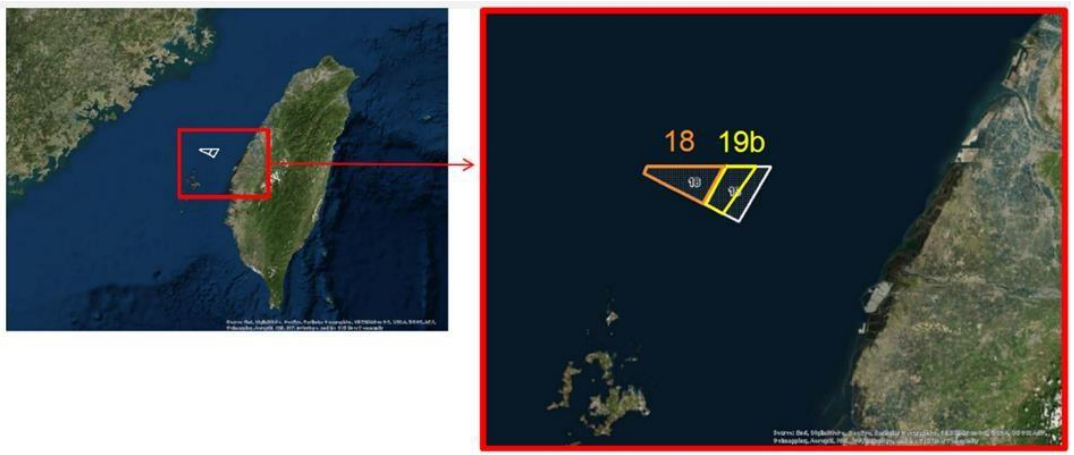


- Developer: **NPI and Yushan Energy**
- Site 18 and 19
- Water depths 35 – 55m
- Capacity:
  - Allocation: 300MW (Grid Connection: Dec.31st, 2024)
  - Auction: 232MW + 512MW (Grid Connection: Dec.31st, 2025)
- Foundation design: 4 legs jackets

- 開發商：台灣北陸能源及玉山能源
- 風場場址: #18 及#19
- 水深約35-55公尺
- 風場容量： 300MW + 232MW + 512MW
- 風機基礎設計：預打樁套筒式基礎(四腳)

PROJECT DESCRIPTION | 專案說明

Site conditions: 場址資訊



- Challenging metocean conditions

  海洋環境條件複雜

- Site further offshore – apx 40 nm from Taichung

  離岸距離遠-距台中約40海浬(約74公里)

- Regular typhoons during the summer

  夏季颱風頻繁

- Earthquake risk

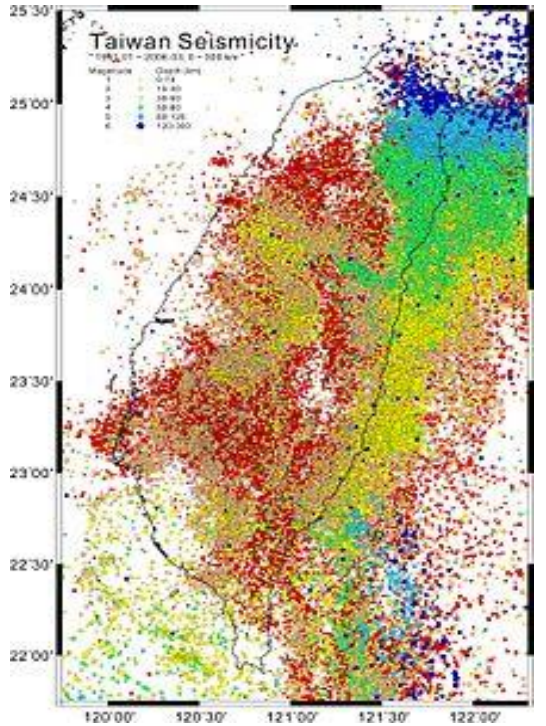
  地震之風險

- Sand-waves up to 12 m high

  沙波高達12公尺

- Interbedded soil layers - sand, silty sand, and occasional clay layers

  地質條件複雜-砂土,黏土質砂土,黏土層



PRESENTATION CONTENT / 目錄

I. Safety moment / 安全宣導

II. Project description / 專案說明

III. BOP Contractor Structure / BOP統包架構說明

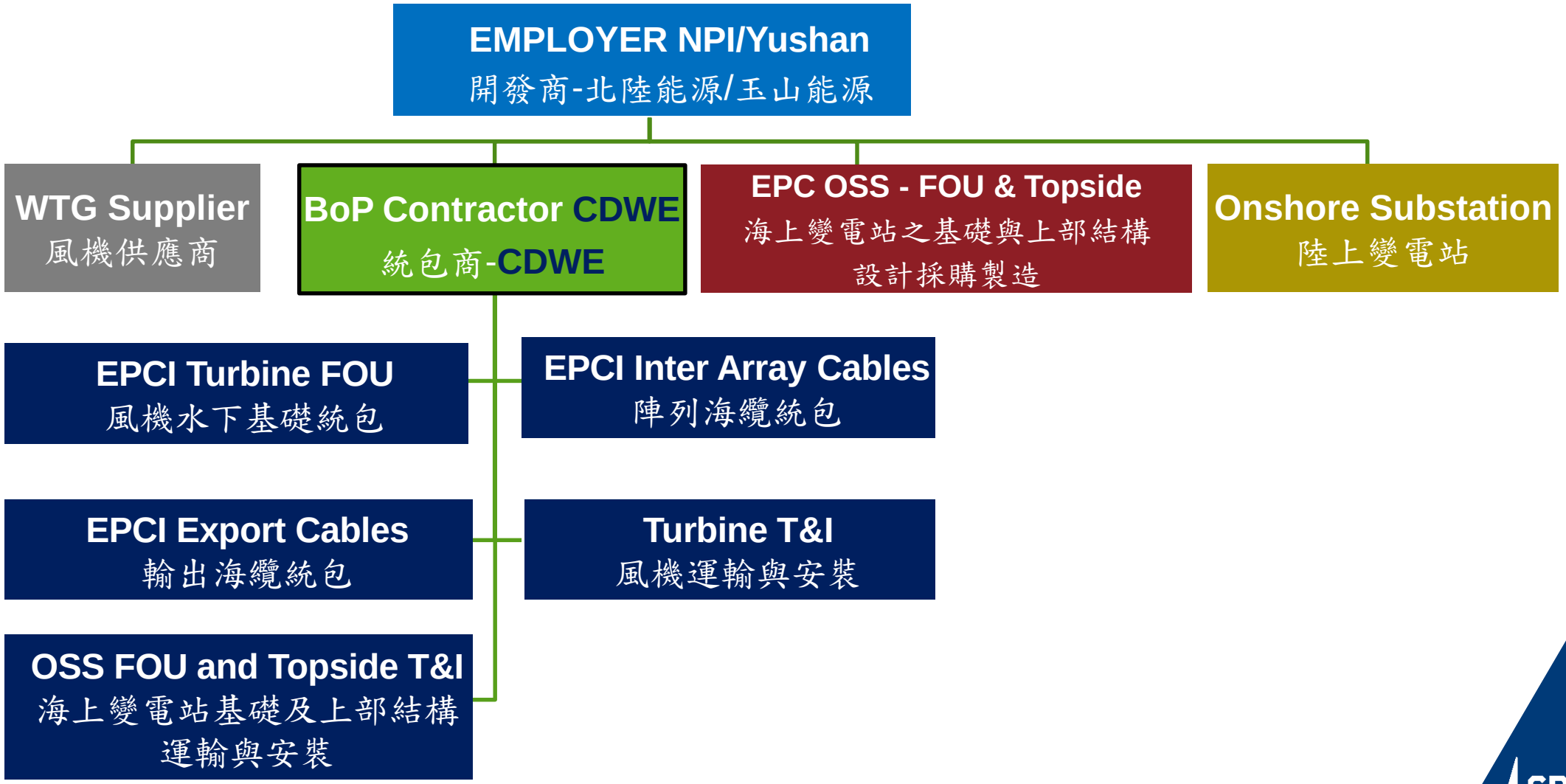
IV. Preliminary Pre-FID schedule / 最終投資決定時程規劃

V. Preliminary specialised vessels requirements / 專業船隻需求

VI. Preliminary Offshore support vessel requirements / 離岸海事工程支援船規格需求

VII. Q&A and AOB / 問題及其他事項

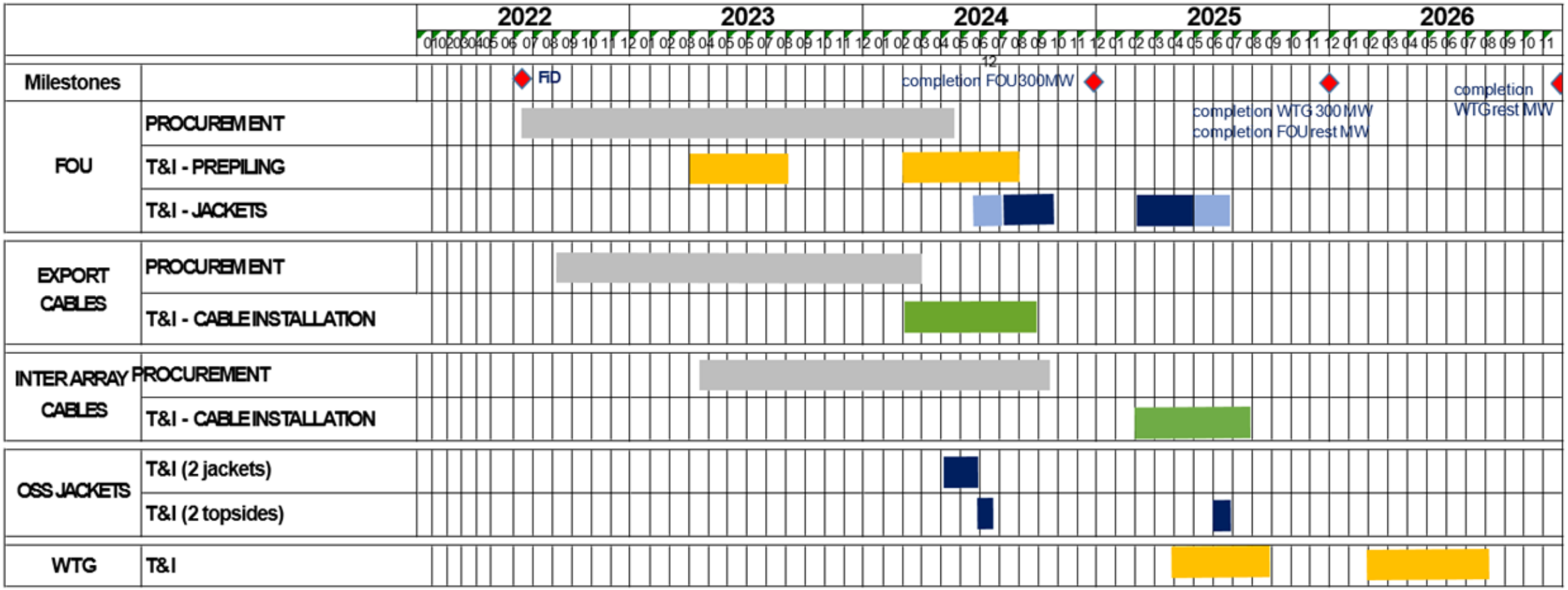
BALANCE OF PLANT (BoP) | 大型統包工程



PRESENTATION CONTENT / 目錄

Preliminary Pre-FID schedule | 最終投資決定時程規劃

(possible change in WTG model not accounted for)



(possible change in WTG size not accounted for)

PRESENTATION CONTENT / 目錄

Preliminary Vessel requirements during Construction period- Specialized vessels
海龍專案施工期船隻需求 - 專業船隻

風場開發資料 Offshore Windfarm information		
離岸風場名稱 Wind Farm name	海龍二號 海龍三號	
開發業者名稱 Developer	玉山能源股份有限公司 台灣北陸能源發展股份有限公司	
開發期程規劃 Development schedule	施工期 Construction Period	自 2019 年 06 月至 2026 年 10 月

Hai Long- Metocean data- 37 years (1979 – 2016) average Hs on site
海龍專案-海洋氣象資訊-37年平均示性波高

P50 calculations / 50%風險估算

P50 Hs limits	January	February	March	April	May	June	July	August	September	October	November	December
Above 1m Hs	87.7%	80.1%	67.1%	48.5%	36.1%	30.0%	21.9%	31.5%	58.4%	83.6%	87.5%	91.9%
Above 1.25m Hs	81.7%	74.5%	60.0%	41.4%	26.9%	18.2%	14.3%	16.4%	47.2%	78.7%	82.8%	87.1%
Above 1.5m Hs	76.4%	69.8%	53.0%	35.3%	20.6%	11.5%	9.3%	11.4%	36.0%	74.0%	77.6%	83.4%
Above 1.75m Hs	71.3%	63.1%	48.4%	28.8%	14.3%	6.3%	6.3%	7.7%	28.7%	68.8%	73.4%	78.9%
Above 2m Hs	67.1%	60.1%	44.6%	23.6%	10.7%	4.9%	5.0%	5.3%	22.9%	61.6%	69.8%	72.7%
Above 2.25m Hs	61.7%	55.4%	40.3%	19.7%	7.7%	2.8%	3.6%	3.8%	19.1%	53.8%	62.9%	67.7%
Above 2.5m Hs	55.3%	49.9%	34.7%	16.3%	5.4%	1.5%	2.4%	3.1%	15.3%	46.8%	56.7%	61.6%
Above 2.75m Hs	49.3%	45.1%	29.0%	12.5%	3.9%	1.0%	1.1%	2.2%	11.1%	40.0%	49.4%	56.1%
Above 3m Hs	43.1%	38.9%	24.8%	9.7%	2.7%	0.3%	0.4%	1.6%	8.1%	33.4%	40.0%	46.6%
Above 3.25m Hs	36.3%	31.7%	21.5%	8.3%	1.8%	0.1%	0.0%	0.2%	5.7%	27.3%	34.6%	40.9%
Above 3.5m Hs	31.6%	26.9%	17.4%	6.5%	1.1%	0.0%	0.0%	0.0%	3.8%	19.6%	27.2%	32.2%
Above 4m Hs	19.2%	15.4%	9.3%	2.2%	0.0%	0.0%	0.0%	0.0%	2.4%	13.1%	17.5%	22.5%
Above 5m Hs	3.8%	2.7%	2.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	4.5%	4.6%

P80 calculations / 80%風險估算

P80 Hs limits	January	February	March	April	May	June	July	August	September	October	November	December
Above 1m Hs	92.4%	88.5%	74.5%	57.4%	45.4%	43.0%	30.6%	41.6%	67.7%	94.3%	94.4%	97.6%
Above 1.25m Hs	87.9%	85.2%	69.3%	47.3%	36.4%	29.2%	22.8%	29.9%	56.4%	90.5%	90.4%	95.9%
Above 1.5m Hs	82.9%	80.6%	62.8%	43.5%	28.8%	21.1%	15.9%	23.3%	48.1%	85.0%	86.2%	90.7%
Above 1.75m Hs	78.6%	75.8%	58.0%	38.2%	23.5%	17.7%	12.8%	19.1%	39.5%	80.2%	80.7%	86.8%
Above 2m Hs	73.8%	71.3%	52.3%	32.4%	18.9%	16.1%	9.4%	15.4%	32.3%	73.2%	74.1%	82.2%
Above 2.25m Hs	70.3%	66.2%	45.5%	28.5%	15.9%	10.2%	7.4%	11.8%	28.4%	64.0%	68.6%	76.1%
Above 2.5m Hs	63.9%	60.9%	39.7%	23.8%	10.1%	6.5%	7.0%	10.3%	22.6%	57.2%	62.8%	70.9%
Above 2.75m Hs	56.4%	56.2%	35.1%	19.1%	6.6%	4.1%	6.2%	8.4%	18.9%	48.3%	58.3%	66.4%
Above 3m Hs	50.2%	50.6%	31.2%	16.4%	4.6%	3.2%	5.3%	7.1%	15.8%	39.7%	53.7%	62.3%
Above 3.25m Hs	45.5%	45.7%	28.2%	12.3%	3.9%	1.8%	4.8%	5.4%	13.2%	34.2%	45.6%	52.7%
Above 3.5m Hs	39.4%	40.2%	22.9%	10.1%	3.4%	1.1%	3.5%	4.4%	10.7%	28.4%	39.2%	46.6%
Above 4m Hs	28.4%	28.0%	15.2%	5.9%	1.6%	0.3%	2.0%	2.5%	7.3%	18.0%	26.7%	34.3%
Above 5m Hs	10.7%	9.0%	4.2%	1.1%	0.0%	0.0%	0.9%	1.2%	3.9%	7.3%	9.0%	11.1%

Specialist vessels with high workability is required to meet the schedule!

需要具有高可操作性的專業船舶才能滿足期程需求！

Hai Long- Metocean data- 37 years (1979 – 2016) average Hs on site
海龍專案-海洋氣象資訊-37年平均示性波高

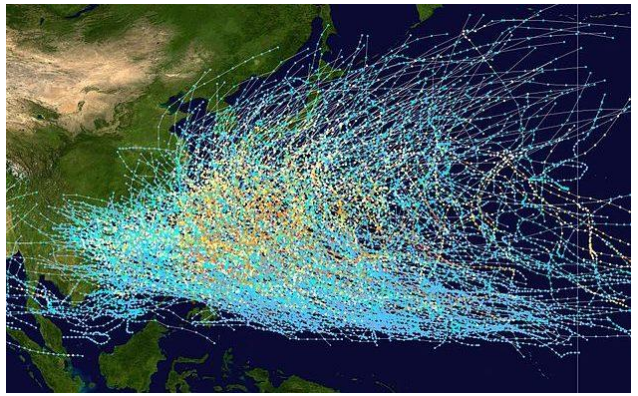
P50 calculations / 50%風險估算

P50 Hs limits	January	February	March	April	May	June	July	August	September	October	November	December
Above 1m Hs	87.7%	80.1%	67.1%	48.5%	36.1%	30.0%	21.9%	31.5%	58.4%	83.6%	87.5%	91.9%
Above 1.25m Hs	81.7%	74.5%	60.0%	41.4%	26.9%	18.2%	14.3%	16.4%	47.2%	78.7%	82.8%	87.1%
Above 1.5m Hs	76.4%	69.8%	53.0%	35.3%	20.6%	11.5%	9.3%	11.4%	36.0%	74.0%	77.6%	83.4%
Above 1.75m Hs	71.3%	63.1%	48.4%	28.8%	14.3%	6.3%	6.3%	7.7%	28.7%	68.8%	73.4%	78.9%
Above 2m Hs	67.1%	60.1%	44.6%	23.6%	10.7%	4.9%	5.0%	5.3%	22.9%	61.6%	69.8%	72.7%
Above 2.25m Hs	61.7%	55.4%	40.3%	19.7%	7.7%	2.8%	3.6%	3.8%	19.1%	53.8%	62.9%	67.7%
Above 2.5m Hs	55.3%	49.9%	34.7%	16.3%	5.4%	1.5%	2.4%	3.1%	15.3%	46.8%	56.7%	61.6%
Above 2.75m Hs	49.3%	45.1%	29.0%	12.5%	3.9%	1.0%	1.1%	2.2%	11.1%	40.0%	49.4%	56.1%
Above 3m Hs	43.1%	38.9%	24.8%	9.7%	2.7%	0.3%	0.4%	1.6%	8.1%	33.4%	40.0%	46.6%
Above 3.25m Hs	36.3%	31.7%	21.5%	8.3%	1.8%	0.1%	0.0%	0.2%	5.7%	27.3%	34.6%	40.9%
Above 3.5m Hs	31.6%	26.9%	17.4%	6.5%	1.1%	0.0%	0.0%	0.0%	3.8%	19.6%	27.2%	32.2%
Above 4m Hs	19.2%	15.4%	9.3%	2.2%	0.0%	0.0%	0.0%	0.0%	2.4%	13.1%	17.5%	22.5%
Above 5m Hs	3.8%	2.7%	2.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	4.5%	4.6%

P80 calculations / 80%風險估算

Typhoon Season 颱風期

P80 Hs limits	January	February	March	April	May	June	July	August	September	October	November	December
Above 1m Hs	92.4%	88.5%	74.5%	57.4%	45.4%	43.0%	30.6%	41.6%	67.7%	94.3%	94.4%	97.6%
Above 1.25m Hs	87.9%	85.2%	69.3%	47.3%	36.4%	29.2%	22.8%	29.9%	56.4%	90.5%	90.4%	95.9%
Above 1.5m Hs	82.9%	80.6%	62.8%	43.5%	28.8%	21.1%	15.9%	23.3%	48.1%	85.0%	86.2%	90.7%
Above 1.75m Hs	78.6%	75.8%	58.0%	38.2%	23.5%	17.7%	12.8%	19.1%	39.5%	80.2%	80.7%	86.8%
Above 2m Hs	73.8%	71.3%	52.3%	32.4%	18.9%	16.1%	9.4%	15.4%	32.3%	73.2%	74.1%	82.2%
Above 2.25m Hs	70.3%	66.2%	45.5%	28.5%	15.9%	10.2%	7.4%	11.8%	28.4%	64.0%	68.6%	76.1%
Above 2.5m Hs	63.9%	60.9%	39.7%	23.8%	10.1%	6.5%	7.0%	10.3%	22.6%	57.2%	62.8%	70.9%
Above 2.75m Hs	56.4%	56.2%	35.1%	19.1%	6.6%	4.1%	6.2%	8.4%	18.9%	48.3%	58.3%	66.4%
Above 3m Hs	50.2%	50.6%	31.2%	16.4%	4.6%	3.2%	5.3%	7.1%	15.8%	39.7%	53.7%	62.3%
Above 3.25m Hs	45.5%	45.7%	28.2%	12.3%	3.9%	1.8%	4.8%	5.4%	13.2%	34.2%	45.6%	52.7%
Above 3.5m Hs	39.4%	40.2%	22.9%	10.1%	3.4%	1.1%	3.5%	4.4%	10.7%	28.4%	39.2%	46.6%
Above 4m Hs	28.4%	28.0%	15.2%	5.9%	1.6%	0.3%	2.0%	2.5%	7.3%	18.0%	26.7%	34.3%
Above 5m Hs	10.7%	9.0%	4.2%	1.1%	0.0%	0.0%	0.9%	1.2%	3.9%	7.3%	9.0%	11.1%



Tropical cyclones from 1980-2005 over South China and Taiwan. Bad weather is a major problem the engineers have to face (photo: NASA/Joint Typhoon Warning Centre/Nilfanion)
1980 - 2005年中國南方和台灣的熱帶氣旋。惡劣天氣是工程師必須面對的主要問題（圖片：美國宇航局/聯合颱風警報中心/ Nilfanion）

Note! 備註
June, July, August and September data does not take Typhoons into consideration
6-9月的資訊並未將颱風納入考量

Preliminary Hai Long Vessel requirements during Construction period
海龍專案施工期船隻需求

類別 TYPE	探測船(地球物理調查船) Survey vessels (Geophysical survey vessels)
基本規格 Basic specifications	甲板面積550m^2、工作吃水深5.5m、船速可達10節以上、抗浪性2.0m - 2.5m波高、最低容納住宿20人。
機具規格 Machine specifications	DP2、多音束聲納、側掃聲納、ROV、甲板上具備2座吊幅寬10m時可吊重1.5噸之起重機。
需用期間(暫估) Estimate Period	2019年07月~2019年08月 2020年07月~2020年08月
數量(暫估) Estimate Quantity	1(APX.)
需用人員(暫估) Estimate Crews or Operators	最低5個DP2操作手、10個船員。 (需可連續7天24小時作業之人數)
備註 Remarks	根據符合國際安全管理（ISM）規則的安全管理系統，可能需要海上安全培訓（MST）或GWO訓練或STCW或BOSIET。

Photo for illustration purposes

Preliminary Hai Long Vessel requirements during Construction period
海龍專案施工期船隻需求

類別 TYPE	探測船(鑽探船) Survey vessels (Drilling vessels)
基本規格 Basic specifications	甲板面積550m^2、工作吃水深5.5m、船速可達10節以上、抗浪性1.25m - 1.75m波高、最低容納住宿20人。
機具規格 Machine specifications	DP2、具備取心鑽探及圓錐貫入試驗(Cone Penetration Test)之設備、ROV、具備2座至少10m長吊臂並可吊重1.5噸之起重機。
需用期間(暫估) Estimate Period	2019年05月~2019年06月 2020年05月~2020年08月
數量(暫估) Estimate Quantity	1(APX.)
需用人員(暫估) Estimate Crews or Operators	最低5個DP2操作手、10個船員。 (需可連續7天24小時作業之人數)
備註 Remarks	根據符合國際安全管理（ISM）規則的安全管理系統，可能需要海上安全培訓（MST）或GWO訓練或STCW或BOSIET。

Photo for illustration purposes

Preliminary Hai Long Vessel requirements during Construction period
海龍專案施工期船隻需求

類別 TYPE	佈纜船(自航式佈纜船 Self- Propelled CLV) Cable laying vessels (Self- Propelled Cable laying vessels)
基本規格 Basic specifications	甲板面積3,500m2、工作吃水深6.5m、船速可達12節以上、可執行作業之水深至少10m、抗浪性2.0m – 2.5m波高、最低容納住宿60人。
機具規格 Machine specifications	DP2/DP3、具備電纜裝載能力2座5000噸電纜盤、電纜溝埋設系統(水刀或切割)、電纜裝載速度具備1,200m/hr之系統、停機坪。
需用期間(暫估) Estimate Period	2024年03月~2025年08月
數量(暫估) Estimate Quantity	1(APX.)
需用人員(暫估) Estimate Crews or Operators	最低5個DP2操作手、20個船員。 (需可連續7天24小時作業之人數)
備註 Remarks	根據符合國際安全管理（ISM）規則的安全管理系統，可能需要海上安全培訓（MST）或GWO訓練或STCW或BOSIET。

Photo for illustration purposes

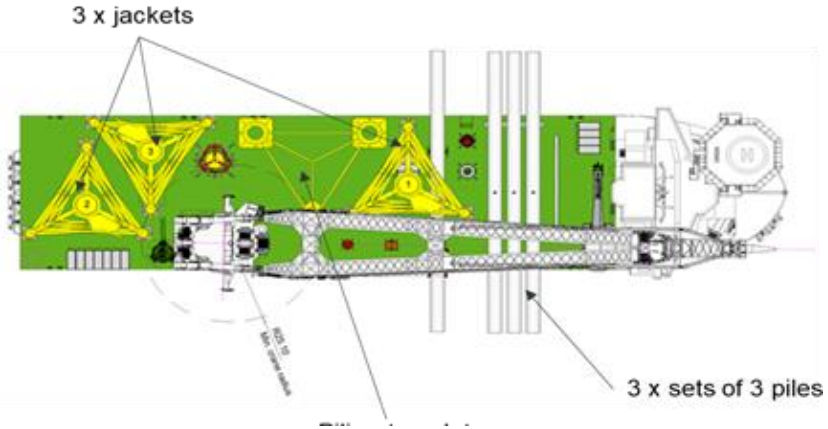
Preliminary Hai Long Vessel requirements during Construction period
海龍專案施工期船隻需求

類別 TYPE	自升式起重船(自航式 TIV) Jack-up vessels (Self- Propelled Turbine Installation vessels)
基本規格 Basic specifications	甲板面積2,000m2、工作吃水深7.0m、可執行作業之水深至少65m、船速可達10節以上、抗浪性2.0m – 2.5m波高、最低容納住宿50人。
機具規格 Machine specifications	DP2、頂升能力達13,250噸、4支撐棒錨達預壓須達6,210噸、攬風繩含絞機、安裝風機所需掛鉤高度為+120 m MSL、大面積樁靴、停機坪
需用期間(暫估) Estimate Period	2025年04月~2026年08月
數量(暫估) Estimate Quantity	1(APX.)
需用人員(暫估) Estimate Crews or Operators	最低5個DP2操作手、20個船員。 (需可連續7天24小時作業之人數)
備註 Remarks	根據符合國際安全管理（ISM）規則的安全管理系統，可能需要海上安全培訓（MST）或GWO訓練或STCW或BOSIET。

Photo for illustration purposes

Preliminary Hai Long Vessel requirements during Construction period
海龍專案施工期船隻需求

類別 TYPE	浮式起重船(打樁船) Floating crane vessels (Pile driving vessels)
基本規格 Basic specifications	甲板面積8,000m2、工作吃水深11.0m、船速可達10節以上、抗浪性1.5m – 3.0m波高、有效載荷能力30,000噸、最低容納住宿80人。
機具規格 Machine specifications	DP2/DP3、具備吊幅寬57m時可吊重3,000噸及並35m時可吊重5,000噸之起重機、2座可達100噸之輔助起重機、含輕柴油及液化天然氣兩種燃料來源供馬力達44,180kw、月池19.6 x 10.5m、8處繫泊系統、停機坪。
需用期間(暫估) Estimate Period	2023年03月~ 2024年05月
數量(暫估) Estimate Quantity	1(APX.)
需用人員(暫估) Estimate Crews or Operators	最低6個DP2操作手、32個船員。 (需可連續7天24小時作業之人數)
備註 Remarks	根據符合國際安全管理（ISM）規則的安全管理系統，可能需要海上安全培訓（MST）或GWO訓練或STCW或BOSIET。

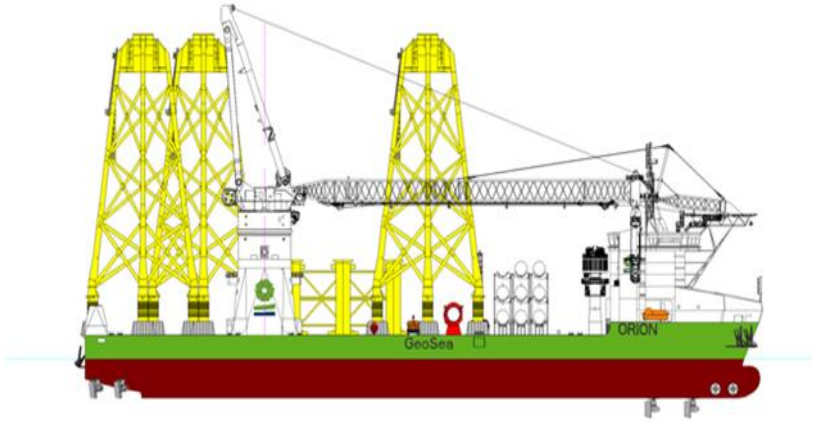


Deck layout: For illustration purposes only

甲板配置圖：僅示意用

Preliminary Hai Long Vessel requirements during Construction period
海龍專案施工期船隻需求

類別 TYPE	浮式起重船(水下基礎安裝船) Floating crane vessels (Offshore Jacket installation vessels)
基本規格 Basic specifications	甲板面積8,000m2、工作吃水深11.0m、船速可達10節以上、抗浪性1.5m – 3.0m波高、有效載荷能力30,000噸、最低容納住宿80人。
機具規格 Machine specifications	DP2/DP3、具備吊幅寬57m時可吊重3,000噸及並35m時可吊重5,000噸之起重機、2座可達100噸之輔助起重機、含輕柴油及液化天然氣兩種燃料來源供馬力達44,180kw、月池19.6 x 10.5m、8處繫泊系統、停機坪。
需用期間(暫估) Estimate Period	2024年06月~ 2025年06月
數量(暫估) Estimate Quantity	1(APX.)
需用人員(暫估) Estimate Crews or Operators	最低6個DP2操作手、32個船員。 (需可連續7天24小時作業之人數)
備註 Remarks	根據符合國際安全管理（ISM）規則的安全管理系統，可能需要海上安全培訓（MST）或GWO訓練或STCW或BOSIET。



Deck layout: For illustration purposes only

甲板配置圖：僅示意用

Preliminary Hai Long Vessel requirements during Construction period
海龍專案施工期船隻需求

類別 TYPE	浮式起重船(海上變電站安裝船) Floating crane vessels (Offshore SubStation installation vessels)
基本規格 Basic specifications	甲板面積8,000m2、工作吃水深11.0m、船速可達10節以上、抗浪性1.5m – 3.0m波高、有效載荷能力30,000噸、最低容納住宿80人。
機具規格 Machine specifications	DP2/DP3、具備吊幅寬57m時可吊重3,000噸及並35m時可吊重5,000噸之起重機、2座可達100噸之輔助起重機、含輕柴油及液化天然氣兩種燃料來源供馬力達44,180kw、月池19.6 x 10.5m、8處繫泊系統、停機坪。
需用期間(暫估) Estimate Period	2024年05月~2024年05月 2025年05月~2025年05月
數量(暫估) Estimate Quantity	1(APX.)
需用人員(暫估) Estimate Crews or Operators	最低6個DP2操作手、32個船員。 (需可連續7天24小時作業之人數)
備註 Remarks	根據符合國際安全管理（ISM）規則的安全管理系統，可能需要海上安全培訓（MST）或GWO訓練或STCW或BOSIET。

Large crane vessel required for Jacket and Topside installation
需大型起重船作為海上變電站之基礎及上部結構安裝用

Preliminary Hai Long Vessel requirements during Construction period
海龍專案施工期船隻需求

類別 TYPE	挖泥船 Dredging vessels
基本規格 Basic specifications	甲板面積400m2、工作吃水深10.0m、船速可達15節以上、抗浪性3.0m波高、最低容納住宿5人、可浚挖至65m水深處(含潮差及湧浪差異)。
機具規格 Machine specifications	DP2、疏浚深度超過65m水深的耙吸管、16,000kW推進動力，可調螺距螺旋槳。
需用期間(暫估) Estimate Period	2023年03月~2023年04月 2023年06月~2023年07月 2024年06月~2024年07月
數量(暫估) Estimate Quantity	1(APX.)
需用人員(暫估) Estimate Crews or Operators	最低2個DP2操作手、12個船員。 (需可連續7天24小時作業之人數)
備註 Remarks	根據符合國際安全管理（ISM）規則的安全管理系統，可能需要海上安全培訓（MST）或GWO訓練或STCW或BOSIET。

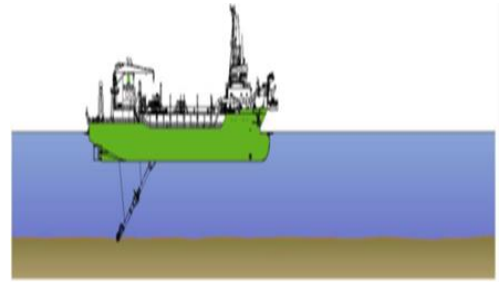
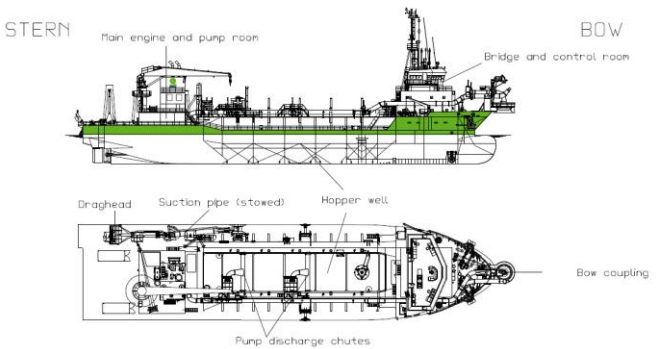


Photo for illustration purposes
浚挖船示意圖



Preliminary Hai Long Vessel requirements during Construction period
海龍專案施工期船隻需求

類別 TYPE	拋石船 Dumping vessels
基本規格 Basic specifications	工作吃水深7.0m、船速可達10節以上、抗浪性2.5 – 3.0m波高、最低容納住宿30人、拋石落管系統可拋至1,000m。
機具規格 Machine specifications	DP2、ROV、載重能力12,000噸。
需用期間(暫估) Estimate Period	待設計定案後決定
數量(暫估) Estimate Quantity	待設計定案後決定
需用人員(暫估) Estimate Crews or Operators	最低5個DP2操作手、20個船員。 (需可連續7天24小時作業之人數)
備註 Remarks	根據符合國際安全管理（ISM）規則的安全管理系統，可能需要海上安全培訓（MST）或GWO訓練或STCW或BOSIET。

Photo for illustration purposes

Figure 4-1, Filter layer installation

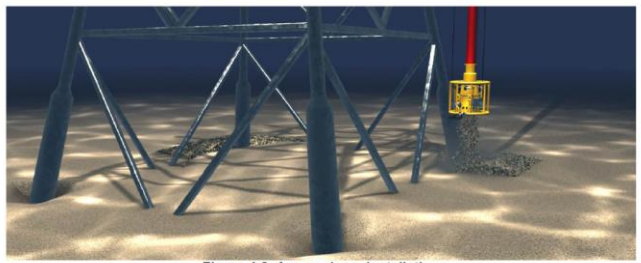


Figure 4-2, Armour layer installation

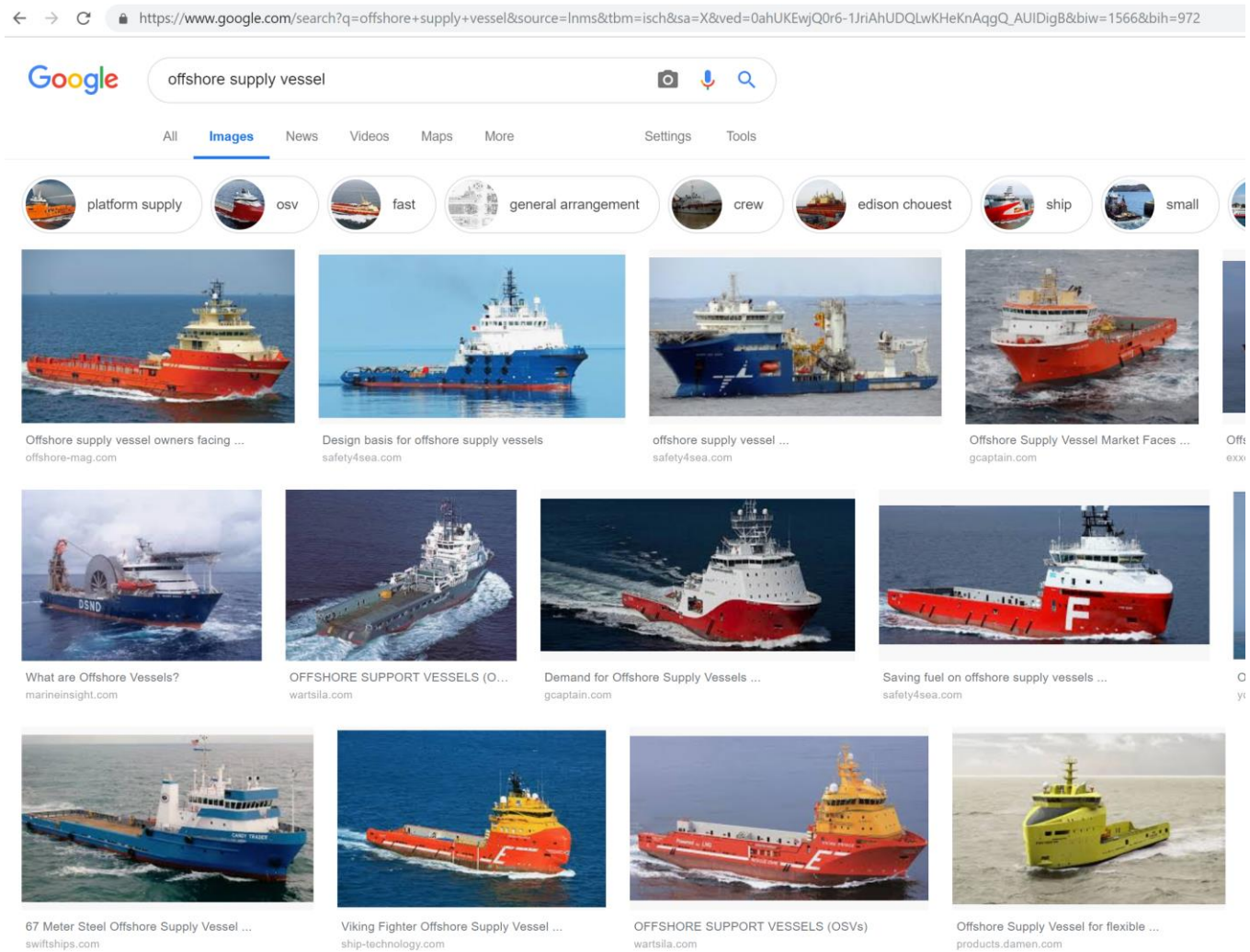
PRESENTATION CONTENT / 目錄

Safety does not happen by accident | 安全並非偶然

Don’t we love a good photo?
我們都愛看漂亮的照片

Most of them are taken in flat calm weather
大部分的照片都是在好天氣時拍攝的

Perfect to be a support vessel in these conditions ☺
要保持這樣的狀況需要支援船的協助☺



Safety does not happen by accident | 安全並非偶然

Don’t we love a good photo?
我們都愛看漂亮的照片

Most of them are taken in flat calm weather
大部分的照片都是在好天氣時拍攝的

Perfect to be a support vessel in these conditions
要保持這樣的狀況需要支援船的協助

Safety does not happen by accident | 安全並非偶然

UK Guard / ERRV vessel
英國警戒/緊急救援船

What do you think the Hs is now?
你認為目前的有義波高是多少?

Safety does not happen by accident | 安全並非偶然

Staying on station means “riding the waves”

乘風破浪，與海共處

Safety does not happen by accident | 安全並非偶然

Staying on station means "riding the waves"

乘風破浪，與海共處

Hai Long- Metocean data- 37 years (1979 – 2016) average Hs on site
海龍專案-海洋氣象資訊-37年平均示性波高

P50 calculations / 50%風險估算

P50 Hs limits	January	February	March	April	May	June	July	August	September	October	November	December
Above 1m Hs	87.7%	80.1%	67.1%	48.5%	36.1%	30.0%	21.9%	31.5%	58.4%	83.6%	87.5%	91.9%
Above 1.25m Hs	81.7%	74.5%	60.0%	41.4%	26.9%	18.2%	14.3%	16.4%	47.2%	78.7%	82.8%	87.1%
Above 1.5m Hs	76.4%	69.8%	53.0%	35.3%	20.6%	11.5%	9.3%	11.4%	36.0%	74.0%	77.6%	83.4%
Above 1.75m Hs	71.3%	63.1%	48.4%	28.8%	14.3%	6.3%	6.3%	7.7%	28.7%	68.8%	73.4%	78.9%
Above 2m Hs	67.1%	60.1%	44.6%	23.6%	10.7%	4.9%	5.0%	5.3%	22.9%	61.6%	69.8%	72.7%
Above 2.25m Hs	61.7%	55.4%	40.3%	19.7%	7.7%	2.8%	3.6%	3.8%	19.1%	53.8%	62.9%	67.7%
Above 2.5m Hs	55.3%	49.9%	34.7%	16.3%	5.4%	1.5%	2.4%	3.1%	15.3%	46.8%	56.7%	61.6%
Above 2.75m Hs	49.3%	45.1%	29.0%	12.5%	3.9%	1.0%	1.1%	2.2%	11.1%	40.0%	49.4%	56.1%
Above 3m Hs	43.1%	38.9%	24.8%	9.7%	2.7%	0.3%	0.4%	1.6%	8.1%	33.4%	40.0%	46.6%
Above 3.25m Hs	36.3%	31.7%	21.5%	8.3%	1.8%	0.1%	0.0%	0.2%	5.7%	27.3%	34.6%	40.9%
Above 3.5m Hs	31.6%	26.9%	17.4%	6.5%	1.1%	0.0%	0.0%	0.0%	3.8%	19.6%	27.2%	32.2%
Above 4m Hs	19.2%	15.4%	9.3%	2.2%	0.0%	0.0%	0.0%	0.0%	2.4%	13.1%	17.5%	22.5%
Above 5m Hs	3.8%	2.7%	2.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	4.5%	4.6%

P80 calculations / 80%風險估算

P80 Hs limits	January	February	March	April	May	June	July	August	September	October	November	December
Above 1m Hs	92.4%	88.5%	74.5%	57.4%	45.4%	43.0%	30.6%	41.6%	67.7%	94.3%	94.4%	97.6%
Above 1.25m Hs	87.9%	85.2%	69.3%	47.3%	36.4%	29.2%	22.8%	29.9%	56.4%	90.5%	90.4%	95.9%
Above 1.5m Hs	82.9%	80.6%	62.8%	43.5%	28.8%	21.1%	15.9%	23.3%	48.1%	85.0%	86.2%	90.7%
Above 1.75m Hs	78.6%	75.8%	58.0%	38.2%	23.5%	17.7%	12.8%	19.1%	39.5%	80.2%	80.7%	86.8%
Above 2m Hs	73.8%	71.3%	52.3%	32.4%	18.9%	16.1%	9.4%	15.4%	32.3%	73.2%	74.1%	82.2%
Above 2.25m Hs	70.3%	66.2%	45.5%	28.5%	15.9%	10.2%	7.4%	11.8%	28.4%	64.0%	68.6%	76.1%
Above 2.5m Hs	63.9%	60.9%	39.7%	23.8%	10.1%	6.5%	7.0%	10.3%	22.6%	57.2%	62.8%	70.9%
Above 2.75m Hs	56.4%	56.2%	35.1%	19.1%	6.6%	4.1%	6.2%	8.4%	18.9%	48.3%	58.3%	66.4%
Above 3m Hs	50.2%	50.6%	31.2%	16.4%	4.6%	3.2%	5.3%	7.1%	15.8%	39.7%	53.7%	62.3%
Above 3.25m Hs	45.5%	45.7%	28.2%	12.3%	3.9%	1.8%	4.8%	5.4%	13.2%	34.2%	45.6%	52.7%
Above 3.5m Hs	39.4%	40.2%	22.9%	10.1%	3.4%	1.1%	3.5%	4.4%	10.7%	28.4%	39.2%	46.6%
Above 4m Hs	28.4%	28.0%	15.2%	5.9%	1.6%	0.3%	2.0%	2.5%	7.3%	18.0%	26.7%	34.3%
Above 5m Hs	10.7%	9.0%	4.2%	1.1%	0.0%	0.0%	0.9%	1.2%	3.9%	7.3%	9.0%	11.1%

Specialist vessels with high workability is required to meet the schedule!

需要具有高可操作性的專業船舶才能滿足期程需求！

Hai Long- Metocean data- 37 years (1979 – 2016) average Hs on site
海龍專案-海洋氣象資訊-37年平均示性波高

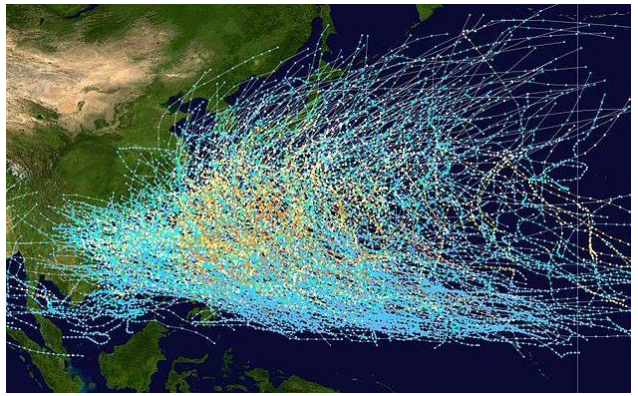
P50 calculations / 50%風險估算

P50 Hs limits	January	February	March	April	May	June	July	August	September	October	November	December
Above 1m Hs	87.7%	80.1%	67.1%	48.5%	36.1%	30.0%	21.9%	31.5%	58.4%	83.6%	87.5%	91.9%
Above 1.25m Hs	81.7%	74.5%	60.0%	41.4%	26.9%	18.2%	14.3%	16.4%	47.2%	78.7%	82.8%	87.1%
Above 1.5m Hs	76.4%	69.8%	53.0%	35.3%	20.6%	11.5%	9.3%	11.4%	36.0%	74.0%	77.6%	83.4%
Above 1.75m Hs	71.3%	63.1%	48.4%	28.8%	14.3%	6.3%	6.3%	7.7%	28.7%	68.8%	73.4%	78.9%
Above 2m Hs	67.1%	60.1%	44.6%	23.6%	10.7%	4.9%	5.0%	5.3%	22.9%	61.6%	69.8%	72.7%
Above 2.25m Hs	61.7%	55.4%	40.3%	19.7%	7.7%	2.8%	3.6%	3.8%	19.1%	53.8%	62.9%	67.7%
Above 2.5m Hs	55.3%	49.9%	34.7%	16.3%	5.4%	1.5%	2.4%	3.1%	15.3%	46.8%	56.7%	61.6%
Above 2.75m Hs	49.3%	45.1%	29.0%	12.5%	3.9%	1.0%	1.1%	2.2%	11.1%	40.0%	49.4%	56.1%
Above 3m Hs	43.1%	38.9%	24.8%	9.7%	2.7%	0.3%	0.4%	1.6%	8.1%	33.4%	40.0%	46.6%
Above 3.25m Hs	36.3%	31.7%	21.5%	8.3%	1.8%	0.1%	0.0%	0.2%	5.7%	27.3%	34.6%	40.9%
Above 3.5m Hs	31.6%	26.9%	17.4%	6.5%	1.1%	0.0%	0.0%	0.0%	3.8%	19.6%	27.2%	32.2%
Above 4m Hs	19.2%	15.4%	9.3%	2.2%	0.0%	0.0%	0.0%	0.0%	2.4%	13.1%	17.5%	22.5%
Above 5m Hs	3.8%	2.7%	2.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	4.5%	4.6%

P80 calculations / 80%風險估算

Typhoon Season 颱風期

P80 Hs limits	January	February	March	April	May	June	July	August	September	October	November	December
Above 1m Hs	92.4%	88.5%	74.5%	57.4%	45.4%	43.0%	30.6%	41.6%	67.7%	94.3%	94.4%	97.6%
Above 1.25m Hs	87.9%	85.2%	69.3%	47.3%	36.4%	29.2%	22.8%	29.9%	56.4%	90.5%	90.4%	95.9%
Above 1.5m Hs	82.9%	80.6%	62.8%	43.5%	28.8%	21.1%	15.9%	23.3%	48.1%	85.0%	86.2%	90.7%
Above 1.75m Hs	78.6%	75.8%	58.0%	38.2%	23.5%	17.7%	12.8%	19.1%	39.5%	80.2%	80.7%	86.8%
Above 2m Hs	73.8%	71.3%	52.3%	32.4%	18.9%	16.1%	9.4%	15.4%	32.3%	73.2%	74.1%	82.2%
Above 2.25m Hs	70.3%	66.2%	45.5%	28.5%	15.9%	10.2%	7.4%	11.8%	28.4%	64.0%	68.6%	76.1%
Above 2.5m Hs	63.9%	60.9%	39.7%	23.8%	10.1%	6.5%	7.0%	10.3%	22.6%	57.2%	62.8%	70.9%
Above 2.75m Hs	56.4%	56.2%	35.1%	19.1%	6.6%	4.1%	6.2%	8.4%	18.9%	48.3%	58.3%	66.4%
Above 3m Hs	50.2%	50.6%	31.2%	16.4%	4.6%	3.2%	5.3%	7.1%	15.8%	39.7%	53.7%	62.3%
Above 3.25m Hs	45.5%	45.7%	28.2%	12.3%	3.9%	1.8%	4.8%	5.4%	13.2%	34.2%	45.6%	52.7%
Above 3.5m Hs	39.4%	40.2%	22.9%	10.1%	3.4%	1.1%	3.5%	4.4%	10.7%	28.4%	39.2%	46.6%
Above 4m Hs	28.4%	28.0%	15.2%	5.9%	1.6%	0.3%	2.0%	2.5%	7.3%	18.0%	26.7%	34.3%
Above 5m Hs	10.7%	9.0%	4.2%	1.1%	0.0%	0.0%	0.9%	1.2%	3.9%	7.3%	9.0%	11.1%



Tropical cyclones from 1980-2005 over South China and Taiwan. Bad weather is a major problem the engineers have to face (photo: NASA/Joint Typhoon Warning Centre/Nilfanion)
1980 - 2005年中國南方和台灣的熱帶氣旋。惡劣天氣是工程師必須面對的主要問題（圖片：美國宇航局/聯合颱風警報中心/ Nilfanion）

Note! 備註
June, July, August and September data does not take Typhoons into consideration
6-9月的資訊並未將颱風納入考量

Preliminary Hai Long Vessel requirements during Construction period
海龍專案施工期船隻需求

類別 TYPE	拖船 Tug
基本規格 Basic specifications	工作吃水深3.9m、船速可達12節以上、拖帶時抗浪性1.25m波高、最低容納住宿12人、繫纜拖力64MT。
機具規格 Machine specifications	續航力1,400NM。
需用期間(暫估) Estimate Period	2023年01月~2024年03月
數量(暫估) Estimate Quantity	2(APX.)
需用人員(暫估) Estimate Crews or Operators	12個船員。 (需可連續7天24小時作業之人數)
備註 Remarks	根據符合國際安全管理（ISM）規則的安全管理系統，可能需要海上安全培訓（MST）或GWO訓練或STCW或BOSIET。

Barge towing tugs- along the Taiwan coast
拖船-台灣沿岸

Preliminary Hai Long Vessel requirements during Construction period
海龍專案施工期船隻需求

類別 TYPE	起/佈錨船 Anchor vessels
基本規格 Basic specifications	甲板面積400m2、工作吃水深5.0m、船速可達10節以上拖帶時抗浪性1.5m波高、最低容納住宿25人、繫纜拖力80MT。
機具規格 Machine specifications	DP2、依作業範圍特定的牽引和錨固系統、備用拖帶繩
需用期間(暫估) Estimate Period	2023年03月~2024年05月
數量(暫估) Estimate Quantity	2(APX.)
需用人員(暫估) Estimate Crews or Operators	最低5個DP2操作手、12-14個船員。 (需可連續7天24小時作業之人數)
備註 Remarks	根據符合國際安全管理（ISM）規則的安全管理系統，可能需要海上安全培訓（MST）或GWO訓練或STCW或BOSIET。

AHTS for long haul barge transportation and offshore support work
安錨船用於長途駁船運輸和離岸海事工程支援工作

Preliminary Hai Long Vessel requirements during Construction period
海龍專案施工期船隻需求

類別 TYPE	水泥拌合船 Grouting vessels
基本規格 Basic specifications	甲板面積400m2、工作吃水深5.0m、船速可達10節以上抗浪性1.25m波高、最低容納住宿25人。
機具規格 Machine specifications	DP2、ROV、400m2淡水槽及抽水馬達(攪拌混凝土使用)、人員轉移所需之走道連結系統。
需用期間(暫估) Estimate Period	2024年06月~2025年06月
數量(暫估) Estimate Quantity	0-1(APX.)
需用人員(暫估) Estimate Crews or Operators	最低5個DP2操作手、12-14個船員。 (需可連續7天24小時作業之人數)
備註 Remarks	根據符合國際安全管理（ISM）規則的安全管理系統，可能需要海上安全培訓（MST）或GWO訓練或STCW或BOSIET。

Photo for illustration purposes

Preliminary Hai Long Vessel requirements during Construction period
海龍專案施工期船隻需求

類別 TYPE	生態調查船 Ecological survey vessels
基本規格 Basic specifications	工作吃水深3.0m、船速可達10節以上、抗浪性1.5m波高。
機具規格 Machine specifications	探測雷達、GPS、聲納、需有足夠停留至海上14-21天之燃料(輕柴油)容量、快速救援工具（FRC）。
需用期間(暫估) Estimate Period	2023年03月~2024年05月
數量(暫估) Estimate Quantity	1-2(APX.) （具體數量和需求會依據後續環評要求做相應更改）
需用人員(暫估) Estimate Crews or Operators	當地船舶最低需求人數 (需可連續7天24小時作業之人數)
備註 Remarks	根據符合國際安全管理（ISM）規則的安全管理系統，可能需要海上安全培訓（MST）或GWO訓練或STCW或BOSIET。

Photo for illustration purposes

Preliminary Hai Long Vessel requirements during Construction period
海龍專案施工期船隻需求

類別 TYPE	警戒船 Guarding vessels
基本規格 Basic specifications	工作吃水深3.0m、船速可達10節以上、抗浪性1.5m波高、最低容納住宿5人。
機具規格 Machine specifications	DP2、探測雷達、GPS、聲納、需有足夠停留至海上14-21天之燃料(輕柴油)容量、快速救援工具（FRC）。
需用期間(暫估) Estimate Period	2023年03月~2026年10月
數量(暫估) Estimate Quantity	1-2(APX.) （具體數量和需求會依據後續環評要求做相應更改）
需用人員(暫估) Estimate Crews or Operators	當地船舶最低需求人數 (需可連續7天24小時作業之人數)
備註 Remarks	根據符合國際安全管理（ISM）規則的安全管理系統，可能需要海上安全培訓（MST）或GWO訓練或STCW或BOSIET。

Photo for illustration purposes

Preliminary Hai Long Vessel requirements during Construction period
海龍專案施工期船隻需求

類別 TYPE	人員運輸船(小型人員運輸船CTV) Crew Transfer Vessels
基本規格 Basic specifications	甲板面積75m2、工作吃水深1.75m、船速可達22節以上抗浪性1.0 – 1.5m波高、最低容納住宿12人、前甲板載重需可達10噸(20英尺貨櫃)。
機具規格 Machine specifications	具備吊幅寬6.5m時可吊重2.9噸之起重機、高壓沖洗設備平台。
需用期間(暫估) Estimate Period	2024年06月~2025年08月
數量(暫估) Estimate Quantity	2(APX.)
需用人員(暫估) Estimate Crews or Operators	2個船員。 (需可連續7天24小時作業之人數)
備註 Remarks	根據符合國際安全管理（ISM）規則的安全管理系統，可能需要海上安全培訓（MST）或GWO訓練或STCW或BOSIET。

Photo for illustration purposes

Preliminary Hai Long Vessel requirements during Construction period
海龍專案施工期船隻需求

類別 TYPE	人員運輸船(大型人員運輸住宿支援船SOV) Crew Transfer Vessels (Service Operation Vessels)
基本規格 Basic specifications	甲板面積250m2、工作吃水深5.5m、船速可達10節以上抗浪性1.5m(人員運輸轉移時) – 3.0m(待工時)波高、最低容納住宿40人、前甲板載重需可達10噸(20英尺貨櫃)
機具規格 Machine specifications	DP2、具備吊幅寬9m時可吊重50噸之起重機、船舶間走道舷梯、運輸燃料之能力、休息娛樂室。
需用期間(暫估) Estimate Period	2025年04月~2026年10月
數量(暫估) Estimate Quantity	1(APX.)
需用人員(暫估) Estimate Crews or Operators	最低5個DP2操作手、12-14個船員。 (需可連續7天24小時作業之人數)
備註 Remarks	根據符合國際安全管理（ISM）規則的安全管理系統，可能需要海上安全培訓（MST）或GWO訓練或STCW或BOSIET。

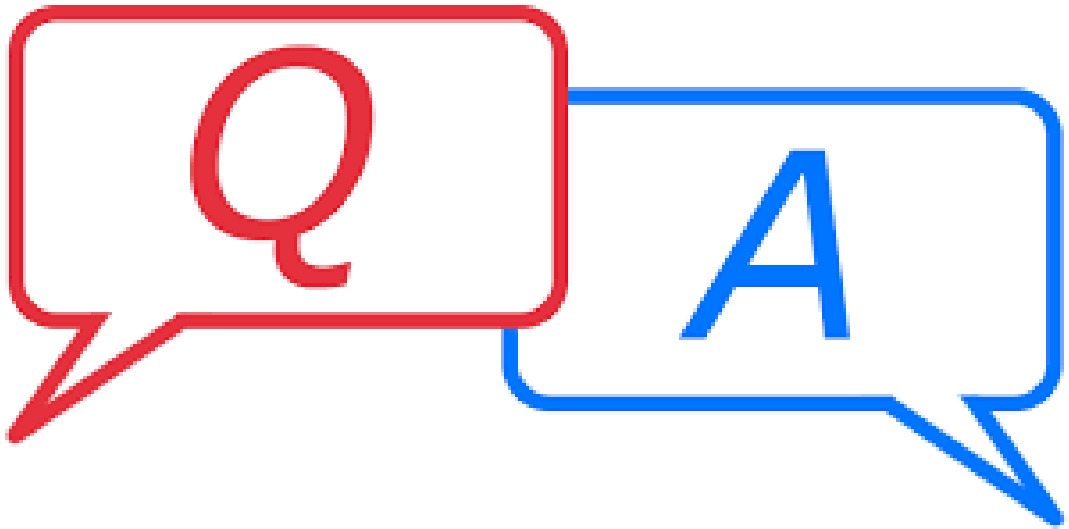
Photo for illustration purposes

Preliminary Hai Long Vessel requirements during Construction period
海龍專案施工期船隻需求

類別 TYPE	駁船(浮式無動力駁船) Barge (Floating non-powered Barge)
基本規格 Basic specifications	船長140m以上、工作吃水深5.5m、最低可運載3組以上基礎(局部甲板載重能力20MT/m2)、最低抗浪性1.0m波高。
機具規格 Machine specifications	具備調壓載設備(可因應台中港潮差)、具備錨定系統。
需用期間(暫估) Estimate Period	2023年03月~2023年08月 2024年03月~2023年08月 2025年03月~2025年06月
數量(暫估) Estimate Quantity	2(APX.)
需用人員(暫估) Estimate Crews or Operators	最低2-3個壓載操作手。 (需可連續7天24小時作業之人數)
備註 Remarks	根據符合國際安全管理（ISM）規則的安全管理系統，可能需要海上安全培訓（MST）或GWO訓練或STCW或BOSIET。

Photo for illustration purposes

PRESENTATION CONTENT / 目錄



Any other business ??

問題及其他事項

CDWE
台船環海風電工程公司