Section 2
Future Growth Industries in Kansai: Towards a Green Transformation

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In "Kansai and the Asia Pacific-Economic Outlook 2023-24," the industrial structure and productivity of Kansai were compared with other regions using basic data to assess the economic position of Kansai. The results indicated that, if we broadly classify industries, Kansai's industrial structure is not necessarily one that leads to high profitability. However, when examining the manufacturing sector, which holds a high share in Kansai's industrial structure, at a more detailed subcategory level, there were industries with higher value added per capita compared to other regions.

In Section 2, building on the last year's analysis, we will examine Kansai's manufacturing sector at the subcategory level to identify industries with potential for future growth and conduct an analysis.

1. A Visualization of Profitable Industrial Structures

In order for a regional industrial structure to be profitable, both the share of each industry and the value added per capita are important. Figure 5-2-1 visualizes the profitable industrial structure in the Kansai, Southern Kanto, Tokai, and Kyushu[1] regions of Japan. The horizontal axis represents per capita value added, and the vertical axis represents the share of value added by industry. The size of the circles indicates the number of employees in each industry.

As shown in the figure, in Southern Kanto, the share of industries such as "Finance and Insurance," "Scientific Research, Professional and Technical Services[2]," and "Information and Communications" is high, and the per capita value added exceeds 10 million yen. In Tokai, the share and per capita value added of "Manufacturing" are high compared to other regions. In Kansai, on the

1) The regional divisions are as follows: Kansai (Shiga, Kyoto, Osaka, Hyogo, Nara, Wakayama), Southern Kanto (Tokyo, Kanagawa, Saitama, Chiba), Tokai (Gifu, Shizuoka, Aichi, Mie), and Kyushu (Fukuoka, Saga, Nagasaki, Kumamoto, Oita, Miyazaki, Kagoshima).

2) As pointed out in Chapter 4, Section 1, in Southern Kanto, the number of employed persons and the regular wages in the "Academic Research, Professional, and Technical Services" sector are higher compared to those in other regions. In this regard, Southern Kanto can be said to have a profitable industrial structure.

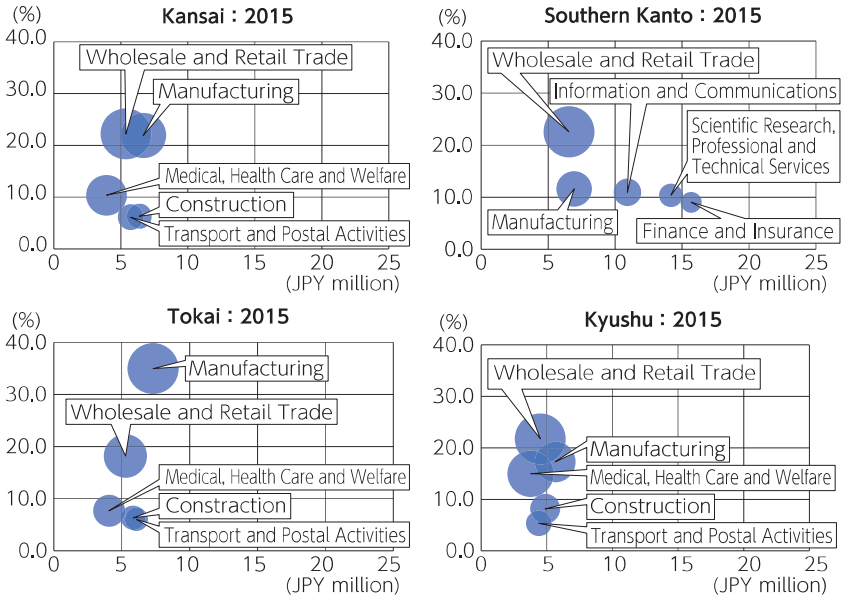


Figure 5-2-1 Comparison of value-added share and value added per capita: Division items

Source: Prepared by the author from the "2016 Economic Census for Business Activity" by the Statistics Bureau, Ministry of Internal Affairs and Communications.

other hand, although the share of industries like "Wholesale and Retail Trade" and "Manufacturing" is high, the per capita value added does not exceed 10 million yen as seen in Southern Kanto. Similarly, Kyushu, like Kansai, has a high share of "Wholesale and Retail Trade" and "Manufacturing" but lacks high per capita value added in its industrial structure.

As mentioned above, Kansai and Kyushu are not necessarily characterized by profitable industrial structures compared to Southern Kanto and Tokai. However, when examining manufacturing industries on a more detailed level, a different picture emerges. Below, we compare and analyze the manufacturing in Kansai, Tokai, and Kyushu, focusing on two sectors that are particularly characteristic, that is, "Electronic Parts, Devices and Electronic Circuits" and "Manufacture of Electrical Machinery, Equipment and Supplies," using a detailed classification.

Figure 5-2-2 visualizes the top five industries in terms of value-added share within "Electronic Parts, Devices and Electronic Circuits" in Kansai, Tokai, and Kyushu.

In Kansai, industries such as "Connectors, switches and relays," "Resistors,

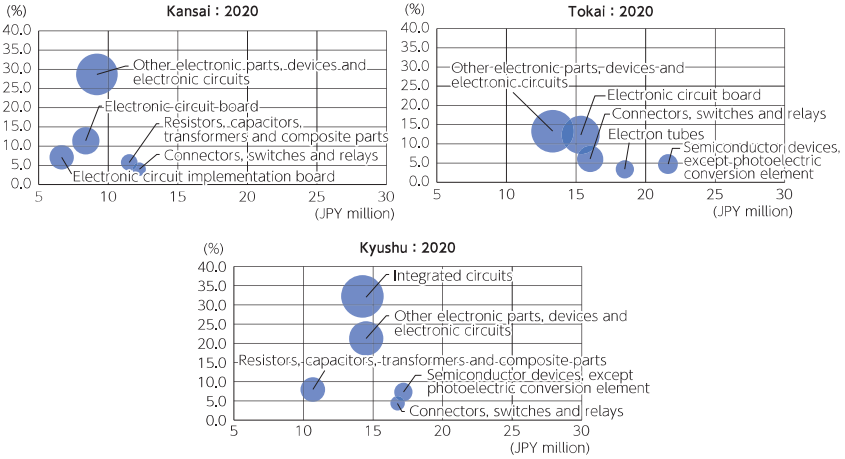


Figure 5-2-2 Comparison of value-added share and value added per capita: Industry items: Electronic Parts, Devices and Electronic Circuits

Source: Prepared by the author from the "2021 Economic Census for Business Activity" by the Statistics Bureau, Ministry of Internal Affairs and Communications.

capacitors, transformers and composite parts," and "Other electronic parts, devices and electronic circuits" show high per capita value added. Kansai is particularly strong in the manufacturing of electronic components such as connectors and capacitors, which are mounted on electronic circuit boards.

In Tokai, industries such as "Semiconductor devices, except photoelectric conversion element," "Connectors, switches and relays," and "Electronic circuit boards" have high per capita value added, indicating strength in both electronic circuit board manufacturing and the production of components like capacitors and transistors.

Kyushu shows an exceptionally high per capita value added and share in industries such as "Semiconductor devices, except photoelectric conversion element," "Integrated circuits," and "Other electronic parts, devices and electronic circuits." This can be attributed to the concentration of semiconductor-related industries in Kyushu, particularly in the "Silicon Island Kyushu" area.

Figure 5-2-3 compares the "Manufacture of Electrical Machinery, Equipment and Supplies" industries in Kansai, Tokai, and Kyushu at a more detailed level. In Kansai, industries such as "Air-conditioning and home comfort," "Generators, motors and other rotating electrical machinery," and "Storage batteries" exhibit high per capita value added. Notably, "Storage batteries" is not among the top five industries in the other two regions, making it a unique strength of Kansai.

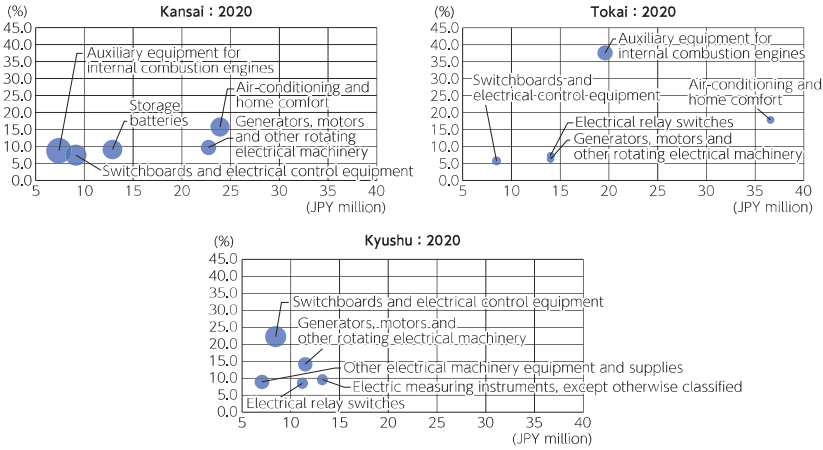


Figure 5-2-3 Comparison of value-added share and value added per capita: Industry items: Manufacture of Electrical Machinery, Equipment and Supplies

Source: Prepared by the author from the "2021 Economic Census for Business Activity" by the Statistics Bureau, Ministry of Internal Affairs and Communications.

In Tokai, industries such as "Air-conditioning and home comfort" and "Auxiliary equipment for internal combustion engines" have both high shares and high per capita value added. Especially, "Auxiliary equipment for internal combustion engines" shows a significantly higher share and per capita value added in Tokai compared to those in Kansai.

This is likely due to the concentration of automotive-related manufacturing companies in Tokai.

In contrast, Kyushu's strengths lie in industries such as "Electric measuring instruments, except otherwise classified," "Generators, motors and other rotating electrical machinery," and "Electrical relay switches," which show high per capita value added, distinct from the other two regions.

In summary, among manufacturing industries, Kyushu stands out with higher shares and per capita value added in semiconductor-related industries compared to other regions. Tokai is characterized by a strong automotive-related industrial structure. Kansai, on the other hand, has a unique strength in "Storage batteries," an industry that is expected to grow significantly due to its role in carbon neutrality and its prominence in initiatives such as the 2025 Osaka Kansai Expo, where it is featured in demonstration projects. In Subsection 2.2, we will examine the current state of the storage battery manufacturing industry using basic data.

2. The Storage Battery Industry in Japan

In August 2022, Japan developed a revised "Battery Industry Strategy," the first update in nearly a decade. This strategy aims to strengthen the country's production base through a coordinated effort between the government and private sector. The key objectives outlined in the strategy are: (1) establishing a manufacturing base for liquid lithium-ion storage batteries (LiB), (2) securing a global presence, and (3) capturing the next-generation battery market.

Specifically, for (1), the strategy targets the establishment of a domestic manufacturing base for storage batteries and materials, aiming for 150 GWh per year by 2030. This includes boosting storage battery exports and securing manufacturing capabilities for both automotive and stationary storage batteries. For (2), from the perspective of securing purchasing power in the global market for upstream resources (e.g. lithium, nickel, cobalt, etc.), as well as securing influence in standardization and the formation of international rules, the goal is for Japanese companies as a whole to secure a manufacturing capacity of 600 GWh per year in the global market by 2030. For (3), in order to bring next-generation batteries such as solid-state batteries into practical use ahead of the world, industry, government, and academia will collaborate. The goal is to achieve full-scale practical use of solid-state batteries around 2030, while also maintaining and securing Japan's position as a technology leader

[The manufacturing process of storage batteries]

Let's review the manufacturing process of storage batteries. According to Nippon Steel Research Institute Corporation (2024), the storage battery manufacturing process can be broken down into seven stages (Figure 5-2-4).

Looking at the locations of companies and factories involved in the manufacturing process of storage batteries, as shown in reference Figure 5-2-1, it is evident that many companies and factories are concentrated in the Kansai region, particularly in Osaka and Kyoto Prefectures. Additionally, it is notable that companies responsible for the "coating" process, which is a part of pre-process in the manufacturing process, are more numerous in Kansai compared to other regions. This suggests that Kansai region has a higher concentration of storage battery manufacturing companies than other areas. Next, we will examine the current status of the storage battery industry in Kansai using basic data.

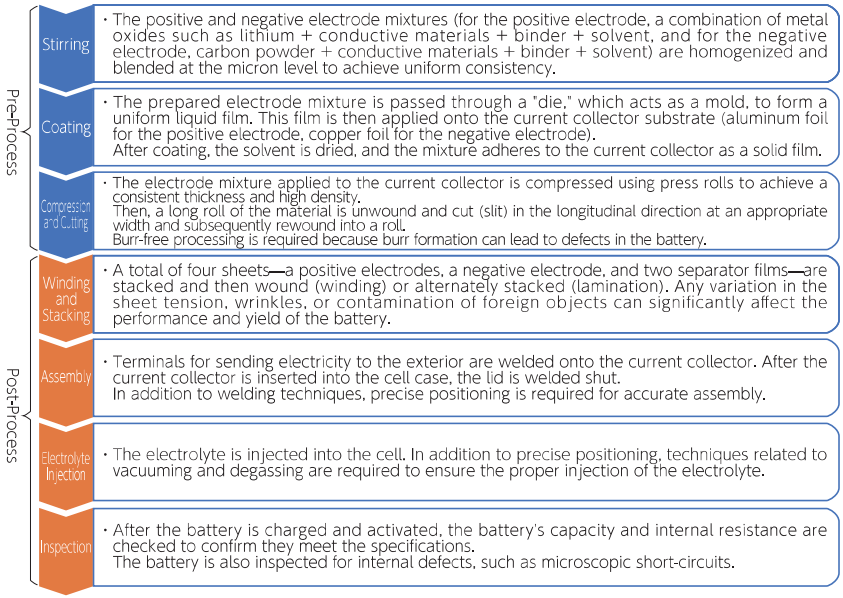


Figure 5-2-4 Overview of the storage battery manufacturing process

Source: Prepared by the author based on the "Report on the Survey Project to Strengthen the Supply Chain for Storage Battery Manufacturing Equipment" by Nippon Steel Research Institute Corporation.

[Current state of the storage battery industry in Kansai]

Figure 5-2-5 shows the trend in the shipment value of the storage battery manufacturing industry across various prefectures in Kansai. The total shipment value in Kansai was approximately 521.3 billion yen in 2000, and it can be seen that this value has been on a decreasing trend up until 2011[3)].

However, since 2012, the trend has reversed, showing an increase, and by 2018, the shipment value had recovered to 457.1 billion yen, reaching the same level as in 2002. Although the trend turned downward again from 2019 onward, the value had recovered to about 400 billion yen by 2021.

Looking at the data by prefecture, it is clear that from 2000 to 2010, Hyogo Prefecture had the highest shipment value. However, since 2012, the shipment values in Osaka and Kyoto Prefectures have been increasing, and by 2021,

3) According to the Development Bank of Japan, Kansai Branch (2013), during this period, the rise of emerging countries (such as China and South Korea) and the decline in demand in advanced countries due to the impact of the Lehman Brothers crisis led to changes in the market environment. These changes contributed to the decline in the status of the Kansai Battery Bay.

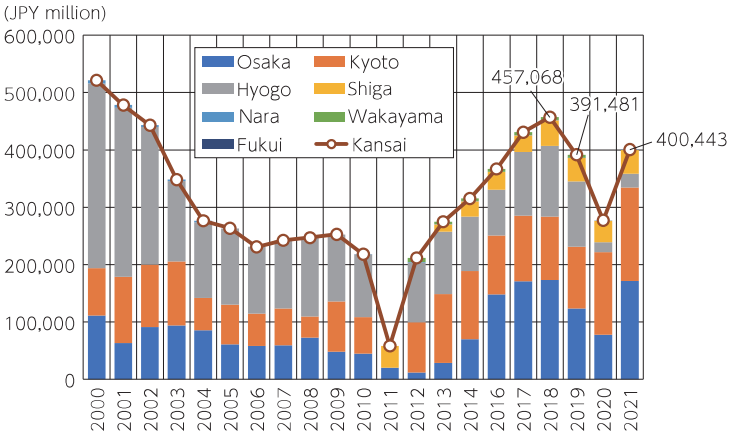


Figure 5-2-5 Changes in the value of shipments by the storage battery manufacturing industry: Kansai: 2000-21

Note: For 2011, please note that there are no published figures for prefectures other than Shiga and Osaka. As a result, the shipment value is low. In addition, the data for 2015 has not been published.
Source: Prepared by the author from the "Census of Manufactures" and "Annual Business Survey" of the Ministry of Economy, Trade and Industry, and the "Economic Census for Business Activity" of the Statistics Bureau, Ministry of Internal Affairs and Communications.

Osaka accounted for 171.2 billion yen and Kyoto for 163.0 billion yen, making up the largest portion of the shipment value[4].

Next, let's look at the trend in the export quantity of lithium-ion storage batteries from Kansai, using the Ministry of Finance's "Trade Statistics."

Figure 5-2-6 shows the export quantity of lithium-ion storage batteries from Kansai to the world, as well as its share of national exports. As the figure indicates, since 2000, the export quantity has shown a general upward trend. In 2018, it peaked at approximately 61,000 tons, and although there was a slight decline from 2019 to 2020, by 2023, it had recovered to around 47,000 tons.

Looking at the national share, it increased from 47.1% in 2000, reaching 70.4% by 2005. However, from 2006 to 2012, the share somewhat declined, remaining generally in the 60% range. Since 2013, the share has risen sharply, reaching 85.3% in 2018, although by 2023, it had slightly decreased to 62.7%.

Looking at the above basic data, it can be inferred that Kansai, with its concentration of companies and factories involved in the storage battery industry,

4) In the Economic Census for Business Activity, the Industrial Statistics, and the Economic Structure Survey, if the number of businesses included in the survey is 1 or 2, the data undergoes confidentiality treatment. As a result, the figures are not publicly disclosed, meaning that the reported shipment values may appear lower than the actual values. This is important to note when interpreting the data.

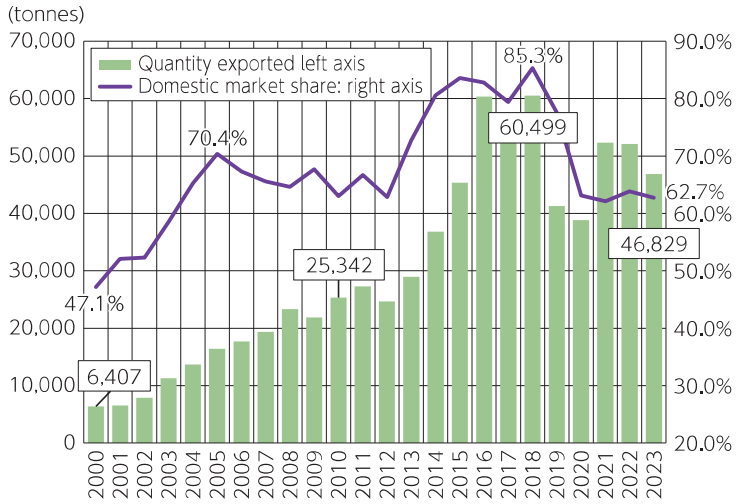


Figure 5-2-6 Changes in the volume and share of lithium-ion battery exports: Kansai: 2000-23

Source: Prepared by the author from "Trade Statistics" by the Ministry of Finance.

has seen steady increases in both shipment values and export quantities.

In the late 2000s, Kansai's storage battery industry was so concentrated that it was referred to as the "Kansai Battery Bay." However, following the 2009 Lehman Brothers crisis and the technological advancements in countries such as South Korea and China, the global share of storage battery manufacturing in Kansai declined[5]. Despite this, the shipment value of the storage battery manufacturing industry in the region has recovered, and the export quantity of lithium-ion storage batteries from Kansai to the world continues to show an upward trend.

As seen above, the storage battery industry in Kansai is becoming an increasingly important sector in the transition towards a carbon-neutral society. In subsection 2.3, we will explore the current status of the hydrogen-related industry, which, like the storage battery industry, is also one of the key industries for achieving a decarbonized society.

5) A similar observation is also made in the Development Bank of Japan (2012).

3. Current State of the Hydrogen-Related Industries

As pointed out in "Kansai and the Asia Pacific-Economic Outlook 2023-24," it is important for Kansai's desired industrial structure to focus on areas that address long-term, global challenges and to commercialize efforts aimed at solving these challenges[6]. In this context, if the "Future Society Showcase Project" to be held at the 2025 Osaka-Kansai Expo is successfully commercialized and contributes to solving challenges, it is believed that Kansai's economy will be able to develop sustainably.

In subsection 2.3, therefore, we will focus on the hydrogen-related industry, which is scheduled to be featured in the Expo's demonstration projects (Table 5-2-1), and conduct an analysis.

Table 5-2-1 Outline of future society showcase at Osaka-Kansai Expo: Green Expo

Green Expo	DAC, Methanation / Hydrogen power generation, Pure hydrogen fuel cells, Ammonia power generation / Hydrogen supply chain model / CO_2-absorbing road surface material, CO_2 recovery equipment / Next-generation solar cells, Energy management systems / Aquifer thermal storage, Synthetic fuels / Junior SDGs Camp / Reuse matching / Tree-planting, etc.

Source: Prepared by the author from Expo Association materials

[Hydrogen strategies in Japan]

In 2017, Japan took the lead in the world by formulating the "Basic Hydrogen Strategy" and has been actively working on the utilization of hydrogen. In June 2023, this strategy was revised for the first time in six years, with a new target of increasing hydrogen supply to 12 million tons by 2040[7]. In this revision, it was also decided to focus support on five categories and nine fields as strategic areas, in which Japan excels: (1) hydrogen supply (hydrogen production, building hydrogen supply chains), (2) decarbonized power generation, (3) fuel cells (decarbonized steel, decarbonized chemical products, hydrogen-fueled ships), (4) direct use of hydrogen, and (5) hydrogen compounds (fuel ammonia, carbon-recycled products). The government and private sector are set to invest approximately 15 trillion yen over the next 15 years to help build the hydrogen supply chain and support the realization of a hydrogen society. In this context,

6) For detailed information, please refer to Chapter 6, Section 2 of the Asia Pacific Institute of Research (2023).
7) For details on the revised strategy, please refer to the Ministry of Economy, Trade and Industry (METI) (2024).

we will now explore the companies in Kansai that are playing a role in the hydrogen supply chain.

[Kansai companies in the hydrogen supply chain]

As highlighted in "Basic Hydrogen Strategy," as decarbonization progresses worldwide, it becomes critically important to establish a global supply chain for the stable supply of hydrogen. Below, we will look at the companies in Kansai involved in the hydrogen supply chain, categorized by different areas of the supply chain.

According to the Kinki Bureau of Economy, Trade, and Industry (2024), the hydrogen supply chain is broadly divided into three areas: (1) manufacturing, (2) transportation and storage, and (3) utilization. reference Figure 5-2-2 shows the distribution of hydrogen-related companies in Kansai, categorized by these supply chain areas. As the figure shows, most of the related companies are concentrated in Osaka and Hyogo prefectures. In terms of the supply chain process, Osaka is home to companies focused on manufacturing[8], while Hyogo is distinctive for housing companies involved in all three areas: manufacturing, transportation and storage, and utilization[9].

[Current state of the hydrogen industry]

Figure 5-2-7 shows the hydrogen production volume in Japan. Between 2000 and 2005, the production and consumption of hydrogen remained relatively stable at around 400,000 thousand m^3. However, in 2006, it increased significantly to 570,737 thousand m^3[10]. From 2008 onwards, production declined, and between 2009 and 2011 it remained flat. Starting in 2012, hydrogen production again began to rise, reaching 611,511 thousand m^3. Since 2013, hydrogen production consistently hovered around 600,000 thousand m^3, and by 2022, it had increased to 610,784 thousand m^3, showing steady growth.

Next, let's examine the current status of the hydrogen industry in Kansai using basic data.

8) The Kinki Bureau of Economy, Trade and Industry (2024) mentions companies involved in hydrogen production in Osaka Prefecture, such as Iwatani Corporation, AIR WATER Inc., Kanadevia Corporation, and NIPPON SHOKUBAI Co., Ltd.

9) The Kinki Bureau of Economy, Trade and Industry (2024) lists companies involved in hydrogen production, transportation, storage, and utilization in Hyogo Prefecture, including Kawasaki Heavy Industries, Ltd. and Kobe Steel, Ltd.

10) The significant increase in production volume in 2006 can be attributed to various factors. One possible contributing factor is that in that year, Iwatani Corporation began operation of one of the world's largest liquefied hydrogen production plants, which likely led to the rise in production volume.

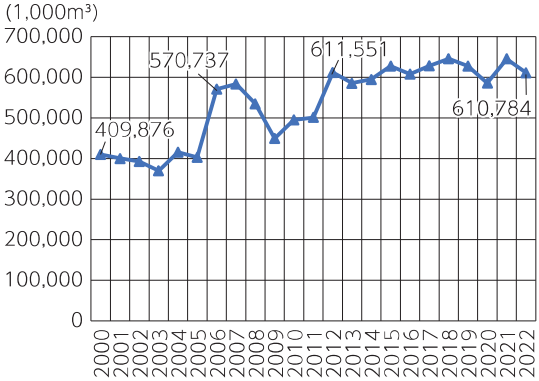


Figure 5-2-7 Changes in hydrogen production: Japan: 2000-22

Source: Prepared by the author from the "Current Survey of Production" of the Ministry of Economy, Trade and Industry.

Figure 5-2-8 shows the trend in the hydrogen gas shipment volume and the national share in Hyogo Prefecture[11]. In 2006, the shipment volume was 29,304 thousand m^3 (with a national share of 6.0%). By 2011, the shipment volume had significantly increased to 79,136 thousand m^3 (with a share of 15.4%). Moreover, in 2018, the volume peaked at 157,059 thousand m^3, with a national share of 18.6%. While the volume has somewhat decreased to 111,547 thousand m^3 (with a share of 12.3%) at the most recent measurement, it remains at a relatively high level.

As mentioned earlier, Hyogo Prefecture is home to companies involved in various stages of the hydrogen supply chain, including hydrogen production, transportation and storage, and utilization. In addition, in 2019, Hyogo Prefecture formulated the "Hyogo Hydrogen Society Promotion Concept," which aims to promote hydrogen-related industries through collaboration between the public sector, private companies, and academia. Against this backdrop, it can be expected that Hyogo Prefecture is steadily building its hydrogen supply chain.

Below, we will focus on a case of hydrogen utilization, specifically the hydrogen-powered ship, which is planned to be part of the demonstration projects at the 2025 Osaka-Kansai Expo (see Box).

11) Regarding the shipment quantity of hydrogen gas in the Kansai region, due to the small number of facilities in prefectures other than Hyogo, the data has been treated as confidential and is not publicly available. Therefore, it is important to note that in subsection 2.3, only Hyogo Prefecture is analyzed.

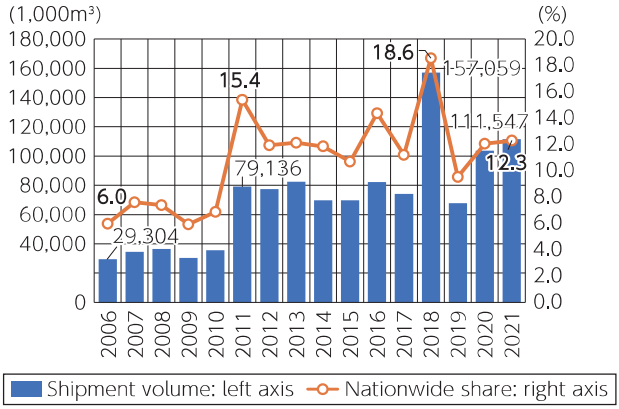


Figure 5-2-8 Changes in the amount of hydrogen gas shipped and the national market share: Hyogo Prefecture: 2006-21

Source: Prepared by the author from the "Census of Manufactures" and the "Annual Business Survey" of the Ministry of Economy, Trade and Industry.

BOX: Hydrogen Utilization Examples

Here, we will discuss an example of hydrogen utilization, focusing on the development of hydrogen-powered ships. As mentioned earlier, hydrogen ships have been designated as a key area for support in Japan's Basic Hydrogen Strategy, and their use is expected to expand in the future. Additionally, there are movements to revitalize tourism by incorporating hydrogen ships into water transport. For instance, the Kansai Association of Corporate Executives' Committee for Wide Area Tourism[12] has proposed tourist cruise routes, such as the Setouchi–Osaka Bay loop, connecting Kansai Airport, Yumesu, Kobe Port, and Takamatsu Port, and the utilization of hydrogen and electric ships[13]. Efforts to examine new forms of wide area tourism using maritime transport are ongoing. Furthermore, there are projects exploring the actual use of hydrogen ships for business.

Bureau International des Expositions (BIE) is considering water transport routes for access to the 2025 Osaka-Kansai Expo. The proposed routes

12) In the preparation of this box, we received valuable materials and insightful comments from the Kansai Economic Federation's Committee for Wide Area Tourism (Chairman: Masato Namba, Chairman of Takenaka Corporation, and Taeko Uemura, Representative Director of Kyo-Nan Warehouse). We would like to express our sincere gratitude for their contributions.

13) The details of the proposals are elaborated in the publication by the Kansai Economic Federation (2024), an incorporated association.

would connect locations like Osaka Castle, Kobe Port, Kobe Airport, and Awaji Island, with twelve routes currently under consideration. Private companies are working to enhance the value of travel by sea, moving toward the commercialization of these routes. Some of these water routes are expected to use hydrogen-powered vessels. For example, a route between the Nakanoshima GATE Terminal and Yumesu is planned to use hydrogen ships developed by companies such as Iwatani Corporation, as announced on their website[14].

It is said that there is growing interest in sustainable tourism among international visitors, and hydrogen ships and electric ships, being quiet, environmentally friendly, and free from exhaust fumes, have high compatibility with these visitors. Looking ahead to the post-Expo period, the development of tourism content that considers sustainability could also become a focus. However, at this stage, hydrogen ships and electric ships still face challenges in terms of size, speed, and cost. Nevertheless, future technological advancements hold promise for overcoming these issues.

For Japan, which faces the inevitability of a declining population, wide area tourism has the potential to become a key driver of new economic growth. To ensure that the benefits of this growth are shared throughout the Kansai region, it is essential to promote unique tourism industries, such as water transport, alongside the development of growth sectors like green transformation (GX) and hydrogen. Both of these initiatives should be advanced together, as complementary driving forces for the future.

4. Future Challenges and Prospects

As we have seen, the Japanese government is formulating new strategies toward achieving a carbon-neutral society, and is currently rolling out policies in collaboration with both public and private sectors. In particular, Kansai is becoming an increasingly important region for promoting these policies, given the concentration of both the storage battery and hydrogen-related industries, which are more developed in this area compared to other regions. Below, we will look at the future challenges and corresponding strategies for each industry.

14) For further details, please refer to the Iwatani Corporation website at https://www.iwatani.co.jp/jpn/hydrogenfuelcellship/route/.

[Storage battery industry]

The manufacturing process of storage batteries is complex and involves multiple stages, making it crucial to secure skilled personnel for each step. In Japan, the shortage of workers has become a serious issue, and the challenge will be how to attract skilled professionals with advanced expertise in storage battery-related fields to Kansai. In response, the Kinki Bureau of Economy, Trade and Industry, together with the Battery Association of Japan and the Battery Association for Supply Chain, has established the "Kansai Storage Battery Talent Development Consortium" as a collaboration among industry, government, and academia. This initiative aims to cultivate talent for the storage battery industry. Specifically, they plan to introduce educational curricula in industrial high schools and colleges of technology throughout Kansai, promote awareness of educational programs centered around the National Institute of Advanced Industrial Science and Technology (AIST) Kansai Center, and strengthen partnerships with universities and other educational institutions to foster and secure human resources for the industry[15)].

[Hydrogen-related industry]

While the hydrogen industry is expected to see growing global demand in the future, stable supply and high costs remain key challenges. Currently, the cost of hydrogen supply is around 100 yen per Nm^3, with goals to reduce it to approximately 30 yen per Nm^3 by 2030, and further to 20 yen per Nm^3 by 2050. To achieve this, the government is working to build large-scale supply chains aimed at reducing costs. Specifically, it plans to import hydrogen produced overseas via liquefied hydrogen tankers, then use it for hydrogen power generation and other purposes once it reaches Japan. In terms of cost reduction, it is crucial not only to choose an efficient method of transporting hydrogen (such as liquefied hydrogen), but also to increase the size of transport vessels to enable large-scale hydrogen transportation. In Kansai, Kawasaki Heavy Industries has already conducted demonstration experiments with the world's first liquefied hydrogen carrier, the "Suiso Frontier," (Hydrogen Frontier) which was developed and built by the company. As noted in Subsection 2.3, companies involved in hydrogen production, transportation, storage, and utilization are found primarily in the coastal areas of Osaka and Hyogo, making this region a promising candidate for becoming a key hub in the future hydrogen supply chain.

In conclusion, by visualizing the profitable industrial structure in Kansai,

15) For detailed information, please refer to the Kansai Storage Battery Talent Development Consortium (2024).

we have identified promising growth industries for the future. Kansai is increasingly becoming a crucial industrial cluster for green transformation, centered around industries such as storage battery manufacturing and hydrogen. With demonstration projects set to be launched at the 2025 Osaka-Kansai Expo, it will be vital for Kansai to effectively communicate its strengths to the world.

References

Asia Pacific Institute of Research. (2023). *Kansai and the Asia Pacific-Economic Outlook 2023-24*. Nikkei Printing Co., Ltd., October.

Development Bank of Japan, Kansai Branch. (2012). "Trends in the Share of Kansai Battery Bay." *Kansai Battery Report Series*, October. (https://www.dbj.jp/upload/investigate/docs/kansai1210_01.pdf (last viewed on June 26, 2024)

Development Bank of Japan, Kansai Branch. (2013). "Current Status and Considerations for the Development of the Storage Battery Industry." *Kansai Battery Report Series*, March. https://www.dbj.jp/upload/investigate/docs/kansai1303_01.pdf (last viewed on June 26, 2024)

Hyogo Prefecture. (2019). "Hyogo Hydrogen Society Promotion Concept." March. https://web.pref.hyogo.lg.jp/kk05/documents/hyogo_hydrogen_booklet.pdf (last viewed on July 2, 2024)

Iwatani Corporation. "Hydrogen Fuel Cell Ship Special Website." https://www.iwatani.co.jp/jpn/hydrogenfuelcellship/route/ (last viewed on July 5, 2024)

Kansai Association of Corporate Executives. (2024). "Kansai Association of Corporate Executives Committee for Wide Area Tourism Report: 'Establishing Maritime Routes Connecting Osaka and Setouchi.'" May 13. https://www.kansaidoyukai.or.jp/wp-content/uploads/2024/05/Maintext.pdf (last viewed on July 5, 2024)

Kansai Storage Battery Talent Development Consortium. (2024). "Directions for Storage Battery Talent Development 2.0." March 28. https://www.kansai.meti.go.jp/3jisedai/battery/torimatome2.pdf (last viewed on July 2, 2024)

Kinki Bureau of Economy, Trade and Industry. (2024). "Data Collection on Hydrogen-related Companies in Kansai." https://www.kansai.meti.go.jp/5-1shiene/smart_energy_initiative/hydrogen_data/index.html (last viewed on June 26, 2024)

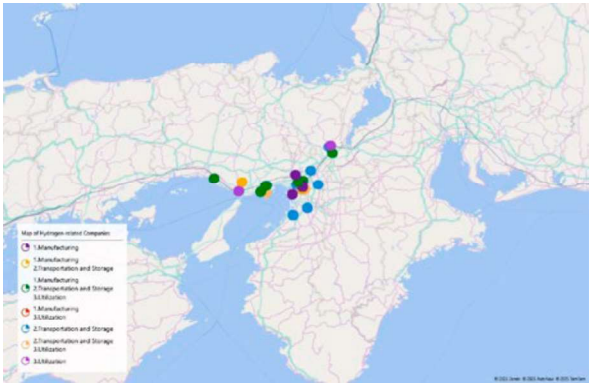
Ministry of Economy, Trade and Industry. (2022). "Battery Industry Strategy." August 31. https://www.meti.go.jp/policy/mono_info_service/joho/conference/battery_strategy/battery_saisyu_torimatome.pdf (last viewed on June 26, 2024)

Ministry of Economy, Trade and Industry. (2023). "Basic Hydrogen Strategy."

June 6. https://www.meti.go.jp/shingikai/enecho/shoene_shinene/suiso_seisaku/pdf/20230606_2.pdf (last viewed on June 26, 2024)
Nippon Steel Research Institute Corporation (2024). "Report on Strengthening the Supply Chain for Storage Battery Manufacturing Equipment." https://www.kansai.meti.go.jp/3jisedai/battery/sc_report.pdf (last viewed on June 26, 2024)
Nishiwaki, F. (2018). "Japan's National Strategy: 'Hydrogen Energy' for Business Leap." Toyo Keizai Inc.

Reference Figure 5-2-1 Map of companies related to the manufacture of storage batteries

Source: Created by the author based on Nippon Steel Research Institute, Corporation (2024)



Reference Figure 5-2-2 Map of hydrogen-related companies in Kansai region

Source: Created by the author based on Kansai Bureau of Economy, Trade and Industry (2024) and Nishiwaki (2018).