Fujisawa Sustainable Smart Town: Panasonic’s imperfect ‘pilot lab’

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# Introduction

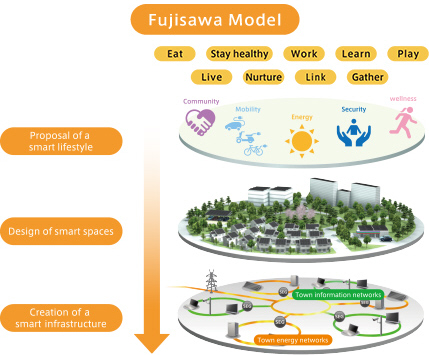
Fujisawa Sustainable Smart Town (SST) was designed to provide “the ultimate ideal” of sustainable, smart living (Fujisawa SST Council, 2018a, p. 1). Located within Fujisawa city, Japan, SST was launched by Panasonic in 2008 (Panasonic Corporation, 2013, page 11). Upon completion, SST will accommodate three-thousand residents (Haslam, 2015). This size is integral to SST’s ‘smart city initiative’, as it allows organizers to test, optimize, and showcase technology.

Like Singapore and Barcelona (Ho, 2017; Bakici et al., 2013), SST’s initiative guides development; however, organizers control how the vision is realized through technology. Nevertheless, SST’s top-down notion of citizenship and data usage affect organizers’ ability to achieve this goal.

# Smart ‘City’ Initiative

SST’s initiative seeks to achieve “the ultimate ideal” by accommodating residents’ sustainable, smart lifestyles (Fujisawa SST Council, 2018a, p. 1). To attain this, smart spaces and infrastructure were constructed (see Figure 1), as part of Panasonic’s Corporate Real Estate (CRE) strategy. A former factory site was developed as an ‘urban expansion’ (Joss et al., 2013, p. 56), using corporate partnerships to build a model, socially progressive community with positive government relations (Tsunashima SST Council, 2018). Promotions position SST’s technology as readily adaptable to ‘greenfield’ or ‘brownfield’ projects (Balch, 2011; Joss, Cowley & Tomozeiu, 2013, p. 56). In addition to the apparent resident-oriented vision, this positioning indicates an underlying corporate vision.

**Figure 1:** Fujisawa SST’s development model

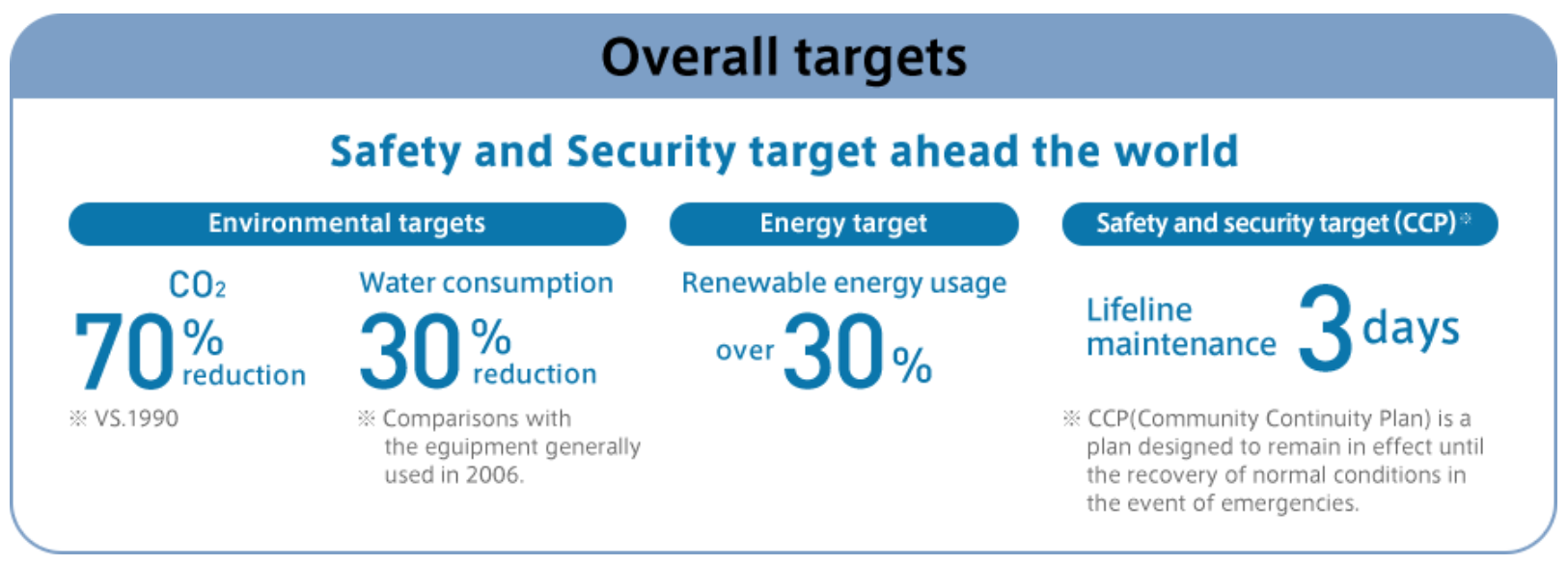


*Source: Fujisawa SST Council, 2018a, p. 3*

With these visions, organizers promote climate change mitigation, disaster preparedness, and social responsibility. The residential vision proposes to optimize working, learning, growth, collaboration, gathering, eating, playing, and living (Fujisawa SST Council, 2018b), while the corporate vision strives to maximize organizers’ return on investment and proliferation of the smart solutions market. Figure 1 indicates SST was designed to accommodate the proposed lifestyle. However, smart spaces and infrastructure are imposed upon residents (Yoneda, 2011; Fujisawa SST Council, 2014), implying adoption of SST’s technology, *not* adoption of the proposed lifestyle, realizes the corporate vision.

Unfortunately, policy documents and status updates are scarce, and poor translation of some documents renders them useless (Panasonic Corporation, 2018a). Nevertheless, objective targets are defined, underpinning achievement of SST’s initiative (see Figure 3).

**Figure 3:** Objective policy goals



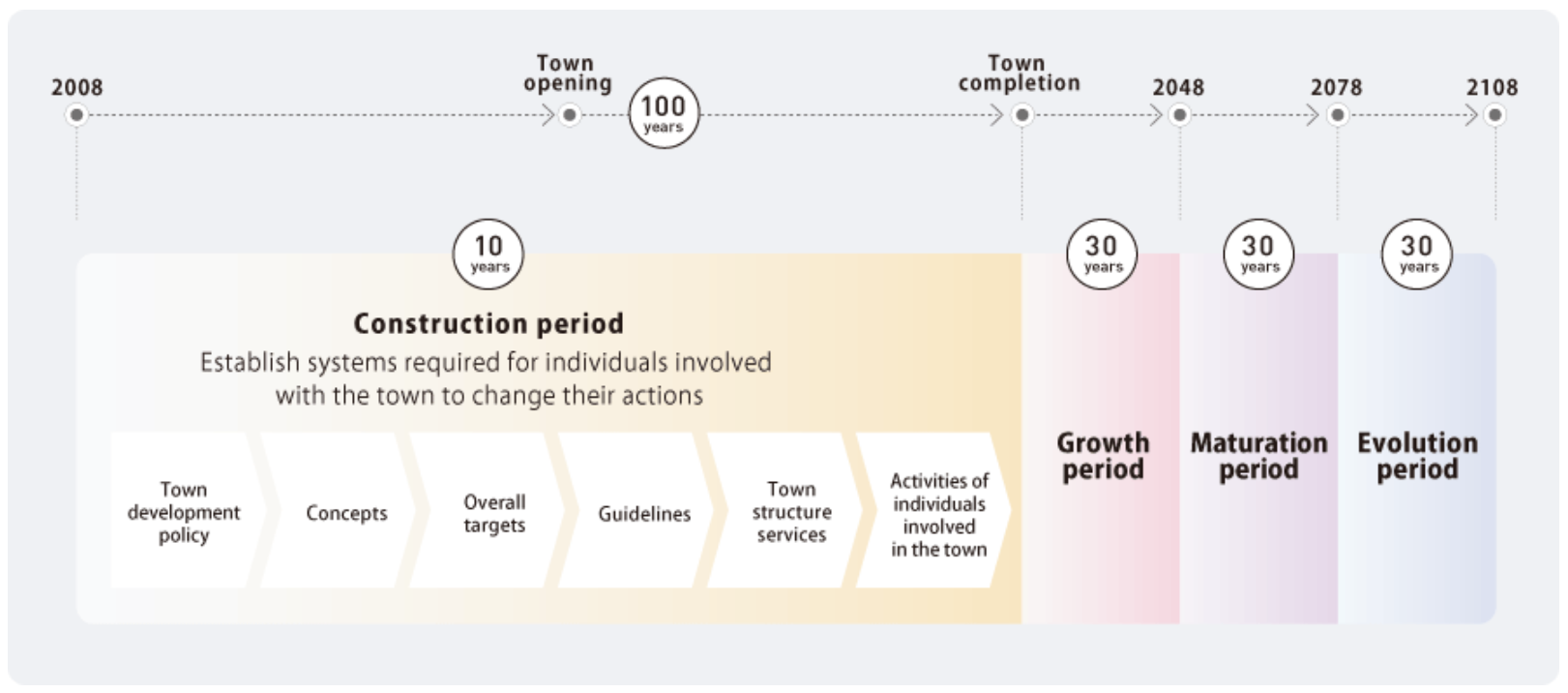
*Source:* *Fujisawa SST Council, 2018c*

Presumably, these targets are achieved, since utilized technologies were designed for use in SST. For instance, CO2 reduction and renewable energy usage are achieved through: an extensive photovoltaic panel system; interconnected energy storage and generation systems, such as Smart Home Energy Management Systems (SMARTHEMSs), Building Energy Management Systems (BEMSs), and ENE-FARM fuel cells; ‘passive design’ that maximizes sunlight and breezes (Shaeri et al., 2018, pp. 32-33); and optimizations suggested through SmartHEMSs or BEMSs (Fujisawa SST Council, 2018a, pp. 7-10). Technology used to achieve water consumption reduction is unclear, but ENE-FARM’s use of excess energy to heat water surely contributes (Fujisawa SST Council, 2018a, p. 10). Furthermore, SST’s energy storage and generation systems contribute to the safety and security target, but it is unclear how the town would maintain security when faced with disaster, as it operates as a “virtual gated town” (Fujisawa SST Council, 2018a, p. 11). Achievement of these targets is indeterminate, but organizers endorse them as indicators of ‘sustainable, smart’ performance, thus promoting benchmarking.

While this is common among smart policy advocates (Price, 2015, p. 421), research into the efficacy of benchmarking systems is lacking. Regardless, firms have been crucial circulators of such policies (Bok & Coe, 2017, pp. 55-56), as SST and its organizers’ popularities have driven widespread dissemination of the ‘sustainable, smart’ vision (Straits Times, 2016; Lenze, 2019).

Organizers also maintain a long-term, albeit unrealistic, vision (see Figure 2). For instance, the period before ‘evolution’ is too lengthy, since most technology employed will presumably be obsolete well before then (Kurzweil, 2007). This yields a question: What type of community have organizers created?

**Figure 2:** Long-term vision of Fujisawa SST



*Source: Fujisawa SST Council, 2018c*

## What type of community is Fujisawa SST?

## Fujisawa SST is a digital, intelligent, smart community, exhibiting characteristics of living labs (LLs), market pilots, and societal pilots. For instance, resident and community data are available to residents, collaborators, and Fujisawa city through SOYLINK and other platforms (Fujisawa SST Council, 2018a, p. 8, 16, 18), implying urban digitality (Komninos, 2011, p.175). Additionally, SST’s digital platforms facilitate communication and collaboration within the community (Fujisawa SST Council, 2018a, p. 18), illustrating SST’s ‘orchestration intelligence’ (Komninos, 2011, p.176). Furthermore, SST’s library, laboratory zone, and workshops improve residents’ human capital, while its disaster notification and energy optimization systems utilize data analytics and real-time reporting (Fujisawa SST Council, 2018a, pp. 9-12, 15-16). These aspects denote ‘amplification intelligence’ and ‘instrumentation intelligence’, respectively (Komninos, 2011, p. 176).

## In theory, SST exhibits smartness through use of digitality and intelligence to fulfill organizers’ normative goal of providing “[e]co [and] [s]mart” lifestyles that deliver services and concepts common to smart urban initiatives (see tier one of Figure 1; Albino et al., 2015, p. 12; Fujisawa SST Council, 2018a, p. 3). However, extensive promotions—international tours (Fujisawa SST Council, 2016b) and hired actresses (Panasonic Corporation, 2013, p. 24)—imply SST’s perceived smartness may be a marketing ploy. This is common among corporate-guided ventures (Batty et al., 2012, p. 486). Therefore, SST is digital, intelligent, and apparently smart, but is too small to be considered a town (Doxiadis, 1970, p. 397). Instead, it exists as a neighborhood exhibiting characteristics of an LL: visions of innovation and urban sustainability, real-world use context, and multiple, varied actors (Steen & van Bueren, 2017 p. 23). Particularly, SST resembles a ‘regenerated city’ LL, as it attracts investment and wealthy residents (Cardullo et al., 2018, pp. 46-49).

## Even though lessons learned in Fujisawa influence Panasonic’s developing LLs and ‘sustainable, smart towns’ (Power Technology, 2018; Tsunashima SST Council, 2018), SST fails to satisfy all LL criteria. For instance, mature technologies are employed, and development does not involve residents (Veeckman et al., 2013, p. 6; Mulder et al., 2008, p. 2; Salter & White, 2013, p.1; Steen & van Bueren, 2017, p. 24). Furthermore, by showcasing and optimizing products to drive sales and smart technology adoption, SST exhibits characteristics of ‘market pilots’ and ‘societal pilots’, respectively (Ballon et al., 2005, pp. 2-3). However, pilots are typically smaller than SST.

## In seeing that SST exhibits LL, market pilot, and societal pilot characteristics, it could be considered a hybrid ‘test and experimentation platform’ (Ballon et al., 2005): a ‘pilot lab’.

# Technology and Services

Figure 1’s first tier shows five services common among smart cities that SST’s technology is integral to providing (Cohen, 2014).

Regarding energy, Panasonic’s SMARTHEMS and BEMS integrate systems, allowing residents to visualize energy, gas and water usage and control HVAC and bathroom systems (Panasonic Corporation, 2012a). They also store energy and provide optimization and disaster settings (Fujisawa Council SST, 2018a, p. 8). Detached houses—PanaHome and Gakken’s Kodomotto smart house (Fujisawa SST Council, 2018d; Panasonic Corporation, 2018a)—integrate Tokyo Gas’s ENE-FARM fuel cell cogeneration system and Panasonic’s SMARTHEMS to generate, optimize, and control energy and hot water (Panasonic Corporation, 2012b; Fujisawa Council SST, 2018a, p. 8). PanaHome’s smart condominiums likely use Panasonic’s BEMS instead of SMARTHEMS. Futhermore, passive design is used to optimize sunlight and breeze infiltration, while the Community Solar System generates energy for the entire town (Fujisawa Council SST, 2018a, pp. 8-10).

In terms of security, SMARTHEMS or BEMS notify residents of emergencies and other dangers, while controlling house-level security. Cameras and monitor high-traffic areas, and streetlights use motion detection to dim or brighten. By integrating technologies, organizers limit access to the town, provide surveillance, assure secure homes, and monitor the town (Fujisawa SST Council, 2018a, p. 12).

To provide mobility, a digital, “total mobility service” offers electric vehicles to rent, buy, or share. It also facilitates battery sharing for transportation and offers vehicle inspections. Additionally, communal buildings provide charging ports (Fujisawa SST Council, 2018a, p. 14).

To further health, residents are given access to SST’s “comprehensive care system”, covering infants to geriatrics. An interconnected server is used to integrate the system, and health promotion events, workshops, childcare services, learning zones, and peer-support groups advocate wellness (Fujisawa SST Council, 2018a, p. 16).

A notion of community is constructed through town portals, asset and insurance support, the Fujisawa SST card program, and Panasonic’s SOY LINK community platform (Panasonic Corporation, 2018b). Fujisawa SST cards operate as identification within SST and allow residents to access services, most of which are interconnected to promote connections (Fujisawa SST Council, 2018a, p. 18).

Notably, Panasonic controls or influences all aspects of SST.

# Actors and Governance Structure

The Fujisawa SST Management Company (the Company) consists of private entities responsible for providing services and developing the town. It governs SST (Fujisawa SST Council, 2015), but one actor influences all development: Panasonic.

## Lead Organizer

Panasonic developed the project and invested half the capital required to form the Company (Fujisawa SST Council, 2015). Furthermore, Panasonic maintains vested interest in most of SST’s technologies (SMARTHEMS, BEMS, Kodomotto, SOY LINK) to capitalize on the growing smart solutions market (Allied Market Research, 2018; Markets and Markets, 2018). In fact, Panasonic has already marketed technology developed for and optimized in SST (Panasonic Corporation, 2018a; Panasonic Corporation, 2018b; SOY LINK, 2019) and has commissioned similar ‘sustainable, smart towns’ (Garfield, 2018; Panasonic Corporation, 2017; Tsunashima SST Council, 2018). Ultimately, Panasonic would benefit most by positioning itself as a leader in the “smart city epistemic community” (Kitchin et al., 2017, p. 277), which appears to be its goal.

## Fujisawa SST Management Company

The Company’s shareholders compose the most influential group of actors. Altogether, these firms invested ¥100 million to form the Company, which serves on SST’s advisory board and oversees all aspects of the venture (Fujisawa SST Council, 2015). As is expected, large shareholders exhibit more control. Panasonic and PanaHome maintain half the Company, while Mitsui *keiretsu* partners control approximately one-third (see Table A). These firms also supply the Company’s directors and auditor, evidently overseeing the endeavor (Fujisawa SST Council, 2015).

**Table A:** Fujisawa SST Management Company and Roles of Investors

|  |  |  |
| --- | --- | --- |
| ***Actor*** | ***Ownership\**** | ***Role*** |
| Panasonic Corporation | 35.5% | Lead Organizer |
| Panasonic Homes Corporation | 14.5% | Organizer |
| Mitsui Fudosan Residential Co., Ltd. | 14.5% | Organizer |
| Mitsui & Co., Ltd. | 8.0% | Organizer |
| Dentsu Inc. | 7.5% | Organizer |
| Nihon Sekkei, Inc. | 5.0% | Advisory Board |
| Tokyo Gas Co., Ltd. | 5.0% | Organizer |
| Nippon Telegraph and Telephone East Corporation | 5.0% | Organizer |
| Sumitomo Mitsui Trust Bank, Limited | 5.0% | Organizer |
| \* Ownership is assumed to denote capital investment in the Company (i.e. Dentsu Inc. invested ¥7.5 mil.) | | |
| *Source: Fujisawa SST Council, 2015* | | |

## Organizers

Company shareholders also compose the most influential organizers. Panasonic’s subsidiary PanaHome develops infrastructure, coordinates estate sales, implements regulations, and develops a framework for operating SST (Panasonic Corporation, 2012b). It also co-developed the Kodomotto smart house, which is now sold elsewhere (Panasonic Corporation, 2018a).

Mitsui & Co. planned SST’s infrastructure and provides energy management services (Panasonic Corporation, 2012b). Mitsui Fudosan Co. manages infrastructure and estate transactions, conceives planning regulations, and develops service frameworks (Panasonic Corporation, 2012b). Sumitomo Trust & Banking Co. designs estate value indicators, manages SST smart cards’ access and reward programs, and procures finance (Panasonic Corporation, 2012b). Mitsui’s role illustrates *keiretsu*’s influence in Japan (Miwa & Ramseyer, 2002).

Dentsu supports an array of management services while managing the Company’s capital investment (Panasonic Corporation, 2012b). Tokyo Gas’s ENE-FARM fuel cell technology provides energy and hot water, and Nippon Telegraph provides outdoor Wi-Fi and other communication services (Panasonic Corporation, 2012b).

Nevertheless, non-shareholder organizers are integral to SST’s success but exhibit less influence. Gakken co-developed Kodomotto with PanaHome (Panasonic Corporation, 2018a), CCC operates the Shonan T-Site entertainment and book store (Business Wire, 2014), Koyama manages the elderly care facility (Camellia Fujisawa SST, 2016), and Yamato operates a last-mile delivery compound (Yamato Transport, 2016).

## Members

Members exercise little influence outside their roles but are still important actors. Ain Pharmaciez operates SST’s pharmacy (Fujisawa SST Council, 2016a), while Accenture co-created the SST concept and designed and promoted a service model (Panasonic Corporation, 2012b). Presumably, Accenture’s biometric identification experience influences security procedures (Accenture, 2011). Sunautas provides mobility sharing and manages vehicle rentals, sales, maintenance, and insurance (Panasonic Corporation, 2012b; Sunautas, 2014). Sohgo Security maintains security equipment and supports the “virtual gated town” vision (Fujisawa SST Council, 2018a, p. 11).

## Advisory Council

The advisory council guides development; however, the Company sits upon the council, presumably maintaining more control than other advisors. It is likely that Fujisawa city exhibits power as well, but it is unclear to what extent. Besides the Company and Fujisawa city, Nihon Sekkei is likely the next most influential advisor. In addition to its investment in the Company, it developed an optimal energy deployment plan, proposes landscape designs, and develops maintenance guidelines (Panasonic Corporation, 2012b). Keio Research Institute is also influential, promoting SST through publications (Sakurai & Kokuryo, 2018). TEPCO, SST’s energy provider, ensures that the town’s distributed energy resources system is efficient, reliable, and integrates seamlessly with TEPCO’s energy network (Doubleday et al., 2019, p. 12).

## Governance

The Company promotes managerial governance (Harvey, 1989, p. 3), by “take[ing] resident views into consideration, incorporate[ing] new services and technologies, and…support[ing]…sustainable evolution of the town” (Fujisawa SST Council, 2018a, p. 1). However, in practice, the structure is entrepreneurial (Hall & Hubbard, 1989, p. 153). The Company uses SST to optimize technologies and attract investors, developers, and governments. While attraction of local investment characterizes Harvey’s ‘entrepreneurialism’ (1989, pp. 4-5), the Company increases interest in organizers’ technologies, so that they can be implemented elsewhere.

Government’s direct role in SST is limited to Fujisawa city’s advisory membership (Fujisawa SST Council, 2018a, p. 26). Implicitly, it serves as client and regulator: it benefits from SST’s growth and tourism, and it ensures compliance with municipal codes. Fujisawa city’s absence in governing implies organizers also control SST’s notion of citizenship.

# Citizenship

SST’s notion of citizenship applies to those who reside in and provide data to the town. Promotions suggest that co-development and inclusive decision-making are integral to the proposed “[e]co [and] [s]mart” lifestyle (Fujisawa SST Council, 2018a, p. 3), indicating citizenship’s structure is bottom-up (Cardullo et al., 2018, pp. 44-45). However, contrary evidence has been presented with respect to LLs’ characteristics. Furthermore, SST promotes a lifestyle that could be described as ‘closed’ (Sennett, 2018, pp. 5-9), as it is imposed upon citizens through infrastructure and technology.

Therefore, SST’s notion of citizenship is top-down: organizers dictate the development of projects. This structure is common among firm-guided, smart projects (Cardullo et al., 2018, p. 45), and further supports the theory that SST is *not* a pure LL. Furthermore, SST’s image of citizenship is ‘non-participation’ masqueraded as ‘tokenism’ (Cardullo & Kitchin, 2019, pp. 5-8). Multiple input channels satisfy the co-development criterium of LLs, but there is no evidence that organizers consider citizens’ input. Furthermore, organizers may be monetizing residents’ data without their permission.

# Data

Data is collected from resident input and feedback systems integrated throughout SST’s infrastructure. For example, SMARTHEMSs and BEMSs aggregate data, producing community- to house-level energy optimization reports (Fujisawa SST Council, 2018a, p. 8). Data is also used by organizers to improve systems, providing value for investors and utility for residents. Ultimately, both humans and technology use data to influence management and optimization decisions regarding: energy creation, supply, and storage (Fujisawa SST Council, 2018a, pp. 7-10); mobility (Fujisawa SST Council, 2018a, pp. 13-14); security and disaster response (Fujisawa SST Council, 2018a, pp. 11-12); community activities (Fujisawa SST Council, 2018a, pp. 17-18); and wellbeing (Fujisawa SST Council, 2018a, pp. 15-16).

Organizers apparently have unchecked access to data, while residents are limited to dashboard-style platforms. This inequality reaffirms that SST’s development is ‘closed’ to residents and raises some questions (Sennett, 2018, pp. 5-9). To what extent do citizens agree to have their data collected? Is it acceptable for data collected in SST to be used in future projects? Must residents relinquish control over their lives for access to the ‘ultimate ideal’ lifestyle?

These questions are easily clarified, but documentation fails to address SST’s code of ethics. However, this is not the venture’s most obvious shortcoming. Instead, it fails to promote sustainability, despite being branded a ‘sustainable, smart town’.

# Suggested Improvements

While SST exhibits smartness, sustainability is not clearly demonstrated. Sustainability petitions current generations to satisfy their needs without impacting future generations’ abilities to enjoy the same standard of living. SST’s vision does not account for all aspects of sustainability and would be better described as ‘green’. For instance, a truly sustainable settlement would aspire to use only renewable energy, not simply “over 30 percent” (Fujisawa SST Council, 2018c). Furthermore, SST relies entirely upon the outside world for food. Likewise, most water appears to come from utility companies, even though organizers claim rainwater is used (Fujisawa SST Council, 2018a, p. 4). Addressing these shortcomings would surely improve sustainability.

Increasing renewable energy usage is a simple way to promote sustainability (Kammen & Sunter, 2016, p. 922). If SST cannot fulfill needs by producing renewable energy, then it must obtain the difference elsewhere. Renewable energy should be purchased from a utility provider. If this is impractical, renewable energy credits—J-credits (Kuramochi, 2015, pp. 1325-1326)—should be purchased to offset non-renewable energy usage. Japanese firms have even facilitated this process through a blockchain, J-credit marketplace (Runyon, 2019).

To reduce water consumption, a combination of green roofs (GRs) and rain gardens (RGs) can be used. Notably, GRs reduce stormwater runoff through retention (Wise et al., 2010, p. 1129; Shafique et al., 2018, pp. 764-766), and should be installed on feasible buildings. However, because most residential roofs are dramatically pitched and thus infeasible for GR installation, public spaces should be landscaped with RGs to reduce ground-level stormwater (Wise et al., 2010, p. 1131; Siwiec et al., 2018, p. 3). With proper substrates and collection systems, both GRs and RGs can be used to harvest grey water (Feehan et al., 2012), which is appropriate for uses such as irrigation.

Regarding food security, GRs can be used to grow produce (Wise et al., 2010, p. 1131; Shafique et al., 2018, p. 766). Advancing urban agriculture using green roofs would improve food security, strengthen disaster preparedness, cut emissions resulting from food transportation and sequester carbon. Furthermore, GRs could provide public space and opportunities for community-building.

These enhancements should be assessed through ex-ante, interim, and ex-post evaluations. An ex-ante, ‘rational planning’ evaluation should determine how to minimize costs and maximize benefits, before implementation (Khakee, 1998, pp. 359, 372). During implementation, progress should be assessed to determine if goals are being met. Following implementation, an ex-post evaluation should aggregate costs and calculate benefits to determine if the ex-ante evaluation was accurate (Khakee, 1998, p. 359).

# Conclusion

While the suggested improvements would enhance SST’s sustainability, they do not address its absence of co-development, which disqualifies it from being considered a pure LL. Regardless, organizers have achieved their corporate and residential visions by penetrating the smart solutions market and by fostering their version of “the ultimate ideal”, “[e]co [and] [s]mart” lifestyle. In doing so, they have developed a ‘pilot lab’, which has proven to be a valid experimentation platform. However, co-development should become a primary focus of governance structures, or else we risk giving prominent actors absolute control of future development.

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