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# FLNG

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# FLNG Solutions Key Principles



## SMART Solutions

Low manning and OPEX optimization



Standard

## Standard Solutions

An expanding catalog of solutions based on standardized components



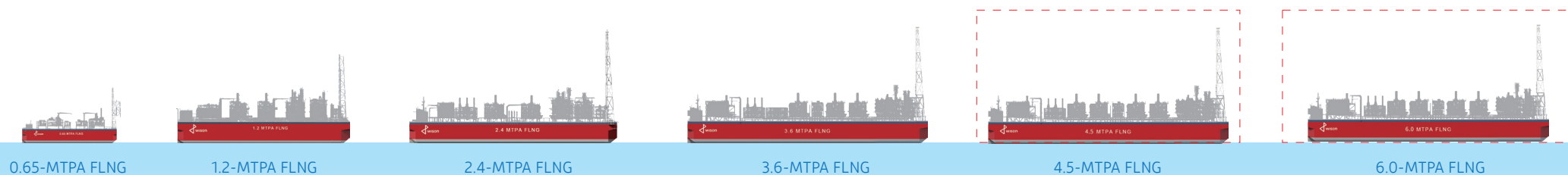
Low carbon

## Low Carbon Solutions

Low Emission solutions to meet market needs

Solutions

# FLNG Solutions Overview



Wison offers a standardized FLNG solutions ranging from 0.65 to 6.0 MTPA featuring:

- Chart IPSMR liquefaction technology

- MRC driven by GT or EM

- Simple open cycle or combined cycle power generation

- Jetty moored, spread moored or turret moored (external or internal)



# Key Design Parameters



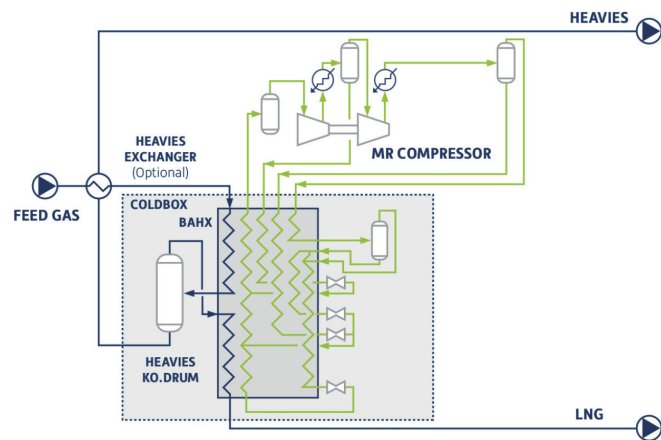
0.65 MTPA 1 train	1.3 MTPA 2 trains	2.4/3.6 MTPA 2/3 trains	4.5 MTPA 3 trains	6.0 MTPA 3 trains
Hull size 145m (L) x 32m (W) x 20m (D)	Hull size 290m (L) x 60m (W) x 35m (D)	Hull size 350m (L) x 60m (W) x 35m (D)	Hull size 350m (L) x 64m (W) x 39m (D)	Hull size 350m (L) x 64m (W) x 39m (D)
Cargo Containment System SPB	Cargo Containment System SPB	Cargo Containment System SPB	Cargo Containment System SPB	Cargo Containment System SPB
LNG storage capacity 20,000 m <sup>3</sup>	LNG storage capacity 180,000 m <sup>3</sup>	LNG storage capacity 180,000 / 225,000 m <sup>3</sup>	LNG storage capacity 180,000/225,000 m <sup>3</sup>	LNG storage capacity 180,000/225,000 m <sup>3</sup>
Liquefaction technology CHART IPSMR	Liquefaction technology CHART IPSMR	Liquefaction technology CHART IPSMR	Liquefaction technology CHART IPSMR	Liquefaction technology CHART IPSMR
Cooling media Water cooling / Air cooling	Cooling media Water cooling / Air cooling	Cooling media Water cooling / Air cooling	Cooling media Water cooling / Air cooling	Cooling media Water cooling / Air cooling
Gas turbine BH / Siemens / Solar	Gas turbine BH / Siemens / Solar	Gas turbine BH LM6000PF+ / Electrical	Gas turbine BH LM9000	Gas turbine BH LM9000 (IAC)
Mooring Jetty / Spread / Turret	Mooring Jetty / Spread / Turret	Mooring Jetty / Spread / Turret	Mooring Jetty / Spread / Turret	Mooring Jetty / Spread / Turret

**Note: Specification can be tailored according to clients' requirements**

# Key Components

## Chart IPSMR Liquefaction Technology

- Single mixed refrigerant cycle (SMR)
- Proprietary brazed aluminum heat exchangers
- No refrigerant pumps
- Higher efficiency compared to competing SMR technologies
- Less equipment and lower cost
- Modularized and scalable approach



## SPB Tank



- Proven technology with generic design shortens engineering duration
- Inherently safe, robust, sloshing-free and with low Boil-Off
- Established diversified local low-carbon supply chain reduces cost
- Dedicated facilities with auto-welding rate greater than 75%
- Independent fabrication ensures schedule benefits
- Delivery competency & commercial viability proven

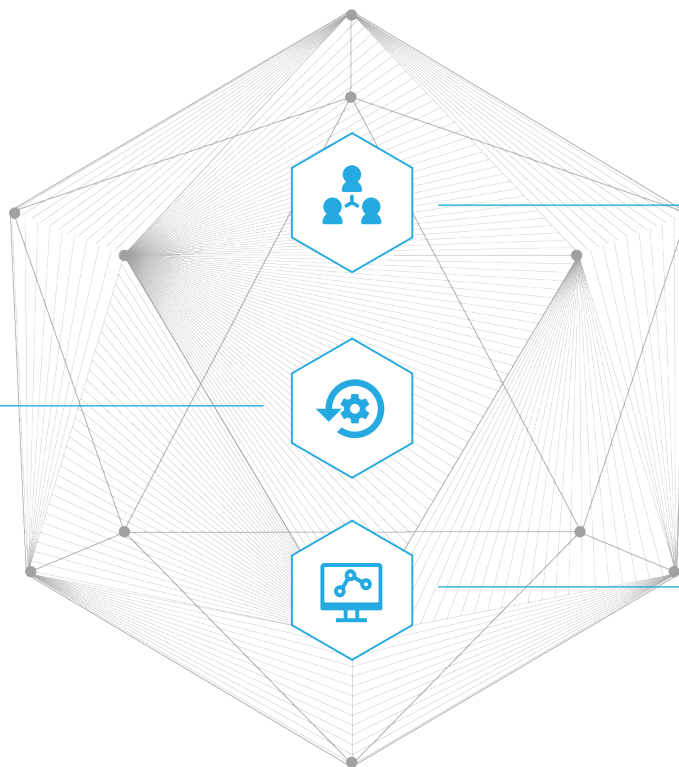


# Embedded Advanced Process Control



## Optimize Process Control

The ability to incorporate dynamic process modelling to provide tighter quality control, which in turn enables real-time, adaptive control to manage changing process conditions online.



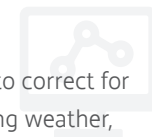
## Reduce Operation Staffing

The use of Embedded Advanced Process Control can significantly reduce operators on board with potential to achieve unmanned operation.



## Increase Efficiency

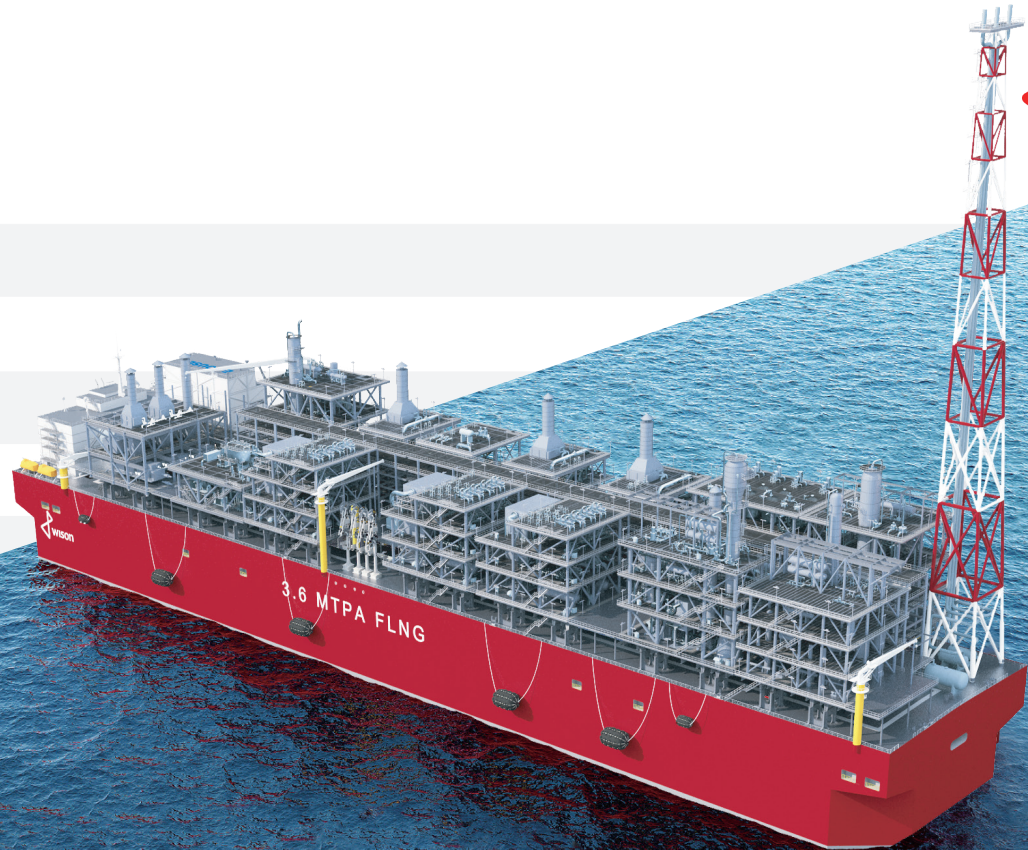
Automatically adjust controls to correct for disturbance caused by changing weather, process or utility conditions (including un-loading operation).





# Low Carbon Solutions

- Carbon Capture
- GT Air Inlet Chilling
- Combined cycle power generation
- High efficiency liquefaction cycles
- Reduced trip & flaring
- Optimized process configurations





# Onshore Solutions

Wison is expanding the application of its core solutions to onshore modularized plants.

- Standardized design with standard liquefaction modules
- Maximum modularization design
- Competitive CAPEX
- Improved Schedule

## Capacity:

- Liquefaction System: 1.2-3.3 MTPA / Train

## Main Equipment:

- MRC Driver: Gas Turbine / Motor
- Main Exchanger: Cold Box
- Gas Pre-Treatment: 4 Modules
  - Acid Gas Removal
  - Dehydration & Mercury Removal
  - NGL Extraction & Feed Gas Booster
  - Inlet Facilities & Condensate Stabilization



# Project Execution Approach



## Shanghai-based Head Office

- Product research & development, and standardized design
- FEED up to “Approved for Construction”
- Long Lead Item by global procurement
- Overall Project Management





# Nantong Yard - Hull & SPB Tank Construction



## Item

## Description

### 1- Dry dock

1. Size: 370m(L) X 68m(W) X 12m(D)
2. Lifting Capacity:
  - 1) 2000T Gantry Crane, 1 set
  - 2) 440T Gantry Crane, 2 sets
  - 3) 300T Gantry Crane, 2 sets

### 2- Quay

1. Heavy Load Quay: 225m (L)
2. Outfitting Quay: 317m (L)
3. Water Depth: 12m (D)

### 3- Skidway

1. Size: 600m(L)X42m(W)
2. Bearing Capacity: 60T/m<sup>2</sup>
3. Lifting Capacity:
  - 1) 300T Crane, 1 set
  - 2) 250T Crane, 1 set

### 4- SPB Tank Workshop

1. Area Covered: Approx. 50,000 m<sup>2</sup>
2. Capable of producing 16 sets of 50,000 m<sup>3</sup> SPB tanks annually.
3. Auto-welding rate exceeds 75% by utilizing automatic welding systems.
4. SPB tank and hull can be constructed in parallel reducing overall project schedule.





# Zhoushan Yard - Module Fabrication, Integration & Commissioning



## Item

## Description

### 1-Skidway

1. Size: 540m (L) x 210m (W)
2. Bearing Capacity: 263T/m<sup>2</sup>
3. Lifting Capacity:
  - 1) 800T Gantry Crane, 1 set
  - 2) 200T Gantry Crane, 2 sets

### 2-Quay

1. Heavy Load Quay: 223m
2. Outfitting Quay: 350m
3. Depth: 15m

- Sufficient facilities for topsides modules fabrication, integration and commissioning
- Experienced shop engineering, AQ/QC construction management team
- Yard Gas Trial available

## Key Benefits



- Standardized design significantly shortens schedule
- SPB tank and hull can be constructed in parallel reducing overall project schedule
- Cooperation agreement signed with key equipment suppliers to ensure rapid Long Lead Items PO placement
- Two modern shipyards to ensure safe and high-quality completion
- Single party responsible for engineering, procurement, construction, integration, commissioning reducing interface risks
- Gas trial available at the Zhoushan Yard to greatly reduce the risk of on-site commissioning and start-up



# Project Showcases



Project Name: Marine XII OFFSHORE FLNG Project  
Client: Eni  
WOM Scope of Work: FLNG EPCIC (2.4 MTPA)  
Sail away planned in 2025



Project Name: Tango FLNG Project  
Client: Exmar  
Successfully completed gas trial in Sep. 2016, and delivered in Jan. 2017  
Tango FLNG was the world's first barge-type FLNG with its quality fully proved in the operation.



Project Name: S188 FSRU  
Client: Exmar  
Delivered in Dec 2017  
World's first new-build FSRU barge