2018 Medium-Term Business Plan Update
(FY2018〜2020)

Seiji Izumisawa, President & CEO

October 31, 2019
Mitsubishi Heavy Industries, Ltd.
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I. FY2019 Status Update
Overview of FY2019 Measures

- Midway through 2018 MTBP, MHI is executing as planned, strengthening financial foundations by embedding cash flow management processes.
- Addressing near-term issues like reduction of demand for steam power, market for medium-lot products, while building a firm financial foundation to enact growth measures for coming years.
- Accelerating SpaceJet M90 development toward Type Certification and first delivery.

Business Scale
- Revenue proceeding according to plan.
- Orders for medium-lot products lower mainly in China and Europe.
- Delays in large-scale projects development.

Profit
- Faster identification and addressing of issues (P.9).
- Focusing on fixed cost reduction in response to change in medium-lot product market.

FCF & Financial Foundation
- Measures to address FCF and strengthening of financial foundations proceeding according to plan.
- Secure investment funds for sustainable growth.

2019 1H Highlights ① – Energy

Growth in Advanced Class GTCC
- U.S. Order for 1,200 MW GTCC
- Upgrade of 2 GTs in Egypt

Growth in Middle & Small Capacity GT
- Growth of H100 use in mechanical drive and private power generation
- Strong order intake for aero-derivative gas turbines

West Sydney Urban Development
- Developed QoEn™, an index to quantitatively indicate optimal energy infrastructure, under joint verification with the University of New South Wales

Thermal Power Service Business
- MOU with Uzbekistan’s Ministry of Energy on Collaboration in Power Plant Operation and Maintenance Support
- Established service company in Philippines

Growth in Middle & Small Capacity GT
- Stand-alone power supply system combining renewables, engine generator and storage battery
- Collaborative sales to Africa with Calik Enerji of Turkey

Green Energy Usage
- Purchased and operating wind farm in U.S. (70 units of 1,000kW MHI turbines)
- Improved output through refurbishment achieving equivalent power generation to MHI Group’s entire energy needs in U.S.

Triple Hybrid
- Stand-alone power supply system combining renewables, engine generator and storage battery
- Collaborative sales to Africa with Calik Enerji of Turkey
2019 1H Highlights ② – Industry / Aircraft

**Expansion of Car Aircon Business**
- U.S. dealer acquisition led to direct sales expansion and used business entry
- Progressed with PMI, including organizational integration, model unification and consolidation of test facilities in Shiga

**Strengthening Logistics Equipment Business**

**Marine SOx Scrubbers**
- Built mass production system for SOx scrubbers that remove sulphur oxide from ship’s exhaust gasses
- Started shipping from affiliate factories in China and Taiwan

**Strengthening of Aero Engine Business**
- Building new aero engine parts factory in Nagasaki Shipyard
- Growing MRO business

**Reduction of CO2 in Steel Production**
- Developed breakthrough zero CO2 emission hydrogen based direct reduction technology using concentrate fines
- Test plant to start running in 2020

**Kaizen in Commercial Aircraft Production**
- Steady production of 14 sets of 787 main wing boxes per month
- Started operation of automated 777X assembly line

PMI: Post Merger Integration

MRO: Maintenance, Repair & Overhaul

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### 2019 1H Highlights ③ – SpaceJet

**SpaceJet M90**
- Advancing assembly of flight test aircraft, accelerating TC testing
- Established base in Montreal to accelerate design work

**SpaceJet M100**
- Advancing study of main model for U.S. market, M100
- Negotiating with potential customers and suppliers

**Service Organization**
- Installed simulator in Haneda Training Center
- Signed acquisition agreement for CRJ program with Bombardier

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### Commercial Aviation Systems Segment

**SpaceJet Business**
- Entrench development and production organizations
- Increase SpaceJet’s mass production potential and product potential

**CRJ Program**
- Inherit CS organization, complete aircraft knowhow, supply chain

**Tier1 Structure Business**
- Productivity improvements and expansion of business area

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- Moved MRJ Division under Commercial Aviation Systems Segment as of October 1
- Maximize synergies between Aircraft OEM Business (SpaceJet), Tier1 Structure Business and Service Business (CRJ)

CRJ: Canadair Regional Jet
Ⅱ. Balancing Growth with Financial Stability
   ~ The Deepening of TOP Management ~
Identify issues and implement solutions more effectively and faster through TOP* Positioning
Achieve financial stability and growth potential by ensuring current businesses achieve TOP

*TOP(Triple One Proportion) = MHI Group Management Indicator that aims at a 1:1:1 balance between Revenue : Total Assets : Market Value

① SBU Needs Efficiency Improvement
By increasing efficiency, achieve profit improvement and business growth

② SBU Needs Fundamental Reform
Regardless of efficiency, profits do not increase; need fundamental reform (e.g. change in strategy)

③ Group-wide Measures
HQ takes lead on group-wide issues (low performing assets, personnel measures for steam power etc.)

SBU: Strategic Business Unit

**Market Value = SBU profit ÷ expected rate of return
As originally planned, capital gained from strengthening financial foundation can now be concentrated in funding growth strategy.

Thanks to significant progress in strengthening of financial foundation and operational efficiencies we have funding capacity for sustained growth.

2018 MTBP Capital Allocation Plan

**Steady Cash Inflow**

1,320 (Unit: Billion Yen)

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount (Bn Yen)</th>
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<tr>
<td>Aggressive Investment</td>
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<td>Defensive/Maintain</td>
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<td>Shareholder Returns</td>
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<tr>
<td>New Business &amp; MSJ</td>
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<tr>
<td>New Facilities</td>
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<tr>
<td>Investment &amp; Lending</td>
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<td>Facility Updates</td>
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<tr>
<td>Risk Response</td>
<td>50</td>
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<tr>
<td>Reduction in Interest Bearing Debt</td>
<td>50 (Includes appropriation of 90bn in cash in hand)</td>
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<tr>
<td>Dividends</td>
<td>190</td>
</tr>
</tbody>
</table>

Strengthening financial foundation, operational efficiency

- **D/E Ratio**: Debt to equity ratio
- **CCC**: Cash Conversion Cycle

Interest Bearing Debt

Working Capital

D/E Ratio

CCC (Days)

<table>
<thead>
<tr>
<th>Year</th>
<th>Interest Bearing Debt</th>
<th>Working Capital</th>
<th>D/E Ratio</th>
<th>CCC (Days)</th>
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<td>1.01</td>
<td>0.89</td>
<td>0.72</td>
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<td>2011</td>
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<td>0.53</td>
<td>0.46</td>
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<td>2012</td>
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<td>0.44</td>
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<td>2013</td>
<td>0.46</td>
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<td>2016</td>
<td>0.44</td>
<td>0.38</td>
<td>0.38</td>
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<td>2017</td>
<td>0.38</td>
<td>0.38</td>
<td>0.38</td>
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<td>2018</td>
<td>0.38</td>
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<table>
<thead>
<tr>
<th>Year</th>
<th>Dividends (Bn Yen)</th>
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<tr>
<td>2010</td>
<td>190</td>
</tr>
<tr>
<td>2011</td>
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<td>2017</td>
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<tr>
<td>2018</td>
<td>190</td>
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</table>
Revision of FY2020 Forecast

- M&A deals have been undertaken with an emphasis on balancing business growth and financial stability
- Revised FY20 target reflecting committed M&A deals and the current state of the medium-lot product market
- Implementing growth strategy built on megatrends to enable business expansion for the next MTBP

<table>
<thead>
<tr>
<th></th>
<th>FY2019 Forecast</th>
<th>FY2020 Forecast</th>
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<tbody>
<tr>
<td></td>
<td>Original Target</td>
<td>Current Forecast</td>
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<tr>
<td>Orders Received</td>
<td>4,300</td>
<td>5,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>➡️ 4,600</td>
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<tr>
<td>Revenue</td>
<td>4,300</td>
<td>5,000</td>
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<tr>
<td></td>
<td></td>
<td>➡️ 4,700</td>
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<tr>
<td>Profit from business activities</td>
<td>220</td>
<td>340</td>
</tr>
<tr>
<td>Profit attributable to owners of parent</td>
<td>110</td>
<td>170</td>
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<tr>
<td>ROE</td>
<td>8%</td>
<td>11%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>➡️ 10%</td>
</tr>
<tr>
<td>FCF</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

(Unit: Billion Yen)
Ⅲ. Growth Strategy
With manufacturing at the core, we will expand business areas that take on changing social values and technological innovations.

We will address Decarbonization and evolve mechanical systems based on Electrification and Intelligence.
Decarbonization, Electrification, Intelligence are growth areas that leverage MHI’s core competences

Shift resources from current businesses to develop growth areas over time

MHI’s Growth into the Future

- Shift resources from current businesses
- Reorganization of business portfolio

Existing Areas

Growth Areas

TODAY

FUTURE

AGV/AGF: Automated Guided Vehicle/Forklift  VPP: Virtual Power Plant  DR: Demand Response
## Existing Power Business

- Balance increased demand for electricity with lowering carbon emissions
- Strengthen MHI’s core competencies to deliver latest technologies to customers

### Projected Power Generation and CO2 Emissions

- **Power Generation (TWh)**
  - Current Scenario
  - NPS Scenario
  - SDS Scenario

### ZERO CARBON

- **Hydrogen Gas Turbine (100% H₂)**
- **CCS/CCUS**
  - CO₂ Capture, Utilization, Storage
- **Light Water Reactor**
  - Zero carbon baseload electricity
- **Offshore Wind**

### LOW CARBON

- **Next Gen GTCC**
- **IGCC**
- **Steam Power**
  - Increase efficiency/replace
  - Biomass cofiring
  - Ammonia cofiring
- **ORC**
  - Waste heat capture
  - Binary Power Generation

### Notes
- **DECARBONIZATION**
- **Next Gen**
- **GTCC**
- **IGCC**
- **ORC**: Organic Rankine Cycle
- **CCS/CCUS**: Carbon Capture and Storage/Utilization

**Source:** IEA World Energy Outlook 2018

NPS Scenario: “New Policies Scenario” – direction in which today’s stated policy ambitions would take the energy sector

SDS Scenario: “Sustainable Development Scenario” – scenario charts a path fully aligned with the Paris Agreement by holding the rise in global temperatures to “well below 2°C … and pursuing efforts to limit [it] to 1.5°C”
Hydrogen Power Generation & Energy Storage

- Develop hydrogen gas turbines in time for arrival of hydrogen society
- Grow businesses through best mix of energy systems to realize a decarbonized future

Testing of Carbon Zero Power Generation Systems in Two Locations

MAGNUM Project (The Netherlands)
World’s Largest 100% Hydrogen Combustion Power Generation Project

- Hydrogen from Natural Gas (Zero CO2 Using CCUS)
- CO₂ Reduction 1.3M CO₂t/Year (440MW GTCC)

ACES* Project (Utah, USA) * Advanced Clean Energy Storage
World’s largest renewable energy storage project

- Hydrogen from Renewable Energy (Using Surplus)
- Amount of energy stored 1,000MW

Further Advancement in Technology
High Efficiency

STEP 3 (~2030)
Hydrogen Firing 100vol% H₂ Multi-cluster Combustor
(MAGNUM Project in The Netherlands)

STEP 2 (~2025)
Hydrogen Firing 100vol% H₂ Diffusion Combustor
(MAGNUM Project in The Netherlands)

STEP 1 (Complete)
Hydrogen Cofiring 30vol% H₂ Premix Combustor
(NEDO Sponsored Program)

Technology validation of latest advanced class gas turbines

Broad Operational Track Record
Over 3m hours

Rich track record of hydrogen cofiring in over 30 GTs since 1970
③ Carbon Recycling

- Convert fossil fuels into green fuels and deliver carbon recycling by building on MHI’s core competencies

**Renewables**
- Electrolysis

**Nuclear**
- Thermal water decomposition using HTGR

**Fossil Fuels**
- Sources of CO₂ (Thermal Power Stations, Steel Plants etc.)

**Separation & Capture**
- CO₂

**Hydrogen Production**
- H₂
- N₂

**Hydrogen Carriers**
- (Ammonia Synthesis)
  - NH₃

**CO₂ Recycling**
- CO₂ Fixing
  - Chemical Products (Methanol etc.)

**CO₂ Storage / Utilization**
- CCS/EOR

HTGR: High Temperature Gas-cooled Reactor

CCS: Carbon dioxide Capture and Storage
EOR: Enhanced Oil Recovery
Expand medium-lot product business by contributing to environmentally conscious growth markets like EV components, next generation forklifts, low GWP chillers etc.

- **Logistics**
  Answering customer needs with next generation forklift trucks

- **Mobility** (Turbos, Aircon)
  Speed up Compatibility with EVs

- **Air Conditioning** (Heating and cooling)
  Reduce environmental burden through high efficiency, low GWP*

- **Ultra small range extender**
- **Electric compressor**
- **Low GWP refrigerant chiller**
- **CO2 condensing unit**

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Reduce Environmental Burden & Expand Business

*GWP: Global Warming Potential*
Autonomous operation of power plants

- The role of power plants will become more diverse with the realization of a low carbon society
- Optimize operations in response to changes in environment

Optimize operations in response to changes in environment

- Respond to diverse KPIs, automatic optimization with simulation technologies using digital twin

Minimize maintenance costs, increase reliability

- Combine AI and OEM technology to assist O&M
  - AI identifies problems instantaneously and provides guidance
  - Assist operations optimizing performance and environmental impact mapped to equipment status and plant’s operational plan

Provide high performance solutions through digitalization of information

- Leverage IoT for remote monitoring, diagnostic applications
  - Remote monitoring
  - Detect abnormalities, offer solutions
  - Visualize equipment abnormalities, performance degradation, changes in status

Remote monitoring / status visualization

Advanced operation and maintenance

Autonomous operation
Due to the boom in e-commerce, demand for logistics solutions are rapidly expanding and diversifying.

Develop logistics solution business to respond to diversified customer needs.

### Automation
(Unmanned / Labor Saving)

- Improvements in functionality of Laser Guided Forklifts responding to customer needs especially driver shortage (e.g. for automated truck loading)
- Expanding use of image recognition and sensor technology for unmanned warehouse receiving and dispatch
- Established new logistics testing center last year at MHI Research & Innovation Center to strengthen development and demonstrate new solutions to customers

### Object Recognition
(Increase Safety)

- Introduced anti-collision function into forklifts using human detection technology
- Advanced detection technology employing deep learning, onboard cameras detect people and alert the driver via alarm
- Prevent accidents due to oversight or assumption

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Logistics Testing Center (Takasago)

Human Detection System
Ⅳ. Foundation for Growth
Strengthening Technological Core to Achieve Growth Strategy

- Strengthen technological foundations by developing MHI Group’s core competencies while acquiring technologies through open innovation

<table>
<thead>
<tr>
<th>POWER</th>
<th>INDUSTRY &amp; INFRASTRUCTURE</th>
<th>AIRCRAFT DEFENSE &amp; SPACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Energy systems integration</td>
<td>• Energy carrier production technology (hydrogen, ammonia, methanation etc.)</td>
<td></td>
</tr>
<tr>
<td>• Carbon recycling</td>
<td>• Renewables, hydrogen GTs, fuel cells, energy storage, CCUS</td>
<td></td>
</tr>
<tr>
<td>• Innovative catalyst technology (Using materials &amp; informatics)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DECARBONIZATION**

**ELECTRIFICATION**

- Electromagnetic field measurement & analysis
- Inverter circuit design & analysis
- Electrification system control tech
- Energy management tech

**INTELLIGENCE**

- Digital technology
- Data analysis, AI
- Sensing, image recognition tech
- Systems security tech
- Robotics & mechatronics
Open Innovation

- Infrastructure and mechanical systems are changing at a rapid pace
- The latest megatrends and technological innovations point to the way forward
- We will collaborate with external partners to develop frameworks to produce innovative ideas and quickly commercialize them

Innovation Promotion Research Institute

- Produce innovative ideas, Cutting-edge technology development
  - Established as research and development specialized corporation in April, 2018 with 100% MHI investment capital
  - Undertaking joint R&D globally with universities, research institutes and other companies
  - Utilizing cutting-edge external knowhow and ideas to develop foundational technology and new products

Technology Scouting

- Venture Investment
  - Technology discovery through direct investment in venture capital and venture companies (e.g. Geodesic Capital)
  - Leveraging Global Research and Innovation Centers in USA, UK and Singapore for market and new technology exploration

Testbed Hub

- Co-creation with external partners
  - Supporting start-ups and regional development
  - Nurturing entrepreneurship among employees
  - Developing new businesses
<table>
<thead>
<tr>
<th>Status of Global Group Management Reform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pushing ahead with management structure reform to drive growth strategy</td>
</tr>
</tbody>
</table>

- Establish agile business development department with direct CEO oversight to strengthen HQ-driven incubation
- Support growth of existing businesses by rolling out technological trends and new business models across the Group

- Explore reorganization of business structure to drive global expansion of businesses in growth strategy
- Drive synergies by placing Mitsubishi SpaceJet, CRJ and Tier 1 businesses under same Commercial Aviation Systems segment management

- Acquire talent that can thrive in businesses focused in electrification, intelligent technologies and further globalization
- Develop plans to nurture self-directed talent, HR systems and shared platforms that support growth strategy
Appendix
## Numerical Targets by Domain

<table>
<thead>
<tr>
<th>Domain</th>
<th>Orders Received</th>
<th>Revenue</th>
<th>Profit from business activities</th>
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</thead>
<tbody>
<tr>
<td><strong>Power</strong></td>
<td>1,426.5</td>
<td>1,600.0</td>
<td>1,800.0</td>
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<tr>
<td><strong>Industry &amp; Infrastructure</strong></td>
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<td>2,000.0</td>
<td>2,100.0</td>
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<tr>
<td><strong>Aircraft, Defense &amp; Space</strong></td>
<td>610.6</td>
<td>700.0</td>
<td>700.0</td>
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<tr>
<td><strong>Others</strong></td>
<td>73.3</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Eliminations or common</strong></td>
<td>△ 109.1</td>
<td>△ 100.0</td>
<td>△ 100.0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>3,853.4</td>
<td>4,300.0</td>
<td>4,600.0</td>
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(Unit: Billion Yen)