Shipbuilding in Japan and Challenges on Industrial Policy

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Ministry of Land, Infrastructure, Transport and Tourism (MLIT)

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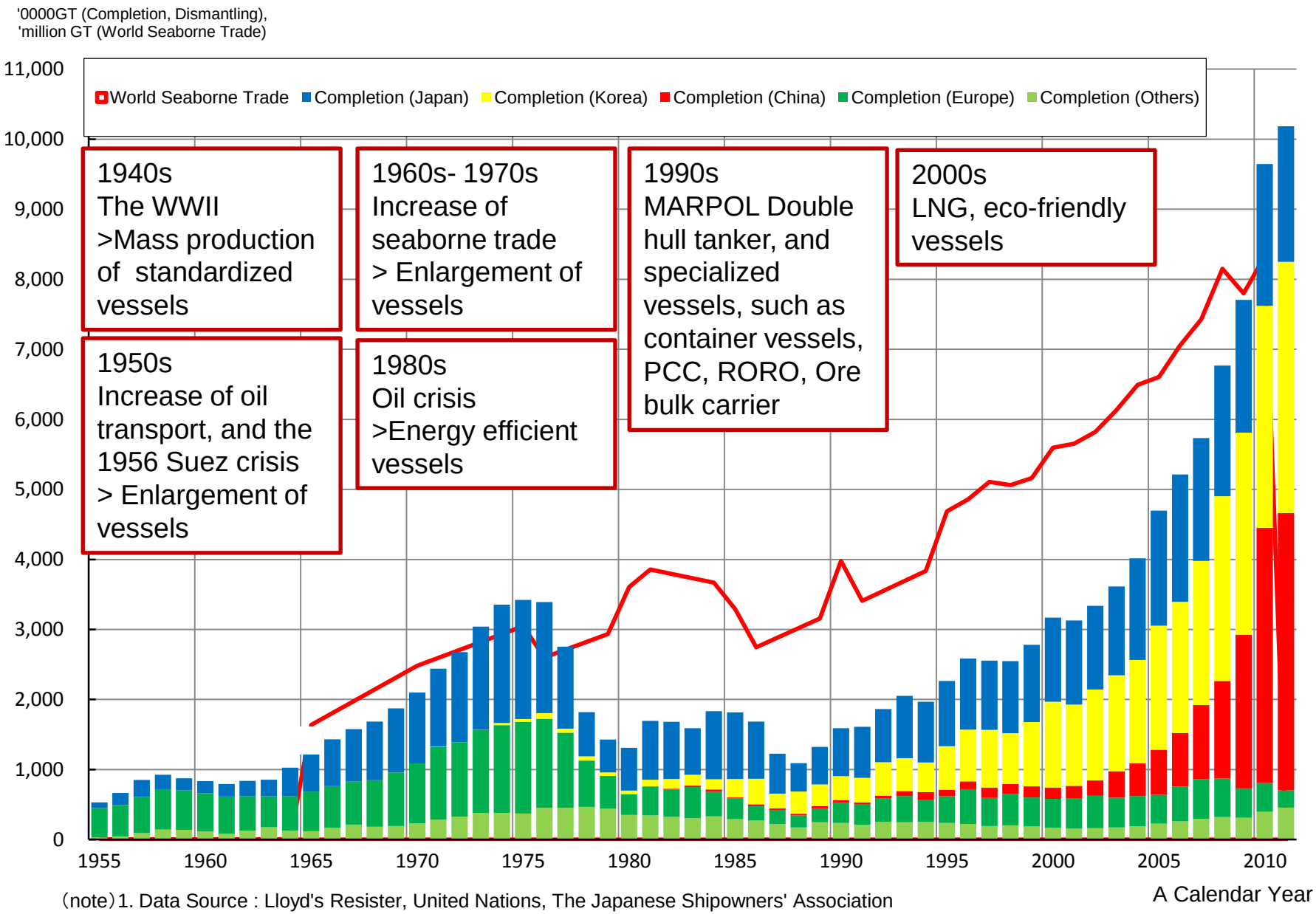
Background:

1: Historical Review of shipbuilding industry: How the innovation occurred

2: Present and future situation of Japanese shipbuilding

Historical Review of shipbuilding industry



（note）1. Data Source : Lloyd's Resister, United Nations, The Japanese Shipowners' Association
2. Ship Size Coverage : 100 Gross Tonnage and over.

Evolution of ships and its factor 1

Sailing vessel to Steam powered ship

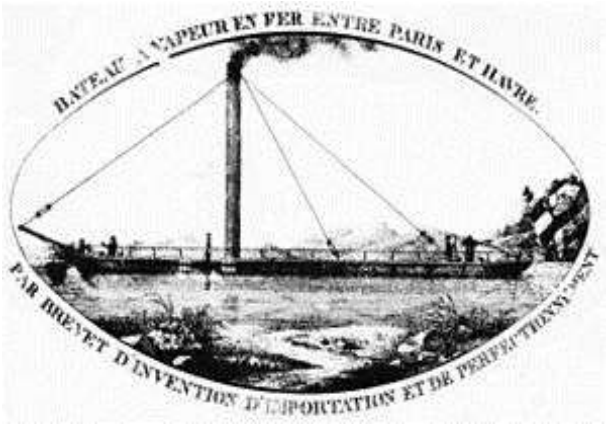
The first steam-powered ship was built in France in 1783

Italian full-rigged ship Amerigo Vespucci

Model of **steamship**, built in 1784, by Claude de Jouffroy

From wooden hull to iron and steel hull

Aaron Manby, built in 1822 at UK shipyard, was the first **iron steamship** to go to sea.



WWII and Mass production of standardized vessels

Liberty ships
Eighteen US shipyards built 2,710 Liberty cargo ships between 1941 and 1945

Block construction
Prefabrication of deckhouses, double-bottom sections, stern-frame assemblies and bow units.

Welding
Grinding welding bead, SS George Washington Carver at the Kaiser shipyards

Evolution of ships and its factor 2

Increase of oil transport

Nearly 500 **T2 tankers** (mainly **T2-SE-A1**) had been built in the US from 1940 to 1945, and after WWII they were used for commercial purpose.

Length 162m
16,600 DWT
33-70 days per Ship for building

Increase of seaborne trade

Due to the enlarged world trade volume, the size of vessels became larger and the fleet number had been increased.

In 1979, Sea wise Giant, a ULCC supertanker, the longest and the greatest DWT ship ever built, was delivered.

The 1956 Suez crisis and the larger scale of transportation

The Suez Crisis of 1956 forced to move oil around the Cape of Good Hope, and larger tankers were more favorable for owners.

In 1958, *S.S. Universe Apollo*, the worlds first 100,000 ton oil tanker, built in the NBC Kure, Japan

Oil crisis

Due to the oil crisis in 1973 and 1979, more energy efficient ships had been increased.

In 1983, on Hariet-maru, a very energy efficient engine which achieved 50% thermal efficiency, and an advanced exhaust heat recovery system were installed.

Evolution of ships and its factor 3

MARPOL Double hull tanker, and specialized vessels, such as container vessels, Pure Car Carrier(PCC), Roll on Roll off(RORO), LNG carrier

In 1989, Exxon Valdez oil spill happened and IMO/MARPOL was amended to made it mandatory for new oil tankers to have double hulls and brought in a phase-in schedule for existing tankers to fit double hulls.

Container

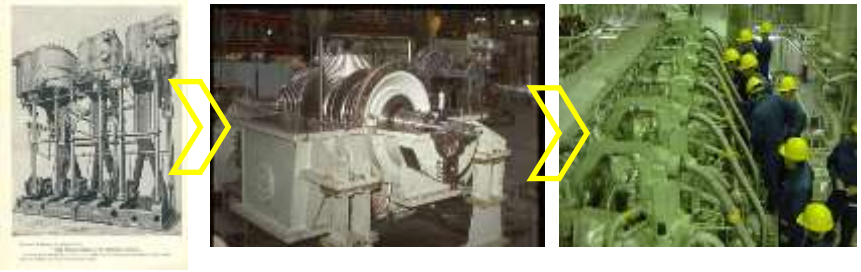
PCC

RoRo

LNG

Other factors

the first practical steamboat was built in 1802, the major engine have been shifted, reciprocating steam engines, steam turbine, and diesel engine.



Container

- ISO standards for containers were published between 1968 and 1970.
- Cargo carrying capacity has been increased rapidly in 2000s.
- The steadily rising expense of fuel oil has prompted most container lines to adapt a slower, more economical voyage speed of about 21 knots, compared to earlier top speeds of 25 or more knots.

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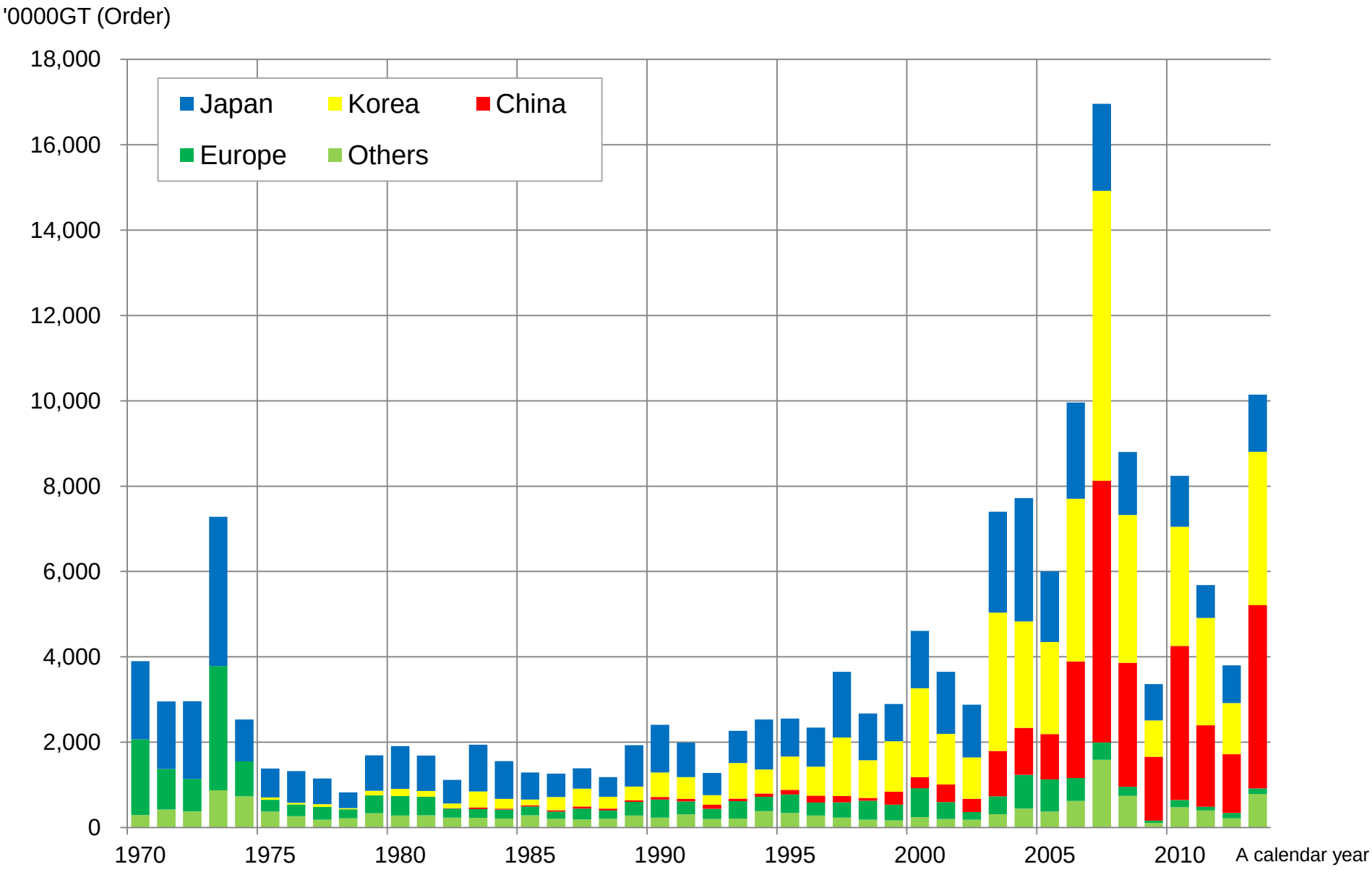
New orders by builder country



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Present and future situation of Japanese shipbuilding


LNG carrier


Oil Tanker


Container Ship

Japanese Shipbuilding

Traditional Line-up


Pure Car Carrier


Bulk Carrier

Competitive advantage in a wide range of products

Any types of ships

energy-saving ships

Offshore segments


FLNG

Towards new and growing markets


LNG Shuttle tanker


Logistics hub

Offshore wind energy


Wind turbines


Installation and maintenance

Japan's maritime technologies cover wide areas, however…


Marine equipment

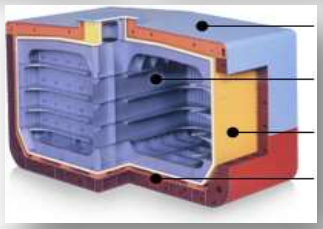

Green ship (energy saving technologies)



Marine research vessels and AUVs





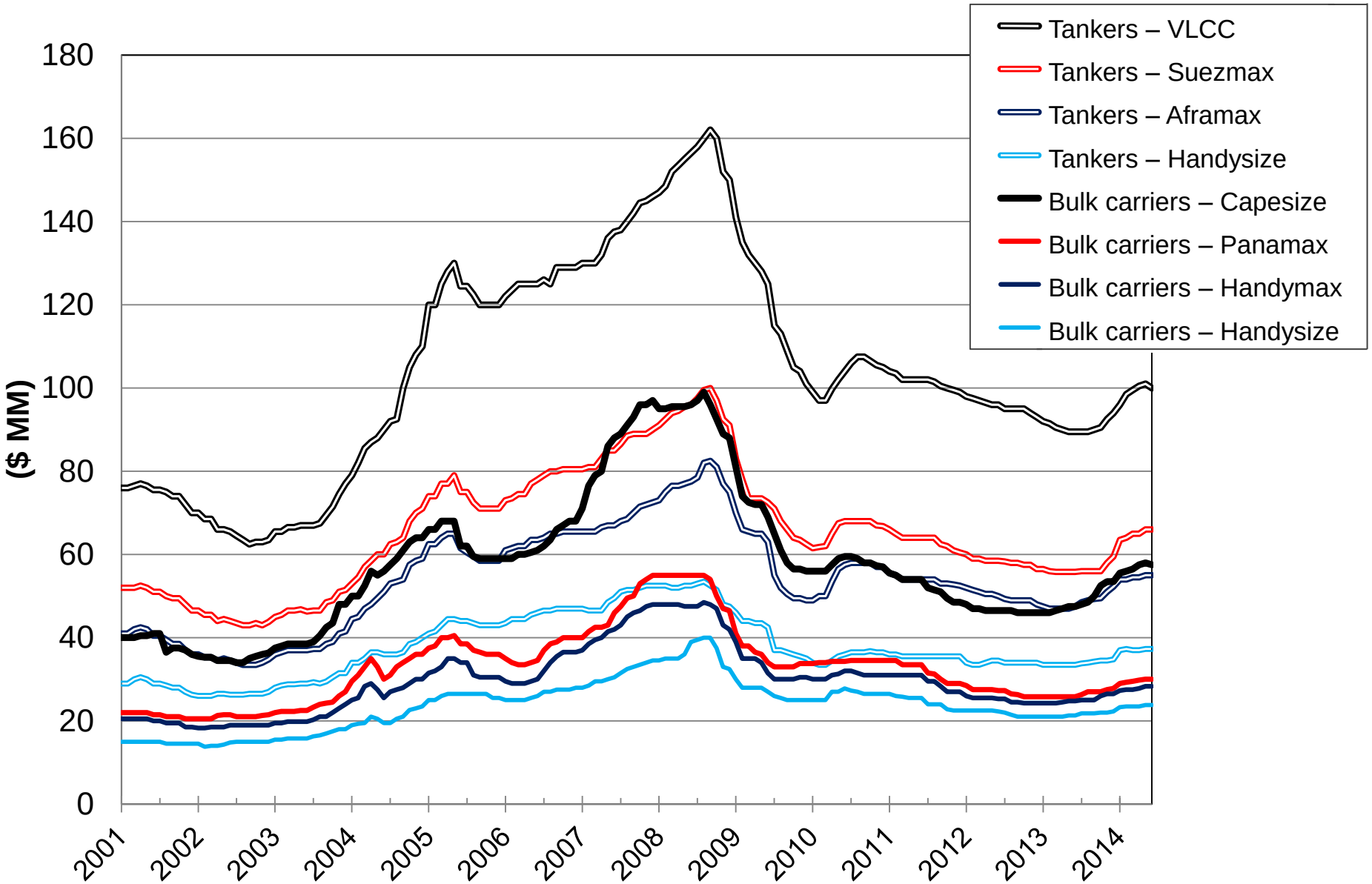


FPSO, Offshore support vessel, LNG Tank


High Speed Vessel


Large Floating Offshore Structure (Mega Float)

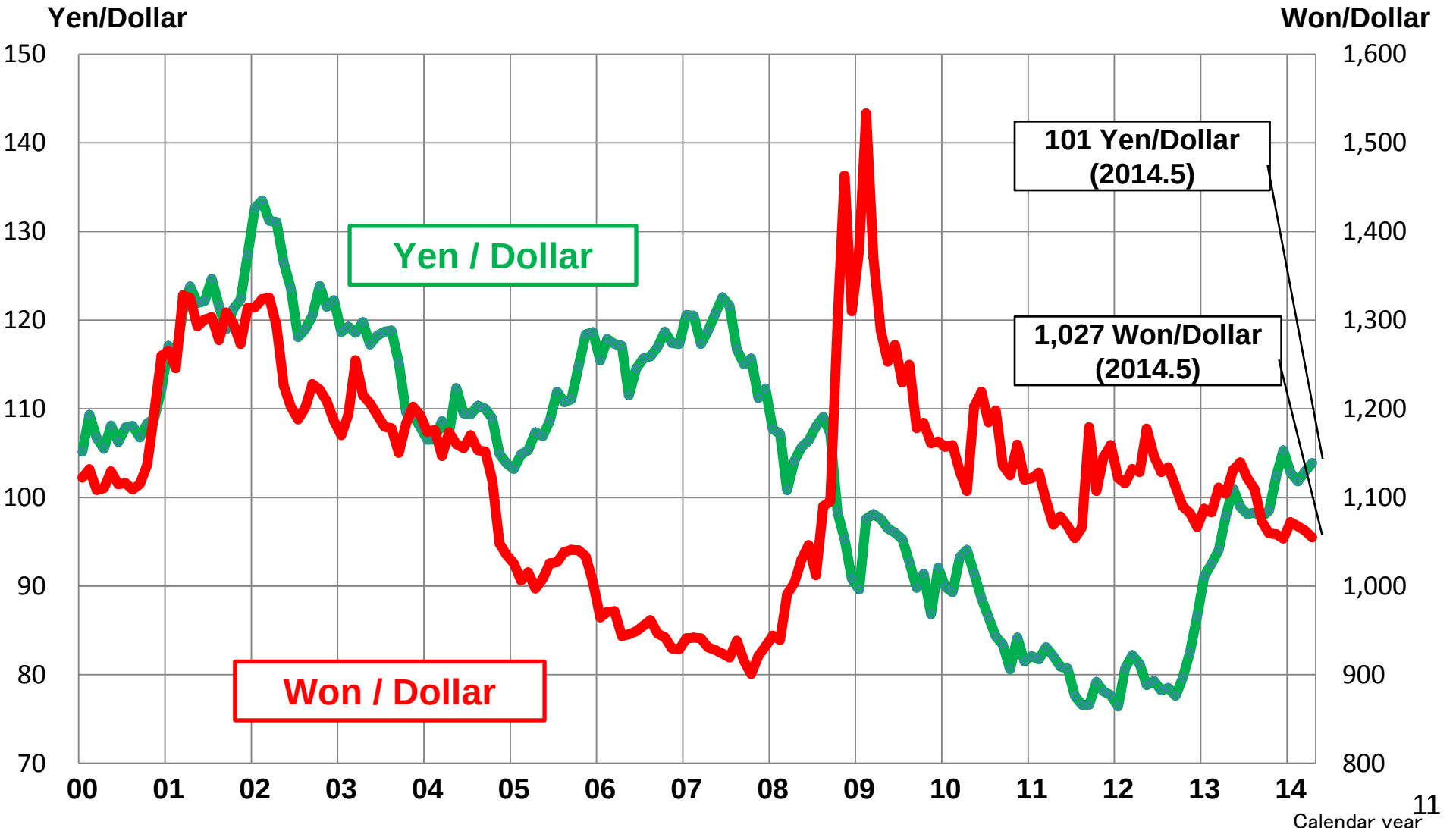
Stagnating ship prices



Clarkson Research Studies
"Shipping Intelligence Weekly"

Exchange rate

Japanese yen has been weakening against US dollar since the end of 2013.
Now is a good opportunity to buy Japanese high-quality eco-ships and energy-saving products!



Advantages and Challenges

1: Advantage

Eco-ships for all range of products

2: Challenges

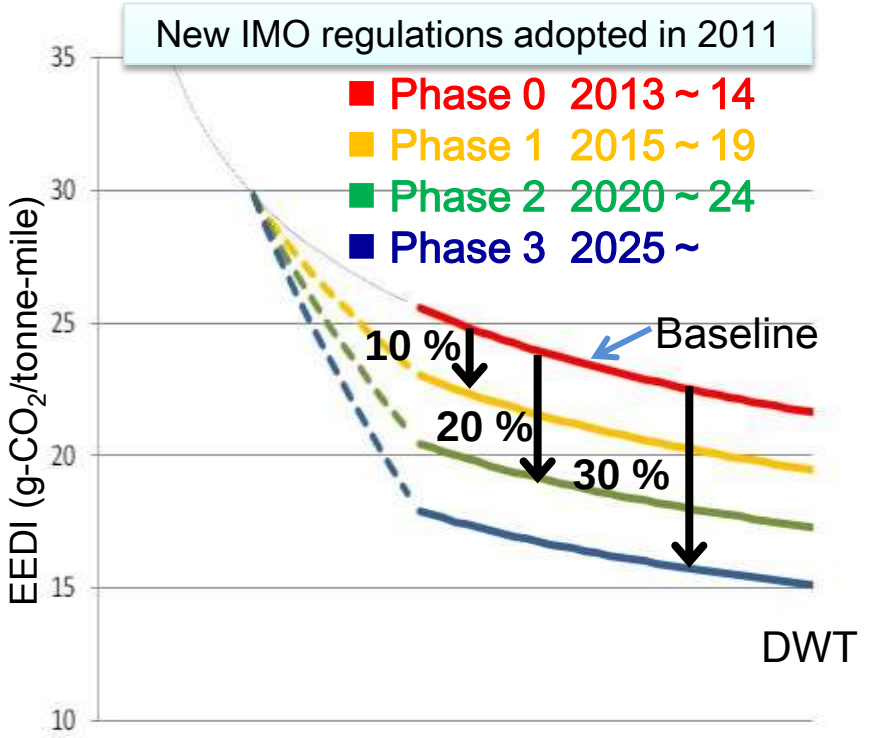
1) Human resource development

2) Re-entry into offshore segments

Environment surrounding Eco ships and Energy saving products

Japan has taken a initiative in developing IMO regulations on CO_2 emission from ships

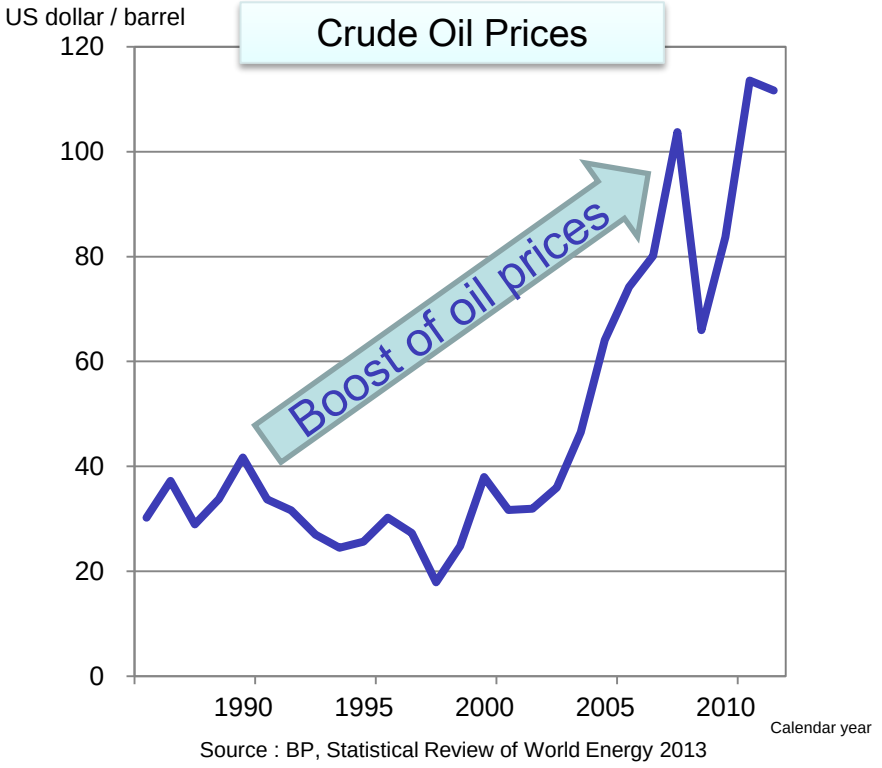
Tightening of regulations on CO_2 emission from ships



New ships shall meet the EEDI* requirement which will become stringent in phases until 2025.

(*) Energy Efficiency Design Index

Rising fuel price



Source : BP, Statistical Review of World Energy 2013

Crude oil prices will rise due to increasing demand in developing countries and other reasons.

Growing demand for eco-ships and energy-saving products:

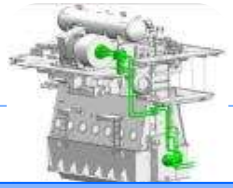
NOTE: Eco means both ecological and economical.

Japan's Business and Government Initiative

- To meet the EEDI requirements in advance, Japanese industries have endeavored and been successful to develop new energy-saving technologies.
- Such technologies cover a variety of factors to generate considerable effects collectively.

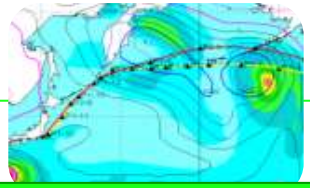
Examples of Japanese industries' research and development

Waste Heat Recovery System



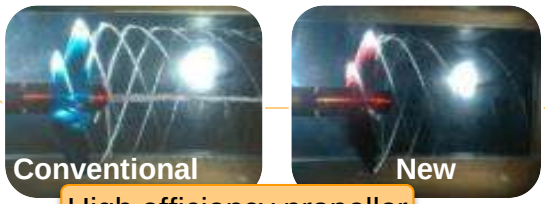
Waste heat recovery system

Next-generation Operational System



Weather routing system

New Type Propulsion



High efficiency propeller

Reduction of Friction Resistance

Air bubbles along hull

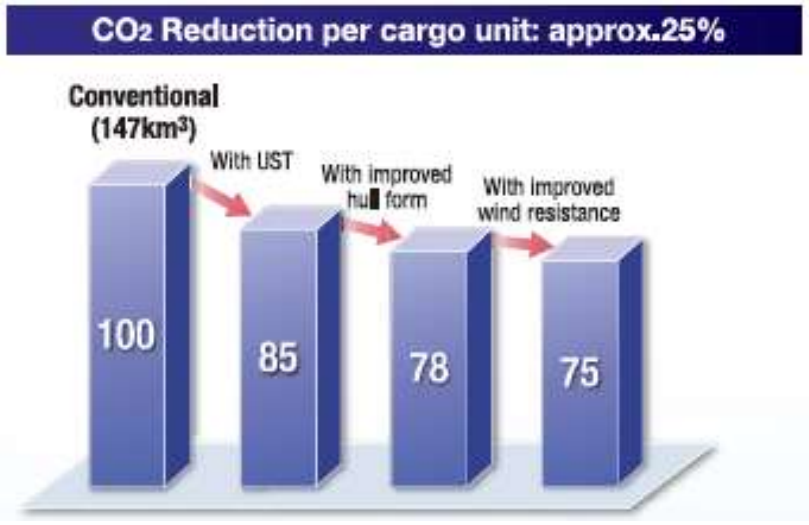
Japanese Advanced Eco-Ships

Achieving significant improvement of energy efficiency

IBIS WIND
(Sanoyas Holdings Corporation)

Clipper Excalibur
(Mitsui Engineering & Shipbuilding Co., Ltd.)

“SAYAENDO”
a series of new type LNG vessels
(Mitsubishi Heavy Industries CO., LTD.)



Japanese energy-saving products

Engine

UEC Eco-Engine
(Mitsubishi Heavy Industries marine machinery & engine CO., LTD.)

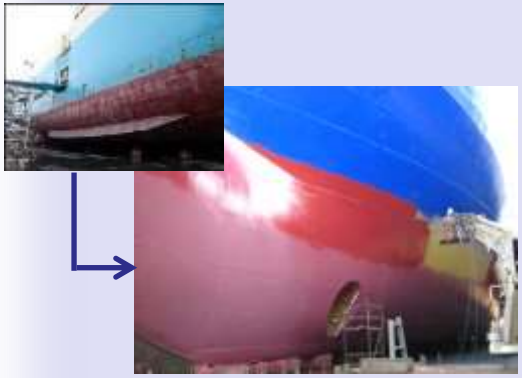
Dual fuel engine 6EY26DF
(YANMAR CO., LTD.)

Dual fuel engine DE28DF / MD36DF
(DAIHATSU DIESEL MFG.CO., LTD.)

Realization of energy saving

Paints

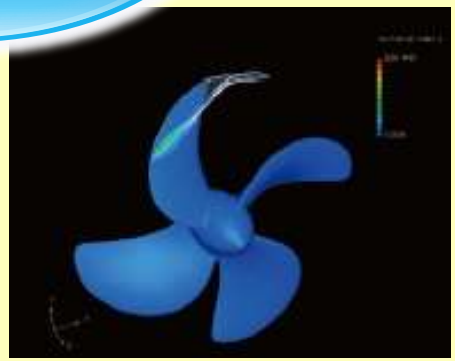
A-LF-Sea
-Ultra low Friction Underwater Coating System-
(NIPPON PAINT MARINE COATINGS., LTD.)



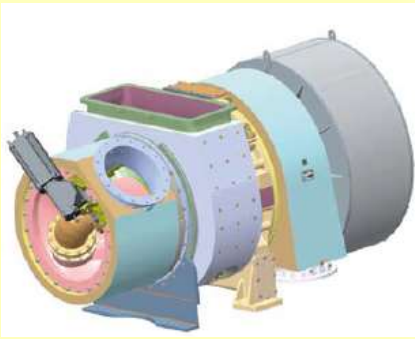
SEAFLO NEO SLZ
(CHUGOKU MAEINE PAINRS, LTD)

Realization of ultra low friction.

Others



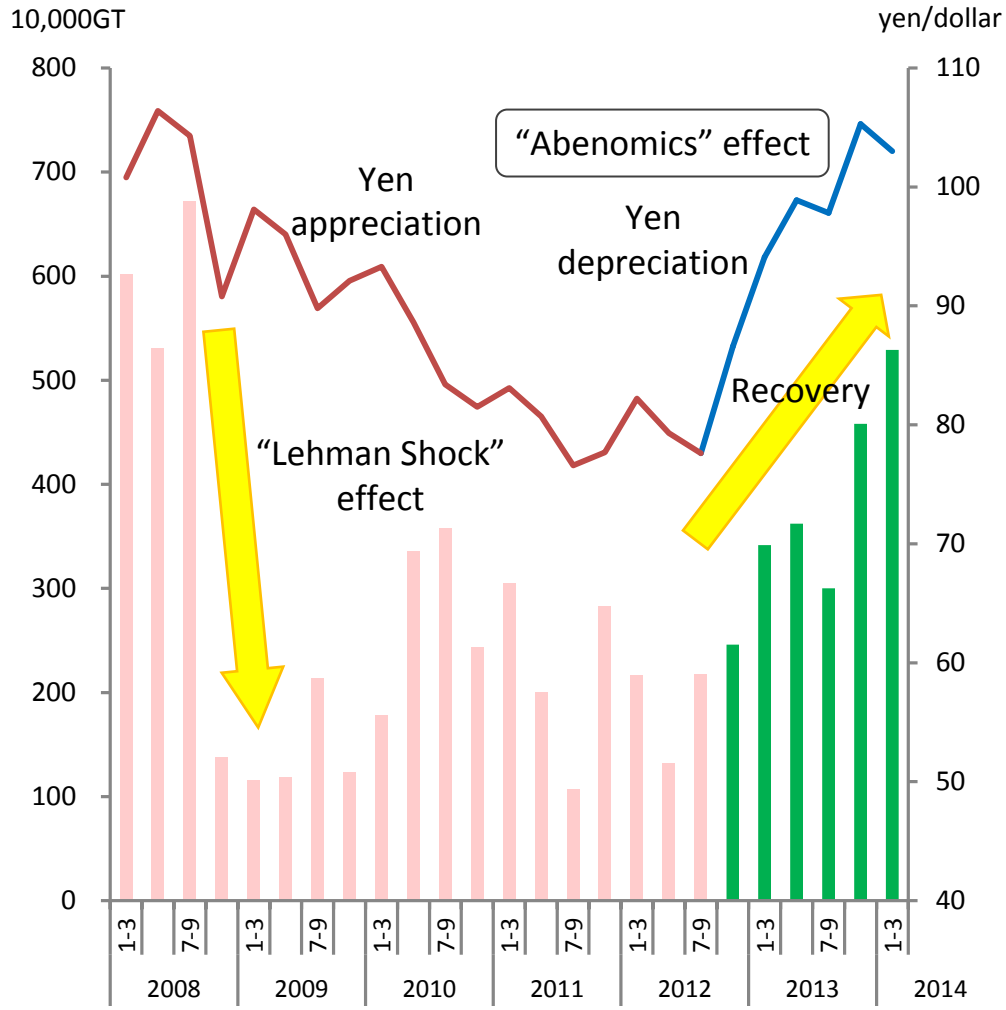
GPX PROPELLER
(NAKASHIMA PROPELLER CO., LTD.)



VTI Turbochargers
(Mitsubishi Heavy Industries
Marine machinery & engine CO., LTD.)

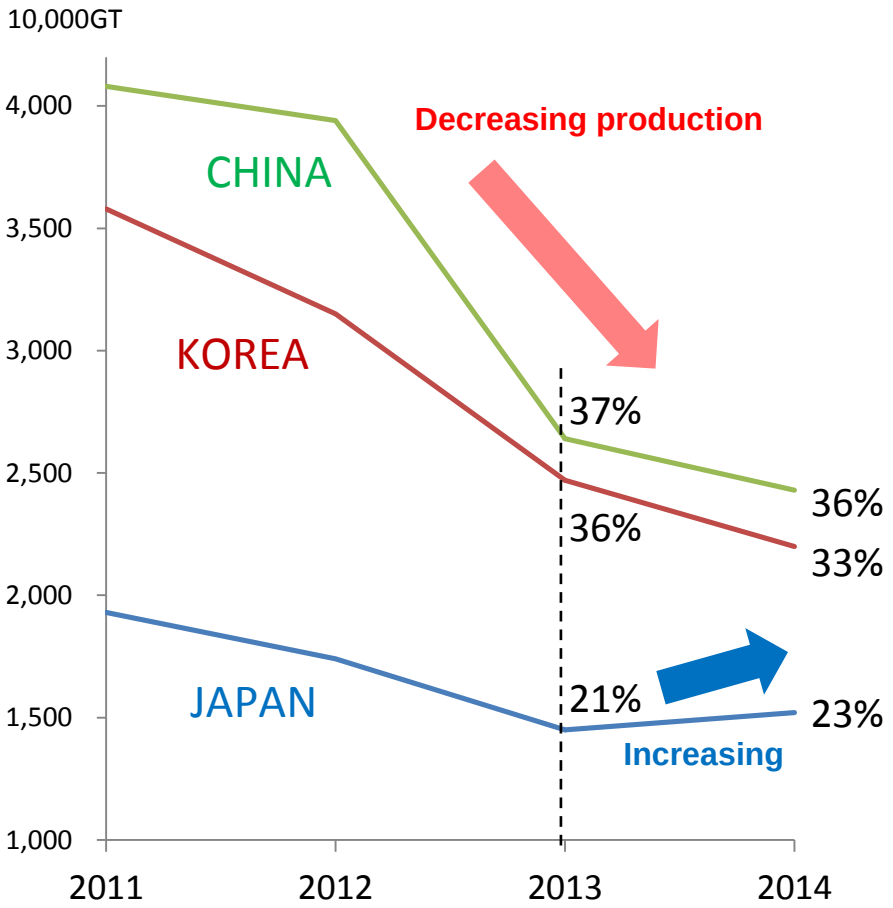
Japan is back: Recovery in Japanese shipbuilding

JPY/USD exchange rate and
export contracts received by Japanese shipyards



Source : Japan Ship Exporters' Association, "Statistics for New Export Ship Orders"

World shipbuilding completions



Source : Clarkson Research Service

Green Growth adopted at OECD MCM meeting

OECD: Organisation for Economy, Cooperation and Development

Declaration on Green Growth

Adopted at the Meeting of the Council at Ministerial Level on 25 June 2009

Towards Green Growth report (2011)

"Green growth" means fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies.

- Air and water pollution
- Climate change
- Water scarcity
- Resource bottlenecks
- Biodiversity loss

etc…

Promotion of "Green Ships"

At the **OECD Working Party on Shipbuilding (WP6)**, Japan proposed to modify the **SSU*** in view of allowing **more flexible export credit financings** for ships that have superior environmental performance (**Green Ships**), and the concept was generally accepted.

Currently, the definition of the Green Ships to which more favorable financial terms and conditions are applied is under the discussion in the OECD WP6.

Proposal by Japan

Scope of the Green Ships

20% improvement from EEDI*1 requirement **AND** 20% improvement from NOx Tier II Control*2 level

*1) Energy Efficiency Design Index to be certified in accordance with MARPOL Annex VI
*2) NOx emission to be certified in accordance with MARPOL Annex VI and NOX Technical Code

Terms & conditions

Max. repayment term
12years → 18years
Min. down payment
20% → 15%

Sector Understanding on Export Credits for Ships (SSU)

- The SSU is an annex to the "*Arrangement on Officially Supported Export Credits*", which provides **financial terms and conditions** to be applied to export credit financings. The SSU is applied to export credits for ships.
- The export credits in accordance with the SSU are considered to be complying with the WTO Agreement on Subsidies and Countervailing Measures. (**Safe Haven of the WTO ASCM**)

Advantages and Challenges

1: Advantage

Eco-ships for all range of products

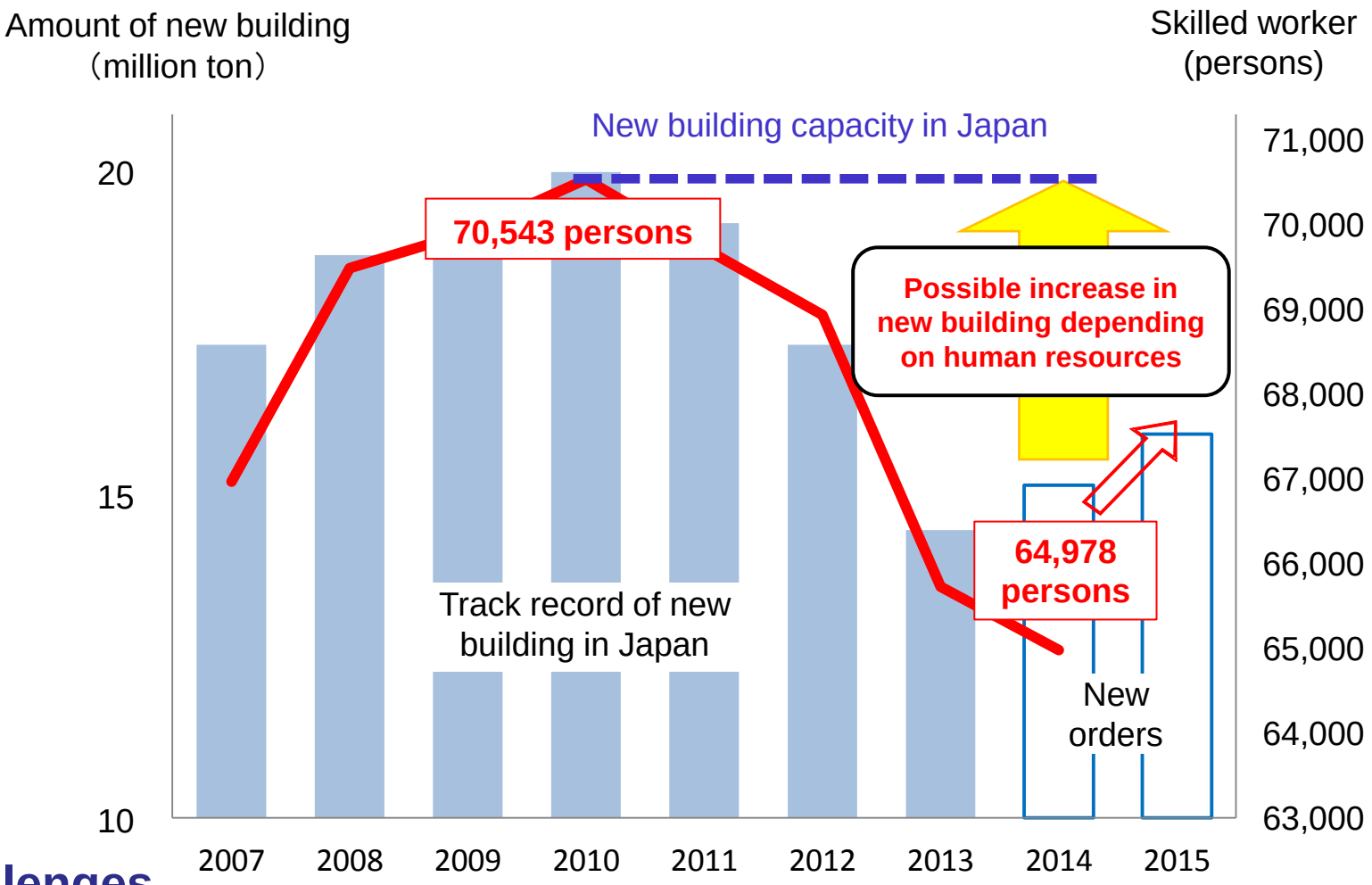
2: Challenges

1) Human resource development

2) Re-entry into offshore segments

Challenge: Shortage of Human Resources for Shipbuilding industry

Amount of new building and number of skilled workers in Japan



Challenges

1. **Securing the number of skilled production workers**
2. **Improving work environment**
3. **Fostering sophisticated human resource development**

MLIT approach for human resource development

1. Securing the number of skilled production workers

- On the job training (Regional joint implementation) to learn wide range practical skill
- Cooperation with academic institution (internship)

2. Improving work environment – especially for women workers –

(1) Developing power-assist-suits for handling heavy load goods
(2) Formulating the guidelines regarding safe working environment for women and senior workers

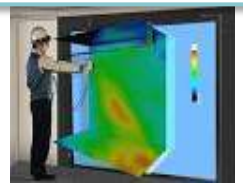
Power-assist-suits in agriculture


Application for shipbuilding


3. Fostering sophisticated human resource development

Utilization of 3D virtual reality techniques for task simulator, which has been developed in other industries

3D-VR techniques



Paint training simulator in automobile sector

Application for shipbuilding

Difficult welding operation

Advantages and Challenges

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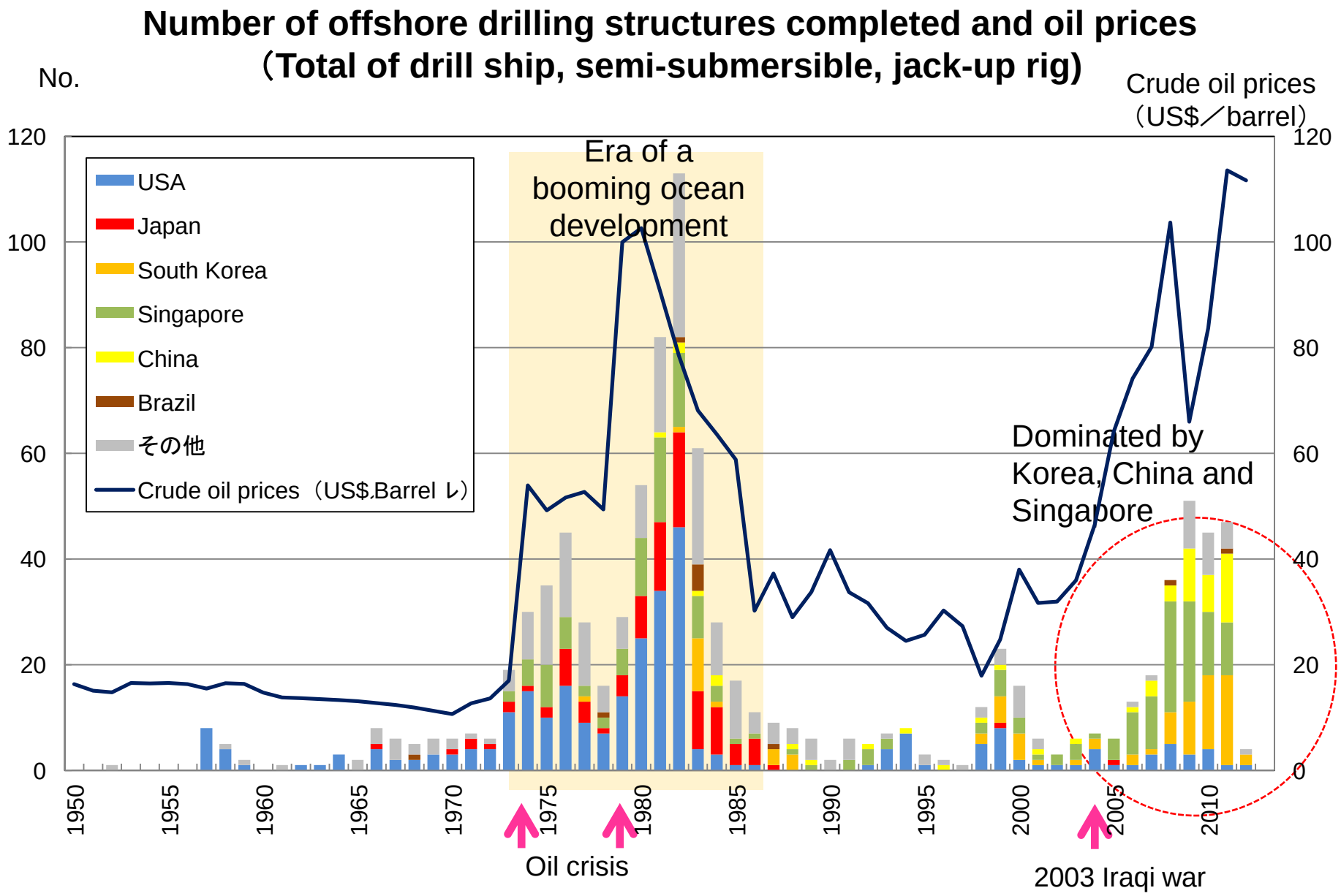
Trend of offshore drilling structures and oil prices



Oil prices: statistical review of world energy 2013 workbook

SWOT analysis for Japan's shipbuilding industry

Internal factors	**Strength** - Trustworthy quality and performance, accumulated know-how - Advanced Technology - Superior production management - Strong maritime clusters: all of shipping, shipbuilding and ship machinery industries are prominent players	**Weakness** - Insufficient number of engineers - Decentralized production facilities with limited economy of scale - Late behind in cross-border company alliance - Wariness for risk-taking business decisions
External factors	**Opportunity** - Market expansion of offshore oil and gas exploitation and production - Tightening safety and environment regulations - Strong financial institutions seeking new investment targets - More emphasis on HSE (health, safety and environment)	**Threat** - Non-existence of oil and gas fields nearby: no training and trial opportunities - Emerging resource protectionism - Weakening economic power of Japan in relative term

SWOT analysis for Japan's shipbuilding industry

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Cooperation with foreign countries by utilizing technologies and production management of Japan

SWOT analysis for Japan's shipbuilding industry

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Cooperation with … and production … by utilizing …

Promotion of offshore industry in line with expansion of offshore development market

… Countries …ogies …ent of Japan

Japan's business and government initiatives in Brazil

Public and private sectors work together to facilitate Brazilian offshore development.

Direct investment in the shipyards in Brazil

Japanese shipbuilders have recently invested in Brazilian shipyards and are working on ship building in Brazil.

Development of human resources in shipbuilding sector

- In June 2013, JICA project on technical cooperation in the shipbuilding human resource development was adopted.
  - The project will start within 2014.

JICA：Japan International Cooperation Agency

Offshore development in Brazil

Promotion of marine machinery and equipment industry

Government support to the Japan's machinery and equipment industry to overcome their technological challenge in the offshore market.

Coping with the local content issues

In December 2012, Nippon Kaiji Kyokai do Brasil LTDA (ClassNK in Brazil) was authorized by ANP as a certifying organization of the local content.

Facilitate the Japanese machinery and equipment industry to be active in Brazilian market.

Specific projects in Brazil's offshore development

Japanese maritime industries may contribute to the offshore development in Brazil through technology-based projects such as **Logistics Hub**.

Continuous private-public discussions between Brazil and Japan

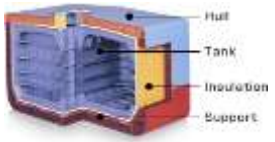
Roundtable meetings

Promotion of marine machinery and equipment industry

In order to assist the Japanese industries to enhance their opportunities in the offshore market, MLIT is providing financial assistance for their technological development. (2013-2017) (Budget: 11.2 million USD in 2013-2014)

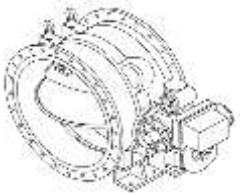
Cargo loading & offloading system Storage

- ✓ **Highly reliable LNG tank**
- ✓ **Cargo loading & offloading system between floating structures**



plumbing

- ✓ **high efficiency valve for preventing backward flow**



Engine

- ✓ **High-capacity power generation system**
- ✓ **High-capacity motor**

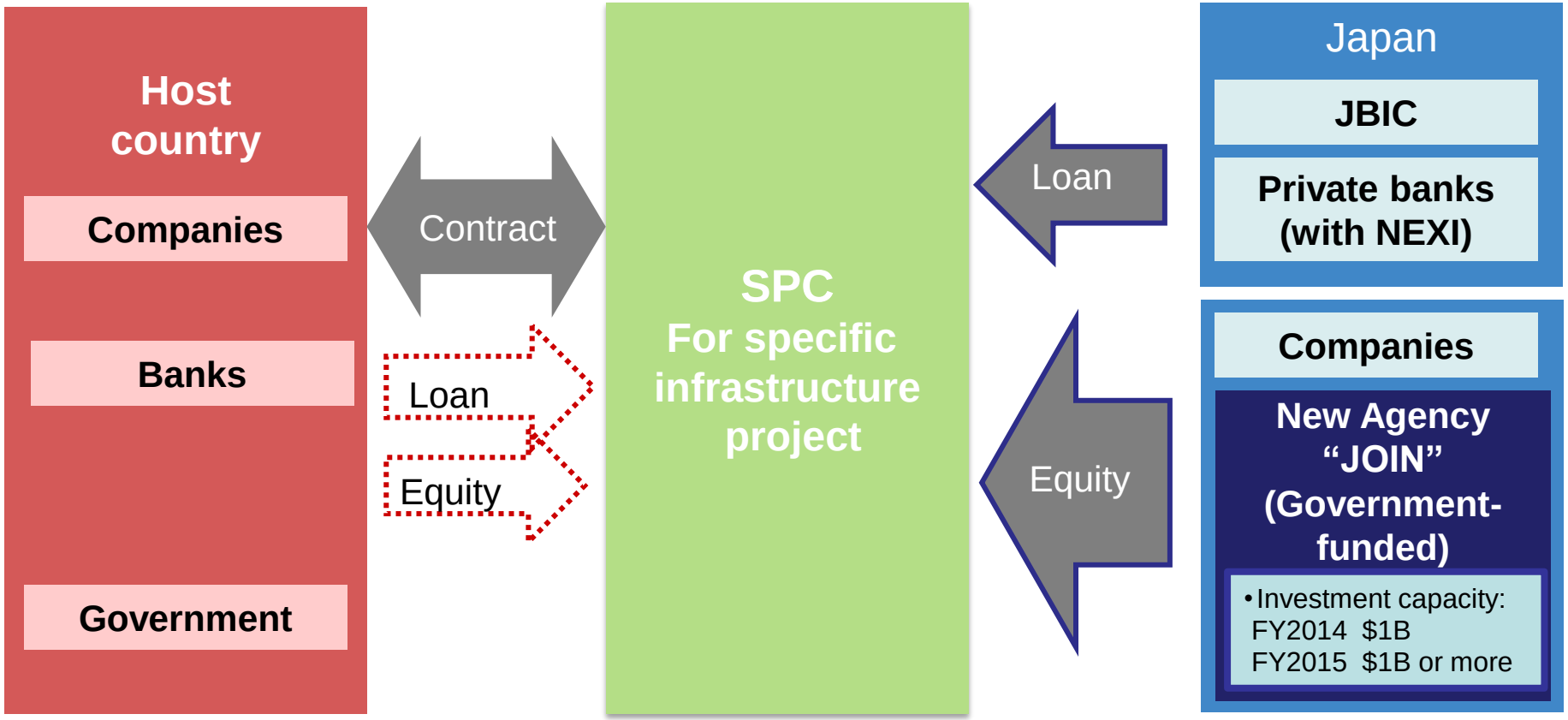
Control system

- ✓ **high-accuracy dynamic positioning system**
- ✓ **Mooring equipment**

New Agency established by MLIT "JOIN": the infrastructure fund

JOIN* will back up the financing of projects by holding a considerable portion of the equity of SPC. This equity finance scheme can improve bankability of the project.

* JOIN: Japan Overseas Infrastructure Investment Corporation for Transport & Urban Development
* The law to establish this agency was adopted by the National Diet in Feb 2014. JOIN established on 20th October 2014.



How the funding by the new agency will work

Scope of funding

- Projects, to be supported by the new agency, need to be relevant to overseas transport* or urban/regional development.

  * ”Transport” includes not only “traditional” sea transport such as the operation of LNG vessels and container vessels, but also offshore projects such as the operation of FPSO, FLNG, PSV, and AHTS*.

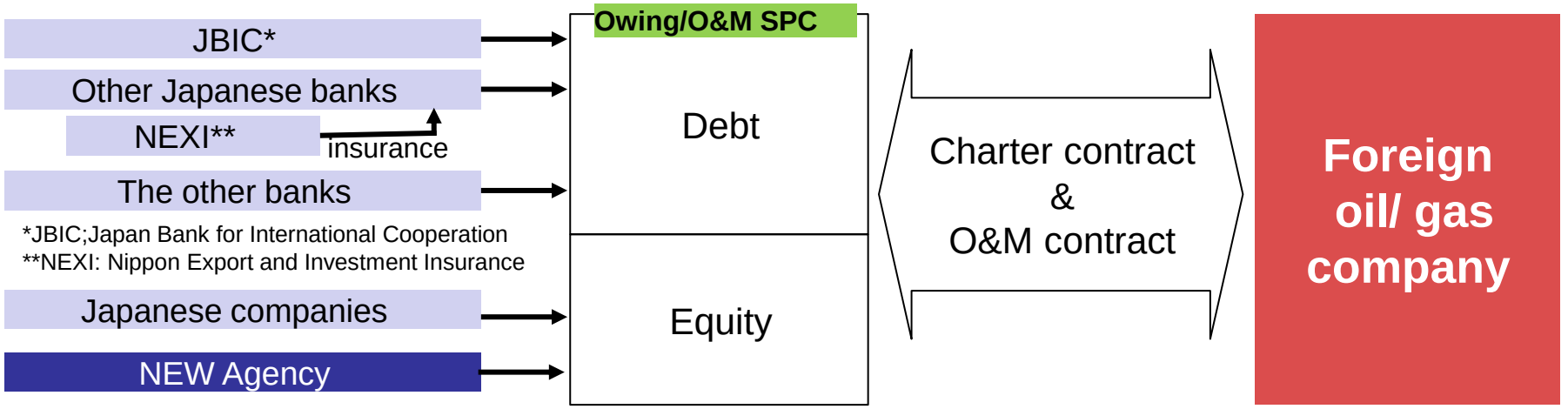
- Co-funding with the JBIC loan is possible

*FPSO: Floating Production, Storage and Offloading system
FLNG: Floating Liquefied Natural Gas
PSV: Platform Supply Vessel
AHTS: Anchor Handling Tug Supply

Where the funding can go

- Owning/O&M SPC of the FPSO / FLNG
- Owning/O&M SPC of the LNG vessels
- Owning/O&M SPC of the PSV/AHTS

Example of Finance structure



Conclusions 1

Shipbuilding industry in Japan has been recovering its international competitiveness, and will achieve further growth by:

- taking an advantages of eco-ship technologies (reduce fuel consumption and CO2) and other environmental technologies (NOx, SOx reduction etc)
- fostering and ensuring human resources for sustainable growth
- Promoting re-entry into offshore market to capture a growing market in maritime sector

Conclusions 2

MLIT assists the industry to achieve the above, and through such efforts, MLIT would like to achieve:

- Safer and more efficient maritime transport, which will assist the world economic growth
- Mitigation of climate change and other environmental problems (air pollution, ballast water, ship recycling)
- Assisting the sustainable development of other growing countries (Asia, Pacific, Africa, etc.) – various ODA projects including island-to-island transport, river transport, patrol boats.

Conclusions 3

MLIT's policies are formulated and implemented in close cooperation with KIKAN-ROREN (Japan Federation of Basic Industry Workers' Unions).

We look forward to cooperation with the members of IndustriALL Globa Union, Shipbuilding and Shipbreaking Committee.

Thank you for your attention.