Growth Strategies

The environment surrounding MHI Group is undergoing changes at an extremely rapid pace, as demonstrated by the shift from low-carbon energy to carbon-free energy and revolutionary advances in digitalization technology, such as AI and the IoT. Amid these conditions, we will need to resolve complex and difficult social issues of the present and the near future if we wish to continue to be a company needed by humankind and society as a whole. To accomplish this task, we are promoting MHI FUTURE STREAM, an initiative involving constant innovation and continuous contribution.

Scouting for and co-creating innovative technologies that relate to social needs and our business strategies.
To realize the co-creation of innovation, we are promoting collaboration with universities, venture companies, and other outside institutions. To that end, we have moved forward with the establishment of MHI Testbed Hub (tentative name), which provides infrastructure such as creative spaces and testing facilities to external partners.

Technology Scouting

Exploring for innovative technologies

DISRUPTION –Disruptive technologies–

Explore technologies that could have a disruptive impact on megatrends, industrial structures, and business opportunities

KEYSTONE –Necessary technologies–

Scout for and co-create the necessary technologies for realizing business models that capitalize on business opportunities

Scout for cutting-edge technologies that have significant impact

Scout for technologies needed for the businesses depicted in "Shift the Path"

Identify business opportunities and potential business threats based on social mapping long into the future

Mega Scan

Exploring all realms of opportunity

Understanding megatrends

↓

Predicting industrial changes

↓

Suggesting hypothetical business opportunities

Drawing out scenarios of estimated future changes in business domains from the perspectives of society, the economy, and technologies

↓

While doing so, determine the contributions that the Group can make (hypothetical business opportunities)

Upstream process in MHI FUTURE STREAM
When considering new businesses, giving consideration first to perspectives that seek to understand significant global changes (megatrends) before considering our own technologies and individual customer needs is a new challenge for the Company.

Realizing new business opportunities for the Group within future scenarios in each industry.
After collaborating with customers and internal/external partners to establish business models, we consider business plans related to new businesses for existing or potentially new SBUs.*

* Strategic Business Unit

Create medium- to long-term measures to convert existing businesses based on an understanding of changes in megatrends

Shift the Path

Converting existing businesses

Establishing hypothetical business models

↓

Giving shape to business plans (new businesses for existing or potentially new SBUs)

↓

Launching new businesses

Business models/Technical requirements

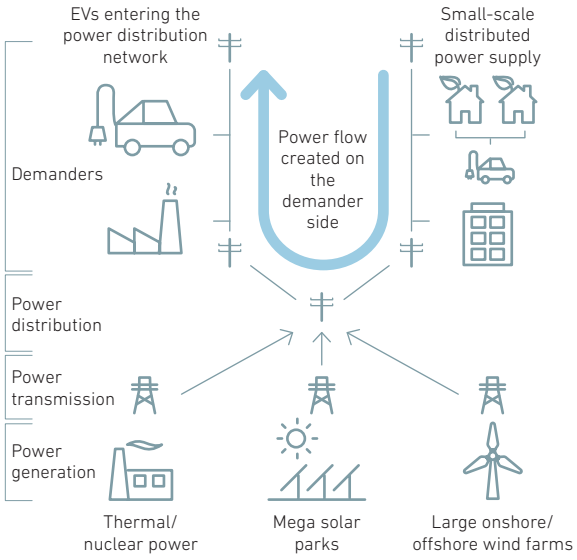
Example: Change in power systems

With the shift toward decarbonization, digitalization, and decentralization, we are seeing changes from the current situation in which power systems are based on a thermal/centralized power supply. Accordingly, we should turn our attention to movements occurring not only the supplier side, such as power generation and distribution, but also on the demander side.

The technological progress and cost reduction of renewable energy, primarily photovoltaics (PV) and wind generators and the widespread use of electric vehicles (EVs), are expected to reduce the price of storage batteries, which in turn will likely reform electricity systems to allow the demander side—including power distribution networks, factories, and households—to play a more significant role. Accordingly, we have started to consider marketing solutions for added value, such as power system stabilization, to the power generated by large-scale consumers such as factories. Meanwhile, with the expanded power supply-related roles and functions on the demander side, centralized power suppliers will be expected to further provide flexibility in order to stabilize power systems.

Additionally, centralized power suppliers will likely use a mix of thermal and renewable energy sources in the future to realize low-carbon emissions.

In terms of these new power systems, MHI Group will turn the use of low-carbon power and the supply of power to large-scale demanders, such as energy distributors and factories, into new business opportunities.



CoCSO's Message

Evolving Existing Businesses and Creating New Ones in Line with Social Megatrends

MHI FUTURE STREAM begins with "Mega Scan," an exploration of the general currents of society as a whole, rather than individual needs, followed by postulation of likely scenarios of changes and consideration of potential new business opportunities. Our exploration of megatrends under Mega Scan, and especially our interpretation of trends likely to impact MHI, has been completed as a first step. In the energy field, for example, we have noted two trends of particular importance to MHI: a value shift from the supplier side to the consumer side resulting from the growth of renewable energies, which have low operating costs, and the development of intelligent machine systems.

Now that we have perceived various megatrends through Mega Scan, today we are at the next stage of MHI FUTURE STREAM: execution of "Shift the Path," the phase in which we seek to convert existing businesses and create new ones. Shift the Path will be pursued from a medium- to long-term perspective (we are assuming 10 to 20 years). While it is difficult to define the time frame, we are applying this perspective to business development in areas where we have no existing business that will be conducted through collaboration among multiple SBUs. We are assuming that those businesses targeted for the medium term will take shape within five years, and those designated for long-term realization will emerge around 2030. All will depend on the characteristics of the given product or business. In the case of medium-lot manufactured products, for example, next-generation products need to be developed within five years, otherwise we would be too late to compete. For a new energy system, I think development would likely take 10 years or more.

Strengthening Ties between Business Segments, Promoting Co-Creation with Partner Firms

Up until now, promotion of MHI FUTURE STREAM has been carried out primarily by the corporate divisions, led by the Marketing & Innovation Headquarters. Now, however, in undertaking business development under Shift the Path, we want to proceed with greater involvement of our various business segments. In particular, we see a need to create mechanisms that will enable collaboration among multiple SBUs.

Previously, there were occasions when multiple business divisions cooperated under the general manager of a specific factory; but now that the business divisions are increasingly operated independently following the organizational change from factories to SBUs, we have to forge functions enabling the creation of cross-SBU and cross-domain businesses. We envision launching the new functions in fiscal 2020, and if new businesses emerge from that initiative we expect that new SBUs will come into being after maybe five years.

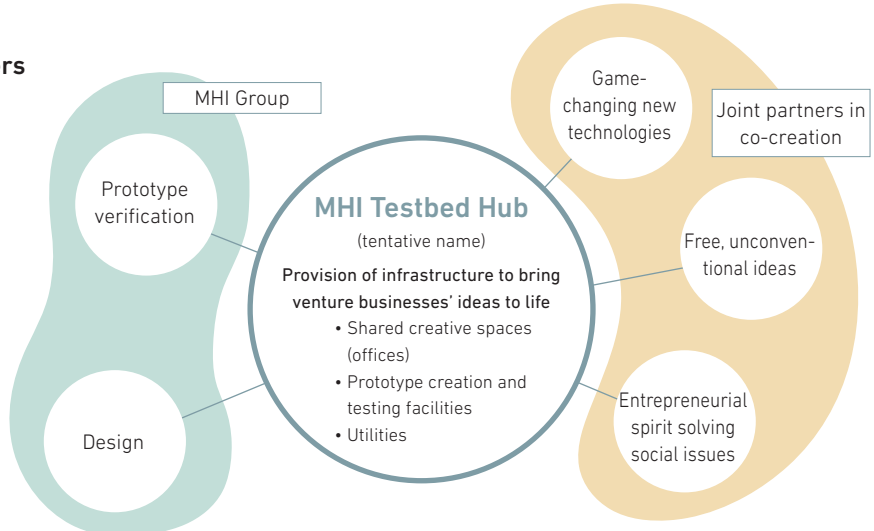
To develop our new businesses, I intend to increase the mobility of our Groupwide human resources. Within MHI Group we have experts in a remarkably broad range of fields, and if we increase opportunities for collaborations among them we can expect this will promote the development of new business areas. Also, as digitalization needs increase, today we need to develop the skills of our IT and electrical engineers. Our plans are to encourage our current employees to learn those fields and expand their fields of specialization.

The "Technology Scouting" element of MHI FUTURE STREAM calls for exploration of technologies in the cutting-edge areas derived under Mega Scan and the innovative technologies necessary to realize the future envisioned under Shift the Path. In carrying out Technology Scouting, we will increase opportunities for co-creation with external human resources. Even up until now we have proactively undertaken open innovation with universities and other entities, but these interactions have been entirely focused on absorbing outside knowledge. Going forward, we will focus rather on joint development integrating our internal human and other resources with external resources. To that end, we intend to establish "co-creation centers" that will function as infrastructure for achieving the new ideas of venture businesses. Furthermore, in our quest to achieve new businesses, we aim to make timely investments into start-up firms both within Japan and abroad.

The activities pursued under MHI FUTURE STREAM have no fixed finish line; the initiatives conducted under Mega Scan, Shift the Path, and Technology Scouting will be continued repeatedly. Our ultimate mission is to cultivate a corporate culture to perceptively understand, and then respond to, the social needs of the world at large. The path down which MHI Group should proceed, I believe, is one of continuous evolution as a manufacturer of machine systems that, with advanced technologies, will give birth to the solutions that society will require.

Establishment of co-creation centers with external partners

1. Social contribution through venture business incubation and regional revitalization
2. Development of employee entrepreneurship
3. Creation of new group businesses



A Long-Term Vision for MHI Group's FUTURE
MHI FUTURE STREAM

Shared Technology Framework Initiatives for Promoting MHI FUTURE STREAM

Under our "Shared Technology Framework,"* MHI Group is striving to strengthen its technological infrastructure, fortify its marketing capabilities, and optimize its value chain, including procurement, across the Group. We are also taking robust steps to strengthen our technological infrastructure and promote MHI FUTURE STREAM as a way of reinforcing our competitiveness over the medium to long term.

Currently we are working to reap even greater results by sharing, Groupwide, the technologies and knowledge acquired through these initiatives. For example, we are expanding applications of the composite-material technologies developed for our aircraft business to a variety of products, jigs, tools, etc. and we are applying the cutting-edge technologies developed for our gas turbines to numerous other products, including compressors, centrifugal chillers, and turbochargers.

We are also promoting the development of innovative products employing additive manufacturing such as 3D printing, which has enabled the realization of structures previously not possible.

* The Shared Technology Framework encompasses the Technology Strategy Office, Research & Innovation Center, ICT Solution Headquarters, Value Chain Headquarters, and Marketing & Innovation Headquarters.

Promoting Shared Use of AI Technologies to Achieve Greater Results

Today MHI Group is applying AI not only to diverse products, services and production facilities, but also to its business processes. In areas relating to products and services, we are actively using IoT technologies to remotely monitor the operating status and usage environment of MHI Group products delivered worldwide. By applying AI and data analysis technologies to this collected data, we are able to detect and diagnose imminent malfunctions and optimize operation.

In production-related areas, we are applying AI technologies in a host of ways: to build work navigation systems; to automate welding devices using image recognition technology to streamline the entire supply chain, including access to the delivery status of procured or assembled items; and to improve production scheduling technology in a quest for shorter lead times.

In areas relating to business processes, we are employing AI to check technical specifications and commercial and legal agreements, thereby enhancing our risk management. Furthermore, to make our business processes more advanced and efficient, we are applying AI to analysis of big data: information relating to design, suppliers, expenditures, etc. Going forward we will continue to focus on initiatives of these kinds.

Continuous Support of MHI FUTURE STREAM Innovations and Infrastructures with Technologies

MHI FUTURE STREAM has three phases whose collective purpose is to realize specific new products, services and businesses: "Mega Scan," during which we scan for business opportunities and threats based on social mapping far into the future; "Shift the Path," in which we create measures for shifting our existing businesses over the medium to long term; and "Technology Scouting," in which we explore and co-create new technologies based on social needs as well as our own business needs and strategies. In implementing MHI FUTURE STREAM, we make use of the multifaceted market and technology sensing capabilities of the Marketing & Innovation Headquarters, Research & Innovation Center and ICT Solution Headquarters. We are also pursuing synergies by introducing and utilizing innovative outside knowledge and technologies through open innovation together with centers of excellence and Innovation Accelerator LLC, established in April 2018.

As an example, under Shift the Path we are probing changes to power systems, an area in which customer needs are diversifying, as illustrated by emerging demand for control capability to stabilize power supply in response to distribution of power generation and fluctuations in demand. For this purpose, we are now striving to develop and provide a menu of services and solutions that make use of AI and IoT and maximize the value of MHI Group products.

To realize an electrified society—using electricity as a power source to supersede engines, for example—it will be necessary to incorporate electrification technologies into machine systems. With our strengths in Fluid Dynamics, electro-heat transfer and other machinery technologies at the core, today we are utilizing our functional materials, micromachining technologies and the like to develop innovative products.

We further believe that by combining digital technologies with machine systems having enhanced control through electrification, it will be possible to realize autonomous, intelligent machines that co-exist harmoniously with humans. In the coming years, we will undertake the necessary investment into related R&D.

Going forward, we will continue to focus on these initiatives as we promote broad sharing of the technologies we develop.