

Group Vision 2030 Progress Report Meeting

December 12, 2023

Kawasaki Heavy Industries, Ltd.

Yasuhiko Hashimoto,
President and Chief Executive Officer

 **Kawasaki**
Powering your potential

カワる、
サキへ。
Changing forward

Agenda / Presenter

Introduction

Kawasaki Heavy Industries, Ltd.
President and Chief Executive Officer
Yasuhiko Hashimoto

**Power Sports & Engine Business
Toward Further Growth**

Kawasaki Motors Co., Ltd.
President and Chief Executive Officer
Hiroshi Ito

**Contributing to national security
through defense business**

Aerospace Systems Company
Senior Managing Executive Officer
Hiroyoshi Shimokawa

**Hydrogen and large-scale CO₂ capture
business strategy
for a carbon neutral society**

Energy Solutions & Marine Engineering Company
Senior Managing Executive Officer
Motohiko Nishimura

**Achieving a sustainable and affluent society
~ Robots are becoming familiar to us ~**

Kawasaki Heavy Industries, Ltd.
President and Chief Executive Officer
Yasuhiko Hashimoto

Summary

Kawasaki Heavy Industries, Ltd.
President and Chief Executive Officer
Yasuhiko Hashimoto

New Values



安全安心リモート社会



近未来モビリティ

つぎの社会へ、
信頼のこたえを

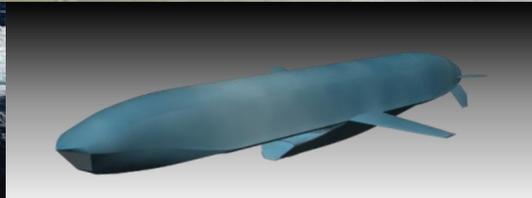
Trustworthy Solutions
for the Future

エネルギー・環境ソリューション



Cross Over

Frontier



Agenda / Presenter

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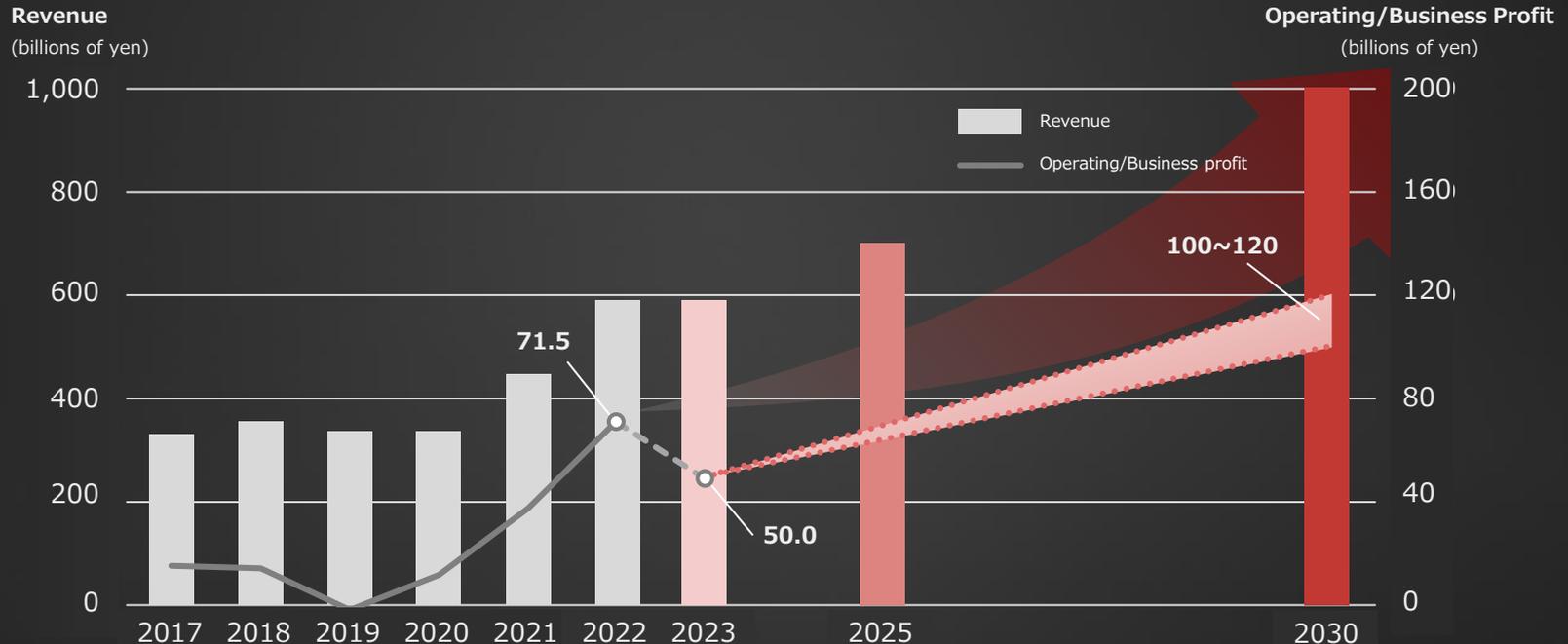


**Power Sports & Engine Business
Toward Further Growth**

**Kawasaki Motors Co., Ltd.
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Hiroshi Ito**

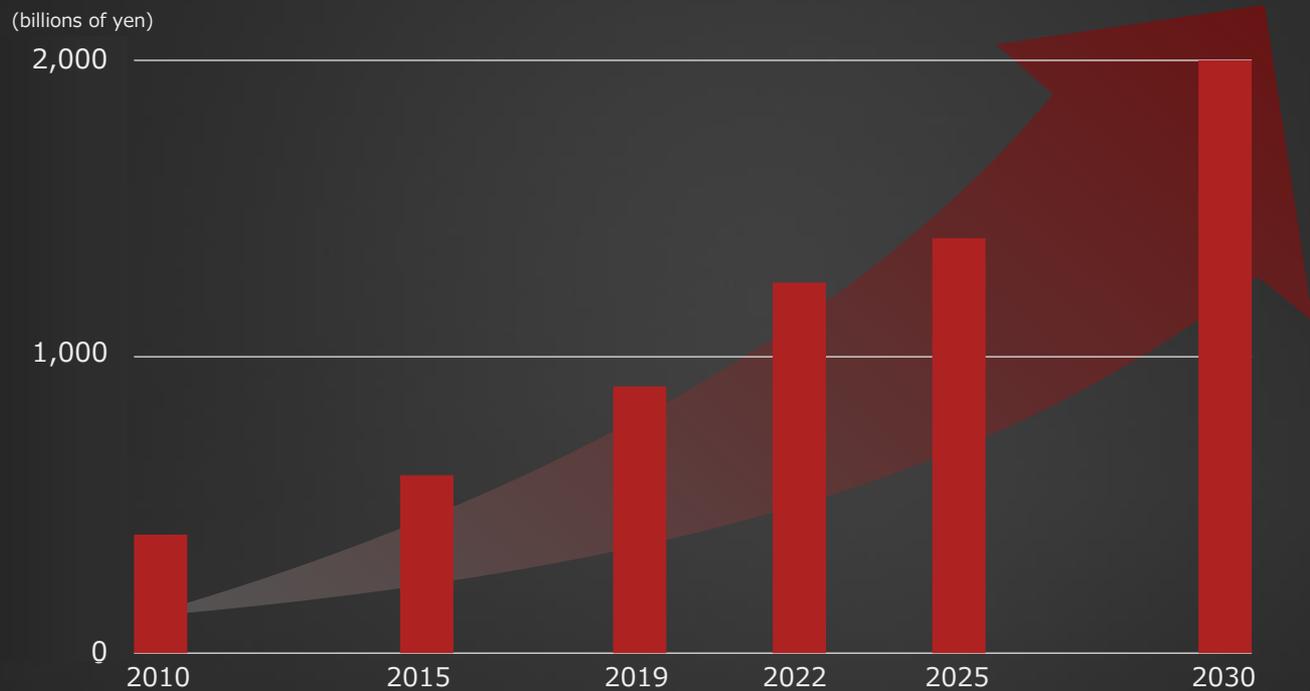
Power Sports & Engine Business Outlook

- Revenues of 700 billion yen are becoming feasible in 2025, with a target of 1 trillion yen for the 2030 vision.
- As one of the mass-production businesses in KHI, PS&E continues to contribute as a major source of revenue.



North America Off-Road Four-Wheelers Market

- Strong growth will continue, as has been the case in the past



*Include PWC (jet ski)



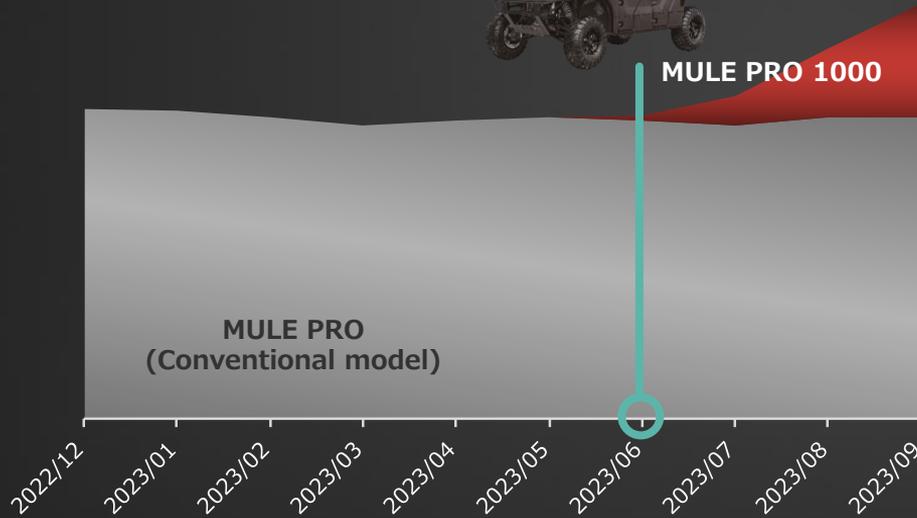
Recreation



Utility

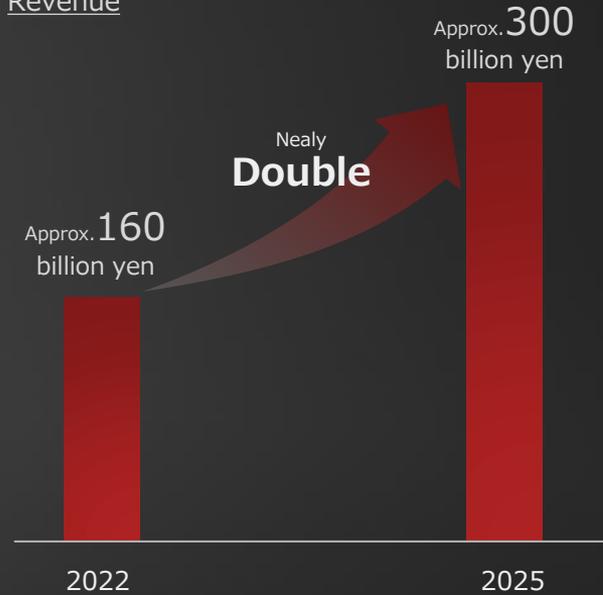
Four-wheelers Business

- New Models : MULE PRO 1000 Series
 - Launched 1,000cc models as an upper level model of the previous 812ccs
 - Its powerful ride quality is highly appreciated, leading strong sales



- Revenue will nealy double by 2025

Revenue

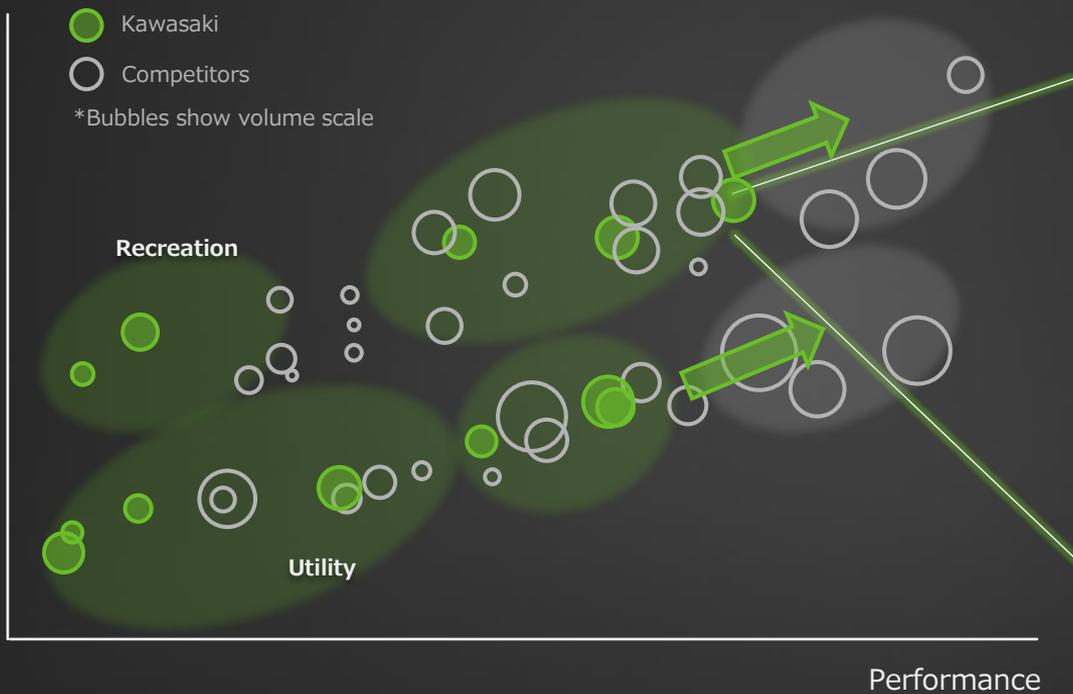


*Include PWC (jet ski)

Launch of competitive new models

The market focus is shifting towards faster and larger models

price



TERYX KRX4 1000

Expansion of production capacity



Investment in KMM plant and a new plant in Mexico expand production capacity from 50,000 units to **100,000** units / year

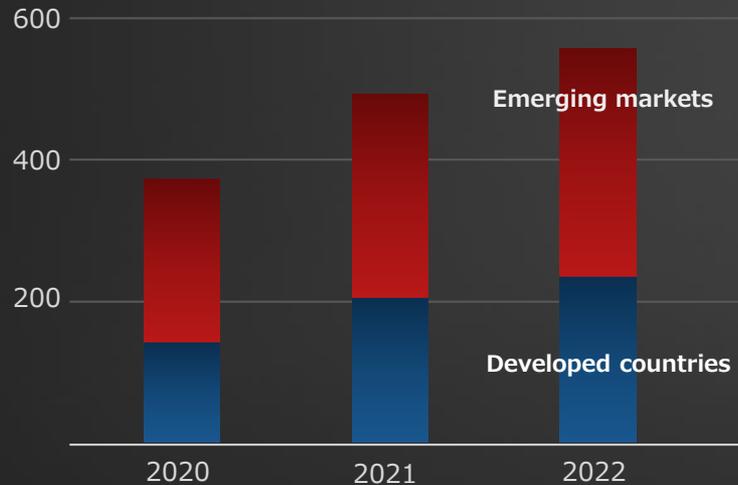
*New plant in Mexico will start full-capacity operation from FY2024 (30,000 units / year)

Motorcycles Business

- Active launch of high class value-added models in developed countries, which are the main profit generators
- Accelerate development of electric / hydrogen engines in response to decarbonization trend



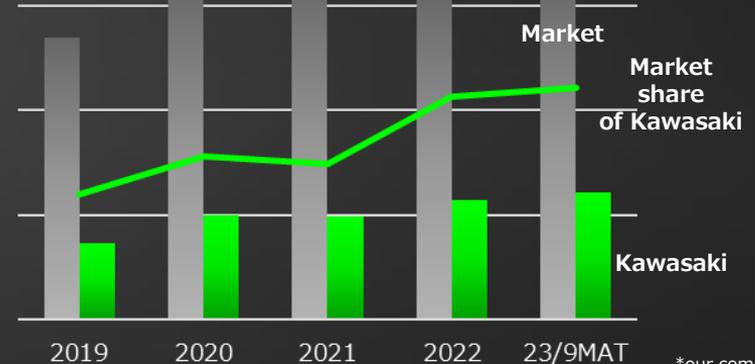
Our sales of motorcycles (thousand units)



Situation in the North American market

- Demand remains strong after the end of the pandemic in 2021 and remains above pre-COVID-19 levels
- Kawasaki is steadily increasing its market share (up 5% from 2019)

Market and sales volume



*our company research

Launched carbon neutral motorcycles

- Carbon neutral models (EV/ HEV) will drive growth

<EV> *Ninja e-1 / Z e-1*

Full-Size EV Sport Model



<HEV> *Ninja 7 Hybrid / Z7 Hybrid*

The world's first Strong HEV motorcycle



Carbon neutral motorcycles (EV/HEV) will drive growth



EV Reputation

- “This is the first electric motorcycle made by a Japanese manufacturer, and it is very symbolic.”
- “Ideal for people looking for an alternative transportation to cars and trains.”
- “I feel like I'm driving a Ninja/Z that I can't believe is in the 125cc class.”
- “Powerful acceleration with e-boost button is very fun.”
- “The function that allows you to move forward and backward slightly is very convenient when parking.”

HEV Reputation

- “Honored to witness the world's first strong hybrid motorcycle.”
- “One of the most interesting bikes of my life, and I was very impressed.”
- “There are various modes such as sporty, fuel efficient, and EV driving, and it feels like three motorbikes in one. Great concept.”
- “Have achieved a high level of resource conservation without sacrificing Fun to Ride. The future of two-wheelers.”
- “Full of functions such as 1000cc like powerful acceleration, forward and backward move when parking, automatic transmission.”



Efforts for Carbon Neutrality : Hydrogen engine

Hydrogen engine motorcycle



Hydrogen engine four-wheel buggy (HySE-X1 for Dakar)



HySE: Hydrogen Small mobility & Engine technology

Tradition and Innovation

- While introducing innovative EVs and HEVs, we also value the heritage that has been loved by our customers for many years.
- Further strengthening our brand as a leading manufacturer that combines "tradition" and "innovation".
- The anniversary model will be introduced in 2024 as a milestone year.

100 year anniversary of the Meguro



MEGURO S1 (New Model)

40 year anniversary of Ninja



special C & G model

New models in 2024 (gasoline engine motorcycles)



Ninja ZX-6R



Ninja ZX-4R



Ninja500



Z500



Eliminator



W230



KX450/X



KLX300



KLX230



MEGURO S1



KLX300SM



KLX230R

Expansion into the aero-engine business

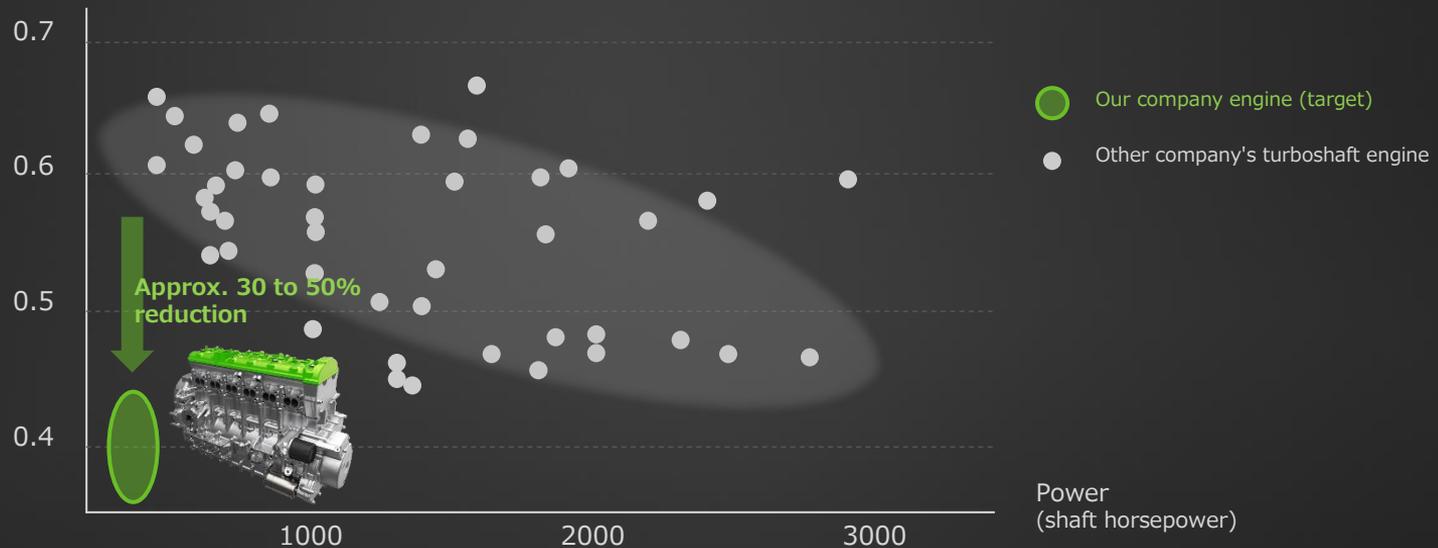


*Aircraft concept CG of VOLTAERO (KMC-funded French electric/hybrid aircraft startup venture)

Aero engine development

- Almost the same weight with a reduction in fuel consumption of about 30 to 50% compared to a similar class of turboshaft engine
- Low fuel consumption allows smaller tanks, which is especially useful with hydrogen fuel (Hydrogen tanks are generally bulky)
- Utilize the internal know-how in certification procedure that Aerospace Systems Company has

fuel consumption rate



Created by our company based on IHS Jane's Aero-Engine 2014-2015

Aero engine development



2024
Sample engine available to customer

2027
Sample engine available to customer

Engine type approval

Engine type approval

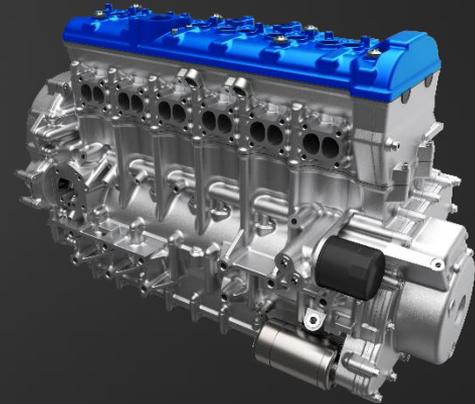
2030

2035

Ninja H2R
Supercharged Engine

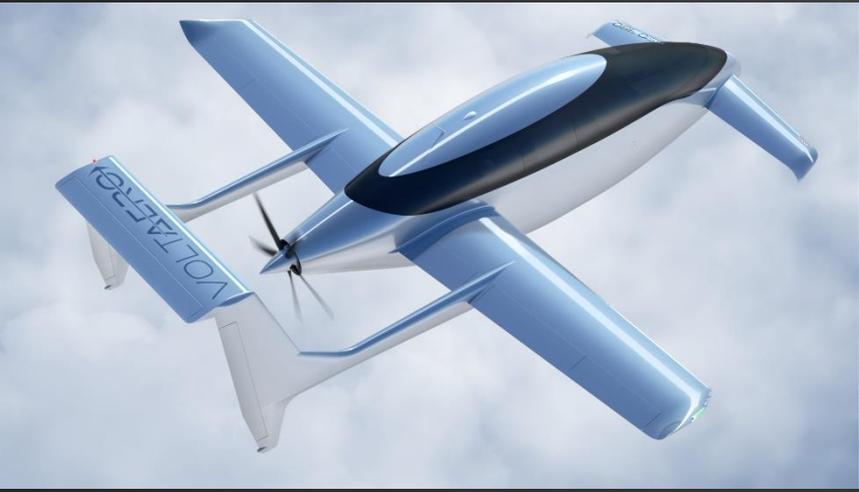
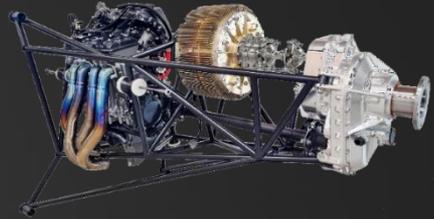
In-line six
Turbo Gasoline Engine

In-line six
Turbo Hydrogen Engine



Collaboration in aero engines

- Promoting investment and collaboration with VOLTAERO, an electric/hybrid aircraft startup, launched by the former Chief Technology Officer of the Airbus Group with extensive contacts and expertise in the industry
- The Ninja H2 SX engine is scheduled for a test flight in early 2024



Expectations for our aero engines

- Reputation at various air shows (Paris, Oshkosh, Dubai)



"Excellent power weight ratio, very attractive."



"It's a very compact design based on power sports products, which is great."



"In an industry dominated by engines with decades-old designs, Kawasaki's entry into the market is very encouraging, and we look forward to it very much."



"It is very interesting that the company is considering hydrogen fuel, and I hope that it will do so."

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Contributing to national security through defense business

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Achieving a sustainable and affluent society ~ Robots are becoming familiar to us ~

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Contributing to national security through
defense business

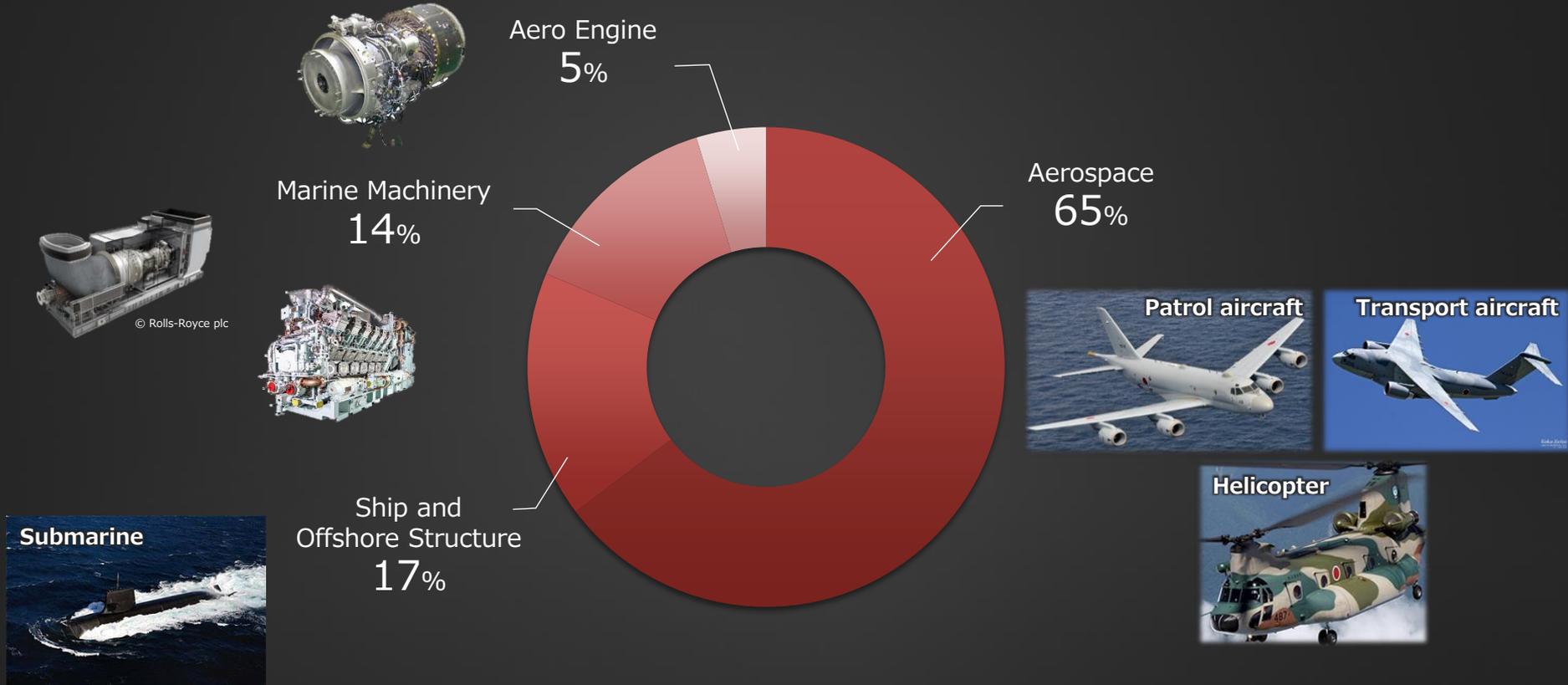
Aerospace Systems Company
Senior Managing Executive Officer
Hiroyoshi Shimokawa

Kawasaki's approach to national defense

Contributing to national defense through patrol aircrafts, transport aircrafts, submarines, etc.

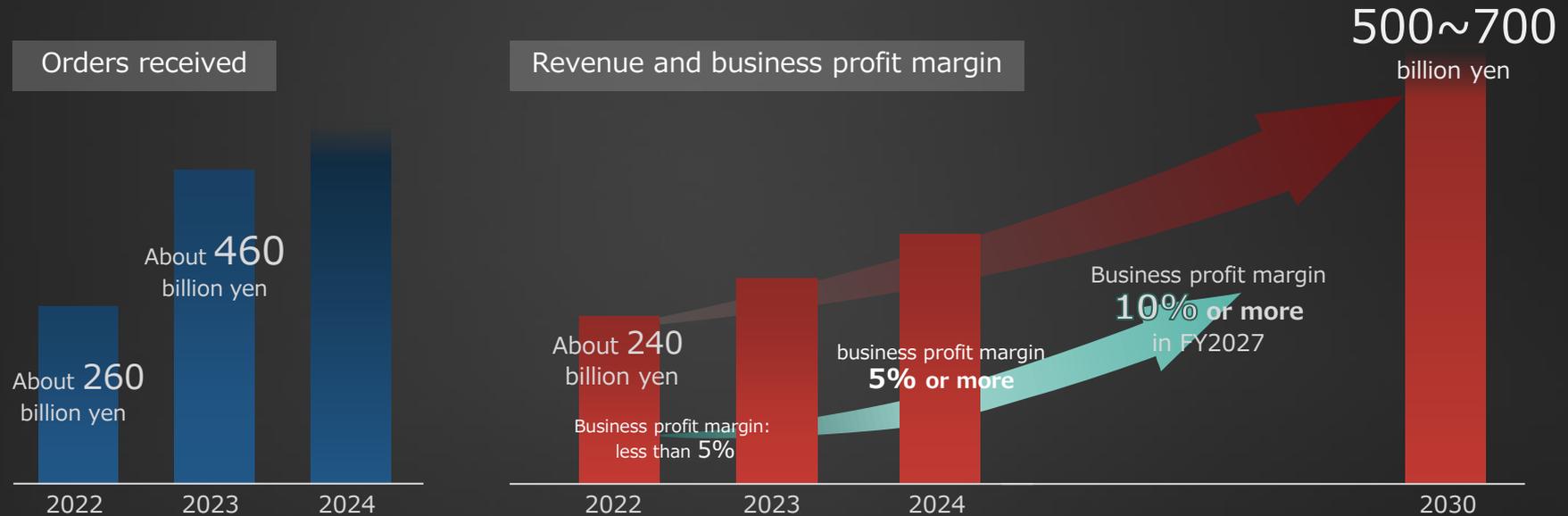


Breakdown of our defense businesses



Prospects for business expansion in line with new defense industry policies

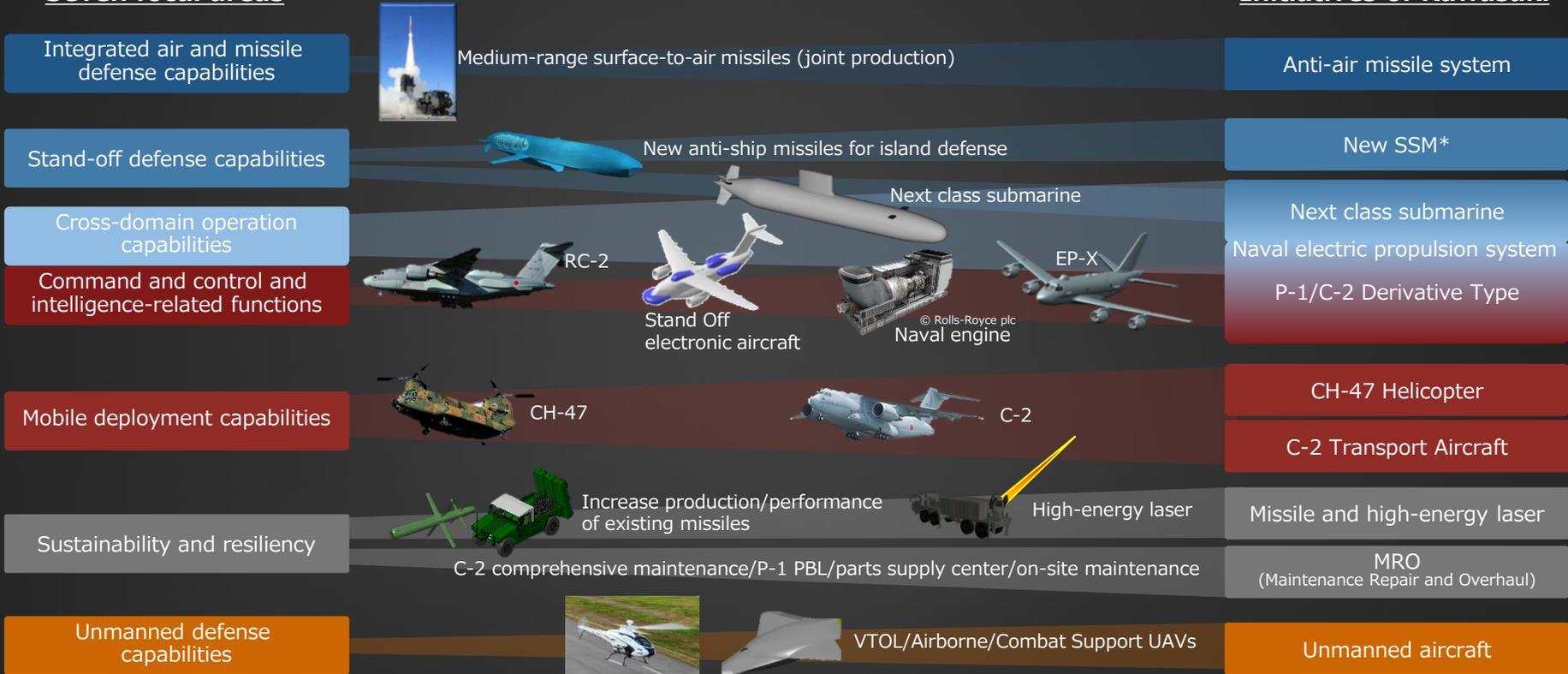
- Orders will increase due to increased defense spending associated with the drastic strengthening of the multidimensional integrated defense force
- Ensuring proper profits by revising the contract system



National defense strategy and our initiatives

Seven focal areas

Initiatives of Kawasaki

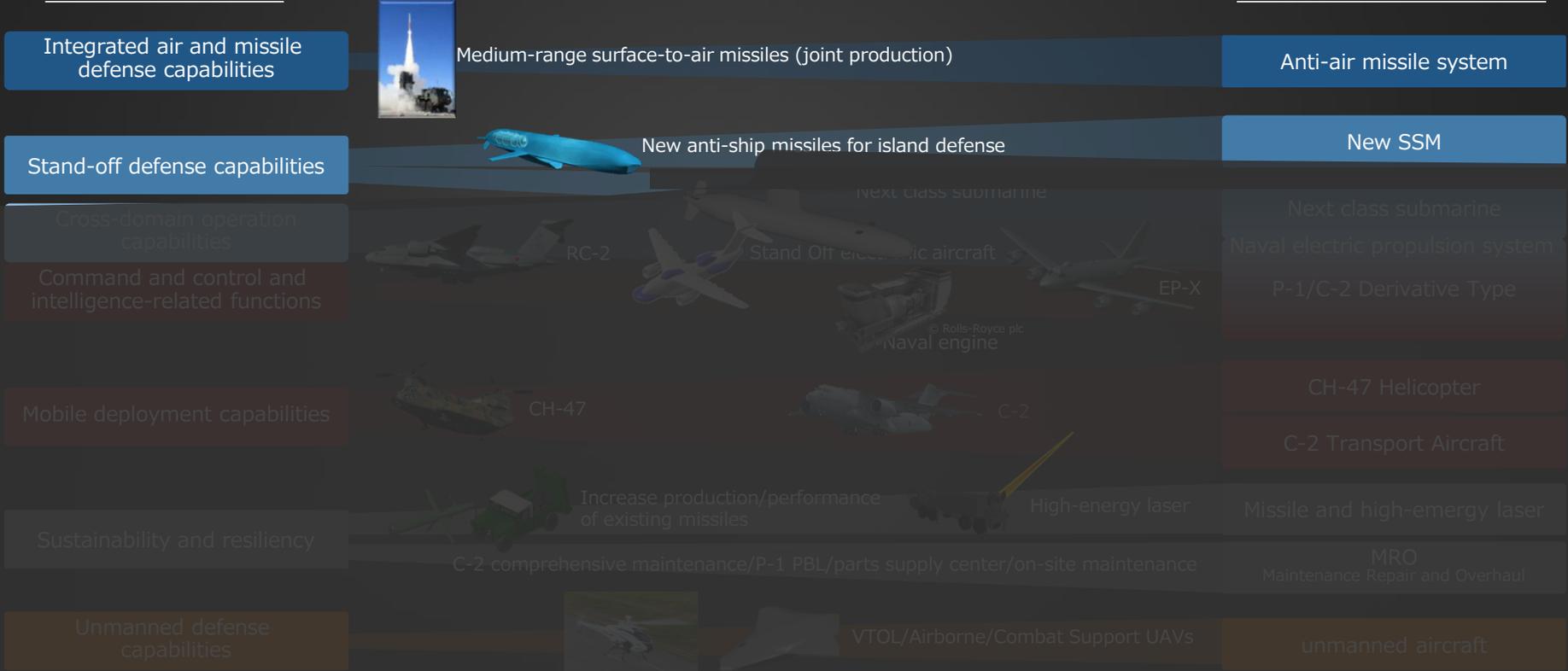


*Surface-to-Ship/Surface Missile

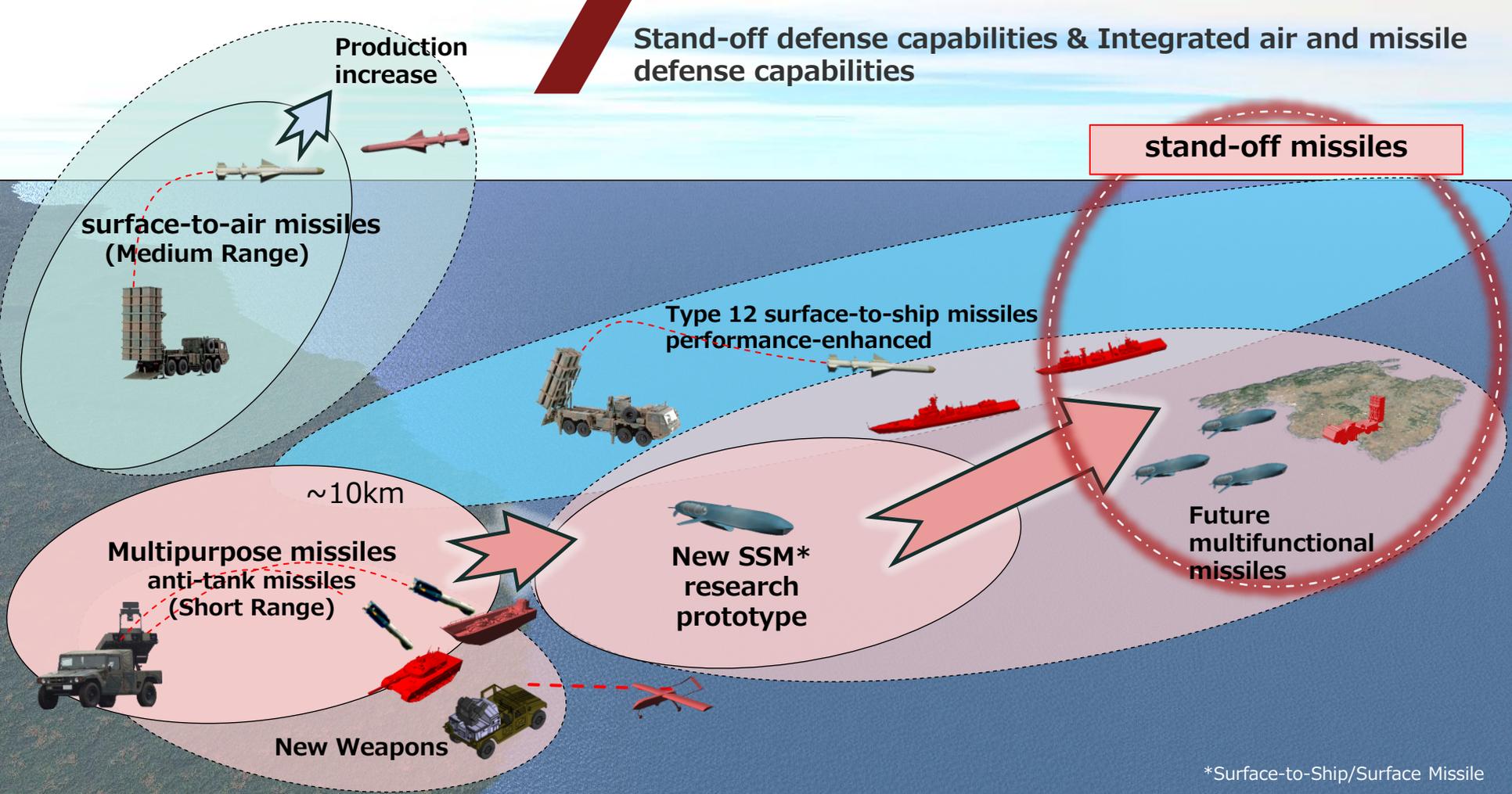
National defense strategy and our initiatives

Seven focal areas

Initiatives of Kawasaki



Stand-off defense capabilities & Integrated air and missile defense capabilities



*Surface-to-Ship/Surface Missile

Stand-off defense capabilities: New SSMs (new anti-ship missiles for islands defense)

- Bringing together our technology for missiles, aero engines, and aircrafts
- Development of missiles with greatly improved performance such as range, survivability

Radar Cross Section test



Airframe
stealth technology

Long range
Improved persistence

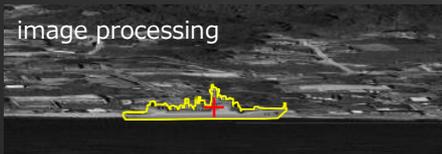
Image video



Sheeka

Precise guidance by infrared imaging

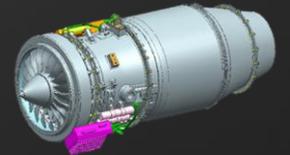
AI Target Extraction and Identification



Turbofan engine

Equipped with in-house developed KJ series

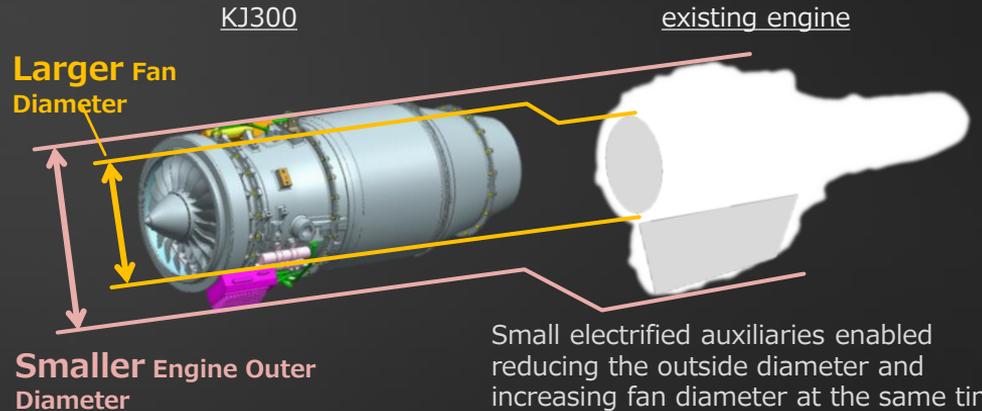
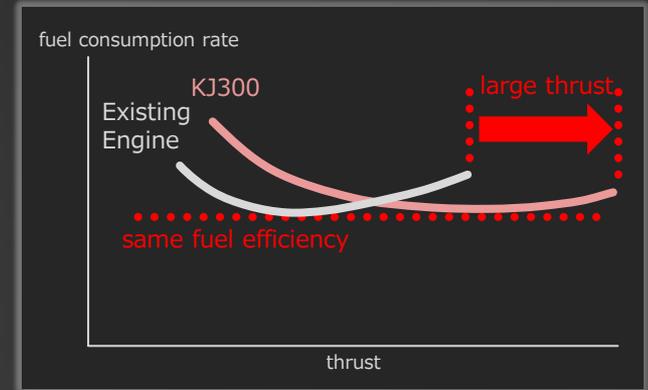
Long range
Low fuel consumption
High thrust



Stand-off defense capabilities: New SSMs (new anti-ship missiles for islands defense)

KJ300 Turbo Fan Engine

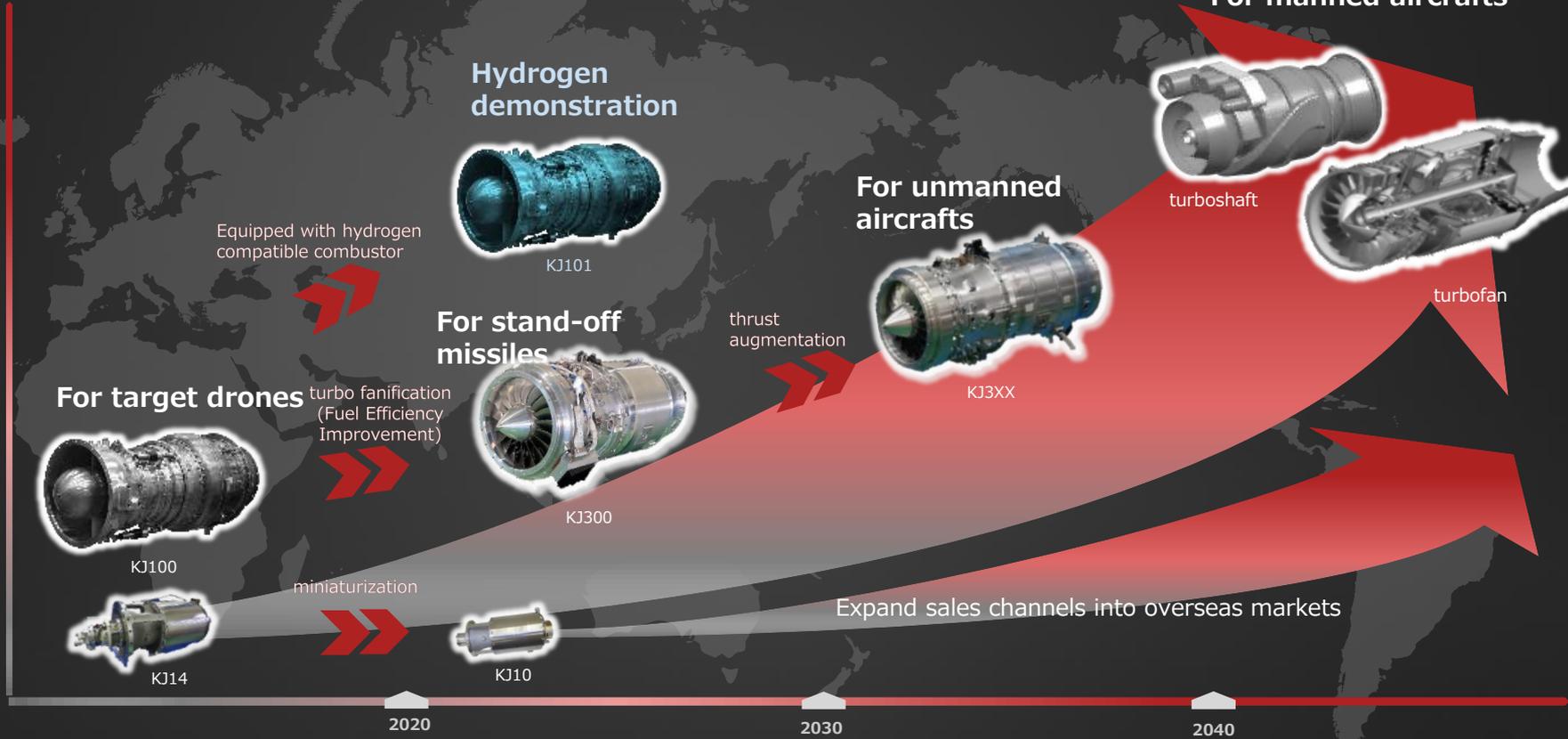
- Japan's only turbofan engine for stand-off missiles
- Same fuel efficiency and greater thrust compared to existing engines
 - ➔ Increased payload, extended range



Small electrified auxiliaries enabled reducing the outside diameter and increasing fan diameter at the same time, contributing to thrust improvement

Development of small aero engines for defense

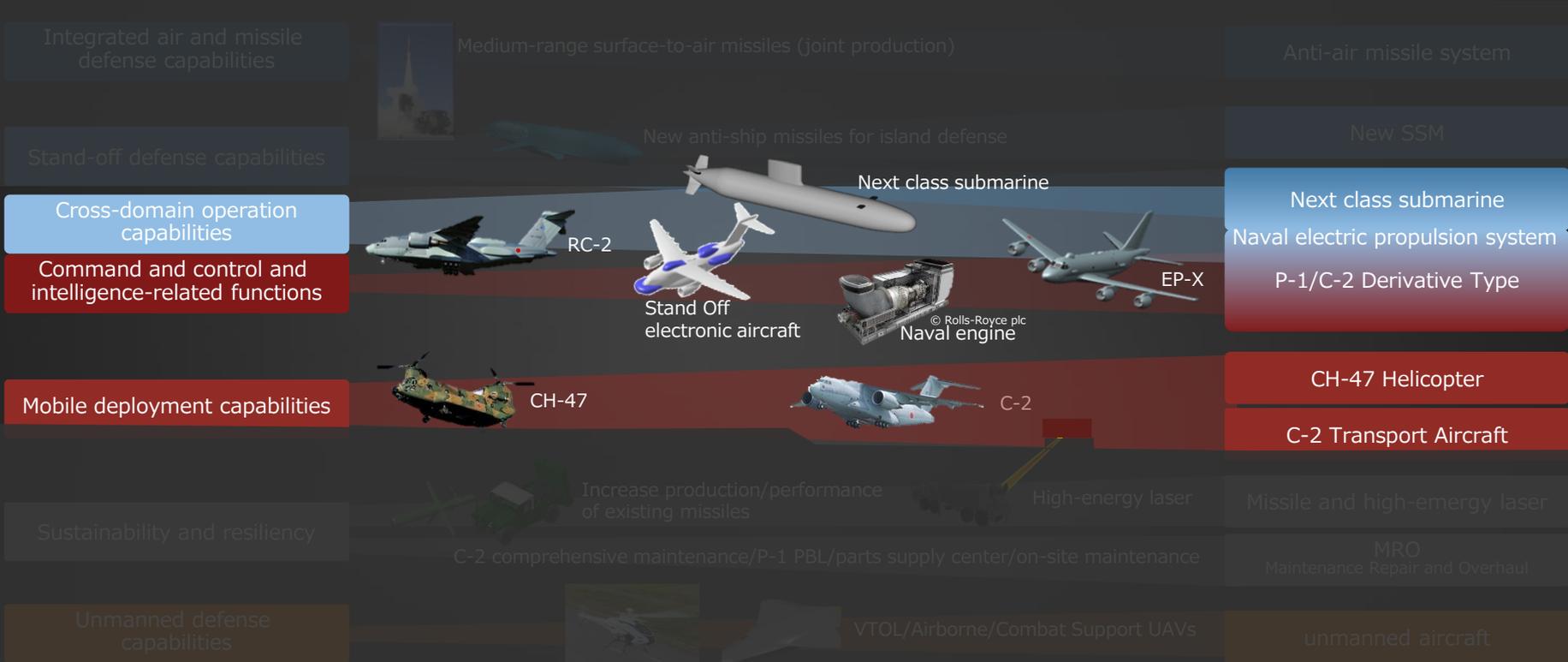
Technical innovation



National defense strategy and our initiatives

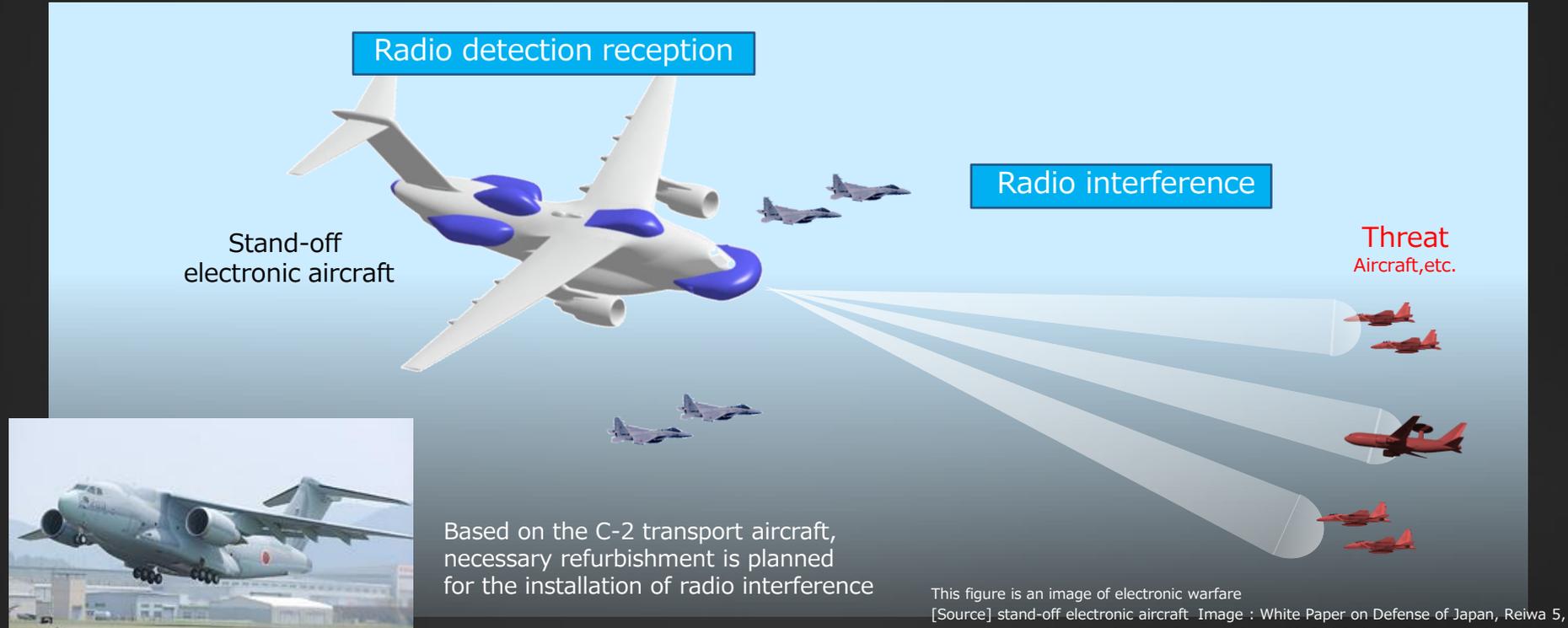
Seven focal areas

Initiatives of Kawasaki



Stand-off electronic aircraft

Effective radio interference from stand-off range against threats



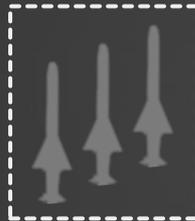
Development of the next class submarine following the latest Taigei-class*

- Received an order to study a new class submarine
- Participated in the MoD research to install stand-off missiles
- All Japanese submarines are equipped with diesel engines manufactured by Kawasaki

High stealth technology

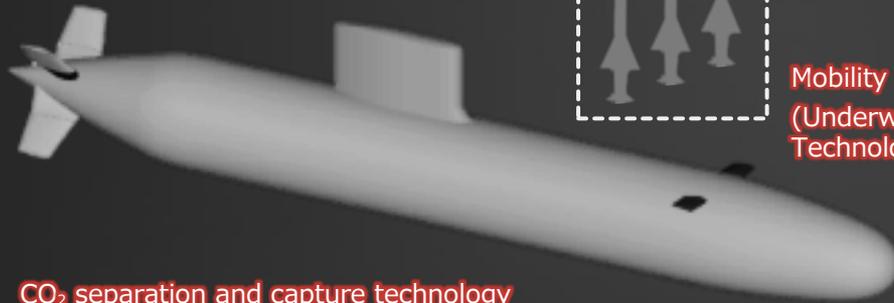
High sensing technology

Stand-off missiles

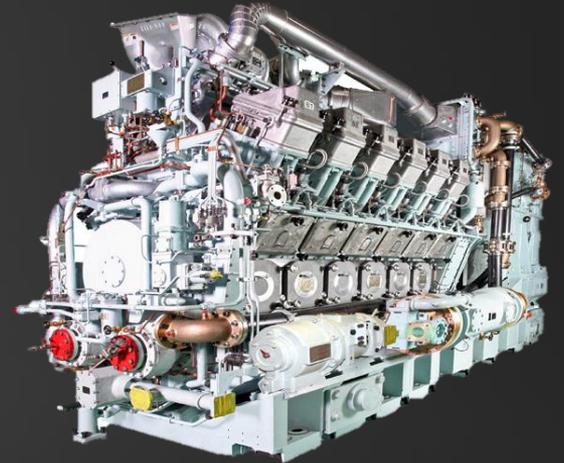


Mobility improvement
(Underwater Navigation
Technology)

CO₂ separation and capture technology



Next class submarine (our concept)



We have been delivering new main engines with significantly improved output since the 2020 planned ships

*Taigei class submarines have been in service sequentially since 2022

Application of submarine technology

Mobility improvement
(Underwater Navigation Technology)



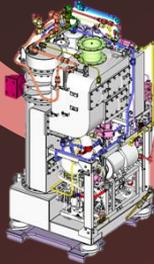
Commercial underwater drone "SPICE ®"
Subsea Precise Inspector with Close Eyes



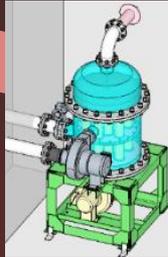
Development of UUV in the defense sector
(Unmanned Underwater Vehicle)

CO₂ separation and capture technology

Air purification device for submarine
(CO₂ scrubber)



Air purification device for land
(Proto type machines for shelters)

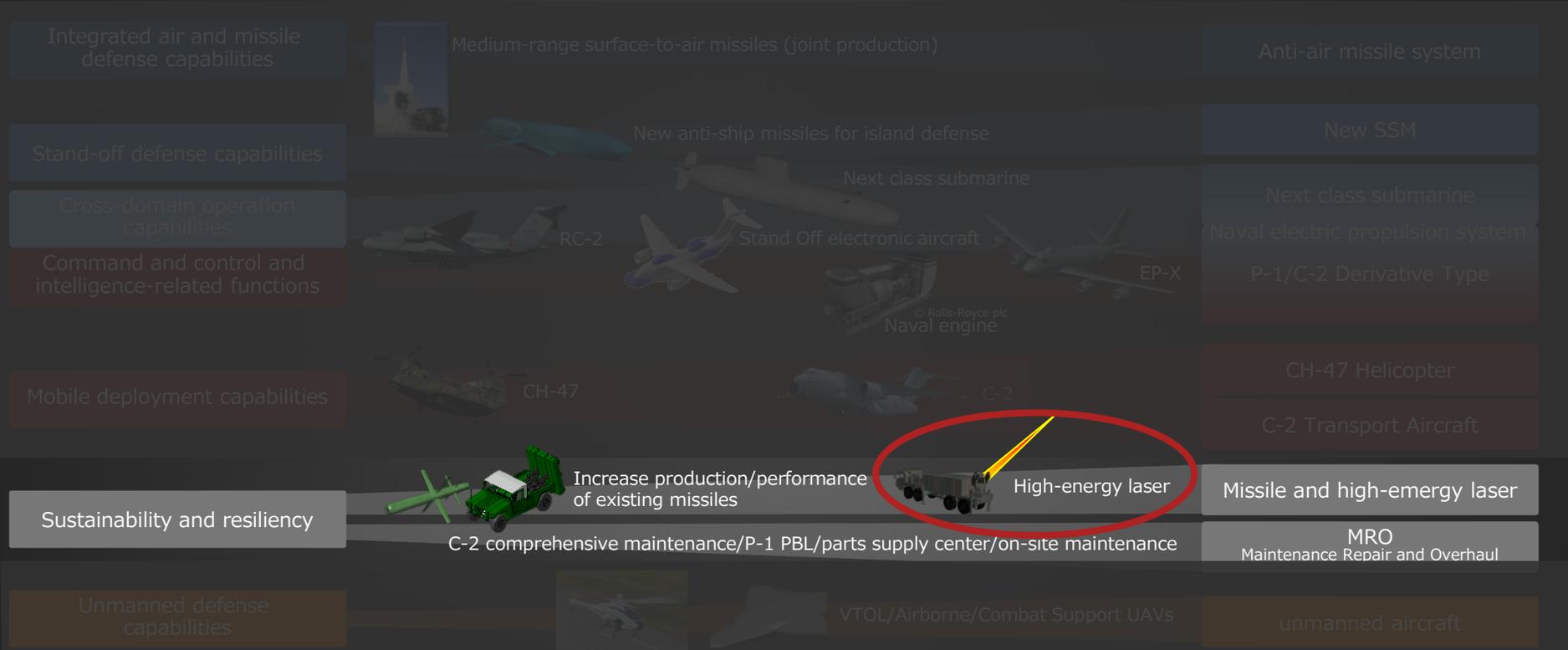


Direct Air Capture: direct capture of carbon dioxide from the atmosphere

National defense strategy and our initiatives

Seven focal areas

Initiatives of Kawasaki



High-energy laser Weapons

Development of domestic high-energy lasers for dealing with drones

The precise guidance technology and the fiber laser technology are combined

Technical feature

- Advanced use of civil technology
- The world's highest output (100kW level)

Dealing with drones

Laser on ship

Laser on vehicle

Image video

Source: The Ministry of Defense Official Channel (ATLA Official Channel)
(<https://www.youtube.com/channel/UCAsYh857uec114d5JK-Dg>)

National defense strategy and our initiatives

Seven focal areas

Initiatives of Kawasaki

Integrated air and missile defense capabilities



Medium-range surface-to-air missiles (joint production)

Anti-air missile system

Stand-off defense capabilities



New anti-ship missiles for island defense

New SSM

Cross-domain operation capabilities



P-1



Stand Off electronic aircraft

Next class submarine



EP-X

Next class submarine
Naval electric propulsion system

Command and control and intelligence-related functions



© Rolls-Royce plc
Naval engine

P-1/C-2 Derivative Type

Mobile deployment capabilities



CH-47



C-2

CH-47 Helicopter
C-2 Transport Aircraft

Sustainability and resiliency



Increase production/performance of existing missiles

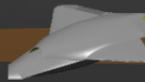
High-energy laser

Missile and high-energy laser

C-2 comprehensive maintenance/P-1 PBL/parts supply center/on-site maintenance

MRO
Maintenance Repair and Overhaul

Unmanned defense capabilities



VTOL/Airborne/Combat Support UAVs

Unmanned aircraft

Unmanned asset defense capabilities

development and demonstration plans



K-RACER-IV

VTOL* High-Speed Flight Demonstrator

*Vertical Take Off and Landing



K-RACER-X2

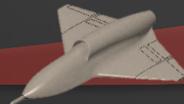
Transportation demo with high payload



Demonstration of more than 20 hours of prolonged air stay



Autonomous flight demonstrator



AI Development for Autonomous Flight, Combat and Group Control

various defense applications



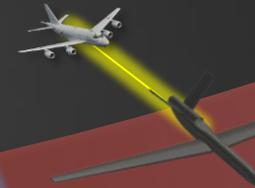
VTOL unmanned aircraft

Drone for transporting goods to Ships and Islands



Carrier-based alert drone

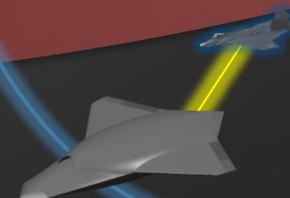
Monitoring from the Fleet



Airborne UAV

Cooperation with patrol aircraft

*Unmanned aerial vehicle



Combat support drone

Cooperation with fighter aircraft

Unmanned asset defense capabilities: VTOL unmanned aerial vehicle (K-RACER)

K-RACER flight experiment



Transport of goods to ships/islands



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Achieving a sustainable and affluent society ~ Robots are becoming familiar to us ~

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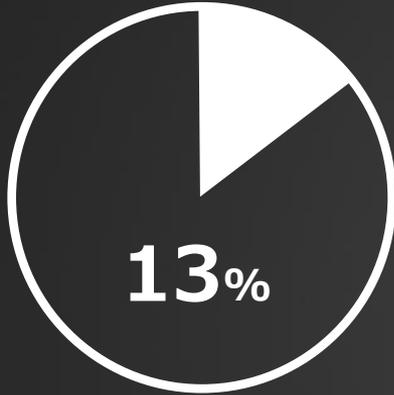
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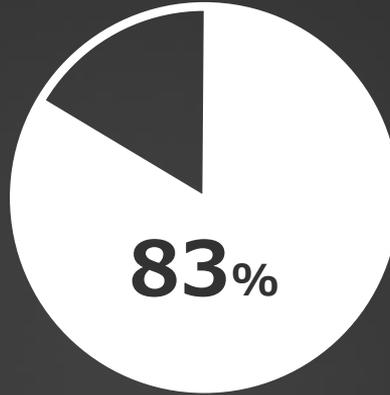
Hydrogen and large-scale CO₂ capture business strategy for a carbon neutral society

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Structural issues related to energy supply and demand in Japan



Low energy self-sufficiency



Domestic primary energy depends on fossil fuels



Stabilization of renewable energy power

Social Requirement

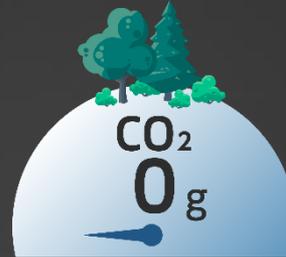
- Securing diverse energy sources
- Energy that does not emit Green House Gas:GHG
- Energy for stabilizing power supply

 **Hydrogen as an essential factor for carbon neutrality**

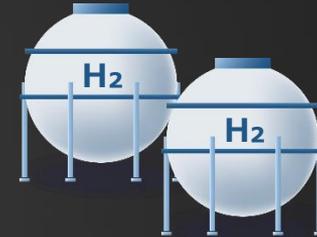
Hydrogen essential for both carbon neutrality and energy security



Can be produced and transported from global renewable energy sources



CO₂ free



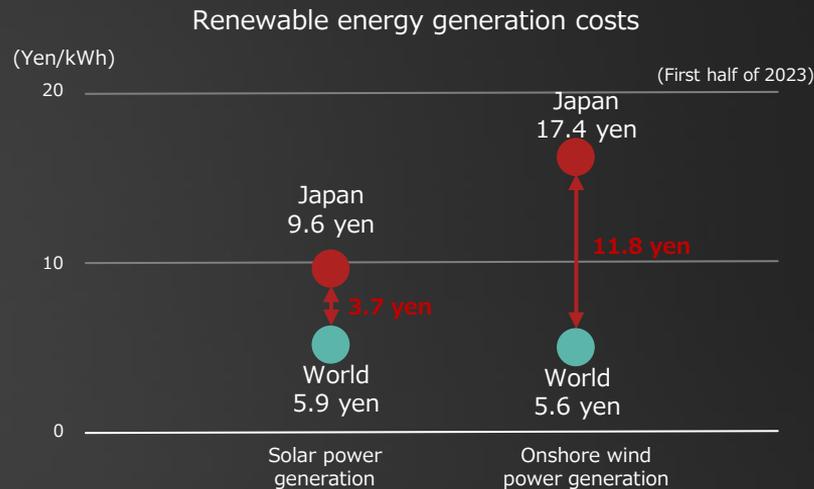
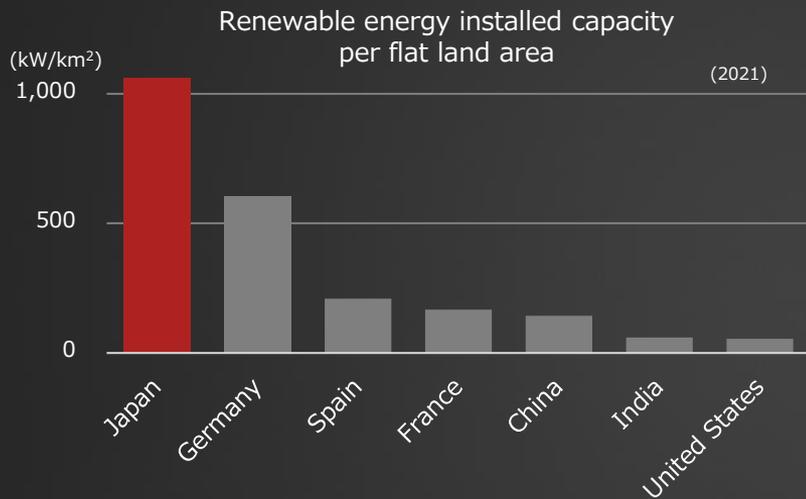
Can be converted and stored in a stable form

advantage of hydrogen

- Capable of mass and long-term storage
- Contributing to the stability of the power supply and demand system by storing hydrogen produced from renewable energy around the world until needed

Necessity for an international hydrogen supply chain

Japan's renewable energy installation density is **the highest level** among major countries, and its renewable energy generation costs are **still higher than any other countries**.



- It is important to bring green hydrogen to Japan from overseas where renewable energy costs are lower than Japan.
- Conversion to liquefied hydrogen, ammonia, and MCH (methylcyclohexane) enables mass transportation.

Compiled by our company the Ministry of Economy, Trade and Industry Agency for Natural Resources and Energy in October 2023 with reference to "Current Status of Renewable Energy in Japan and Overseas and Proposed Issues of the Procurement Price Calculation Committee for the Current Fiscal Year."

Why Kawasaki Heavy Industries Chooses Liquefied Hydrogen

Challenges

Safety Issues

Overseas Source

Marine transportation

Japan

Liquefied Hydrogen



Ammonia



MCH



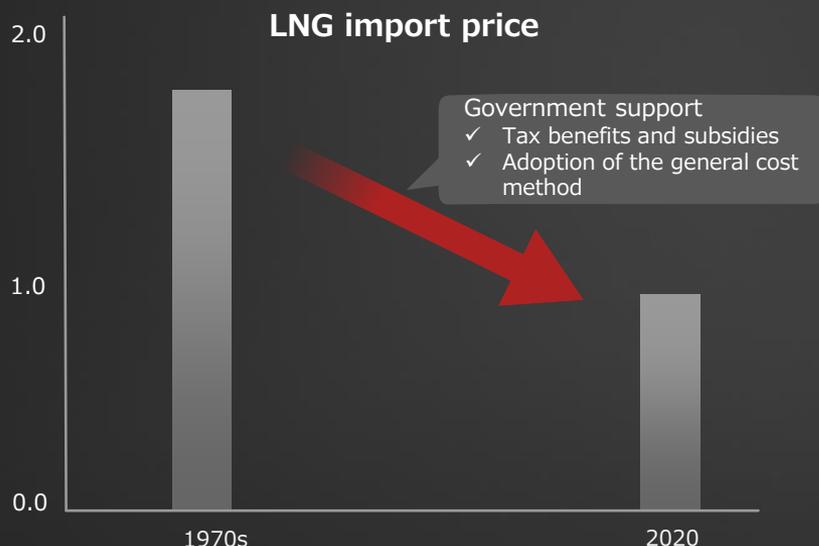
Government Support for hydrogen supply chain is progressing

~Following the same path as the introduction history of LNG ~

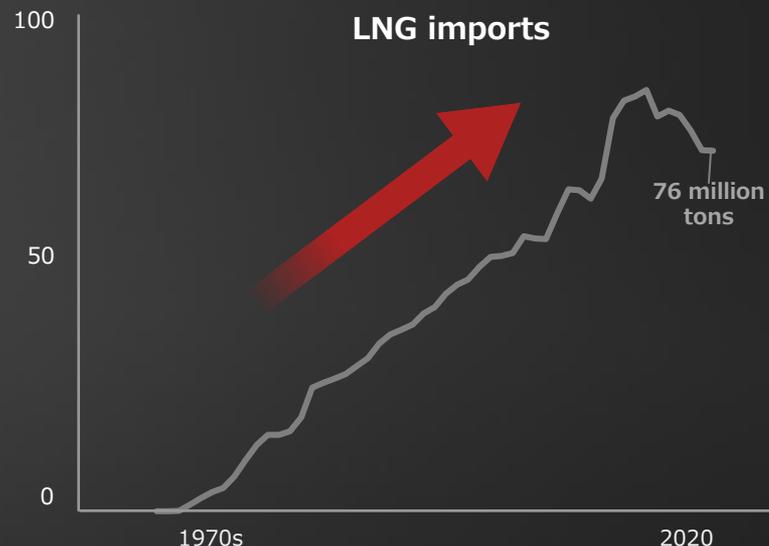
- Basic Hydrogen Strategy was revised in June 2023 and differential compensation and terminal development support are specified as part of a 15-year investment of 15 trillion yen to build a large-scale supply chain
- When LNG was introduced to Japan in 1970s, imports increased with governmental support despite higher costs than oil prices

Government support is the key to **mass adoption**

Ratio to Crude Oil Price



million tons



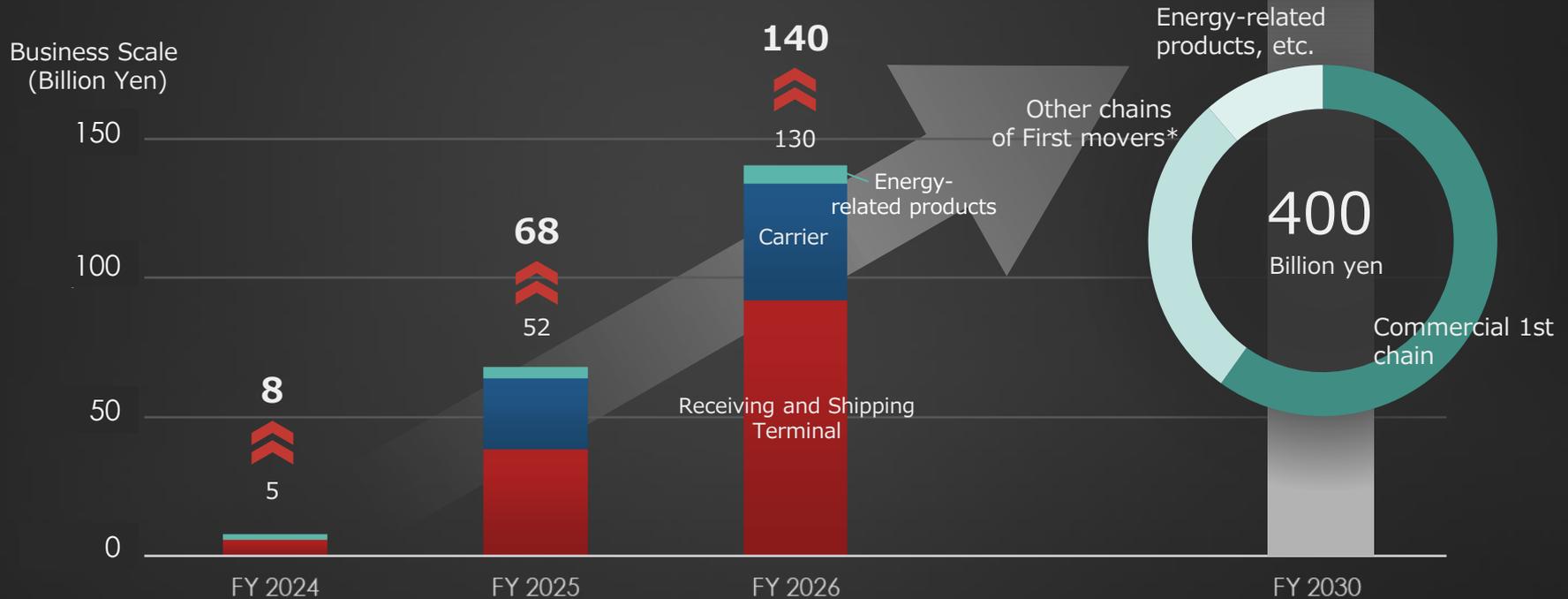
Compiled from Ministry of Finance Japan Trade Statistics, Energy White Paper 2023, Agency for Natural Resources and Energy, the Ministry of Economy, Trade and Industry



Progress in the hydrogen business

Our Hydrogen Business Outlook

- The forecast for FY2024 through FY2026 was revised up from the previous forecast announced in 2022
- Steady progress in commercialization demonstration (carrier and terminal) and expecting increased sales of energy-related products



*First mover: A company that plans to start supplying hydrogen by around 2030

Existing business contributes to hydrogen business promotion

Sakaide Works, one of the world's leading shipyards specializing in the construction of large liquefied gas carriers, is to become a plant that holds the key role to realize a hydrogen society

Existing liquefied gas carrier



LPG fueled LPG/ammonia carrier

13 Consecutive Orders received

| | | |
|--------------------|--------------------|-------------------|
| Jul. 2021 1 order | Apr. 2022 1 order | Jan. 2023 1 order |
| Aug. 2021 1 order | Jun. 2022 1 order | Feb. 2023 1 order |
| Oct. 2021 1 order | July. 2022 1 order | Mar. 2023 1 order |
| Dec. 2021 2 orders | Dec. 2022 1 order | Jul. 2023 1 order |



Large liquefied hydrogen carrier



LNG carrier

Since the first construction in 1981, we have built wide variety of LNG Carriers from large to small carriers for maritime transportation



Small and medium-size line-up



HySTRA

NEDO's Demonstration Project for Establishment of Mass Hydrogen Marine Transportation Supply Chain Derived from Unused Brown Coal.

Existing business contributes to hydrogen business promotion

Low-temperature technology and production technology through history of large LNG tanks contribute to establish cryogenic technology for the large liquefied hydrogen tanks

Large LNG tank / Liquefied hydrogen tank / Liquefied hydrogen Container

Large liquefied hydrogen tank



Deliveries of large LNG tanks and liquefied hydrogen storage facilities (including under construction)

2010 and later

Large LNG tanks:

24units(including 7 after 2020)

Liquefied hydrogen storage equipment:

20 units (including 9 after 2020)



50,000m³ class (commercialization demonstration project)

Further enlargement with lower costs



200,000m³class (future project)

Slide for projection
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Slide for projection
※Please check it out from the YouTube video

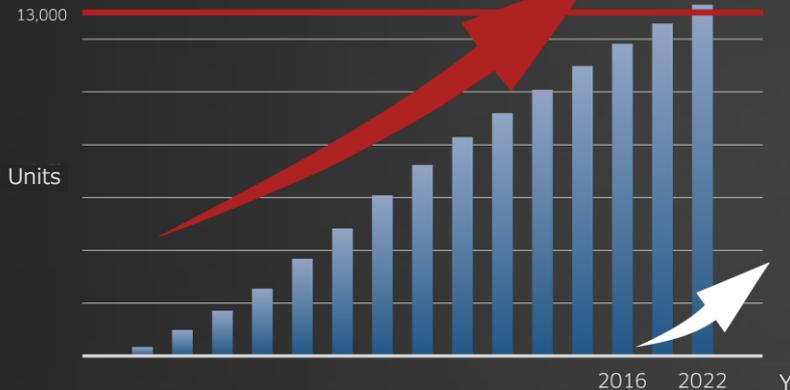
Existing business contributes to hydrogen business promotion

Reliable energy products manufactured by Kawasaki, which has abundant track record worldwide, serve as a foothold for the introduction of hydrogen

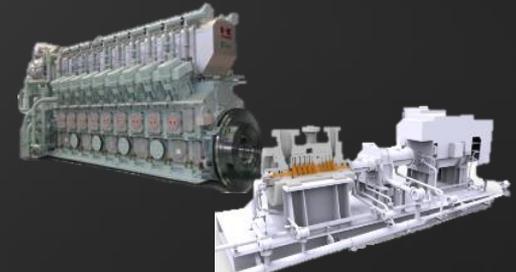
Gas Turbines (GT)

Hydrogen pure firing GT

Cumulative sales of more than 13,000 units



Hydrogen Gas Engine, Compressor



Hydrogen co-firing lineup

- 1MW class (pure firing available)
- 5MW class
- 8MW class
- 20MW class (pure firing available)
- 30MW class

100 units for power generation since 2018

- Hydrogen pure firing power plant 1site
- Hydrogen co-firing power plant 2sites
- Hydrogen ready power plant 5sites

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Accelerated efforts to build liquefied hydrogen supply chains

2020

2030

2040 ~

Commercialization Demonstration

- Reinforced business structure
JSE (Japan Hydrogen Energy), JSE Ocean
- Determined shipping and receiving locations
- Completed development of major commercial-scale equipment

Commercial Operations

- Accelerated partnership for commercialization and demand creation
Memorandum of Cooperation with Resonac(Japan)
- Increase in orders for gas turbine co-firing models

Reinforced business structure

- October 2023, Kawasaki, Iwatani and INPEX have concluded a shareholder agreement for INPEX to acquire shares in JSE.
- Companies with advanced technology and knowledge related to hydrogen and energy are considering participation.



Reinforced business structure - JSE Ocean

Jan.2023 JSE Ocean was established for examining the maritime transportation of liquefied hydrogen by liquefied hydrogen carriers.(JSE 100%)

Sep.2023 Japanese 3 shipping companies participated
Together with 3 companies with abundant knowledge and experience of maritime transportation of energy, JSE aims to establish a maritime transport operation method for liquefied hydrogen in commercial-scale international supply chains.

JSE

50.2%

"K" LINE

16.6%

**Mitsui
O.S.K.Lines**

16.6%

NYK Line

16.6%

JSE Ocean

Determined shipping and receiving locations

Shipping terminal
Hastings District, Victoria

Receiving terminal
Kawasaki coastal area in Kanagawa Prefecture



Government and local governments also accelerate

March 2023

Conclusion of memorandum of cooperation ^{*1} in the presence of the governments of Japan and Australia ^{*2}

[Purpose]

Development of an international liquefied hydrogen supply chain between Japan and Australia

June 2023

Tokyo, Ota Ward and Kawasaki City signed partnership agreement

[Purpose]

To expand hydrogen utilization in airport coastal areas

September 2023

Kawasaki City and Kawasaki Heavy Industries signed partnership agreement

[Purpose]

Sustainable development of the regional economy through development of hydrogen demand in the coastal area of Kawasaki

(^{*1}) Mr. Yasutoshi Nishimura, Minister of Economy, Trade and Industry, Mr. Hiroaki Ishizuka, Chairman of NEDO, Ms. Jenny McAllister, Australian Assistant Minister for Climate Change and Energy, Mr. Justin Hayhurst, Australian Ambassador to Japan, and Mr. Tim Pallas, Treasurer of the Victorian State Government at the Asia Zero Emission Community (AZEC) Public-Private Investment Forum

(^{*2}) Memorandum of Understanding signed between Japan Suiso Energy, Iwatani, Electric Power Development, and Sumitomo

Accelerating movements toward the hydrogen society in Japan

November 2023 Himeji Area

Basic agreement for cooperation on hydrogen transportation and utilization, starting in Himeji area

Nippon Telegraph and Telephone, NTT Anode Energy, Panasonic

Himeji Area

Chubu Area

Kyushu Area

November 2023 Kyushu Area

Construction of hydrogen production system and start of operation of hydrogen fuel cell bus using produced hydrogen locally

Kyushu Electric Power, Kyushu University

December 2022 Chubu Area

Concluded a basic agreement on joint consideration of a hydrogen production project using waste plastic gasification facilities near Nagoya Port, Aichi Prefecture

Iwatani, Toyota Tsusho, JGC Holdings

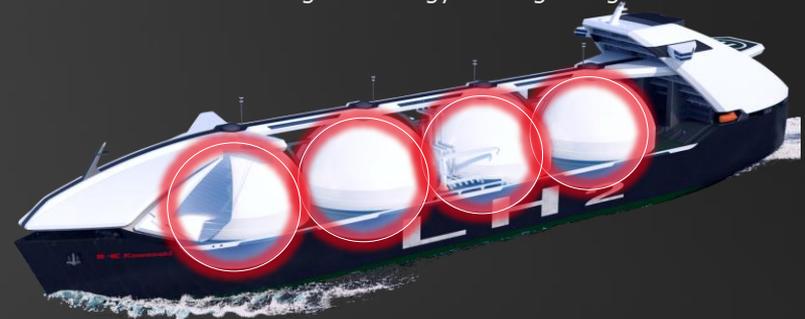
Development of major commercial-scale equipment

- Cargo tanks for large liquefied hydrogen carriers

Jun. 2023 **Completed technological development** of cargo tank for large liquefied hydrogen carriers by using the test tank desined based on "CC61H type" (grantd by NEDO*)

Completing the technical challenges of increasing size and verifying tank operation technology

- New cargo tank with our company's proprietary technology (Spherical Bilayer Structure, Two-Stage Thermal Insulation)
- Confirmed insulation performance as planned
- Established manufacturing technology for large cargo tanks



Large liquefied hydrogen carriers are planned to be Zero-Emission powered carriers using boiled-off hydrogen as fuel for maritime transportation.



The government of Japan and our company are leading the revision of the international regulations on transport requirements for liquefied hydrogen to be adopted by the IMO_MSC108 (Maritime Safety Committee) in the spring of 2024

Development of major commercial-scale equipment

- Terminal Tanks

Large tank for hydrogen terminals

- Basic design is to be completed in March 2024
- Start of approval procedures for the High Pressure Gas Safety Law

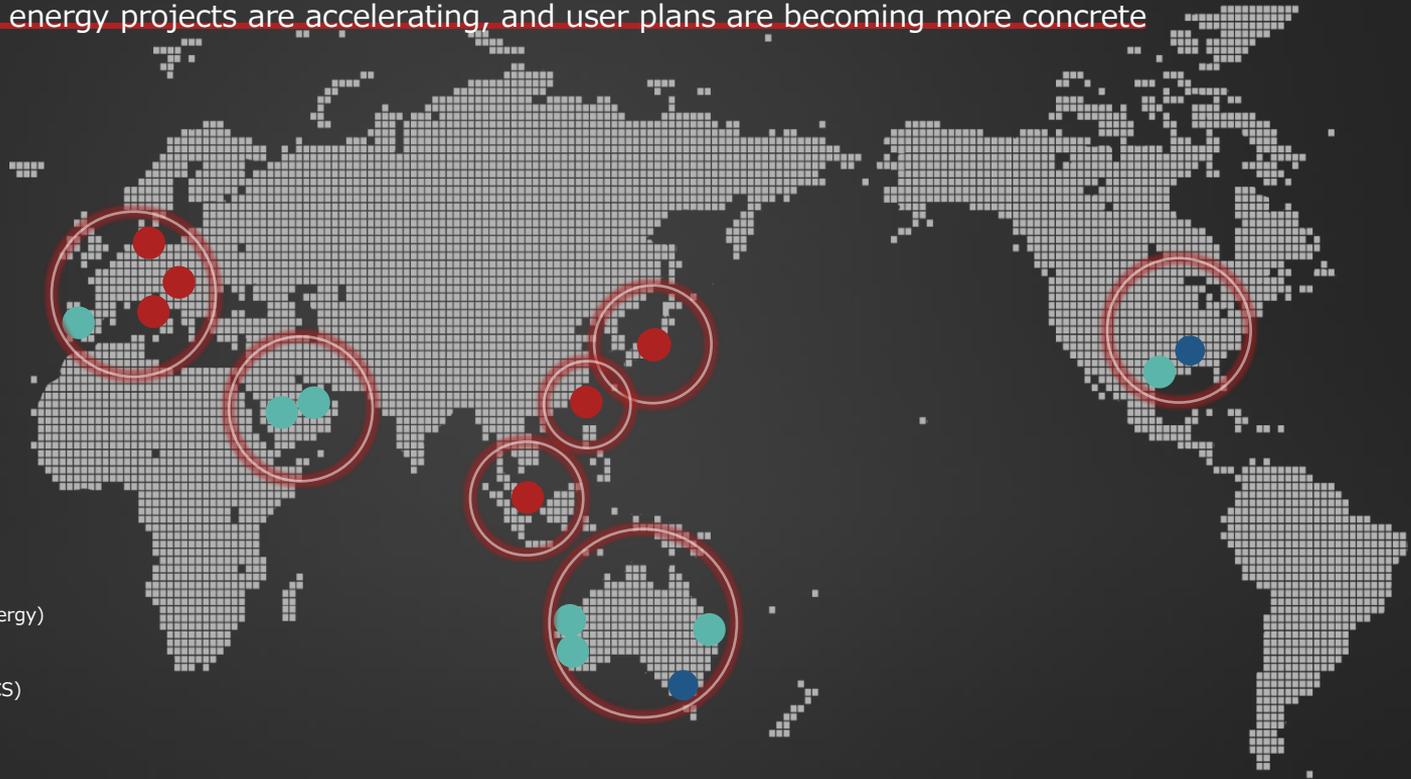
| | |
|----------------|---|
| ~ March 2024 | Completion of pre-screening |
| ~ October 2024 | Detail design |
| October 2024 | Application for inspection of specified equipment |

Developed a tank that can be enlarged
Our unique structure and cooling system



Accelerated efforts to commercialize liquefied hydrogen supply chains

- Projects are steadily progressing around the world
- Renewable energy projects are accelerating, and user plans are becoming more concrete



- Supplier
(Hydrogen from Renewable Energy)
- Supplier
(hydrogen from Fossil fuel + CCS)
- User

Accelerated partnership to commercialize liquefied hydrogen supply chains

ADNOC

Strategic collaboration agreement

Joint research on large-scale hydrogen production and hydrogen liquefaction, as well as related infrastructure and maritime transportation of liquefied hydrogen

PTT Global Chemical

Memorandum of understanding on hydrogen gas turbine power generation facilities

Development, construction, and operation of power generation facilities using hydrogen gas turbines developed by Kawasaki

Kawasaki city

Cooperative agreement

Aiming for sustainable development of the regional economy through development of hydrogen demand in the Kawasaki city coastal area

Memorandum of cooperation*¹ in the presence*² of the governments of Japan and Australia

Japan and Australia agree to develop an international liquefied hydrogen supply chain

Resonac

Memorandum of cooperation for hydrogen power generation business development in the Kawasaki area

Promote hydrogen demand to realize a hydrogen society

● Supplier
(Hydrogen from Renewable Energy)

● Supplier
(hydrogen from Fossil fuel +CCS)

● User

(*1) Minister of Economy, Trade and Industry Yasutoshi Nishimura, President of NEDO Ishizuka, Assistant Minister of Climate Change and Energy McAllister, Ambassador to Japan Hayhurst, and Minister of Finance Paras, Victorian Government
(*2) Memorandum of Understanding signed between Japan Hydrogen Energy, Iwatani, J-Power, and Sumitomo Corporation

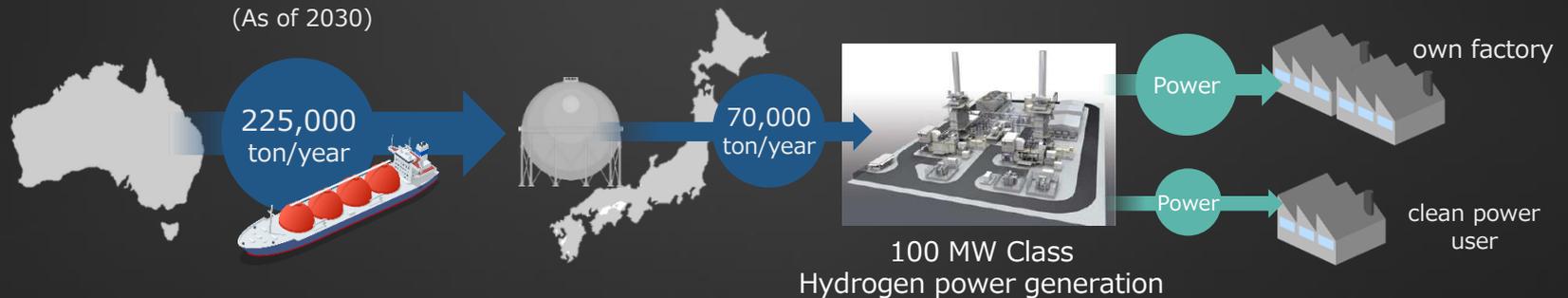
Memorandum of cooperation for hydrogen power project in Kawasaki city with Resonac

Around 2030 To start new hydrogen power generation business of 100 MW or more using imported hydrogen at Resonac Kawasaki city Plant (reduction of CO₂ emissions equivalent to 700,000 tons*)

*Calculated based on the Ministry of the Environment's "Evaluation Results of Progress in Global Warming Countermeasures in the Electric Utility Sector" (Reference Materials) (page 36)

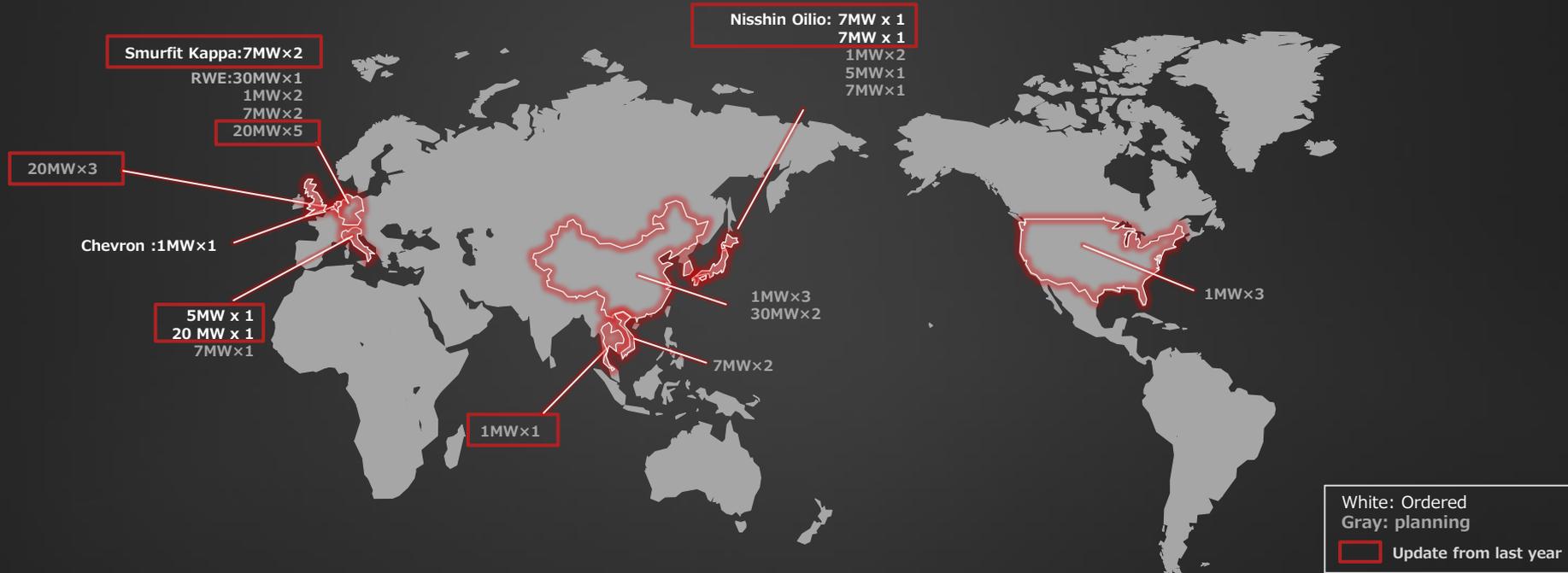


- The first concrete demand for the international liquefied hydrogen supply chain
- The generated power will be used by Kawasaki and Resonac for the realization of zero-emission plants, and used by future potential companies aiming to achieve carbon neutrality



Worldwide orders to energy-related products

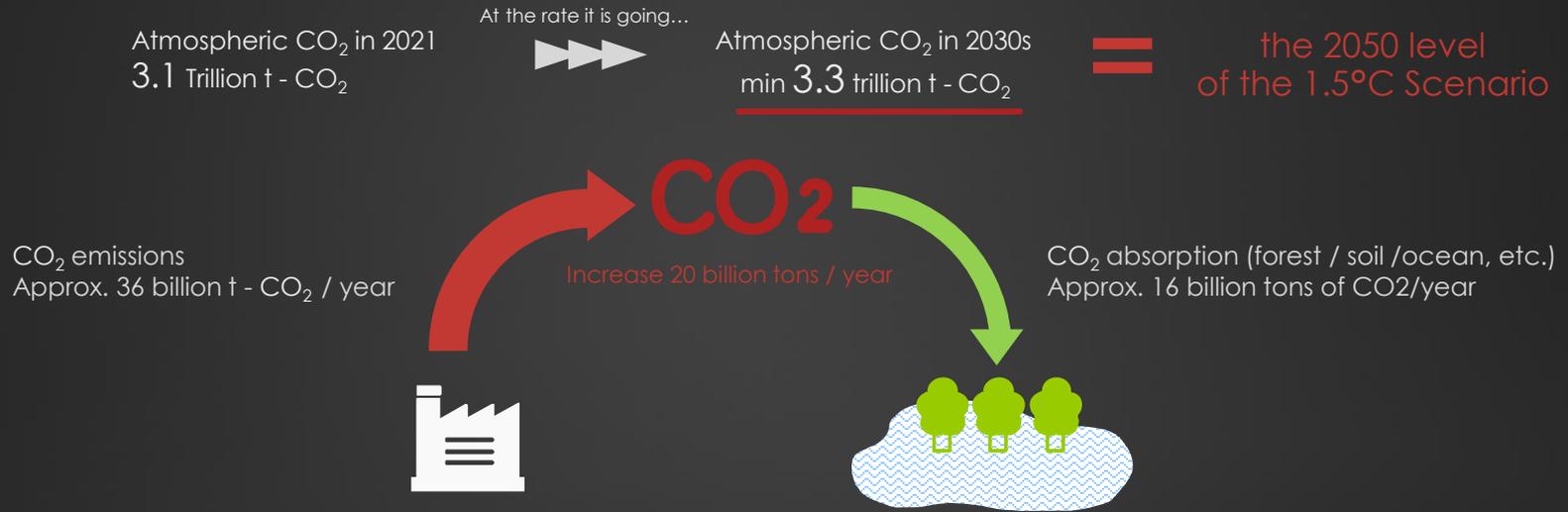
- Orders for hydrogen gas turbines increase in Europe and Japan, and we are working on a lot of inquiries from overseas.
- Chevron Phillips Chemical International N.V. (Belgium) launches **hydrogen co-firing operation with modified gas turbines**
- Demonstration of hydrogen co/pure-fired power generation is to start in 2026 with RWE (Germany).



Progress of Large-Scale CO₂ capture business

Global CO₂ balance and the need for DAC

- Atmospheric CO₂ increased at a rate of 20 billion tons per year. Expected to reach the 2050 level of the 1.5°C Scenario in another 10 years.



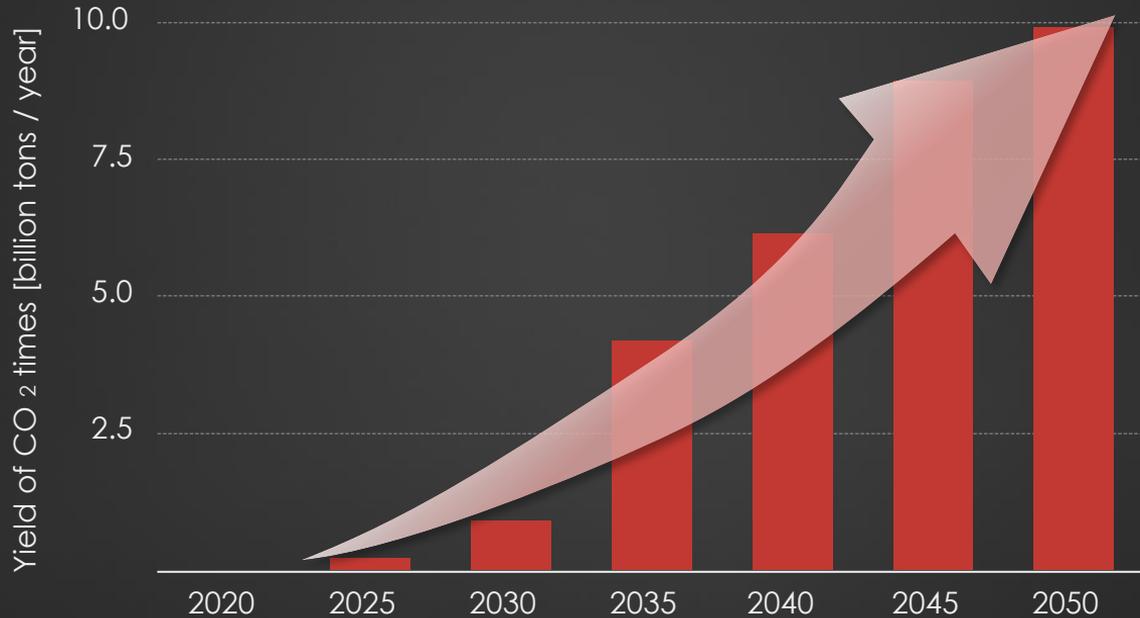
- Even if CO₂ emissions from fossil fuels are further reduced in the future, the 1.5°C scenario will not be met, so negative emissions from DAC are necessary

Source Friedlingstein et.al (2022), Global Carbon Budget 2022, IEA (2021), Net Zero by 2050: A Roadmap for the Global Energy Sector, Met Office (2018), How much CO₂ at 1.5°C and 2°C?, Our World in Data, CO₂ and Greenhouse Gas Emissions,

Needs of DAC

To achieve carbon neutrality in the world,

CO₂ capture from the atmosphere will grow to about **1 billion tons / year** by 2050



*Created by KHI based on IEA "Net 0 by 2050 A Roadmap for the Global Energy Sector"

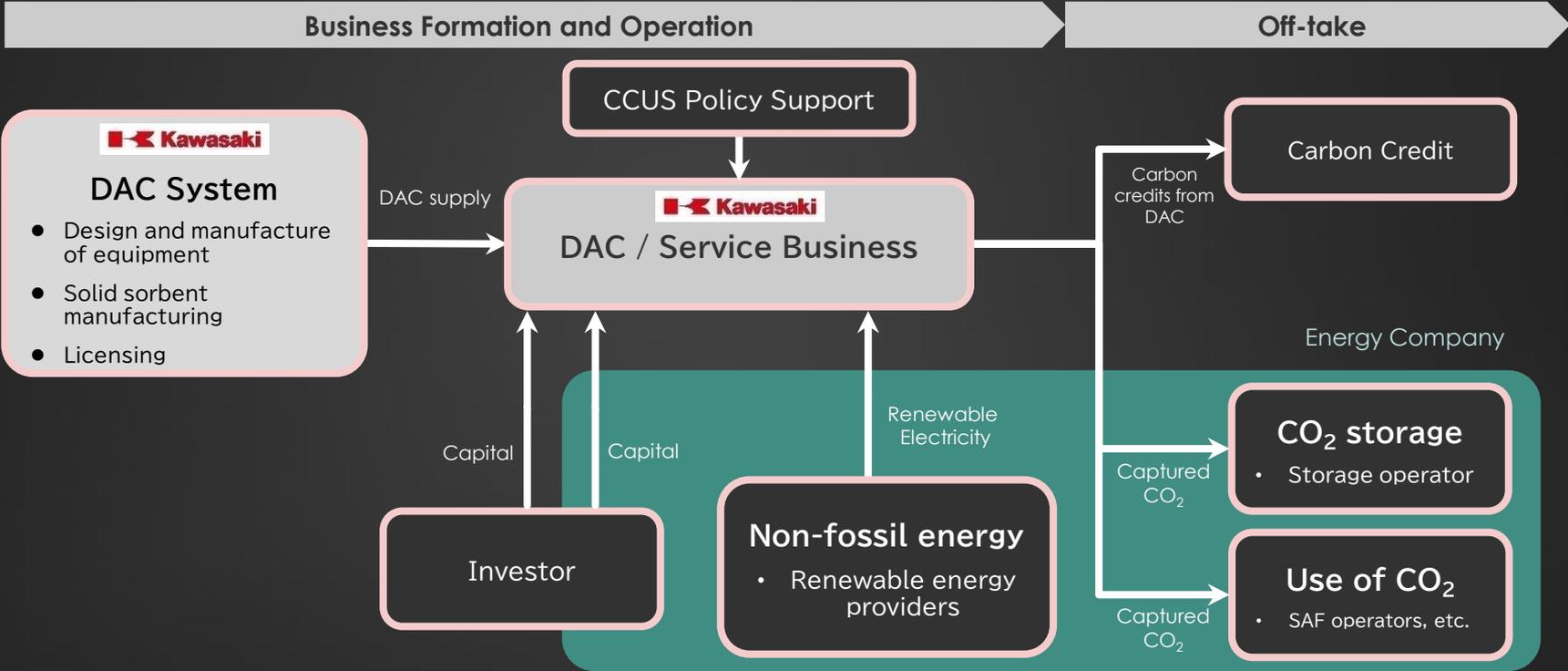
DAC progress areas

CO₂ capture from the atmosphere has high CO₂ storage potential,
proceeding in areas where renewable energy is readily available



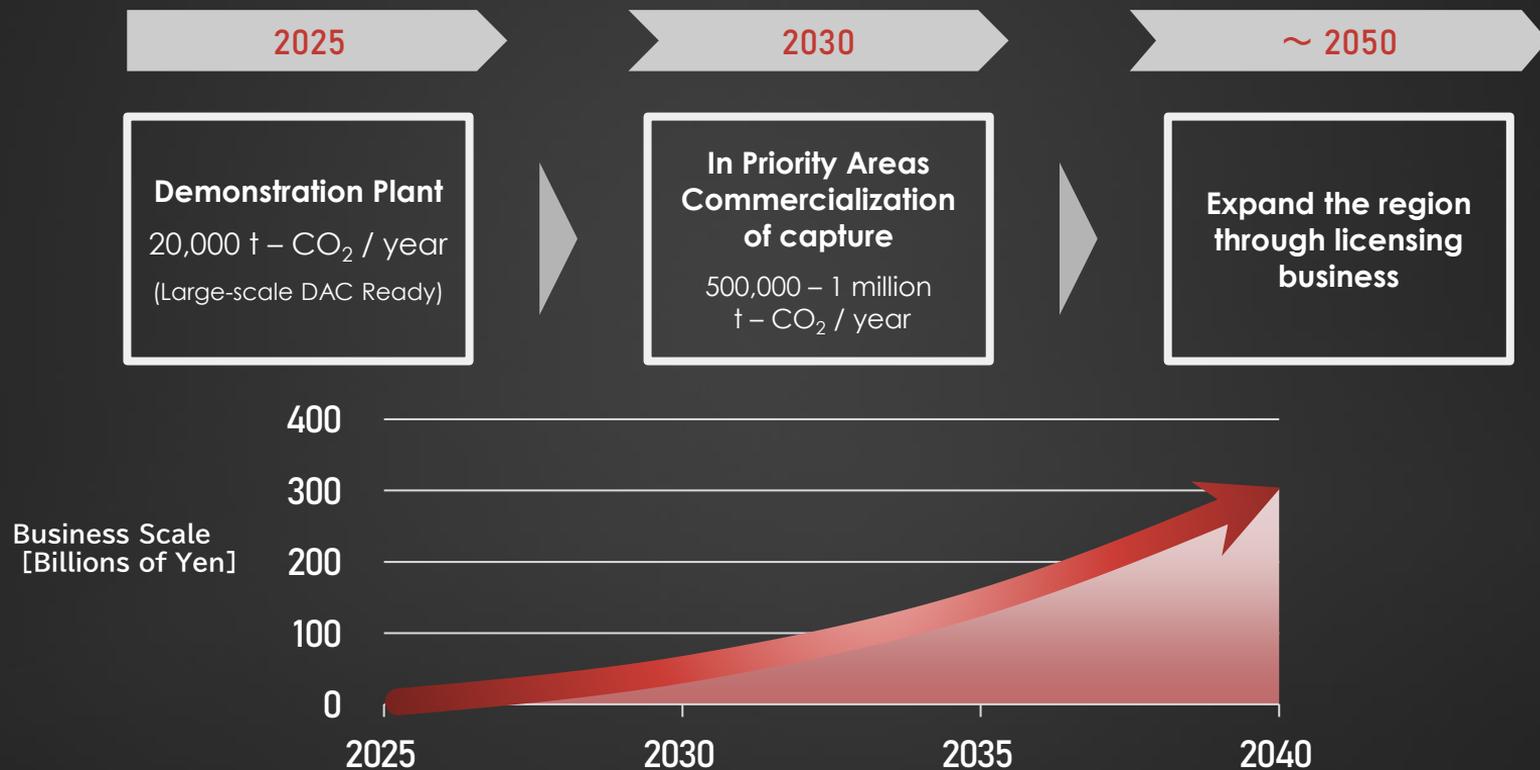
Development of our DAC business

- In addition to supply DAC system, develop CCUS service business using our DAC in collaboration with energy companies



Our DAC business outlook

- Started around 2025, aiming for a business scale of approximately **50 billion** yen in 2030





Our DAC business

Large-Scale DAC ready around 2025

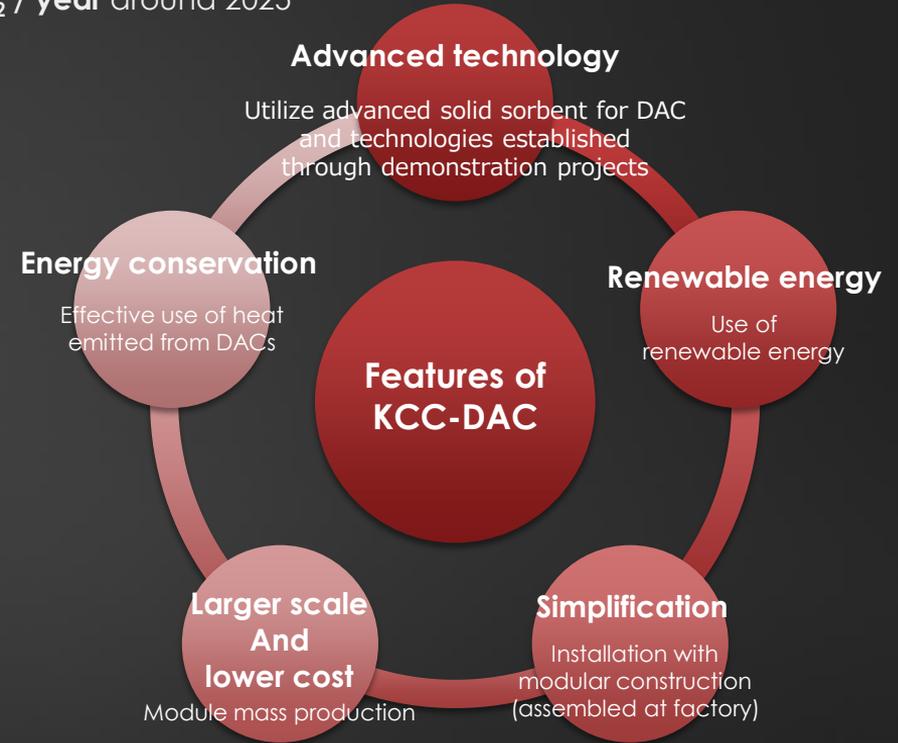
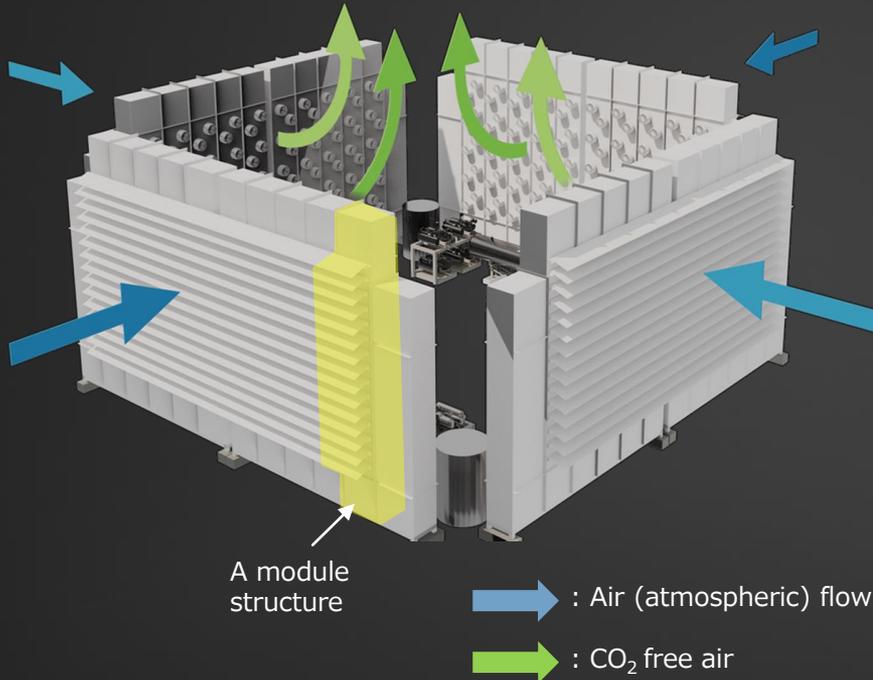
KHI promotes
CO₂ capture business from the atmosphere
through large-scale DAC facilities (Approx.
500,000 - 1 million t - CO₂ / year)

Respond to contacts from energy companies

DAC image of 1 million t - CO₂ / year

Toward large-Scale DAC ready

- Demonstration of facilities of **Approx. 20,000 t - CO₂ / year** around 2025



Hydrogen-Powered COROLLA equipped with our “ CO₂ adsorbent ”

Challenges to carbon negatives

- Toyota Motor Corporation launched a new technology challenge to "capture CO₂ the more you drive" in the final round of Super Taikyu Series 2023 held at Fuji Speedway on November 11-12
- KHI supports and cooperates with this challenge and provides CO₂ adsorbent



*Photo courtesy of Toyota Motor Corporation



*Photo courtesy of Toyota Motor Corporation

Our CO₂ separation and capture technology is used in various ways

Contributing to the realization of carbon neutrality

Agenda / Presenter

Introduction

Kawasaki Heavy Industries, Ltd.
President and Chief Executive Officer
Yasuhiko Hashimoto

Power Sports & Engine Business Toward Further Growth

Kawasaki Motors Co., Ltd.
President and Chief Executive Officer
Hiroshi Ito

Contributing to national security through defense business

Aerospace Systems Company
Senior Managing Executive Officer
Hiroyoshi Shimokawa

Hydrogen and large-scale CO₂ capture business strategy for a carbon neutral society

Energy Solutions & Marine Engineering Company
Senior Managing Executive Officer
Motohiko Nishimura

Achieving a sustainable and affluent society ~ Robots are becoming familiar to us ~

Kawasaki Heavy Industries, Ltd.
President and Chief Executive Officer
Yasuhiko Hashimoto

Summary

Kawasaki Heavy Industries, Ltd.
President and Chief Executive Officer
Yasuhiko Hashimoto

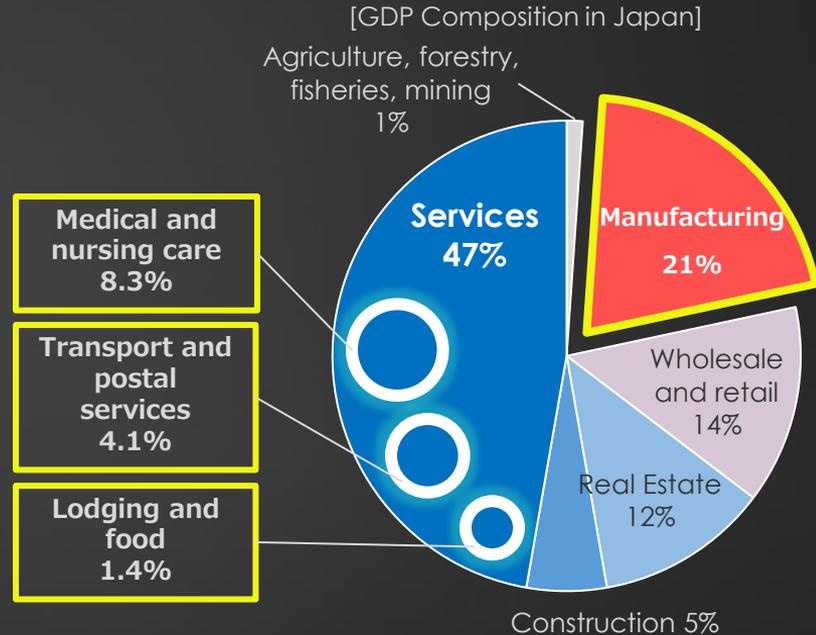


Achieving a sustainable and affluent society
~ Robots are becoming familiar to us ~

President and Chief Executive Officer
Yasuhiko Hashimoto

Areas where robots have been introduced

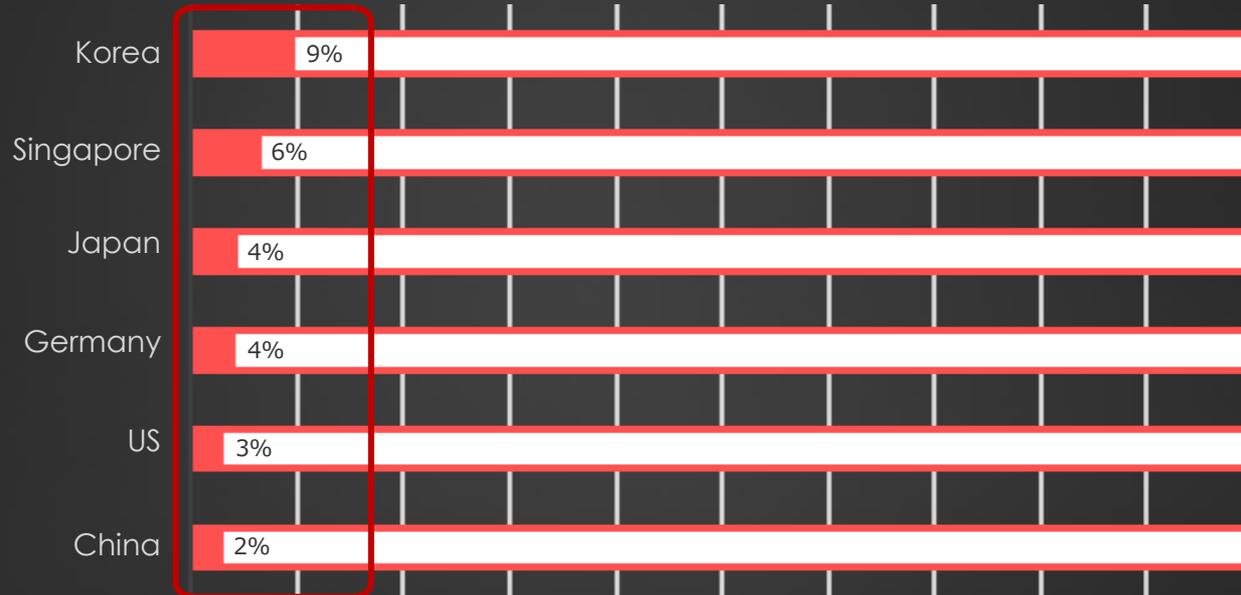
- Robots are currently used in Japanese industry mainly in manufacturing and some service industries



Source: Economic and Social Research Institute, Cabinet Office, Government of Japan, FY2021 National Accounts

Robot adoption rate in the manufacturing industry in each country

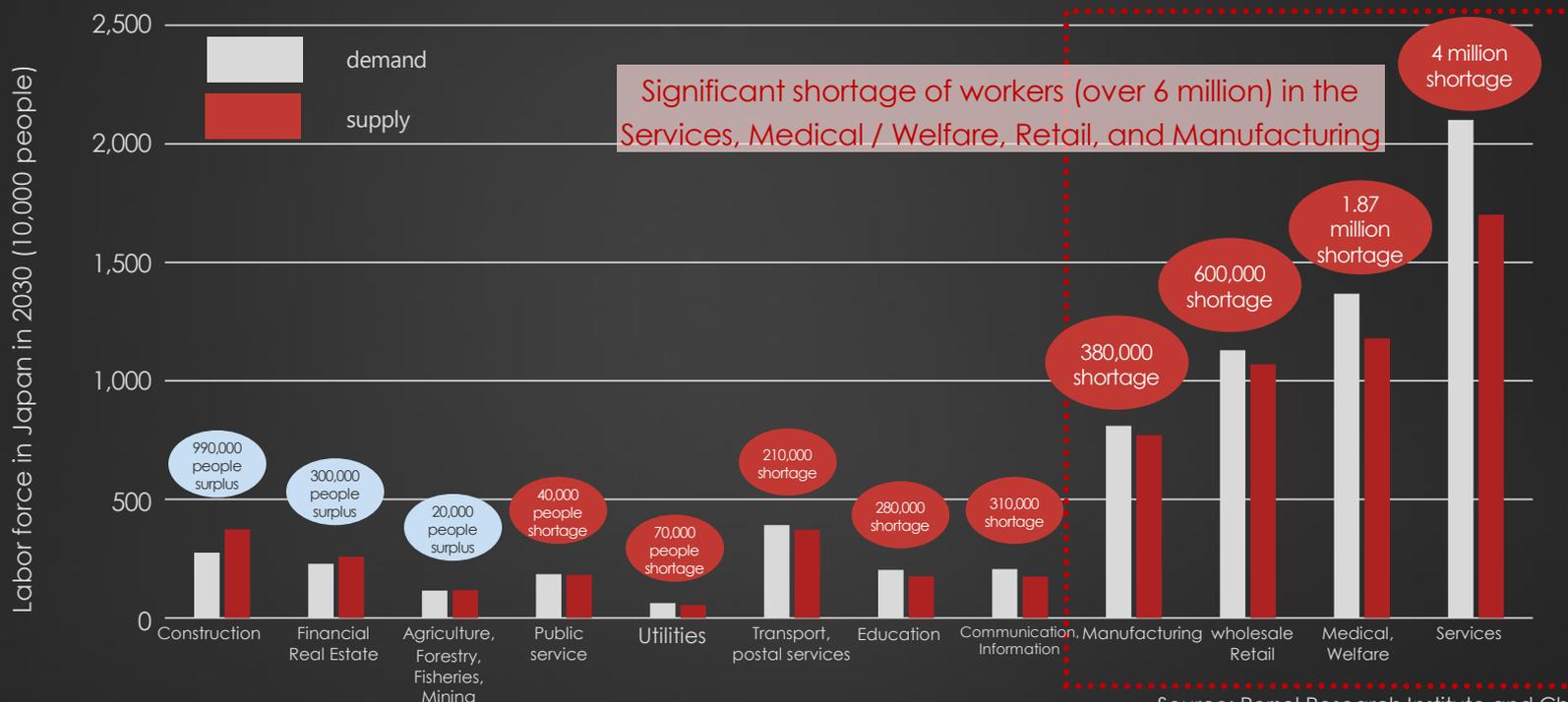
- Even in the manufacturing industry where robots are being introduced, robots are being used only and still a few percent



Source: IFR: World Robotics 2020 Industrial Robots

Room for robot introduction

- With labor shortages accelerating through 2030, there remains significant room for the introduction of robots



Source: Persol Research Institute and Chuo University: Future Estimates of the Labor Market 2030

Development of robot business

- Developing a **3-pillar business** by adding social robots to industrial robots and medical robots

Industrial robots



Medical robots



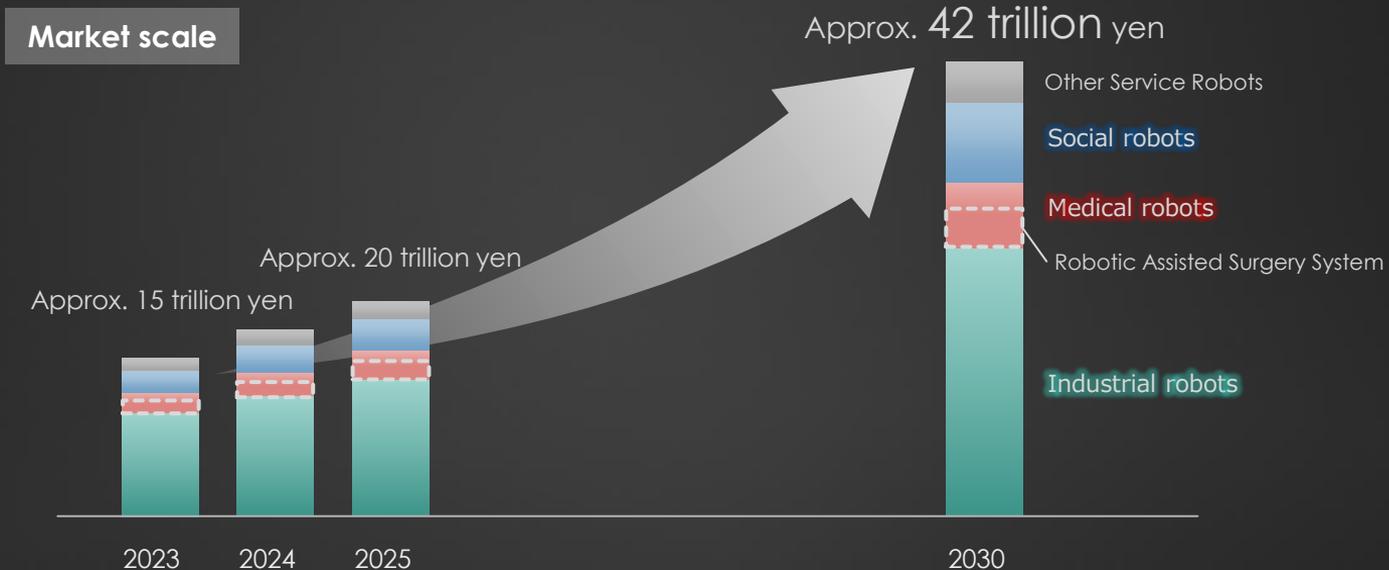
Social robots



- Robots that useful to society
- Robots that support communication with people

Outlook for the robotics market

- The robot market has grown from a market of about **15 trillion yen** to a market of about **42 trillion yen** in 2030



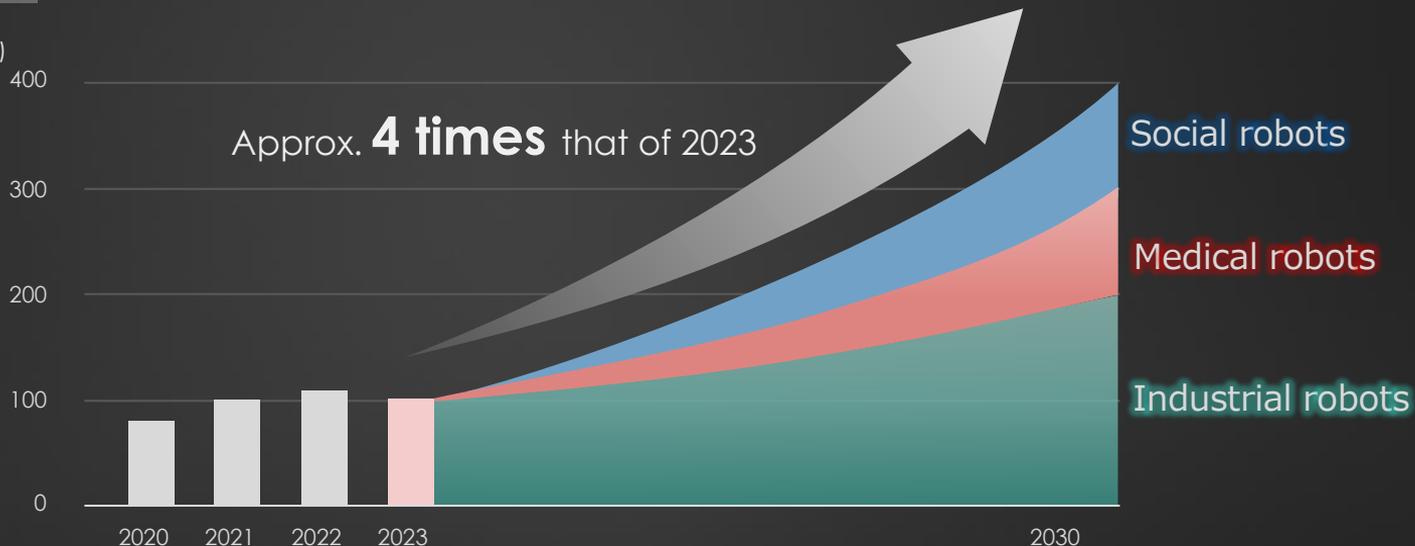
Source: Created by KHI based on Allied Market Report

Our robotics business outlook

- Growing into one of the pillars supporting KHI group's overall earnings
by acquiring reliable technologies and expanding the market

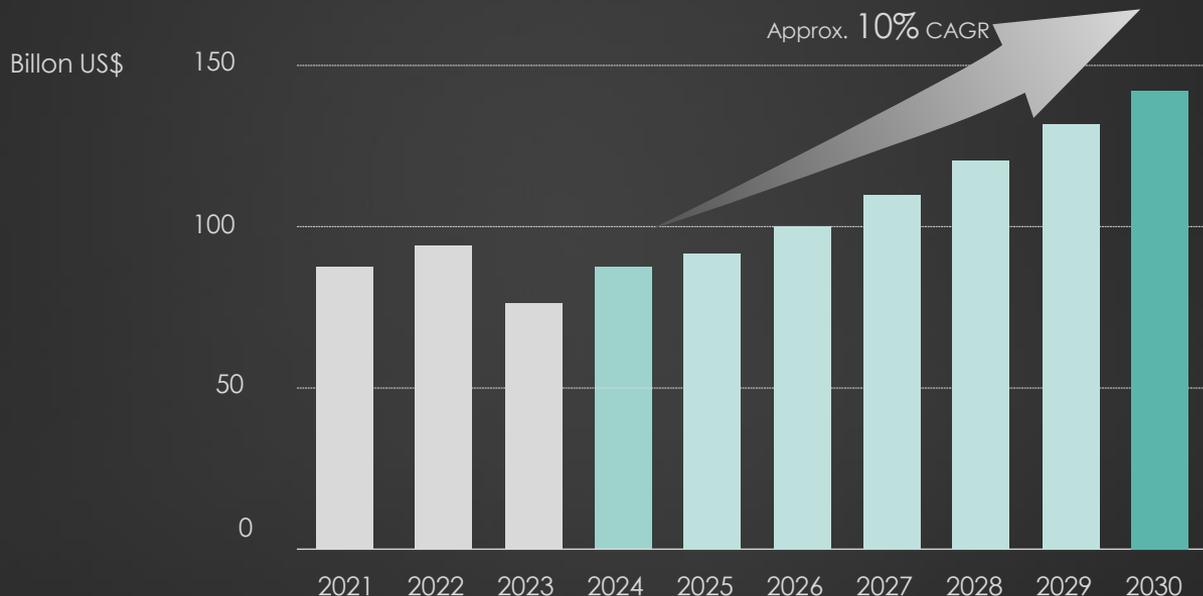
Revenue

(billion yen)



Industrial robots: Robots for semiconductor industry

- Semiconductor production equipment market bottomed out in 2023 and is expected to recover and grow from 2024



*CAGR : Compound Average Growth Rate

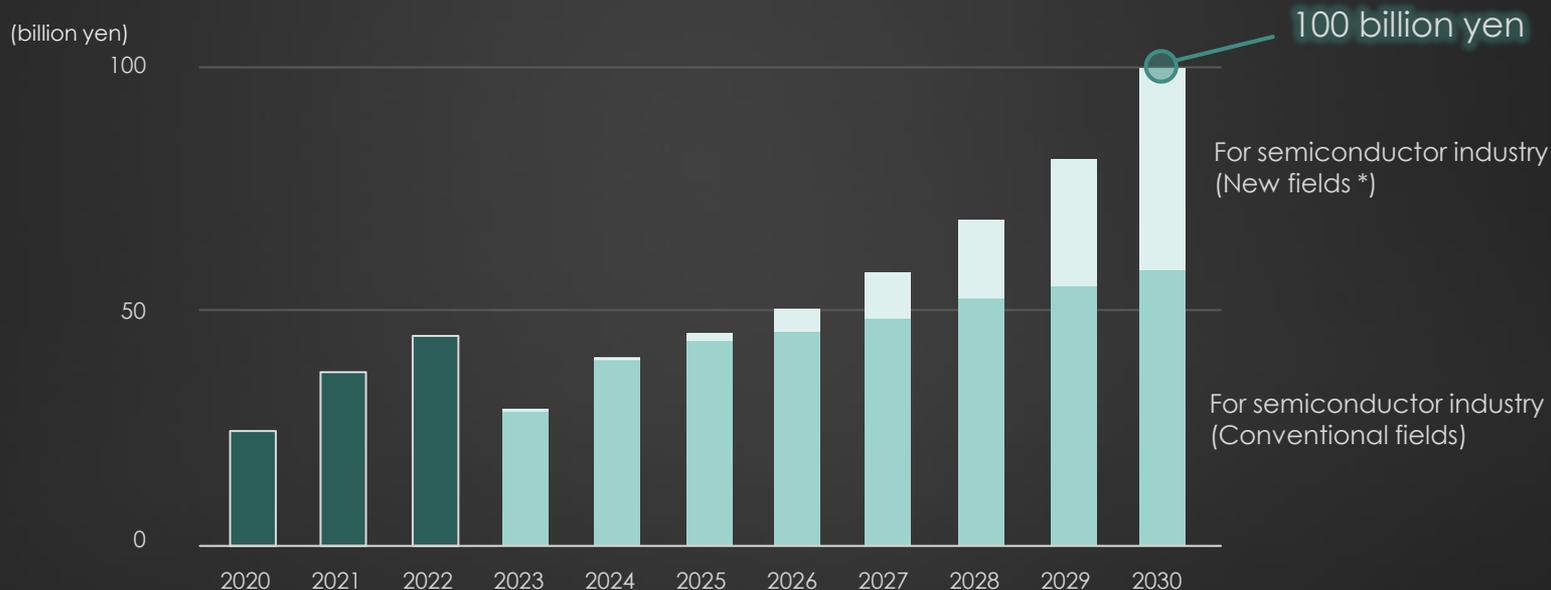
Source: Created by KHI from SEMI, DataM Intelligence report

Industrial robots: Growth image of robotics business for the semiconductor industry

- Achieve sales of 100 billion yen in 2030 in the business for the semiconductor industry by entering new fields*, in addition to growth in existing businesses in which we have gained a large market share

*New fields: Vacuum process robots, back-end process, maintenance, automation, etc.

Revenue (Robots for Semiconductor industry)

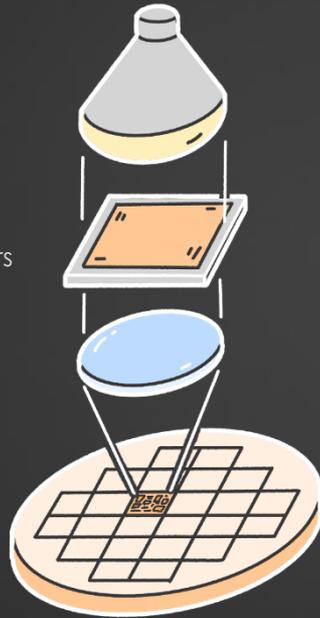


Industrial robots: Semiconductor manufacturing process (Excerpt)

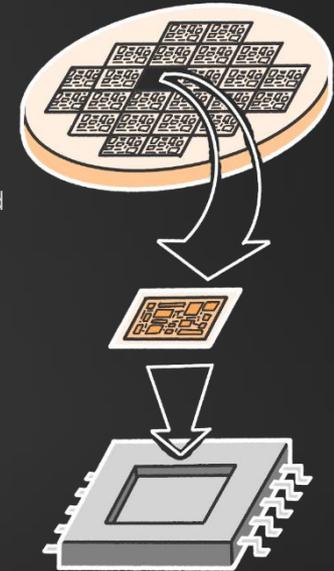
Front-end process

Back-end process

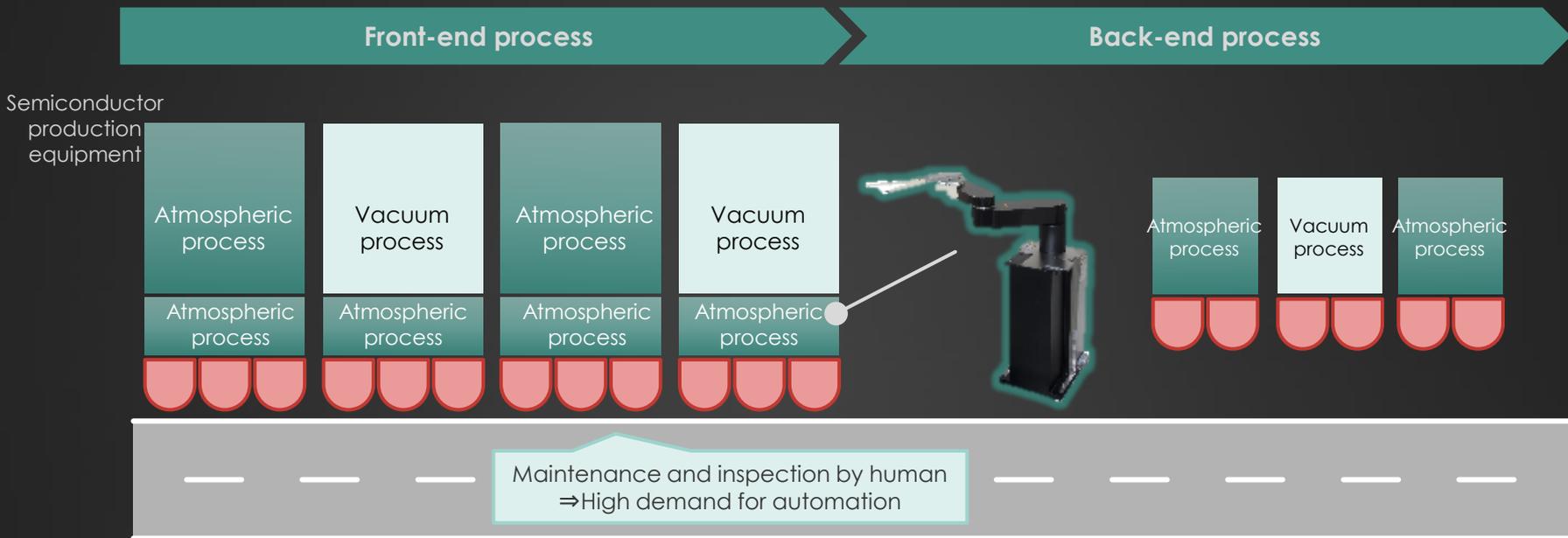
Generate patterns by performing various chemical processes on wafers



Cut wafers after processing and assemble them as IC chips



Industrial robots: Semiconductor manufacturing process (Excerpt)



Provide products centered on "robots that operate in atmospheric processes" which are in high demand by customers in Front-end process



Industrial robots: Development of robots for semiconductor industry (Present)



Provide products centered on "robots that operate in atmospheric processes," which are in high demand by customers



Major semiconductor production equipment share among manufacturers
Approx. 60%

■ KHI
■ Other companies

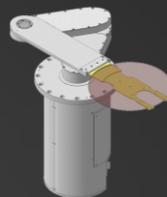
*Estimation by KHI

Industrial robots: Development of robots for semiconductor (Future)



Expansion to system products

Expansion to vacuum process



A major semiconductor equipment manufacturer has decided to adopt KHI

The share of vacuum process robots is 40%



Provide products centered on "robots that operate in atmospheric processes," which are in high demand by customers

Expansion to Back-end process

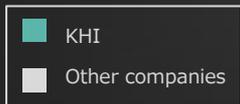


Major semiconductor production equipment share among manufacturers
Approx. 70%

Expansion into maintenance and automation markets



*Estimation by KHI

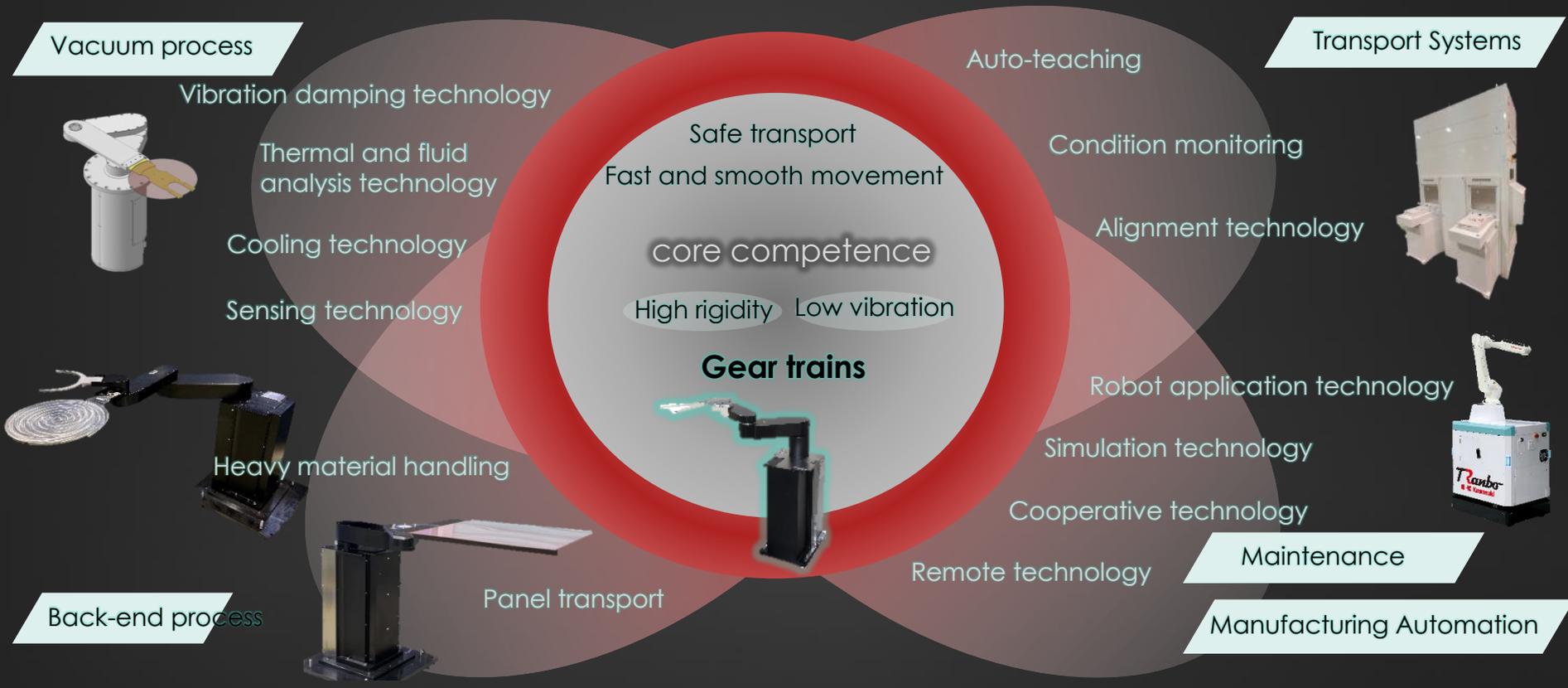


Industrial robots: Next step in robots for semiconductor

- KHI always works with customers to promote the development and validation of the next product

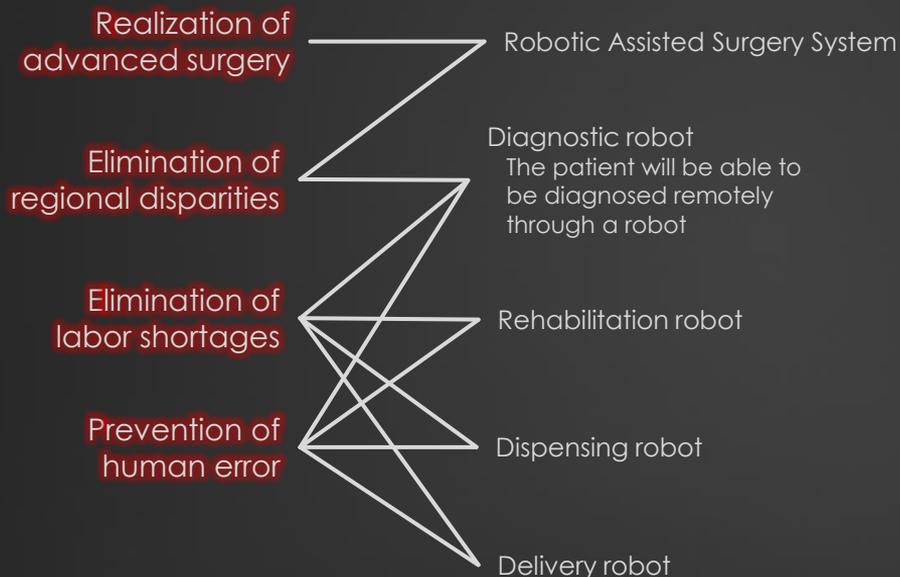


Industrial robots: Comprehensive technological capabilities to support the growth of robots for semiconductor (our strength)

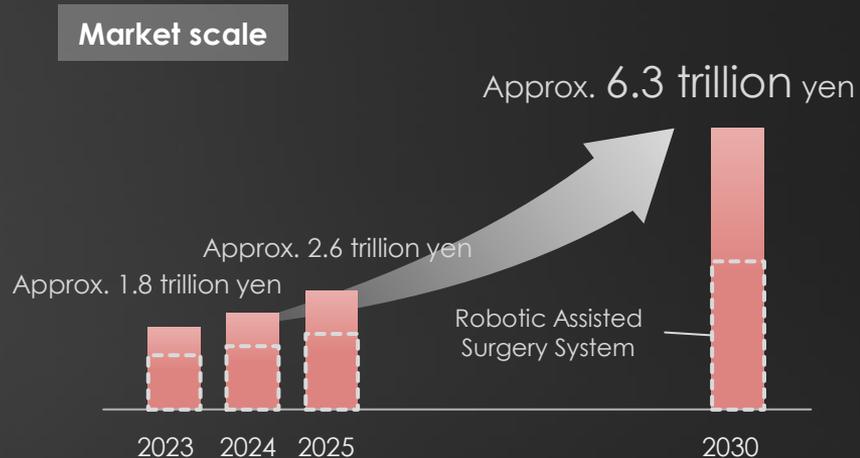


Medical robots: Robot needs in hospitals and nursing homes

- Various robots are expected to be provided to meet the needs in hospitals



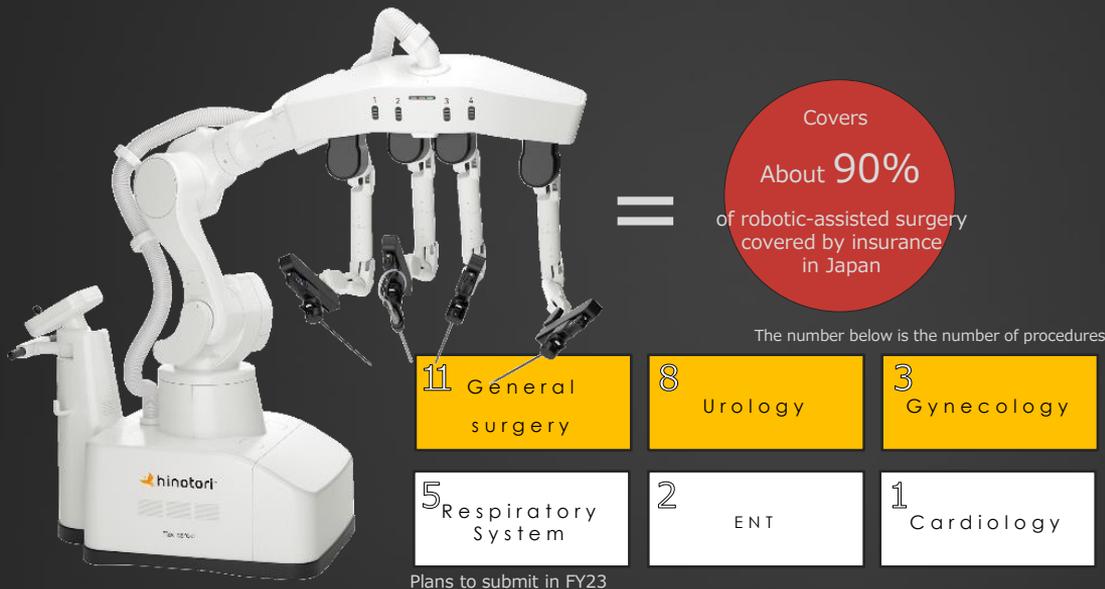
- Approx. 3.5 times growth by 2030



Source: Created by KHI based on Allied Market Report

Medical robots: Robotic Assisted Surgery System “hinotori™”

- With the increase in the number of applicable medical departments, the number of cases steadily increased



Total number of cases
(End of November 23)

3,000⁺



Medical robots: Robotic Assisted Surgery System “hinotori™”

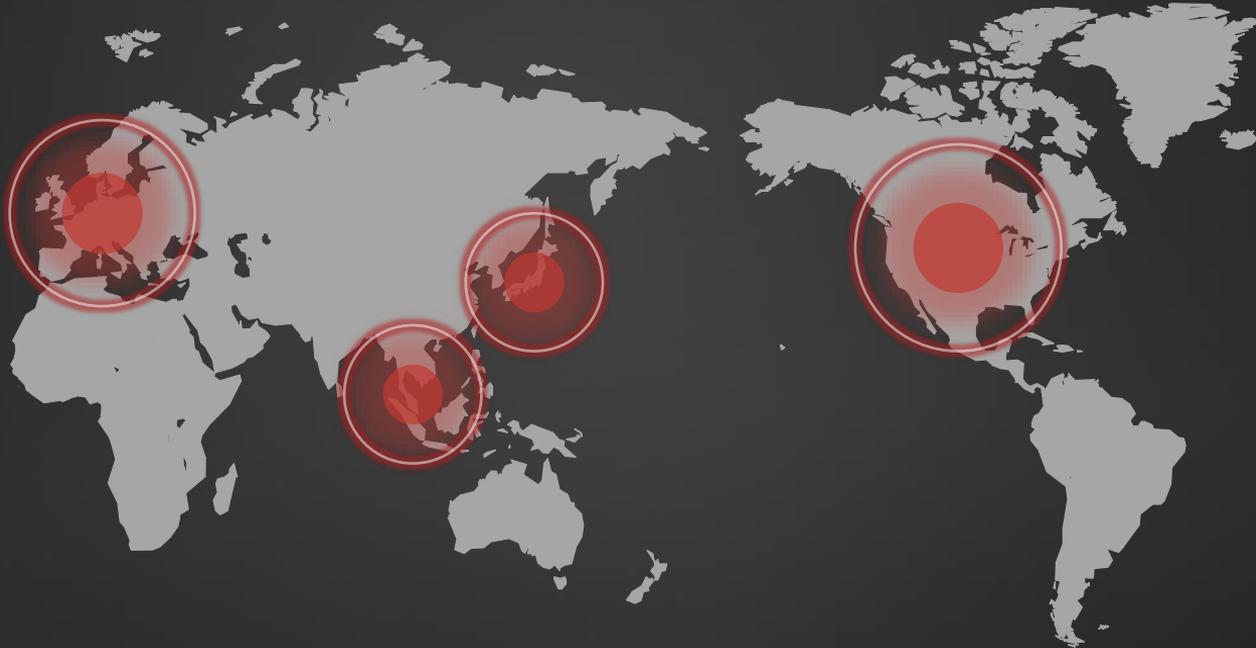
- Introduced in many university and core hospitals
- “Market fit” is completed and the “Mass production” phase is underway

Phase to **generate profit** including consumables such as instruments



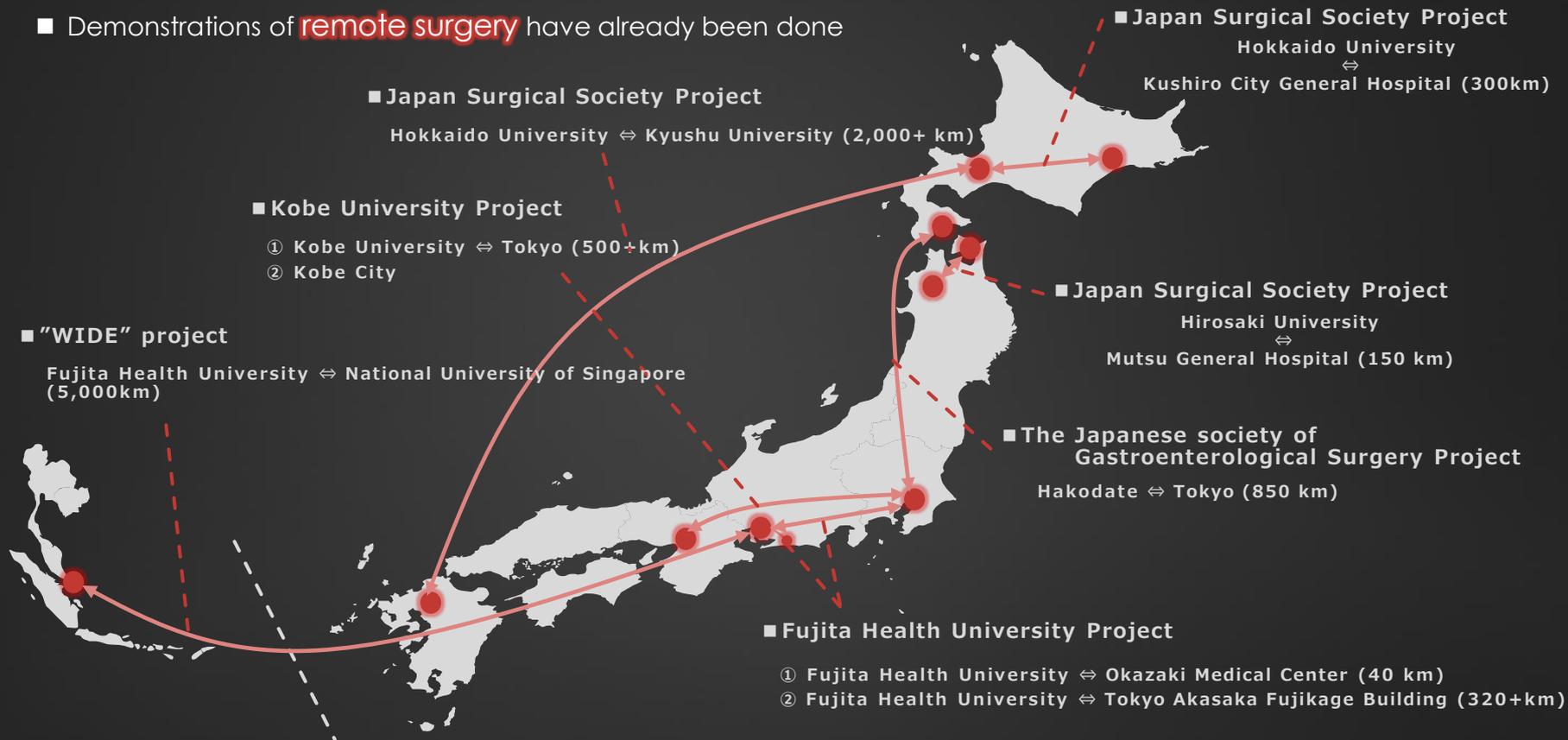
Medical robots: Robotic Assisted Surgery System “hinotori™”

- Mediaroid received regulatory approval from Health Science Authority in Singapore
- Mediaroid plans to receive regulatory approval in Europe and US from the next fiscal year



Medical robots: Remote surgery using the "hinotori™"

■ Demonstrations of **remote surgery** have already been done



Medical robots: Remote surgery using the “hinotori™ ”

**Novice
(patient side)**



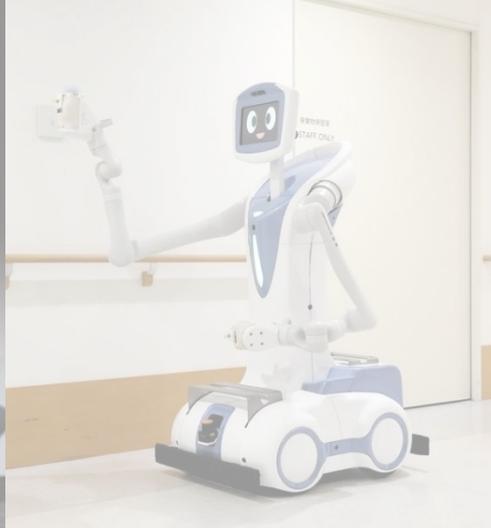
Proctor



- Distance : 300Km
- Delay time : 40ms (including processing time)

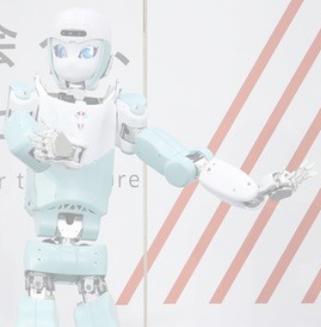


Medical robots



つぎの社会
信頼のこた

Trustworthy Solutions for the future

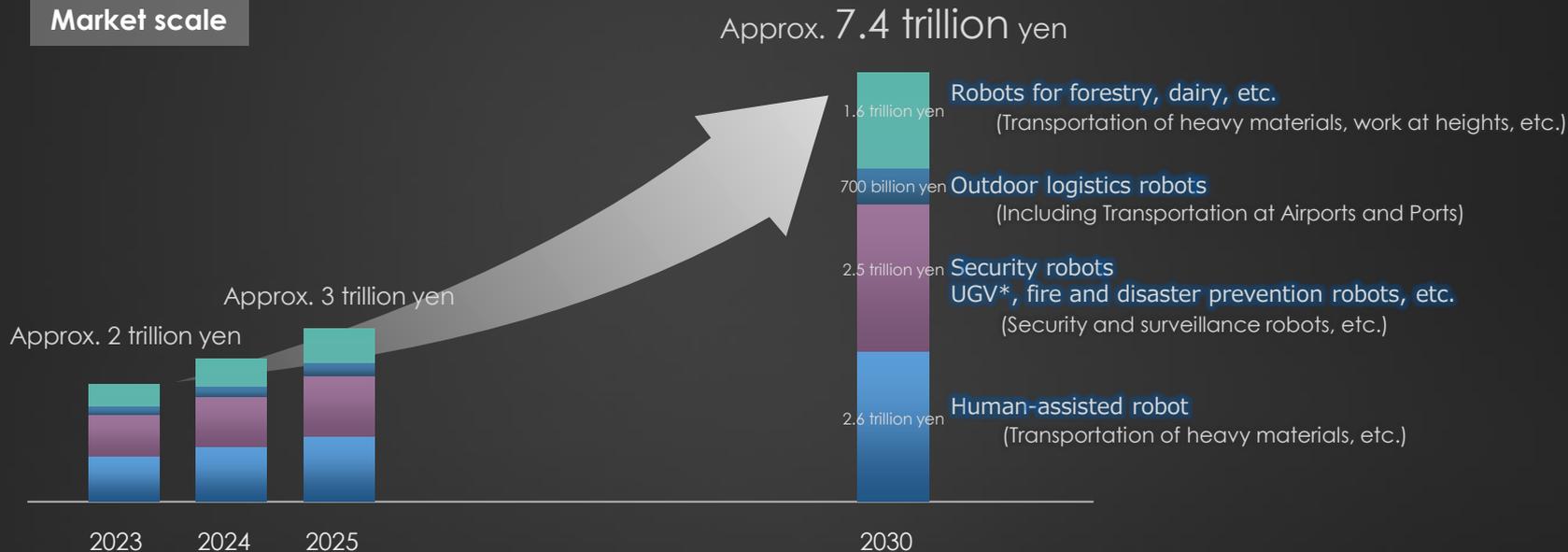


Contributing to society by implementing various solutions such as in-hospital delivery robots and nursing care robots as well as Robotic Assisted Surgery System

Social robots: Market scale

- Social robots market grow from Approx. 2 trillion yen market to Approx. 7.4 trillion yen market by 2030

Market scale



*UGV:Unmanned Ground Vehicles

Source: Created by KHI based on Allied Market Report

Social robots: Global Trends

- Movement toward participation in the social robotics market is accelerating around the world

Advanced areas of social robots



World's most advanced technology
Applied development with huge funds in huge markets (Security, logistics, cleaning, etc.)



overwhelming quantity is strength



Social robots: Current inquiries to us

Railway company

Garage security Station inspection



Cleaning

Transportation

Customer guidance

Airport

Information Security



Luggage delivery

Electric power company

overhead wires inspection Routine inspections of power plants



Working at height

Heavy duty transport

Gas Company

Gas leak detection



Instrument inspection

Hotel

Luggage delivery



Information

Cleaning

Municipalities

forest management Search in case of disaster



heavy transport pest control

Overseas

Providing GPR to affluent cities



GPR: General Purpose Robot



Partnership with Microsoft

- Collaboration with Microsoft to "Provide affluent lifestyles through robotics" as a common goal

Knowledge of the manufacturing industry
and ability to develop markets



Industrial robots



Social robots



Medical robots



The latest digital technology



Microsoft Azure



Azure Open AI Service



Fabric



Digital Twin

2023

Development of
prototype industrial
metaverse

2024~

Service
Commercialization
and market creation

2027~

Realization of an
affluent society

Social robots also aim to be carbon neutral

- Social robots powered by "hydrogen fuel cell"

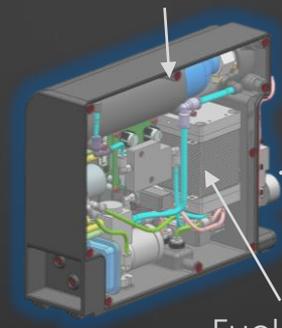
< Lineup of cylinders >

Can be used in a wide range of applications



Compact FC Unit
(Power generation)

Hydrogen cylinder



Fuel cell

Unit built
into the body



Cooperation: Toyota Boshoku Corporation

Evolution of technology and expansion of robot application

To communicate easily

simplified teaching

AI application



Language input

To operate remotely

Remote control



To move

Move



Cooperation with people



To eliminate the safety fence



Industrial robots



To reduce the load on people



Agenda / Presenter

Introduction

Kawasaki Heavy Industries, Ltd.
President and Chief Executive Officer
Yasuhiko Hashimoto

Power Sports & Engine Business Toward Further Growth

Kawasaki Motors Co., Ltd.
President and Chief Executive Officer
Hiroshi Ito

Contributing to national security through defense business

Aerospace Systems Company
Senior Managing Executive Officer
Hiroyoshi Shimokawa

Hydrogen and large-scale CO₂ capture business strategy for a carbon neutral society

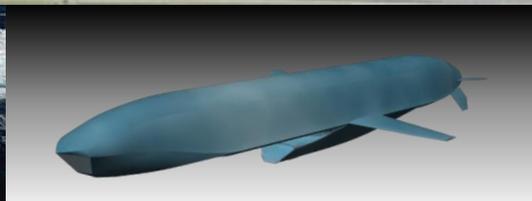
Energy Solutions & Marine Engineering Company
Senior Managing Executive Officer
Motohiko Nishimura

Achieving a sustainable and affluent society ~ Robots are becoming familiar to us ~

Kawasaki Heavy Industries, Ltd.
President and Chief Executive Officer
Yasuhiko Hashimoto

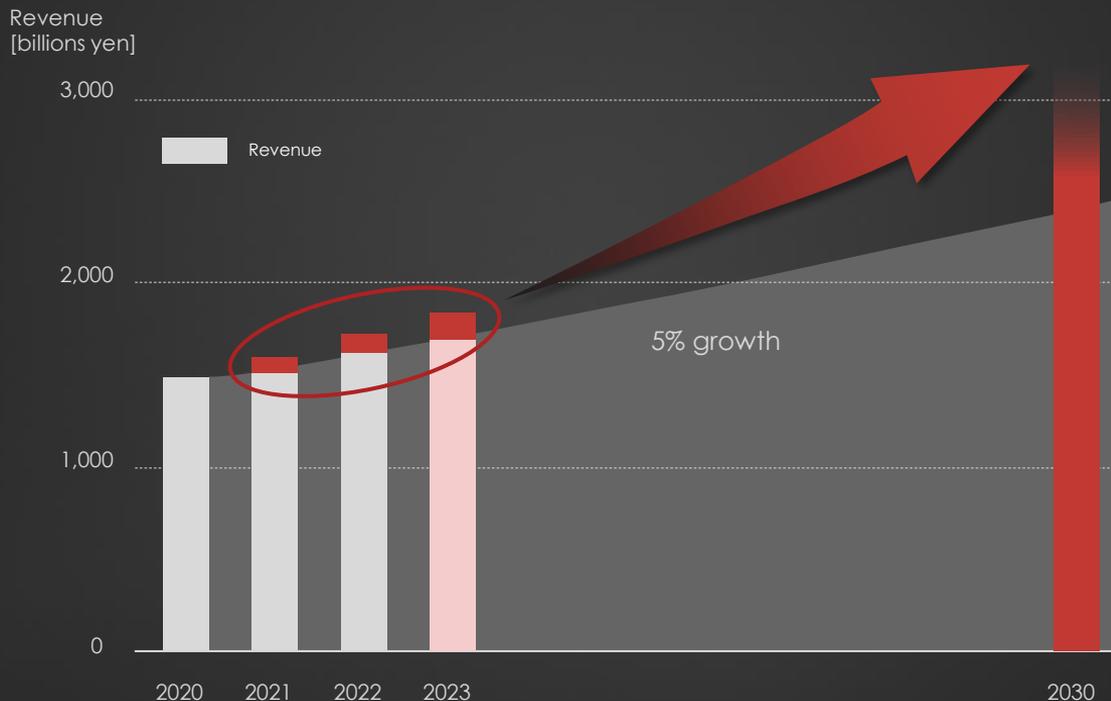
Summary

Kawasaki Heavy Industries, Ltd.
President and Chief Executive Officer
Yasuhiko Hashimoto



Business growth image

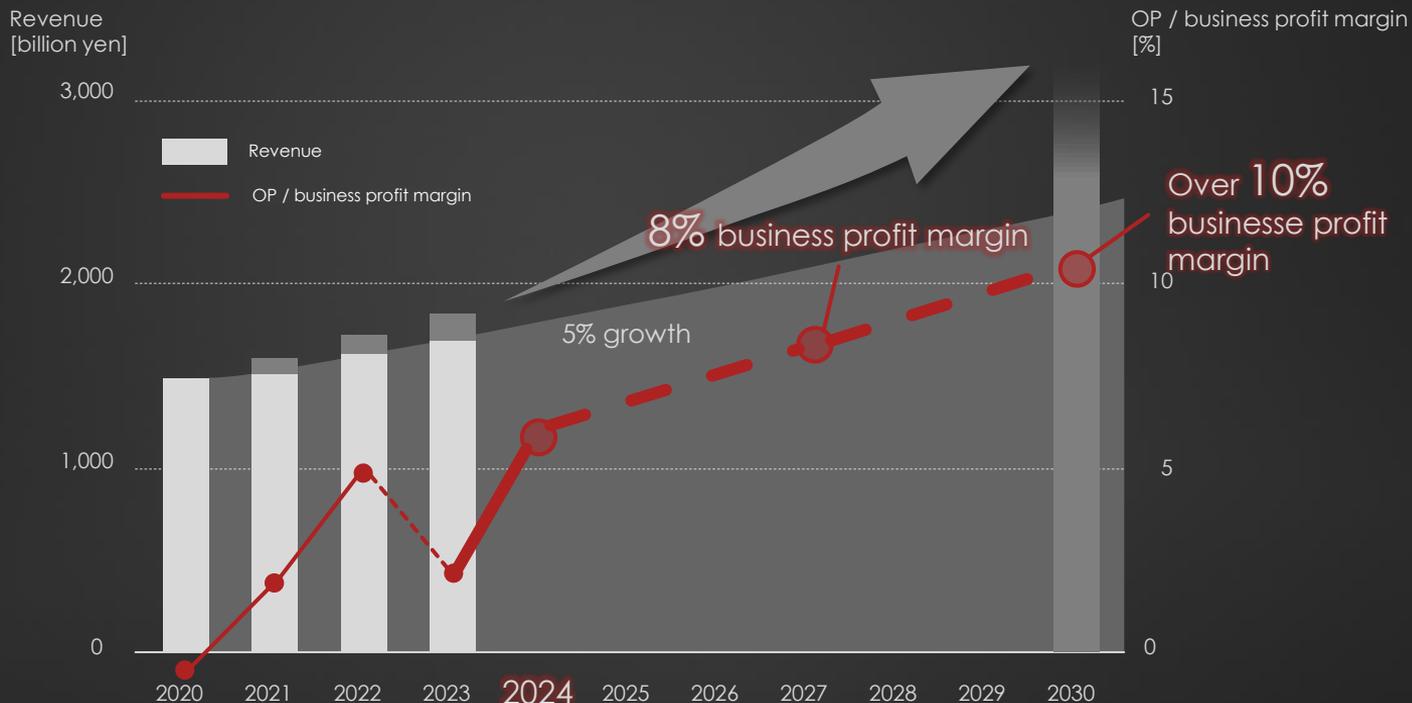
- Achieve business growth of Approx. 7~8%, exceeding the target of 5% set for 2020



Business growth image (Profit)

- In fiscal 2024, our business returned to a growth path.

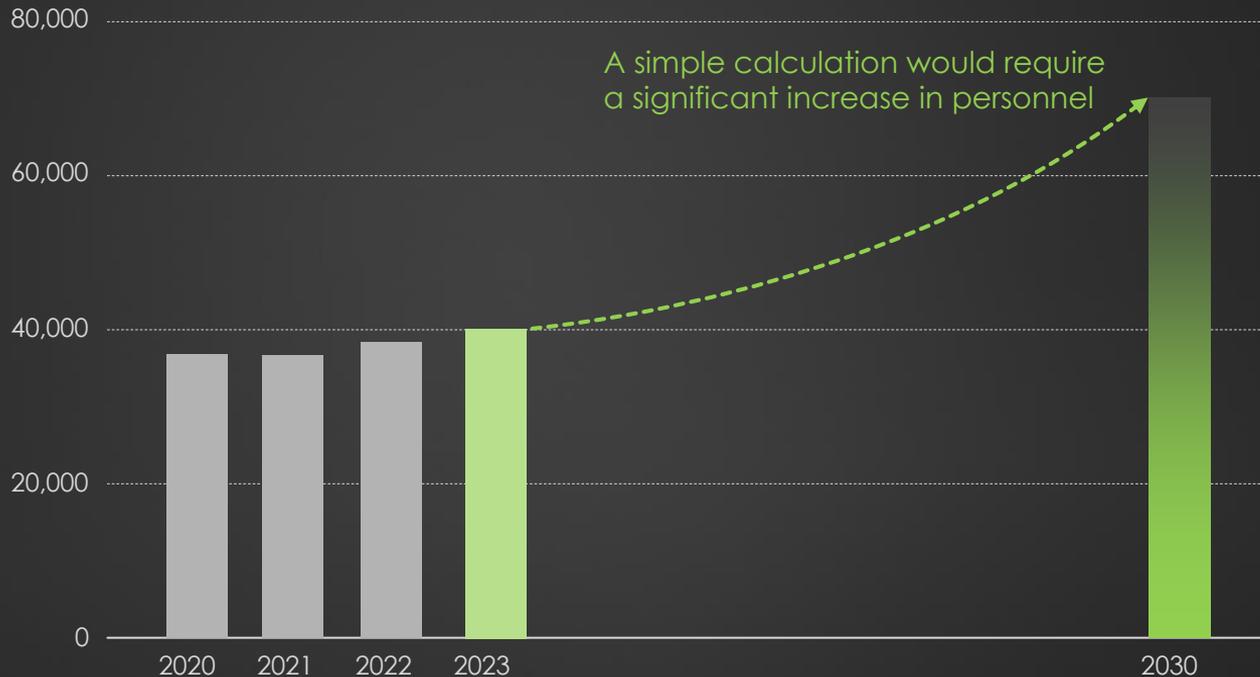
Achieve a business profit margin of **8%** by 2027 and **over 10%** by 2030



Issues in personnel supporting business growth

- Shortage of workforce in the mid- to long-term in global

Number
of employees
[Person]



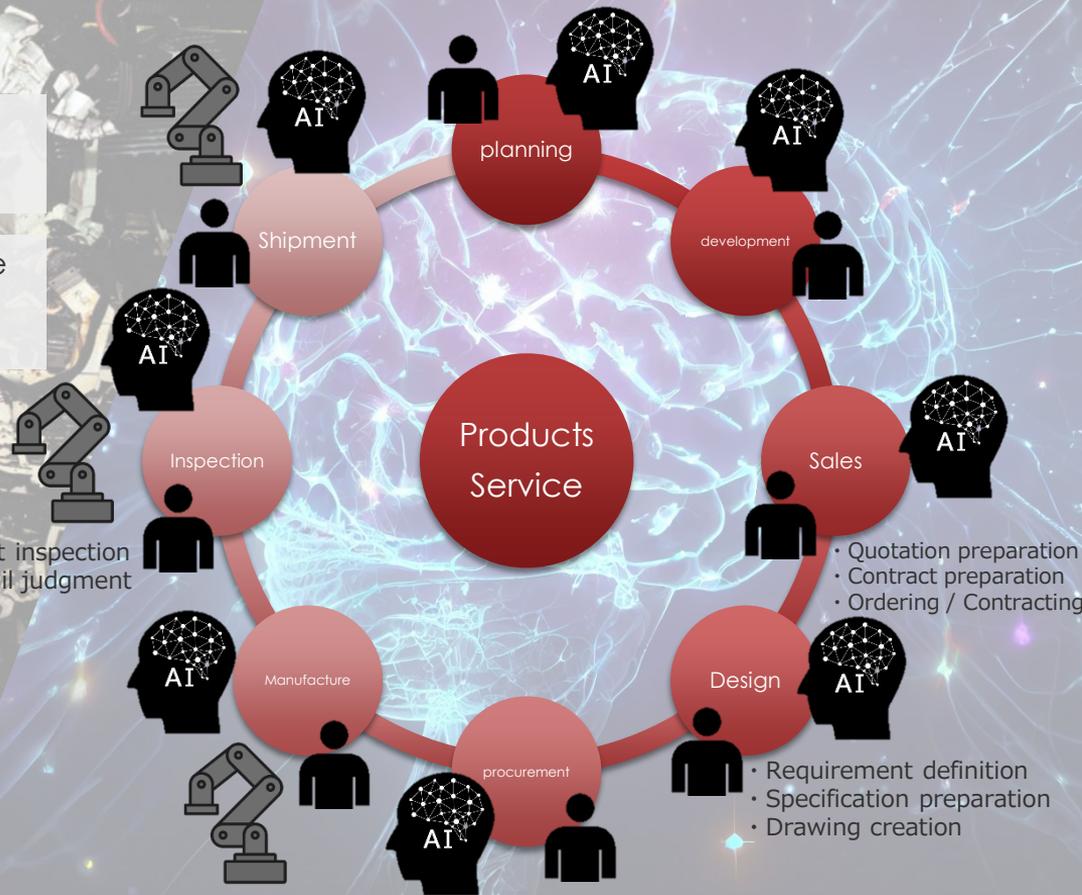
Foundation for business growth

- Realizing a society in which everyone can participate by realizing remote control of robots
- Productivity improvement by replacing simple and repeatable tasks with robots and utilizing AI

- Shipment inspection
- Pass / Fail judgment

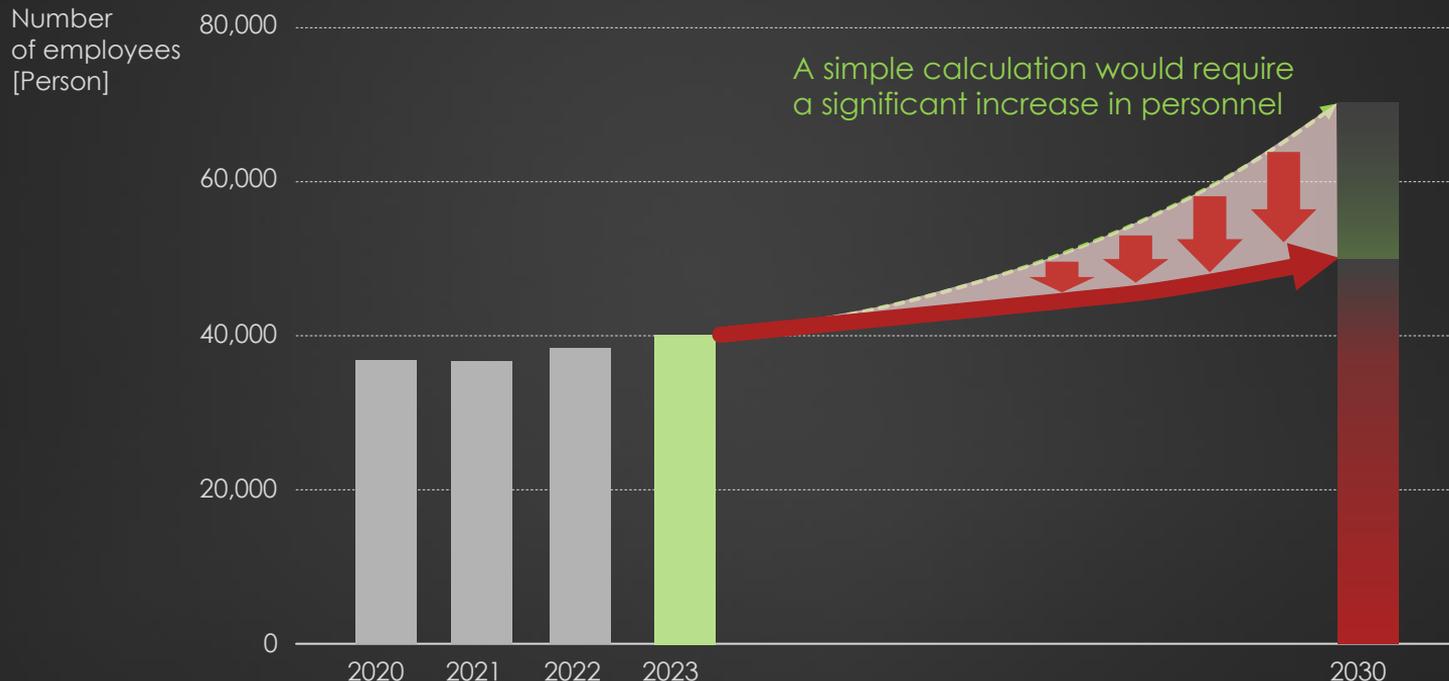
- Quotation preparation
- Contract preparation
- Ordering / Contracting

- Requirement definition
- Specification preparation
- Drawing creation



Personnel plan to support business growth

- Minimize employee growth through remote, robots, AI and DX



Human resources to support business growth

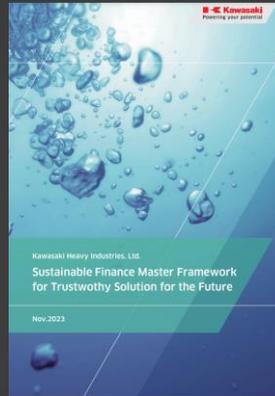
- In addition to improved treatment through efficient management, we will realize a work style that employees focus on high-value-added work and get experience “satisfaction” and “growth”



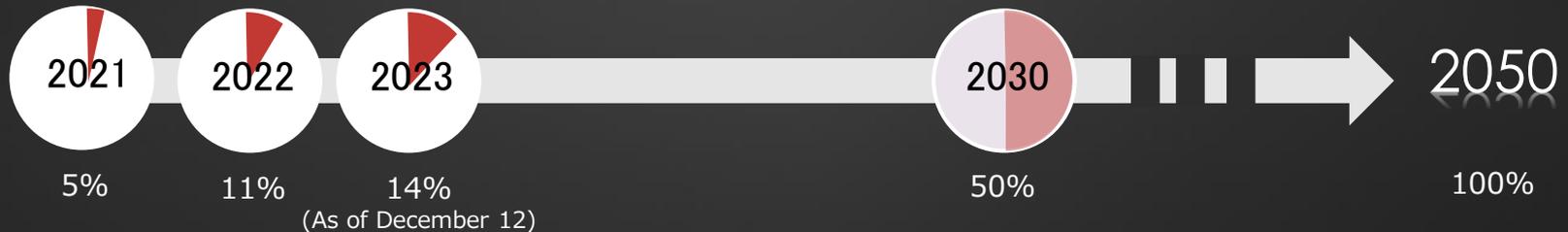
World's first sustainable finance master framework

Accelerate **realization of Group Vision 2030** based on solutions to social issues through sustainable finance

Green, Transition, Social, Blue, Link, Impact, and all other sustainable finance types of financing are available for environment-related projects



This master framework will provide a **complete financing structure** for the realization of the Group Vision



Procurement ratio (KPI)

New Values



安全安心リモート社会



近未来モビリティ

つぎの社会へ、
信頼のこたえを

Trustworthy Solutions
for the Future

エネルギー・環境ソリューション



Cross Over

Frontier