

Message from the CTO

Technology Roadmap toward 2050 to Achieve "Group Management Policies 2023" and Society the IHI Group Seeks



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Significant Results Achieved toward Medium- to Long-Term Carbon Neutrality

"Project Change" has been placing emphasis on carbon solutions, air transportation systems, and maintenance and disaster prevention and mitigation, aiming to create growth businesses by resolving social issues. First, as progress in carbon solutions, we took a major step in social implementation with regard to ammonia utilization and methanation. Specifically, we succeeded in achieving the world's first 100% combustion of liquid ammonia on a gas turbine. Large-scale ammonia combustion (20% of heating value) will also commence from the end of FY2023, one year earlier than originally planned, at JERA Hekinan Thermal Power Station, which will be the world's first case for a large-scale commercial thermal power generation facility. Further, we have started sales of methanation equipment that produces synthetic methane (e-methane) using catalysts to cause a reaction between CO₂ emitted from factories and other sites and hydrogen. Our proprietary catalyst is used which boasts the world's top-class longevity. Methanation enables to use existing city gas infrastructure and is thus considered one of key technologies toward carbon neutrality. For air transportation systems, in addition to developing technology related to electrification, we are working to improve profitability by reforming the production process such as by shortening production lead times. With regard to maintenance and disaster prevention and mitigation, we have commenced consultation services together with Sumitomo Forestry Co., Ltd. to use satellite data in conducting appropriate forest management in tropical peatland, as a step forward in contributing to global climate change initiatives.

Initiatives for Value Chain Creation to Be More Sustainable and High-Growth along "Group Management Policies 2023"

For the field of aero engines and space which is positioned as a growth business in "Group Management Policies 2023," we will work to improve production efficiency through the use of digital technology, etc. Also, as part of our initiatives for next-generation aircraft, we will continue

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to focus on development of new material such as fiber-reinforced plastic (FRP) and ceramics. For the clean energy field which is positioned as a Development-focus business, technological development is ongoing for the field of clean fuel. In fields related to the ammonia value chain, for example, we make efforts in technological development for commercialization, particularly aiming to enter upstream in the value chain. We are also working to develop technology in manufacturing e-methane and sustainable aviation fuel (SAF) as clean fuel from carbon recycling. These fields are expected to provide medium- to long-term social contribution and see increased market scale; thus, such technological development will be prioritized. Toward improvement and evolution of lifecycle businesses (LCB) in each area with regard to Core businesses, we will provide technical support for LCB expansion into not only the upstream and downstream equipment of IHI's products but also their peripheral devices.

Invest Half of R&D Costs into Focus Areas to Increase Feasibility of "Group Management Policies 2023"

Research and development resources were set to be concentrated into the Growth, Development-focus, and core businesses in "Group Management Policies 2023" to accelerate the speed of research and development. As the Group's R&D headquarters, Technology & Intelligence Integration, has reviewed the budget allocation of research and development costs from FY2022. Traditionally, the budget has been largely allocated to research fields from the bottom up as suggested by researchers, but to enhance feasibility of "Group Management Policies 2023", half of research and development costs is invested into focus areas set from the top down. Out of the remaining research and development costs, 30% is allocated to fundamental technologies of our strengths in cooperation with business areas, and 20% to the research and development toward the future based on researchers' free-flowing thinking. Discussions are being held regarding directionality and timing of development with head office divisions and business areas involved in new businesses, and the IHI Group is working together as one.

Research and Development in Line with the Medium- to Long-Term Technology Roadmap

Issues surrounding the IHI Group include achieving carbon neutrality in the medium to long term, contributing to a circular economy, and initiatives in biodiversity conservation. Our focus areas, largely related to these issues, will lead to continuous growth for the IHI Group through the resolution of social issues. For these areas, we are creating a technology roadmap toward 2050 and promoting research and development toward commercialization. In creating a roadmap, it is necessary to correctly understand trends such as changes in society and technological innovation, and to incorporate them. To do so, we aim to participate in the relevant field's global ecosystem* and in the world's leading research and development. For social contribution through resolving social issues, we will promote a good balance between value creation in Core businesses and value creation in Growth and Development-focus businesses from a medium- to long-term perspective.

*Ecosystem refers to a business environment whereby a good cycle of growth in advanced technology and economic growth is generated in which various participants including companies, research institutions, and universities having a common goal in a given field coexist and thrive through aggregation and coordination, and takes the name from the ecosystem of the natural environment.

● Diagram Showing Relationship between IHI's Fundamental Technologies and Social Contribution through Their Use

