

# Revitalization Plan Update

May 7, 2021

Chiyoda Corporation

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# 1. Executive Summary

# Executive summary

## Revitalization Plan in review

- We have completed the second year of our five-year Revitalization Plan. We are making steady progress on the three major actions of this plan: “Further develop the risk management structure,” “Enhance EPC execution and management capacity,” and “Reinforce human resources” (p5)
- We expect that there will be a delay of 2-3 years in achieving our quantitative target for “accumulating consolidated-basis net profits” due to external factors such as the COVID-19 pandemic and falling oil & gas prices (p6)

## Business roadmap for the future

- Accurately gauge the macro trend of the accelerating transition to a carbon-free society as we move towards carbon neutrality in 2050 (p8)
- To achieve our vision for 2030, a waypoint on this path, along with completing the Revitalization Plan, with our collective strength in engineering and our real-world implementation capabilities, we will transform our business portfolio and further improve our ability to generate profits (p10)

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## 2. Revitalization Plan in Review

# Revitalization Plan Review (Qualitative)

## Revitalization Plan actions

Topic	Identified action (5 years)	Progress (recent 2 years)	Assessment
1. Further develop the risk management system	<ul style="list-style-type: none"> <li>Further develop risk management and project execution structure</li> </ul>	<ul style="list-style-type: none"> <li>Established an integrated risk management system</li> <li>Avoided accepting orders that exceed our human resources availability</li> </ul>	○ / △
	<ul style="list-style-type: none"> <li>Further enhance corporate governance</li> </ul>	<ul style="list-style-type: none"> <li>Kept 4 independent outside directors</li> <li>Segregated business oversight and execution (only two executives (president &amp; CFO) may concurrently serve as board members)</li> </ul>	○
2. Enhance EPC execution and management capacity	<ul style="list-style-type: none"> <li>Enhance EPC execution and management capacity</li> <li>Strengthen construction execution capabilities</li> </ul>	<ul style="list-style-type: none"> <li>Improving real-time grasp of project execution and predictive accuracy with the introduction of Chiyoda AWP* and integrated data management</li> <li>Strengthened organization &amp; human resources for contract &amp; sub-contract management</li> </ul>	○ / △
3. Reinforce human resources	<ul style="list-style-type: none"> <li>Enforce meritocratic selection, diversify skill sets, proactively recruit external talent</li> </ul>	<ul style="list-style-type: none"> <li>Deployed new HR system in April 2021</li> </ul>	○

\*Chiyoda Advanced Work Packaging (AWP) is a project management tool using digital technology whereby construction work is packaged through integrated management to optimize the EPC process from engineering and procurement to construction, commissioning, and handover.

○ : Achieved  
△ : Ongoing

# Revitalization Plan Review (Quantitative)

## Revitalization Plan quantitative targets

Topic	Identified action (5 years)	Progress (recent 2 years)	Assessment
1. Order targets	<ul style="list-style-type: none"> <li>Annual LNG/gas projects of JPY200-450bn, global environmental projects of JPY100-150bn</li> </ul>	<ul style="list-style-type: none"> <li>2 year totals(*): LNG/gas projects approx. JPY 850bn Global environmental projects approx. JPY 200bn</li> <li>Some large projects have been postponed due to falling oil prices and the COVID-19 pandemic.</li> <li>Received order for large project in Qatar</li> </ul>	○ / △
2. Net profit	<ul style="list-style-type: none"> <li>Transform earnings structure in order to consistently generate JPY10-20bn in net profit</li> <li>Accumulate JPY90bn in profits over 5 years</li> </ul>	<ul style="list-style-type: none"> <li>Posted profits of JPY 20bn in first 2 years of Revitalization Plan</li> </ul>	△
3. Increase the shareholders' equity ratio	<ul style="list-style-type: none"> <li>Lift shareholders' equity ratio back up to 20% or better</li> </ul>	<ul style="list-style-type: none"> <li>Shareholders' equity ratio has returned to 11%</li> </ul>	○ / △
4. Eliminate accumulated losses	<ul style="list-style-type: none"> <li>Eliminate accumulated losses during timeframe covered by the business plan</li> </ul>	<ul style="list-style-type: none"> <li>The accumulated losses have been eliminated thanks to the accumulation of profits and a reduction in capital</li> </ul>	○
5. Reduce fixed costs	<ul style="list-style-type: none"> <li>Reduce consolidated-basis SG&amp;A to JPY15bn</li> </ul>	<ul style="list-style-type: none"> <li>Consolidated-basis SG&amp;A was JPY 13bn in FY2020</li> </ul>	○

\*Global environmental projects includes domestic refinery and petrochemical projects and international metal projects.

○ : Achieved  
△ : Ongoing

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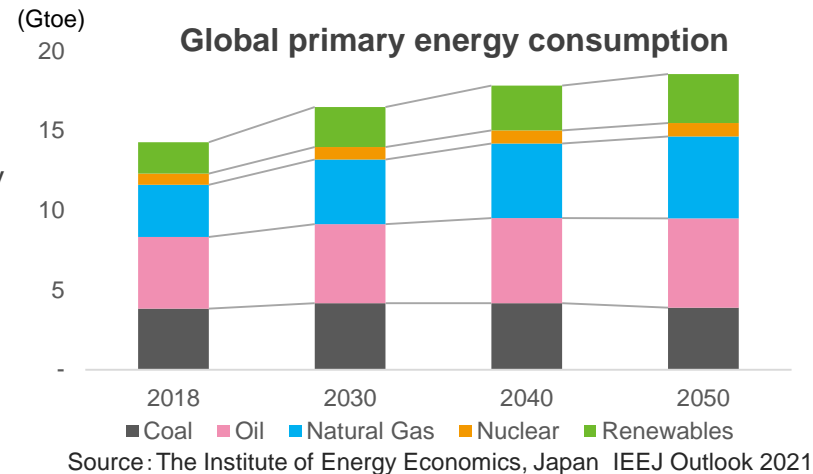
**3.** Business Environment:  
Accelerating Decarbonization



# Business Environment: Accelerating the Transition to a Decarbonized Society

## Widening adoption of low-carbon & green LNG

- ◆ Demand for natural gas & LNG will remain firm as they are a pragmatic solution to address both growing energy demand and decarbonization
- ◆ The widespread adoption of renewable energy will be essential to realizing a carbon-free society by complementing with natural gas & LNG



## The accelerating shift to decarbonization/hydrogen energy

- ◆ Hydrogen strategies are being drafted because hydrogen utilization is viewed as a critical factor in all sorts of industries—materials, power generation, mobility, steel—to achieve the goal of carbon neutrality by 2050 in countries and regions around the globe
- ◆ Countries and regions are working to expand the market by setting specific quantitative targets, such as goals for hydrogen consumption and FCVs(\*) in operation by 2030

\* FCV : Fuel Cell Vehicle

## Public policy goals around the world

Country	Public policy goals
Japan	By 2030, reduce greenhouse gases by 46% compared to 2013. Boost hydrogen consumption to 3mn tons in 2030 and 20mn tons in 2050
US	Reduce greenhouse gas emissions by 50-52% compared to 2005. California: 1mn FCVs, 200 hydrogen stations, 400mn tons hydrogen production by 2030
EU	Boost electrolytic hydrogen production capacity to 40GW, 10mn tons
China	Support development of FCV manufacturing supply chain. FCVs: 50,000 vehicles by 2025, 1mn vehicles by 2030-2035 Hydrogen stations: 300 locations by 2025, 1,000 locations by 2030-2035

Source: Prepared by Chiyoda based on Ministry of the Environment's website

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## 4. Vision for 2030

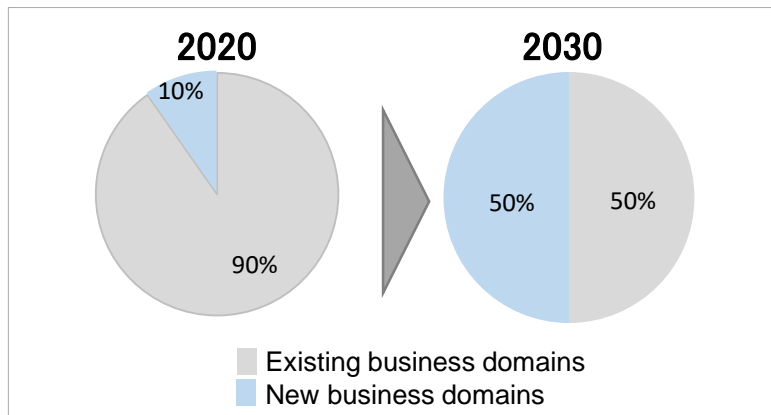
# Vision for 2030

## Vision for 2030

1. With our advanced technological capabilities, we will accelerate the transition to a carbon-free society, including hydrogen energy, and contribute to the achievement of carbon neutrality by 2050
2. We will transform our business portfolio by pursuing growth in the carbon-neutrality and life sciences fields while at the same time creating and strengthening models for recurring business, lifting the share of profits from new areas to 50%
3. We will transform our earnings structure in order to generate a net profit of JPY30bn or higher

### Profit split between existing and new businesses

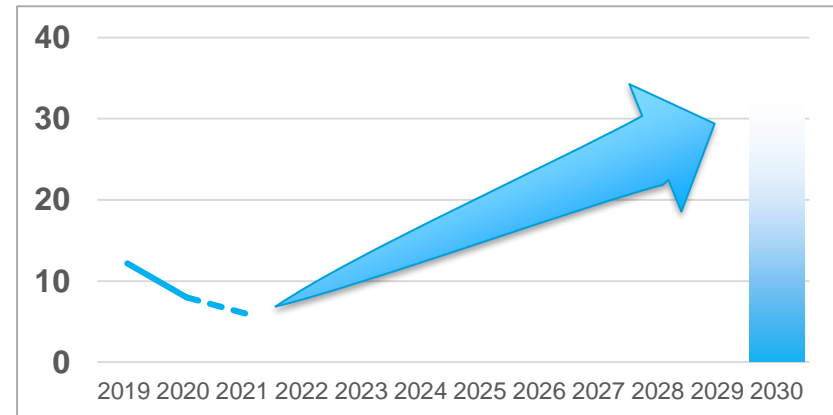
By transforming our business portfolio, we aim for a 50:50 split in profits between existing and new businesses



### Profit objective

We aim for an earnings structure that will allow us to generate net profit of JPY30bn or higher by 2030

(JPY bn)

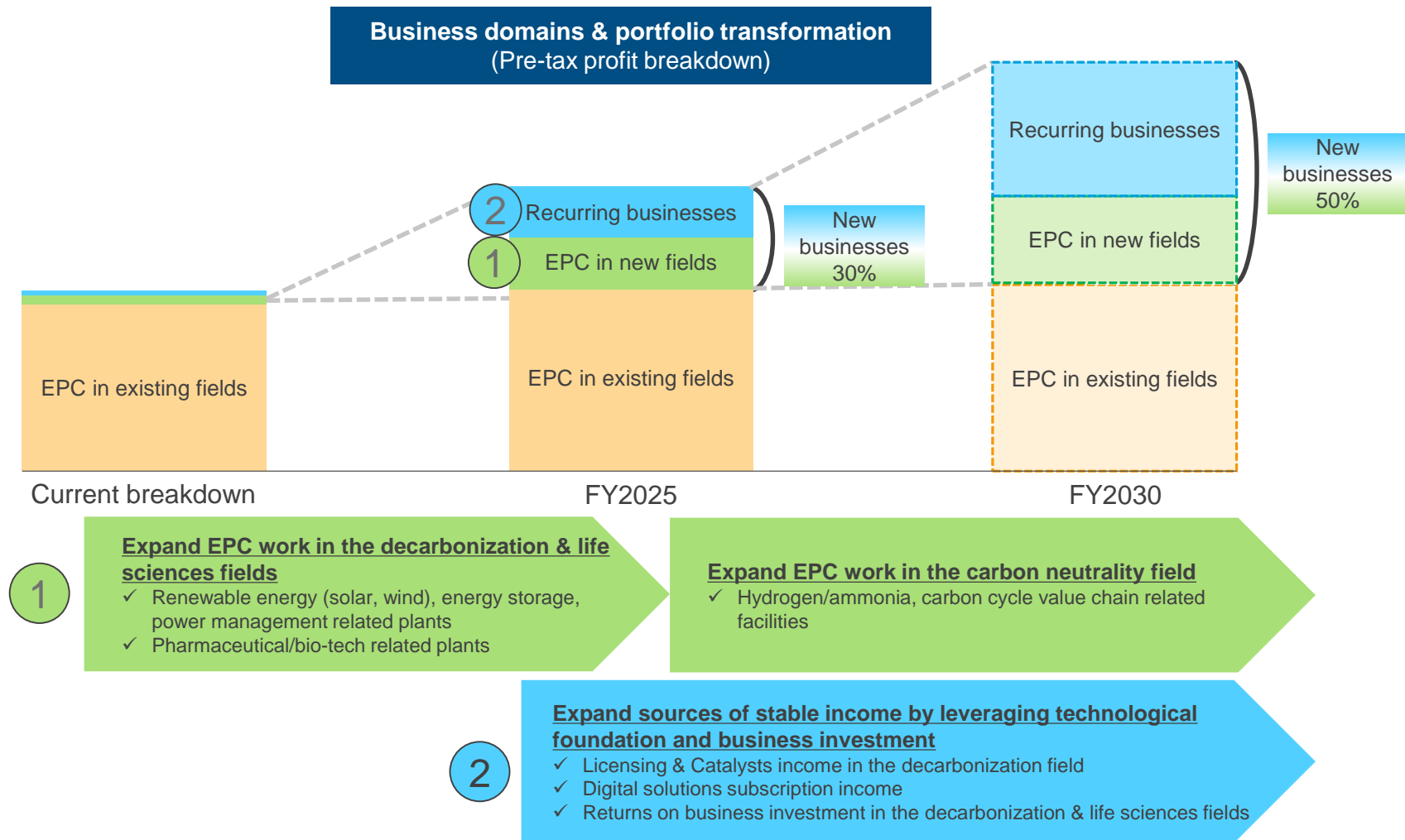


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## 5. Business Portfolio Transformation

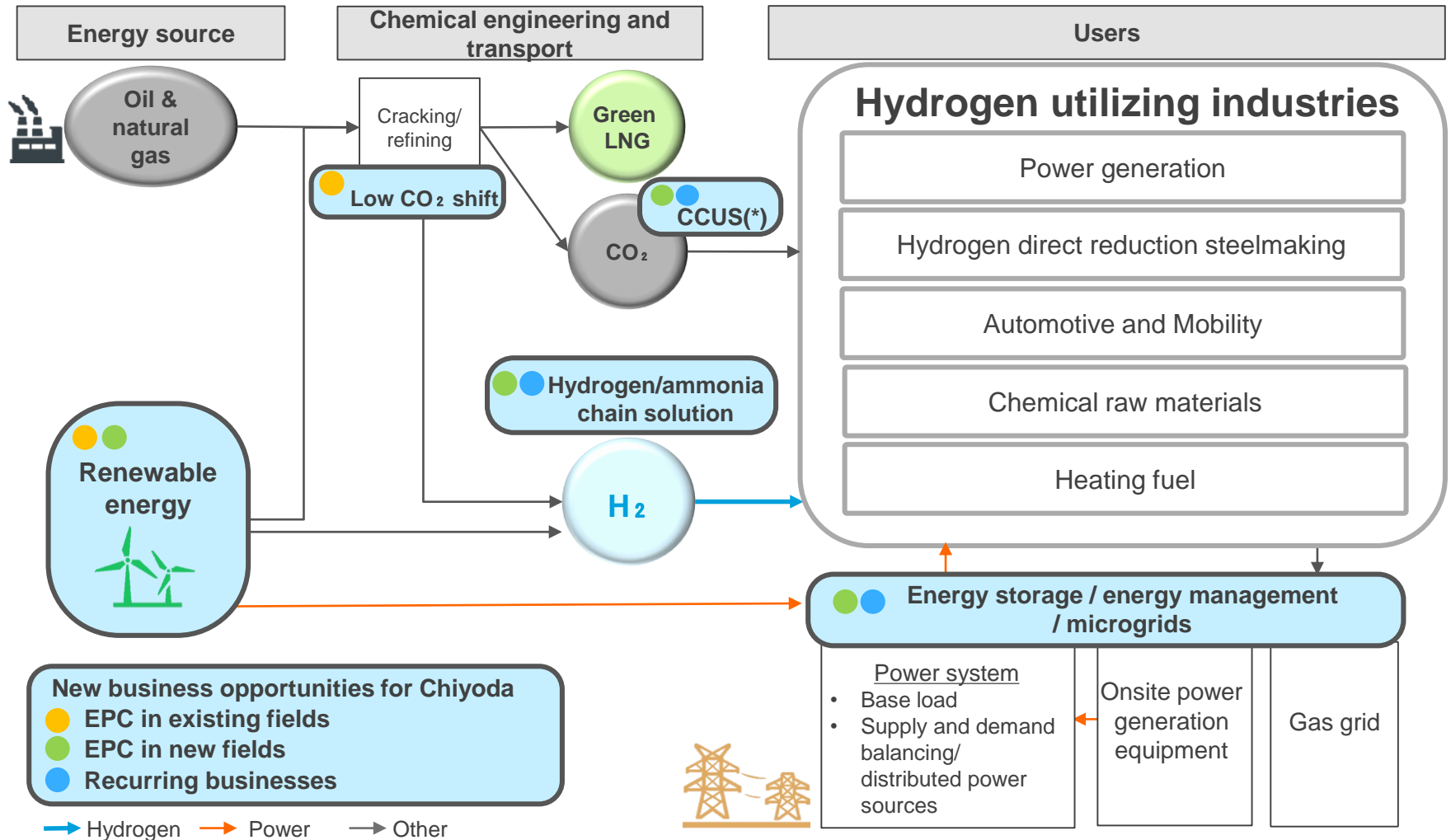
# Business Portfolio Transformation

- To achieve our vision for 2030, by 2025 we will expand our EPC work in new fields and establish recurring businesses (sources of stable income from licensing, catalyst, digital solutions, and business investment)
- We aim to shift towards more stable income by 2030 by expanding income from recurring business



# Chiyoda Business Integration with a View to Decarbonization

- Aggressively promote hydrogen utilization across a wide range of industries as a means of realizing a carbon-free society
- Optimize energy management systems to lower costs and realize decarbonization



\*CCUS: Carbon dioxide Capture, Utilization and Storage

## Initiatives to Decarbonize and Reduce CO<sub>2</sub>

We will help the transition to cleaner energy in conventional LNG, oil, petrochemical, and power generation

### Qatar: NFE LNG(\*) export terminal (new LNG plant) EPC phase

#### Significance of this order to Chiyoda

This project incorporates carbon dioxide capture and storage equipment and aims to significantly reduce greenhouse gas emissions compared to a conventional LNG plant.

It will crystallize our technical know-how of decarbonization.

■ Qatar: World's largest trains



Courtesy of Qatargas Operating Company Limited

### US: FLG(\*\*) Project LNG cooling equipment electrification

Replaces gas turbine with the world's largest electric motor-driven cooling system. Completed the facilities that produce 15mn tons of LNG per year



Courtesy of Freeport LNG Development, L.P

### Optimizing plant operations with EFEXIS™



#### Client DX support: Optimizing plant operations

Deploying the EFEXIS™ solution helps to optimize our clients' plant operations and maximize asset value in Japan and across the world.

It also helps to improve plant productivity, reduce operating and maintenance costs, and reduce greenhouse gas emissions in the operation.

\*North Field East LNG export terminal in Qatar

\*\*Freeport LNG export terminal in United States (3 Trains)



## Hydrogen Business (SPERA Hydrogen<sup>®</sup>, ammonia)

By making the most of our engineering solutions and taking advantage of the benefits of various hydrogen carriers, we will help to make a hydrogen-based society a reality

Business environment that will be key to widespread use of hydrogen/fuel ammonia

Accelerate shift to a decarbonized society

Make the most of existing facilities

Accelerate technological development

Support hydrogen & ammonia imports

Broadening usage, incl. FCVs

### Hydrogen/ammonia related engineering

Objective

Offer optimized equipment configuration/cost/schedule for every phase of the hydrogen value chain

Strategy

- Help to scale up hydrogen/ammonia infrastructure from production to import
- Build SPERA Hydrogen chain

### Hydrogen/ammonia chain solution business

Objective

Participate in cross-industry regional hydrogen deployment projects in locations like Japan, Asia such as Singapore, and Europe

Strategy

- Offer hydrogen chain solutions in Japan Asia such as Singapore, and Europe ,where there is ample hydrogen import demand
- Leverage our technology to offer licensing & catalysts

Volume of hydrogen used in hydrogen / ammonia projects involving Chiyoda in 2030

Total 1.75 million tons (equivalent to about 6 GW)



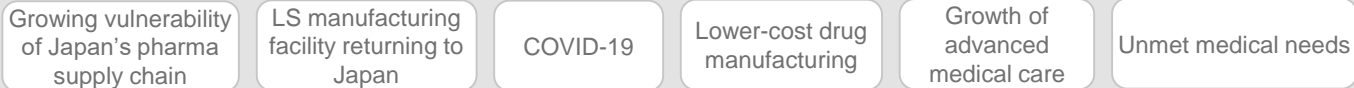


# Life Science Business



In light of the world's growing unmet medical needs, we will become a provider of high value-added biotechnology & life science solutions

## The changing environment for biotechnology & life science (LS)



- Ongoing EPC work for Shionogi & Co., Ltd. Covid-19 vaccine factory for genetically modified protein.



Courtesy of Unigen inc.

### Biotechnology & pharmaceutical life science engineering

Objective

Become an industry leader in EPC for biotechnology & life science

Strategy

- Ramp up group-wide project execution and manufacturing facility engineering capabilities
- Expand into EPC areas that solve the medical needs of society, such as advanced bioprocess plants and manufacturing new types of corona vaccines

Target for orders received for 2030  
JPY 50 bn

### Lateral expansion & monetization of next-generation manufacturing process technologies

Objective

Challenge into the small-molecule drug and cell base CDMO(\*) business and Pursue horizontal deployment and monetization of the technologies.

Strategy

- Implement continuous manufacturing for pharmaceuticals that uses our continuous manufacturing process technologies
- Industrialize the expansion cell culture process / challenge into the cell base culture CRO(\*\*) business & CDMO business

Number of projects handled in 2030  
10 cases / year

(contribution to development & manufacturing of pharmaceutical products)

\*Contract Development Manufacturing Organization

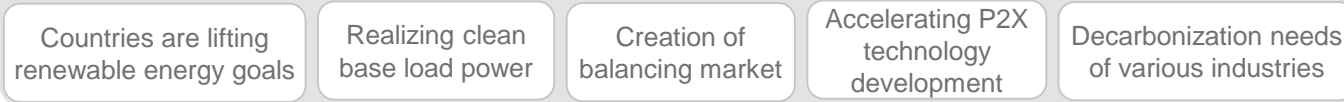
\*\*Contract Research Organization

# Energy Management Business



- We will strengthen the EPC business in the fields of renewable energy, energy storage, and energy management (EMS) and move into the O&M business
- We will create recurring businesses by using the facilities know-how that we have accumulated through our EPC business and our digital solutions

## Business environment for the energy storage and energy management fields



Storage battery system for North Hokkaido Wind Energy Transmission Corp.

### Renewable energy/energy storage/EMS engineering

Objective

Expand EPC work for renewable energy incl. offshore wind farms / energy storage / EMS, move into the O&M business

Strategy

- Take advantage of our project management capabilities to win EPC work in the fields of offshore wind farms & energy storage
- Move into the O&M business for facilities in which we have been involved
- Strengthen engineering capabilities for the overall system optimization in P2X(\*) field

Target for orders received for 2030 JPY 50 bn

### Energy utilization optimization business

Objective

Offer solutions that optimize utility use by connecting renewable energy/energy storage/EMS and plant utilities

Strategy

- Leverage our EPC facilities know-how and AI-based renewable energy variability forecasting system to expand energy storage solutions that connect power systems and energy storage systems in an optimal manner
- Create an Energy as a Service(\*\*) business that optimizes utilization of existing process & utility
- Develop advanced technology in the P2X field

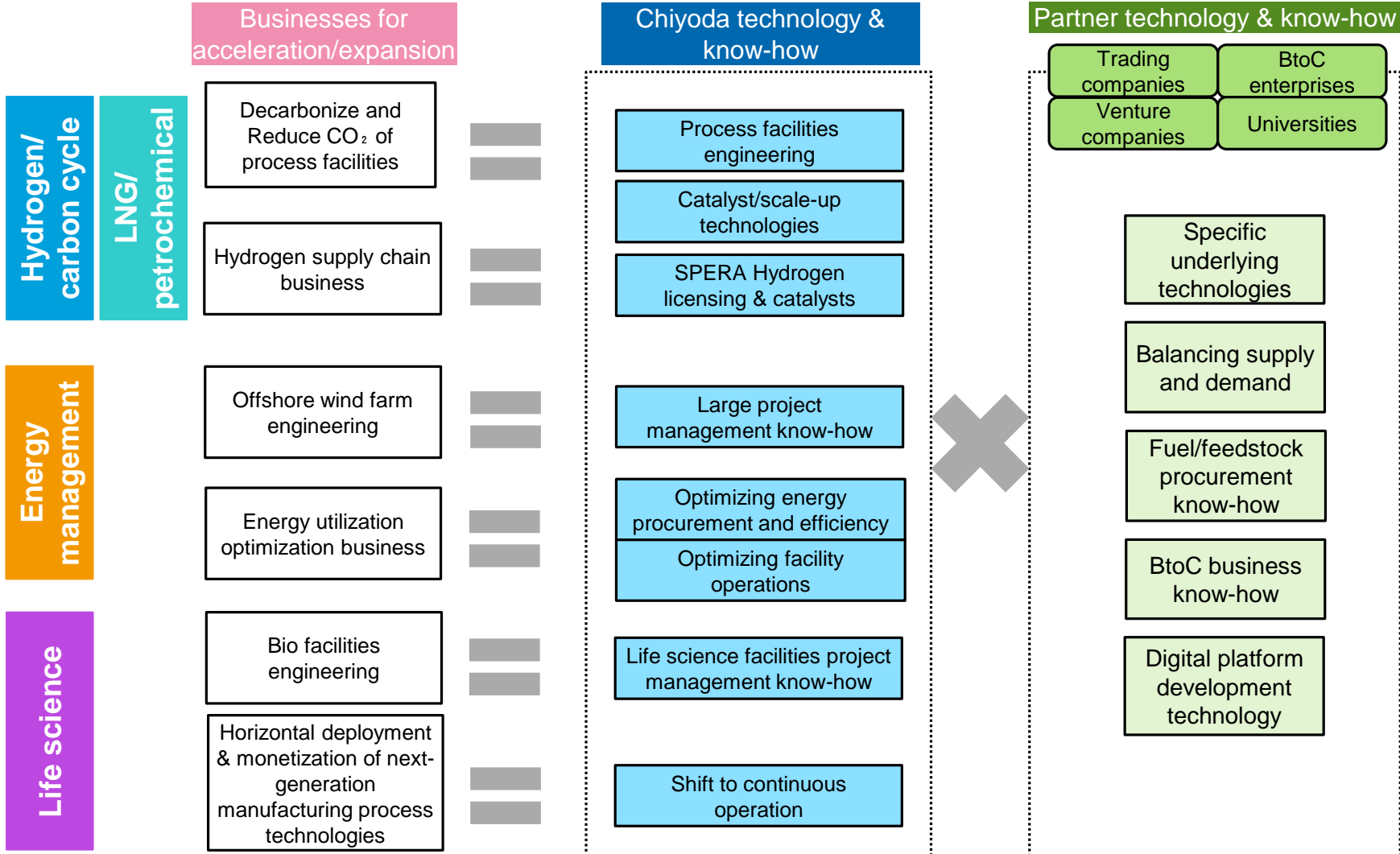
Early income realization and expansion of profit base in EaaS business for industrial customers, and expansion to area utility business

\*Power-to-X: the concept of using compounds produced by electrolysis powered by renewable energy

\*\*Energy as a Service: providing one-stop utility-related services, helping to cut costs, increase asset value, and reduce CO<sub>2</sub> emissions

# Partnering to Accelerate Commercialization

Accelerate and expand commercialization by proactively co-creating and collaborating with other companies with the know-how and technology that we lack



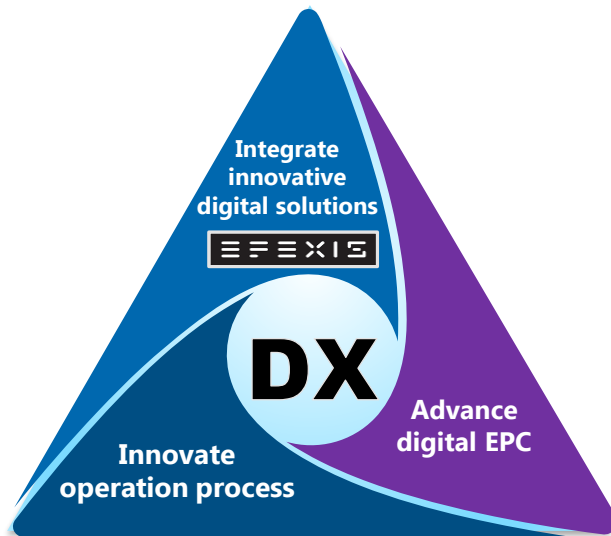
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## 6. Digital Transformation (DX)

# Enhance the Business Model by DX

## Enhance the value of our core business models

### Accelerate the Chiyoda Group DX



### Medium to longer term initiatives

#### Company-wide DX promotion

- Accelerate deployment of project management data model and Chiyoda AWP
- Deploy supply chain collaboration and digital materials / labor management
- PlantStream™(\*) provides automated engineering using digital technology. Proper forecasting of project completion by establishing concurrent engineering data models
- Digital workplace evolution and proactive deployment of robotic process automation (RPA)

LNG/petrochemical business	Hydrogen/carbon cycle
Energy management	Life science

- With EFEXIS™, we aim for optimal and autonomous plant operation by combining engineering expertise and digital / AI technologies
- Establish energy management platforms for plants and communities
- Apply digital twin technology to optimize operation of dehydrogenation facilities

### Medium to longer term objectives

By 2025:

- Improve project execution efficiency by 20 %
- Improve construction execution efficiency by 20 %

Realize the Energy Transformation (EX) by engineering the DX on production, operation, and supply chain

\*\*PlantStream™ is a standalone CAD system that reduces the space design processes that are part of basic plant design work by 80% and also has made it possible to create 3D models five times faster than before.



# Enhance the Business Model by DX

## Digital solutions We Offer

Innovative digital solution  
to maximize customer asset values

Provide innovative solution combining plant engineering expertise and advanced AI / digital technologies

### LNG Plant AI Optimizer™

Using Deep Learning AI technology to indicate continuous productivity improvement for the best LNG plant operations



1)

4:08min

### CDU Operations Optimizer

Provide optimal operating parameters in real time during the switching operation of Oil Refinery



2)

3:46 min

### FCC AI Optimizer

Provide AI system to achieve optimal operation for Fluid Catalytic Cracking and Residue Fluid Catalytic Cracking unit



2)

4:57min

### Foaming Prediction AI System

Mitigate turndown and/or unplanned shutdown by predicting abnormal operation(occurrence of foaming) of acid gas removal unit



1)

2:42min

### Furnace-Diagnosis real-time support System

Provide web interface remotely supporting safe, efficient and flexible operation and maintenance of process furnace unit in real time



2)

3:41min

### PlantStream™

Commercial Business of autonomous CAD with phenomenal precision and speed that converts the expertise of skilled plant design engineers into algorithms

- Reduce 80% of man-hours spent on 3D spatial design during basic design
- Develop 3D model 5 times faster than ever before



### PlantStream™

EFEXIS™

1) English Video 2) Japanese Video

The link in production solutions name will direct you to an introduction web page.  
When reading a QR code, please hide other QR codes to avoid misreading.

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## 7. SDG Initiatives



# SDG Initiatives

Leveraging our strengths, Chiyoda Group will continue to push ahead on our Revitalization Plan while also contributing to the development of a sustainable society with our engineering prowess

## Priority issues (Materiality) For Chiyoda Group

SUSTAINABLE DEVELOPMENT GOALS



Affordable and clean energy



Industry, innovation and infrastructure



Climate action

Revitalization Plan  
~ Revitalization and vision for the future ~

### Chiyoda CSR values

1. A Reliable Company
2. Environmental Initiatives
3. Social Contributions
4. Respect for Human Rights
5. Commitment to Fairness

### Chiyoda's strengths

- **Project execution capabilities**  
Use engineering to ensure high product quality
- **Overall optimization capabilities**  
Provide optimal solutions for complex constraints and problems
- **New technology implementation capabilities**  
Combine basic research and engineering technologies

The Chiyoda Corporate Philosophy  
~Our mission to fulfill~

“Energy and environment in harmony”  
We will enhance our business in aiming for harmony between energy and the environment and contribute to the sustainable development of a society as an integrated engineering company through the use of our collective wisdom and painstakingly developed technology.

## Sustained Growth and Reinforcing Our Reputation for Reliability



### *Energy and Environment in Harmony*

Chiyoda Corporation Corporate Planning Department, <https://www.chiyodacorp.com/en/>

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