



Development of Aquaculture and Chinese Supply Chain

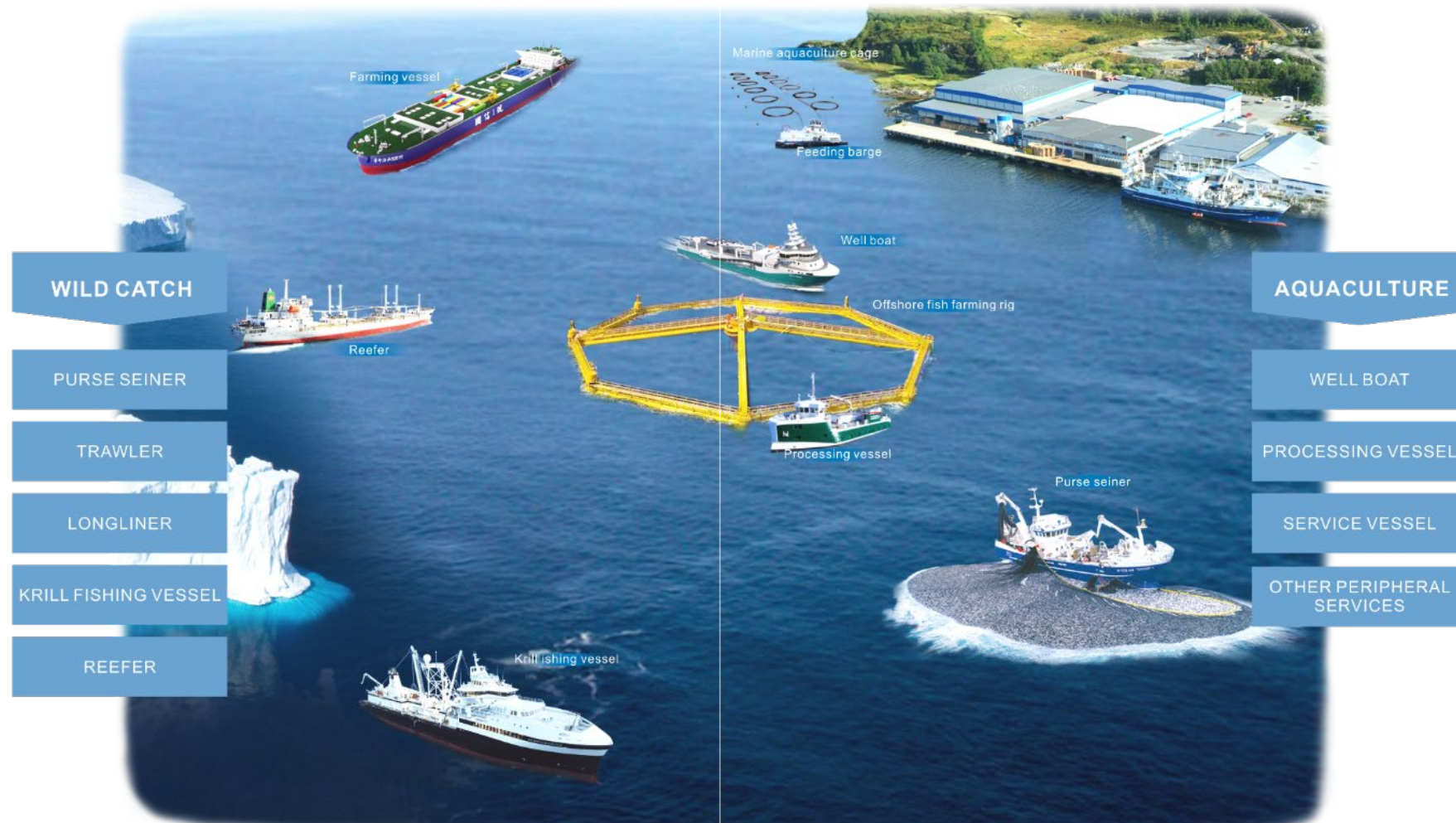
Michael He , Aquaculture Division , CSBY

Who Are We?

CSBY Group is a Chinese company focused on marine fishery aquaculture and fishing.

In aquaculture, we provide the following business services:

- Life support system solutions for trout and salmon
- Processing solution for farmed fish.
- Agency services for the design and supply of aquaculture facilities. (Net pens, service vessels, Well boat (LFC))



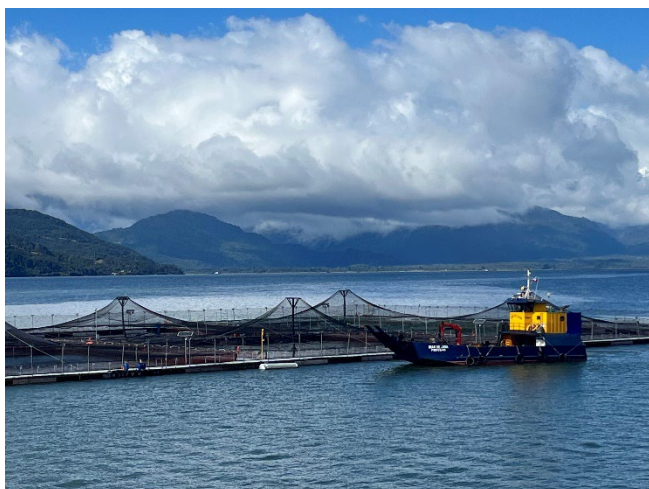
Who Am I ?

I work for CSBY as an engineer in the aquaculture division. I focus on product and technology advancement in aquaculture.

CSBY maintains good cooperation with investors and solution providers in Norway and Chile;

We will share China's aquaculture solutions from a Chinese perspective, hoping to offer more thought on this industry.

Meanwhile, we hope CSBY's three business services can create value for Russian investors!



Background

Tracing back the development of China's aquaculture, I will share the following stages:

- From the earliest nearshore aquaculture
- To offshore netpen farming
- To today's exploration of deep-sea aquaculture

Each stage has brought upgrades/ advancement in current Chinese aquaculture: from manual farming practices into gradual industrialization.

Now let me begin my presentation.

Topics

I will introduce the following aspects:

- Net pens (gravity HDPE type)
- Truss-type cage (fully submersible and others)
- Farming & process aquaculture vessels (functionally successful, but economic success has yet to be proven)
- Aquaculture service vessels (feed transport, management and maintenance, net cleaning, diver support, etc.)
- Live fish carrier vessels (well boat)
- Trout and salmon processing systems

Nearshore gravity HDPE net pens: mature supply chain, but limited wave resistance and profitability

China's nearshore aquaculture has long relied on **gravity HDPE deep-water net pens**, the largest stock of offshore aquaculture facilities in China, and the foundational equipment for nearshore marine ranching.

This net pen suits large-scale farming in nearshore, relatively placid waters, **but has limited wave resistance and cannot extend into remote deep-sea areas.**

For local species such as large yellow croaker, sea bass and grouper, a complete industry chain from hatchery, offshore farming, **live fish handling, processing and sales has been established**, with high industrial maturity.



Stock scale

30,000 units

Domestic stock of gravity HDPE net pens

Main farming regions

Fujian - Guangdong - Shandong - Zhejiang

Representative species

Large yellow croaker - Grouper - Sea bass - Pompano

Total output

50.0_{x10,000 t}

Stage 1 · Building platforms for international clients

China mastered technology and localization by building Norwegian benchmarks

Ocean Farm 1 (SalMar, Norway) – submersible truss-type cage

Commissioning year

2017

Diameter

110 m

Height

69 m

Farming volume

250,000 m³

Species: Atlantic salmon

1.5M fish



Havfarm 1 (Nordlaks, Norway) – floating platform

Commissioning year

2020

LOA / Breadth

385 m / **59.5** m

Draught

30.7 m

Farming volume

400,000 m³

Species: Atlantic salmon

10,000 tonnes



Stage 2 · Building of supporting vessels

Chinese shipyards, 2024-2026, are densely winning contracts for supporting vessels (aquaculture service boats, well boats etc.)

12 units of 20m hybrid catamaran aquaculture work boats, approx. RMB 629 million;
Another 2 units signed in Sep 2026 (RMB 92.8 million), delivered Jun 2028.

Used for net cleaning, inspection, feeding and underwater maintenance at Norwegian farms.

4 units of 5,000 m3 well boats, with future options for up to 6 more, delivered sequentially from 2029.

Designed by Salt Ship Design of Norway.

4,500 m3 LFC: 2 firm + 4 options; 6 vessels approx. RMB 2.8-3.3 billion; first delivery in 2029.

Also signed 3+7 hybrid offshore service vessels combining anchoring, ROV maintenance, lifting and towing.



Deep Blue No.1:

A fully submersible truss-type cage independently developed after absorbing Ocean Farm 1 technology; can dive and float up according to water temperature

Commissioning year

2018

Circumference

180 m

Height

35 m

Farming volume

50,000 m³

Species: Atlantic salmon

1,500 t/year



Total scale :

~ 89 units

including fully submersible , half submersible, sitting type and others

2020-2025 CAGR

37.0 %

Guoxin No.1 - World's first 100,000-ton onboard **closed -farming** smart vessel

Commissioning year

2022

Length overall

249.8 m

Draught

12 m

Farming volume

80,000 m³

Species: Large yellow croaker

3700 t/year



Suhai No.1 - World's first self-propelled closed salmon vessel

Commissioning year

2025

Length overall

249.9 m

Draught

14 m

Farming volume

83,000 m³

Species: Salmon and trout

8000 t/year



CSBY Perspective: Summary of Aquaculture Equipment

Equipment design and construction can now largely be manufactured in China, but core equipment and control systems still rely on European supply

Achieved - Self-sufficiency in equipment manufacturing

- From building Norwegian benchmarks to independent developing submersible cages, farming vessels - have all been realized
- Multiple farming vessels built and delivered, breakthroughs in typhoon-avoidance cruising, closed water farming, smart feeding
- Design and facilities building are largely self-sufficient
- Localized solutions and equipment validated

To Address - Core equipment and control system

- Core farming and processing equipment: Europe is still the pioneer and leader in the aquaculture.
- Control system embodies the know-how and expertise of the industry, which is critical.
- Local equipment need more time to reach European level.

CSBY Perspective: Summary of China's Deep-Sea Aquaculture

- 01 Manufacturing capacity for aquaculture equipment keeps strengthening;
- 02 Trout and salmon farming is gaining recognition;
- 03 Traditional local species farming lacks a systematic industrial approach; deep-sea costs are not yet competitive and need breakthrough;
- 04 Chinese consumers prefer to ice-chilled whole fish, which hinders the development of seafood processing technologies;
- 05 The coexistence of traditional and industrial aquaculture will continue;
- 06 Typhoon resistance is a key challenge in China.

CSBY Perspective: The Future of Global Aquaculture

- 01 Continued development of aquaculture equipment, moving from nearshore to deep-sea model;
- 02 Continued development of green energy in deep-sea model; countries like Norway are already using diversified green energy;
- 03 Beyond trout and salmon, emerging economies are exploring industrial farming of more species, but this is a systematic undertaking with a long road ahead
- 04 Deep-sea aquaculture needs policy support and financial support; compared with nearshore farming, costs rise significantly but it is more environmentally friendly;
- 05 Norwegian-invested salmon RAS projects in China are worth exploring and attention.

Ningbo Nordic - Land-based RAS for Atlantic salmon

Total Investment

90 Million Euros

Total Land Area

200,000 m²

Project Phase 1
In operation

4000 tonnes/year

Project Phase 2
Commissioning

4000 tonnes/year

Project Phase 3
Planned

4000 tonnes/year



Importance of this project

- **99% water recirculation rate** - far beyond traditional aquaculture; cuts water consumption at source
- **Zero wastewater discharge** - prevents marine pollution and habitat damage
- **Fully enclosed land-based model** - immune to typhoons, red tides and other natural disasters
- **Management** - automated monitoring and precise feeding , real-time environmental control for aquaculture conditions.
- Asia's pioneering commercial land-based Atlantic salmon facility



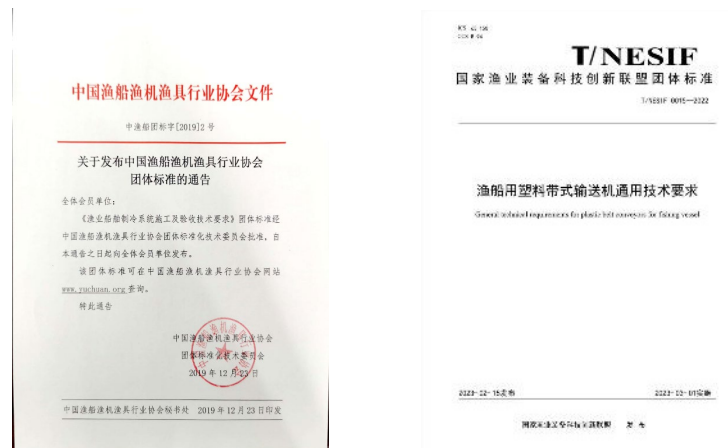
Technical Resources

Technical cooperation, aquaculture research & development with universities and design bureaus

Company own research and patent



Cooperation with design parties



Cooperation with university & institute



Vessel Design / Building

Farming & Processing vessel– Vessel design / vessel building / life support system and fish processing system



Refrigeration



Fish Processing Plant



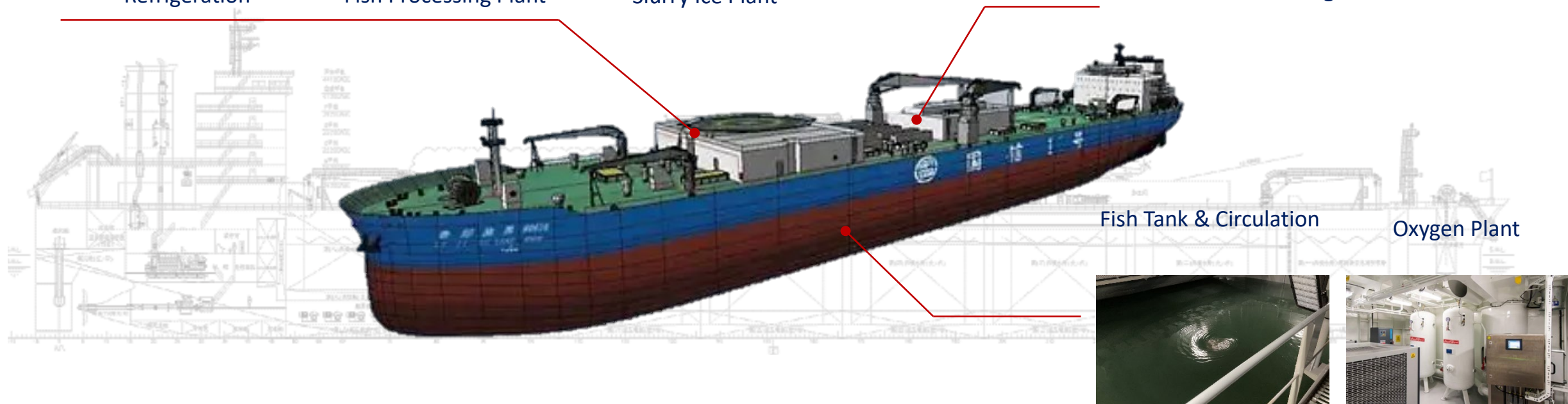
Slurry Ice Plant



Feeding Storage



Feeding Facilities



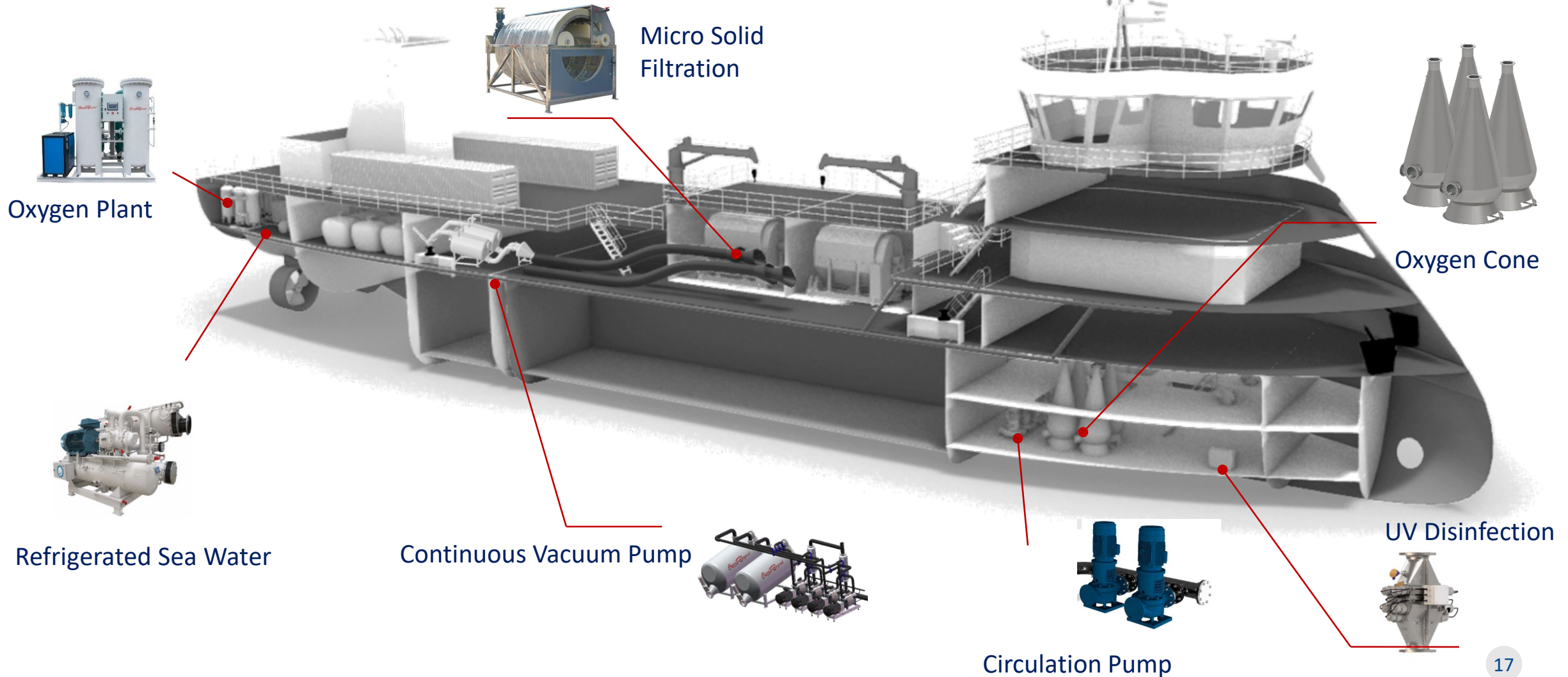
Fish Tank & Circulation

Oxygen Plant



Vessel Design / Building

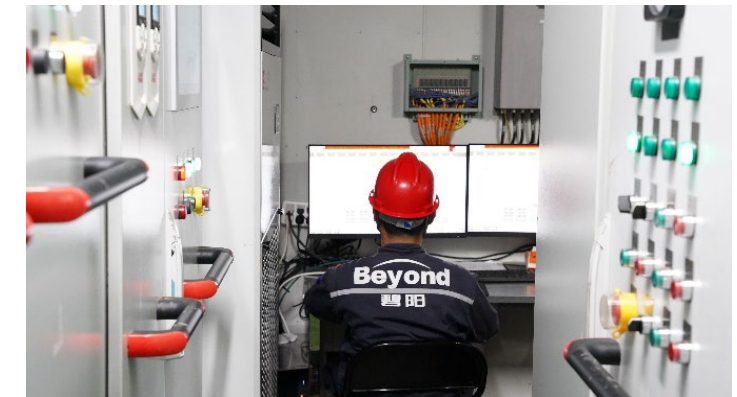
Well Boat – Vessel design / building / life support system



Control System in Aquaculture:

CSBY develops the aquaculture control system (CB-AquaSmart) including the following functions based on different hardware

- **CB-Control** undertakes basic equipment operation, water quality control, enabling linked control of all subsystems and real-time status monitoring.
- **CB-Management** focuses on production and processing management, storage of production data, trend analysis and report output.
- **CB-Insight** integrates IoT technologies to support cloud-based remote control and secure operation & maintenance via internet.

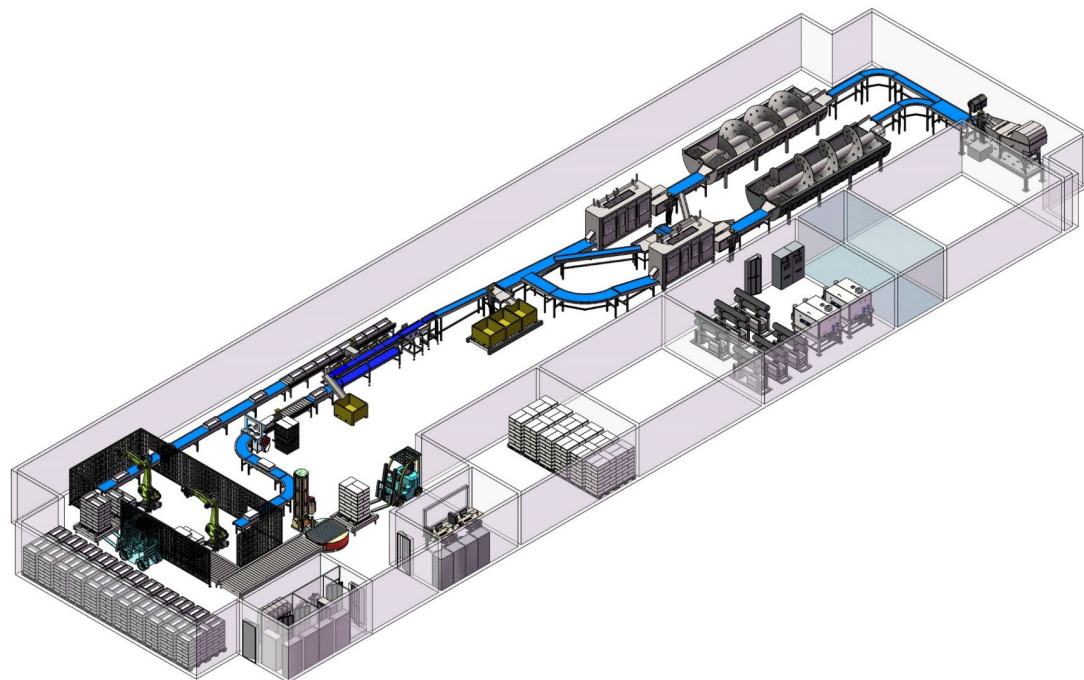


Fish Processing Solution on Farming & Processing Vessel

Onboard salmon processing plant

Including

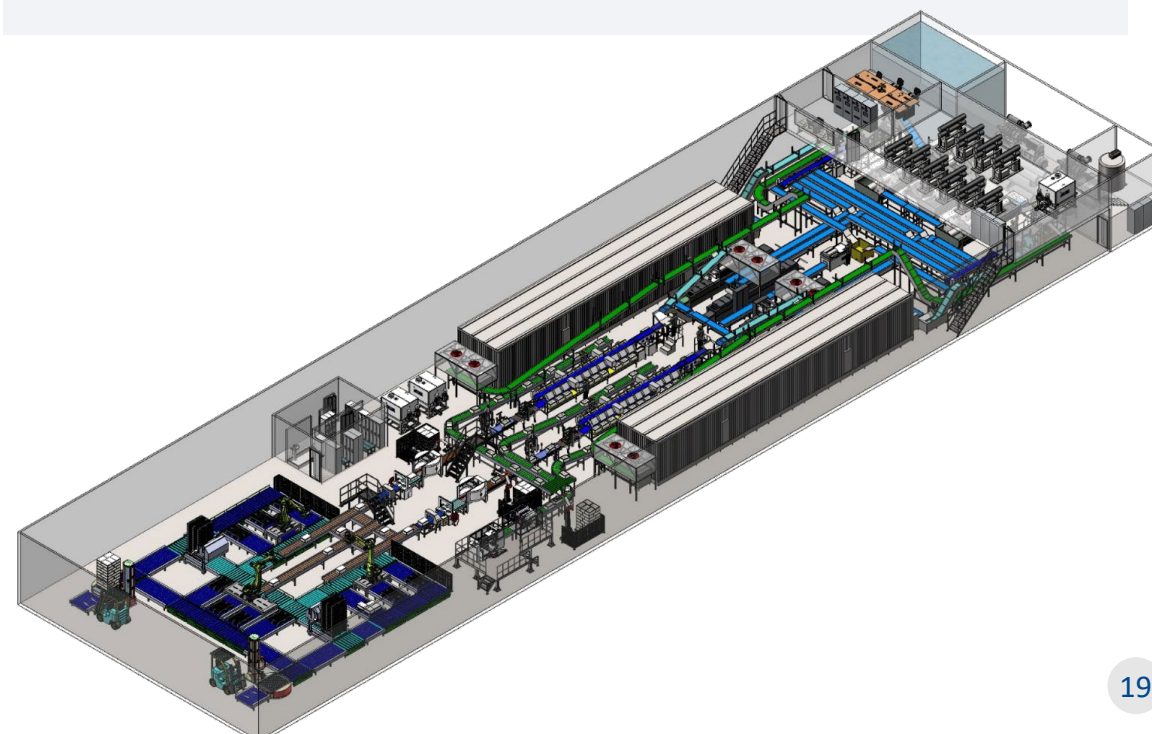
- Stunning & bleeding
- Gutting
- Cleaning & sorting
- Ice packaging

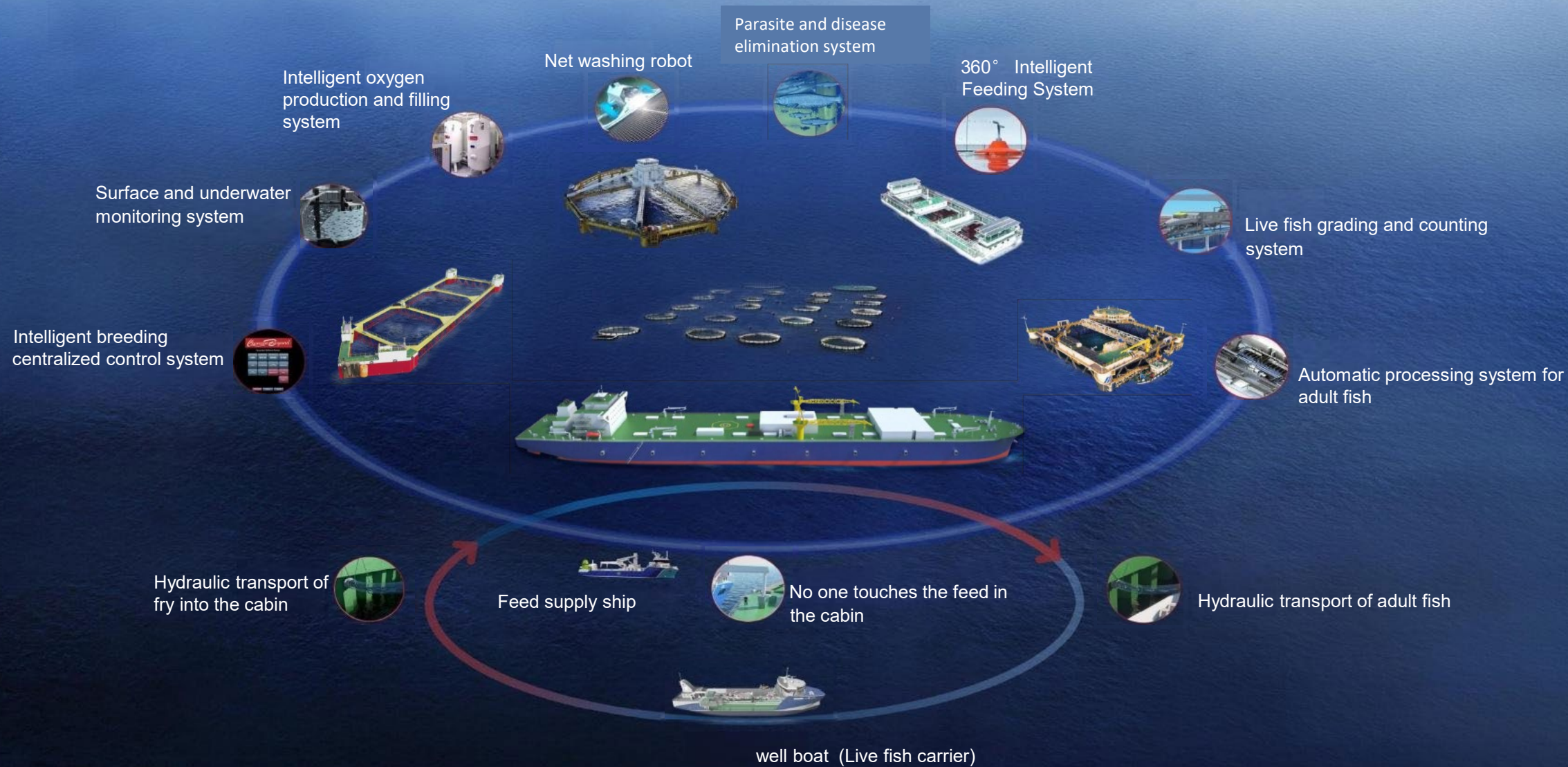


Onboard yellow croaker processing plant

Including

- Chilling & preservation by slurry ice
- Grading
- Ice packaging for fresh fish
- Frozen fish





CSBY's engagement: from deep-sea trout/salmon farming to adult fish processing

From farming (fish life support system) to adult fish processing (fish processing, refrigeration and fish meal plant)

Representative facilities supplied

PROJECT 01

Deep Blue No.1 aquaculture & processing service vessel

Chilled salmon processing system

Supplied System



Slurry Ice System from CSBY
(Conson No.1)

PROJECT 02

Suhai No.1

Trout & salmon farming life support system

Chilled trout & salmon processing system



Iced fish process line

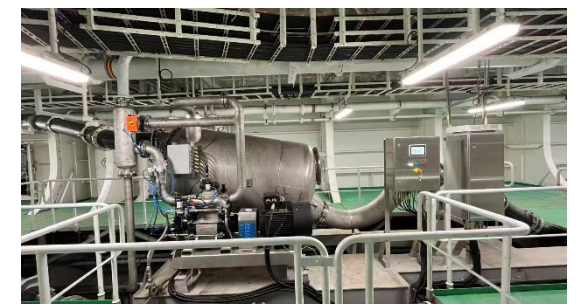
PROJECT 03

Conson No.1

Chilled large yellow croaker processing system



Life support system – Oxygen plant
(Suhai No. 1)



Vacuum fish pump system
(Suhai No.1)

CSBY's Core Competencies: Dedicated to optimizing aquaculture production and processing

01

Aquaculture life support system and solutions

Focused on life support systems for trout and salmon; can deliver complete equipment and solutions for service vessels, live fish carriers etc;



02

Adult fish processing systems

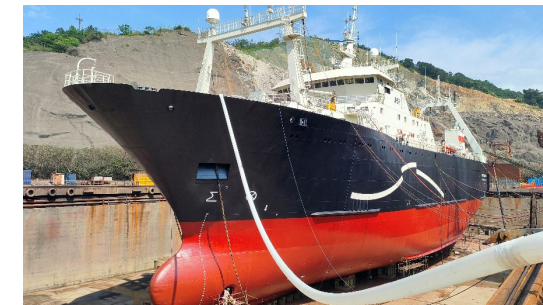
From harvesting adult fish onward, providing comprehensive solutions for processing, preservation and by-product handling.



03

Matching resources for global fishery investors (Bfishery, member of CSBY)

Providing overseas clients with complete solutions from design to supply of aquaculture and supporting facilities;





please contact us for future cooperation.

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Оптимальное решение для
переработки морепродуктов

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Thanks a lot for your time and looking forward
to the cooperation!

THANKS



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