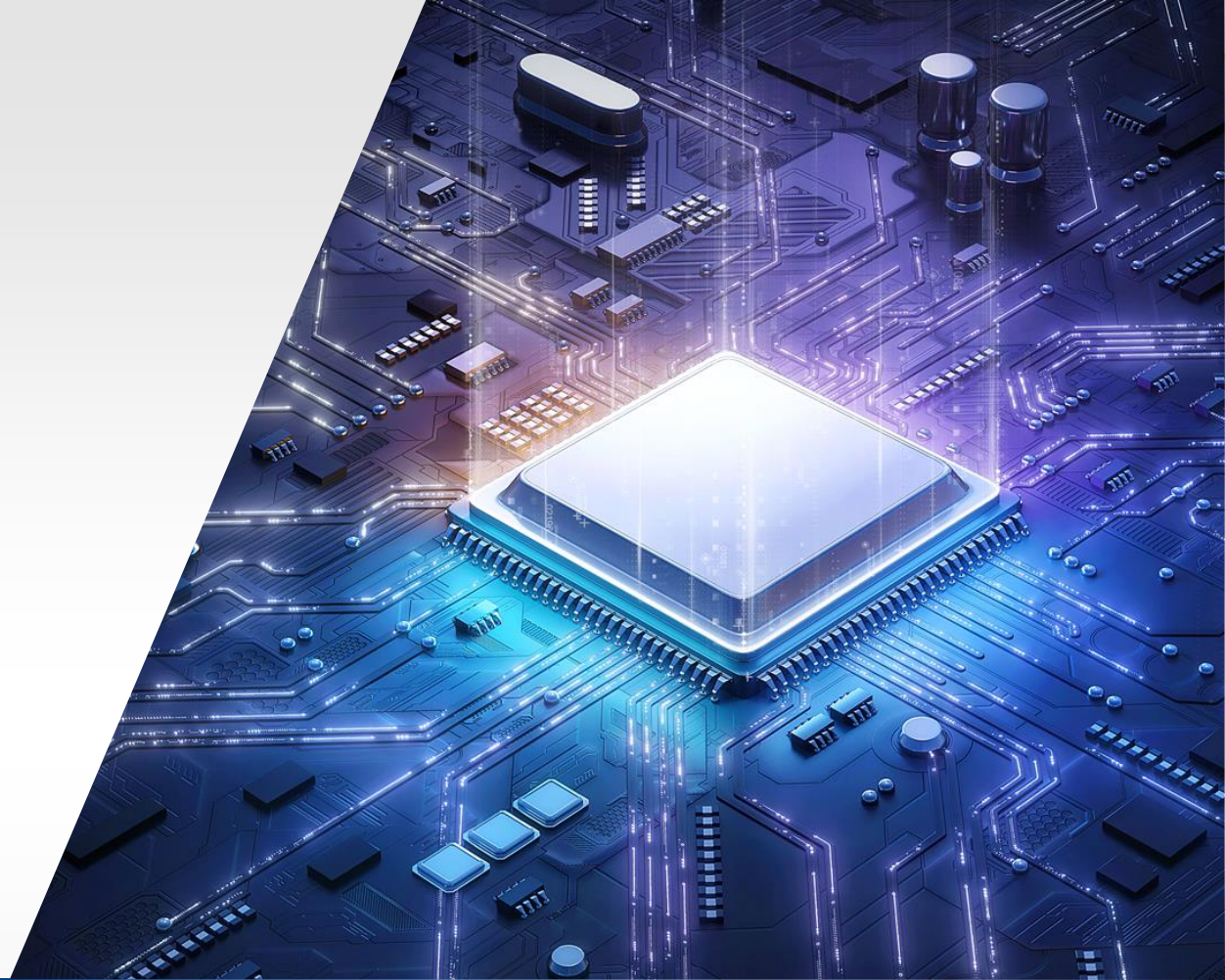


EMBEDDED PROCESSING



MAY 16, 2024
TOSHIHIKO SEKI
SVP AND GM OF EMBEDDED PROCESSING PRODUCT GROUP
RENESAS ELECTRONICS CORPORATION

AT A GLANCE

EMBEDDED PROCESSING

Our products / technologies



32bit Arm Cortex-M based MCU for intelligent IoT



32bit high-performance, high-efficiency MCU

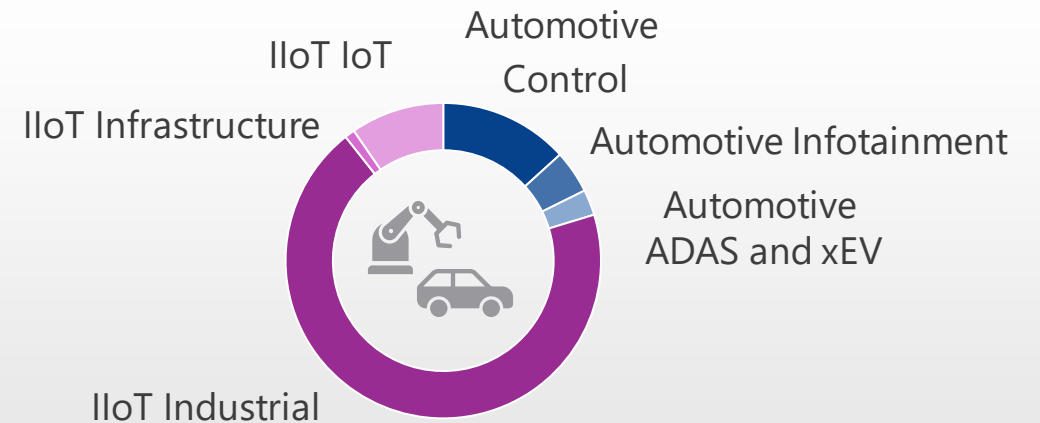
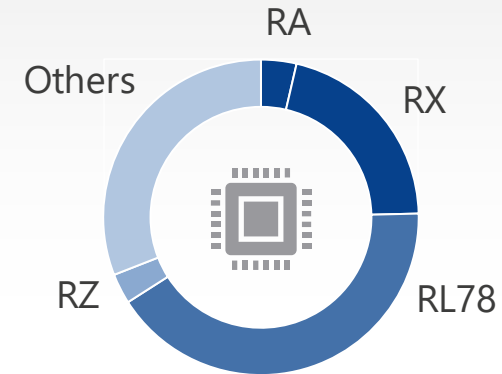


16bit low power consumption MCU



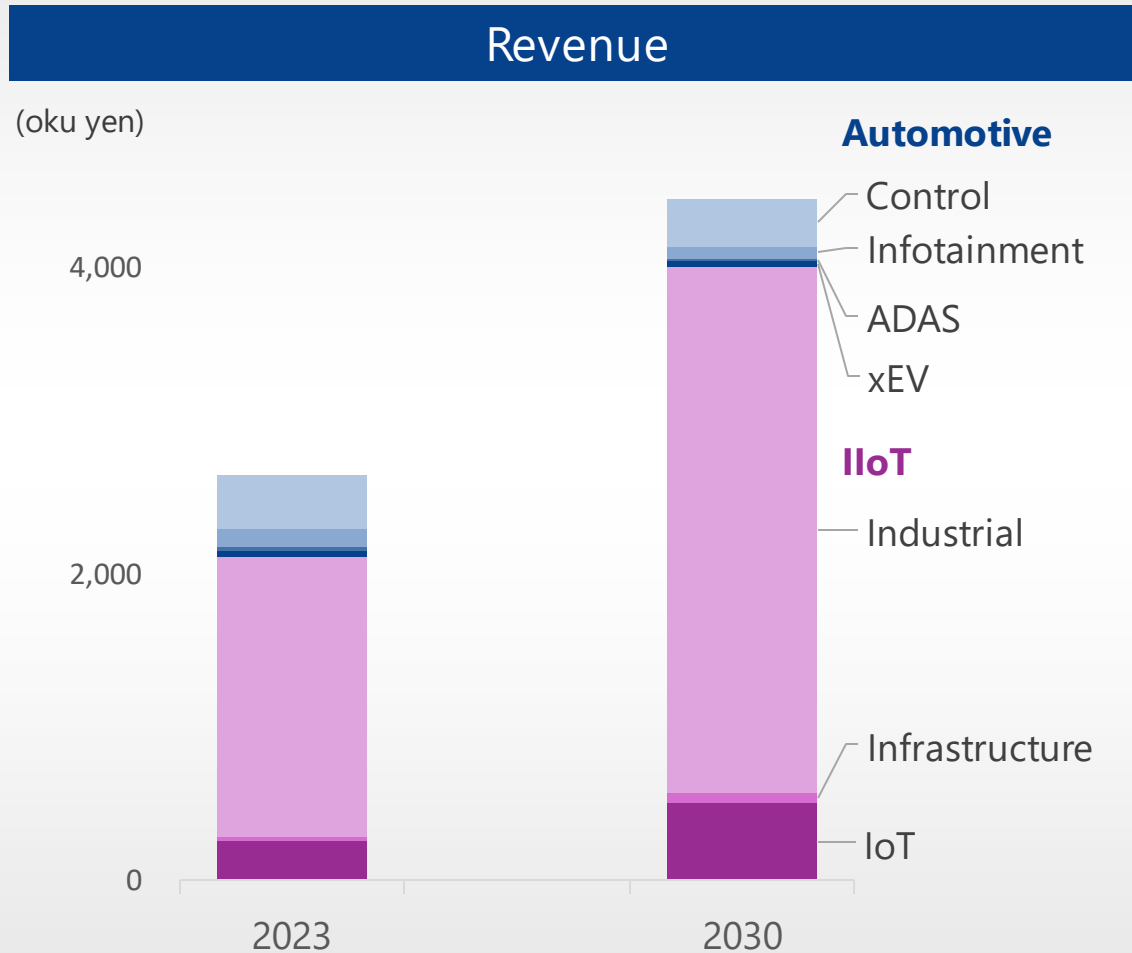
64bit MPU for HMI, e-AI, real-time control & industrial networking

2023 Revenue




GROWTH DRIVERS

EMBEDDED PROCESSING



* FX \$1 = 100yen, €1 = 120yen

Growth drivers



Industrial / Mass market

➤


Scalable embedded processor

Embedded AI MCU/MPU

Complete Portfolio incl. ARM, RISC-V and Proprietary

UX and Catalogue business

AI for Mass



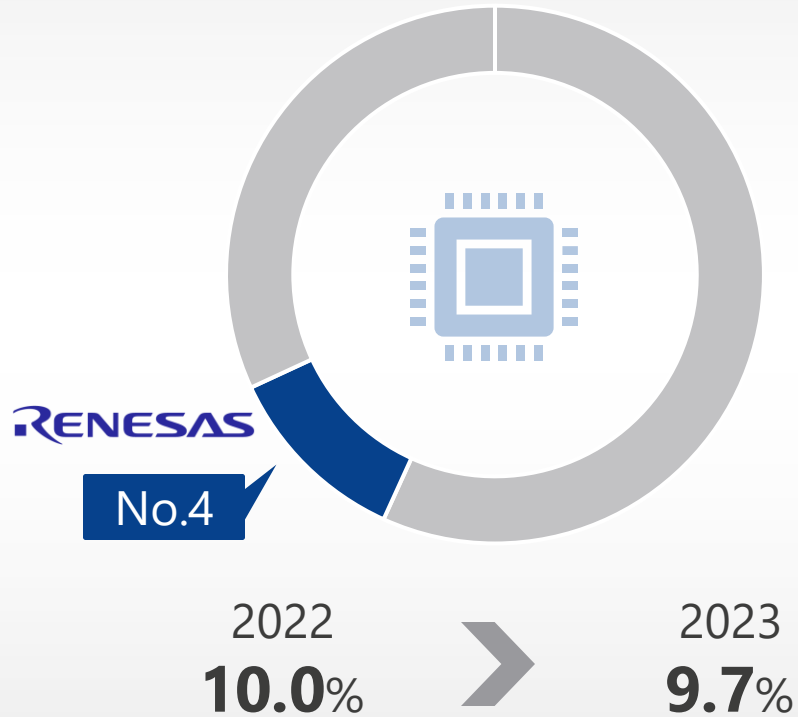
IoT

➤

Edge and Endpoint intelligence

MCU SHARE AND DESIGN IN

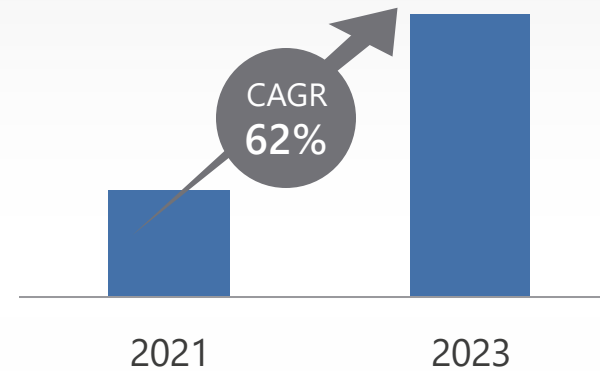
MCU share for Industrial & IoT



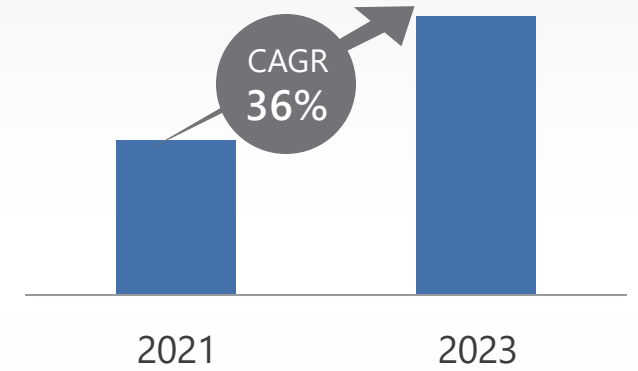
Graphs created by Renesas based on Gartner Research. Calculations performed by Renesas Source: Gartner®, Market Share: Semiconductors by End Market, Worldwide, 2023, Rajeev Rajput et al., 1 April 2024, MCU for Industrial & IoT = Total Microcontroller excluded Automotive application GARTNER is a registered trademark and service mark of Gartner, Inc. and/or its affiliates in the U.S. and internationally and is used herein with permission. All rights reserved. Gartner does not endorse any vendor, product or service depicted in its research publications, and does not advise technology users to select only those vendors with the highest ratings or other designation. Gartner research publications consist of the opinions of Gartner's research organization and should not be construed as statements of fact. Gartner disclaims all warranties, expressed or implied, with respect to this research, including any warranties of merchantability or fitness for a particular purpose.

Design-in

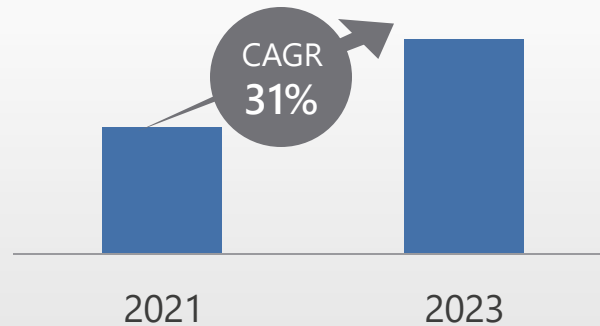
RA (Arm MCU)



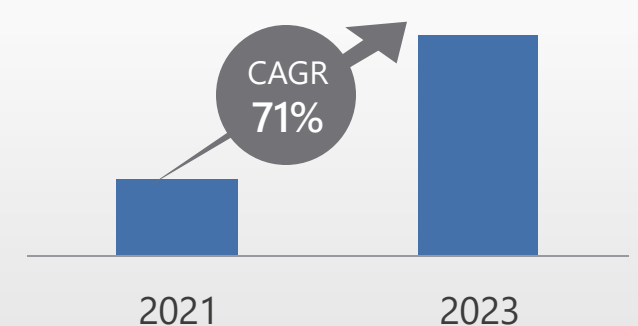
RL (8/16bit MCU)



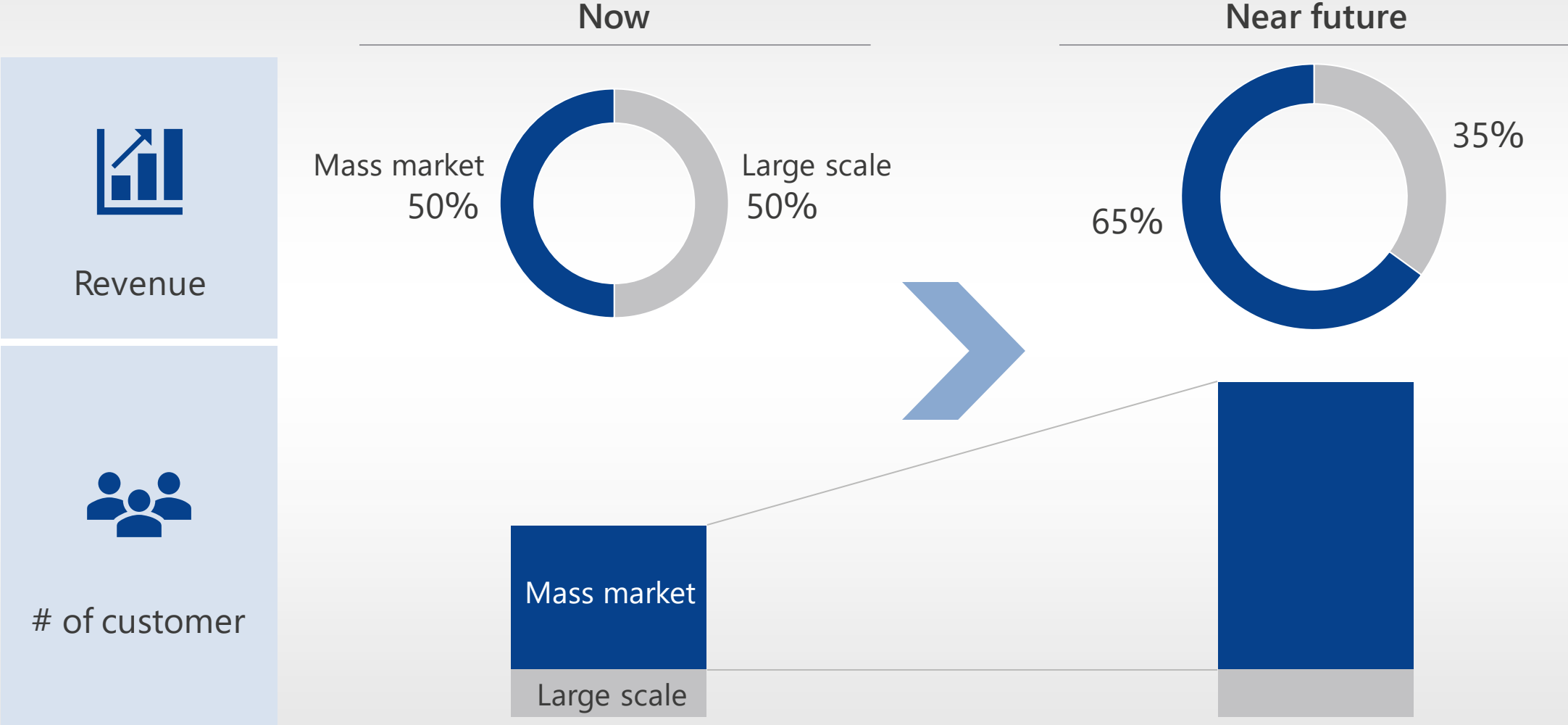
RX (32bit MCU)



RZ (MPU)



TARGET BUSINESS PROFILE



EMBEDDED PROCESSING STRATEGY

Scalable
embedded processing
portfolio



Core technology



Motor control



HMI

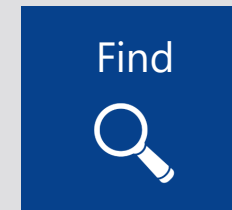


Security & Safety



AI/ML
at the endpoint

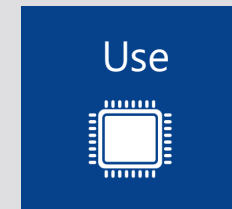
User experience



Find



Buy



Use



Share

USER EXPERIENCES

Find

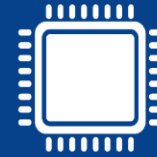


Buy



- # of stock at Catalog Disti.
- Free samples
- Die bank
- Multi-Lines operation

Use

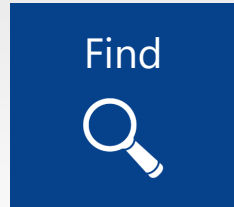


- SW platform
- Design guide
- Application note
- Code generator
- Tuning tools
- On-line tutorial

Share



USER EXPERIENCES



Optimizing accessibility and visibility

	Company A	Company B	Renesas
Contents User's Manual	○ Approx. 1,500 pages	○ Approx. 2,000 pages	△ Approx. 3,000 pages
Accessibility Ease of accessing information Web, APN, Guide, Selection	◎	◎	△
Visibility Number of Registrations of parts on Altium Designer	74k	150k	83k



Open-source community and ecosystem partner

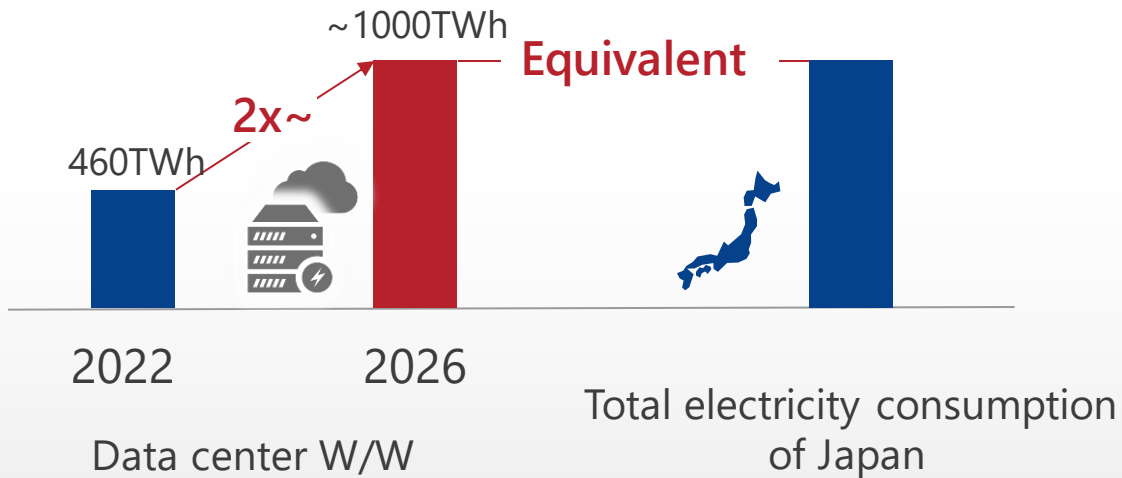
	Company C	Company D	Renesas
Open-Source Community			
Arduino Supported Hardware	5	20+	3
Zephyr RTOS Supported Boards	8	19	1
Ecosystem Partner	300+	200+	350+

GEN-AI TREND CAUSES A SHIFT IN COMPUTING BALANCE



FROM CENTRALIZED CLOUD TO BALANCE WITH DISTRIBUTED EDGE/ENDPOINT

Data center in "Centralized Cloud" cannot meet GenAI demand due to power crisis

Data center electricity consumption forecast

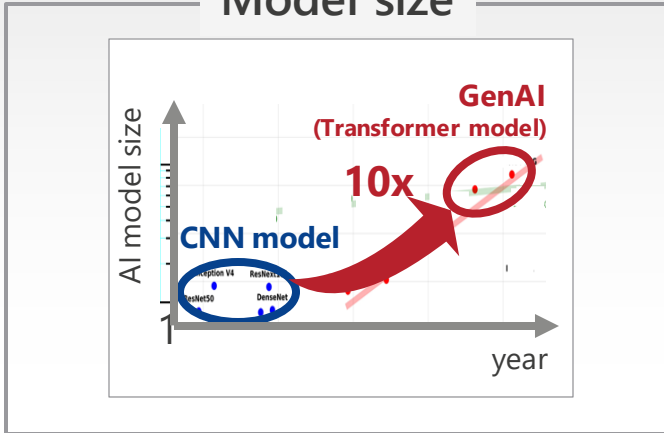


Source: International Energy Agency's (IEA) Electricity 2024 report

	Cloud only	Best balance
Centralized cloud  Server	Huge learning Realtime inference Not good for inference	Huge learning
Distributed edge/endpoint  Embedded system	10x power efficiency Renesas' challenge Realtime inference	

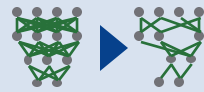
RENESAS' AI SOLUTION IN GEN-AI ERA

Model size



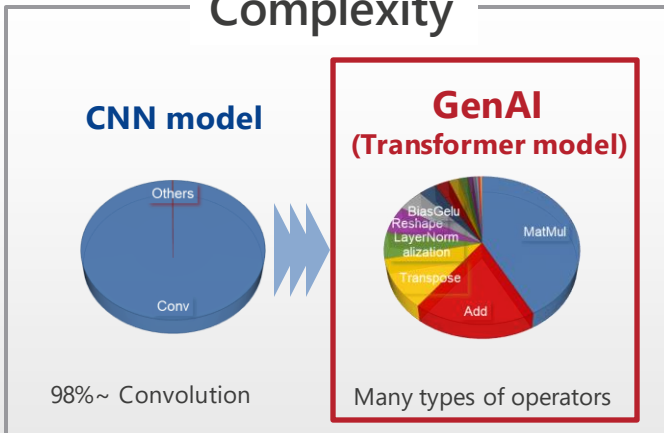
Renesas' AI solution

Sparse pruning technology



DRP-AI dedicated to pruning tech can reduce not only mem size but also power consumption

Complexity

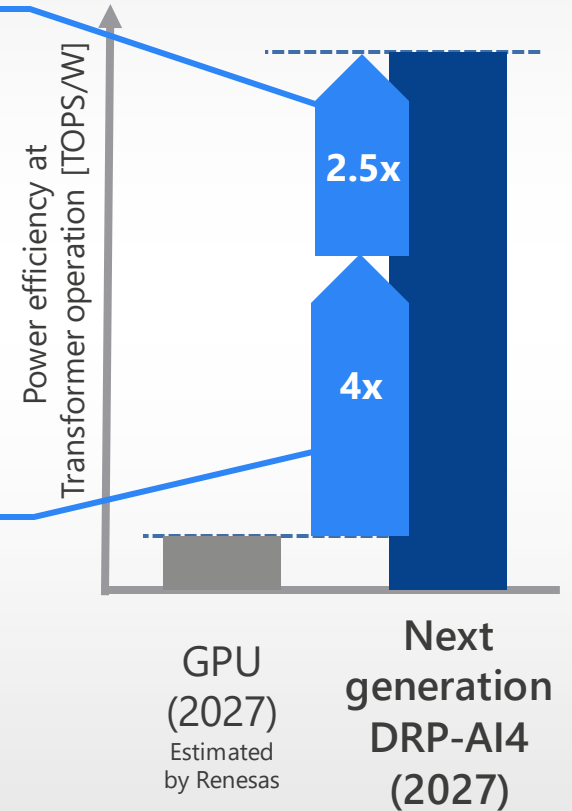


Flexible & Real-time



Flexible parallel computing, DRP-AI provides high power efficiency

10x Efficiency rather than GPU

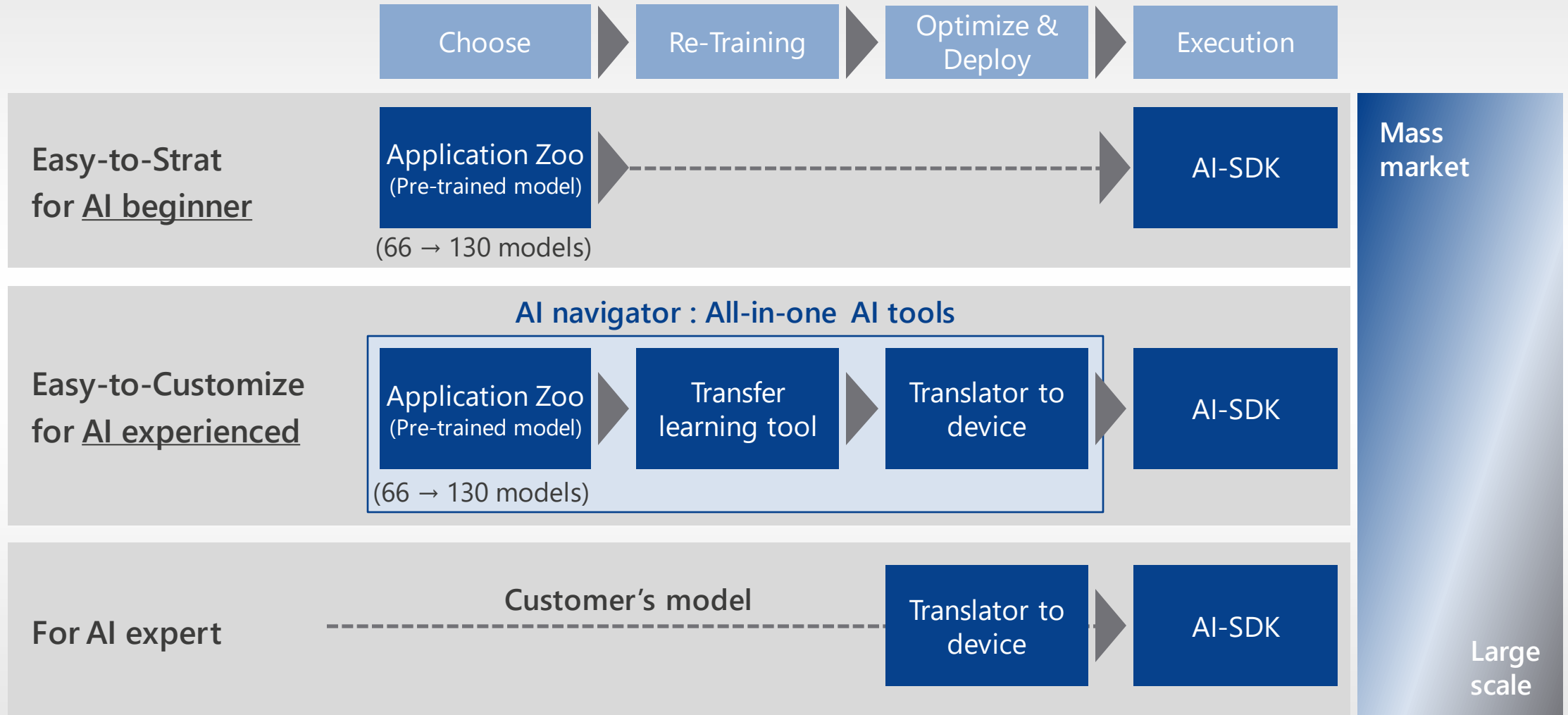


Source: "Data Movement Is All You Need: A Case Study on Optimizing Transformers" Proceedings of the 4th MLSys Conference, San Jose, CA, USA, 2021

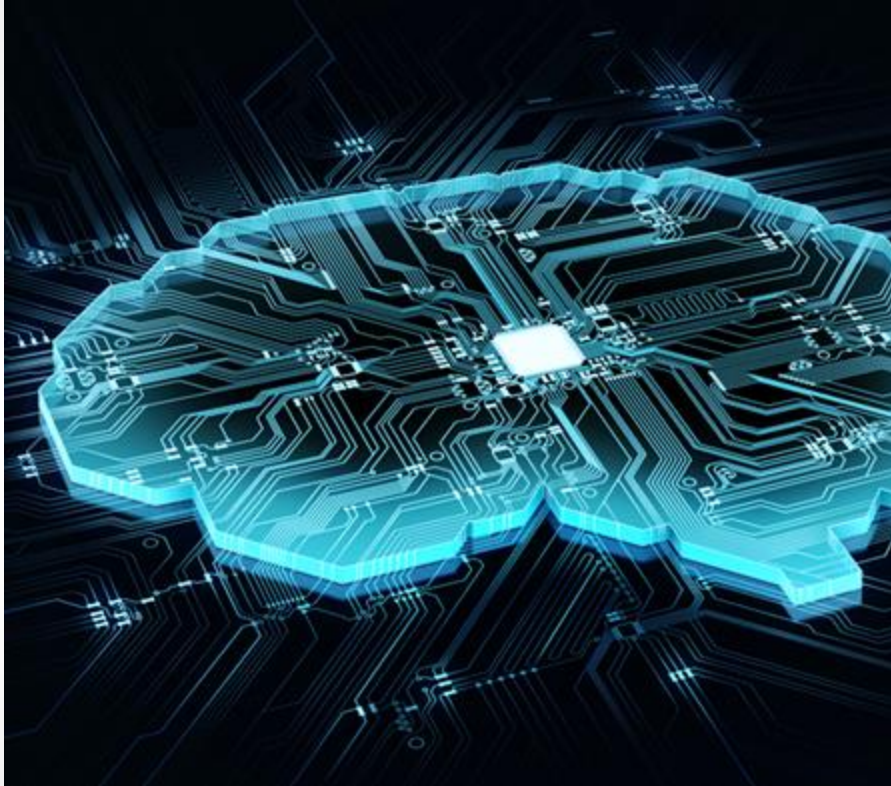
DRP: Dynamically Reconfigurable Processor

SOFTWARE FOR AI

PROVIDE VARIOUS TYPES OF S/W FOR MASS MARKET



SUMMARY



Rich scalable MCU/MPU portfolio

User experiences improvement

Power efficient AI solutions & bring to mass



THANK YOU

(FORWARD-LOOKING STATEMENTS)

The statements in this presentation with respect to the plans, strategies and forecasts of Renesas Electronics and its consolidated subsidiaries (collectively "we") are forward-looking statements involving risks and uncertainties. Such forward looking statements do not represent any guarantee by management of future performance. In many cases, but not all, we use such words as "aim," "anticipate," "believe," "continue," "endeavor," "estimate," "expect," "initiative," "intend," "may," "plan," "potential," "probability," "project," "risk," "seek," "should," "strive," "target," "will" and similar expressions to identify forward looking statements. You can also identify forward-looking statements by discussions of strategy, plans or intentions. These statements discuss future expectations, identify strategies, contain projections of our results of operations or financial condition, or state other forward-looking information based on our current expectations, assumptions, estimates and projections about our business and industry, our future business strategies and the environment in which we will operate in the future. Known and unknown risks, uncertainties and other factors could cause our actual results, performance or achievements to differ materially from those contained or implied in any forward-looking statement, including, but not limited to: general economic conditions in our markets, which are primarily Japan, North America, Asia and Europe; demand for, and competitive pricing pressure on, our products and services in the marketplace; our ability to continue to win acceptance of its products and services in these highly competitive markets; and movements in currency exchange rates, particularly the rate between the yen and the U.S. dollar. Among other factors, a worsening of the world economy, a worsening of financial conditions in the world markets, and a deterioration in the domestic and overseas stock markets, would cause actual results to differ from the projected results forecast.

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