



# Future Business Development in the Transition Period of Energy Resources

**NIKKISO CO., LTD.**

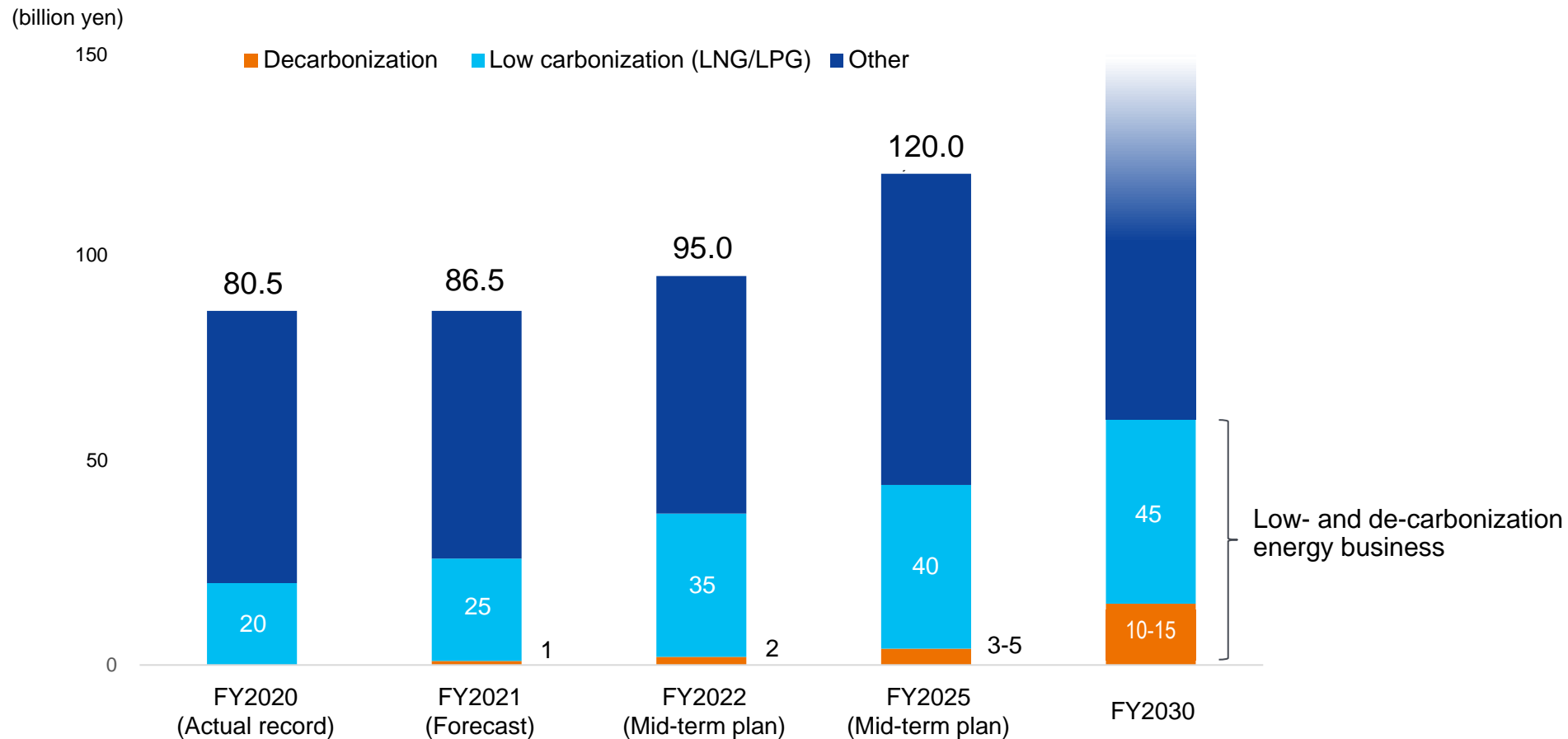
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(Security code: 6376)

## We are managing a portfolio balanced against economic fluctuations and transition in the industrial structure

	Business characteristics	Major initiatives and measures	Sales volume (billion yen)
Industrial gas	<ul style="list-style-type: none"> <li>Markets are linked with GDP growth</li> <li>Long-term steady growth is expected</li> <li>Local production for local consumption</li> </ul>	<ul style="list-style-type: none"> <li>As the demand for oxygen for hospitals and raw material gas for semiconductors is firm despite the COVID-19 pandemic, we will promote low-cost production at our factory in India, and strengthen market development in developing countries</li> </ul>	16 (18%)
Petrochemical	<ul style="list-style-type: none"> <li>Markets grow or shrink heavily depending on change in supply and demand by region and industry in the global supply chain</li> </ul>	<ul style="list-style-type: none"> <li>Establishment of production and sales systems in response to supply chain changes in China and the Middle East</li> </ul>	32 (35%)
Pharmaceuticals, semiconductors, etc. (Hi-tech)	<ul style="list-style-type: none"> <li>Heavy reliance on large investments in advanced technologies</li> </ul>	<ul style="list-style-type: none"> <li>Development of new applications such as biopharmaceuticals and 5G based on experience gained in petrochemicals and multilayer ceramic capacitors, etc.</li> </ul>	5 (6%)
Energy	Oil & gas	<ul style="list-style-type: none"> <li>Establishment of order-receiving and production systems for mass construction of the floating production, storage and offloading systems (FPSO)</li> </ul>	5 (6%)
	Nuclear/thermal power generation	<ul style="list-style-type: none"> <li>Construction of a slim business structure for precision equipment to match the scale of business after the Great East Japan Earthquake</li> </ul>	4 (4%)
	Low carbon (LNG/LPG)	<ul style="list-style-type: none"> <li>Market formation changing dynamically over the medium to long term due to a variety of factors, including ones previously considered non-economic, particularly short-term energy supply-demand relationships and energy policies in each country</li> <li>- Availability of primary energy and energy mix in each country</li> <li>- Geopolitics, low- and de-carbonization, and reduction of environmental impact</li> </ul>	27 (30%)
	Decarbonization	<ul style="list-style-type: none"> <li>Supply of infrastructure equipment faces competition in the globalized supply chain</li> <li>Integrated operation of CE&amp;IG by making NCI a subsidiary</li> <li>Introduction of LNG/LPG test facilities for cryogenic pumps at the Miyazaki Factory</li> <li>Start and acceleration of development of products for hydrogen and ammonia in Japan, the United States, and Europe</li> </ul>	1 (1%)
			<b>Total: approx. 90 billion yen</b>

## Trend in sales of Industrial Business



The following and subsequent pages explain energy conversion, which is changing significantly around the world

## 1. History of Nikkiso's flexible response to several energy shifts, recognizing them as business opportunities

- Coal → Oil → Nuclear power → LNG

## 2. Acceleration of existing initiatives

- Making sure to capture demand by enhancing our manufacturing capacity of products for LNG/LPG as transient energy toward decarbonization

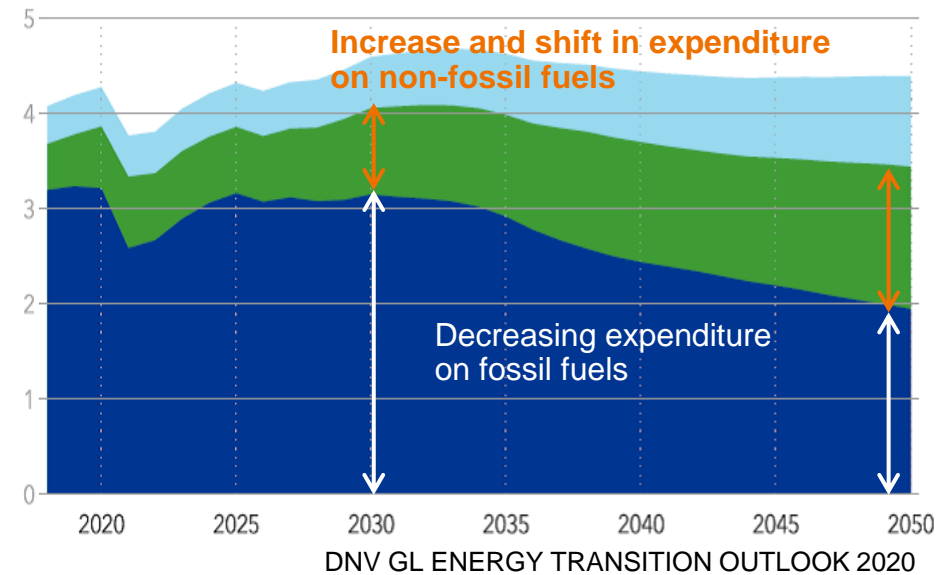
## 3. Response to new changes

- Involvement in advanced projects in the 2020s for full-scale deployment of decarbonized energy between 2030 and 2050
  - “Green” Energy – Hydrogen and hydrogen carriers
  - “Blue” Energy – CCS/CCUS

World energy expenditures by source

Units: Trillion USD/yr

Grid  
Non-fossil energy  
Fossil energy



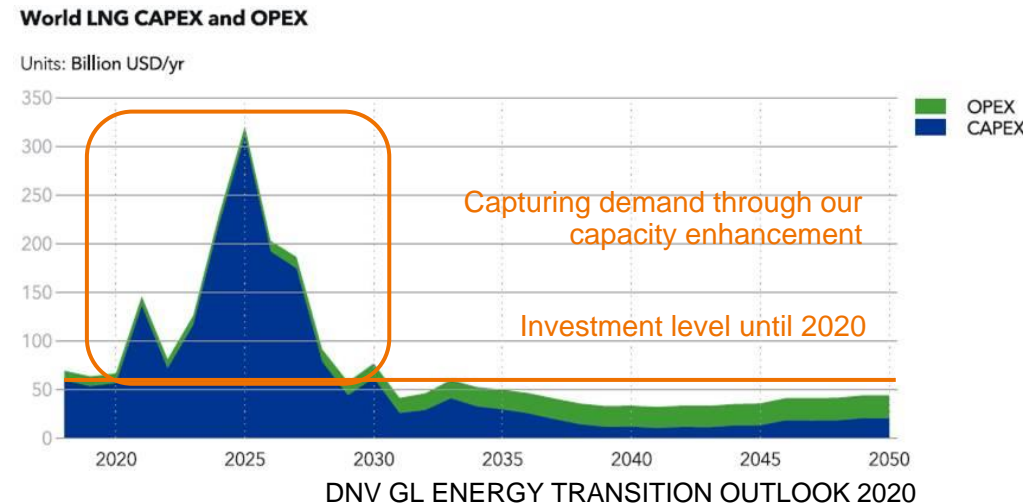
## Business opportunities to capture

### 1. Further expansion of LNG/LPG supply chain globalization

- Exporters: Russia (Arctic 2), Qatar
- Importers: China, India, Southeast Asia
- Consumption: Expansion of the range of small scale applications as importing regions expand geographically

### 2. New applications as alternative energy

- LNG-/LPG-powered ships: Orders received for fuel filling systems worth approx. 8 billion yen in 1H FY2021



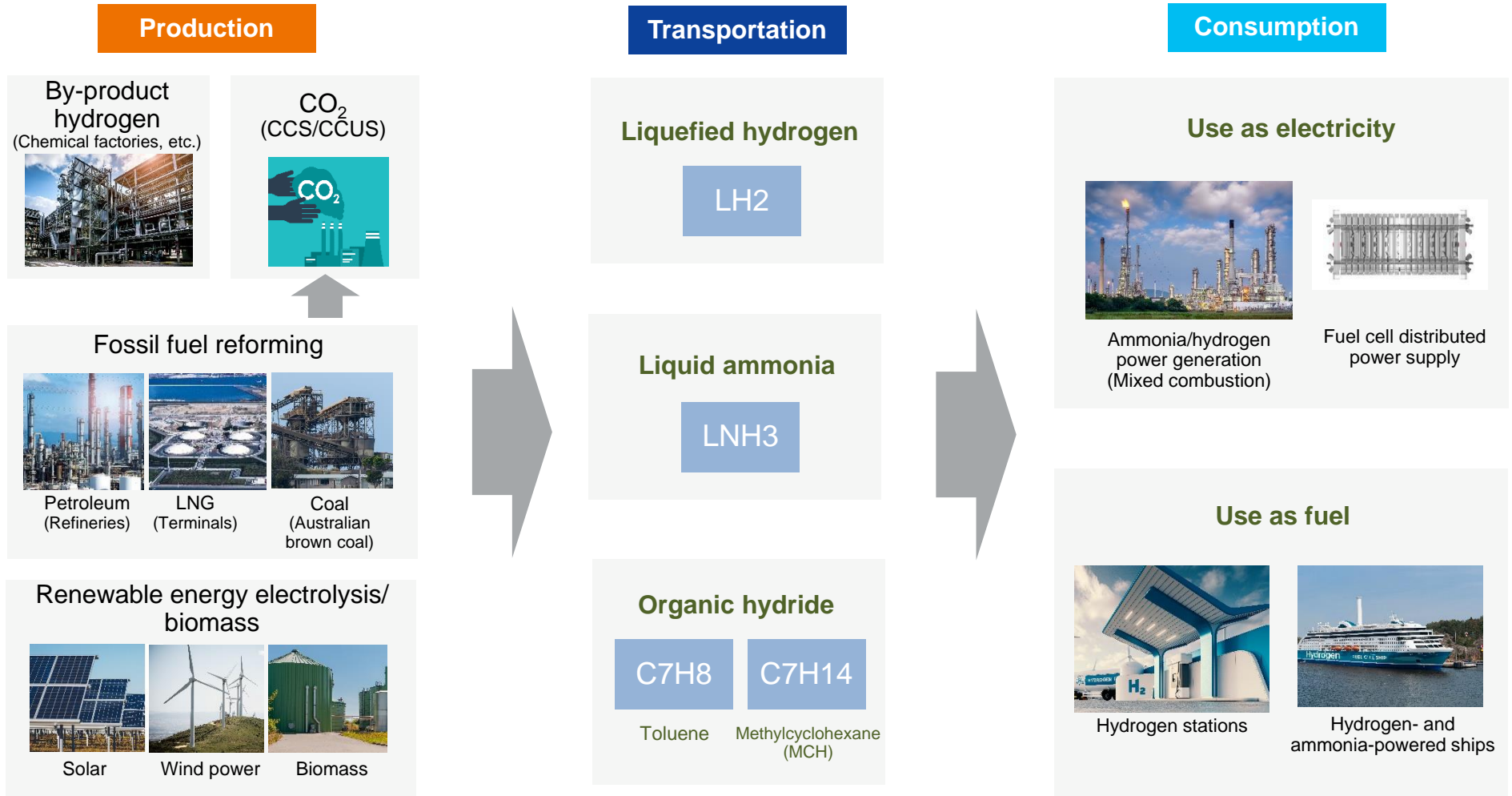
## Our approach

### ◆ Enhancement of manufacturing capacity to meet growing demand, and promotion of localization of sales and manufacturing

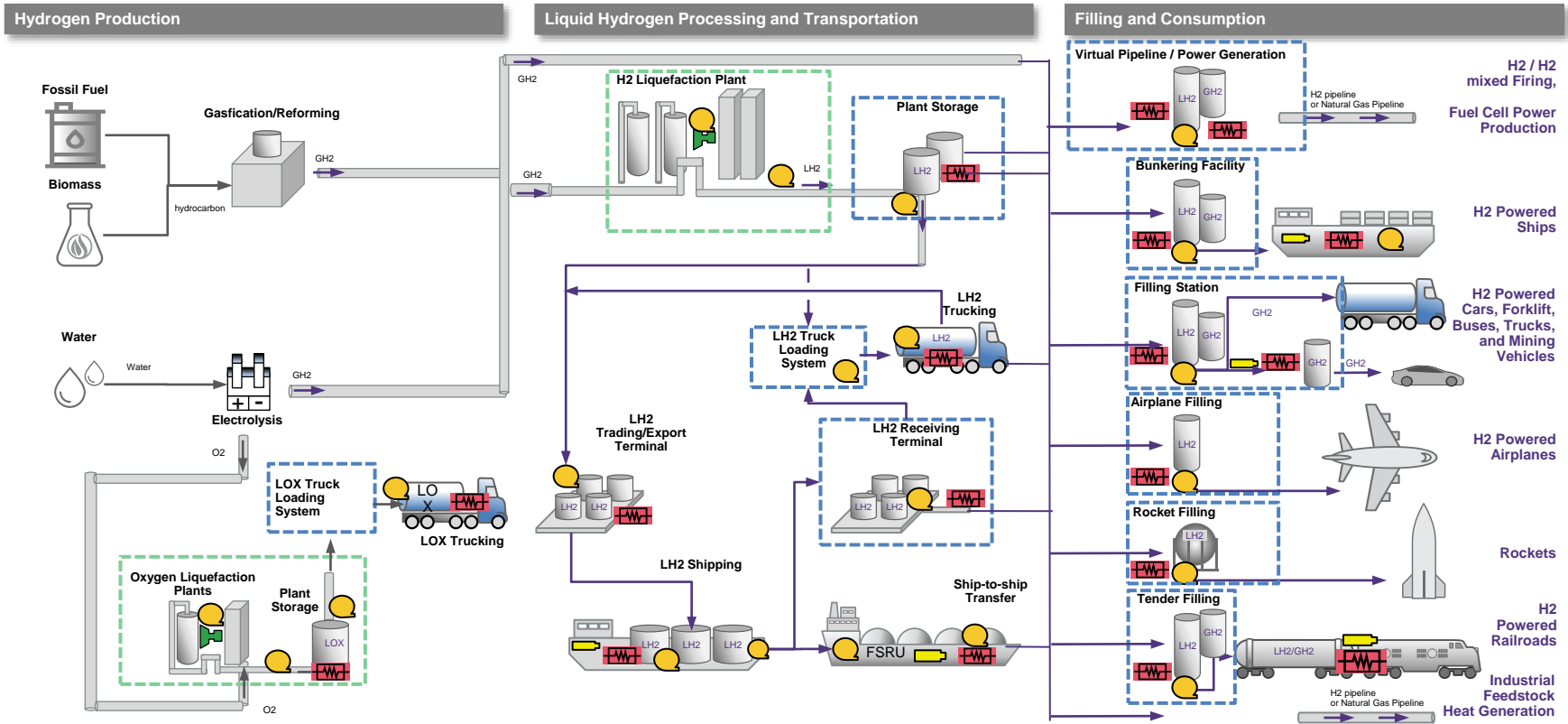
- 2021: Assembly of pumps and operation of LNG/LPG test facilities in Miyazaki
- 2021: Consolidation and enhancement of CE&IG sites in Malaysia
- 2022 plan: Assembly of fuel gas supply systems for LNG-powered ships and operation of liquid nitrogen test facilities in South Korea
- In other areas, we will continuously consider approaches that efficiently utilize resources of Industrial Business companies

# Nikkiso's Approach to Decarbonization

Experience and technology developed in petrochemical and LNG/LPG can be applied to Green and Blue energy businesses



# Hydrogen Value Chain and Our Product Lines



**Covering a wide range of our products from upstream to downstream in the hydrogen value chain as well as oil, gas, and LNG**



# Business Opportunities in Decarbonized Energy:

## (1) Liquid Hydrogen

### Business opportunities to capture

#### 1. Expansion of liquid hydrogen station business in California, U.S.

Consumption

- Stations for forklifts, which are already in the spreading phase
- Full-scale operation of stations for passenger cars from 2020
- Bus stations, which started to be launched in 2021
- Truck stations, whose demonstration has started for commercialization in or after 2023



#### 2. Expansion to various applications including liquid hydrogen import supply chains and power generation in Japan

Transportation

Consumption

- Participation in many advanced demonstration projects targeted around 2025

#### 3. Hydrogen exports from the Middle East, Australia, and Southeast Asia

Production

Transportation

- Participation in advanced projects utilizing approaches linked to imports above

### Our approach

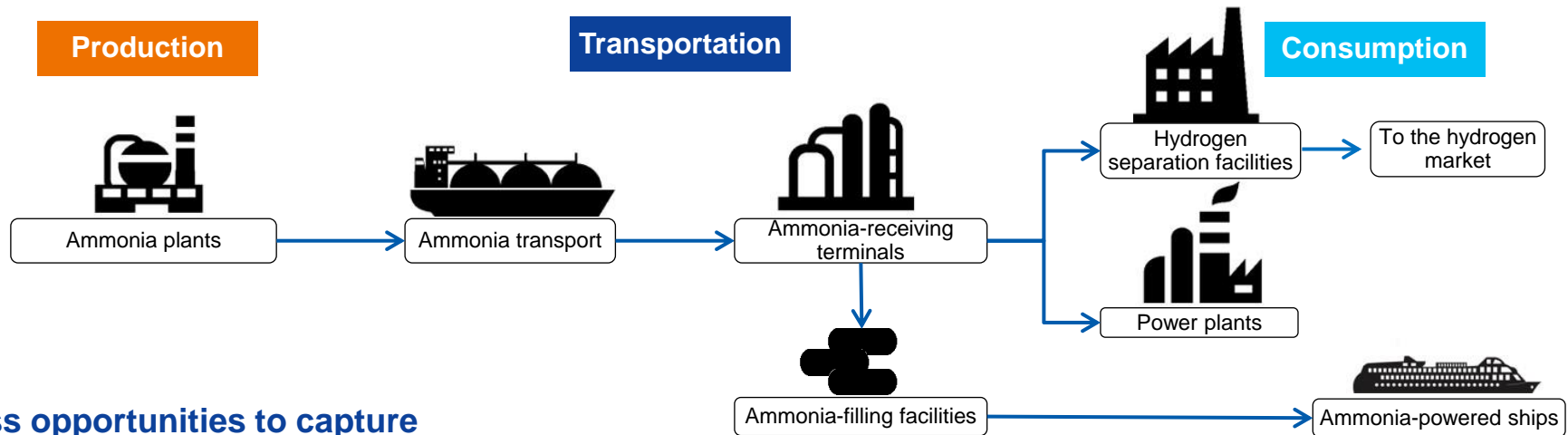
#### ◆ Taking advantage of technology and experience in hydrogen as industrial gas and LNG/LPG

- Liquid hydrogen stations
  - Utilizing GP Strategy Alternative Fuel Division acquired in 2020 to supply a set of equipment required for stations as EPC
  - Deepened collaboration with hydrogen suppliers and station operators
- Advanced projects
  - Promotion of the development of capacity enlargement through the tripolar system of Japan, the United States and Europe in response to increasing demand based on products for and experience in hydrogen as industrial gas

**The product and market development efforts to date have taken shape. We have already received inquiries from many customers as leads, and started receiving more orders from this term**



# Business Opportunities in Decarbonized Energy: (2) Ammonia



## Business opportunities to capture

1. Exports from the Middle East, Australia, and Southeast Asia Production Transportation
2. Expansion to various applications including ammonia import supply chains and power generation in Japan Transportation Consumption
3. Introduction of new ammonia-powered ships, conversion from or combined use of LPG- or LPG-powered ships Consumption

## Our approach

- ◆ Development of submerged pumps for prestressed concrete tanks (PC tanks) in demand due to enlargement of receiving terminals
  - Competitive advantage gained by having both canned motor technology and cryogenic submerged pump technology
- ◆ Taking advantage of experience in LPG-powered ships

**Inquiries have increased rapidly this year, based on experience and technology of LPG and ammonia as an industrial raw material**

Pumps for discharging and feeding liquid from a tank  
Canned motor pumps



Boosting pumps for feeding liquid to engine  
LEWA reciprocating pumps



- Experience of 26 units: 7 ships in Japan, 15 ships overseas, and 4 units for ground testing
- Possible to use in ships powered by ammonia with similar liquid properties or ships powered by both ammonia and LPG

### Case: Seabed transportation of CO<sub>2</sub>

Snøhvit Project on the Melkoya island in Norway

- Multiphase flow transportation using LEWA diaphragm pumps through a 140 km undersea pipeline on the seabed at a depth of 250 to 345 m



### Example: CCS by the amine adsorption method

Cases of absorption of CO<sub>2</sub> using amine absorbent and recovery as high-concentration CO<sub>2</sub> have been developed globally by coal-fired power generators, etc.

- Mitsubishi Heavy Industries: Delivered a total of 14 recovery plants in Europe, the United States, Southeast Asia, India, etc.
- Toshiba
- CESAR (CO<sub>2</sub> Enhanced Separation and Recovery, EU Project), etc.



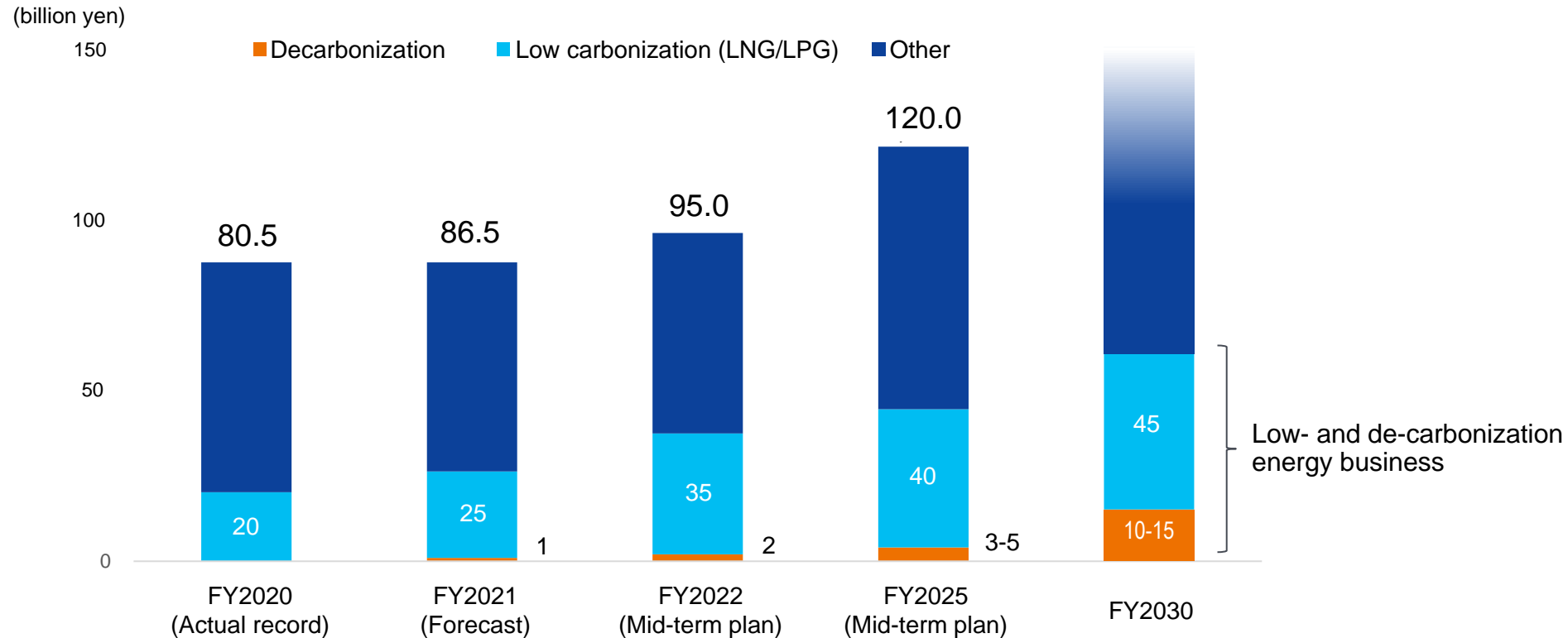
Selection of canned motor pumps necessary for the amine adsorption process and optimization for the process are under consideration

- 1. The collaborative development system utilizing technologies the Industrial Business has globally**
  - Adoption of Higashimurayama Plant as Engineering Center
  - Cooperation and clarification of roles within the Nikkiso/LEWA/CE&IG Group
  - Complementary relationships through alliances with other companies
- 2. Geographic expansion by effectively utilizing the manufacturing capacity the Industrial Business has globally**
  - Manufacturing and large testing facilities in Miyazaki to cover global markets
  - Development and enhancement of regional bases
- 3. Global and regional sales systems mutually utilizing the customer bases the Industrial Business companies have globally**
  - Nikkiso has strengths in Japan
  - LEWA/Geveke have strengths in Europe
  - CE&IG has strengths in North America
  - Mutually utilize bases in Asia and other regions

# Toward the Medium-Term Business Plan “Nikkiso 2025” and 2030



## Trend in sales of Industrial Business



- Steady progress toward the midpoint (2022) of the Medium-Term Business Plan, mainly due to the expansion of the LNG-powered ship business
- Aim to achieve Phase 2 of the Medium-Term Business Plan (2025), focusing on the expansion of low- and de-carbonization businesses
- Expand the low- and de-carbonization businesses to over 50 billion yen

