Appendix

Cases

The NIMBY attitude of the Japanese public, especially regarding environmental infrastructure, is internalized in the policymaking process (Yachiyo Engineering Co., Ltd. & Japan Environmental Sanitation Center, 2022), so the design and participatory process were implemented, considering the conservative attitude of Japanese public. The designers, invited by the respective local governments, proposed interventions to overcome the image of each facility.

Global challenges of sustainable development and large waste generation have led to calls for a circular economy (CE). Practitioners from policy and business backgrounds have developed the concept (Ellen Macarthur Foundation, 2021; EUROPEAN COMMISSION, 2015, 2020) to outline a sustainable development strategy that proposes tackling environmental degradation and resource scarcity problems. The concept emphasizes a new business model that relies on ’circular’ material flows, as opposed to the current ’linear’ model that leads to waste while creating value (Esposito et al., 2018; Lacy & Rutqvist, 2016).

The section discusses the three chosen case studies in Japan where the design process was important and resulted in an alternative design compared to the conventional design. The three cases are atypical cases, where individual architects and city-level officials have pioneered the use of multifunctional design to environmental infrastructure to address the potential issue of NIMBY-ism.

These examples emphasize the importance of the aesthetics+ strategy and community access to ensure that environmental infrastructure is not associated with negative association of NIMBY. We bring insights from practitioners and architects, by highlighting these cases, we show how the sociological concept of NIMBY can be mitigated through a design-led approach by practitioners (architects). Among the design-based approaches, we show the importance of community-centred architecture and multifunctional use from the cases.

3.3.1 Hiroshima Naka Incineration Plant

The Hiroshima Naka is a waste-to-energy plant and was completed in 2004. It produces 12 MWe (no heat recovery) of energy. While the facility meets the demands of waste management, it also has several other uses.

The construction and design of the Hiroshima Naka Incineration Plant was motivated by the overarching Hiroshima 2045 Vision for a “peaceful and creative city” and Hiroshima’s branding as a “city of water” (Hiroshima Prefectural Civil Engineering Bureau Construction and Maintenance Division Construction and Repair Planning Group, 2017). Its design, therefore, put emphasis on environmental protection, creation, and awareness (Hiroshima Prefectural Civil Engineering Bureau Construction and Maintenance Division Construction and Repair Planning Group, 2017). Its award-winning architect, Yoshio Taniguchi, who is most well-known for his redesign of the Museum of Modern Art (MoMA) in New York City, sought to use design elements to elevate the importance of incineration plants in the public consciousness [(arch-hiroshima, 2006; Hiroshima Prefectural Civil Engineering Bureau Construction and Maintenance Division Construction and Repair Planning Group, 2017).](https://www.zotero.org/google-docs/?KpIPtZ) The resulting community-centred architecture, which extends from the Hiroshima Peace Memorial Park and the city out to the ocean, seeks to create harmony between Hiroshima’s cityscape and its surrounding natural environment (Hiroshima Prefectural Civil Engineering Bureau Construction and Maintenance Division Construction and Repair Planning Group, 2017). The Eco-rium, the part of the plant that is open to the public, is also made of glass to highlight, rather than hide, the machinery, which fosters greater awareness of waste management (Hiroshima Prefectural Civil Engineering Bureau Construction and Maintenance Division Construction and Repair Planning Group, 2017). By creating an aesthetically pleasing structure, much like the art museums that Taniguchi has designed in the past, and by surrounding the plant with vegetation, Taniguchi sought to challenge the negative perception of incineration and NIMBY-ism, conjuring a new image of cleanliness, beauty, and environmental consciousness [(arch-hiroshima, 2006; Hiroshima Prefectural Civil Engineering Bureau Construction and Maintenance Division Construction and Repair Planning Group, 2017).](https://www.zotero.org/google-docs/?KpIPtZ)

The Eco-rium, which creates a passage through the incinerator, allows visitors to observe the machinery and other facilities inside the waste management plant. The facility offers guided tours to visitors, providing information on the operation of the plant. Additionally, noise and human activity are kept to a minimum within the waste-to-energy infrastructure. Such features make it a popular site to visit. Its location on the Bay of Hiroshima attracts local inhabitants, who use the space to fish, partake in physical activity, or enjoy the beauty of the Bay.

Through such an innovative intervention, the facility that would have been seen as ‘dirty’ has been able to attract visitors by providing an open, inviting space that encourages various uses. In this case, an open space that can be used by both local inhabitants and visitors.

3.3.2 Kamikatsu Zero Waste Center

Kamikatsu Town is a small town in Tokushima Prefecture, whose economy had been dominated by its forestry sector. Since open burning was the main way to manage waste from the forestry sector (such as twigs and other biomass), it was also the main method of dealing with general waste (Tomiyama, 2019). In 1997, this practice had to be halted, as the amended national Waste Management and Public Cleansing Act called upon local governments to adopt technologies to reduce air pollution, particularly dioxins [(Ministry of Health and Welfare, 1998; Kamikatsu Town Hall Planning and Environment Division, 2020)](https://www.zotero.org/google-docs/?r9mVmE) . As a result, the town was propelled to consider alternatives, but, due to fiscal challenges brought by an aging population, the adoption of advanced technologies proved to be difficult (Tomiyama, 2019).

Inspired by the ‘zero waste’ concept promoted domestically by civil society organizations, the town shifted its focus away from incineration and toward resource circularity, declaring to go zero waste in 2003 (Kamikatsu Town Hall Planning and Environment Division, 2020; Tomiyama, 2019). The Zero Waste Center was designed as part of this town-wide initiative. The declaration entailed zero-incineration and zero-landfill for garbage disposal. In 2020, a facility called the Kamikatsu Zero Waste Center was built by architect [Hiroshi Nakamura](https://www.dezeen.com/tag/hiroshi-nakamura-nap/) to fulfil this aim. The facility was constructed with waste materials.

Several other innovations improve the multi-functionality of the facility. The facility is multifunctional, providing a range of services to users. In addition to the recycling station, the facility is also equipped with a store that encourages the residents to bring, take, and exchange goods for free within and beyond the community. Other amenities in the facility include a coin laundry, a restroom, an office space, a hotel, and a hall.

Residents are requested to use their own transport to get to the Zero Waste Center. For those who do not have access to means of transport, waste is collected every odd-numbered month. Residents are also encouraged to recycle their food waste from kitchen. The waste is separated into 45 categories, from an overarching classification of 13 types. As for the ‘reuse’ store, only residents can bring in items to be reused, but both residents and tourists are permitted to take items.

Similar to the Hiroshima Naka Incineration Plant, the Kamikatsu Zero Waste Center is predicated on making the structure - and thereby the concept of waste management - visible; instead of erasing or minimizing its existence, architect Hiroshi Nakamura designed it as a space for local residents to manage their own waste under the principles of the 3Rs (reducing, reusing and recycling) (Nasu, 2020). The structure consists of both the waste management building and a hotel. Because the structure does not need to collect compostable waste (compostable waste is handled at the household level), the hotel could be built close to the waste management portion of the structure without the need to address sanitation concerns such as odor (Nasu, 2020).

The structure plays an important role promoting the local government’s vision, bolstering impacts on the community beyond the specific services it provides. The Kamikatsu Zero Waste Center, for instance, was built under the vision of a zero-waste Kamikatsu Town, which aimed to achieve 100% recycling of materials. As of 2018, the town recycles 81% of its resources and has recognized the limitations of relying on recycling to achieve its zero-waste vision (Sugimoto, 2018a).

To facilitate the circular economy, a certification system for local businesses was adopted, including criteria such as “local food”, “returnable”, “BYO” (bring your own), and “local reuse” and thereby emphasising reducing and reusing resources (Sugimoto, 2018b). The Kamikatsu Zero Waste Center itself is also consistent with this community-wide initiative, with not only the recycling waste bins and stockyard, but also the thrift store where items can be reused.

Moreover, the Kamikatsu Zero Waste Center also has wider implications for its response to demographic challenges, namely population ageing. Through hiring Chief Environmental Officer Momona Otsuka, a Generation Z woman who moved to Kamikatsu straight after graduating from university abroad (Kuzuhara, 2021), the company managing the Kamikatsu Zero Waste Center has created space for youth empowerment and leadership, and fostered diversity. Due to the publicity around her tenure and leadership, more young people are visiting, some of whom have since moved to the town to support this mission (Kuzuhara, 2021).

In light of the national state of emergency at the onset of the COVID-19 pandemic, Kamikatsu, which had welcomed up to 3000 visitors a year, closed its borders, severely damaging its economy (Kirita, 2021). To cope, they developed online tours and lectures for those interested in the town, with the inaugural course focusing on zero waste and their ‘leaf business’ (a burgeoning business in which the Kamikatsu residents, including older women, collect and sell attractive leaves, flowers, and other vegetation commonly used to decorate plates of traditional Japanese cuisine (Ministry of Agriculture, Forestry and Fisheries, n.d.; Kirita, 2021). As a result, there was greater participation by students from distant areas that were previously less likely to connect with the town (Kirita, 2021). Despite this, residents revealed that it is difficult to offer online substitutes for previous experiential learning opportunities, which included being able to visit and smell the Zero Waste Center (Tokushima Prefecture, n.d.; Kirita, 2021).

3.3.3 Musashino Clean Center

The Musashino Clean Center, located in a residential area in Tokyo, is an incineration plant that originally began operating in 1984 [(Musashino E-Service, n.d.)](https://www.zotero.org/google-docs/?izaA0J). After roughly two decades in 2006, inspections revealed that the structure was in need of extensive renovations, and, after Musashino City’s 4th Long Term Strategy and Plan in 2008, the redesign of the incineration plant began to be considered [(Musashino E-Service, n.d.)](https://www.zotero.org/google-docs/?izaA0J). After extensive consultations with the local community and relevant experts starting in 2011, the Kajima Corporation began construction in 2013 and completed the redesigned plant in its current form in 2017, winning a Good Design Award that year [(Musashino E-Service, n.d.)](https://www.zotero.org/google-docs/?izaA0J). During the consultations, the community advocated for environmental consciousness (focusing largely on air pollution), safety, resilience to earthquakes, and visually appealing design (Responsible Party of the Musashino City Environment Department Clean Center's New Center Construction, 2017). Much like the Hiroshima Naka Incineration Plant, the concept behind the Musashino Clean Center was to create a plant that “does not look like a waste management plant” [(Kajima Design 2017)](https://www.zotero.org/google-docs/?mcPf92). To do so, Kajima Corporation restricted the height of the plant to 15 meters to create greater coherence with the shorter residences in the neighborhood and enveloped the plant with a “green curtain” facade based on the local tree species to further unify the structure with the rest of the locality [(Kajima Design 2017)](https://www.zotero.org/google-docs/?CGTDTw). Similar to the Hiroshima case study, the structure is designed such that there is an open space made available for the community to use for local events, such as the Eco Marché (Musashino E-Service, n.d.). The Eco Marché is a community event with stalls selling eco-friendly goods, food and beverages, and workshops on sustainable living, focusing on local production, local consumption and the 3Rs.The Musashino Clean Center also provides free tours to the public (Kajima Design, 2017) raising awareness of the need for waste management locally.

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