

## “Group Management Policies 2023”

Transforming Business and Business Portfolio

# Development-focus Business | Clean Energy

**Clean Energy business represented by fuel ammonia and others is defined as Development-focus Business, which would drive our future growth in parallel with Aero Engines and Space business. We will build and enhance the value of our entire Clean Energy value chain. Such efforts will start with gas turbines that utilize world-leading ammonia combustion technology and storage and receiving terminals boasting a top-class share. We are open to invest in fuel manufacturing projects. We will also build a new business model leveraging the IHI Group’s high engineering capability.**

### **Create a new profitable business by solving the various social issues primarily through the development of the Ammonia Value Chain**

The IHI Group is working on the development of an Ammonia Value Chain for the realization of a decarbonized society. Ammonia does not emit CO<sub>2</sub> when burned. Focusing on this advantage, the Group has been developing ammonia combustion technology for more than 10 years. The development of ammonia-related technologies has already entered the social implementation phase and the Group aims to make contributions in the electric power and industrial fields by leveraging its proprietary “killer content” technologies. More specifically, various initiatives are underway, such as the ongoing application of ammonia to thermal power plants in collaboration with JERA Co., Inc. and the development of heavy duty gas turbines, combusted exclusively with ammonia in collaboration with General Electric as well as the development of ammonia fueled engines for ships. Moreover, we are also considering participating in the upstream part of the Green Ammonia Value Chain in India, the Middle East, and Oceania. Most of the ammonia currently in circulation is manufactured from fossil fuel and emits CO<sub>2</sub> in its manufacturing process. The Group aims to

reduce CO<sub>2</sub> emissions of the overall value chain by supplying green ammonia manufactured from renewable energy.

The IHI Group will also work on new businesses such as methanation, palm ecosystem, and Sustainable Aviation Fuel (SAF) in addition to the development of the Ammonia Value Chain. We aim to create new profitable businesses by solving the diverse social issues faced by various regions and customers.

### **Cultivate the entire Ammonia Value Chain including ammonia as a fuel for the business to become comparable to the Aero Engines and Space business between 2040 and 2050**

The development of the Ammonia Value Chain which is at the center of our clean energy business, is an effective solution to decarbonize regions with many thermal power plants such as Japan and Southeast Asia. IHI will work on building the entire value chain and increasing its value by supplying equipment such as gas turbines and gas engines utilizing its world-leading ammonia combustion technology. This will all be based on the storages and receiving terminals boasting top-class track records. At the same time, we will also consider investment in the upstream part

of Green Ammonia Value Chain thereby expanding our business throughout the whole chain.

In Japan, the Ministry of Economy, Trade and Industry (METI) set the goal of achieving 3 million tons of domestic ammonia usage in 2023 and 30 million tons in 2050 to replace coals and LNG. IHI plans to grow our ammonia operation as a vital business which can bear a certain share of the responsibilities for achieving METI’s goal. The Group targets approximately 900 billion yen in the period between 2040 and 2050 as revenue from the entire Ammonia Value Chain business, which includes the upstream value chain. In addition, ammonia is promising also as a carrier of hydrogen, thus the Group will expand our business with an eye also on conversion of ammonia circulated as fertilizer into green ammonia.

### **Drawing on its experience in the past, the IHI Group will address the scale of risks, returns, time frame for collection, and risk diversification**

Countries around the world are increasingly taking measures against climate changes and active discussions are going on for realizing a decarbonized society. Under such circumstances, the ammonia combustion technology is expected to create business opportunities in the electric power and industry fields. Nevertheless, investment in the upstream value chain and development of relevant equipment comes with a certain risk. The Group will take risk management measures that leverage its experience. Specifically, our internal experts will discuss each case, identify risks, and study countermeasures. In particular, the Group will implement investment projects after considering the balance between risks and profitability as well as the time frame for recovering investment. The IHI Group is also building the fuel ammonia manufacturing business, a pillar of the ammonia value chain. In parallel, the Group is studying the risks in cases where demand for ammonia as a fuel does not grow as anticipated in the electric power and industry fields or cases where it is unable to capture the anticipated share of the fuel ammonia supply market.

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We will strengthen risk diversification by broadly and flexibly developing our business through measures such as supply of green ammonia to the existing market which is centered on ammonia as a fertilizer as well as the utilization of ammonia as a hydrogen carrier.

**Realize a decarbonized society primarily through development of the Ammonia Value Chain**

The medium- to long-term target of the Development-focus business is to grow a profitable business in the clean energy field primarily by building the

Ammonia Value Chain so that it will be comparable to the Aero Engines and Space business in terms of revenue. Our business strategy is to realize a decarbonized society through the supply of equipment including gas turbines combusted exclusively with ammonia from the perspective of the value chain, in addition to supply of fuel-use green ammonia manufactured from renewable energy, which does not emit CO<sub>2</sub> in the manufacturing process. Currently, the Ammonia Value Chain business is in the development phase for commercialization and its 2,000 kW-class gas turbine combusted exclusively with ammonia is in the final phase of development. IHI aims to

complete this development by 2030 and targets its utilization in the electric power field. Going forward, the IHI Group will establish a solid business for the value chain as a whole in the latter half of the 2020s through moves such as participation in the green ammonia supply business. Further, we will promote development of new businesses such as methanation, palm ecosystem, and SAF, through which we aim to diversify risks and build new business models. In terms of profitability, the Group expects the business to start contributing to earnings from mid-2030s, as it requires development and investment upfront.

**Succeeded in development of gas turbine combusted exclusively with ammonia. Jointly developing application of the technology to heavy duty gas turbines with GE**

