



Medium-term Management Plan (FY2021-FY2025)

Realization of Your Success, Our Pride.

Progress report

December 6, 2021

Toyo Engineering Corporation

Haruo Nagamatsu, President & CEO

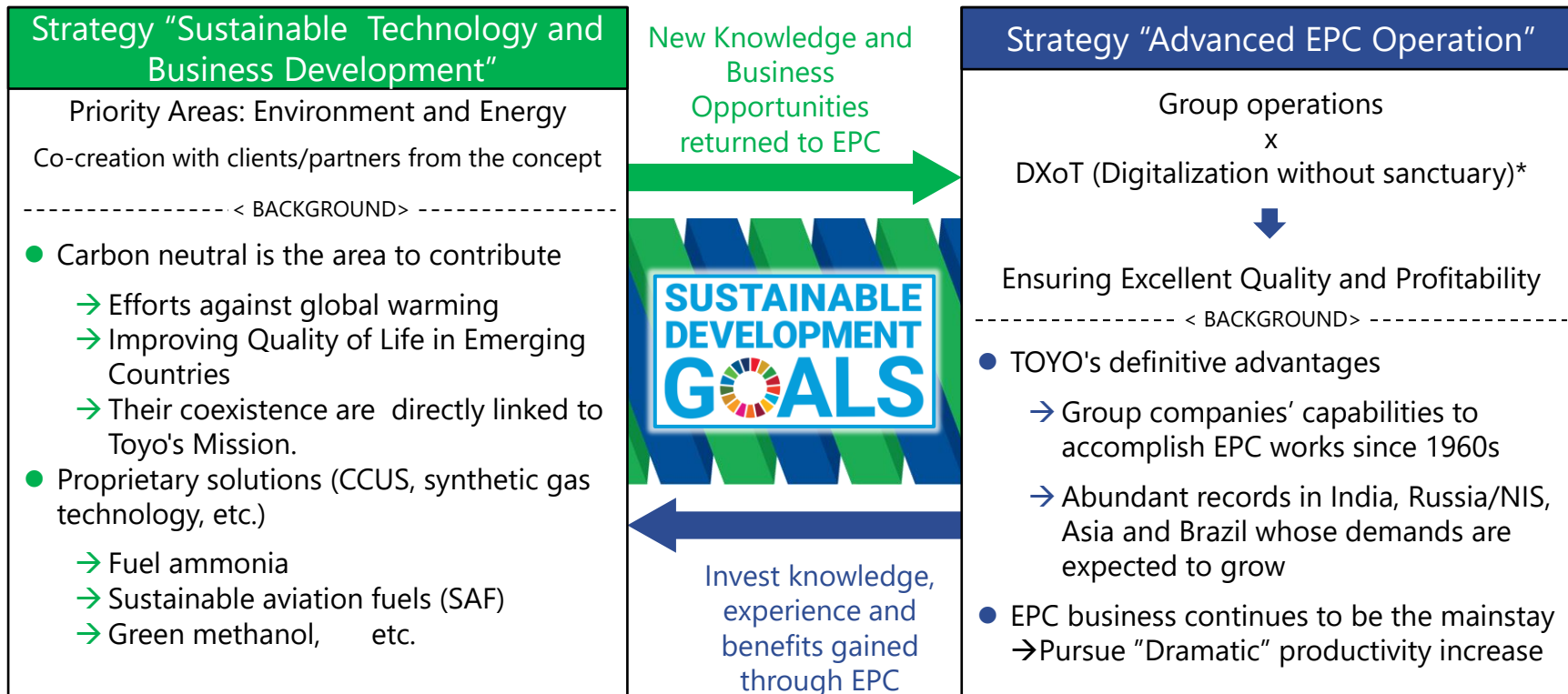


- **Medium-term Management Plan and Numerical Targets**
- **Examples of Carbon Neutrality Initiatives**
- **Advanced EPC Operation**
 - progress of DXoT
- **Sustainability**



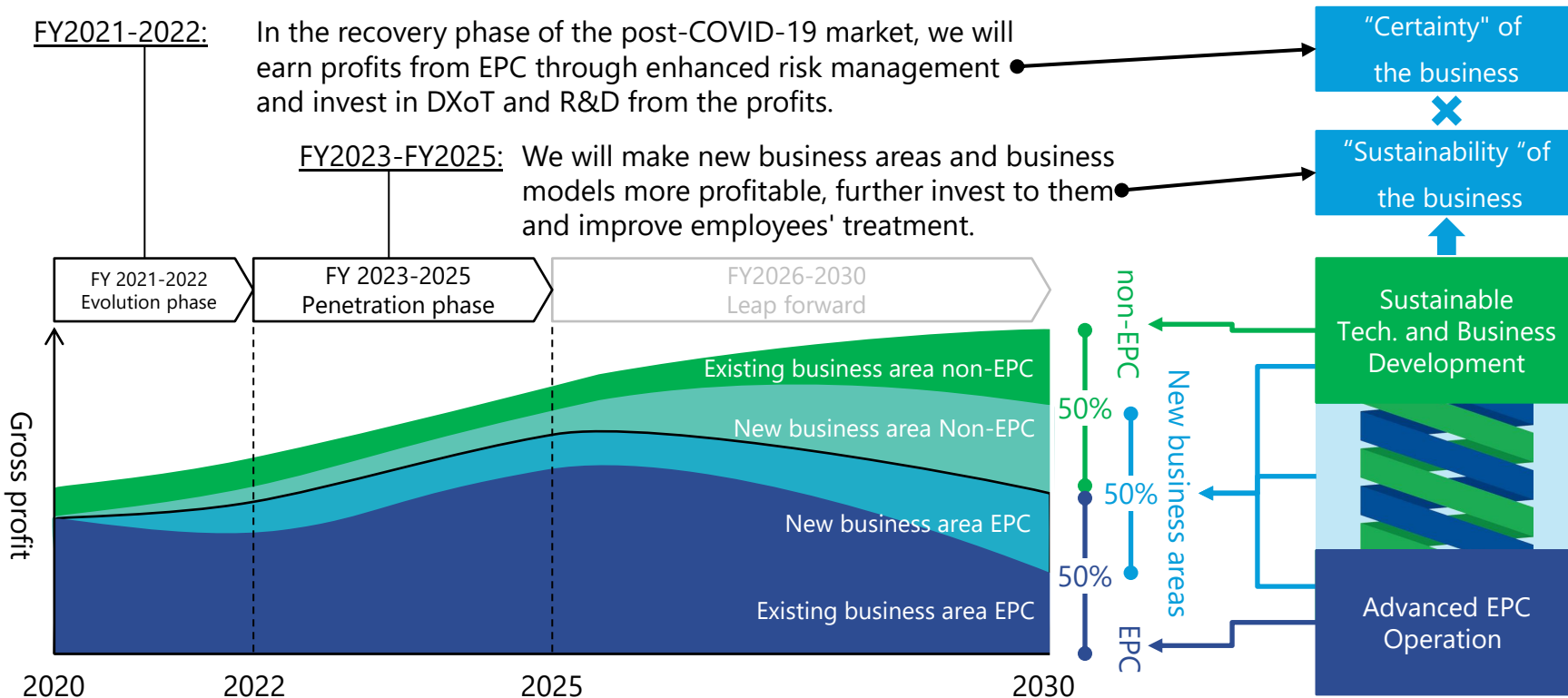
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Sustainable Global society through Sustainable Technology & Business Development and Advanced EPC Operation



* : Digital Transformation of TOYO

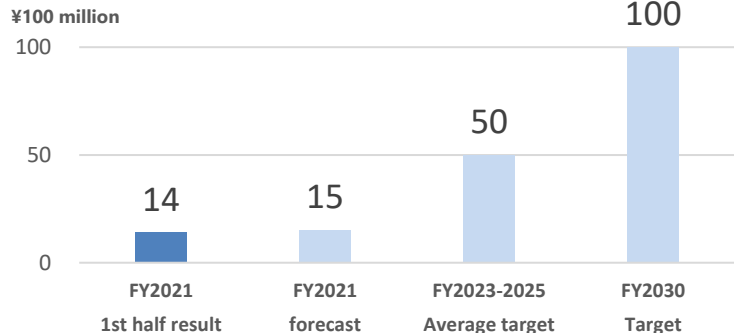
TOYO's sustainability (certainty x sustainability) as well as Global community



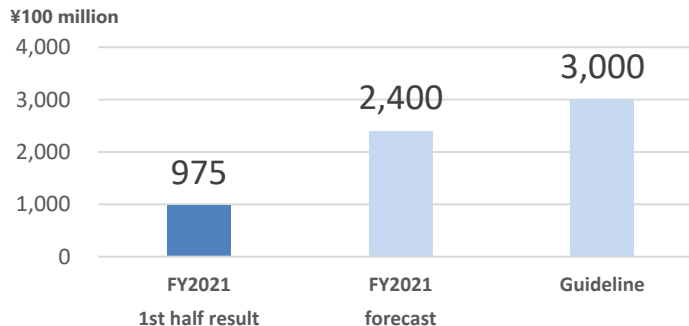
※ : Non-EPC = non-EPC/EP Lump-Sum projects

KGI (Key Goal Indicator)

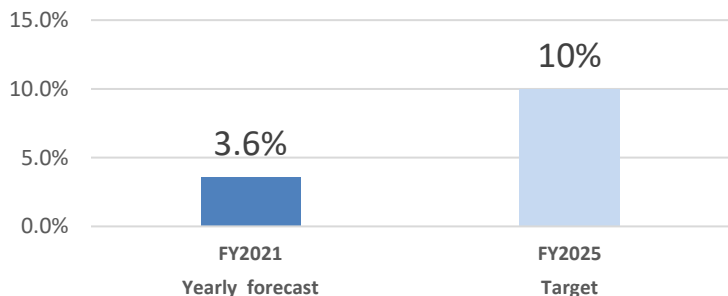
Consolidated net income



Consolidated net sales



ROE



- Consolidated net income

Early operation of Nigeria fertilizer, domestic maintenance work, overseas petrochemicals FEED contributed.

- Consolidated net sales

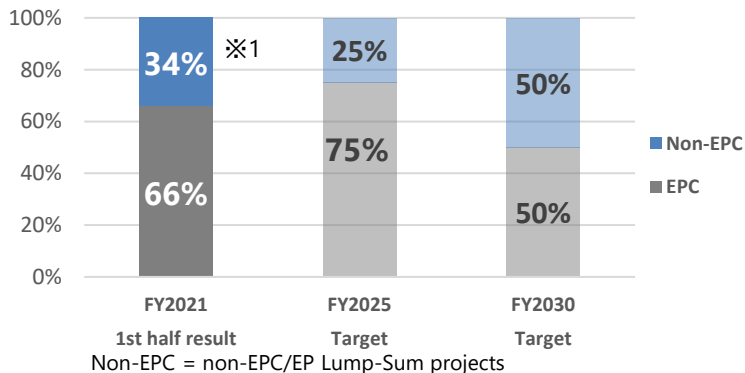
Expected to improve in the 2nd half by projects in India, Russia and new orders award recently

- ROE

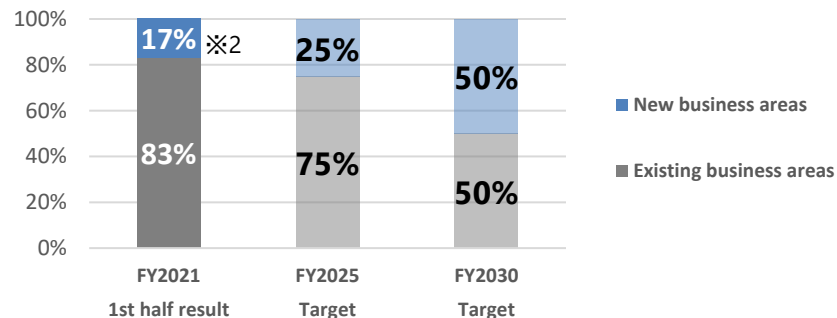
Improve profit levels toward ROE target in FY2025

KPI (Key Performance Indicator)

Non-EPC gross profit composition







New business areas gross profit composition



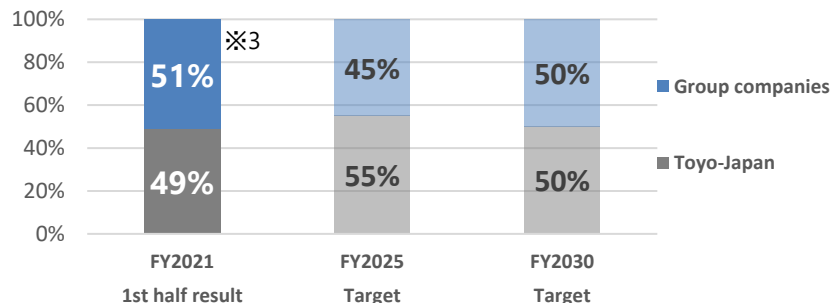
※1: Major Non-EPC Projects: Petrochemical FEED (China)
Maintenance work (Japan)

※2: Major New Business Projects: High-performance chemicals (South Korea and China)
Methane hydrate (Alaska)

※3: Major Projects of Group Companies in the 1st half:

-  Toyo-India (Oil and Gas)
-  TPS (maintenance and pharmaceuticals)
-  Toyo-China (semiconductor-related)
-  Toyo-Korea (Semiconductor-related)

Group companies gross profit composition



TSPI (Brazil) is not included as an equity-method company.

New order target in the 2nd half of FY2021 (Yellow Highlights) are additional awarded order after 1st half)

New order target : JPY 280 billion (JPY122 billion in the 1st half)

Existing business domains		New business domains	
Business Areas	Major Expected New Orders	Business Areas	Major Expected New Orders
Chemicals / Fertilizers	<ul style="list-style-type: none"> ● Ammonia (Middle East) ● Chemicals (China and Southeast Asia) 	Recycling and Low environmental impact	<ul style="list-style-type: none"> ● Waste PET recycling (Japan)
Petrochemicals	<ul style="list-style-type: none"> □ Petrochemicals (China) 	CO ₂ utilization, Energy conservation	<ul style="list-style-type: none"> □ Examination of CO₂ recovery and utilization □ Energy conservation and GHG reduction service HERO (Southeast Asia)
Oil and Gas (FPSO, etc.)	<ul style="list-style-type: none"> ● FPSO ● Refinery (India) 	Next generation Energy	<ul style="list-style-type: none"> □ FS of Fuel ammonia
Power generation (Re-energy, Gas Thermal Power)	<ul style="list-style-type: none"> ● Biomass power generation (Japan) ● Geothermal power generation (Southeast Asia) ● Gas-fired power generation (South America) * 	Resources and Energy Security	<ul style="list-style-type: none"> □ Marine Mineral Resources (Japan)
Transportation system	<ul style="list-style-type: none"> ● Railways (Southeast Asia) 	Quality of Life	<ul style="list-style-type: none"> ● Advanced Pharmaceuticals (Japan) ● High-performance chemicals (China)

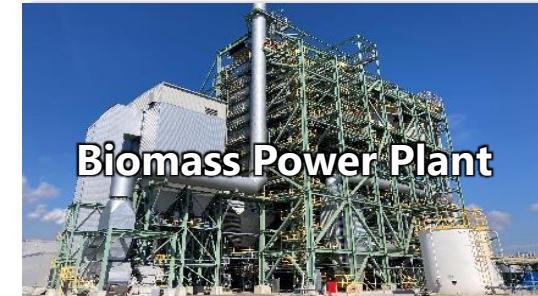
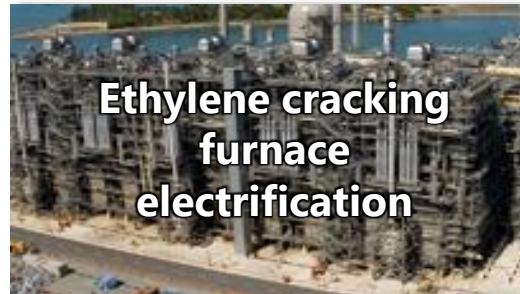
● EPC □ Non-EPC

* : Equity method companies



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Examples of Carbon Neutrality Initiatives



SAF production using woody biomass as a raw material

Production of SAF at pilot plant and supplied to a commercial flight (FY2017-2021)



Supplied SAF to JL515 (June 2021)

Note: This project was commissioned by the New Energy and Industrial Technology Development Organization (NEDO) and implemented jointly with Mitsubishi Power Ltd., JERA Co., Inc., and Japan Aerospace Exploration Agency (JAXA)

SAF production using wood biomass as a raw material

Start a study for a commercial-scale SAF production technology and the creation of a supply chain (August 2021)

Schedule for commercialization

FY2021-2022:

Commercial-scale plant plans

Design FT* Reactors for Japanese Specification

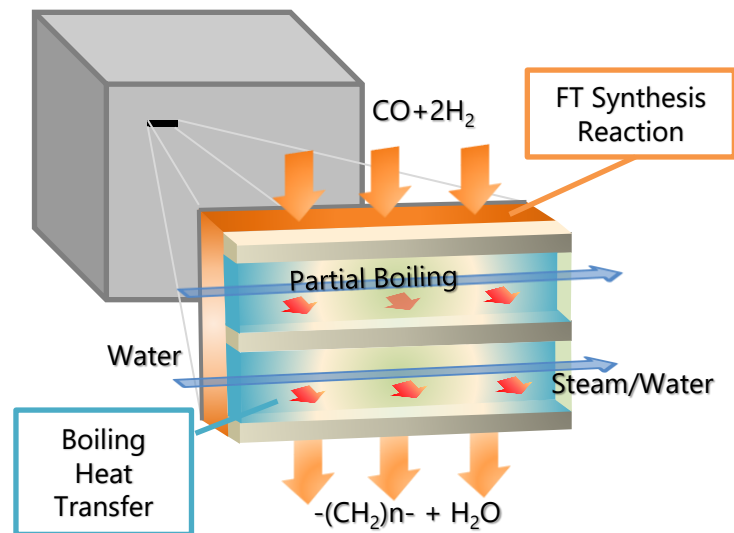
Evaluate business feasibility

FY2023-2024:

Transfer to the implementation phase

for the creation of a supply chain

<Microchannel FT Synthesis Technology>



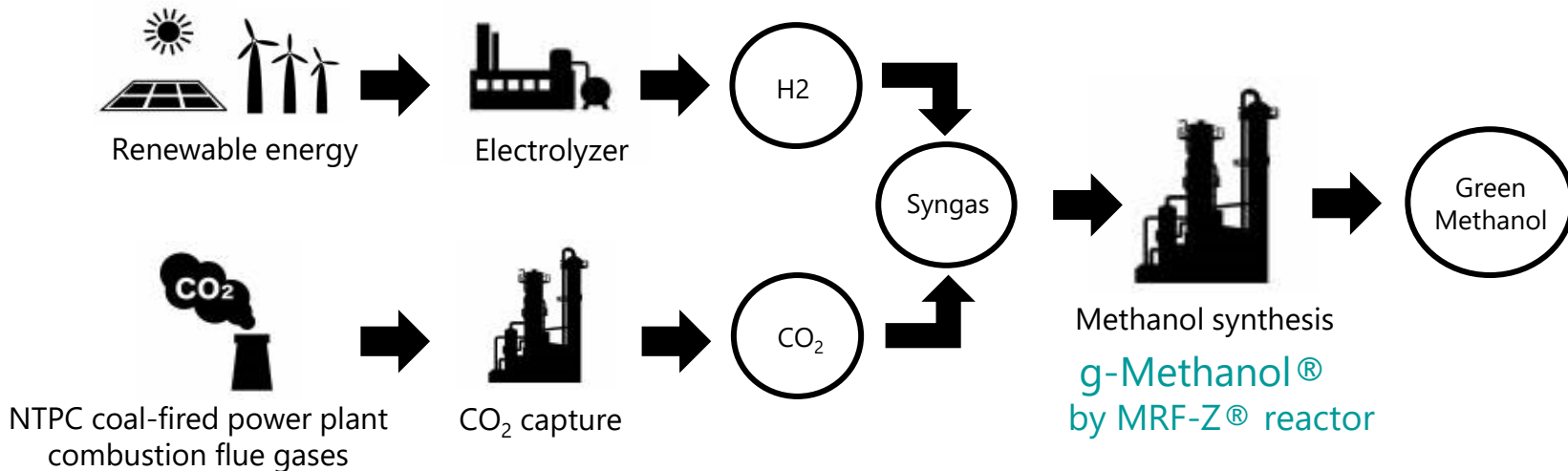
Note: This project was implemented jointly with JERA Co., Inc., Mitsubishi Heavy Industries, Ltd., and ITOCHU Corporation, with support from NEDO.

* : Fischer Tropsch synthesis. Technology synthesizing liquid hydrocarbons from CO and hydrogen by using a catalytic reaction

CO₂ Value Chain (Direct methanol synthesis from CO₂)

g-Methanol® adopted at the Demo Plant in India (October 2021)

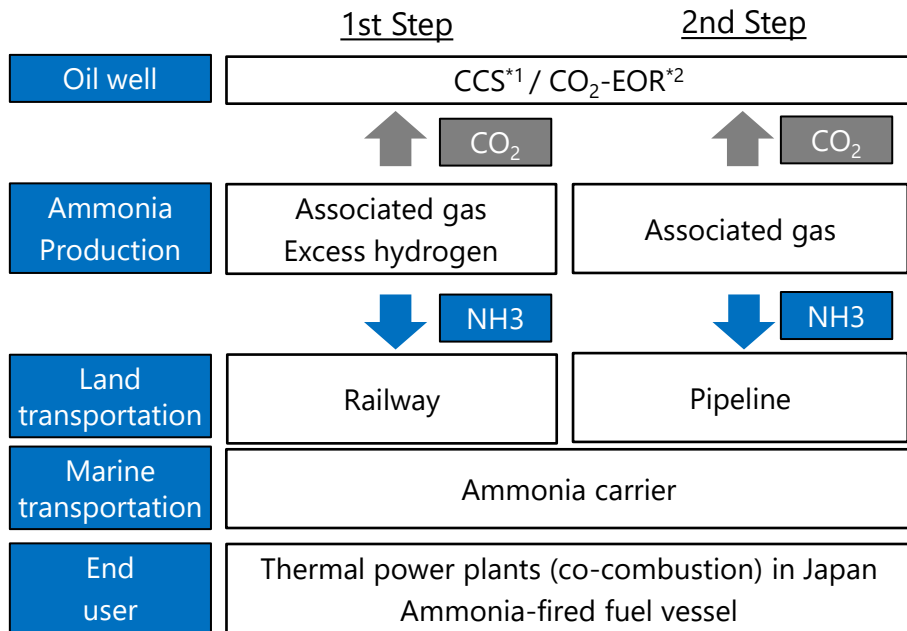
- Client: National Thermal Power Corporation, India (NTPC)
- Site Location: Vindhyachal, Madhya Pradesh, India
- Production capacity: 10 tons/day
- Scheduled Completion: February 2023



Consulting with customers to create a value chain from the perspective of business creation

Plan to develop and commercialize Fuel Ammonia VC (Value Chain) between East Siberia and Japan

◆ Details of a feasibility study



◆ Characteristics and superiority of this project

- Cheaper natural gas
- Cost of marine transportation is low
(Closer than the Middle East, North America and Australia)



Phase 2 online MOU signing ceremony (September 2, 2021)

(Note) Joint implementation with Irkutsk Oil Company, Japan Oil, Gas and Metals National Corporation (JOGMEC), and ITOCHU Corporation

*1: Carbon dioxide Capture and Storage *2: Enhanced Oil Recovery through CO₂ Injection

Development of marine mineral resources

Contributing to the realization of a carbon-neutral society through the development and research of marine mineral resources in Japan (EEZ)

◆ Cobalt-rich ferromanganese crust (including Cobalt and Nickel as battery materials)

Started a study on the engineering of mining testing machines (from November 2021)

JOGMEC Commissioned Project

"Technical Development for Design of Cobalt-Rich ferromanganese Crust Mining Testing Machines Related to Marine Mineral Resource Surveys in Fiscal Year 2021"

◆ Rare earth mud (including Neodymium and Dysprosium, which are magnets and motor materials for EVs)

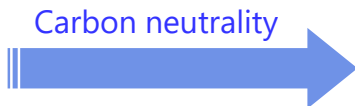
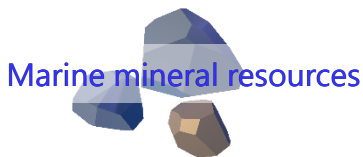
Continuing to conduct business from FY2019

Manufacturing of the recovery of rare earth mud production system is underway (from July 2021)

Awarded Cross-ministerial Strategic Innovation Promotion Program

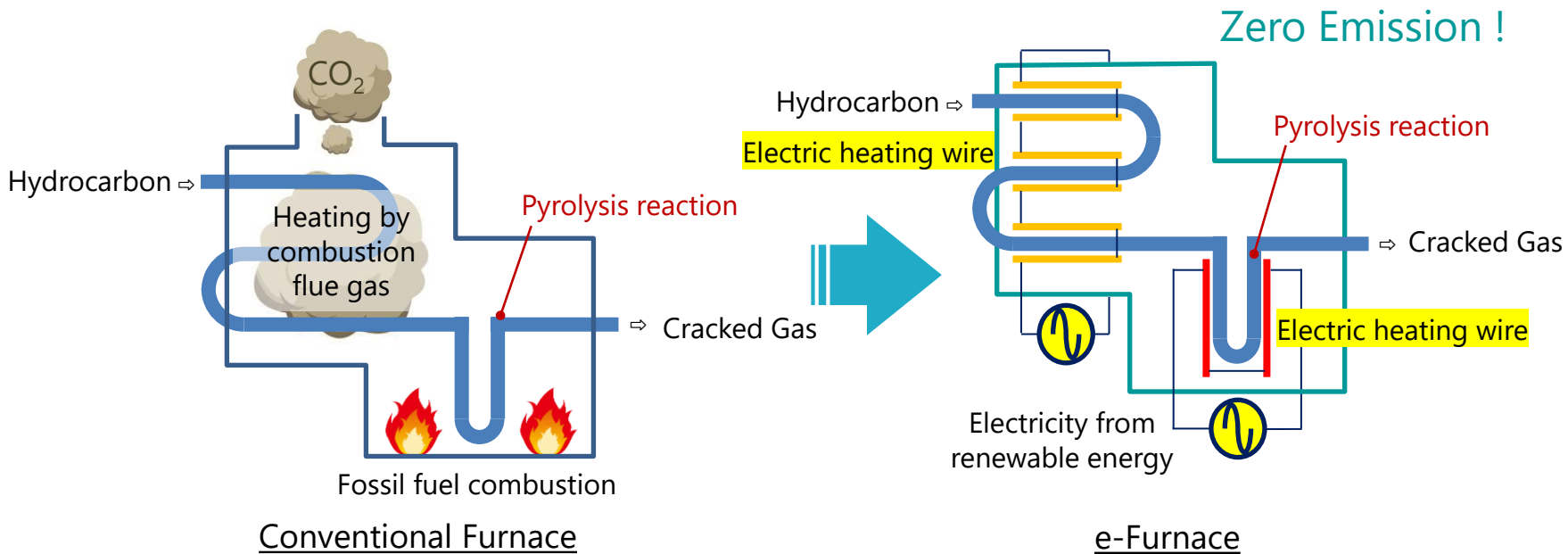
"Development of Innovative Technologies for Exploration of Deep Sea Resources

- Development of Rare Earth Mud Production Technology"



Ethylene Cracking Furnaces Electrification

Toyo is working on developments to use renewable electricity instead of the fossil fuel gas for the Ethylene Cracking Furnaces to the reduction of CO2 emissions (October 2021 ~)



Note: Adopted for the 2nd Public Solicitation for the "International Demonstration Project on Japan's Energy Efficiency Technologies in FY2021, NEDO

A total of 10 EPCs (total of approximately 550 MW) were awarded

	FY of award	Construction site	Equipment capacity
①	2017	Kamisu, Ibaraki	50MW class
②	2018	Takaoka, Toyama	50MW class
③	2018	Yonago, Tottori	50MW class
④	2018	Ishikari, Hokkaido	50MW class
⑤	2019	Omaezaki, Shizuoka	75MW class
⑥	2019	Gamagori, Aichi	50MW class
⑦	2020	Ichihara, Chiba	75MW class
⑧	2021	Seiro, Niigata	50MW class
⑨	2021	Karatsu, Saga	50MW class
⑩	2021	Tahara, Aichi	50MW class



Biomass power plant (Kamisu, Ibaraki)

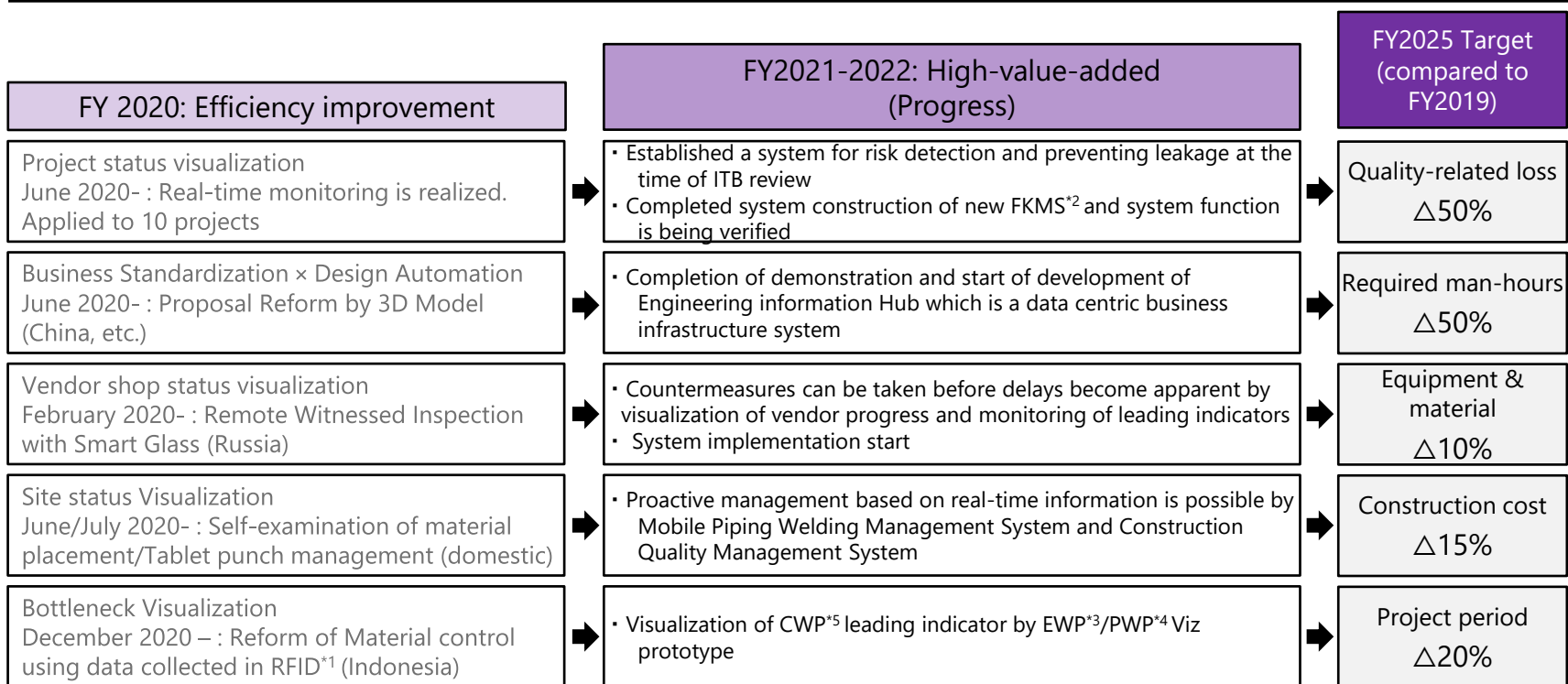


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DXoT's target of 6 times productivity by 2025

Continue business reforms and system development, and start implementation into projects

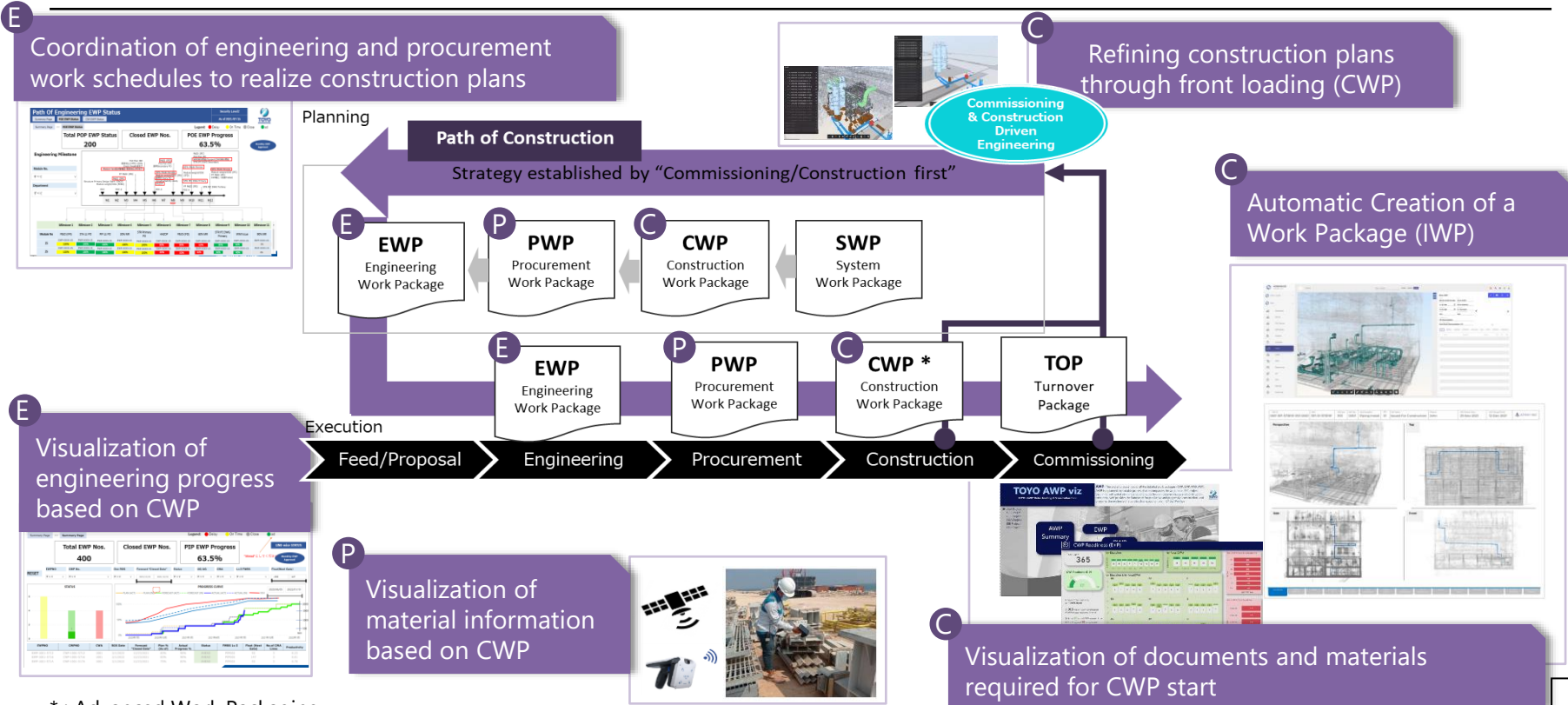
⇒Improvement of project profits by advanced risk management, reducing man-hours and preventing problems



*1: RFID=Radio Frequency Identification *2: Feedback Knowledge Management System
 *3: Engineering Work Package *4: Procurement Work Package *5: Construction Work Package

Establishment of DX x AWP * - TOYO AWP "CC Driven Engineering"

EPC Data Linkage Integrated System is under development. Realization of proactive management by refinement of project planning, automatic coordination of work packaging, and visualization of leading indicators/impediments



* : Advanced Work Packaging

Strengthening Risk Management Using Lessons Learned

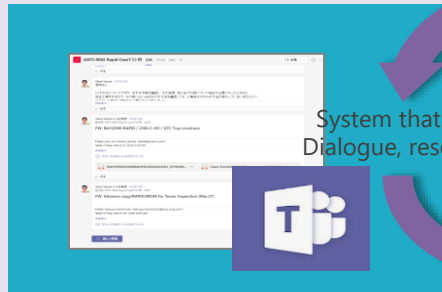
Sophistication of the knowledge management system

- Construction of a system that enables the natural accumulation of knowledge by combining experience, collective intelligence and organizational intelligence

Alarm detection support system

- Proposals and designs are implemented using the AI for the detection of abnormal signs.
- AI's criteria for judgment and response raise the standards for judging and responding to attributes and the standards for judging and responding to unskilled individuals.

Conversion of Tacit Knowledge to Explicit Knowledge and accumulation and utilization of them through collaborative tools



System that does not cause trouble
Dialogue, resolution, and retention



Organizational intelligence

Registration, management and utilization of Lessons Learned

Feedback Knowledge Management System

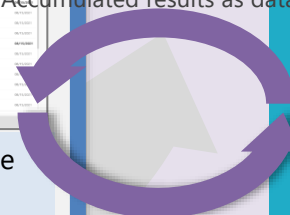
Accumulation of project trouble information

Accumulated results as data



By leveraging accumulated data
AI Learning and Strengthening

Accumulated results as data



By leveraging accumulated data
AI Learning and Strengthening

ITB*1 Review AI

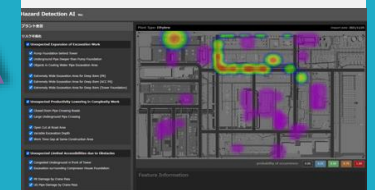
Required action in ITB Review
Feedback extraction



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UG*2 Constructability Hazard Detection AI

Detect UG risk

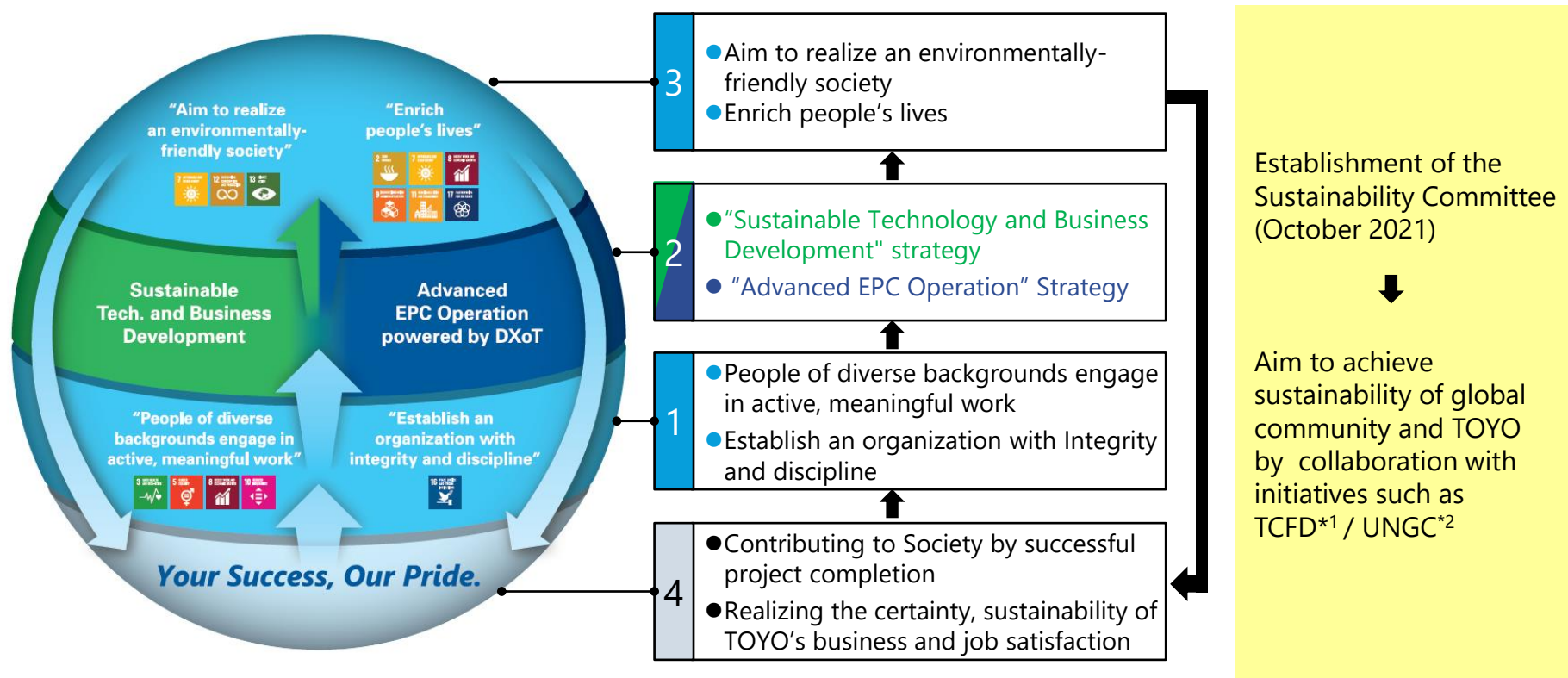


*1: Invitation to Bid *2: Underground



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Mission: Engineering for Sustainable Growth of the Global Community



*1: Task Force on Climate-related Financial Disclosures *2: United Nations Global Compact, agreed both in November 2021



Your Success, Our Pride.