

# Materials Business of Yokogawa

With over 100 years of achievements and trust, we contribute to solving our customers' problems in the industry and various societal issues with our ability to "Measure" and "Connect"

## About Us

Our core business is Industrial Automation, in particular measurement, control and information management of production facilities. We have supported the growth of numerous industries. Our business is divided into three segments: "Energy & Sustainability," "Materials," and "Life."



Headquarters : Musashino, Tokyo

## Business Overview

### Vision of the Materials Business | Business Segment

#### VISION

To help realize a new circular society that can coexist with the global environment

#### Energy & Sustainability



- Oil & Gas
- Petrochemicals
- Renewable Energy
- Electric Power
- Energy Management
- Energy Storage

#### Materials



- Specialty Chemicals
- Biomass Material
- Fibers & Textiles
- Non-Ferrous Metals
- Mining & Metals
- Mobility
- Pulp & Paper
- Steel
- Electrical / Electronics

#### Life



- Pharmaceuticals
- Healthcare
- Food
- Water

### Materials Industry Domain

In addition to growth in the Process Automation (PA) domain with a focus in chemicals, we are also expanding in new domains in the supply chain.

Vast amount of know-how  
(Domain Knowledge)

Process Automation

Perfecting our Strengths

#### Chemical-related

##### Specialty Chemicals

- Engineering Plastic
- Synthetic fiber
- Adhesive
- Paint
- Film



##### Intermediate Chemical

- General-purpose resin
- Synthetic detergent
- Agrochemicals & Fertilizers



#### Mining & Metals

- Copper
- Aluminum
- Magnesium
- Raw Metal



- Pulp & Paper
- Iron & Steel
- Cement
- Rubber
- Fibers & Textiles
- Glass etc.

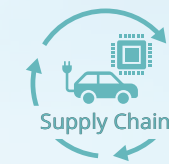
### New Insight

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### New Domain

#### Mobility Supply Chain

- Mobility
- Semiconductor
- Battery



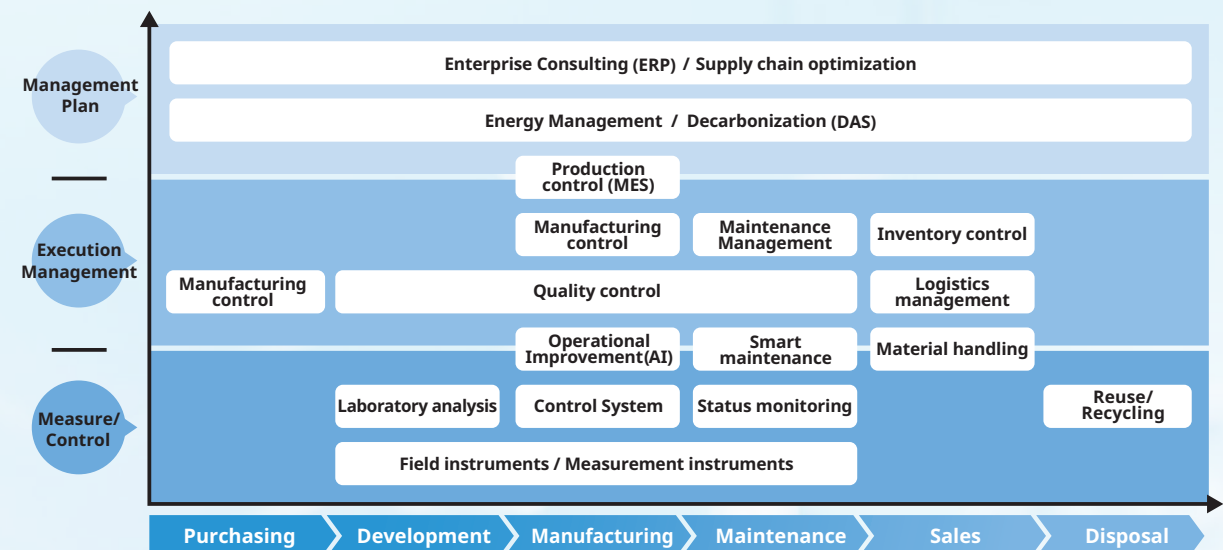
#### Sustainable Business

- Carbon management
- Material recycling



### Materials Industry Solution Portfolio

Providing solutions across the supply chain from purchase to disposal



# ~We support the creation of earth-friendly materials for the future~

Yokogawa is a partner that strives to realize a circular society with our customers throughout the entire supply chain.



# Solutions by industry



## Chemical

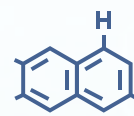
The chemical industry is the foundation that supports our livelihoods and manufacturing industry. Related fields are vast including petrochemical, functional chemical, and life sciences. The issues that manufacturing sites face and solutions are becoming more diverse. As the environment surrounding the chemical industry rapidly changes, we provide solutions to problems all the way from the management team to field staff.



## Specialty Chemicals

Semiconductor, plastic, paint, film, etc.

We provide solutions for high-mix low-volume production and batch production of semiconductor materials and functional materials, etc. that contribute to quality improvement, safety assurance, and operational improvement through the immediate and low-cost introduction and utilization of digital technology.



## Intermediate Chemicals

Fine Chemicals and Surfactants

We provide solutions that contribute to stabilizing quality, safe operation, energy efficiency, increased productivity, etc. in processes involving chemical reactions for the purification and refinement of materials and industrial materials.



## Agrochemicals & Fertilizers

Fertilizer, Pesticide, etc.

Growing agricultural products is necessary as global population increases, and thus we provide solutions that contribute to reducing the environmental load, increasing productivity, and stabilizing production.

### Case Study

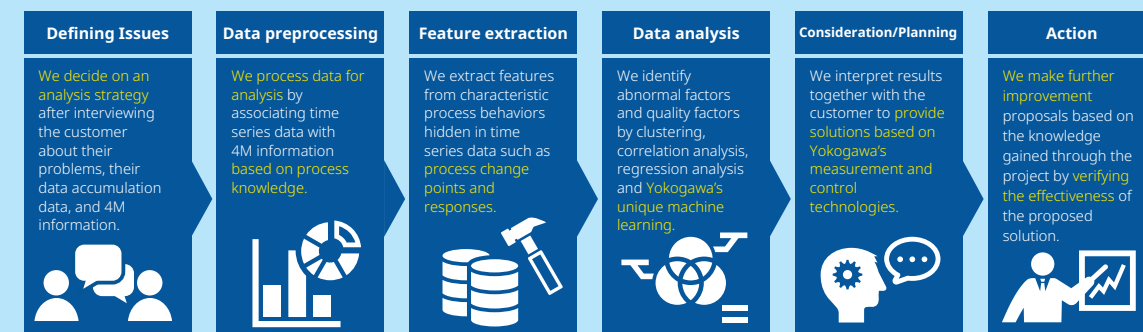
## Improving and Stabilizing Product Quality Using Big Data

~Fine Chemicals × Process Data Analytics~

As our customer demanded a significantly high level of quality stabilization to enhance competitiveness and increase added value, they chose Yokogawa as their analysis partner based on Yokogawa's track record of plant quality stabilization including chemical processes.

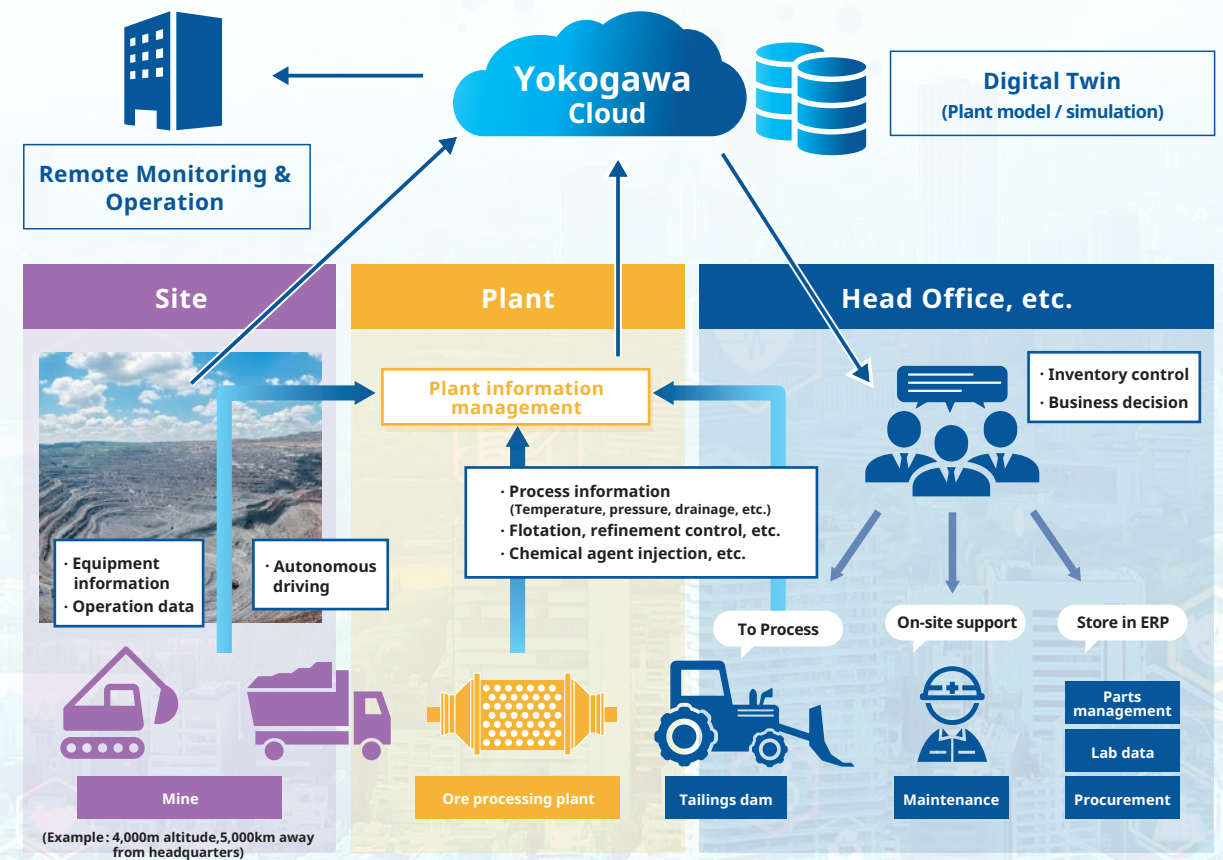
Yokogawa worked hard to share "field insights" as explicit knowledge instead of keeping them as implicit knowledge, and used those hints to proceed with the analysis.

As a result, we were able to identify several causes that impact production quality which led to improvements in the facility including, precision improvements for necessary sensors, adding new quality control points, modifications of the control sequence, etc.



## Mining & Metals

Recently, in the Mining & Metals industry, there is increasing demand to support: the environment (decarbonization), safety, advanced control & maintenance, and remote operations. The need for optimization and automation of operations across the site is rising. In addition to measurement and control solutions for scattered sites, Yokogawa's solutions include unified operations through the cloud, environmental load reduction, safety improvements, and operations improvements. We help solve our customers' problems with our experience and knowledge accumulated mainly in Australia, South America, and Africa.



## Iron

In the steel industry, they are working on various issues including electrification of furnaces, hydrogen steelmaking, weight reduction (e.g. mobility), capital intensification, industry integration, and decarbonization, as they transition to net zero. In addition to measurement and control solutions for iron making, steelmaking, and rolling processes, Yokogawa provides optimal solutions in: energy saving (carbon management), equipment/device aging management, safety measures, manufacturing/operations technology, and knowledge sharing. We strive to solve issues for our customers working alongside EPC partners and the like.



## Pulp & Paper

In the pulp and paper industry, they work on issues including decreasing demand due to digitalization in society, energy reduction during production, and the like to keep up the industry that is essential to daily life. In addition to solutions for measurement and control of paper quality, Yokogawa provides solutions including plant optimization modeling technology (DDMO (Data Driven Modeling for Optimization)), creating facility models from plant operation data, and we work with EPC partners to solve our customer's problems.



## Electrical/ Electronics/ Semiconductors

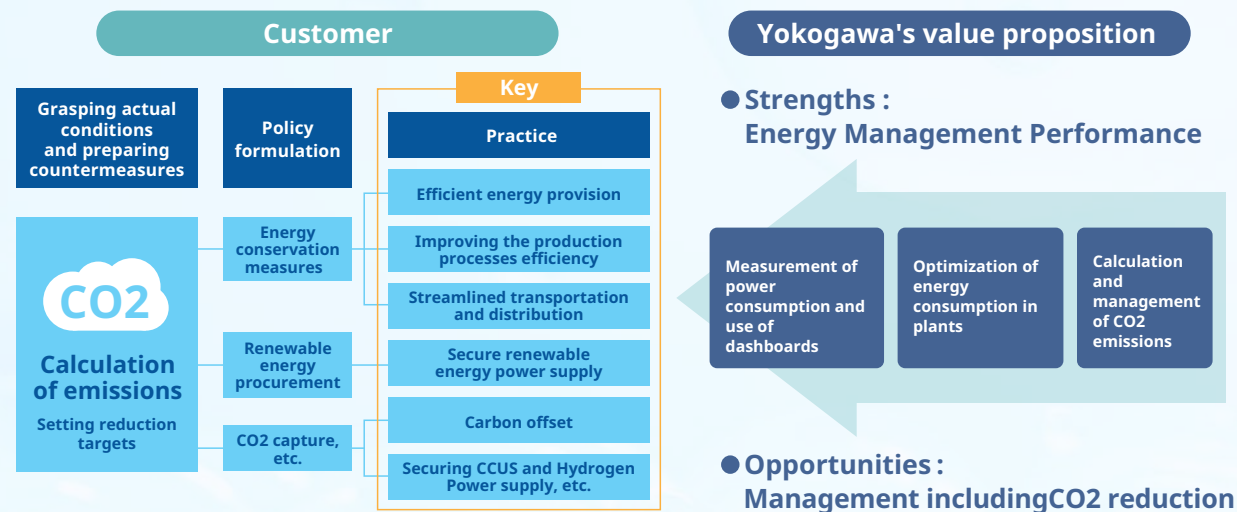
Recently, there has been increasing needs for semiconductors, electronic parts, devices, and related manufacturing equipment due to electrification of vehicles. Investments digitalization are increasing as is demand for environmental products for realizing a decarbonized society. Manufacturing plants are required to meet labor-savings and improved efficiency for greater productivity, skill transfer, and measures for high reliability and quality. Yokogawa provides solutions based on measurement and control technologies, such as smart factory/DX, traceability, on-site visualization, facility management, quality stabilization, evaluation/tests, and energy/energy reduction, to address issues throughout the customer's supply chain.

We strive to provide new value by:  
 Using our vast industry experience and domain knowledge mainly in the materials industry for issues shared in the industry including “Decarbonization”

## Common Solutions

### Carbon Management Solution **CO2**

Using our company's strengths, including CO2 reduction, to help solve Environmental and Social Issues (Contribution to the achievement of SDGs targets)



The Carbon Management Solution of Yokogawa is an initiative geared towards achieving carbon neutrality by GHG (Greenhouse Gas) emissions control and shifting to inexpensive, reliable, and sustainable energy alongside our customers using our unique technology and know-how.

Especially in the industrial world, GHG emissions control is becoming an important business agenda that can determine a company's survival. In addition to the company wide annual report based on secondary data (accounting management data), Yokogawa provides emission amount calculation at the product and organization level in addition to real time monitoring. We also provide cause identification and analysis based on industry knowledge and even reduction simulations to achieve low carbonization of processes and contribute decarbonized business.

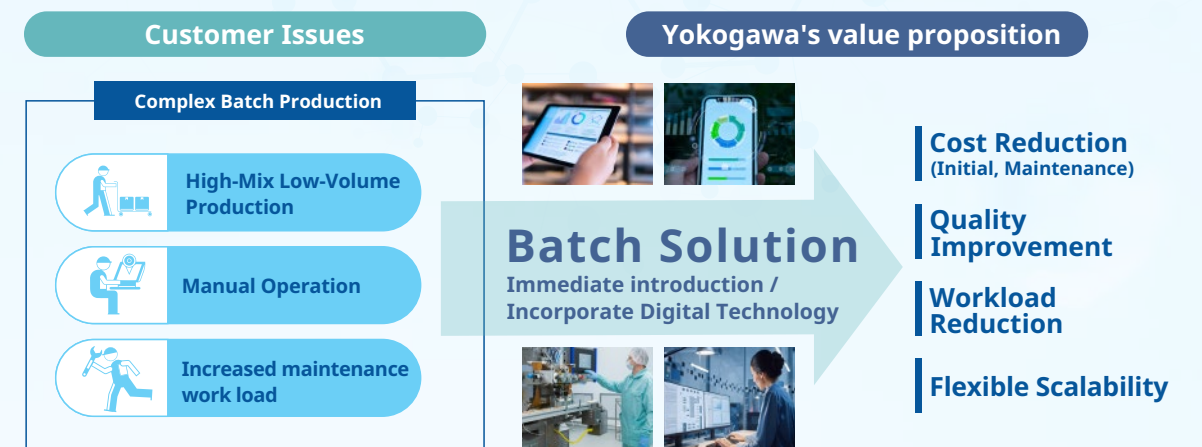
Furthermore, our design allows you to utilize your existing instrumentation system, so you can start with minimal initial investment. (We work in both on-premise and cloud)

Our slogan at Yokogawa is “Co-achieving zero carbon,” we are your preferred partner that achieves carbon neutrality across the supply chain with our customers by using our technology and knowledge in “measurement” and “control.”

<https://www.yokogawa.co.jp/solutions/solutions/carbon-management-solution/>

### Batch Solution

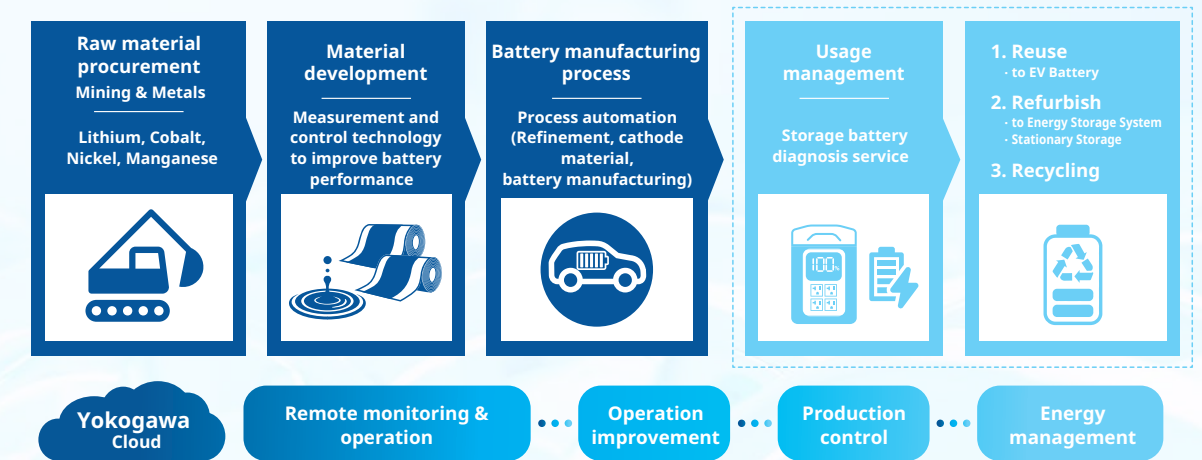
Batch Solution is a Digital Transformation (DX) solution that incorporates digital technology with minimum introduction load (cost and time) to improve quality and ensure safety



Yokogawa's batch Solution is a Digital Transformation (DX) solution that contributes to quality improvement and security assurance by utilizing digital technology immediately and at low cost for batch manufacturing processes that require a lot of manual work. In particular, we reduce the workload related to maintenance and provide flexible scalability. We connect with our customers' facilities via software available in computers and the cloud allowing us to start with high priority operations for our customers to achieve digitalization.

### Battery Solution

We provide customer value and problem solving throughout the battery supply chain.

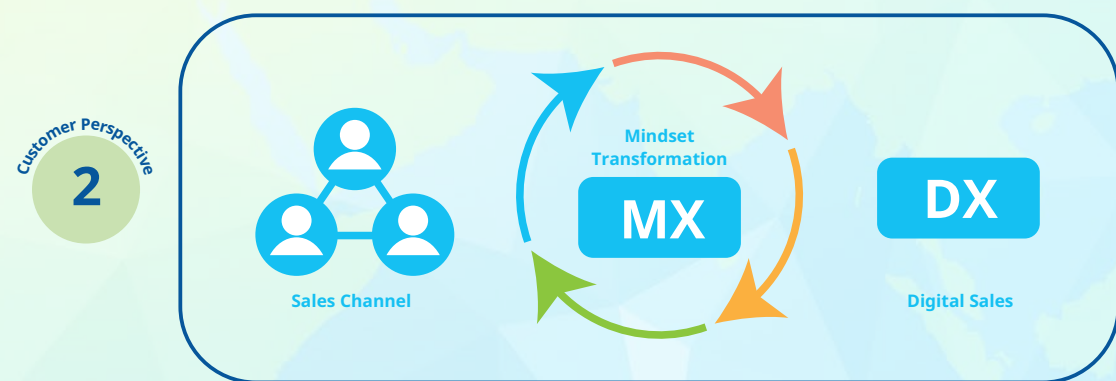
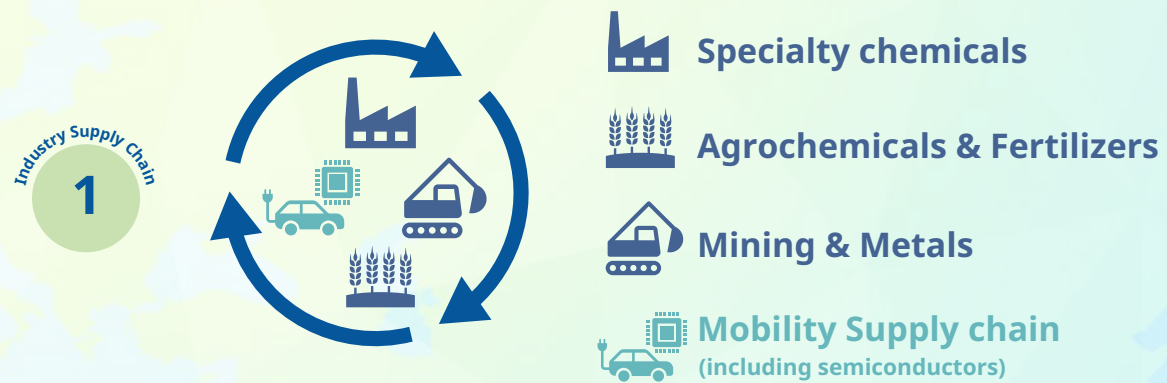


Yokogawa pursues to provide a solution that organically combines the knowledge and achievements in measurement, control, and information across the supply chain from: materials mining for lithium-ion secondary battery and fuel cell; materials development; manufacturing process; and even reuse and recycling. In particular, we provide: mining solutions for mineral resources used as ingredients; Measurement solutions that rapidly and accurately measures coating weight of battery electrodes; quality control solutions such as film thickness measurement, thickness control, and traceability improvements; and storage battery diagnosis services. Our goal is to solve issues including “quality improvement” and “CO2 reduction” across the entire battery supply chain.

<https://www.yokogawa.com/industries/bt/> (English only)

# Our contributions

**Approach** Based on Customer base, Industry × Customer issue × Solutions



## Common Solutions



### Our 3 approaches to help solve customer issues

- 1 Industry Supply Chain**  
We contribute to our customers' entire supply chain with a focus in experienced and/or related industries with our knowledge and experience
- 2 Customer Perspective**  
We will identify customer issues together (MX), and contribute through effective services and proposals using digital tools
- 3 Solution**  
We contribute to our customers by developing unified solutions for social issues and global deployment

## New Technology



### In a World First, Yokogawa's Autonomous Control AI Is Officially Adopted for Use at an ENEOS Materials Chemical Plant

- One year of stable operation demonstrates this next-generation control technology can decrease environmental impact, achieve stable quality, and transform operations -

ENEOS Materials Corporation (formerly the elastomers business unit of JSR Corporation) and Yokogawa Electric Corporation (TOKYO: 6841) announce they have reached an agreement that Factorial Kernel Dynamic Policy Programming (FKDPP), a reinforcement learning-based AI algorithm, will be officially adopted for use at an ENEOS Materials chemical plant. This agreement follows a successful field test in which this autonomous control AI demonstrated a high level of performance while controlling a distillation column at this plant for almost an entire year. This is the first example in the world of reinforcement learning AI being formally adopted for direct control of a plant.

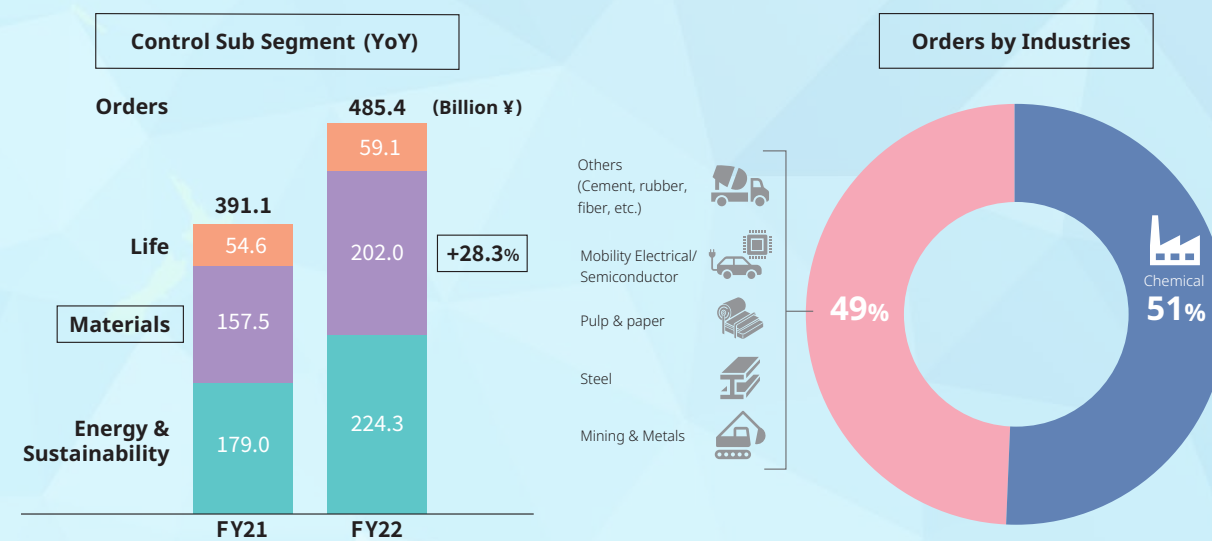


Distillation columns at the JSR chemical plant

**Factorial Kernel Dynamic Policy Programming (FKDPP) Autonomous Control AI Algorithm Takes Highest Honor in Japan Industrial Technology Awards**

For more information **Japanese** <https://www.yokogawa.co.jp/news/press-releases/2023/2023-03-15-ja/> **English** <https://www.yokogawa.com/news/press-releases/2023/2023-03-15/>

















## Reference



### Yokogawa Group

Global Network **64** Countries Service Structure **200** Offices+ **2,500+** Service Engineer

# Contributions to the SDGs

Areas where the materials business contribute, and related SDGs, targeting the year 2030		
<b>Achieving carbon neutrality</b>	 	Supporting distribution, storage, and utilization of renewable energy
<b>Improving efficiency in society &amp; industry</b>	  	Smart manufacturing business, consultation, ERP, MES, and EMS
<b>Optimizing plant lifecycle &amp; protecting environment</b>	   	Supporting the plant's long-term optimal operation and reduction of environmental footprint
<b>Improving health &amp; safety</b>	 	Supporting safety and security of plant and workers
<b>Creating a resource-recycling ecosystem</b>	    	Contributing to specialty chemicals and biochemical industries, supporting efficiency improvement of recycling businesses

**Together with our customers, we work towards a value creation society that is environmentally sustainable.**

Yokogawa believes it is our raison d'être to solve environmental and social issues. We proactively contribute to the initiatives to achieve carbon neutrality with other companies and strive to realize a new circular society that can coexist with the global environment.

## Yokogawa Electric Corporation

Materials Business Headquarters

<https://www.yokogawa.com/about/company-overview/general-information/material/>

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