Industry & Infrastructure
Business Plan

Takashi ISHIZUKA
Executive Vice President,
President and CEO of Industry & Infrastructure

July 12, 2019
Mitsubishi Heavy Industries, Ltd.
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   1-2. Management Structure
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   Supplement-2. Thermal Systems
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1-1. Sales Overview

- Mitsubishi Shipbuilding Co., Ltd./Mitsubishi Heavy Industries Marine Structure Co., Ltd.
- Mitsubishi Heavy Industries Technology Engineering, Ltd.
- Mitsubishi Heavy Industries Environmental & Chemical Engineering Co., Ltd.
- Primetals Technologies
- Mitsubishi Heavy Industries Machine Tool Co., Ltd.
- Mitsubishi Heavy Industries Machinery Systems, Ltd.
- Mitsubishi Heavy Industries Thermal Systems, Ltd.

FY2018
Revenue
¥1,907.8 billion

(*) Chemical plants, Transportation systems, CO₂ capture plants

M-FET: Mitsubishi Heavy Industries Forklift, Engine & Turbocharger Holdings, Ltd.
1-3. FY2018 Major Topics

**Commercial Ships**

Christening and launch ceremony of KITAKAMI for Taiheiyo Ferry

**Material Handling Equipment**

Market launch of “Rack Fork Auto” laser-guided type AGF

AGF: Automated guided forklift

**Metals Machinery**

Strong orders for “EAF Quantum***” from steel manufacturing companies in China and other countries

* Newly developed electric arc furnace realizing significant reductions in power consumption, running costs and CO₂ emissions.

**Air-conditioning & Refrigeration**

“ETI-Z Series” of high-efficiency next-generation centrifugal chillers featuring low-GWP refrigerant won a METI Minister’s Award for energy savings.

GWP: Global Warming Potential
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  Supplement-9. Engineering
2-1. Review of FY2018

Orders Received, Revenue, Total Assets

<table>
<thead>
<tr>
<th>Year</th>
<th>Orders Received</th>
<th>Revenue</th>
<th>Total Assets</th>
<th>Initial target</th>
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</thead>
<tbody>
<tr>
<td>FY2017</td>
<td>1,711.3</td>
<td>1,488.3</td>
<td>1,950.0</td>
<td>1,907.8</td>
</tr>
<tr>
<td>FY2018</td>
<td>1,890.0</td>
<td>1,852.0</td>
<td>1,900.0</td>
<td>1,907.8</td>
</tr>
</tbody>
</table>

Profit from Business Activities

<table>
<thead>
<tr>
<th>Year</th>
<th>Profit from Business Activities</th>
<th>Profit rate</th>
<th>Initial target</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2017</td>
<td>80.0</td>
<td>70.1</td>
<td>80.0</td>
</tr>
<tr>
<td>FY2018</td>
<td>41.0</td>
<td>3.7%</td>
<td>80.0</td>
</tr>
</tbody>
</table>

Results

- **Orders received**
  + ¥140.6bn YoY
  - Commercial ships, chemical plants, material handling equipment
  - ¥98.0bn below target
  - Chemical plant project deferment

- **Revenue**
  + ¥17.8bn YoY
  - ¥7.8bn above target

- **Profit from business activities**
  + ¥29.0bn YoY
  - Improvement in profitability of transportation systems
  - Increased sales of material handling equipment
  - ¥9.9bn below target
  - Deterioration in specific project profitability, etc.

Order Backlog

<table>
<thead>
<tr>
<th>Year</th>
<th>Order Backlog</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2017</td>
<td>1,273.2</td>
</tr>
<tr>
<td>FY2018</td>
<td>1,181.9</td>
</tr>
</tbody>
</table>
2-2. 2018 Business Plan Numerical Targets (1/2)

Revenue

<table>
<thead>
<tr>
<th>Year</th>
<th>FY2017</th>
<th>FY2018</th>
<th>FY2019</th>
<th>FY2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue (In billion yen)</td>
<td>1,890.0</td>
<td>1,907.8</td>
<td>1,950.0</td>
<td>2,000.0</td>
</tr>
</tbody>
</table>

Orders Received

<table>
<thead>
<tr>
<th>Year</th>
<th>FY2017</th>
<th>FY2018</th>
<th>FY2019</th>
<th>FY2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orders Received (In billion yen)</td>
<td>1,711.3</td>
<td>1,852.0</td>
<td>2,000.0</td>
<td>2,100.0</td>
</tr>
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</table>

Profit from Business Activities

<table>
<thead>
<tr>
<th>Year</th>
<th>FY2017</th>
<th>FY2018</th>
<th>FY2019</th>
<th>FY2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit from Business Activities (In billion yen)</td>
<td></td>
<td></td>
<td>41.0</td>
<td>70.1</td>
</tr>
</tbody>
</table>

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# 2-2. 2018 Business Plan Numerical Targets (2/2)

## Breakdown of Profit from Business Activities Target

### Improved earning capacity in 3 categories

(Growth investments, Earning capacity enhancement, Business model reform*)

<table>
<thead>
<tr>
<th></th>
<th>FY2018 actual</th>
<th>FY2019 target</th>
<th>FY2020 target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth investments</td>
<td>70.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earning capacity enhancement</td>
<td></td>
<td>110.0</td>
<td></td>
</tr>
<tr>
<td>Business model reform</td>
<td></td>
<td>160.0</td>
<td></td>
</tr>
</tbody>
</table>

* Business model reform: Shift areas of competition, Shift to new business model
I&I Business Plan Strategies

- Completed the transformation of all business operations into individual business companies in 2018, consolidating to 7 business groups
- Place emphasis on raising profits through self sustained management of business companies and active use of MHI resources
- Review growth scenarios of existing businesses to assess and realize their maximum value in the medium/long term
  - Divide existing businesses into three categories:
    - **Growth investments**
    - **Earning capacity enhancement**
    - **Shift areas of competition/Shift to new business model**
### Business environment

<table>
<thead>
<tr>
<th>Material handling equipment</th>
<th>Expanding market</th>
<th>Possible impact from US-China trade frictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turbochargers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metals machinery</td>
<td>Market growth remains at same level</td>
<td>Earning capacity enhancement</td>
</tr>
<tr>
<td>Engines</td>
<td>Market in recovery mode</td>
<td></td>
</tr>
<tr>
<td>Machinery systems</td>
<td>Fierce competition</td>
<td></td>
</tr>
<tr>
<td>Machine tools</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial ships</td>
<td>Supply/ demand gap</td>
<td>Shift areas of competition</td>
</tr>
<tr>
<td>Engineering</td>
<td>Intensifying competition (industry reorganization, etc.)</td>
<td>Shift to new business model</td>
</tr>
<tr>
<td></td>
<td>Increased EPC-related risk (shortage of skilled workers overseas, etc.)</td>
<td></td>
</tr>
</tbody>
</table>
2-3. Core Strategies for FY2019/FY2020 and Medium/Long Term (3/3)

Growth Investments  
⇒ Secure profit growth in the term of on-going business plan

Shift areas of competition, shift to new business model

⇒ Strengthen medium/long term earning capacity

Earning capacity enhancement  
⇒ Secure steady profit

Business Growth Model

Shift areas of competition, Shift to new business model

Growth Investments

Earning capacity enhancement

2018 Medium-Term Business Plan  
Medium/long term

Profit
2-4. Core Measures for FY2019/FY2020 and Medium/Long Term (1/4)

Growth Investments

Expand revenue and profit in growth markets

- **Strengthen marketing**
  (conversion to directly managed dealers, etc.)
  [Material handling equipment, Thermal systems]

- **Develop and launch strategic products**
  - Promote unmanned, automated operation
    [Material handling equipment]
  - Environmentally friendly products
    [Material handling equipment, Thermal systems, Turbochargers]

- Laser-guided type AGF
  AGF: Automated guided forklift

- Centrifugal chiller featuring low-GWP refrigerant
  GWP: Global Warming Potential

- Ultra-compact range extender for electric vehicles

Material handling equipment, Thermal systems, Turbochargers
2-4. Core Measures for FY2019/FY2020 and Medium/Long Term (2/4)

Earning capacity enhancement

Promote higher efficiency in preparation for business environment changes

- Further structural reforms, following prior years’ PMI Enhancement of life cycle businesses [Metals Machinery]
- Focus resources into core competencies [Engines]
- Promote resource sharing and personnel mobilization [Machinery systems]
- Pursue mass customization, launch new products [Machine tools]

Metal 3D printer
Shift areas of competition, Shift to new business model

Improve earning capacity through differentiation

- **High value-added areas** (high-density outfitted ships, etc.) [Commercial ships]
- **Marine engineering areas** (response to environmental regulations, etc.) [Commercial ships]
- **Lifecycle businesses** [Engineering (EPC)]

Commercial ships, Engineering

Rehabilitation & maintenance of Manila Metro Rail Transit Systems Line 3 (Philippines)
Order received in January 2019

* O&M: Operation & maintenance

- Effective use of MHI Group technologies
- Mobilization of personnel among domain/business companies
- Provide common platforms (digitalization, etc.) (proactively use external resources)

⇒ Strengthen competitiveness of business companies

- Business [Self sustained management]
- Business [Self sustained management]
- Business [Self sustained management]
- Business [Self sustained management]
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Achievement of 2018 Medium-Term Business Plan

Growth Investments
- Material handling equipment, Thermal systems, Turbochargers

Earning capacity enhancement
- Metals machinery, Engines, Machinery systems, Machine tools

Shift areas of competition/
Shift to new business model
- Commercial ships, Engineering

Business companies
Self sustained management

Domains
Proactive resource allocation

Toward further growth
1. Business Overview
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   1-2. Management Structure
   1-3. FY2018 Major Topics

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Supplement-1. Material Handling Equipment

**Business Environment**
- Exponential expansion of e-commerce market
- Rapid increase in need for material handling solutions
  1) Automation (unmanned, manpower saving)
  2) Safety enhancement

**Challenges**
- Growth of conventional businesses
- Business model conversion
- Technology differentiation

**Measures**
- Expand base load business scale and improve earning capacity
  ⇒ Complete PMI, expand servicing operations, etc.
- Further growth centered on growth strategies
  1) Expansion of direct sales, entry into rental and used vehicle businesses
  ⇒ Acquisition of North American dealer, etc.
  2) Expansion of AGF (automated guided forklift) business
  3) Global collaboration with business partners
  4) Upfront investment in future technologies and businesses

**Market Scale**

<table>
<thead>
<tr>
<th></th>
<th>FY2017</th>
<th>FY2018</th>
<th>FY2019</th>
<th>FY2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Thousand units)</td>
<td>0</td>
<td>600</td>
<td>1,200</td>
<td>1,800</td>
</tr>
</tbody>
</table>

**Business Scale (Revenue)**

<table>
<thead>
<tr>
<th></th>
<th>FY2017</th>
<th>FY2018</th>
<th>FY2019</th>
<th>FY2020</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>600</td>
<td>1,200</td>
<td>1,800</td>
</tr>
</tbody>
</table>
Supplement-2. Thermal Systems

Business Environment

- Market to remain solid despite concerns over US-China trade frictions. Stable growth is expected to continue.
- Environmental awareness is increasing.
- Electric vehicles market is expanding.

Measures

- Strengthen sales network, especially in Europe and China
- Continually launch environment-friendly products
- Expand business in electric compressors for electric vehicles
- Strengthen R&D

Focus on expanding business scale through promotion of the above measures

Market Scale

(In trillion yen)

- Air-conditioning & refrigeration market
  - CAGR: Compound average growth rate
  - CAGR 4%

Business Scale (Orders and Revenue)

Orders
Revenue

<table>
<thead>
<tr>
<th>FY2016</th>
<th>FY2017</th>
<th>FY2018</th>
<th>FY2019</th>
<th>FY2020</th>
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<tbody>
<tr>
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</tbody>
</table>
Supplement-3. **Turbochargers**

### Business Environment
- Power trains becomes more diversified due to tightening of environmental regulations.
- Motorization is expanding in emerging economies.
- US-China trade frictions

### Challenges
- Strengthen development capability to offer products for a diversified power train line-up.
- Expand sales in emerging economies
- Enhance earning capacity

### Measures
- Development of turbochargers designed for hybrid and plug-in hybrid vehicles which are expected to become the main-stream among fuel-efficient vehicles
- Development of lower-cost turbochargers for emerging economies
- Improvement of productivity by applying IoT to increase operating ratio, and strive to fully automate production lines

#### Market Scale
(in trillion yen)

<table>
<thead>
<tr>
<th></th>
<th>FY2017</th>
<th>FY2018</th>
<th>FY2019</th>
<th>FY2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S.A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan (Sagamihara)</td>
<td></td>
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</table>

#### Business Scale (Revenue)

<table>
<thead>
<tr>
<th></th>
<th>FY2017</th>
<th>FY2018</th>
<th>FY2019</th>
<th>FY2020</th>
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<tbody>
<tr>
<td>China</td>
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<td></td>
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</tr>
<tr>
<td>Thailand</td>
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<tr>
<td>U.S.A</td>
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</tr>
<tr>
<td>Netherlands</td>
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<tr>
<td>Japan (Sagamihara)</td>
<td></td>
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</tr>
</tbody>
</table>
**Supplement-4. Metals Machinery**

**Business Environment**
- The market is recovering
- Growing trend toward capital investment
- Environmental awareness is increasing

**Challenges**
- Capture demand and expand market share
- Pursue further efficiency through further optimization of organization and processes

**Measures**
- Focus on strategic products
  - Expand sales of ESP lines
  - Expand portfolio of environment-friendly products
- Strengthening of lifecycle business
  - Expand maintenance servicing business
  - Expand and improve digitalization

**Market Scale**
- Global demand for finished products (Mt)
- Global factory operating rate

**Business Scale (Orders and Revenue)**
- Orders
- Revenue

ESP: Endless strip production (environment-friendly, integrated metal production line requiring low investment cost)
Compared to conventional lines with separate processes for casting and rolling, ESP significantly reduces energy consumption, CO₂ emissions and running costs.
### Business Environment

- Stable demand for stand-by generators is continuing. (data centers, large commercial facilities, etc.)
- Demand is appearing in emerging economies for distributed power systems, and in Japan for new power generation and urban development needs.

### Challenges

- Further strengthen core competencies for high output segment (1-3 MW)
- Response to demand for power supply system combining renewable energy and DR and VPP

### Measures

- Response to demand for stand-by generators
  1) Development of ultra-high-efficiency engines
  2) Expansion of generator set business
     - Achievement of high added value
     - Expansion of after-sale servicing business
     (Attract customers through IoT and AI)
- Development, demonstration and business development of hybrid electric power supply systems
- Development of new services in DR and VPP areas

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**Market Scale**

<table>
<thead>
<tr>
<th>(Thousand units)</th>
<th>Market of 0.5-3.0MW (units)</th>
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</thead>
<tbody>
<tr>
<td>FY2017</td>
<td>140</td>
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<tr>
<td>FY2018</td>
<td>130</td>
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<tr>
<td>FY2019</td>
<td>120</td>
</tr>
<tr>
<td>FY2020</td>
<td>110</td>
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</tbody>
</table>

**Business Scale (Revenue)**

<table>
<thead>
<tr>
<th>FY2017</th>
<th>FY2018</th>
<th>FY2019</th>
<th>FY2020</th>
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<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

DR: Demand response  VPP: Virtual power plant
**Business Environment**

- The domestic market, which accounts for 70% of revenue, is firm.
- Business is stable on multiple products and focus on after-sale services.

**Challenges**

- Although domestic business is forecast to remain stable, significant future growth is unlikely.

**Measures**

- Efficiency enhancement through optimal allocation: resource sharing and human resources mobilization
- Allocate resources into global markets where growth is anticipated (box making machinery, etc.)
- Further strengthening of earning capacity through application of digitalization in after-sale servicing business

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### Box Making Machines

- High-performance, high-priced machines are well received in Japan, US and Europe.
- Development and launch of medium-performance, mid-priced machines
- Expansion of business scale through expanded and improved lineup

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### Digitalization of After-sale Services

- Manpower shortages and challenges in skill transfer are emerging at after-sale servicing sites.
- Promoting education of young employees and acquisition of multiple capabilities through video and voice-based digital tools

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### Business Scale (Orders and Revenue)

<table>
<thead>
<tr>
<th></th>
<th>Orders</th>
<th>Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2017</td>
<td></td>
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<tr>
<td>FY2018</td>
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<tr>
<td>FY2019</td>
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<tr>
<td>FY2020</td>
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</tbody>
</table>
Business Environment

- Gears are becoming of increasingly higher precision (short term: vehicle applications, medium/long term: robot applications).
- Applications of metal 3D printing technology are poised to accelerate (medium/long term)
- Business negotiations are becoming delayed due to US-China trade frictions.

Measures

- Expanding sales of gear grinding machines
- Development of small-diameter modular gear cutting machines and tools
- Market entry of metal 3D printers
- Acceleration to MCMD

* MCMD: Mass Customization Modular Design

Business Scale (Orders and Revenue)

Orders
Revenue

<table>
<thead>
<tr>
<th></th>
<th>FY2017</th>
<th>FY2018</th>
<th>FY2019</th>
<th>FY2020</th>
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</thead>
<tbody>
<tr>
<td>Orders</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Revenue</td>
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</tbody>
</table>
Supplement-8. **Commercial Ships**

### Business Environment
- Demand is stable for domestic ferries and government ships
- Gas carriers face intensifying competition against Chinese and Korean companies. (Reorganization of Korean shipbuilders, etc.)
- Demand is increasing for environmental equipment supported by more stringent environmental regulations.

### Measures
- Acceleration of shift to high-density outfitted ships (ferries, government ships, etc.)
- Realization of low-cost gas carriers
- Strengthening of marine engineering business (response to environmental regulations (SOx scrubber, FGSS, etc.) and safety regulations)
- Initiatives toward becoming the customer's lifecycle partner (cruise ship repair, etc.)

**Business Scale (Orders and Revenue)**

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<thead>
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<tr>
<td>FY2019</td>
<td></td>
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<tr>
<td>FY2020</td>
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FGSS: Fuel gas supply system

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Customer needs are increasingly sophisticated and complicated.
(single product/technology ⇒ concept design to O&M management)
EPC business is becoming less profitable.
(increasing construction costs)
Domestic and overseas engineering companies are shifting to new business model.
Environmental awareness is increasing globally.

Business Environment

Challenges

New business model and portfolio for diversifying profitability

Measures

• Development of business considering plant lifecycle, concept design to O&M management.
  (expansion and improvement of project financing and engineering after-sales service business, etc.)

Improve profitability of large projects

• Project management through digitalization
• Strengthening of risk management functions during bidding phase
• Appropriate management of construction partners.

Accelerate development of core technologies

• Development of differentiated technologies for waste to energy plant, CO₂ recovery systems, APM, etc.

APM: Automated People Mover

Orders
Revenue

Business Scale (Orders and Revenue)

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<tr>
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<th>FY2017</th>
<th>FY2018</th>
<th>FY2019</th>
<th>FY2020</th>
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<tbody>
<tr>
<td>Orders</td>
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<td>Revenue</td>
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O&M: Operation & maintenance
EPC: Engineering, procurement & construction
MOVE THE WORLD FORWARD