- Hello and welcome. I am Hideaki Ishii, Toshiba's CTO and an Executive Officer. I would like to thank you for joining us.
- Today, I will provide you with an overview of Toshiba's technology strategy.

Forward-looking Statements and Other Cautionary

- This document has been prepared solely for the purposes of providing information regarding the strategic reorganization described herein ("Reorganization") and does not constitute an offer to sell or a solicitation of an offer to buy any security of Toshiba Corporation ("Toshiba"), its subsidiaries or any other company in Japan, the United States or any other jurisdiction.
- This document has been translated from the Japanese-language original document for reference purposes only. In the event of any conflict or discrepancy between this document and the Japanese-language original, the Japanese-language original shall prevail in all respects.
- This document contains forward-looking statements and prospects concerning the future plans, strategies, and performance of Toshiba group.
- These statements are not historical facts; rather, they are based on assumptions and judgments formed by the management of Toshiba group in light of currently available information. They include items which have not been finalized at this point and future plans which have yet to be confirmed or require further consideration.
- Since Toshiba group promotes business in various market environments in many countries and regions, its activities are subject to a number of risks and uncertainties which include, but are not limited to, those related to economic conditions, worldwide competition in the electronics business, customer demand, foreign currency exchange rates, tax and other regulations, geopolitical risk, and natural disasters. Toshiba therefore cautions readers that actual results may differ from those expressed or implied by any forward-looking statements. Please refer to the annual securities report (yuukashoken houkokusho) and the quarterly securities report (shihanki houkokusho) (both issued in Japanese only) for detailed information on Toshiba group's business risks.
- Unless otherwise noted, all figures are 12-month totals on a consolidated basis.
- Results in segments have been reclassified to reflect the current organizational structure, unless stated otherwise.
- Since Toshiba is not involved in the management of Kioxia Holdings Corporation (formerly Toshiba Memory Holdings; hereinafter "Kioxia") and is not provided with any forecasted business results for Kioxia, Toshiba group's forward-looking statements concerning financial conditions, results of operations, and cash flows do not include the impact of Kioxia.
- The execution of the Spin-off described in this document is subject to approval at Toshiba's general shareholders' meeting and the fulfillment of all review requirements of the relevant regulatory authorities.
- Depending on the applicable laws and regulations (including securities listing regulations and U.S. laws and regulations), developments in the application, revision and enforcement of various regulatory regimes including tax regulations, interpretations by the relevant authorities, further considerations in the future and other factors, the implementation of the Reorganization may take longer than expected and there may be changes in the structure of the reorganization.

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- First, please take a moment to review this slide on our forward-looking statements.

Agenda

01 Toshiba Group Technology Strategy

02 Cutting-Edge and Fundamental Technologies

03 An R&D Structure that Demonstrates Combined Strengths

04 In Closing

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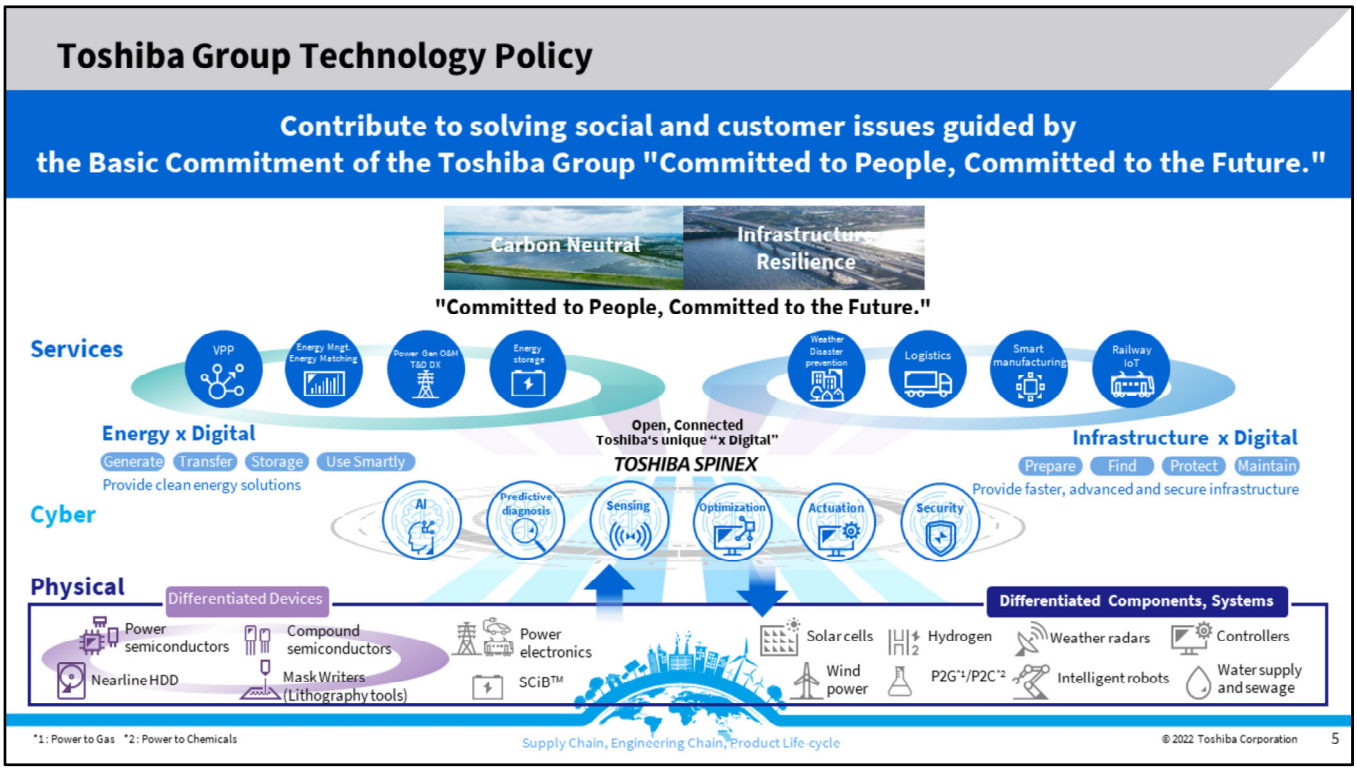
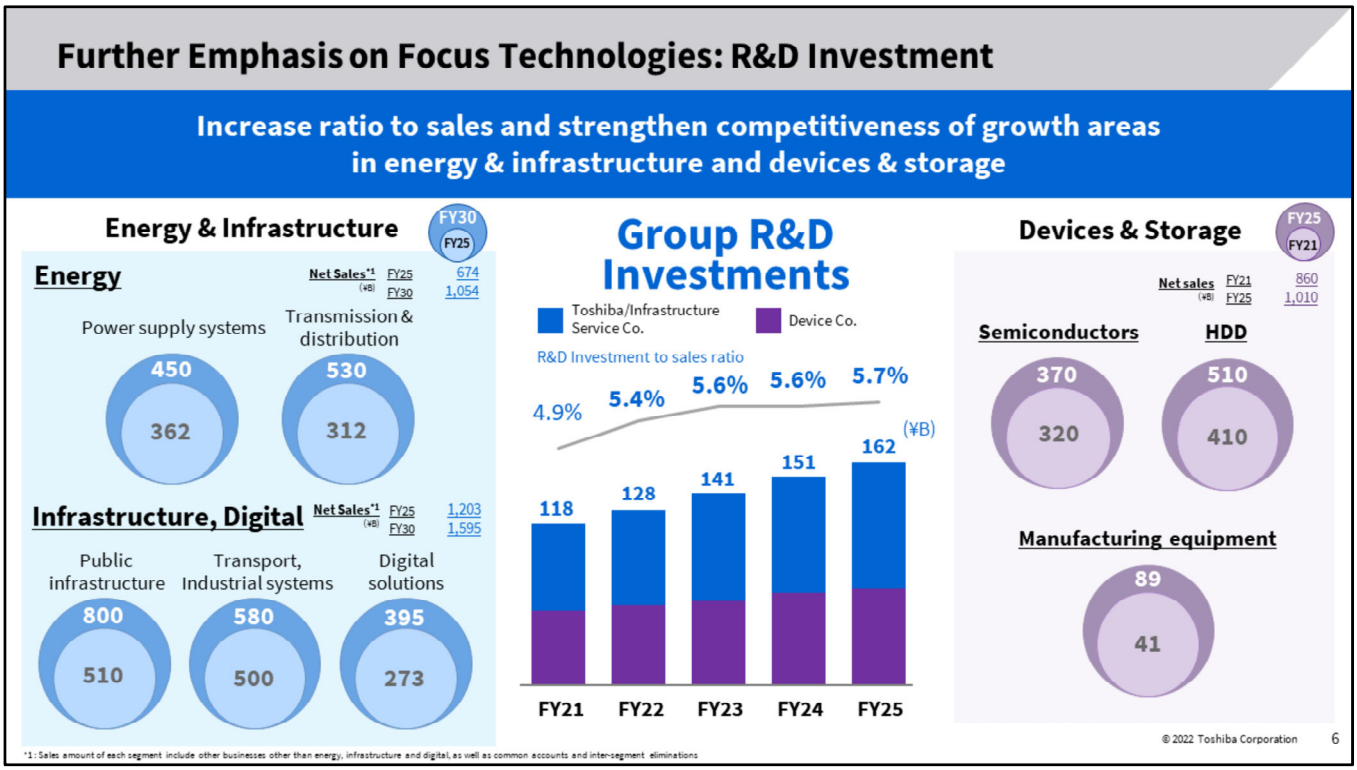
- In this presentation, I will talk through the core components of our technology, including our cutting-edge initiatives and state of the art R&D capabilities and how we will use these inherent strengths as we move forward with the strategic reorganization and spin-off.
- Our strategies for the energy and infrastructure businesses and devices and storage businesses will be explained in other sessions.

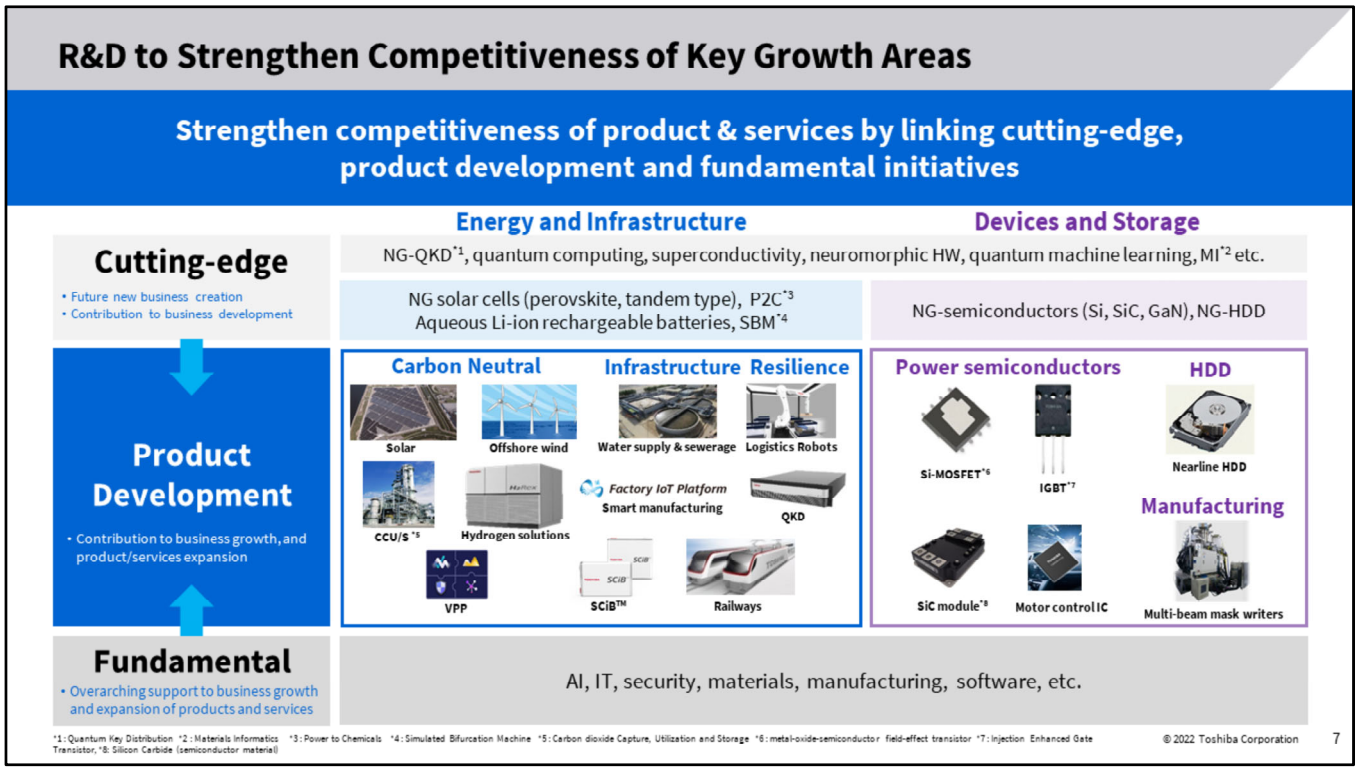
- And I will start by looking at our Group technology policy.



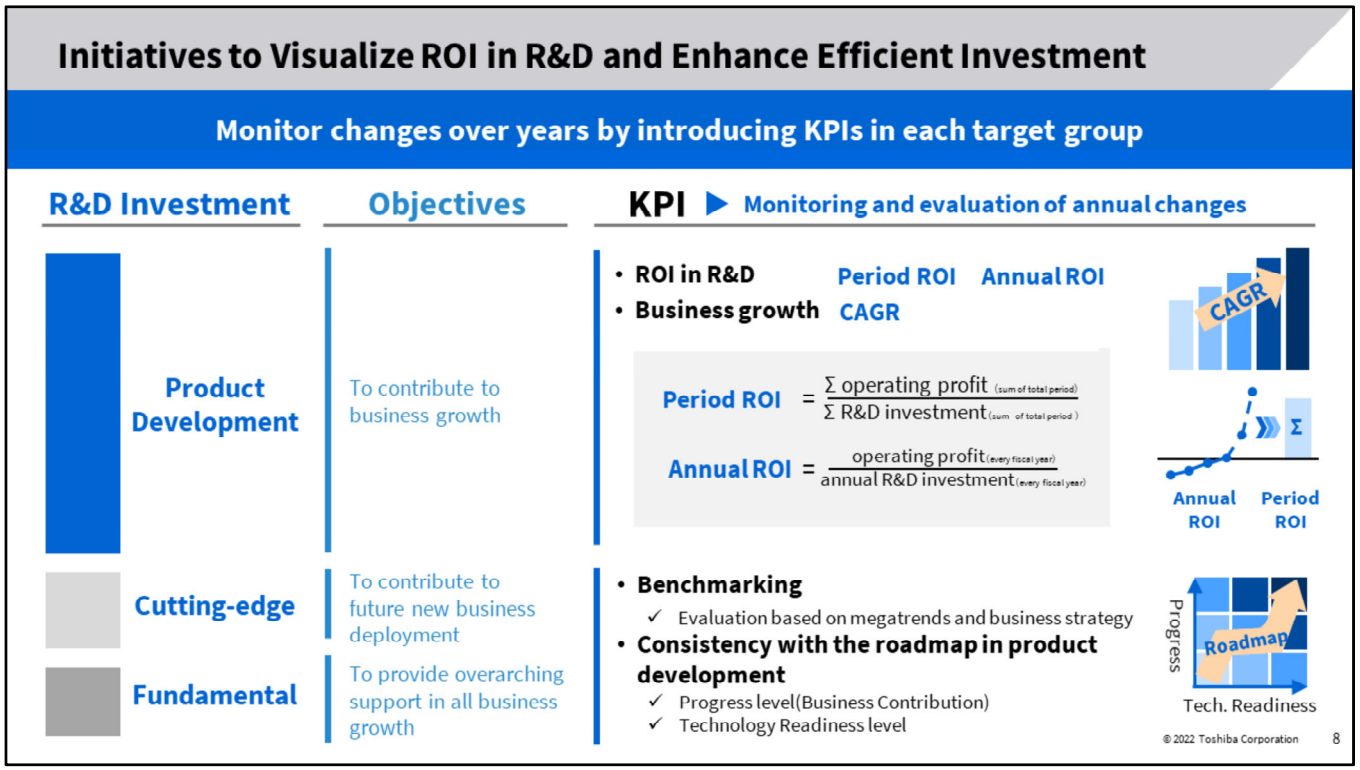
- Slide 5 provides an overview of Toshiba's technology strategy.
- As many of you may know, we aim to contribute to solving social and customer issues guided by our basic commitments: "Committed to People, Committed to the Future" – this is central to everything that we do.
- We endeavor to solve issues facing society and our customers by utilizing our strengths in CPS technologies, and offering differentiated devices, components and systems that will lead the evolution of social and information infrastructure.
- With our "TOSHIBA SPINEX" brand we provide infrastructure services and solutions based on open IoT reference architecture.



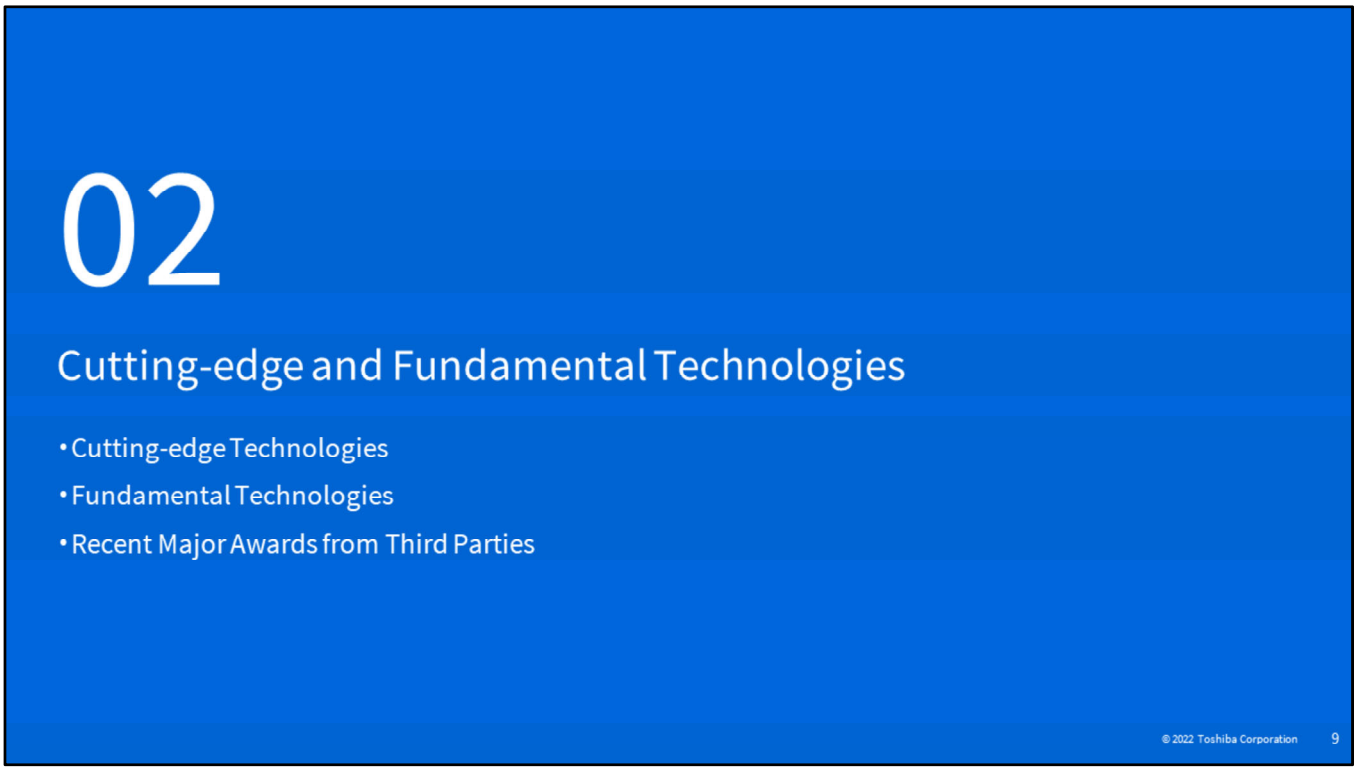
- In order to achieve our core technology strategy outlined on the previous slide, we will need to increase our R&D investments which will help drive growth across the business.
- The bar graph shows Toshiba Group's R&D investment plan from FY2021 to FY2025.
- Net sales in core businesses are shown right and left of the graph.
- Over the five years FY2021-FY2025, we plan investments of approximately 700 billion yen, which is increased by 60 billion yen from the total amounts of past five years FY2016-FY2020.
- From FY2022 on, we will raise the R&D budget, increase the ratio to sales over 5.5% and further accelerate the development and commercialization of focus technologies.



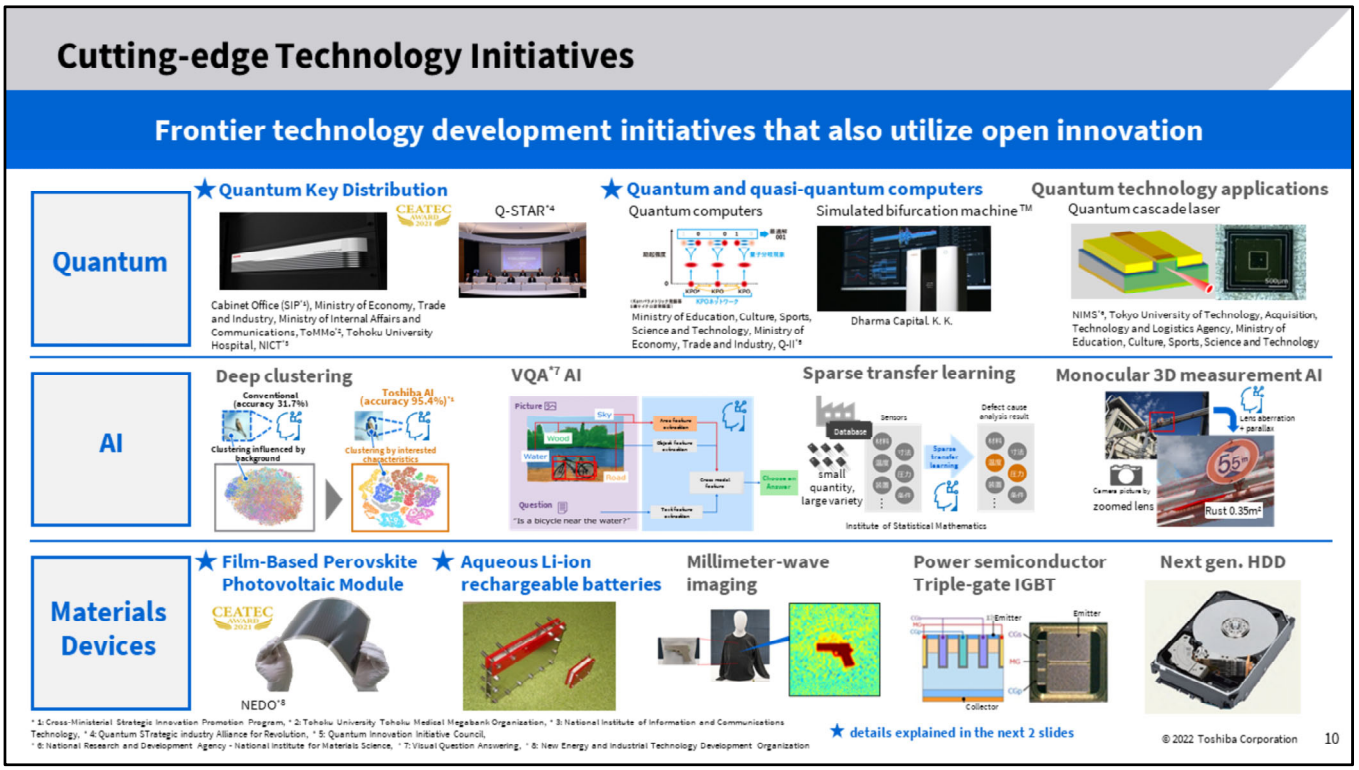
- Moving to slide 7 – this slide outlines how we leverage R&D to enhance the business and strengthen the competitiveness of our core businesses.
- We categorize our R&D into 3 groups based on timeline to commercialization and role.
- Technologies for product development contribute to current business growth and to product and service expansion in each company.
- Fundamental technologies are those that we consider to support business growth in overarching business areas, such as AI and manufacturing.
- We think of R&D investments in cutting-edge technologies over the medium- to long-term timeframe. This includes technologies that we believe will drive the future of the business.
- By linking these group activities, we aim to enhance the competitiveness of our technology-driven businesses, products and services.



- As we think about how to effectively and efficiently invest in R&D, we have identified key performance indicators to measure the efficiency of R&D investment, which are monitored and evaluated annually.
- In the product development category, ROI in R&D and CAGR for business growth are used as KPIs. Benchmarking and consistency with the roadmap in product development are utilized as KPIs in the cutting-edge and fundamental areas.
- We monitor changes in these KPIs to visualize the progress and ROI of our R&D, and use them as evidence for clarifying the direction of R&D themes: strengthen, continue, shrink or cancel.



- Moving to the second section of our presentation. Here, we will focus on our cutting-edge and fundamental technologies, and mention some recent major award wins from third parties.



- As I mentioned on slide 7, we think of cutting-edge technologies as those that we expect to be key drivers of future technology.
- Breaking that concept down even further, on the slide you will see that within our cutting-edge technologies, there are three key areas that we expect to be at the forefront of that change: quantum, AI, and materials & devices.
- In tackling various advanced themes, we are active in promoting industry-government-academia collaborations, such as co-creation with customers, joint work with world-class research institutes, and setting up industry consortiums.
- Next two slides, I would like to highlight several examples of our latest activities on cutting edge technologies.

Examples of Cutting-edge Technologies in Quantum & Quasi-Quantum

Promote spread of quantum & quasi-quantum technologies and their safe and secure application

Quantum Key Distribution (QKD)

BT Group plc, Quantum Xchange, SpeQtral Pte Ltd, etc.

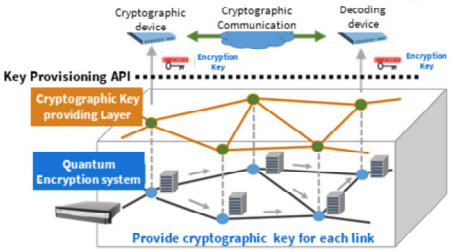
Commercialized in 2021

World's fastest speed in key distribution
* in long distance case
300kb/s @10dB loss

World's longest distance in key distribution
* in long distance case
120km

WW No.1 **Longer distance**
communication distance, over 600km*1

WW First **Miniaturization**
chip-based quantum key distribution system*2



Aiming to establish a quantum key distribution platform for the realization of end-to-end secure encrypted communication

Simulated Bifurcation Machine ™

Dharma Capital. K.K.

Providing the same performance as a quantum computer using computers that is commercially available

Finds the optimal solution to a one-million-bit problem in 30 minutes; a typical algorithm would take 14 months*3

WW First

Started to validate effectiveness of quasi-quantum computing for high-speed, high-frequency stock market trading for the first time in the world

*1: Part of this achievement is supported by the EU through the Horizon 2020 project OpenQKD.
*2: Part of this achievement is supported by Agile Quantum Safe Communications, an InnovateUK joint research and development project through the Industrial Strategy Challenge Fund of the UK Government.
*3: Goto et al. Science Advances 2021. Compared to our algorithm in 2019.

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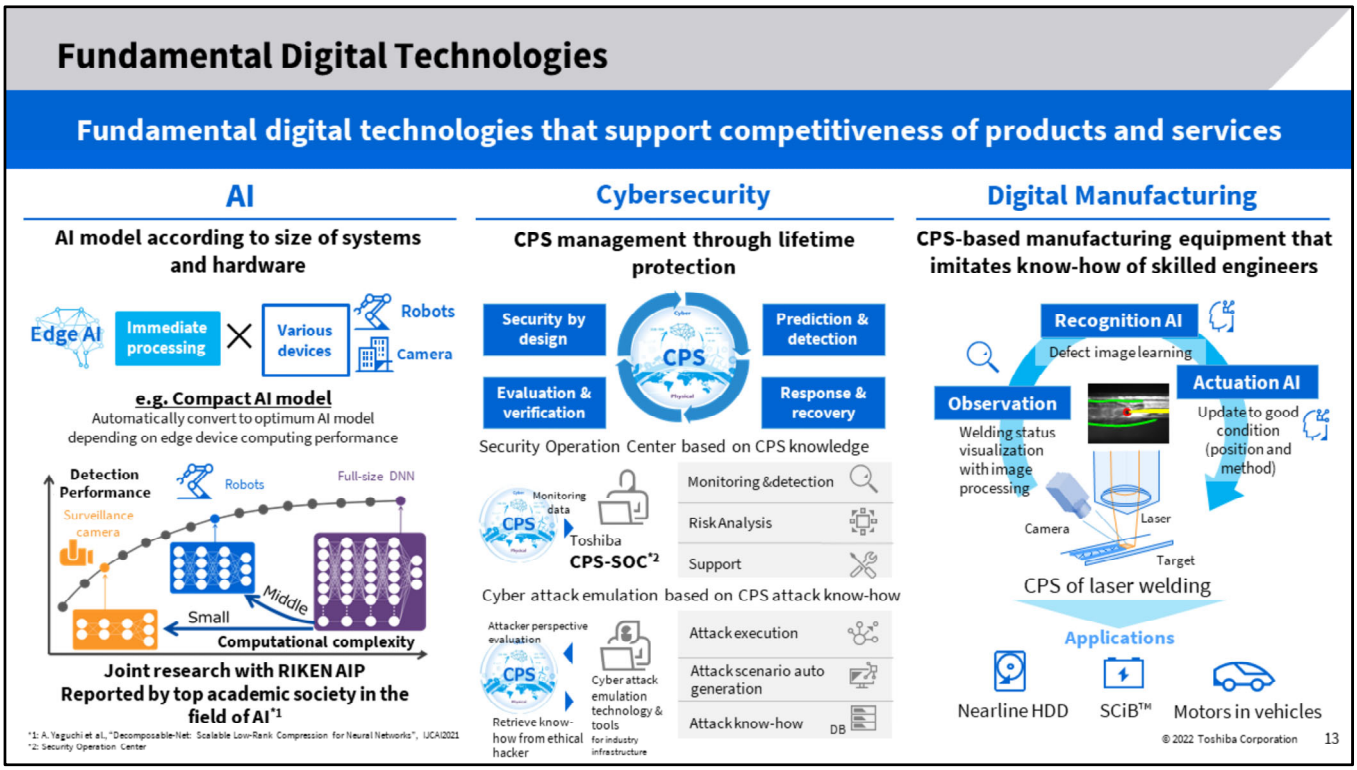
- On this slide, we have some examples of our cutting-edge technologies in the quantum & quasi-quantum field.
- Quantum cryptography communications are based on the principles of quantum mechanics, and impossible to eavesdrop.
- In 2021 we have commercialized the world's highest performance QKD system. We developed world-first and world-No.1 technologies, including secure communications over a distance of 600km and miniaturization using optical integrated circuits.
- Our simulated bifurcation machine can achieve the same performance as a quantum computer, even on a commercially available computer. We can find the optimal solution to a one-million-bit problem in 30 minutes. That would take 14 months with a standard algorithm.
- We have started to evaluate the computing performance in areas where instant judgments are required, such as financial transactions.

- On slide 12, you can see a few examples of our cutting-edge technologies in materials and devices.
- On the left is our thin-film based perovskite solar cells, which has the world highest efficiency with a large area film size. Compared to current Si panels, these solar cells are lower cost, lighter weight and more flexible. They can be placed in areas where current Si panels cannot be installed, such as low load roofs such as greenhouses, windows of buildings and the roofs of EVs – a clear competitive advantage.
- On the right is our water-based lithium-ion rechargeable batteries. These use a non-combustible aqueous solution as the electrolyte that will ensure our safety, and therefore face fewer restrictions on installation under Japan's Fire Service Act. The batteries have another excellent features including long life, and capabilities that the electrolyte does not freeze, not even at -30 degrees Celsius. Thus it's easy to install in various public facilities including hospitals and schools.
- Toshiba's unique technologies help save energy and achieve security and safety in energy and infrastructure.



- This slide shows fundamental digital technologies that underpin the competitiveness of our products and services.
- One example is scalable AI, the compacting technology that we've developed. It minimizes performance loss by using an AI model that automatically adjusts to match the computational requirements of target systems. This technology increases efficiency and can be applied to various products with different computational scales, from relatively large-scale robots through to small-scale surveillance cameras.
- On the cybersecurity front, lifetime management of CPS is critical. We have established Security Operation Center(SOC) to detect signs of incidents at an early stage, and technology that maintains strong defenses of systems and services by performing simulated attacks.
- On the digital manufacturing front, we are using CPS-based manufacturing, particularly by using AI to reproduce the capabilities of skilled engineers. In welding, we've been able to improve the quality by introducing real-time optimization of welding conditions, which vary according to target shapes and environmental conditions.
- Again, these are just a few examples of digital technologies we've developed that ensure our products and services remain competitive.

Recent Major Awards from Third Parties

Film-Based Perovskite Photovoltaic Module

Japan Electronics and Information Technology Industries Association (JEITA)
Minister of Economy, Trade and Industry Award and
Grand Prix in the Carbon Neutral Category in CEATEC AWARD 2021*1

Air-cooled Heat Pump Chillers "EDGE32 series"

Japan's Energy Conservation Center (JEC)
2021 Energy Conservation Grand Prize, Agency for Natural Resources and Energy Director-General's Award*2

Carbon dioxide Capture, Utilization and Storage

CCUS demonstration facility construction project team
(Toshiba Energy Systems, Chiyoda Corporation)

The Engineering Advancement Association of Japan (ENAA)
2021 Encouragement Awards*3

Nb/Ti Superconducting Magnet for freezers

14th One Step on Electro Technology*4

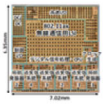
Ultra High Voltage substation equipment

(joint award of 5 companies inc. Toshiba Energy Systems)
14th One Step on Electro Technology*4

Source: TEPCO PD, UHV test site

Wireless LAN Communication

Development of high speed and high efficient wireless LAN
Minister of Education, Culture, Sports, Science and Technology
Science and Technology Award of Development Category*5



QKD

Japan Electronics and Information Technology Industries Association (JEITA)
Semi Grand Prix of Solutions Category
in CEATEC AWARD 2021*1

The institute of physics
Business Innovation Award 2021*6

MM Research Institute
The Winner of Next Generation Social Infrastructure,
Smart Solution Category in MMRI Awards 2021*7

Water and Sewerage Treatment

Design, Build, Operate & Maintain and Transfer of Salori Sewage Treatment Plant and related facilities in Allahabad

First Prize (Minister of Land, Infrastructure, Transport and Tourism Commendation) in 4th Japan Construction International Award*8

Derwent Top100 Global Innovator 2021*9

Selected by US research firm Clarivate Analytics. Recognized as one of the world's 100 most innovative companies and research institutes for ten consecutive years

Traction energy storage system for railways, with SCiB™

Japan Institute of Design Promotion
GOOD DESIGN AWARD 2021*10

HAORI inverter air conditioner

Japan Institute of Design Promotion
GOOD DESIGN AWARD 2021*10

*1: https://www.global.toshiba/ww/news/corporate/2021/10/news-20211019-01.html
*2: https://www.toshiba-carrier.co.jp/news/press/210222/ (in Japanese)
*3: https://www.toshiba-energy.com/info/info2021_0715.htm (in Japanese)
*4: https://www.toshiba-energy.com/info/info2021_0610.htm (in Japanese)
*5: https://www.global.toshiba/jp/news/corporate/2021/04/news-20210405-02.html (in Japanese)
*6: https://www.toshiba.eu/pages/eu/Cambridge-Research-Laboratory/toshiba-quantum-key-distribution-technology-commercially-ownership-fully-operational-received/
*7: https://www.global.toshiba/jp/company/digitalsolution/news/2021/0825.html (in Japanese)
*8: https://www.toshiba.co.jp/infrastructure/news/20210915.htm (in Japanese)
*9: https://www.global.toshiba/jp/news/corporate/2021/02/tp0401.html (in Japanese)
*10: https://www.global.toshiba/ww/news/corporate/2021/10/news-20211020-01.html

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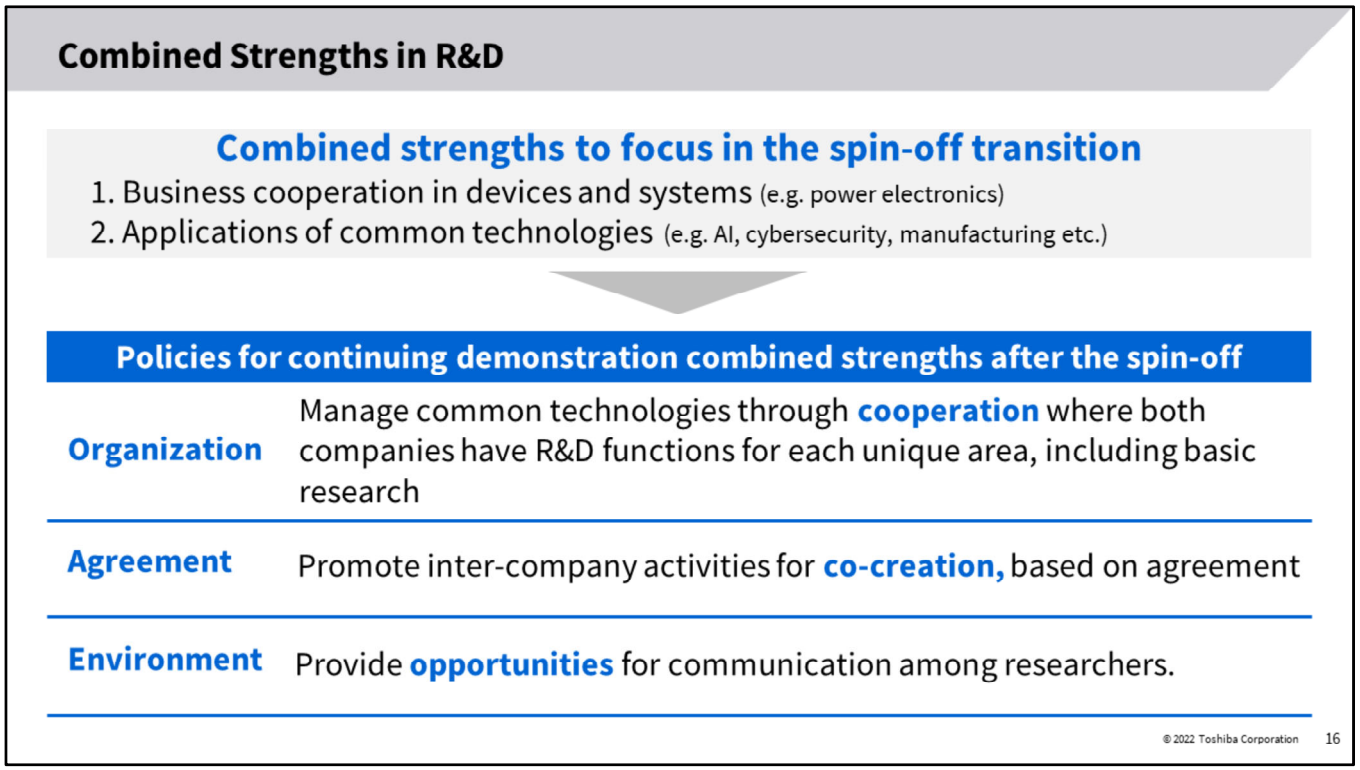
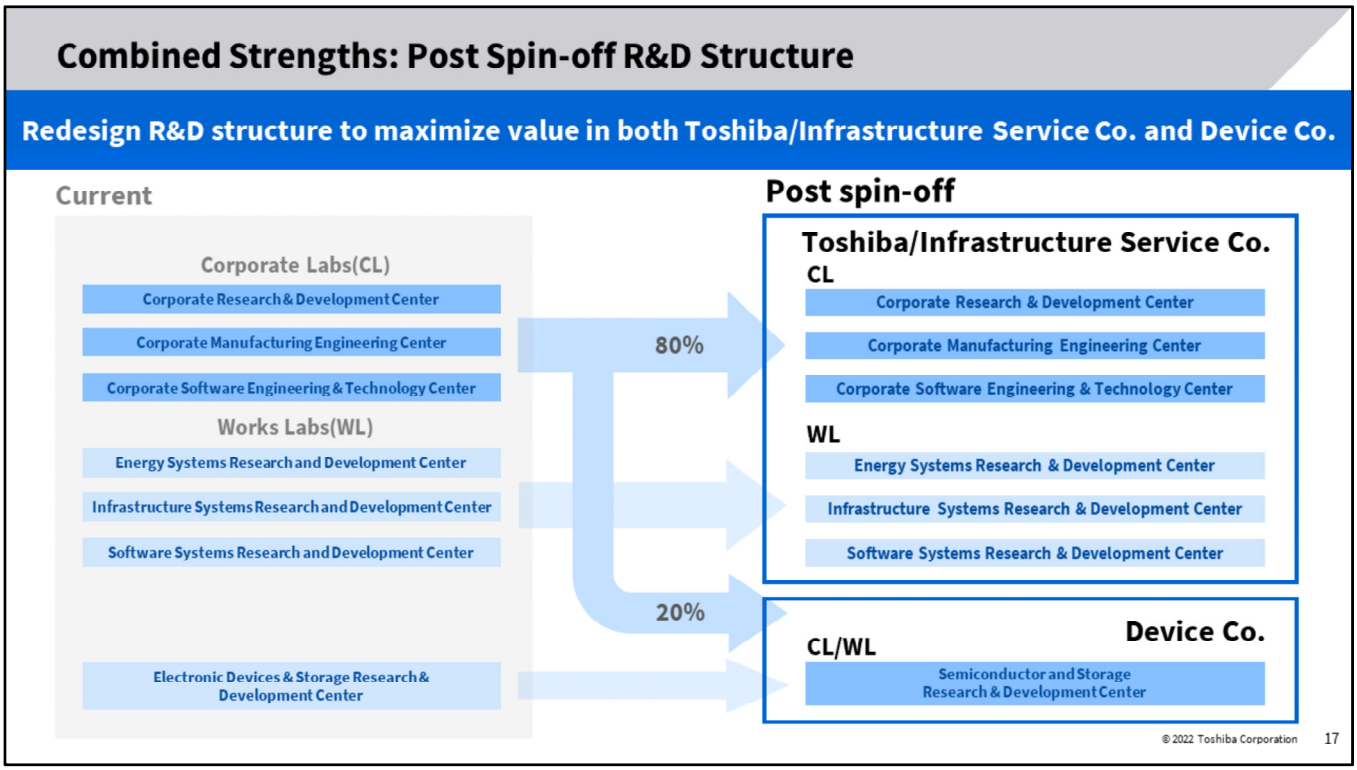
- On this slide you can see some of the major awards we've received from third parties over the past year.
- We don't need to discuss each of them, but it is important to note that we've received awards across a wide range of work, including energy, infrastructure, devices, design, and patents.

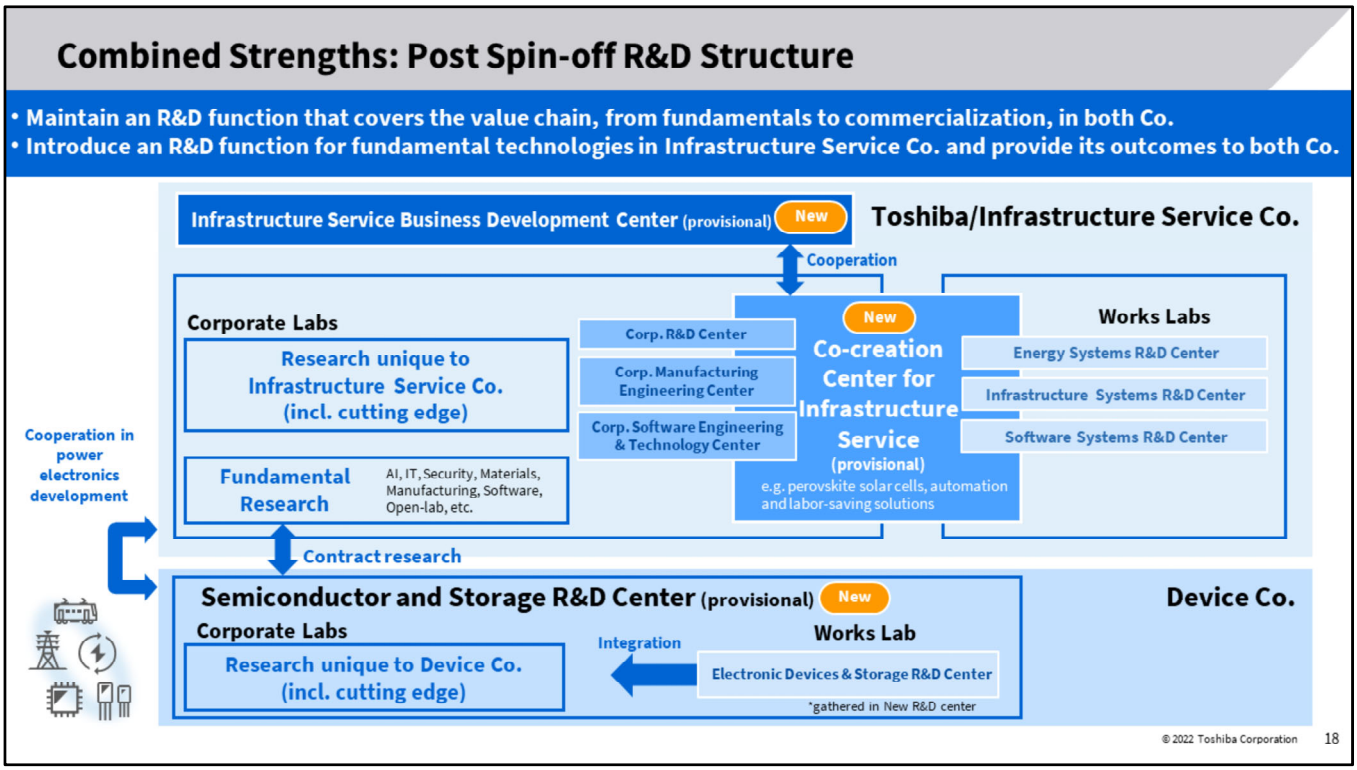
- In section three, I will discuss new structure that we believe best demonstrates our R&D strengths and competitive advantages.



- As we've discussed, R&D is a strength and a competitive advantage for Toshiba, and that will not change after the separation.
- At a high level, our R&D strength is derived from business cooperation across devices and systems, such as the work between our power electronics businesses, and the application of common technologies in areas such as AI, cybersecurity and manufacturing.
- We will continue to manage common technologies across the businesses, with the condition that two companies will maintain research capabilities unique to each business area, including basic research.
- We will also look to strike agreements to promote inter-company activities for co-creation, to the extent possible.
- And finally, we will look to provide opportunities for communications amongst our researchers across the businesses.
- On the next three slides, I'll take a more detailed look at each of these elements of our post spin-off R&D collaboration.



- We have been hard at work reconfiguring our R&D structure to maximize the value of both companies post spin-off.
- The corporate labs are engaged in advanced development and basic researches in all group domains. They will be split into the 2 companies on the basis of research area. Approx. 80% of the researchers will move to Infrastructure Service Co. and the other 20% or so to Device Co..
- The works labs, R&D divisions in group companies, will join the company most closely related to their current company's area of business.



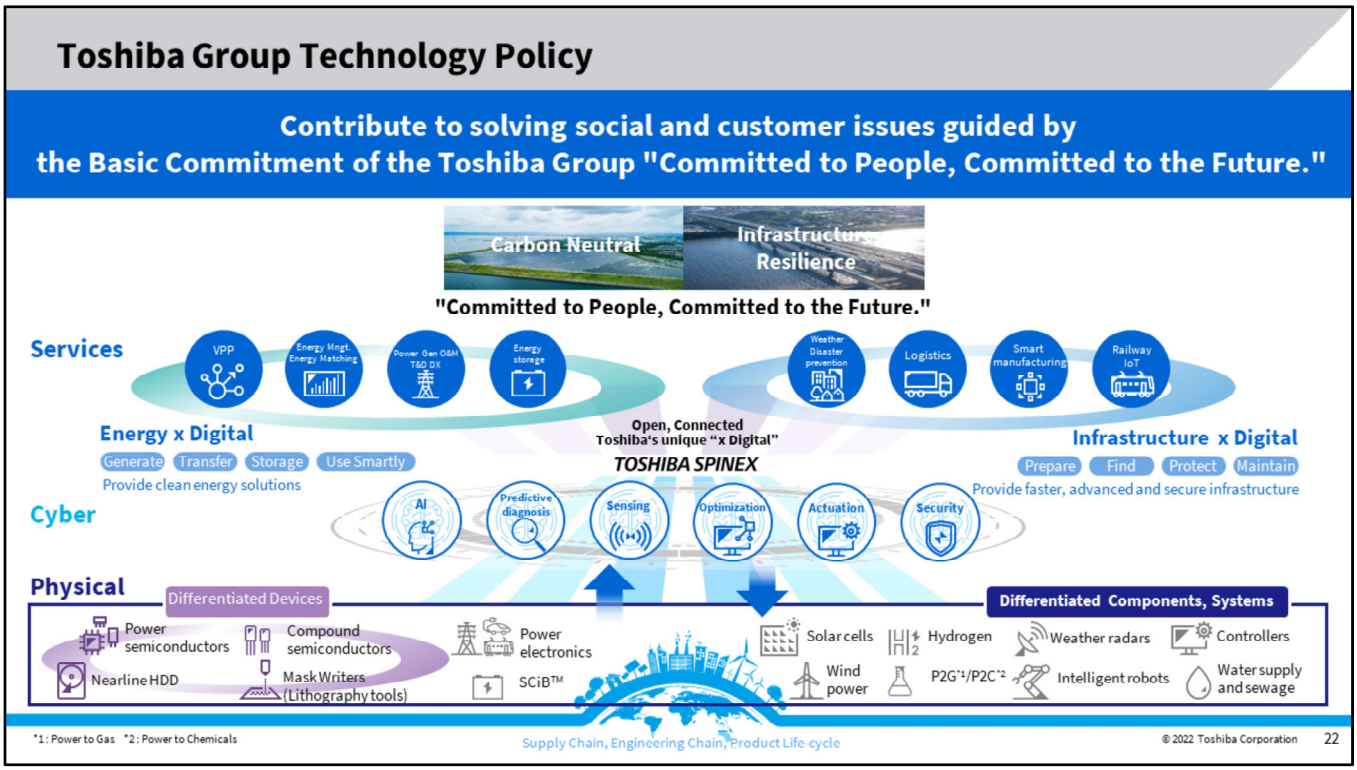
- Here you can see the changes that will give us a new R&D structure
- Under our current structure, Corporate Labs includes cutting-edge and fundamental technologies, as well as research capabilities that are unique to Infrastructure Service Co. and Device Co..
- Following the spin-off, the research capabilities that are unique to Infrastructure Service Co. and Device Co. will be transitioned to independent Labs in each company. An R&D function that covers the value chain, from basic research to commercialization, will be maintained by each company.
- To the extent there is overlap in R&D among the two companies post spin-off, Infrastructure Service Co. will house R&D researchers responsible for developing fundamental technologies, such as AI and manufacturing technologies. Research progress in these common areas will be shared among two companies based on a yet-to-be arranged agreement, to demonstrate our strength and a competitive advantage.
- Within the Infrastructure Service Co., we will establish a “Co-creation Center for Infrastructure Services” and Infrastructure Service Business Development Center. We will promote cooperation between these organizations, and accelerate R&D that drives commercialization in

new growth business areas, such as new solar cells, automation and labor-savings solutions.

- Within Device Co., we will establish a new “Semiconductor and Storage R&D Center” by incorporating research capabilities from the corporate labs and works labs. We will accelerate advanced development and basic research.

- Our new sate-of art R&D Division building will offer opportunities for enhancing the R&D strengths of both companies.
- It is now under construction in Kawasaki, and is scheduled to open for operations in FY2023.
- Our hope is that the building serves as the home base for co-creation amongst researchers and engineers in both companies, as well as co-creation with customers and partners.
- The building will be a home to diversity, a base for cultivating capable human resources, technology, and social value, and to be an open-minded center that delivers value to society.

- Let me close by providing a quick summary of my presentation.



- To refresh your memory, here once again is the Toshiba Group technology policy.
- Our approach is grounded in our basic commitments: “Committed to People, Committed to the Future.”
- We endeavor to solve the global issues facing society and our customers by utilizing our strengths in CPS technologies, and offering differentiated devices, components and systems that will lead the evolution of social and information infrastructure.
- With our "TOSHIBA SPINEX" brand we provide infrastructure services and solutions based on open IoT reference architecture.
- Thank you for your attention.

Committed to People,
Committed to the Future.

TOSHIBA

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