Aero-Engine, Space & Defense Business Area Briefing

October 23, 2024

IHI Corporation

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President of Aero-Engine, Space & Defense Business Area

IHI

Generate revenue of **¥800 billion** by **FY2030** and **¥1,000 billion** by **FY2040**

Sustainably increase civil aero-engine **sales and earnings over the medium and long terms**

Bolster defense business **sales and earnings** on higher defense budgets and institutional reforms

In the space business, **increase contributions to national space development and cultivate private sector operations**

2. Business Area Operating Results

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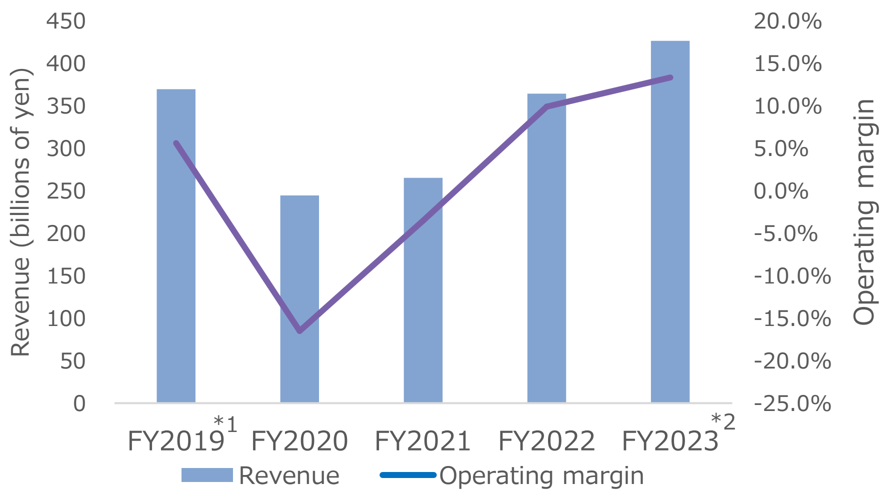
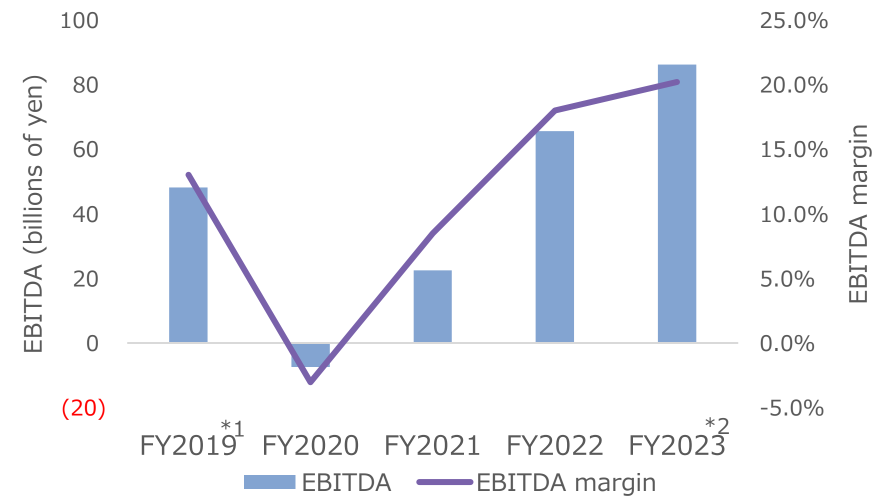
Revenue and earnings growth far exceeded pre-pandemic levels

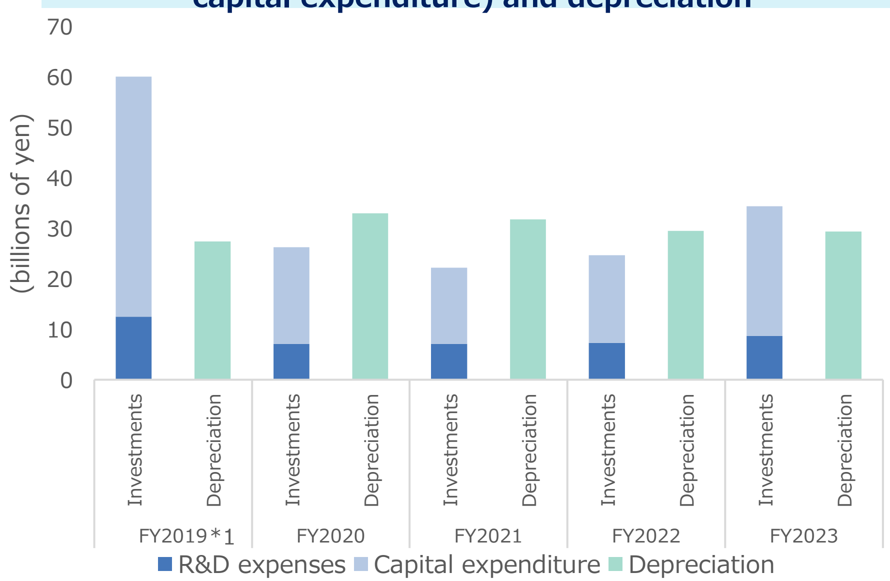
Revenue



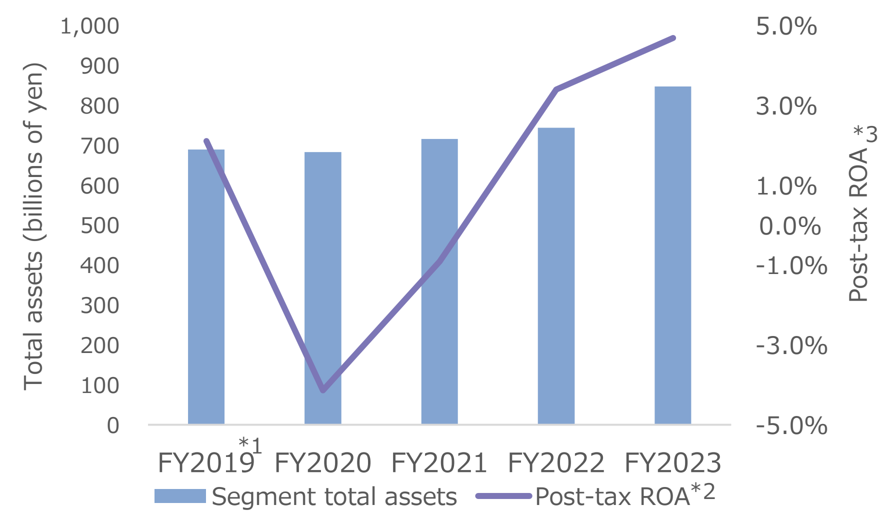
EBITDA



In-house-funded investments (R&D and capital expenditure) and depreciation



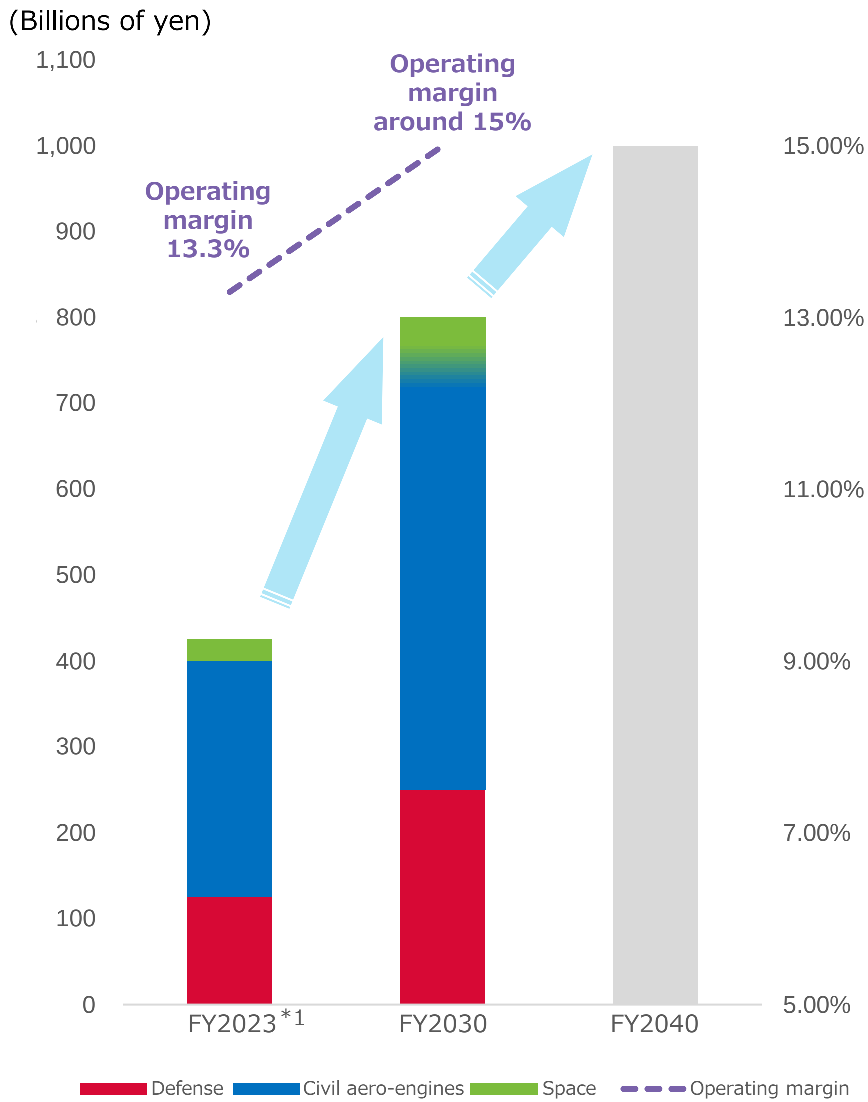
Segment total assets



*1 International Financial Reporting Standards applied to fiscal 2019 figures.
*2 Excluding impact of PW1100G-JM powder metallurgy issue in fiscal 2023.
*3 Post-tax ROA = Post-tax earnings divided by total assets.

3. Business Area Goals

Boost revenue to ¥800 billion by FY2030 and ¥1,000 billion by FY2040
Deliver sustainable growth by leveraging core propulsion technologies to maximize business synergies



*1 Excluding impact of PW1100G-JM powder metallurgy issue in fiscal 2023

Defense

Earned recognition for long and extensive track record in developing and manufacturing defense engines

Civil Aero-Engines

Enhanced industry presence through international civil aero-engine development programs

Defense

Leveraged advanced technical capabilities amassed from high quality standards in civil aero-engine business to participate in Global Combat Air Programme

Civil Aero-Engines **Defense** **Space**

Drawing on business synergies to further expand revenue

Civil Aero-Engine Business

4. Civil Aero-Engine Business:
(1) Market Trends

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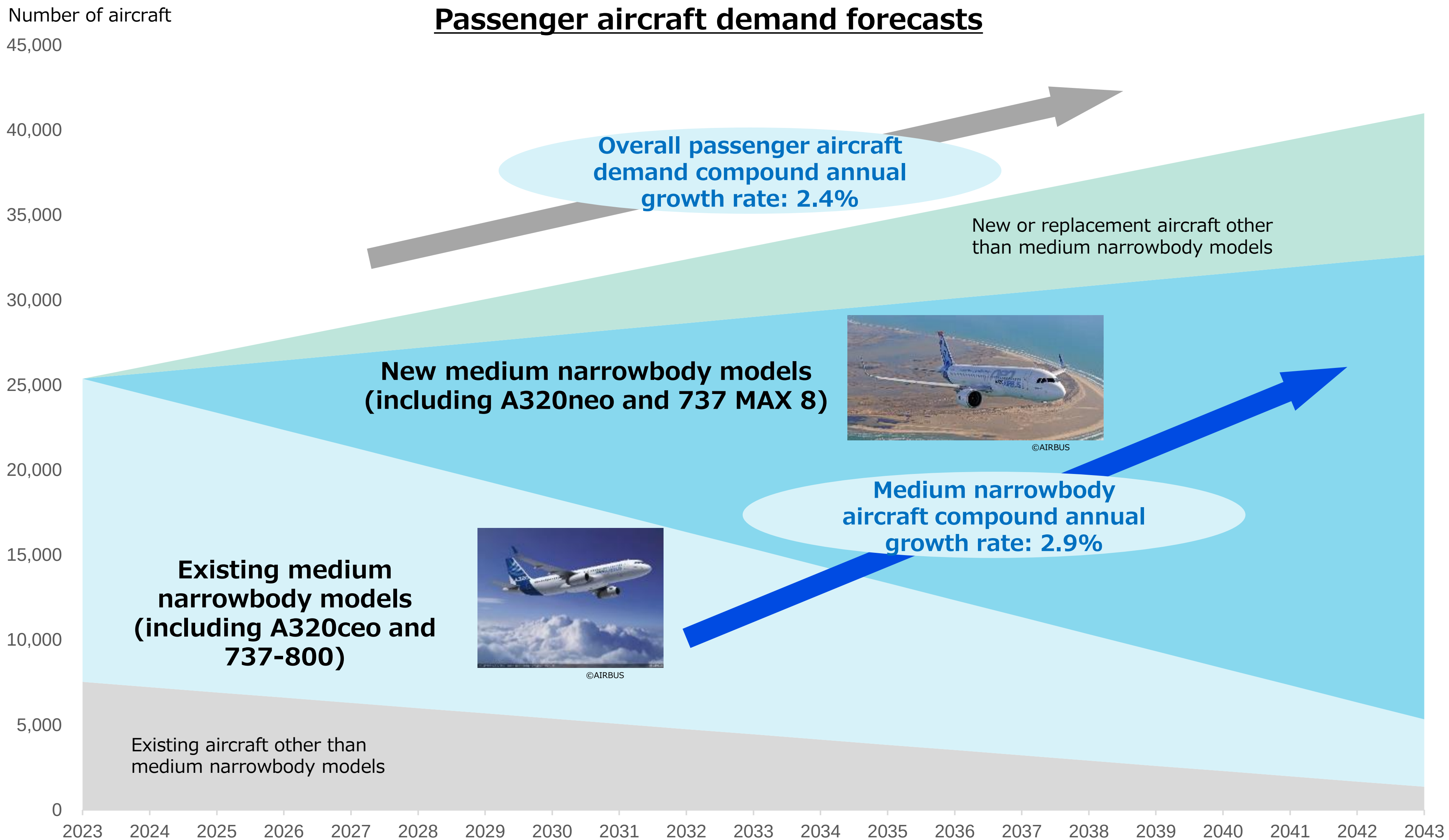
Demand expanding particularly for medium narrowbody aircraft employing key offerings

✓ Passenger aircraft demand growth to match that of global passenger demand (3.5% annual growth rate for 2020~2043)

Passenger aircraft demand forecasts



IHI prepared this slide based on the Japan Aircraft Development Corporation's Worldwide Market Forecast 2024–2043, issued in March 2024

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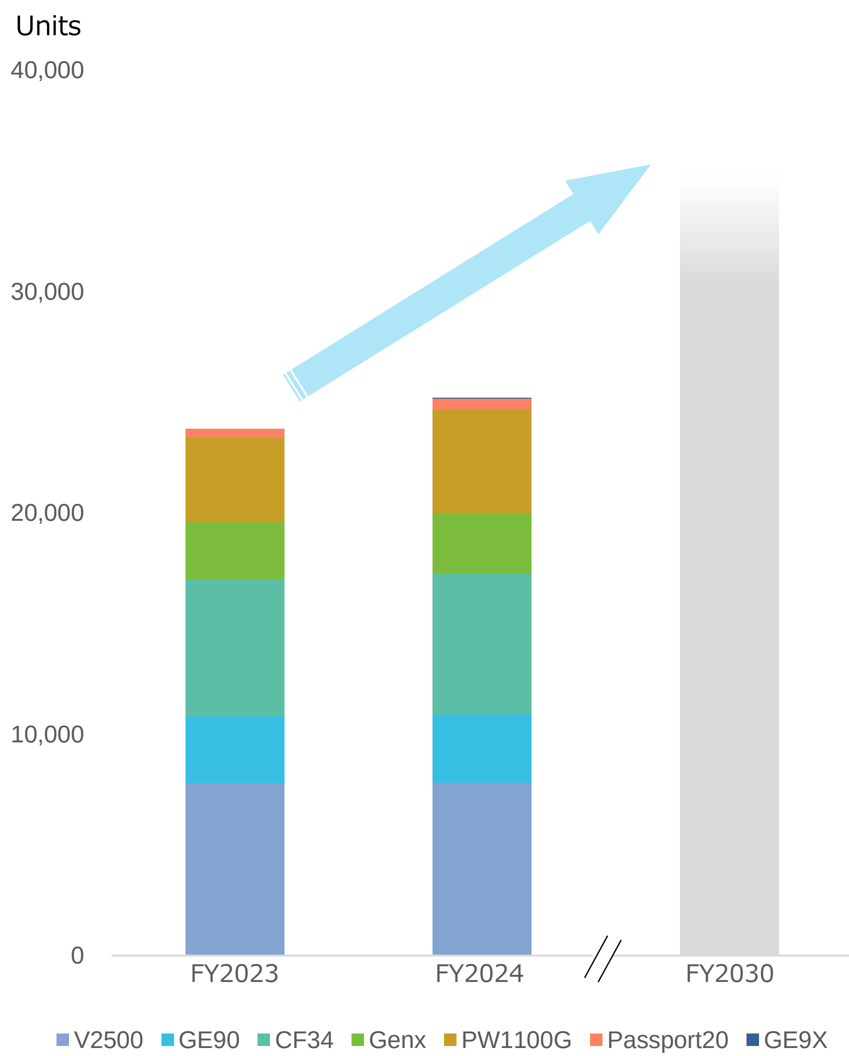
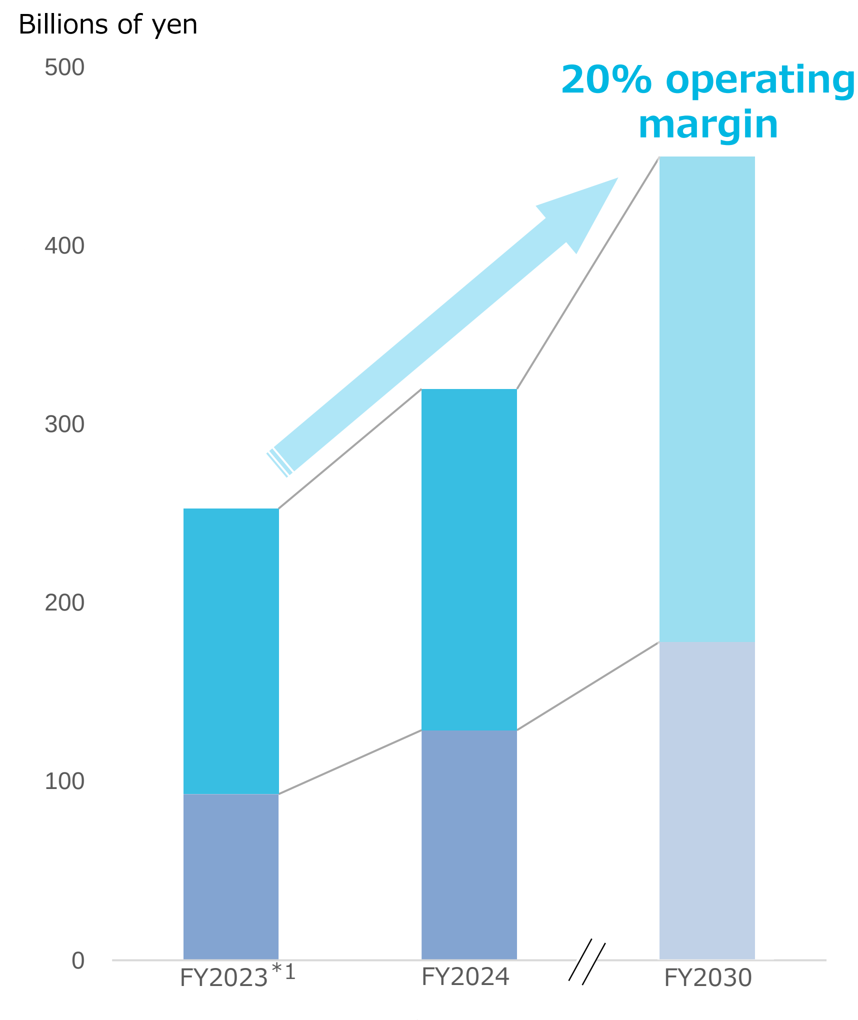
Total engine shipments have steadily increased, with aftermarket revenue growth being even faster

Cumulative engine shipments



Civil aero-engine business revenue



*1 Excluding impact of PW1100G-JM powder metallurgy issue in fiscal 2023.

Note: Aftermarket encompasses spare parts + maintenance and parts repairs

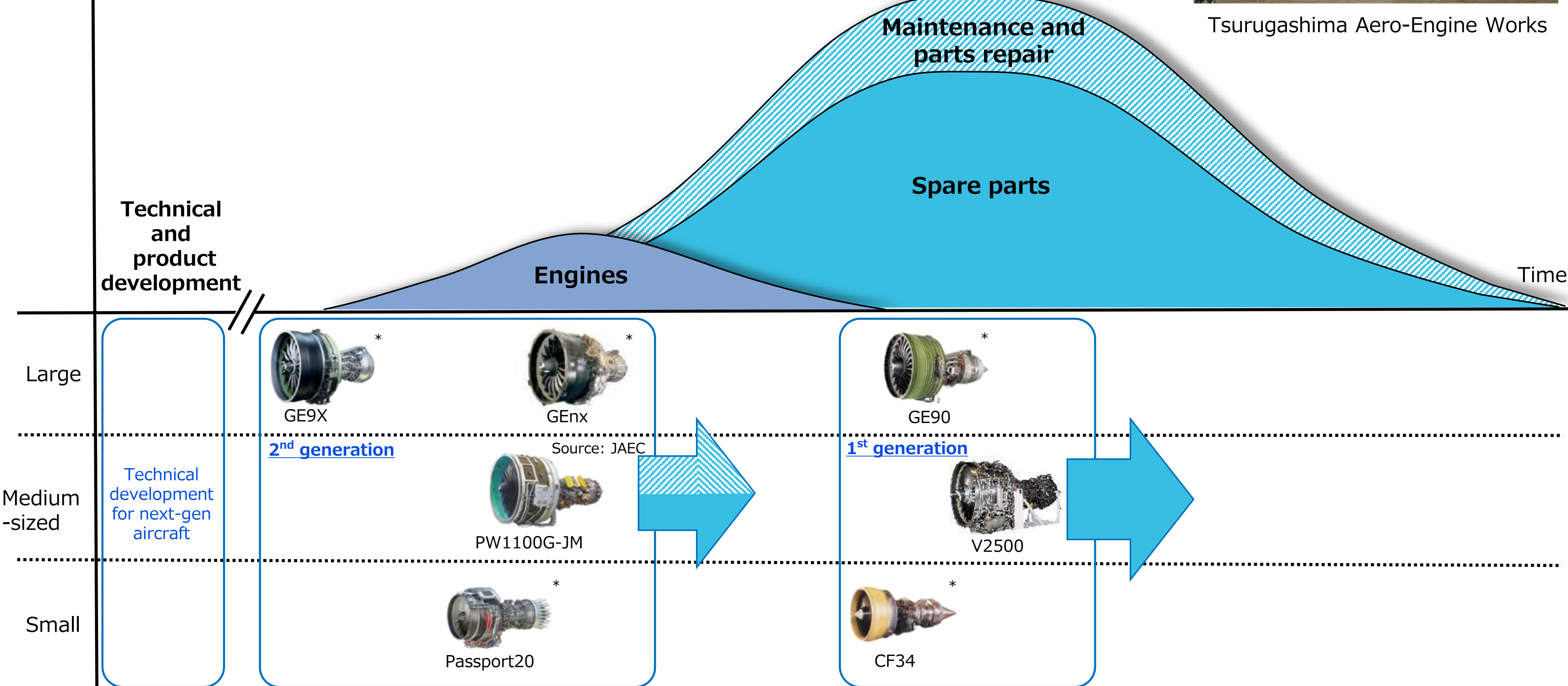
4. Civil Aero-Engine Business:
(3) Envisioned Earnings Model

Invest earnings from existing engines in next-generation models to establish solid revenue streams for the medium through long terms

Original Equipment Manufacturing business: (1) Engines and (2) Spare parts
Maintenance, Repair, and Overhaul business (MRO): maintenance and parts repair
*Aftermarket = Spare parts + MRO

- Have already contracted to provide long-term maintenance and parts repairs for second-generation models
- Expanding facilities to cater to demand growth

Tsurugashima Aero-Engine Works



*Courtesy of GE Aerospace

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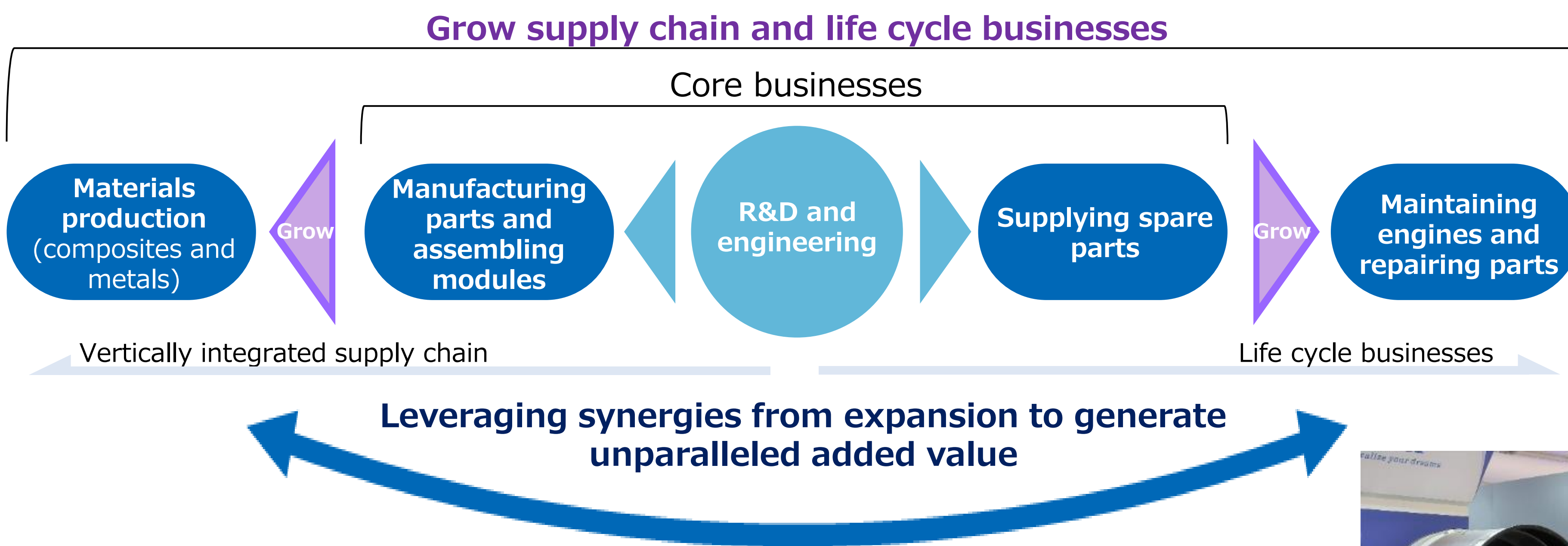
Endeavor to add even more value to next-generation engine program

- ✓ Enhance added value by expanding the value chain beyond existing core businesses
- ✓ Generate unparalleled added value through synergies by expanding supply chain and lifecycle business



PW1100G-JM example

- The IHI Group developed composite materials offering exceptional design flexibility
- We were the world's first to employ composite materials with structural fan exit guide vanes, earning accolades for contributing significantly to weight reduction

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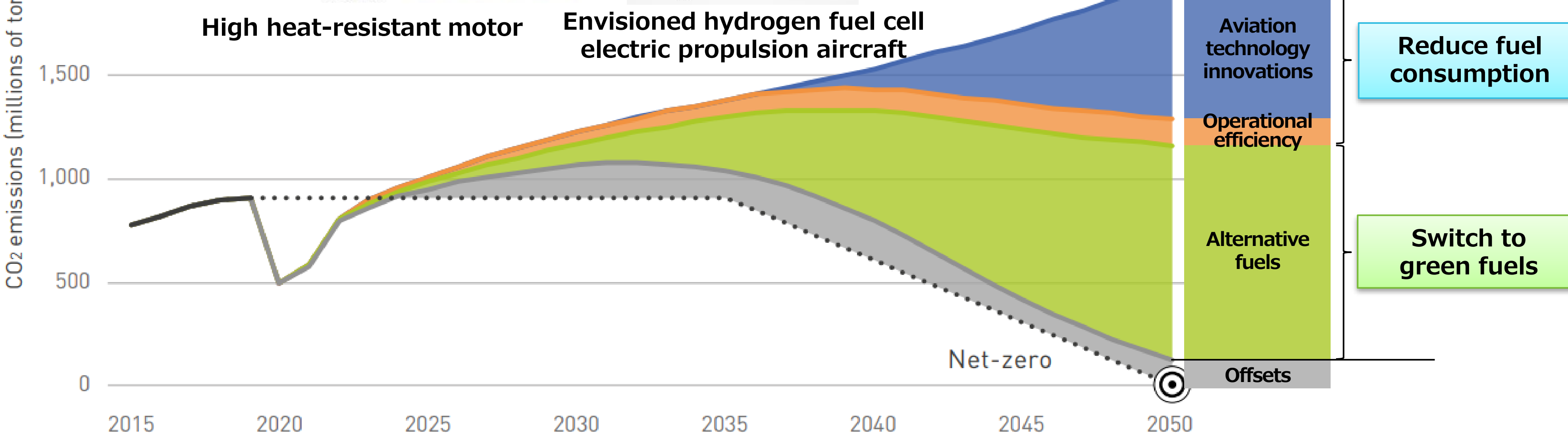
Undertake R&D to achieve carbon neutrality by 2050

✓ Tap in-house technological seeds to spearhead the development of new propulsion systems and electric power and thermal management systems

High heat-resistant motor

Envisioned hydrogen fuel cell electric propulsion aircraft



Source: Air Transport Action Group's Waypoint 2050 2nd Edition: September 2021

R&D harnessing Green Innovation Fund

Electrification
1. High heat-resistant motor: Electric generator built into engines
2. Gas bearing motor: Electric turbo machinery and electric blower
3. Electric power and thermal management systems

Hydrogen fuel cell efforts
Liquid hydrogen tanks/hydrogen fuel cell fuel supply systems, and fuel cells

Defense Business

5. Defense Business:
(1) Help Overhaul Nation's Defense Capabilities

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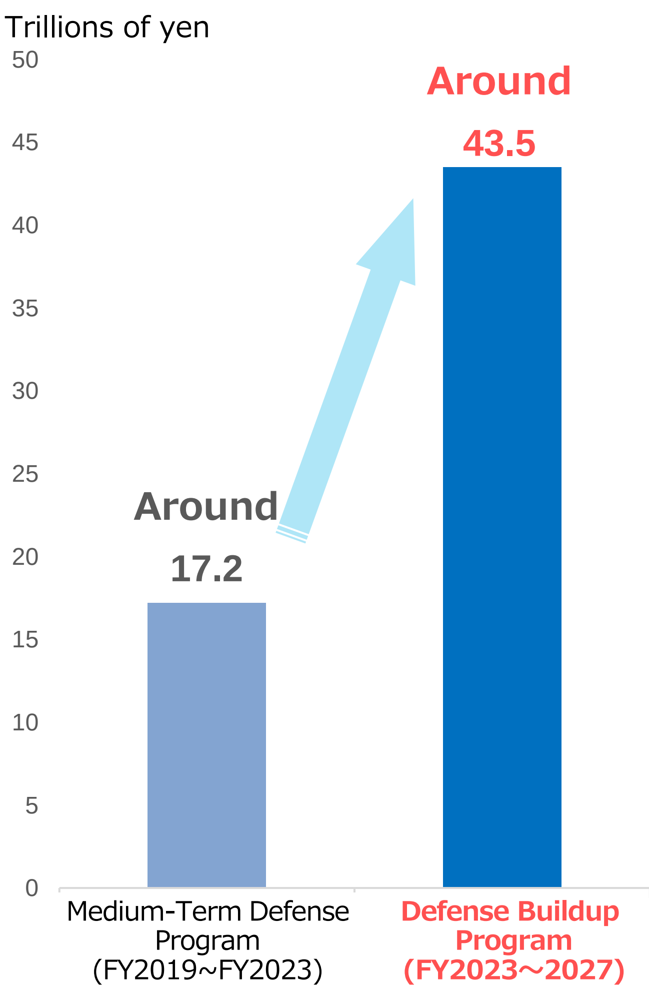
IHI offers products and services for all seven major programs to "Fundamental reinforcement of Japan's defense capabilities"

✓ Japanese government aims to increase defense budget to 2% of GDP by FY2027

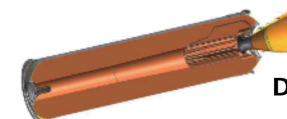
The expenses based on contracts (material expenses) to be newly concluded



Figures based on above program and plan

Seven major programs to "Fundamental reinforcement of Japan's defense capabilities"

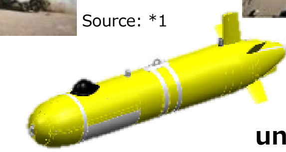
- Stand-Off Defense Capabilities
- Integrated Air and Missile Defense Capabilities
- Unmanned Defense Capabilities
- Cross-Domain Operation Capabilities
- Mobile Deployment Capabilities/Civil Protection
- Command-and-Control and Intelligence-related Functions
- Sustainability and Resiliency



Defense rocket motors

Source: *1

Source: *2



Unmanned underwater vehicles

Aero-engines

Source:*3

(Photo Credit: Northrop Grumman)

Space Domain Awareness satellites

Source: *4

Satellite constellation

Transport aircraft engines

Aero-engine maintenance, repairs, and overhaul, and auxiliary capabilities

Nuclear, biological, and chemical warning systems and decontamination sets

Note: See Appendix 2 for sources

5. Defense Business:
(2) Medium-Term Goals

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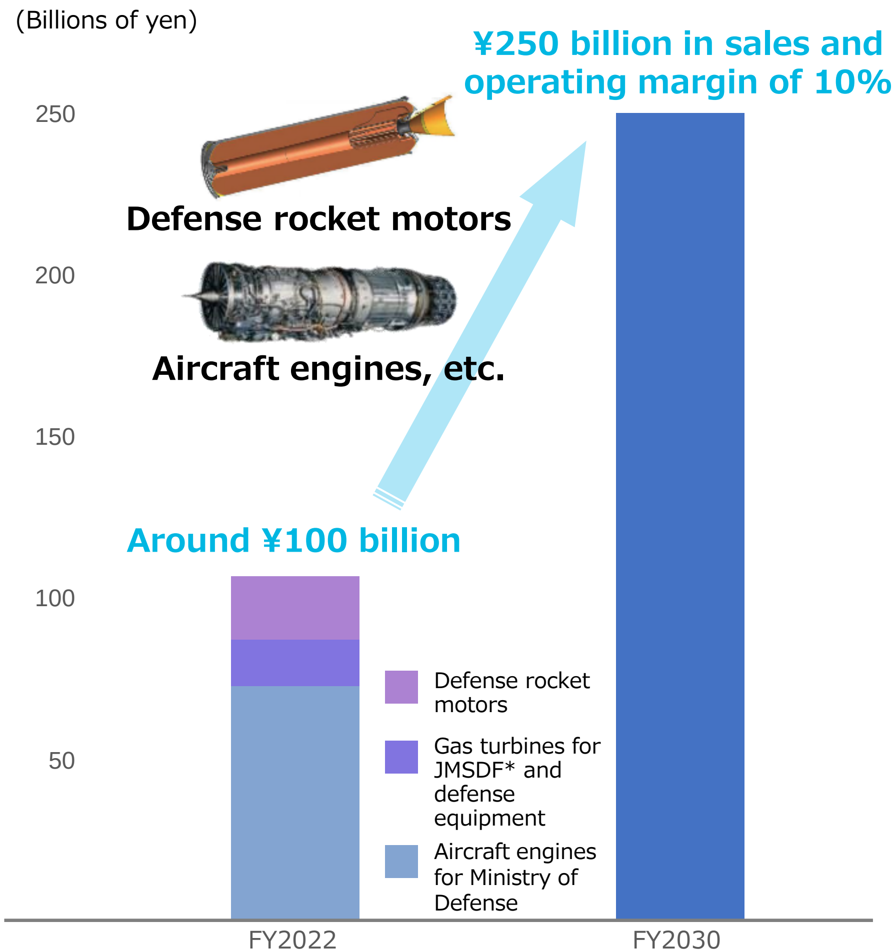
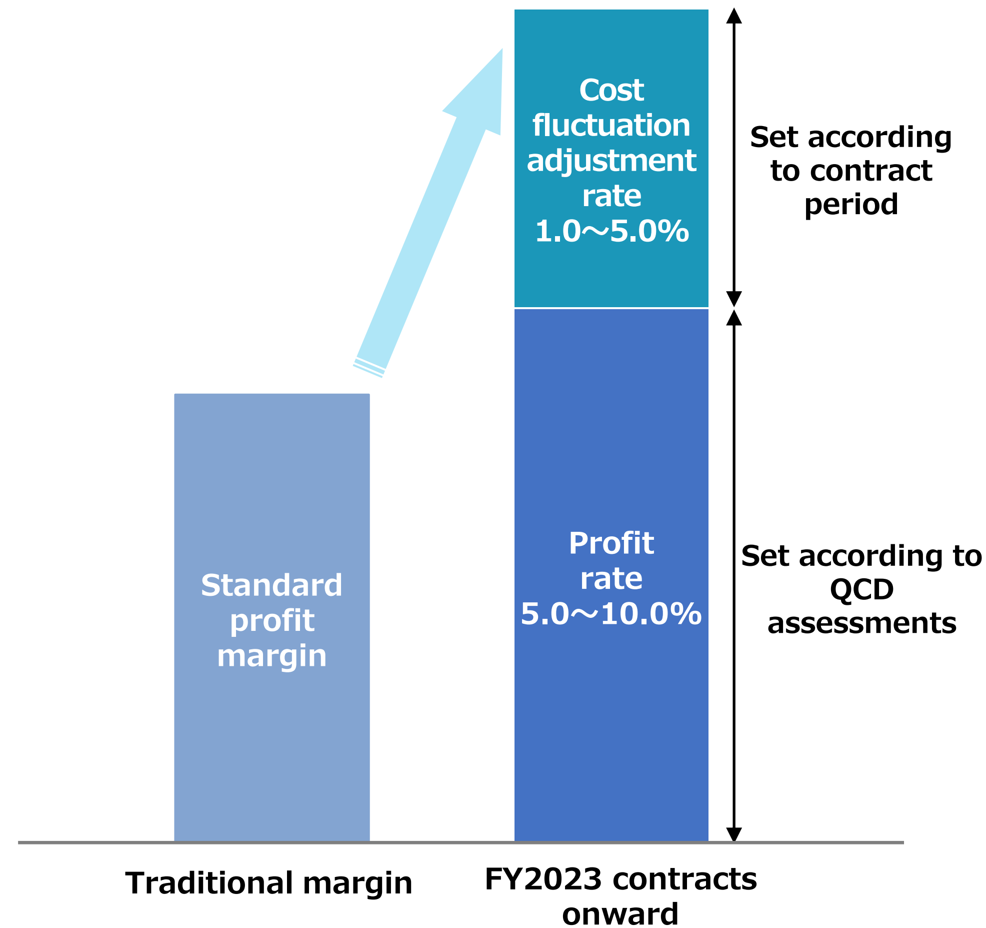
FY2030 targets: Sales of ¥250 billion and operating margin of 10%

IHI's defense business sales



* Japan Maritime Self-Defense force

Enhance profit margins as part of defense industry policy



- Corporate efforts reflected in profit margins through Ministry of Defense evaluations of quality, cost, and delivery management
- Deploying a cost fluctuation adjustment rate absorbs the risk of cost increases from soaring prices and other uncontrollable factors

5. Defense Business:
(3) Expand Solid-Fuel Rocket Motor Business

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Provide propulsion systems for numerous medium- to-large-diameter missiles

✓ Solid rocket motors for missile propulsion systems contribute to standoff defense and integrated air defense missile defense capabilities

SM-3 Block IIA
(Joint development and production by Japan and US)

PAC-3/PAC-3MSE

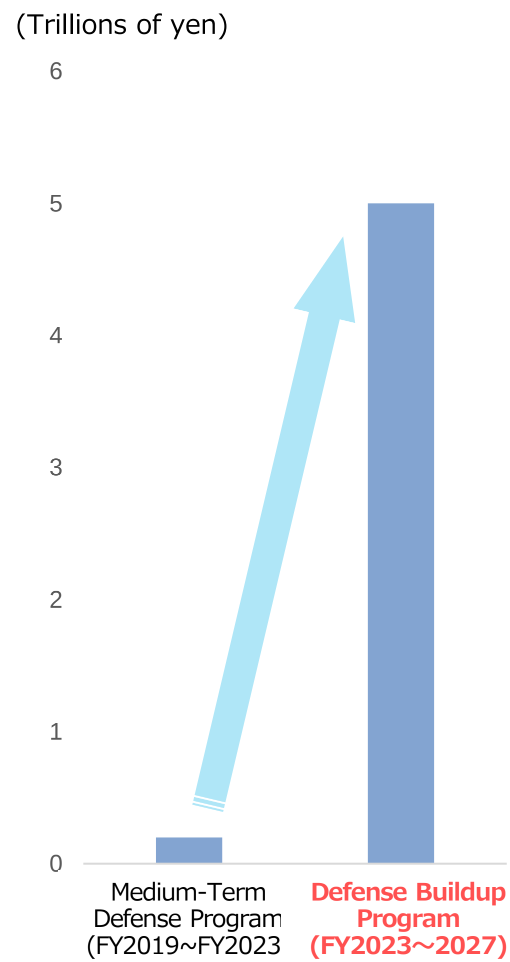
(PAC-3 missile)

Type-11 surface-to-air missile/
Surface-to-air guided missile for
base air defense

(Surface-to-air missile for base air defense)

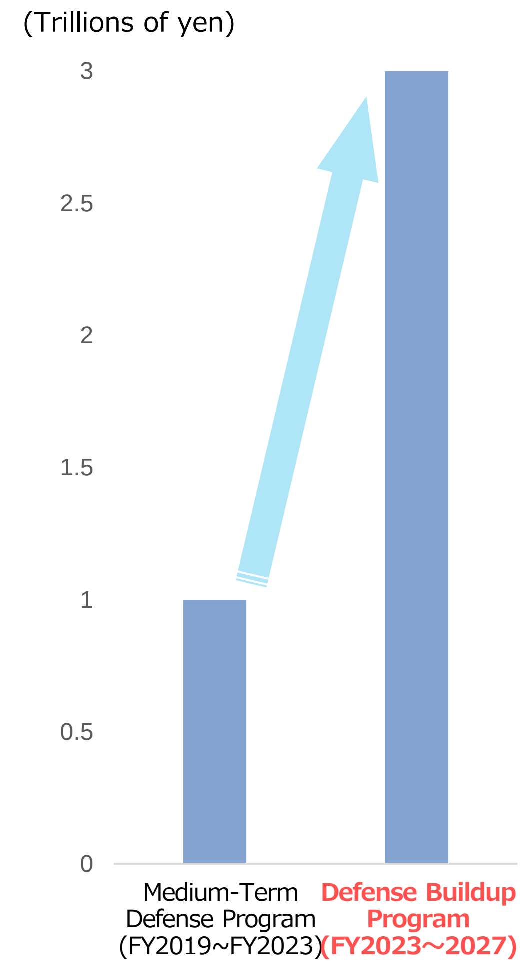
Note: See Appendix 2 for sources

Standoff defense capability-related budget



Figures based on above plan

Integrated air and missile defense capability-related budget



Figures based on above plan

Leveraging long experience in developing and manufacturing defense engines to strengthen global deployment of defense business

Export licensed domestic engine parts to U.S. original equipment manufacturer

Help strengthen alliance between Japan and United States by complementing IHI and original equipment manufacturer production capabilities

Maintenance business for engines mounted on F-35 fighter jets

(From June 29, 2023, press release)

In Asia-Pacific, serving as regional maintenance depot alongside Australia

International joint development for next-generation fighter aircraft (GCAP)

Source: *1 (computer-generated image)

Playing a vital role by stepping up collaboration with the public and private sectors

Note: See Appendix 2 for sources

Space Business

6. Space Business:
(1) Expand Business through Public-Private Collaboration

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Expand contributions to nation's space development and commercialize launch services

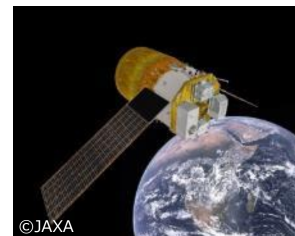
IHI's rocket technologies

World-class liquid engine

IHI developed the turbo pump

The world's largest solid-fuel rocket

Government-led space development

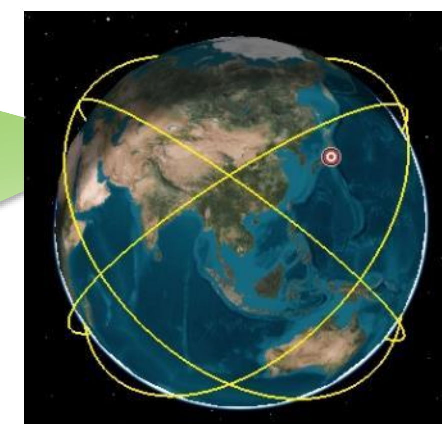


Help transport materials to International Space Station

Participate in resupply missions to lunar orbiting crewed station

Expand into private-sector business

Enter launch services business



Expand satellite utilization business

6. Space Business:
(2) Satellite Utilization Services

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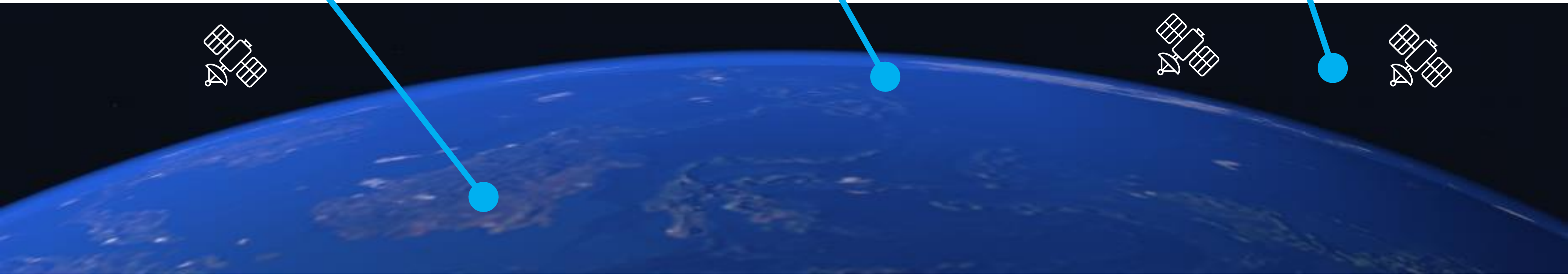
Foster new industries and boost national security by expanding satellite utilization services

Tropical forest and peatland management combining satellite and ground data (through NeXT FOREST*1)

Securing maritime safety, including through IHI Ocean Monitoring Service*2

Collaborating with Northrop Grumman for space domain awareness*3



*1 A joint venture with Sumitomo Forestry Co., Ltd. https://www.ihi.co.jp/csr/nextforest/index.html

*2 IHI Ocean Monitoring Service https://www.ihi.co.jp/ijs/business/satellite/

*3 https://www.ihi.co.jp/all_news/2022/aeroengine_space_defense/1198210_3479.html

Toward Tomorrow

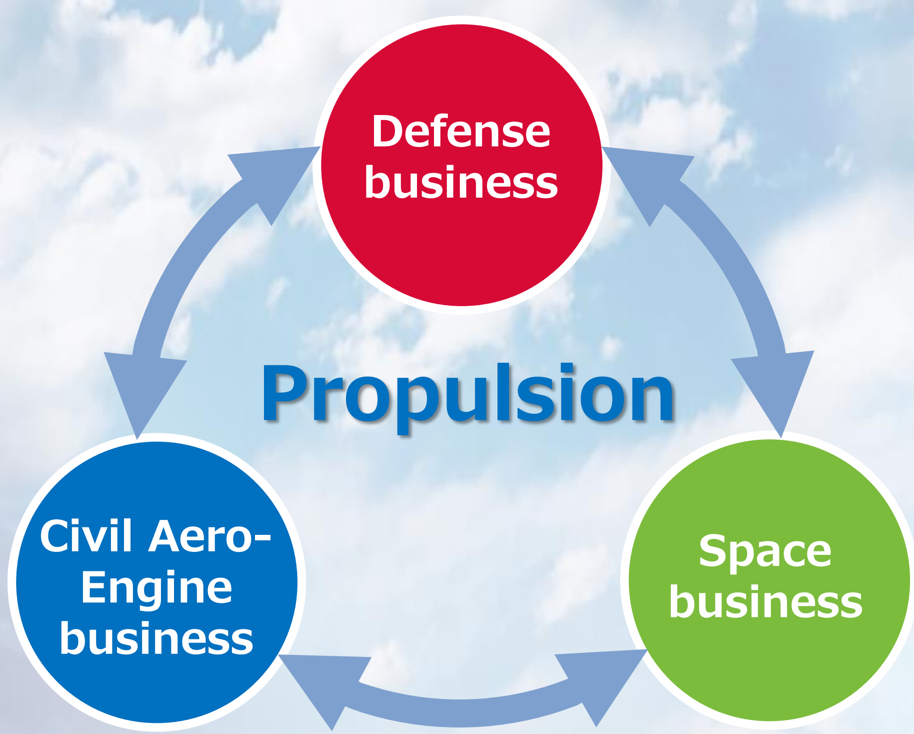
7. Toward Tomorrow

IHI will harness its technological expertise based on its propulsion capabilities to:

- Support global air transportation
- Contribute to Japan's security
- Pioneer new space frontiers

Source:*1 (Computer-generated image)

Source:*2



Courtesy of GE Aerospace

Note: See Appendix 2 for sources

Appendix

Appendix 1: Civil Aero-Engine Program Portfolio

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Product portfolio balanced across generations and sizes

Generation	Size	Engine program*	Aircraft (Type)	Main Partners	Cumulative Unit Sales (As of end-March 31, 2024 (Source: IHI results briefing))	Status (80′ / 90′ / 00′ / 10′ / 20′)
1st generation	Medium-sized	**V2500** 	A320, MD-90 (Single Aisle)	P&W JAEC (IHI: 14%) MTU	**7,782**	Started development in 1984
1st generation	Large	**GE90**  *	B777 (Medium Widebody)	GE IHI: 9% Safran	**3,029**	Joined GE's development program in 1990
1st generation	Small	**CF34**  *	Bombardier CRJ, ARJ, E170~195 (Regional Jets)	GE JAEC (IHI: 27%)	**6,201**	Joined GE's development program in 1996
2nd generation	Large	**GEnx**  *	B787, B747 (Small Widebody)	GE JAEC (IHI: 13%) Safran MTU	**2,577**	• Development: 2004~ • Shipment: 2011~
2nd generation	Medium-sized	**PW1100G-JM**  Source: JAEC	A320neo (Single Aisle)	P&W JAEC (IHI: 15%) MTU	**3,821**	• Development: 2011~ • Shipment: 2014~
2nd generation	Small	**Passport20**  *	Bombardier Global 7500/8000 (Business Jets)	GE JAEC (IHI: 27%)	**406**	• Development: 2012~ • Shipment: 2017~
2nd generation	Large	**GE9X**  *	B777x (Medium Widebody)	GE JAEC (IHI: 10%) Safran MTU	-	• Development: 2014~

Red text: Joint venture
Blue text: Revenue-sharing partner

Development / Initial production / Commercial production / Parts and maintenance expansion

* Courtesy of GE Aerospace

Appendix 2: Links for Sources (some in Japanese only)

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*1 Air Self-Defense Force website	https://www.mod.go.jp/asdf/equipment/other/Patriot/index.html
*2 Maritime Self-Defense Force website	https://www.mod.go.jp/msdf/release/202211/20221121-1.pdf
*3 Northrop Grumman	https://news.northropgrumman.com/file?fid=5b5049e4a1383544d163f9a3
*4 Cabinet Office website	https://www8.cao.go.jp/cstp/anzen_anshin/20221021_meti_3.pdf

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*1 Maritime Self-Defense Force website	https://www.mod.go.jp/msdf/release/202211/20221121-1.pdf
*2 Air Self-Defense Force website	https://www.mod.go.jp/asdf/equipment/other/Patriot/index.html
*3 Air Self-Defense Force website	https://www.mod.go.jp/asdf/equipment/other/yuudoudan/index.html

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*1 Ministry of Defense website	https://www.mod.go.jp/j/policy/defense/nextfighter/index.html

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*1 Ministry of Defense website	https://www.mod.go.jp/j/policy/defense/nextfighter/index.html
*2 Maritime Self-Defense Force website	https://www.mod.go.jp/msdf/release/202211/20221121-1.pdf

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Realize your dreams