行政院所屬各機關因公出國人員出國報告書
（出國類別：考察）

赴日瞭解 Wi-SUN Alliance、太陽光電設備、智慧電網設備及離岸風力第三方驗證相關檢測驗證作法出國報告

服務機關：經濟部標準檢驗局
出 國 人　職稱姓名：局長連錦漳、簡任技正龔子文
出國地點：日本
出國期間：中華民國 108 年 8 月 19 日至 8 月 23 日
報告日期：中華民國 108 年 11 月 7 日

目錄

圖目錄

壹、 背景及目的說明

為實現 2025 年非核家園政策，達到再生能源占比 20%之目標，政府積極推動再生能源及智慧電網布建。本局負責智慧電網相關標準、檢測驗證及再生能源的第三方驗證工作。日本為亞洲地區智慧電網布建及再生能源的先驅，擁有完整的智慧電網相關標準、檢測驗證及再生能源的第三方驗證相關能量。本此考察規劃拜訪日本電器安全環境研究所(JET)、日本品質保證機構(JQA)、日本海事協會 Class NK、日本藤澤市永續智慧城市、及京都大學原田研究室(場域網絡標準聯盟 Wi-SUN Alliance)等單位，了解智慧電網通訊應用、相關標準發展、設備檢測驗證作法及離岸風電專案驗證作法，並洽談合作事宜。

貳、 活動行程簡述

此次考察從 108 年 8 月 19 日至 23 日，為期 5 日，行程如表 1。

表 1、赴日考察智慧電網及再生能源發展行程

日期	拜訪單位	地點	拜訪目的
8/19 (一)	(上午) 搭機前往日本東京	東京	
	(下午) 藤澤永續智慧社區 (The Fujisawa Sustainable Smart Town)	神奈川	瞭解日本在社區型用戶之分散式電源及需量反應空調卸載之整合調控發展情況。
8/20 (二)	(上午) 一般財團法人 電氣安全環境研究所 (Japan Electrical Safety & Environment Technology Laboratories, JET)	東京	了解其太陽光電(PV)檢測驗證之制度，同時也能汲取檢測能量建置經驗，並了解未來台灣即將推行之智慧家電、智慧電網以及工業自動化之機器人檢測驗證。
	(下午) 日本海事協會(Class NK)	東京	日本再生能源發展情形與展望、驗證機構與政策配合之發展，以及探詢未來檢測、驗證、研究等發展之合作機會。
8/21 (三)	京都大學拜訪原田教授實驗室	京都	了解 Wi-SUN 多跳接標準發展的最新情況，作為標準調和以及測試案例編寫之重要參考。
8/22 (四)	(上午) 一般財團法人日本品質保證機構(Japan Quality Assurance Organization, JQA)八王子實驗室	東京	1. JQA)自 1992 年雙方簽署合作備忘錄開始，日方提供諸多檢測驗證技術培訓與協助，為我電機電子產品安規、電磁相容檢測驗證技術打下堅實基礎 2. JQA 也發展綠電憑證是由總部「地球環境事業部」執行，這次參訪更能相互交流
	(下午) 一般財團法人日本品質保證機構(JQA)總部	東京	
8/23 (五)	搭機返回台灣		

參、 參訪成員名單

單位	姓名職稱
經濟部標準檢驗局 Bureau of Standards, Metrology and Inspection, M.O.E.A.	**連錦漳 局長** Dr. Ching-Chang Lien, Director General
	龔子文 簡任技正 Tzu-Wen Kung, Senior Technical Specialist
金屬工業研究發展中心 Metal Industries Research & Development Centre	**武威宏 處長** Wei-Hung Wu, Director
	邱信豪 副組長 Sin-Hau Chiu, Assistant Chief
財團法人台灣大電力研究試驗中心 Taiwan Electric Research & Testing Center	**黃順義 董事長** Shun-I Huang, Chairman
	張庭綱 副處長 Ting-Kang Chang, Deputy Director
財團法人中國驗船中心 CR Classification Society	**謝謂君 董事長** David Hsieh, Chairman
	張耀方 處長 Yao-Fang, Chang, Director
國立中央大學 National Central University	**通訊工程學系 胡誌麟 副教授** Professor Chih-Lin Hu, Department of Communication Engineering
中興工程顧問股份有限公司 Sinotech Engineering Consultants Inc	**工業區及城鄉發展部 規劃師及都市技師 陳蓓如規劃師** Pei-ju Chen, Planning Director of Land Development, Highway & Aviation Engineering Dept.
中原大學團隊 Chung Yuan Christian University	**電機工程學系 陳士麟 教授** Professor Shi-Lin Chen, Chung Yuan Christian University, Department of Electrical Engineering
	席寶祥 博士 Dr. Pao-Hsiang Hsi, Senior Consultant, Swiss Reinsurance Company Ltd.
財團法人台灣電子檢驗中心 Electronics Testing Center, Taiwan	**林宗清 副執行長** Tsung-Chin Lin, Vice President
	葉明時 經理 Daniel Yeh, Manager
財團法人台灣經濟研究院 Taiwan Institute of Economic Research	**陳彥豪 副所長** Yen-haw Chen, Deputy Director

肆、 參訪內容記要

一、 日本藤澤市永續智慧城市 (The Fujisawa Sustainable Smart Town, Fujisawa SST)

(一) 參訪單位簡介

日本神奈川縣藤澤市永續智慧城市(Fujisawa Sustainable Smart Town, Fujisawa SST)，由神奈川縣藤澤市政府與松下集團（Panasonic）於 2010 年 11 月 17 日簽署 Fujisawa SST，共同開創新的環境及街廓改造。該基地位於藤澤市西南部的 JR 東海道本線鐵路沿線，佔地約 19 公頃，原為松下集團的工廠舊址，2007 年起進行土地更新及活用，故松下企業便與政府合作，設置「由地區到地球的環境行動都市-藤澤」先導型示範計畫。藤澤智慧城市（Fujisawa SST）推動之作法，是由智慧住宅（Smart House）進化為智慧城市（Smart City），再到 Fujisawa SST。藤澤永續智慧城鎮之開發經費（耗資約 160 億台幣），採用一般住宅之開發經費執行，公司營運成本由日本松下集團出資 50%，三井公司 30%，餘由其他公司共同出資。藤澤永續智慧城市（Fujisawa SST）建置分為三個層面，包括基礎建設（光纖網路、太陽能板）、空間規劃設計及科技服務，欲利用雲端資訊科技，達到環境、能源、及安心安全 3 大方向目標。

日本神奈川縣藤澤市永續智慧城市發展願景為「以 100 年持續居住」為願景，並具體訂定該社區 3 大目標：(1)環保：降低 70%的二氧化碳排放量及減少 30%生活用水；(2)能源：再生能源利用率達 30%以上；(3) 安心：災難發生時，確保 3 天份的防災物資及基本生活所需能源，其規劃分為五大主軸，分別如下：

1. 能源管理

採分散型發電構想，獨棟住宅均設置太陽能發電、蓄電池、燃料電池及家庭能源管理系統（Home Energy Management System，HEMS）。各戶可自行發電、儲能、節能控管，並傳輸使用能源資料至自治會，自治會將每個月提供分析報告建議住戶節能的使用方式，並藉由發給紅利點數方式獎勵節能。

2. 安全安心：

設置監視器及 LED 感測路燈。夜晚無人車時，路燈會自動降低亮度，以節省能源；當感測到有人車接近及行進路線，將自動調整亮度，配合監視器錄影。每戶住宅均設置保全設備及火災警報器。

3.便利交通

由租車公司進駐社區服務中心，可租賃共用電動車、電動腳踏車、或一般車輛，並提供買賣車、車險、車檢等服務。

4.健康照護

引進地區照護系統，結合醫療、照護、用藥等領域，運用 ICT 技術管理住戶健康資訊及治療資訊，必要時提供其所需服務。

5.社區管理

社區專屬網頁，作為發布資訊、溝通、舉辦活動及取得服務的平台，而每戶住宅配置智慧電視及平板取代傳統的傳閱板。

（二）拜訪人員

関家一雄---神奈川大學工科大學 特別研究員
笹川雄司---神奈川大學工科大學 廣報担當
村上隆史---ECHONET Consortium 技術委員長

圖 1、考察團隊與日本神奈川縣藤澤市永續智慧城市合影

（三）交流與探討

本次考察首先由智慧城市管理公司介紹藤澤市永續智慧城（Fujisawa Sustainable Smart Town）的設計理念，接著帶領考察團參觀城市管理中心、減碳作法、能源管理、防災整合等實踐。參訪時段對於以下問題尋求答案：

1. 松下集團是否有規劃發展藤澤市永續智慧城的 2.0 版並推廣到日本其他地方或是國外?

藤澤市係屬住宅社區型，目前松下集團運轉中的尚有綱島（Tsunashima）SST，係以都會區的辦公大樓、百貨公司、住宅大樓等為適用對象。二者皆係由民間營建業視需要建設與推廣。

圖 2、考察團隊參與日本藤澤市永續智慧城市介紹

2. 日本躉購電價補貼大幅減少後，對新智慧城市規劃是否有影響?

由於東京電力的平均售電價格約為新台幣 6 元，已等同太陽能發電成本，遂不再需要政府的補貼。

3. 智慧社區包括：(1)能源管理、電動車、醫療/照護等相關的產業技術、(2)社區規劃、社區管理等服務業技術、(3)房地產、融資貸款、資產維護等房地產/金融業，如何經由房地產業者結合不同的製造業與服務業來打造合理價位的社區而能吸引客戶購置，整體的核心業者是房地產及營造業者嗎?是如何達到整合效果?

藤澤 SST 係由松下集團及三井公司開發房地產方式售屋，而綱島 SST 係由 Nomura、Kanden 及松下集團三家房地產業者開發並租售。

4. 國家有那些標準、法規須要制定俾利於推動永續智慧社區?

由於日本的電價水準、高齡化及少子化社會、環保要求等提供適當的社會、經濟條件，才有民間企業與個人買主願意投入 SST 的產銷。而藤澤市政府更是重要的推手。法規面主要是建築法規、分散式電源（含儲能）逆送電法規、醫療照護法規、緊急避難（海嘯、地震等）法規、電動車、快遞等交通運輸法規等，由於日本法規已允許並鼓勵建置，在藤澤 SST 內才會有這些環保、安全與人性化的設施。

二、 一般財團法人日本電氣安全與環境研究所(Japan Electrical Safety & Environment Technology Laboratories, JET)

(一) 參訪單位簡介

日本電氣安全與環境研究所 JET(Japan Electrical Safety & Environment Technology Laboratories) 成立於 1963 年，是日本政府根據電器和材料控制法(Electrical Appliance and Material Control Law)指定的授權測試機構，接管政府所進行的測試服務。從那時起，JET 與製造商、進口商、經銷商和消費者合作，支持在日本建立和提高電氣設備和設施的安全性。JET 積極推進其在產品檢測和檢驗服務、驗證服務、與海外機構的合作以及品質管理體系（ISO9001）註冊服務方面的業務，並通過環境管理體系（ISO14001）註冊服務為環境保護做出貢獻。

同時，JET 也致力於新能源用途之產品檢測驗證，如用於小型分散型發電系統的系統互連設備驗證、用於大規模分散式發電系統併網之功率調節器、太陽光電模組驗證、太陽光電電站運維驗證及地面型太陽光電模組-系統可靠性要求保證。

JET 基於公平可靠的 ISO 標準執行評估和註冊服務，其主要管理系統標準如下：ISO9001 Quality management system；ISO14001 Environment management system；OHSAS18001 Occupational health and safety management system;ISO27001 Information security management system；ISO50001 Energy management system。

針對測試與驗證 JET 以提供一站式的服務為主，希望獲得日本電器和材料安全法驗證的海外客戶，JET 使用日本以外的測試機構頒發的 CB 證書，如 PSE 合格評定證書和 S-JET 證書。透過這種方案，JET 支持並提供快速的驗證方式。且 JET 接受這些測試機構根據 JET 的要求進行的工廠檢查結果。這些程序使客戶可以有效地處理整個驗證過程。

JET 提供代理服務可透過日本以外的國家（如中國和韓國）的 JET 驗證單位申請驗證，並使用測試報告和 CB 證書取得驗證。這些服務使客戶能夠快速獲得所需的驗證。

根據長久累積之經驗使得 JET 能夠提供廣泛的服務，並應政府和各機構的要求，JET 研究電氣安全、與新能源相關的技術、節能和環境議題等。JET 開展太陽能電池組件之合格評定基準和復雜的老化試驗技術的研究和

開發。JET 還研究了具有類似要求的太陽光電系統評估，並進行了研究和開發，並與國家實驗室密切合作。另外 JET 對從零售商處購買的電氣產品進行市場監督測試。JET 持續對以制定符合國際標準的國家安全標準進行調查與修正。從正確製造、進出口、經銷和使用電子產品的角度來看，JET 出版宣傳文物以促進電氣安全，並舉辦研討會，為國內外商業實體用戶提供有價值的信息。

(二) 拜訪人員

薦田康久---理事長
鈴木一弘---常務理事/總務部長
住谷淳吉---理事/經營企畫部長/技術部長
川口晶寬---東京事業所副所長
初見隆司---業務推進部長
佐藤恒之---業務推進部長國際担当部長
尾崎愛太郎-業務推進部長副本部長
平野麻實---業務推進部統括組主查

圖 3、考察團成員與日本電氣安全與環境研究所人員合影

(三) 交流與探討

1. JET 業務概況介紹

JET 自 1963 年成立經過數次的改名以及整頓，實驗室數量也依業務性質擴增，發展迄今其承接業務及產品之各項檢測驗證主要類別如下：

(1)太陽電池模組驗證；
(2)家庭用電氣製品安全驗證；
(3)用電器具適合性檢查驗證；
(4)無線控制設備驗證；
(5)併聯系統保護裝置驗證；
(6)智慧機器人驗證；
(7)再生能源用蓄電池驗證。

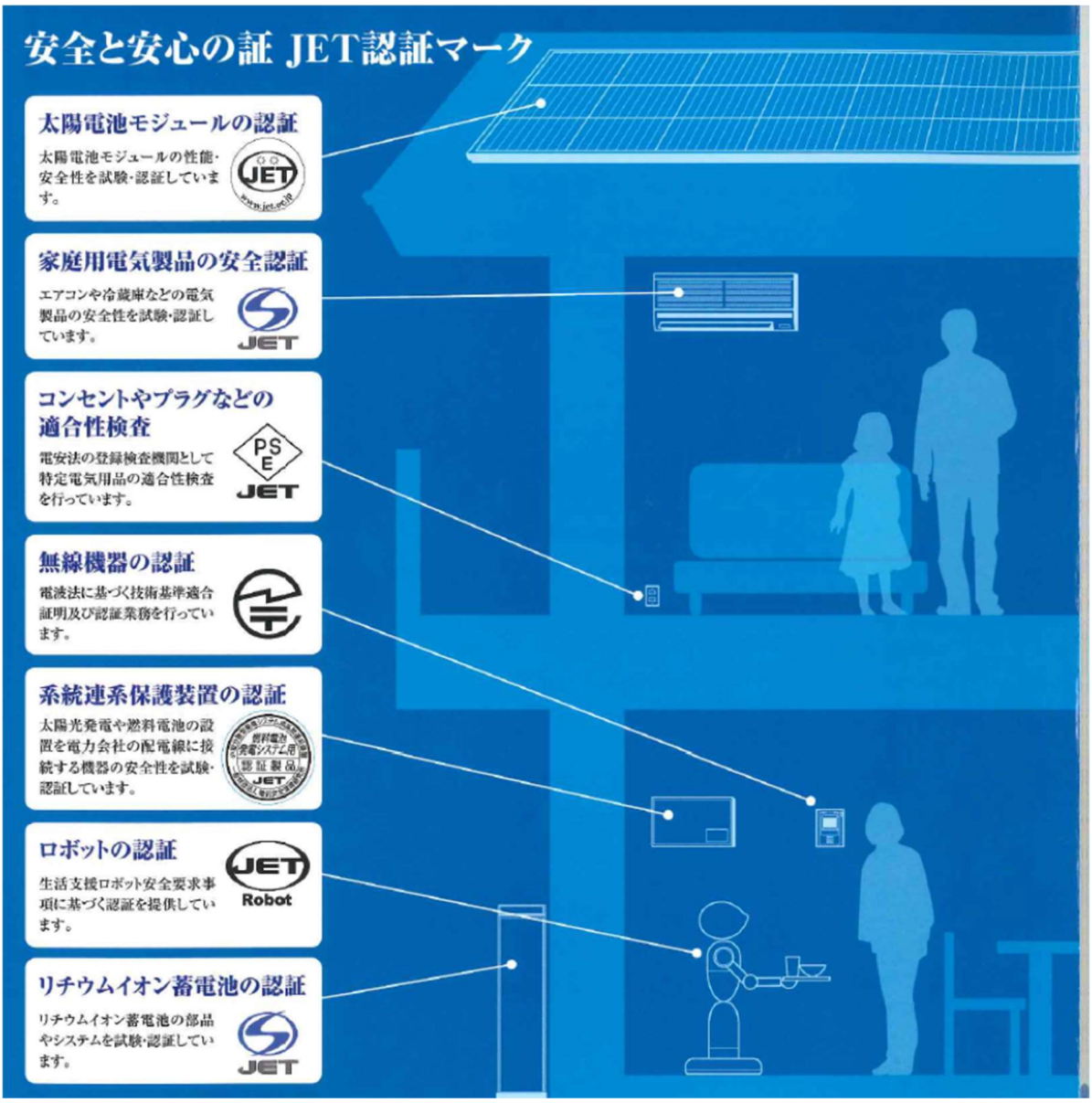


圖 4、JET 提供之產品安全驗證服務及驗證標誌

2. 新能源產品之測試與驗證業務

JET 在再生能源領域之檢測業務主要涵蓋太陽能發電及燃料電池發電等，包括如下：

(1)小型分散式發電系統併網及保護設備驗證

為確保太陽能發電系統、小型燃氣發動機發電系統、燃料電池發電系統和電池系統(包括EV)併網的變流器(電力調節器)的安全性和性能，JET 執行相關第三方系統驗證制度，有助於發電設備之併網。

(2)大規模分散式發電系統併網變流器(電力調節器)測試

JET 執行 MW 級以上分散式太陽光電發電系統併網變流器(電力調節器)測試，測試方法主要參照國際標準包括 IEC、UL 及 IEEE 等。

(3)太陽光電模組驗證(JET PVm Certification)

JET PVm 驗證制度為日本推行之太陽光電模組第三方驗證制度，依照國際 IEC 相關標準包括 IEC 61215、IEC 61730 等進行太陽光電模組安全及性能之測試。

(4)太陽光電系統操作及維護驗證

JET 依照「太陽光電系統定期檢驗及失效查驗指引報告」進行太陽光電系統驗證，該制度主要在登錄通過驗證合格之太陽光電營運及維護公司及工程師，並以第三方公正立場驗證報告。

(5)二次基準太陽能電池校正

執行日本商業化運行的校正方案，進行可追溯至國際標準之二級基準太陽能電池校正，提供太陽能裝置性能量測評估的基準。

(6)太陽能電池性能量測：

進行研發單位所發展出之太陽能電池產品進行性能量測，確認發電效能。

(7)太陽光電模組長期可靠度測試

為確保太陽光電模組之長期可靠度，依 IEC 標準進行高溫高濕試驗之延長試驗、增加試驗週期的溫度循環試驗及鹽霧試驗等。

3.日本 JET 電力技術試驗所

JET 電力技術試驗所，其座落於橫濱鶴見區 JET 橫濱試驗所旁，該所於 2011 年完成建築物之落成後，3 月起即陸續進行原本位於東京試驗所之併聯設備系統驗證測試之轉移，4 月後開始進行提供多台式系統併聯驗證檢測服務，9 月建置完成配光曲線試驗設備，2012 年 7 月持續將太陽光電相關試驗設備自總部搬遷至該所，進行相關產品之驗證。

JET 電力技術試驗所主要的業務在提供再生能源發電系統及其分散式電源所需設備之驗證檢測、節電高效型照明器具可靠度評估、太陽電池模組驗證、系統併聯保護裝置驗證、照明燈具配光曲線及相關研究和委託測試服務等。

其中太陽光電模組量測設備包括長脈衝型太陽光模擬器太陽光電模組性能量測設備、冰雹試驗設備、UV 試驗設備、機械負荷試驗設備、穩態太陽光模擬器溫升試驗設備、濕漏電絕緣試驗設備、模組撞擊試驗設備、環境溫箱試驗設備、短脈衝太陽光模擬器大面積太陽光電模組性能試驗設備等。

4.日本太陽光電模組驗證制度介紹

日本於 2009 年 4 月至 2010 年 3 月編列近 200 億日圓預算，用以促進太陽光電產業之發展，對於太陽光電模組之補貼條件中設有產品驗證條件，如結晶矽太陽光電模組效率須要大於 14%，薄膜型之產品效率須大於 8%,另外有一項極重要的門檻即是須取得日本 JET 的驗證和保證，因此輸往日本之太陽光電產品在申請相關補貼時，必須先取得相關驗證。

日本太陽光電模組之驗證開始於 2003 年 4 月,驗證標示制度則開始於 2005 年 4 月，剛開始以性能之檢測為主，一直到了 2006 年 10 月後，才將安全的驗證加入，其驗證制度之適用範圍主要針對家庭使用之太陽光電模組，工業用則需有另外之考量，產品種類則包括結晶矽太陽光電模組(包括單晶矽及多晶矽)和薄膜型太陽光電模組(包括非結晶矽(a-Si)、串疊型電池模組(Tandem cell module)、銅銦硒(CIS)等)，聚光型的太陽光電模組則不在涵蓋的範圍內。

日本太陽光電模組申請驗證之流程如圖 5，首先向 JET 申請進行產品檢測，在進行檢測接近完成時，JET 會派員進行工廠檢查，在太陽光電模組驗證制度中，除了模組須符合相關之測試標準規定外，製造工廠之品質系統也須符合品質相關之規範，且對於製造工廠之檢測設備也有規定，通過產品驗證之工廠每年由 JET 進行工廠檢查，工廠檢查主要著重於太陽光電模組製造過程中之品質及技術控制，申請流程如圖對於所有之產品測試項目如目視檢查、I-V 特性測試、絕緣測試等皆須逐一通過品管檢驗，當產品測試和工廠檢查都合格後，廠商將獲准合格之驗證證書，得以在產品上貼上合格標籤。

通過驗證之產品有效期限為 5 年，通過驗證之型式將列於 JET 之網站(http://www.jet.or.jp)，驗證標籤須貼於每一個驗證產品上。

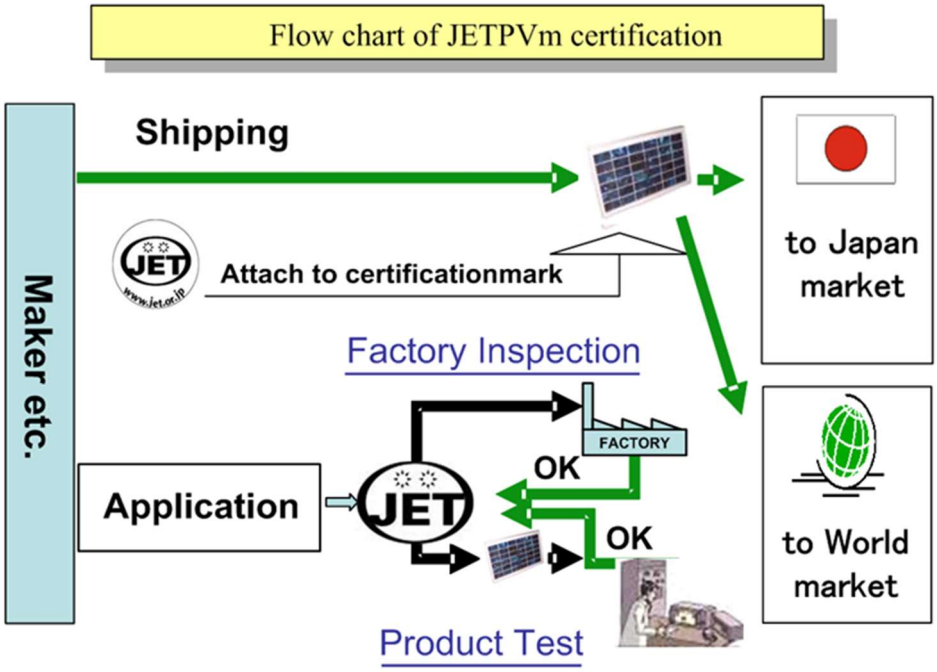


圖 5、日本太陽光電模組申請驗證流程

申請 JET 太陽光電模組驗證作業流程如圖 6 所示，工作項目如下：

(1)驗證申請及流程

a. 填寫模組驗證申請書(規格書/工廠調查表/相關附件資料)後連同樣品寄至日本 JET，待 JET 受理後與客戶確認申請內容之相關疑點，並於釐清所有疑點後，正式完成受理。

b. 通過測試及首次工廠檢查後，核發證書。

(2)實驗室依照規定之測試標準進行試驗：

a. 性能測試標準

結晶矽模組 JIS C 8990（IEC 61215）

薄膜型模組 JIS C 8991（IEC 61646）

b. 安全性測試標準

構造要求：JIS C 8992-1（IEC 61730-1）

安全測試要求：JIS C 8992-2（IEC 61730-2）

(3)特殊要求及規定：針對尺寸超過 1.8 m 的模組，由於有一部分的試驗無法對應，若是使用其他機構之數據，或是測試用之特殊模組測試，需要向 JET 進行諮詢。

(4)工廠檢查一年一次，分為首次工廠檢查、定期工廠檢查及臨時工廠檢查三大類，其流程及內容大致如下說明：

a. 首次工廠檢查：事前提出工廠調查報告書，JET 將依據工廠調查表上所記載之內容為參照依據，針對製造、試驗/檢查、組織、品質系統等進行調查。

b. 定期工廠檢查：依工廠調查表之調查項目基準，針對製造、試驗/檢查、組織、品質系統等進行調查。另同首次與定期工廠檢查的檢附相關表單證明，調查其有關之檢附表單證明的記錄維持是否適當。

c. 臨時工廠檢查：登錄之產品、材料不符試驗規範時；於首次工廠檢查或定期工廠檢查，為辨明登錄產品、材料有不適性之重大影響時；其它 JET 判斷認為有必要實施時。

(5)申請通過後之證書有效期限：5 年。

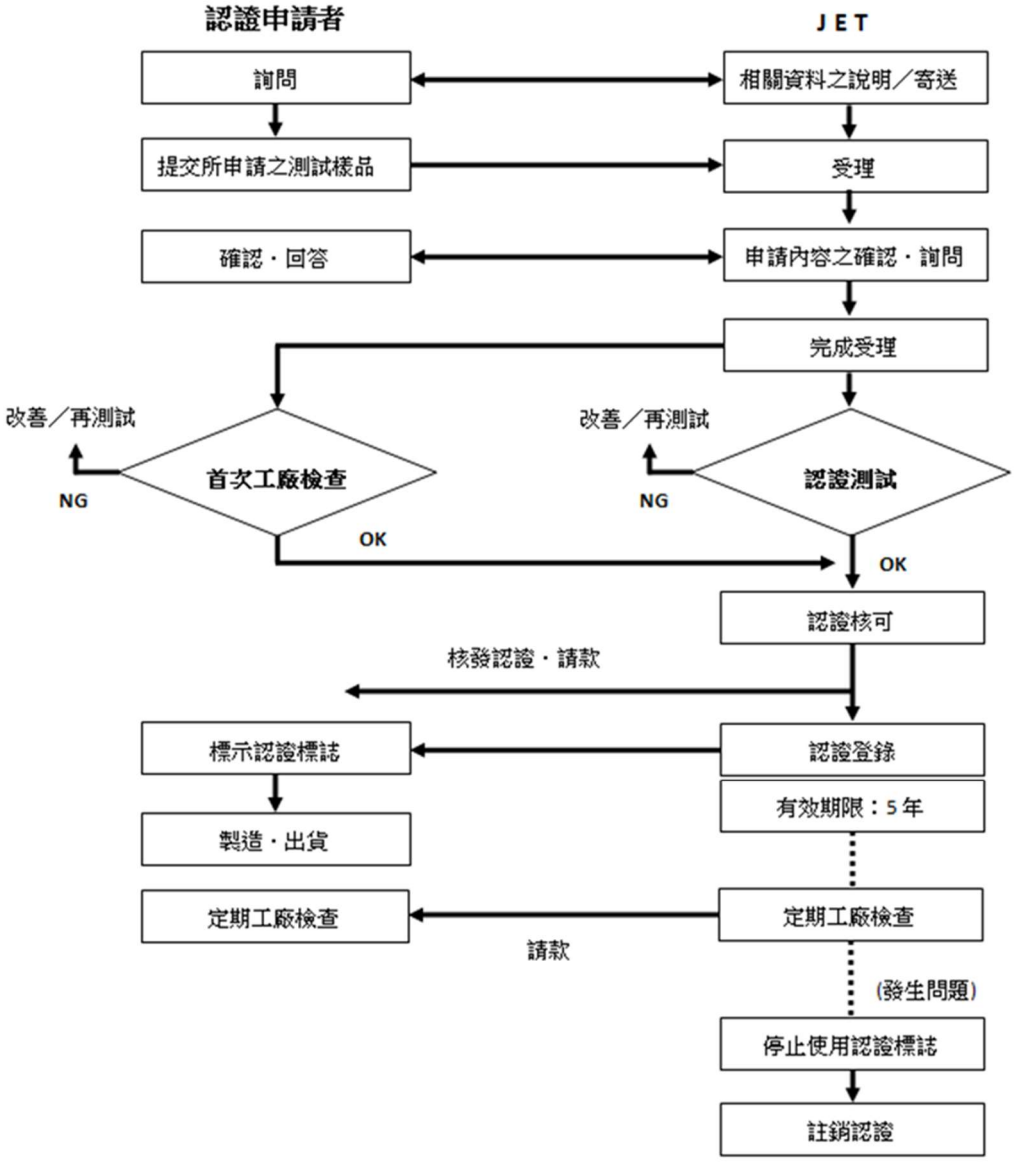


圖 6、日本 JET 太陽光電模組驗證申請流程

5. 智慧型電器及新能源測試驗證所需設備投入及對策

JET 本身已有許多類型之測試實驗室，但因科技及產品類別不斷地推陳出新，且能源產品之量級也越來越大，因實驗室檢測能量也要跟上檢測需求則需投入許多成本，若在日本已有相當能量且性質相同之實驗室,採用合作策略以符合產業檢測需求。JET 與國家級實驗室 AIST 之 FREA (産業技術総合研究所福島再生可能エネルギー研究所)合作，提供各種大型再生能源產品檢測。

6.智慧家電 ECHONET Lite 推動情況未來合作議題

日本政府針對智慧家庭所推動的 ECHONET Lite 協定仍屬日本市場專用之協定，因此通過 ECHONET Lite 驗證的廠商，主要還是以日本公司居多。但不論智慧家庭採用的通訊標準為何，透過標準的訂定也加速完成實施智慧電網能源管理示範場域，導入智慧家電等電器設備，同時利用能源管理系統技術有效調控並節省能源，達到低碳社會的目標，未來將搭配需量反應等能源管理技術，邁向智慧社區為主的技術應用發展。

7.未來合作議題

台灣已有檢測機構與日本電器安全環境研究所自 2001 年起簽署了工廠檢查方面及部分產品檢測的合作協定，由該檢測機構負責 JET 驗證之台灣工廠的年度工廠檢查業務，以及 S-MARK 的申請、體系驗證合作，並有日本 JET 專家長期進駐指導，可協助台灣廠商在電器產品輸日驗證的申請，以順利獲得 PSE-Mark 和 S-Mark，並期望電器產品類別範圍能擴大，如智慧家電及新能源產品都能透過台日檢測合作及技術交流，將提高產品的市場競爭力，有助於台灣的產品進入日本市場。

三、 日本海事協會(Class NK)

(一) 參訪單位簡介

日本海事協會全名為Nippon Kaiji Kyokai (Japan Marine Association)，簡稱Class NK或NK，成立於1899年，發展至今屆滿120周年，主要從事船舶檢驗及入籍，全球有超過130個服務據點、6個計畫/圖面審核中心，以及4個直營據點，以全世界船舶來看，約有20%、9100餘條船隻入Class NK船籍。

再生能源的部門亦為全球性的組織，隸屬於事業開發總部，其總部設置於東京。為加強專業能力，Class NK併購相關於風況評估、風機設計評估、海上施工評估等服務之顧問公司WEIT(Wind energy institute of Tokyo Inc)，此外，Class NK也結合了學界、業界相當多之專家做為其建置能量，石原教授即為其一。再生能源中風力機的部份，主要為大型風力機驗證以及國際再生能源組織的合作兩項工作項目，驗證包含了風力機發電機驗證、專案驗證、場址驗證以及浮體式風力機的驗證。

台灣與日本海事協會過去曾簽署合作備忘錄(MOU)如下：

1. 於104年10月21日在標準檢驗局劉前局長見證下，金屬工業研究發展中心與日本海事協會(Class NK)完成簽署再生能源產業合作備忘錄。
2. 於106年6月6日於日本海事協會總部，在標準檢驗局劉前局長見證下，由金屬工業研究發展中心、中國驗船中心與日本海事協會，進行離岸風能技術合作備忘錄簽署。

台灣與日本海事協會過去曾就日製離岸風力機技術系統實證計畫可行性調查。

1. 日立、東京大學及Class NK合作向日本NEDO研提「日製離岸風力機技術系統實證計畫」，於105年9月獲得通過，並向台灣方提出計畫合作事宜。
2. 雙方於105年10月起至106年5月互相交流及研究，將抗颱Class T風速等級57m/s納入臺日雙方國家標準，分別於106年1月及106年3月正式公告，並為台電公司第1期離岸風場標案所採用。

台灣與日本海事協會專案驗證訓練

1. Class NK 與標準檢驗局團隊針對第三方驗證計畫合作進行專案驗證技術轉移訓練案。針對場址條件評估、設計基準評估、鋼構銲接設計驗證等主題，增強驗證團隊專案驗證整體實力。

2. 考量台灣特有的氣候條件狀況，Class NK 亦安排日本及韓國專家學者針對颱風與地震影響之風力機及基座設計分析，進行課程及實務訓練。

(二)　拜訪人員

冨士原康一---會長
坂下広朗---副會長
赤星貞夫---再生能源事業部部長
松永昌樹---開發本部國際部部長
山口欣弥---營業本部副部長
村上修-----企劃部部長
羅亞興-----營業本部主事

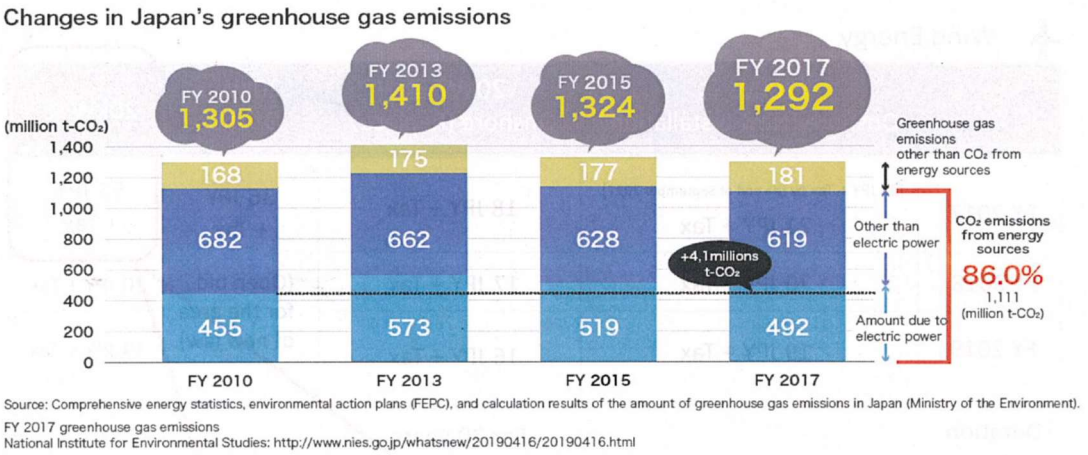
圖 7、考察團成員與日本海事協會人員合影

(三)　交流與探討

Class NK 會長於致詞時竭誠歡迎局長及台灣檢測驗證團隊到訪，亦希望於再生能源發展上能與相關單位有更多的合作。並表示日本離岸風電發展進度可能稍晚於台灣，目前遭遇到漁業權問題，以及日本法律亦規定須

進行環境影響評估，而日本環評四個步驟全部走完約需 4-5 年，此兩項議題是目前發展上的一大瓶頸，如何解決漁業權問題，以及縮短環評時程是目前經濟產業省的重要課題。在此一議題上，Class NK 會長聽取台灣發展情形，如台灣在風場發展上以跨部會來進行，行政院有一專責政務委員及單位來負責處理與協調，以經濟部主導開發事宜，漁業權由農委會主責，航權為交通部主責，環境影響評估則在開發計畫時就要提出，由環境保護署負責。透過跨部會協調、補償、配套措施等來解決相關問題。

接著由 Class NK 赤星貞夫部長簡介日本再生能源發展現況，日本為了實現京都議定書所訂定的減少溫室氣體排放，引入節能技術與新能源技術，但在 2011 年的福島大地震後核電站停止運轉，溫室氣體占比攀升，日本藉由加強節能工作，溫室氣體排放量於 2017 年回復到接近 2011 年左右的水準，但來自發電需求而產生的二氧化碳排放量仍是增加的情形。



Source: Comprehensive energy statistics, environmental action plans (FEPC), and calculation results of the amount of greenhouse gas emissions in Japan (Ministry of the Environment).
FY 2017 greenhouse gas emissions
National Institute for Environmental Studies: http://www.nies.go.jp/whatsnew/20190416/20190416.html

圖 8、日本溫室氣體碳排放量近年變化

日本政府面對能源及碳排放的長期目標，除了降低總體能耗，也亟需增加不排放二氧化碳的再生能源及其他能源。日本官方預估 2030 年和 2017 年的電力總體需求相去不遠，但預期將化石燃料發電的比例大幅降低，可參閱圖 5。

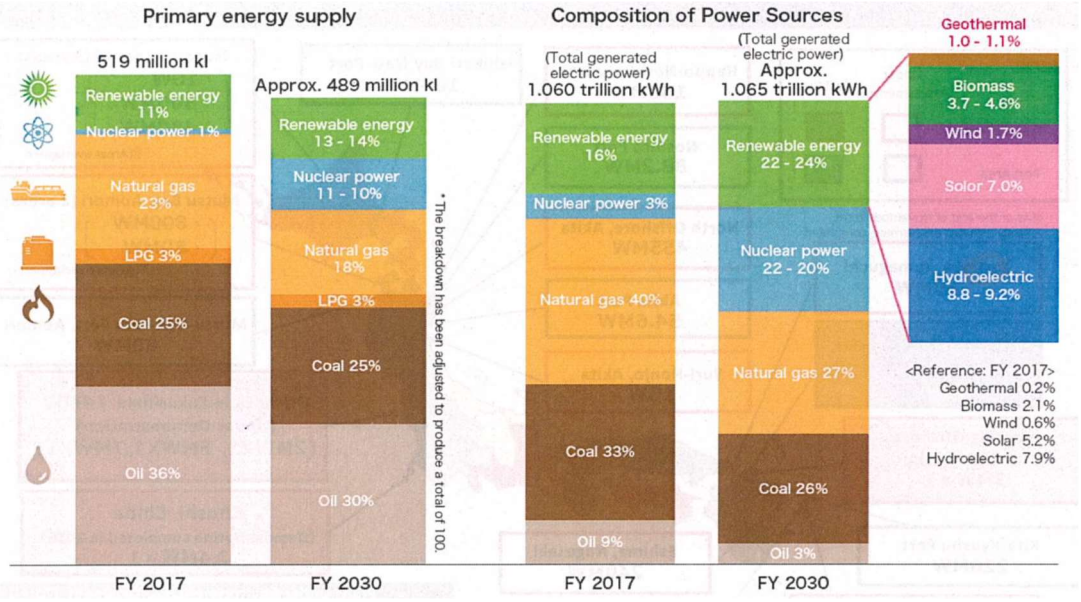


圖 9、2017 與 2030 日本電力總體需求及能源供給組成

目前屬於再生能源的水力及太陽光電，已經在日本發展有相當規模，日方寄予厚望於風力發電及生物發電，但由於風力發電成本仍然非常高，尤其離岸風電成本非常高，同時也會反映在電費的躉購價格，並影響到使用者的用電費率。日本與台灣相同，有許多個規劃中、建設中的風場開發案，包含有正進行環境影響評估的案場，合計約有 5.37GW 左右(港區 550MW，一般海域 4,820MW)，未來也可能改變為招/投標制度，以競爭的方式來降低開發成本與電費躉購價格。

Class NK 則依照電力事業法許可過程，執行了一些陸域風場的驗證，近期也剛執行完成並發佈第一個商轉的離岸風場專案驗證。此外，日本政府主導的浮體式離岸風力機研究計畫，由於浮體式基礎於日本是以船舶來認定，故 Class NK 也為 5 座的示範浮體式離岸風力機之基礎進行船籍登錄，亦針對 2 座浮體式風力機的施工安全進行檢查，同時研究著床式風力機及洋流潮汐能發電設備等安全審核。小型風力機部份，則有兩家臺灣廠家(新高、東元)的風力機送至日本進行產品驗證。

目前 Class NK 亦參與幾個海洋能源發電的實證計畫，現正於北九州進行中，包括洋流發電、潮汐能發電設備等，預期在今年夏季末之前，會安裝在實驗海域。

議題討論：

1. 檢測驗證技術標準，是日本自行發展或是有與國際機構合作?

Class NK 回覆：離岸風電之驗證標準係以 IEC 標準為基礎，日本的電氣事業法再進行必要的修正，以此做為離岸風場的驗證基礎。

2. 颱風在台灣海峽仍為嚴峻的問題，先前有和日方 Class NK、東京大學石原老師等進行合作，日後是否可以長期觀察、配合專案驗證做交互比對等議題，雙方進行下一期或長期合作?

Class NK 回覆：颱風的侵襲仍為大氣與流場機率，因此仍不容易量測得到。於先前合作中，東京大學發展有極端風況評估軟體 MASCOT，可針對風場極端風況進行計算分析，並與台灣方的觀測資料進行比對與確認，未來日後可以此方向，持續發展合作事宜。

3. 承如簡報中所述，北九州已有浮動式離岸風力機與潮汐能發電實證計畫，有鑑於此類再生能源發電為未來趨勢，台灣於標準制定與實際應用上，可否以先期研究等方式與日方進行合作?

Class NK 回覆：目前為止有 5 個浮體式離岸風力機的驗證經驗，浮體式離岸風力機在技術上是可以克服沒有太大問題，但在經濟性與成本上，浮體式仍是相當昂貴的選擇，因此目前日方政府及一些合作單位如 NEDO、Class NK 等，正在努力研究降低成本及提高效率，有部份技術文件已上傳到官方網站上，後續將會持續增加與更新，Class NK 相當樂於跟台灣政府及相關單位來分享發展經驗。

4. 國際間現以 IEC 標準為基礎，但於驗證領域，未來朝向 IECRE 體制發展，聽聞赤星部長今年也有參加南非之年會，如 Class NK 有後續發展計畫或 IECRE 新資訊等，可否分享予標準檢驗局?

Class NK 回覆：今年 5 月於南非召開之 IECRE 年會，TAF 的盛念伯副處也有以觀察員身份參加，會議中有碰面並交換不少資訊，未來將會更緊密的聯繫及分享資訊。而其他國際組織的資訊分享，Class NK 與台灣的交通部有一既有通聯管道，如有其他需求亦可以透過此管道進行溝通聯絡。

5. 另外在 MWS 部份，保險公司對於 MWS 成果非常重視，日方不曉得是否有無要求?

Class NK 回覆：與 MWS 較為相關的單位係如東京海上火災等民間保險公司，經濟產業省及國土交通省等政府單位則不會參與，另外則多為海上的再保公司前來洽詢 MWS 相關內容。

四、 京都大學原田教授實驗室

(一) 參訪單位簡介

Wi-SUN 為國際上有關低功耗物聯網通訊網路技術之優選通訊協定，國內在智慧電網的先進讀表基礎建設（Advanced Metering Infrastructure, AMI） Route B （Home Area Network, HAN）亦選 Wi-SUN 為無線通訊協定，目前此部分均為單跳接（Single Hop）通訊傳輸設計。為配合智慧城市發展，Wi-SUN 聯盟正研議新的多跳接（Multi Hop） 通訊傳輸標準，將電動車等移動式儲能裝置納入而成為 Enhanced HAN，新標準因此必須與國家通訊傳播委員會（NCC）所規範的 Wi-SUN 實體層進行調和。

京都大學原田教授為 Wi-SUN 聯盟主席，並為 Wi-SUN 標準的主要制定成員，拜訪京都大學原田教授團隊及研究實驗室係為瞭解 Wi-SUN 多跳接通訊標準發展的最新情況，作為我國在標準調和以及測試案例編寫之重要參考。

(二) 拜訪人員

本此考察係由京都大學情報学研究科／通信情報系統專攻通信学講座教授及 Wi-SUN Alliance 理事会議長原田博司（Hiroshi Harada）接待。

圖 10、考察團成員與京都大學原田博司教授合影

(三)　交流與探討

訪問團一行七人於京都大學與原田教授會談，係由原田教授親自提出簡報講解 Wi-SUN 發展歷程，及包括 Wi-SUN 在居家醫療數據傳輸等方面的應用，再由訪問團請教原田教授。

1. Wi-SUN Multi-Hop（即 Extended HAN）的實體層測試和網路互通層測試的方法及規範？與 Wi-SUN （Single Hop）HAN 的測試方法有那些差異，及包括那些增加的測試規範？

   原田教授答覆：已公佈於 Wi-SUN Alliance 網站。具體而言，有以下三項文件可資參考：

   (1)20150605-TCC-Echonet-Interop-Test-Spec-for-HAN-extension-Stage2-1v02 版
   (2)20150605-TCC-Echonet-Interface-Comformance-Test-Spec-for-HAN-extension-Stage2-1v01RC5 版
   (3)20160212-TCC-Echonet-MAC-Comformance-Test-Suite-Spec-for-Ext-HAN-1v02RC1 版

2. Wi-SUN FAN 和 Multi-Hop 的測試案例，目前測試案例的相關資料？其中，對於 Relay 裝置單元的測試內容包括那些主要的項目？

   原田教授答覆：同上述第(1)項。亦已公佈於 WiSUN Alliance 網站。

3. 目前在日本智慧家庭之發展有 Wi-SUN HAN 和 ECHONET Lite 整合推動和產業規範，後續 Wi-SUN FAN 和 ECHONET 之間是否仍舊會有相同的整合和產業規範的提出？

   原田教授答覆：尚未發展到那個階段。

4. Wi-SUN HAN 和 FAN 在全球的推廣與使用之概況？目前在智慧電網以外，還有那些其他產業市場也正使用 Wi-SUN 技術？是否有其他具體的應用服務案例？

   原田教授答覆：於 2019 年 5 月計有 6 家 Promoter Member，82 家 Contributor Member 以及 104 家 Adopter Member，此 104 家公司包括美、日、歐、韓的電力公司。在應用領域方面，除電力、天然氣等公用事業以外，亦發展居家照護、環境保護、農業水利等之監控。

5.Wi-SUN 技術應用在 HAN 和 FAN 時，對於資料傳輸的安全性機制為何？以及相關安全性資料傳輸標準規範的訂定作法與建議？

原田教授答覆:均採用既有的資安協定譬如PANA(Protocol for Carrying Authentication for Network Access）、IEEE 802.1x 等協定。

五、 一般財團法人日本品質保證機構(Japan Quality Assurance Organization, JQA)

(一) 參訪單位簡介

日本經產省督導成立電機電子產品驗證機構,早期主力是電子類產品，發展至今已橫跨燈具，醫療器材，影音資訊，家電產業…等之安規，EMC及能效等全方位領域檢測驗證能量。JQA 業務分主要兩大主軸：1. 品質系統驗證能量；2. 產品檢測驗證。

1.日本品質保證機構 JQA 品質系統驗證能量：

(1)管理系統：ISO 9001（品質），IATF 16949（自動車），JIS Q 9100（航空宇宙），TL 9000（電気通信），ISO 13485（医療機器・体外診断用医薬品）

(2)食品安全：ISO 22000（食品安全），FSSC 22000（食品安全），ISO 9001-HACCP（食品安全），JFS-C（食品安全），JGAP・ASIAGAP（農業生産工程管理），

(3)能源與環境：ISO 14001（環境），ISO 50001（能源系統驗證），ISO 45001・OHSAS 18001（労働安全衛生），ISO 39001（道路交通安全），REACH＋プラス（製品含有化學物質管理）。

(4)資訊安全管理：ISO/IEC 27001（系統資安防護），ISO/IEC 27017（雲端系統資安防護），JIS Q 15001（個人資安防護），PCI DSS（支付卡資安防護），CSMS（控制系統資安防護），ISO/IEC 20000（IT service），ISO 22301（事業継続）。

(5)JQA 業在綠能憑證業務能量也有著墨，107.7 月，辦理「亞太再生能源憑證與市場高峰會」邀請日本能源經濟研究所新能源部理事工藤拓毅與會介紹「日本再生能源推動制度發展」。

2.日本品質保證機構 JQA 產品檢測驗證

(1)電機電子製品・醫療機器測試與驗證

(2)電氣用品安全法（PSE Mark），消費生活用製品安全法

(3)（PSC Mark），醫藥品醫療機器等法，電波法

(4)S-JQA Mark 測試/驗證，CMJ 登録，IECEE CB 驗證/測試，IECQ 驗證，台灣 BSMI 驗證符合性證明，ECHONET Lite 規格適合性驗證／AIF 仕様適合性驗證

(5)JIS 驗證

(6)計測器校正・計量器檢定

(7)建設材料・機械製品試験・検査

(二)　拜訪人員

小林憲明---理事長
平岩貞浩---理事
塩田武彥---安全電磁中心所長
高橋一修---安全電磁中心企劃室室長
立原克法---安全電磁中心驗證部部長
梁敏-------安全電磁中心驗證部顧問

圖 11、考察團於 JQA 總部與理事長合影

(三)　交流與探討

本此考察首先參觀日本品質保證機構安全電磁中心，洽談在「日本電波法」，「醫藥品、醫療機器等法」相關驗證合作機會。JQA 簽發世界首張服務型機器人證書，其中最核心驗證技術是「機能安全」，未來希望在「機能安全技術研習」與 JQA 繼續維持技術合作。日本品質保証機構(JQA)目前也持續關注綠電證書發展，經濟部標準檢驗局再生能源憑證中心則就台灣再生能源憑證與日本品質保証機構(JQA)進行交流。

1. JQA 為經濟部標準檢驗局日本唯一認可 RPC 指定驗證機構，2014 年迄今實際執行並核發 COC 證書合計達 150 件以上，以「多功能事務機」、「大尺寸 LCD 顯示器」、及「汽車音響」等為大宗。

2. 國際 IECEE CB 驗證服務方面，JQA 在就 IT、AV、醫療器材、照明器材等領域與台灣電子檢驗中心(以下簡稱 ETC)合作。ETC 為國際 IECEE CB scheme CBTL，JQA 為該等領域之 NCB。

3. ETC 與 JQA 都是亞洲網路論壇之創始會員機構,該論壇政致力於建置亞洲共通驗證體系。

4. JQA 的主要驗證業務在日本電氣產品方面,由於日本的電氣產品市場極大，同時日本消費者對電氣產品的安全性也非常的重視。從 2001 年 4 月 1 日起，在日本行之多年的電氣用品取締法(Electrical Appliance and Material Control Law)，已被電氣用品安全法(Electrical Appliance and Material Safety Law)所取代，於日本境內銷售的大多數家用或商用電氣產品及部分重要零、配件，均受新法的管制。新法中，執行檢測的測試機構也由公營法人，放寬至政府認可的民間實驗室，加入了市場自由競爭的機制。同時新法增加了危險品回收的相關規定，也加重了違規的罰則。日本市場的電氣產品依據日本政府制定的電氣用品安全法和經產省頒布的省令(技術標準)分為甲種產品(Category A)和乙種產品(Category B)。甲種產品為強制性驗證產品，包括電線、保險絲、配線器材、限流裝置、小型變壓器、電熱器具、電動應用機械器具、電子應用機械器具、其他使用交流電的機電器具、攜帶式發電機等產品類別，共計 116 項產品。甲種產品必須由授權評估單位來執行強制性第三者驗證。 廠商取得符合性證明書後才能貼上菱形 PSE(Product Safety of Electrical Appliance & Materials)標誌。乙種產品為業者自我宣告的方式，包括非特定電氣用品驗證範圍(即非甲種產品)之電線、電線管、保險絲、配線器材、限流裝置、小型交流電動機、電熱器具、電動應用機械器具、光源應用機械器具、電子應用機械器具、其他使用交流電的機電器具等產品類別，共計 341 項產品。乙種產品製造商若根據電氣用品安全法的安全要求，保證電氣產品之安全結構者，即可自行貼上圓形 PSE 標誌。

伍、 心得與建議

一、 藤澤市永續智慧城市

日本藤澤市永續智慧城市參訪過程中獲致以下重要觀察與心得：在能源管理部分，首先的重點是透過微環境（Micro-Environment）之規劃建構節能的基礎，譬如：藤澤市南邊臨海，距離相模灣約 2 公里，智慧城在整個社區中心留有「風道」，風道兩側為社區建築，夏季來自海面較涼爽的南風可以自然地流動到各個住家，降低智慧城整體所需的空調用電，這和美國綠建築協會 LEED 以及全球知名 Climate Group 所推廣的 EP100+RE100 理念十分相近。

圖 12、透過智慧城預留「風道」達到微環境優化節能

第二層次的能源管理則是太陽能發電、儲能及家庭能源管理系統（HEMS），透過網路通訊最大化地使用在地生產的能源，利用 FIT 補貼優勢並減少輸配電損失。儲能實施方面除了部分家庭配備有儲能設備，並利用電動車（V2G）作為儲能設備。惟目前 V2G 與電動車快充系統使用兩套設備：V2G 使用單相/200V/5kW 之獨立逆變器而電動車平日充電則使用另一套三相/200V/50kW 充電樁。如此，V2G 之運用會有侷限性，且設備之投資與保養費用勢必增加。

圖 13、V2G 與平時電動車充電使用兩套設備

第三層次的能源管理是透過每月由城市管理中心寄發之用電分析報表。透過 HEMS 與發電、用電、儲能設備間通訊收集到的資料，彙整到城市管理中心並進行分析，將分析結果提供給住戶作為未來優化用電的參考。

第四層次的能源管理提升到活動規劃層次。這些包含:

1. 交通：建立共同租賃系統，減少使用私家車需求。
2. 貨物運輸：社區內設置 Next Delivery System, 物流包裹送到共同的收取點，城市管理公司用網路通知住戶，住戶打開電視收到提領包裹訊息後再步行或騎自行車前往取件。如此可大幅節省物流業者在智慧城內小巷道穿梭的時間及減少汙染排放。
3. SST Square：城市管理公司與鳶尾書店合作，在休閒健康主題館內除養生運動等主題書籍外，搭配瑜珈、Starbucks 等會館。家庭親子主題館內除食譜童書類主題書局外，亦搭配烹飪教室等活動教室。如此各種活動可在同一建築物內進行、提高誘因並減少交通需求，並可即知即行創造正面循環。
4. Wellness Center：城市管理公司與學研合作經營安親班、托嬰中心，並安排各種活動讓不同年齡層的人在此共同進行活動，達到世代融合、交流、與傳承。

貫穿整個藤澤市永續智慧城的規劃，除了上述科技與人文的想法，還有商業模式的串聯。這可以從智慧城的開發商 Panasonic 透過 SST 轉型從「設備供應商」變成「家庭自動化解決方案提供者」，城市管理公司透過地方創生商品、建立社區平台提供服務預約、防災推送等信息，提高與保持社區價值，到成立 Incubator，提供新創事業發展的空間等。 這些都是未來國內規劃智慧城值得參考的重點。換言之，國內發展智慧城亦必須具備商業價值：要有「開發商」及「營運商」合作，而以「開發商」作為系統整合業者，相當於「營造業」。分階段營造智慧城區，再由城區客戶採購並支付營運費用，如此逐區發展終成為整個智慧城。

另外日本 ECHONET Consortium 及 Japan Smart Community Alliance（JSCA）指派專家於今年十月八日來台講解智慧家電的互通性標準及其示範應用。據此，台日雙方可以針對 SST 之相關法規、示範計畫等作深度會談。

二、 日本電氣安全與環境研究所 JET

JET 的業務範圍跟標準檢驗局的標準、檢測及驗證業務非常相似，都是替消費者及使用者的安全把關，同時是引領產業前進的先驅，並與國內檢測機構已有良好之合作關係。JET 發展至今能有這樣的規模及能量，也是兢兢業業地不斷累積自身的實力，並懷著為產業服務精神，更不斷地接收新的資訊而向外擴展業務，是一個非常值得敬佩的檢測驗證機構。從 JET 實驗室的管理更了解日本人做事的嚴謹，這也值得國內檢測驗證機構效法。

台灣於今年通過「再生能源發展條例」修正案，定下 2025 年再生能源達 27 GW 的目標，包含鼓勵綠電自由市場及公家機關與用電大戶設置綠能等措施。由於再生能源發電具不穩定的特性，台灣目前也正積極發展具智慧化之發電、輸電、配電及用戶的整合性電力網路，以提升電力系統運轉效率、供電品質及電網可靠度，並促進再生能源擴大應用與節能減碳之政策目標。經由此次參訪與技術交流更了解在智慧電網、智慧家電以及新能源產品檢測方面，於未來將有更多合作機會替國內業者創造更多出口日本之機會。

三、 日本海事協會 Class NK

日本近幾年，為因應減碳議題，積極、大力的推動再生能源及節能發展，離岸風電的開發也是目前的重要項目之一，為了因應臨海區域水深較

深，日本已經著手朝向浮體式離岸風力機進行研究開發，目前研發成果亦可謂世界先驅之一，而日本政府亦以示範合作計畫的方式，讓業界、學術與研究單位共同參與之外，亦讓 Class NK 驗證機構參與其中，構成完整的風電設計、製造、驗證之完整產業鏈，藉由讓實際案例的執行，上中下游皆獲取離岸風電之開發經驗。

有鑒於臺灣與日本皆為颱風與地震頻繁的國家，且臺日雙方皆有共同發展與建置離岸風電驗證技術的目標，雙方在標準、檢測驗證以及法規制度等，都處於學習發展階段，離歐洲較為成熟的風電產業仍有一段空間，且目前國際間驗證機制也於 IEC 轉換為 IECRE 之過渡轉換期，日本為 IEC 會員國，未來期能與 Class NK 持續的配合，於風電標準、實際案場聯合驗證，抑或是先導型研究等，展開更多合作的契機。

四、 京都大學原田教授實驗室

1. IEEE 802.15.4 定義物理層（Physical Layer, PHY Layer）與媒體控制層（Medium Access Control Layer, MAC Layer），適用於低耗電且低資料率（Low Power and Low Data Rate）的無線個人活動空間網路（Wireless Personal Area Network, WPAN）即短距離內之通訊傳輸規範。IEEE 802.15.4g 則係補充 IEEE 802.15.4，而係適用於低資料率之智慧電表等的無線傳輸。

2. 各個標準制定團體係研訂標準，譬如：IEEE 802.11 無線區域網路（LAN）係由 WiFi 聯盟採用並予推廣；同理，IEEE 802.16 無線都市區域網路（MAN）係由 WiMAX Forum 推廣；而 Wi-SUN 聯盟係採納並推廣 IEEE 802.15 無線智慧公用事業網路（Smart Utility Network, SUN）之團體。SUN 係基於 IEEE 802.15.4g 射頻（RF）及 IPv6/6LowPAN，適用於 FAN 及 HAN、國內資策會及工研院均為 Wi-SUN 的 Contributor Member，而 NextDrive 公司為 Adopter Member。

3. Wi-SUN 剖繪（Profile）綜述如下：

   (1)Wi-SUN 工作組包括：由 ECHONET WG 建構 HAN，由 FAN WG 建構 FAN，二者均採用既有的通訊協定，而二者之間僅 HAN 採用 802.15.10 Layer 2 Routing，而 FAN 採用 RPL（Routing Protocol for LLNs, Low Power and Lossy Network）而有所不同，此外，FAN 的安全驗證同 WiFi 採用 802.1x Extensible Authentication Protocol，相對於 HAN 採用 PANA（Protocol for Carrying Authentication for Network Access）

屬 IETF（Internet Engineering Task Force）的協定。亦即二者皆採用既有的通訊安全協定。

(2)Wi-SUN 另設兩個工作組：JUTA WG 及 RLMM WG，因係天然氣或瓦斯表之通訊，數據量少，遂不採用載波偵聽多路存取（Carrier Sense Multiple Access, CSMA）而係採用極低耗電的 F-RIT（Feathery-Receiver Initiated Transmission）MAC 協定。

(3)在低耗電的無線區域（LPWA）協定當中，802.15.1 係規範 WPAN/Bluetooth；802.15.5 係規範 Mesh Network；802.15.10 係規範 Layer 2 Routing；802.15.5 係規範 ZigBee。

4. Enhanced HAN 的 Connecting Sequence 係在原 HAN 的 Connection 部份另加 Sleep Device 及 Relay 兩個中間層，前者適用於儲能而後者適用於移動式家用電器（Home Appliance Device, HAD）。原田教授表示：相關測試標準已公佈在 Wi-SUN 網站。

5. 欲比較低耗電廣域（LPWA）通訊協定應從以下六方面近行評比：是否可免頻段執照、傳輸率（Transmission Rate）、傳輸範圍、傳輸所需的電源功率、支援 IP 通訊的能力、空中編程(On-The-Air Update, OTA Update）能力等。

6. 欲比較 IoT 系統，應從以下七個方面進行評比：標準化程度、製造廠數目、不與第三代夥伴計劃(3rd Generation Partnership Project, 3GPP）相競爭、OTA Update 能力、通訊範圍須在 sub-GHz 之下達數百公尺、支援多跳接能力、易應用於傳統無線系統環境譬如 WiFi 等。

7. 經由原田教授的測試，Wi-SUN 的通訊範圍達 600m（可視距離）或達 300m（不可視距離）。係要求接收功率大於-90dBm 且封包錯誤率（Packet Error Rate, PER）小於 10%，後者係對於 250 octets 八位元組（Byte）的 PSDU（PLCP Service Data Unit,即：Physical Layer Convergence Protocol）所評比者。換言之，必須要有多跳接功能。

8. 國內 NextDrive 公司製成具有 WiFi、BLT、Wi-SUN 功能的 IoT 閘道器，京都大學與 NISSAN 製成 Wi-SUN FAN 模組。據之可經由多個閘道器而與上游之 3G、4G 等通訊系統相聯網。

9. 原田教授實測家庭健康照護功能包括：病（老）人移動位置、血壓、血糖等健康數據、氣溫、灰塵粒子、照度、耗電等之監測，並據之經由大數據分析對於病（老）人猝死、中風等風險進行預防。

10. 國內正積極推動智慧城市及能源互聯網，相關的無線通訊遂必須符合上述第 5、6 兩項之要求。低耗電的目標係指在通訊器材的生命週期不須更換電池。在智慧社區方面，國內亟待加強的是老人照護，包括遠端醫療、

殘障者輔具、病況量測、照護與診斷分析、預警、老人意外之防範等，如此，發展出老人與殘障的照護產業。在智慧城市方面，亟待加強的是環保防汙、交通運輸、治安、能源、娛樂、休閒等管理之智慧化。在能源互聯網方面，重點在於配電系統管理與需求面管理包括：自動需量反應、分散式電源、能源市場、容量市場及輔助服務市場等相關個體(Entity)或利害關係人（Stakeholders）之間的互通性。

另外原田教授也同意指派 Wi-SUN Alliance 的專家於十月八日赴台講解 Wi-SUN 在 Extended HAN(家庭區域網路)方面的發展動向包括:電動車、儲能等 Wi-SUN 的測試標準、Wi-SUN 在社區照護、瓦斯（天然氣）表等示範計畫以及與 4G、5G 網路聯網等之應用。

五、 日本品質保證機構 JQA

從個人到企業，5S 已落實到日本生活文化。每日整理整頓活動已成生活的一部分。從另一角度深入觀察，日本凡事都在執行防微杜漸工作，從小細節要求著手。因此很難看到不按 SOP 執行的工作，更難發現工作沒有 SOP，或空有 SOP 卻窒礙難行的工作。以上都是執行檢測驗證行業必須隨時追蹤落實的工作態度，在 JQA 幾乎每一角落隨時在發生。

JQA 相關實驗室對於基本的工作環境管理落實相當徹底,主因於有時在進行設備驗證時委託單位也會派員觀看設備驗證過程，有紀律的試驗室環境管理會讓委託單位對於檢測驗證結果有更高的信賴度，這些檢測驗證實驗室的管理值得國內相關單位學習與落實。

JQA 是日本頗負盛名之績優驗證機構,其國際化腳步領先日本在地其他檢測機構。在國際上也是國際知名之標竿驗證機構。JQA 自 1985 年被日本政府指派參加台日技術交流合作計畫以來,已成為台灣檢測業界長期夥伴，對我國檢測業的技術傳承，打下厚實基礎。如今，JQA 已發展成日本及 ISO 管理系統產品驗證於一體，提供整合性一站式服務之驗證機構。其證書信賴度也是業界第一。從服務角度切入，整合品質系統驗證服務，產品驗證國際化等，已完成系統化整合服務鏈，每年辦理無數場次說明會，傳遞最新驗證訊息，是業界信賴的驗證夥伴。是我方學習的標竿。

日本與台灣經濟發展條件相類似，如天然資源匱乏，處於天然災害劇烈之高風險地帶。推動綠能產業，需要從制度面，一步一腳印努力，如推動工廠製程 AI 自動化、再生能源產業設備驗證，推動綠電憑證制度等，協

助產業提升競爭力的過程扮演關鍵角色。現今技術日新月異，JQA 仍保持業界領先的口碑，很值得台灣檢測驗證產業學習。

若論 JQA 最值得學習之處，或說日本最怕我國趕上的地方，就是「凡事從小處要求之一絲不苟的工作態度」，「奉獻給機構希望更茁壯蓬勃發展的企圖心」，其餘就是引進國際最新資訊與技術服務產業。學習新技術只是表象，如何落實進而展現績效，就需要上述態度與企圖心。

JQA 為標準檢驗局在日本唯一認可驗證機構。本次參訪後團隊一致認為有必要繼續尋求更擴大技術合作。如新領域驗證：功能性安全驗證，服務型機器人驗證，汽車零組件品質驗證，又如研究再生能源憑證機制度設計，台灣方面未來將就台灣再生能源憑證運作經驗與日本品質保證機構 JQA 持續交流。

六、 日本與台灣檢測驗證機構合作

日本與台灣檢測驗證機構間的合作關係，近年來隨著台灣方面檢測驗證能量的提升，已經從過去的單方向學習逐步進展到雙邊交流。台灣和日本由於產業性質相近，在實驗室相關認可方面推動上，也對雙邊的檢測驗證機構帶來實質效益。本此考察，台日雙邊討論未來可交流合作項目。後續建議可將整合雙邊可交流合作項目，協同推動日本與台灣檢測驗證機構合作。

陸、 附件

Sustainable Smart Town

FujisawaSST

Introducing Fujisawa Sustainable Smart Town. A town sustainably evolving through living ideas has come to life

We did not simply aim to create a state-of-the-art smart town, but a town seeking the ultimate ideal.
The Fujisawa Sustainable Smart Town (Fujisawa SST) we are developing in Fujisawa City,
Kanagawa Prefecture is a joint project between the private and public sectors
which involves partner companies promoting advanced initiatives and Fujisawa City itself
The main feature of this project is that we will build an actual smart town with 1,000 households.
We are not simply aiming to develop a town underpinned by advanced technology-based infrastructure,
but a town based on actual lifestyles.
We first put a 100-year vision at the center of our project
and then established guidelines for town and community designs.
Residents sharing the objectives of the town live, interact and exchange ideas for achieving better lifestyles.
The town management company will take resident views into consideration,
incorporate new services and technologies,
and continuously support the sustainable evolution of the town.
Actual lifestyle-based innovative systems will continue to bring energy in every aspect of people's lives
in terms of energy, security, mobility, wellness, community and also emergency measures.
Fujisawa SST will serve as a model for future towns.

Sustainable Smart Town
FujisawaSST

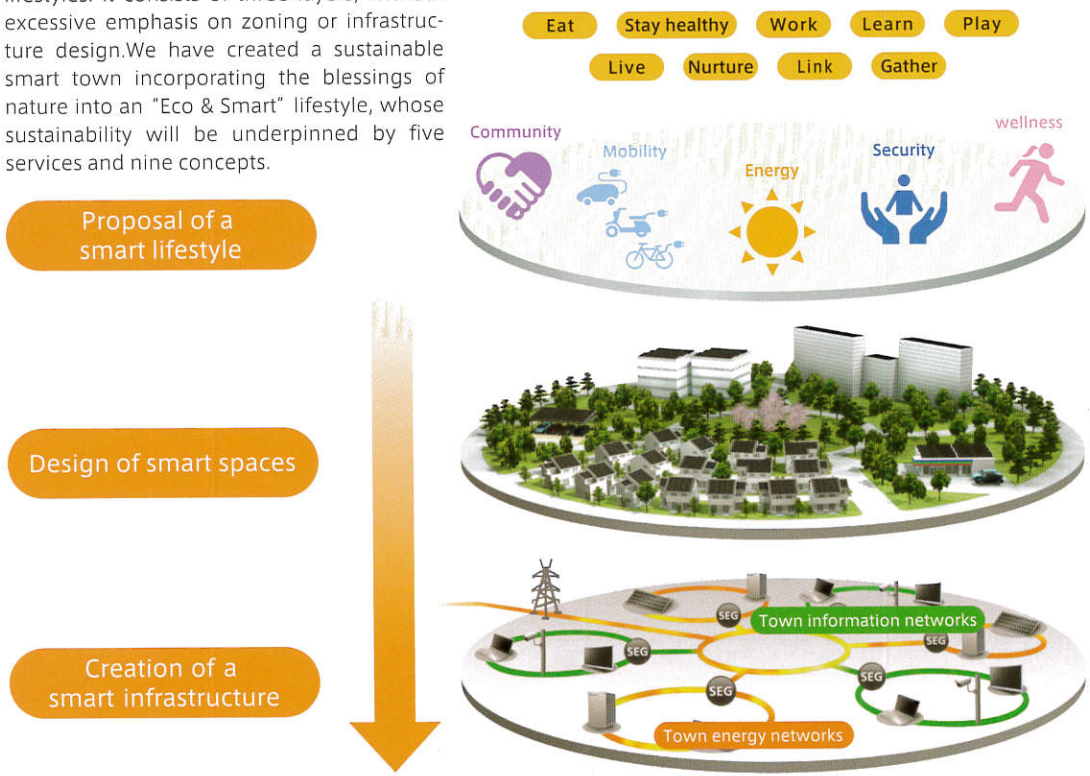

ing energy to life.

The Fujisawa SST challenge to build a new smart town based on actual lifestyles, not technologies, is underway

What we honor at Fujisawa SST is not the town's scale, but the underlying concept and process of how it was built. In a technology-centric smart town the primary focus is the infrastructure, which is built first before designs for comfortable homes and facilities are drawn up. Services for residents are the last consideration. But at Fujisawa SST, the primary consideration was to create a concept for a smart community lifestyle based on residential comfort, regional characteristics, and future living patterns – taking into account such aspects as energy, security, mobility, and wellness. Next, we designed the entire town with optimized smart spaces like homes and facilities to realize this smart lifestyle. And finally, we created an optimum smart infrastructure to support this new way of living. Fujisawa SST will sustainably develop with ideas and processes based on actual lifestyles. We will build a sustainable town enabling residents to have eco-friendly and comfortable lifestyles incorporating the blessings of nature while ensuring safety and security. We will actively promote smart town projects in Japan and other countries modeled on Fujisawa SST.

Fujisawa Model

This town's design is based on residents' lifestyles. It consists of three layers, without excessive emphasis on zoning or infrastructure design.We have created a sustainable smart town incorporating the blessings of nature into an "Eco & Smart" lifestyle, whose sustainability will be underpinned by five services and nine concepts.



The town development approach adopted for Fujisawa SST received a great deal of praise.

●Adopted as a "Model Project for Promoting CO_2 Reduction in Housing and Buildings" by the Ministry of Land, Infrastructure, Transport and Tourism ●Adopted as a "Business Promoting CO_2 Reduction to Enhance the Value of a Low Carbon Society" by the Ministry of the Environment ●Obtained CASBEE's highest S Rank certification for Urban Development ●Certified as a "Business for Promoting Town Development in Harmony with the Environment" by Kanagawa Prefecture ●Good Design Award 2015 (Regional/community development and social contribution activities) ●Received Kanagawa Global Environment Award 2015 (Kanagawa Smart Energy Plan) ●2016 Environment Minister's Award for Global Warming Prevention Activity (Countermeasure Technology Introduction and Dissemination Category) ●Logistics Environmental Conservation Activities Award at the 18th Annual Logistics Environment Awards ●Municipality Division Award at the Wellness Award of the Year 2017

In order to turn our town concept into reality, we set a series of numerical targets and guidelines to help revitalize residents' activities

Fujisawa SST's mission is to turn the concept into a real town. As such, Fujisawa SST set a number of numerical targets to set the direction for creating this town, and devise guidelines to ensure that these numerical targets could be met. We will then establish town structures including the town management company and five smart services. We will link the structures and services to eco-friendly and smart activities of all individuals involved in the town.

【Target figures】

Environmental targets

CO_2 70% reduction※1

We aim to achieve significant reductions in carbon dioxide (CO_2) emissions for the entire town through the installation of solar panels, storage batteries, and energy-saving equipment for detached houses, facilities, and shared areas.

＊ We aim to achieve virtually zero CO_2 emissions for detached houses.

※1 VS.1990

Water consumption

30% reduction※2

We will minimize water consumption across the entire town by installing water-saving products and making maximum use of rainwater.

※2 Comparisons with the eguipment generally used in 2006.

Energy target

Renewable energy usage

over 30%

Throughout the entire town, we will make effective use of energy generated through technologies such as a community solar power generation system installed on land for public use. Together with solar panels to be installed on houses, facilities and public zones, we will cover over 30% of energy used in the entire town with renewable energy sources.

Safety and security target (CCP)

Lifeline maintenance 3 days

CCP (Community Continuity Plan) is a plan designed to remain in effect until the recovery of normal conditions in the event of emergencies. This is a challenging new attempt to implement the concept of BCP (Business Continuity Plan: action plan for companies to ensure the continuity of their businesses in emergency situations) into a town-creation project. For example, we are extending medium-pressure gas pipes right into the middle of the town to ensure that it can remain strong in the face of disasters. Our aim is to lay down a comprehensive emergency structure to maintain sufficient washing water, food, drinking water, manhole toilets, and convertible cooking benches that can last until normal conditions are reestablished.

【Guidelines】

Proposals for the Town

· Project Design Guidelines

◎Guidelines for project promotion processes

Design and Development of the Entire Town

Town Design Guidelines

◎Town development guidelines

◎Environment creation guidelines

Sustainable Management

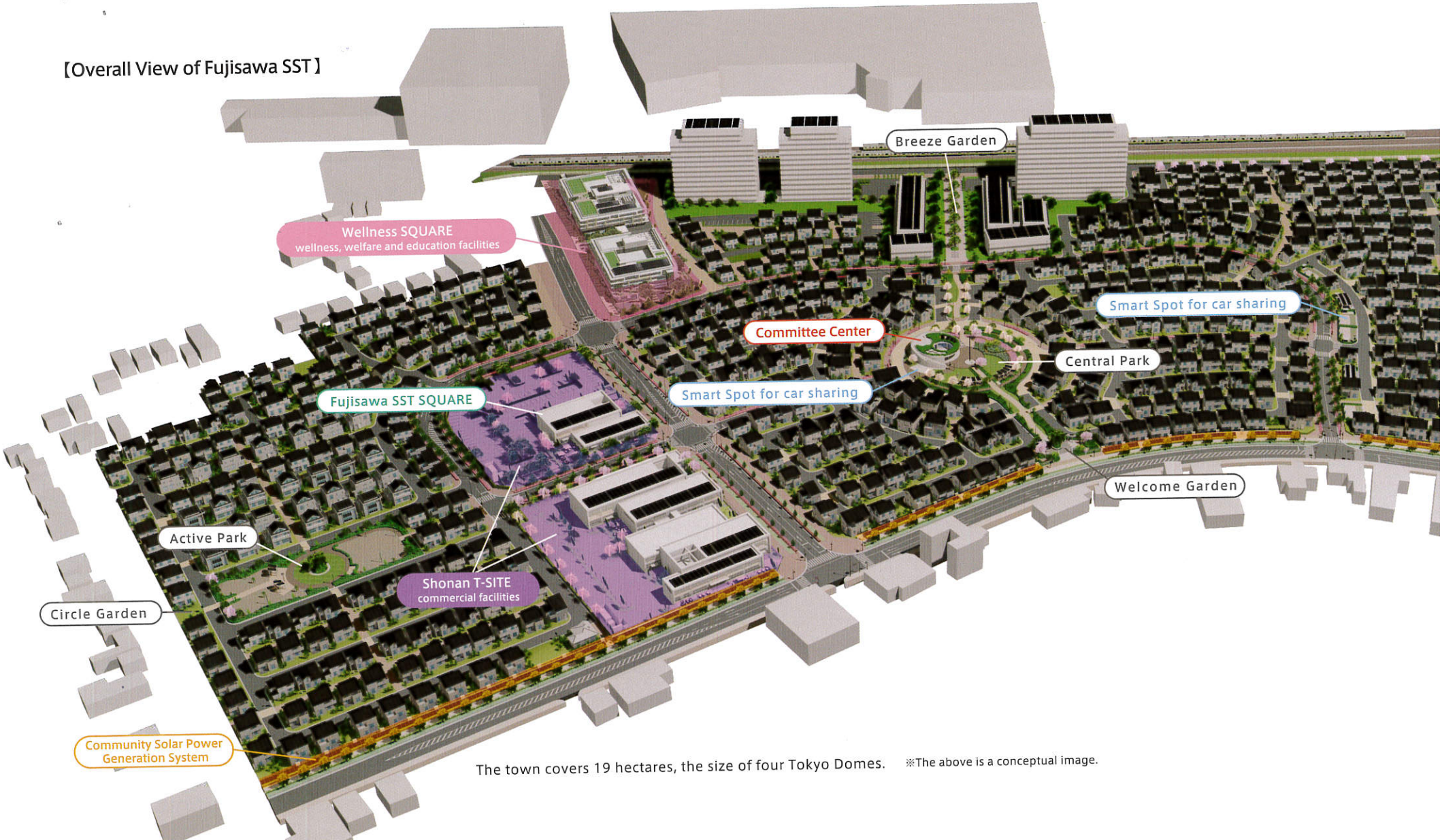
Community Design Guidelines

◎Lifestyle guidelines

◎Emergency guidelines

For bringing energy to life over the next 100 years onward, planned houses, commercial facilities, wellness, welfare and educational facilities, parks and zones will be built to develop the town

【Overall View of Fujisawa SST】



The town covers 19 hectares, the size of four Tokyo Domes.

※The above is a conceptual image.

For example, houses will adopt an energy management system, which provides comfortable living by linking energy-creation, energy-storage and energy-saving equipment. The Community Solar Power Generation System will supply a total 100 kW on public land. We will continue to promote innovative smart town initiatives in each zone of the town such as the community center named Committee Center, which will serve as a shelter equipped with a power generation system in the event of an emergency. Fujisawa SST will aim to be a new town even after 100 years by incorporating houses and facilities with state-of-the-art equipment and services of the time based on actual lifestyles.

Bringing new energy from the sun

Fujisawa Energy

Managing local energy generation for
"self-creation and self-consumption of energy", using a hybrid of
natural energy and advanced technologies, including energy-creation,
energy-storage, and energy-saving technologies

Bringing new energy to safety and security

Fujisawa Security

Ensuring safe and secure living through
a new security service called
"virtual gated town"

Bringing new energy to mobility

Fujisawa Mobility

Providing total mobility lifestyles that enable non-driving
residents to become more active,
and drivers to become more eco-friendly

Bringing new energy to wellness

Fujisawa Wellness

Providing lifestyles that help all individuals
involved in the town improve their health
while having communications in daily life

Bringing new energy to community ties

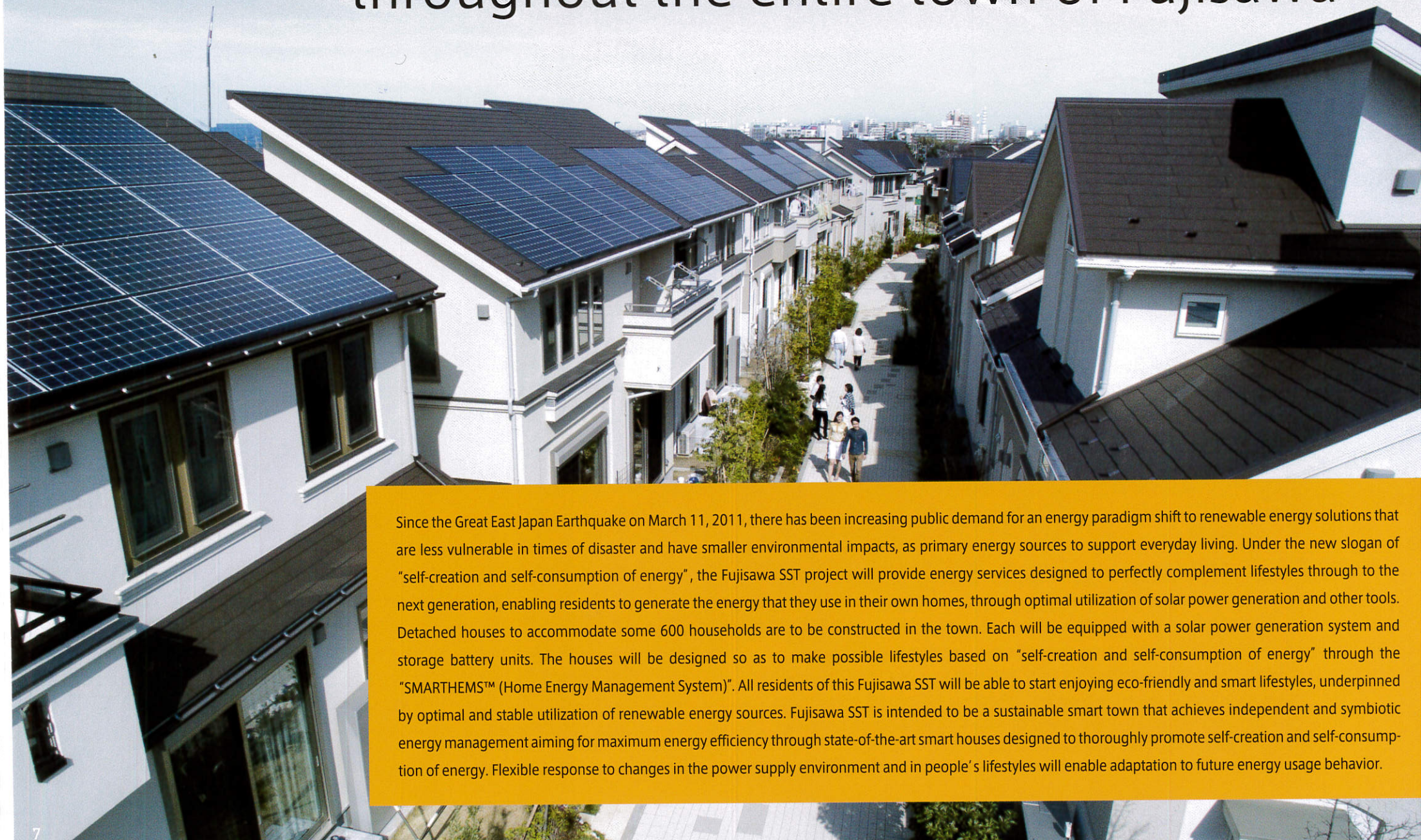
Fujisawa Community

Supporting community life, enabling individuals
to join person-to-person networks and
enjoy greater connection with the community

Bringing new energy from the sun

Fujisawa **Energy 1**

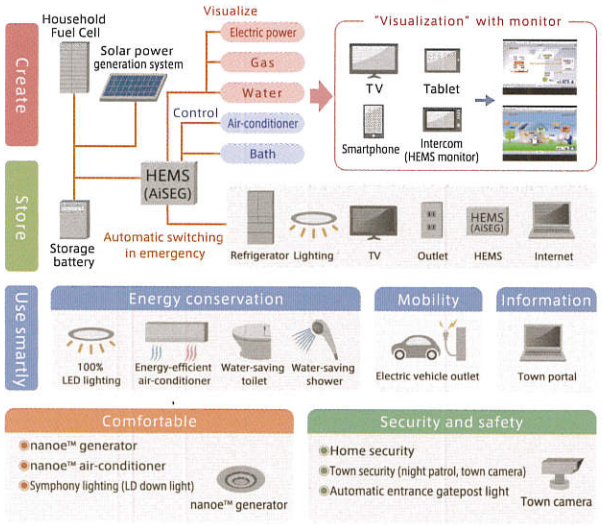
Utilizing Sunlight and Breezes throughout the entire town of Fujisawa



Since the Great East Japan Earthquake on March 11, 2011, there has been increasing public demand for an energy paradigm shift to renewable energy solutions that are less vulnerable in times of disaster and have smaller environmental impacts, as primary energy sources to support everyday living. Under the new slogan of "self-creation and self-consumption of energy", the Fujisawa SST project will provide energy services designed to perfectly complement lifestyles through to the next generation, enabling residents to generate the energy that they use in their own homes, through optimal utilization of solar power generation and other tools. Detached houses to accommodate some 600 households are to be constructed in the town. Each will be equipped with a solar power generation system and storage battery units. The houses will be designed so as to make possible lifestyles based on "self-creation and self-consumption of energy" through the "SMARTHEMS™ (Home Energy Management System)". All residents of this Fujisawa SST will be able to start enjoying eco-friendly and smart lifestyles, underpinned by optimal and stable utilization of renewable energy sources. Fujisawa SST is intended to be a sustainable smart town that achieves independent and symbiotic energy management aiming for maximum energy efficiency through state-of-the-art smart houses designed to thoroughly promote self-creation and self-consumption of energy. Flexible response to changes in the power supply environment and in people's lifestyles will enable adaptation to future energy usage behavior.

Detached houses in Fujisawa SST to be equipped with a complete SMARTHEMS™, integrating solar power generation, storage batteries and other devices aimed at the future

Every detached house in Fujisawa SST will be equipped with a solar power generation system and storage batteries. Devices for managing power consumption by home appliances will be integrated into a complete Smart HEMS (Home Energy Management System). This will be a house that is comfortable and eco-friendly to live in and enables optimal control of household energy consumption while utilizing electricity generated from Fujisawa's sunlight. Customers can choose between all-electric and fuel cell type homes, according to which type best meets their particular lifestyle energy needs. This is how we aim to realize "independent and symbiotic energy management", with which people generate their own home-use energy and utilize it in an efficient and smart manner.



Smart management from power saving to selling by linking solar power generation systems, storage batteries and ENE-FARM

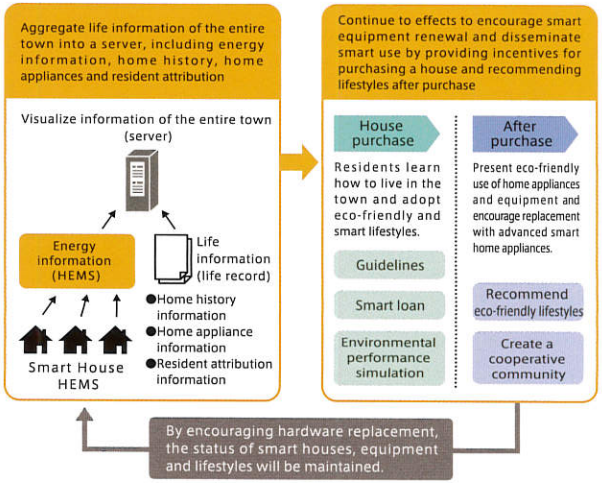
Detached houses have the latest Energy Creation-storage Linked System for Home, which links a solar power generation system or storage battery to the ENE-FARM household fuel cell cogeneration system. Electric power generated by respective systems can be used to meet household requirements and excess power can be sold. In the future, individual houses that are independent in energy terms will be linked to the Building Energy Management System (BEMS) of facilities in the town to create a group. We have our sights set on the establishment of an independent and symbiotic energy management system where the value is expanded by linking individual groups to the town's Community Energy Management System (CEMS). Utilizing these systems enables you to respond to next-generation energy use styles, where the town and residents cooperate in electricity conservation.

Achieving eco-friendly and comfortable living with the adoption of "passive design" to streets or zones of the town, delivering sunlight and breeze to the entire town in Fujisawa City.

"Passive design" naturally utilizes wind power, sunlight, water, ambient heat and other natural resources of Fujisawa. "Passiveness" is a concept enabling very comfortable living with minimal burden on energy resources. It incorporates traditional knowledge about homebuilding, such as the thatched roofs used on traditional Japanese houses. Based on this concept, roadside trees and garden paths are designed along with comfortable wind flows from the Shonan beach in Fujisawa SST. Town design guidelines requiring building houses with at least a 1.6 m margin allows town design that does not block sunlight. Passive design enables houses that will also be equipped to achieve optimal energy management efficiency through "active" devices for energy creation, storage and saving based on solar energy. The active devices and passive technologies will enable comfortable and eco-friendly living throughout the entire house through a synergistic effect.

Not only "visualizing" power consumption of houses and facilities, but also providing energy consulting services to meet changes in lifestyles

In Fujisawa SST, electric power of houses and all facilities of the town will be visualized with Smart HEMS or BEMS, including electric power generated by solar power generation systems or the power consumed by home appliances. In addition, energy consulting services will be offered based on the family structure or the power use status. We will provide eco-friendly and budget-pleasing support by helping residents control excessive electric power use or sell generated power.



Bringing new energy from the sun

Fujisawa **Energy 2**

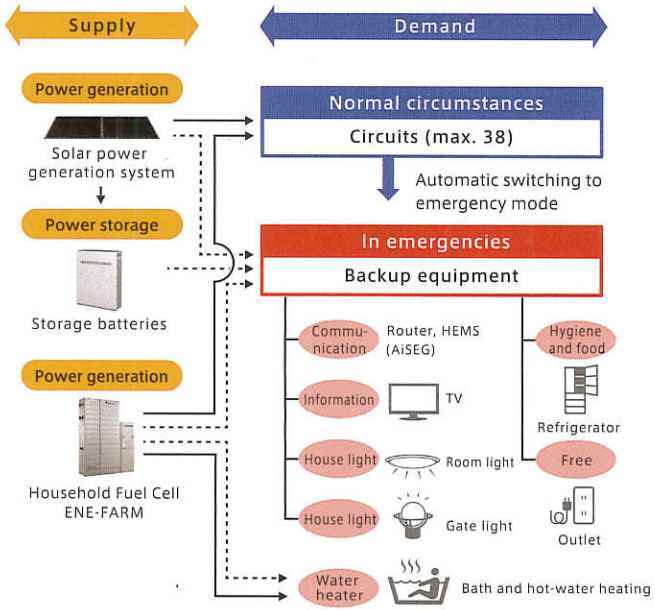
Lit-up for hope during emergencies

The importance of uninterrupted power supply was brought home to us through the tragic experience of the Great East Japan Earthquake.People depend on electric power for everyday living and its supply should never be interrupted, even in a time of emergency. Fujisawa SST sees consistent, reliable power supply as another theme and mission of the sustainable smart town project. In Fujisawa SST, all homes will have functioning lights in the event of an emergency. Families will have energy sources available for information media such as mobile phones and tablets, and means of transportation `such as electric vehicles (EV) and electric-assisted bicycles. In Fujisawa SST, homes will remain lit to help keep inhabitants' hopes and spirits up during an emergency.

Energy Creation-storage Linked System for Home
Supplying electric power and hot water in emergencies by utilizing ENE-FARM

Detached houses of Fujisawa SST are equipped with the Energy Creation-storage Linked System for Home, which controls not only the solar power generation system and storage batteries but also ENE-FARM. The system will achieve more stable power supply by allowing the use of solar-generated electricity and electricity generated by ENE-FARM even in the event of a power outage. Hot water will also be supplied. Furthermore, the energy management system will continue to supply energy in emergencies such as by distributing power to lighting, refrigerators, TVs and other pieces of equipment essential for daily life in accordance with selected settings.

●Conceptual image of emergency backup power supply system for detached houses



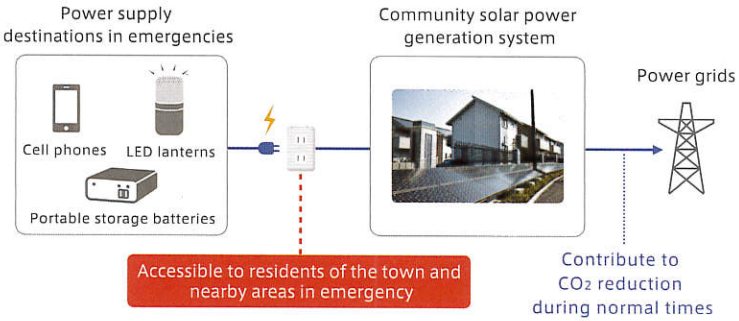
Establishing the Community Solar System, distributed renewable energy system, and other hardware throughout the town

In the south of the town, a community solar power generation system was installed on public land.
Under normal circumstances, this system will feed power into power grids and contribute to low-carbon lifestyles in the region. In the event of a disaster, it will become an emergency power source for Fujisawa SST and neighboring areas. The system consisting of compact units with solar power generation functions can be easily moved by unit. In the future, versatile use of this system will become possible as a distributed renewable energy source. We are building a disaster-resistant town by installing solar power generation systems and storage batteries in the Committee Center, the community center in the Central Park. Furthermore, we will lay power lines underground and use medium-pressure gas conduits with high earthquake resistance.

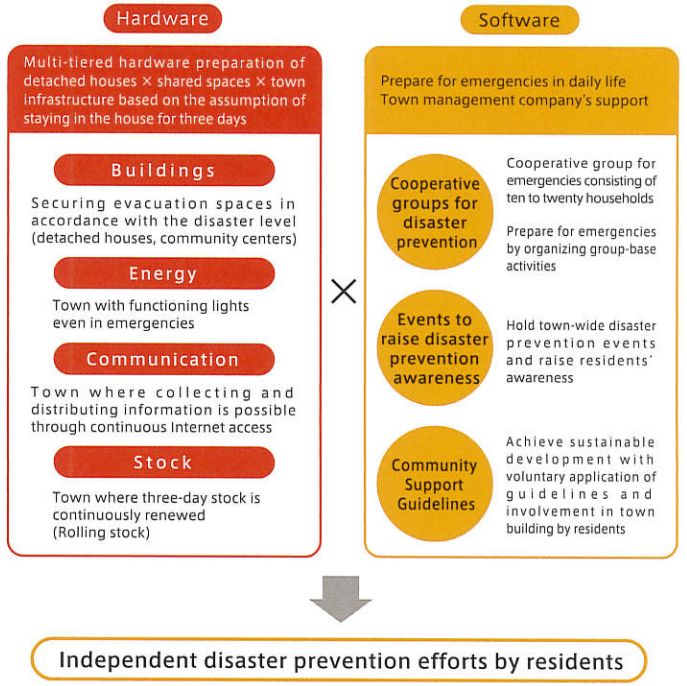
Providing daily support system to raise residents' awareness to enable maximum use of the town's facilities in emergencies

We will raise residents' awareness of efficient hardware use in daily life scenarios in preparation for emergencies. Ten to twenty households will create a mutual assistance group and participate in seasonal or disaster prevention events organized by the town management company. Residents will strengthen group ties and deepen cooperation through communications, which will help them cooperate in emergencies. The town management company will support the operation of energy-related equipment of houses and the town for continuously maintaining and evolving hardware for emergencies. It will provide a finely-tuned backup service such as offering advice on replacement timing or performing periodic maintenance.

●Conceptual image of community solar power generation system



●Hardware and software preparation for emergencies



Bringing new energy to safety and security

Fujisawa Security

Protecting town residents' safety and security with invisible gates

The "gated town" is a security-oriented residential concept that has been introduced into towns in Japan and other countries. In a gated town, security is enhanced through installation of boom barriers and security gates at entrances, and by strictly restricting the coming and going of vehicles and pedestrians. Although a fort-like, guarded town may be physically secure, the protective measures can also give rise to a sense of cloistered unease among residents. Fujisawa SST will realize the concept of a "virtual gated town", a new model of security that delivers a higher level of safety without hemming in the town with gates and barriers. The absence of physical walls relieves residents from psychological oppression, and facilitates more efficient communication among townsfolk. Thus, the town will also provide "warm" security based on mutual exchange and consideration. In addition, the disaster prevention push notification TV system will be installed and lent, which will deliver and display disaster and town information on home TVs. Residents will be able to play, safely and without anxiety, in the open atmosphere of Fujisawa SST.

Disaster prevention push notification TV system that automatically displays alerts when residents are watching programs or while in standby mode

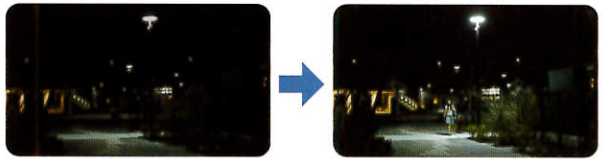
An information terminal will be linked to the TV of each residence. Disaster information (special heavy rain and other special weather warmings) from the Meteorological Agency will automatically be delivered and displayed. The Town Management Company provides a service to distribute independent alerts if there are power outages or other risks due to typhoons, storms and tornados. This TV system will also be utilized for safety confirmation in emergencies, communications of changes in town events, or ballots related to community programs.

Ensuring security throughout the entire town, where safety of residents can be monitored in an unobtrusive manner through a combination of surveillance cameras, lights, and human patrols

Around 50 surveillance cameras and lights are effectively installed at the entrance to the town, public buildings, shady areas in the park, crossings on main streets, etc. Furthermore, combining these facilities with patrols by "security concierges", will give the town comprehensive security in an open atmosphere. Children's safety can be monitored in an unobtrusive manner. And, street layouts designed to minimize vehicular through traffic will also contribute to secure and safe town planning through traffic safety. Security cameras and lighting will be used for disaster prevention purposes by ensuring safety in emergencies. In addition to monitoring by cameras, a certain number of street lights will remain illuminated to ensure safety, and house entrance lights as well as room lights will provide faint street lighting.

Illuminated brightly enough by detecting humans or cars — Eco-friendly security system linking camera-lighting functions

Installed in optimal locations, LED street lights with sensors will dim when there is nobody around at night. But when a passerby or car is detected, they will provide sufficient brightness to illuminate not only the area directly beneath, but also a short way ahead, thus realizing both security and eco-friendliness. Furthermore, with cameras and lights connected to a wireless network, the system will relay security lights in the direction of the street ahead.



Illuminate brightly enough not only directly under, but also a short way ahead of a passerby

A security approach aimed at providing reassurance for residents - Integrated "space + town + house + people" security

In Fujisawa SST, space-level security is protected by limiting gateways to the town, town-level security is ensured with surveillance cameras and lights and house-level security is provided by integrating functions such as intrusion detection, fire detection, and emergency warning in the home security system. By adding a security guard patrol service, this integrated network of systems and services enable the provision of security without any blind spots.

Home security by the town management company

We will offer a security system that works to guard a house on a 24-7 basis, not only when residents are at home but also they are away for a short or extended period of time. Security guards rush to the scene in emergencies.

Bringing new energy to mobility

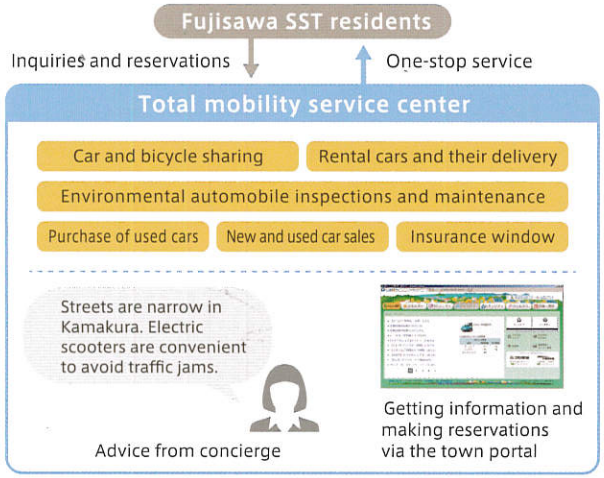
Fujisawa **Mobility**

Fujisawa SST will offer entirely new total mobility services for all residents with and without their own cars. It will include the service of sharing electric vehicles (EV) and electric-assisted bicycles as well as a rental car delivery service, and battery stations for renting rechargeable batteries. These days, traffic jams can be seen regularly around Fujisawa, with long lines of vehicles heading for tourist spots especially on holidays. Our mobility sharing services, which include electric-assisted bicycles, will also contribute to the solution for this social problem of traffic gridlock. Mobility innovations in Fujisawa SST will benefit the residents, the environment, and the regional community. Fujisawa mobility will help create a flexible and comfortable relationship between residents and their cars.

An active town, even for people without cars
An eco-town, even for people with cars

New "total mobility service" recommending and offering electric vehicles (EV), electric bicycle sharing and rental car delivery services tailored to purposes or needs

A unique feature of Fujisawa SST's mobility services: It will offer a sharing service for electric vehicles (EV) and electric-assisted bicycles tailored to residents' purposes or needs, including the time of day, distance to your destination, and the environment. There is an option to use a rental car delivery service to deliver a car near resident's home. This service will also allow residents without their own cars to broaden the scope of their activities and help residents have more active lives.

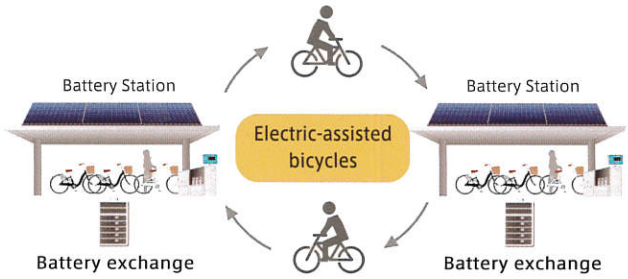


Mobility concierge and Mobility portal — One-stop services recommending optimal service use or routes to your destination by human and technology

Mobility concierge is a one-stop service offering various total mobility services. As well as accepting reservations, in consideration of the distance, hours of use, change in traffic conditions by time of day, the concierge chooses an optimal mobility service from car sharing or rental car, and selects a means of mobility such as electric vehicles (EV) and makes recommendations. The introduction of places only known to local residents or events will help you use mobility services. The Mobility portal, which enables you to check availability and make reservations on your TV or smartphone from home, also provides car sharing or rental car delivery service use records and thereby allows the amount of CO_2 reduction to be checked through the use of these services. These one-stop services promote the use of new mobility services.

The battery sharing service promotes a new mobile lifestyle by eliminating the time and effort for charging batteries of electric-assisted bicycles and concerns about batteries going flat at awkward times

The battery sharing service enables residents to freely replace and use batteries for electric assisted bicycles. It will eliminate the time and effort required for charging batteries after getting home and concerns about running out of battery power while commuting or shopping. We will spread mobility lifestyles with less environmental impact by removing a bottleneck in the adoption of bicycles.



Environmental automobile inspection service is also available for improving gasoline mileage and reducing CO_2 emissions

Environmental automobile inspections are new criteria in the legal automobile inspection system. The inspections help minimize the emissions of carbon monoxide (CO), carbon hydride (HC), nitrogen oxide (NOx), dark smoke (DS) that are harmful to humans and carbon dioxide (CO_2), which is thought to be the main cause of global warming. Reduction of gasoline consumption leads to fuel cost reduction. This system will raise environmental awareness by attaching the eco clean sticker to cars that passed the inspections.

●Effects of environmental automobile inspections on gasoline mileage

[Gasoline cost for one trip to the pump (40 L)]

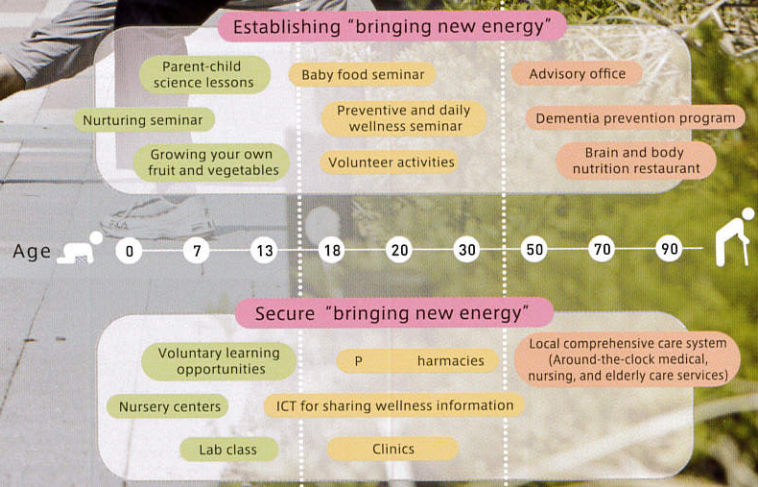
Installing electric vehicles (EV) and V2H outlets in the Committee Center as means to provide electricity in emergencies

In emergencies, electric vehicles (EV) and V2H outlets installed in community centers "Committee Center" will be open to the public as a valuable emergency power supply and generate energy that people require to live.

Fujisawa Wellness

Social interaction helps all people associated with the town to live a physically and psychologically healthy life

Is there such a thing as a town where all residents, from children to the elderly, can live comfortably in the way they want? The world is facing many problems, including a low birth rate and aging populations. Fujisawa SST gives one answer to this question – social interaction. The town will provide a Wellness Square, a focus for elderly care facilities, assisted residences for the elderly, pharmacies, home care services, clinics, nursery centers, after-school day-care centers, cram schools, etc. In this area, a range of services are seamlessly linked across field boundaries to efficiently offer optimum services to every resident. Still more, there will be opportunities for naturally linking people and fostering interaction among those who come to the Wellness Square. The elderly can pass down their knowledge and skills to children, and children can brighten the lives of the elderly. Fujisawa SST aims to create a town that can always present this charming sight.



A "local comprehensive care system" for providing linked and seamless medical care, nursing care, elderly care, and pharmaceutical services

For example, medical care and elderly care have up to now been regarded as entirely different fields. Patients returning home after hospitalization tend to find it hard to get essential home care, due to distance limitations and lack of information. To overcome these problems, a "local comprehensive care system" needs to be built to provide appropriate services seamlessly that meet residents' needs. Fujisawa SST will promptly set up this state-driven system, and provide linked services that transcend the traditional borders of medical care, nursing care, elderly care and pharmaceutical services. Based on residents' health information and treatment information, we will examine measures to provide services as and when needed using ICT (Information and Communication Technology)..

Plan and hold diverse health promotion events.

Based on the guidelines of the Ministry of Internal Affairs and Communications and other administrative bodies for utilizing ICT and health checkup data, we will plan and hold events for the maintenance of good health and contribute to the welfare of the local population including individuals such as full-time homemakers, who have few opportunities to have health checkups.

Nursery schools, cram schools and after-school day-care centers for developing "thinking skills" — The basis of "zest for living"

A nursery school is created not merely to shorten waiting lists for nursery schools. It is an opportunity to develop children's individuality and to foster thinking skills. Cram schools and after-school day-care centers are also provided in response to children's urges to "learn" and "acquire knowledge." The Wellness Square will provide study-support services in combination with a nursery center, to form a basis for developing a "zest for living." The Wellness Square also supports daily health care.

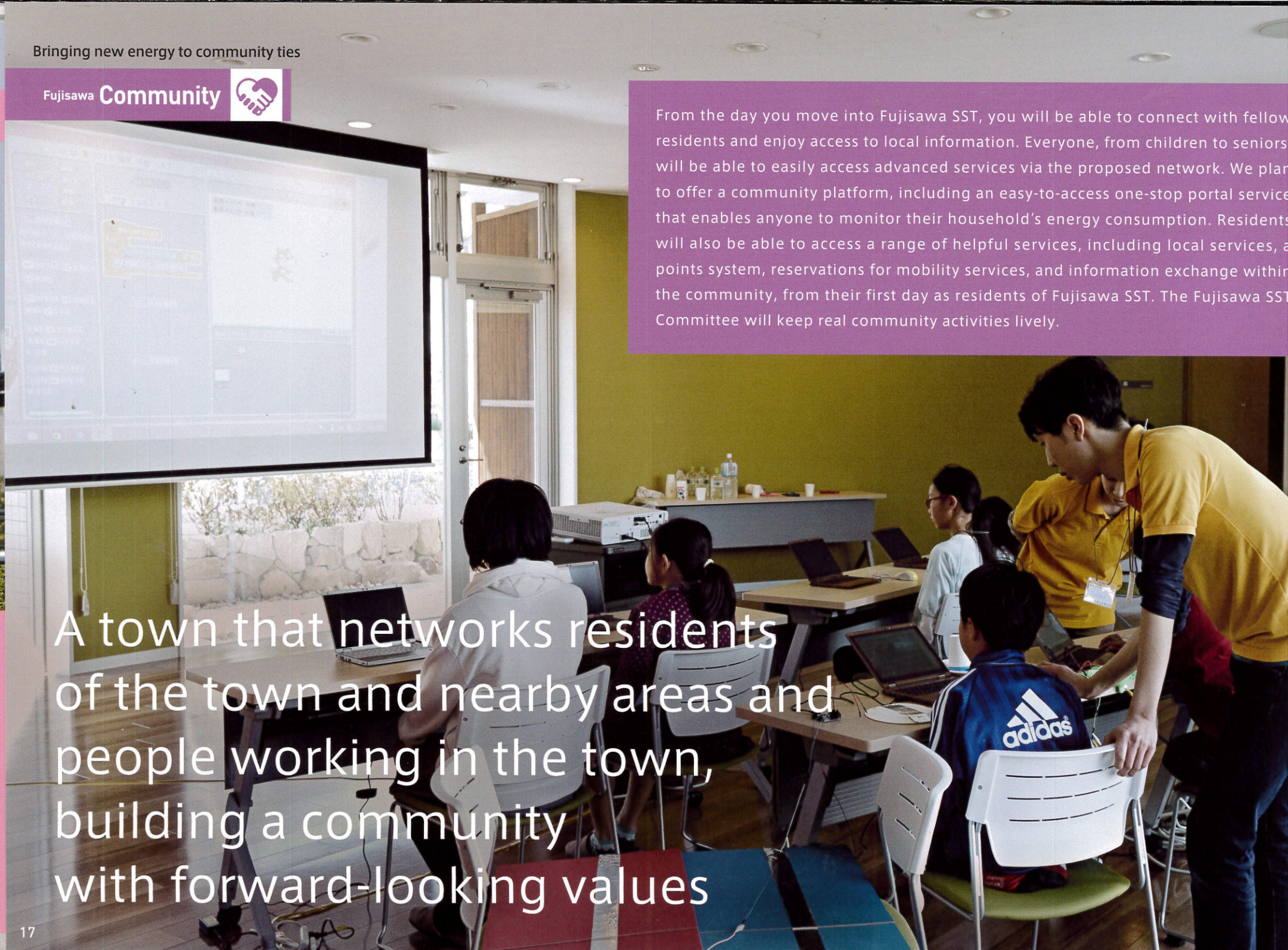
Library zone and laboratory zone Area for enjoying warm connections with the community

The Wellness Square will include a community place that is freely open to Fujisawa SST residents. A collection of picture books and encyclopedias is placed in the library zone to stimulate curiosity and a thirst for knowledge. Both children and adults will be intrigued by the experimental kits in the laboratory zone. Children visiting the Well SITE* to do their summer homework projects are likely to receive kindhearted advice from elderly people waiting for clinical examination. Residents strolling into the Well SITE* may find themselves chatting for the first time with other residents. Warmth and people-to-people interaction at the SITE is what marks the town as special.

Residents listen to and respond to other residents' interest in "learning" and their "desire to pass on" their experience. All the people in the town take center stage in communication.

A wide range of opportunities, including parent-child science lessons, baby food seminars, and advisory office are provided to ensure "bringing new energy". The town not only offers "opportunities", but also has a system that lets residents take the lead in planning "opportunities". For example, a resident who plays the ukulele as a hobby holds ukulele lessons, or people who want to learn English hold English conversation classes by inviting residents who have studied abroad to teach the class. The residents themselves generate social interactions that broaden their knowledge and outlook. New-style lifelong learning – another feature of Fujisawa SST.

Fujisawa Community



From the day you move into Fujisawa SST, you will be able to connect with fellow residents and enjoy access to local information. Everyone, from children to seniors, will be able to easily access advanced services via the proposed network. We plan to offer a community platform, including an easy-to-access one-stop portal service that enables anyone to monitor their household's energy consumption. Residents will also be able to access a range of helpful services, including local services, a points system, reservations for mobility services, and information exchange within the community, from their first day as residents of Fujisawa SST. The Fujisawa SST Committee will keep real community activities lively.

A town that networks residents of the town and nearby areas and people working in the town, building a community with forward-looking values

As an entrance to town services, a portal site supporting multiple devices provides informationthat everyone needs

Fujisawa SST will provide a one-stop portal site linked to town information and other unique services. The portal site is designed to carefully simulate scenarios for using the site. For example, your household energy consumption is visualized to provide energy-saving advice that is specifically tailored to your home. You can also access events and sightseeing information for the surrounding area, make reservations for mobility sharing, and gain access to residents' experience and word-of-mouth information. The portal site itself predicts how it will be used. In the event of an emergency, you can quickly access the information needed and related information and immediately find the information you need, such as the latest conditions and safety confirmation. The portal site also supports multiple devices to allow easy access from the smart TVs equipped as standard in all detached houses, as well as smartphones and PCs. Everyone, from children to seniors, can get the information they need in every situation.

Purchase and repair records of housing and home appliances are registered as housing information in the Life Record to protect the value of your assets

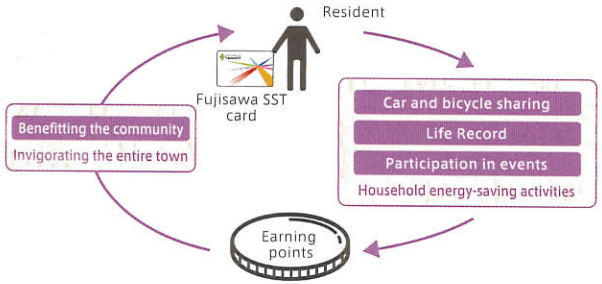
Management of housing information will help maintain asset value. This is the Life Record. The housing records are appropriately managed to ensure the best house maintenance. Registered family information and home appliances information help to encourage energy-saving habits.

The Energy Report and Eco-life Recommendation Report provide advice on optimum energy-saving lifestyles that match your way of life

We will give residents an Energy Report that summarizes electricity use data and an Eco-life Recommendation Report that gives energy conservation advice on a monthly basis. Residents will receive specific advice on how to use energy most efficiently and how to reduce the power consumption of each piece of equipment tailored to their lifestyles.

The unique Fujisawa SST card and point program helps create a community, ensure the observance of guidelines and meet the targets of the entire town

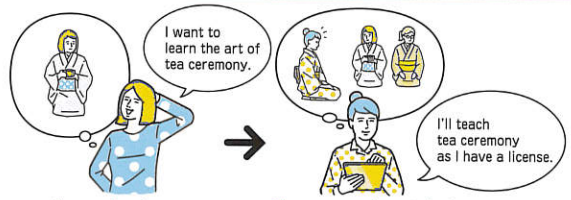
The Fujisawa SST card can be used as an ID card for a wide range of services in the town. For example, residents only need to pass the card over the verification terminal instead of following a complicated procedure for borrowing an electric-assisted bicycle or replacing a rechargeable battery. The card will also be used for verification for using town facilities. Points will be given by participating in the Life Record program and town events and answering questionnaires. Presents will be given for accumulated points. You can check your point balance and history on the portal site. The card encourages the active participation of residents in programs designed to improve the town value.



Creation of a town where individuals help each other based on real-time information. The SOY LINK community platform was created by Fujisawa SST for the local community

Using new technologies, we want to revive companionable neighborhood communications, like we used to have in Japan, but in a form suited to our current lifestyles. SOY LINK provides a community platform that links residents, stores, companies, groups and people working in the town and strengthens the collective powers of the town. If there is a system for residents to exchange their abilities, we will have more opportunities for utilizing older people's knowledge and experience. If we develop mutual understanding based on their experience, we will instinctively help each other in the event of crises and disasters. We believe that we will be able to lead a more companionable life in the future if we can build a cooperative society.

Resource requests



This is a service designed to match resources, such as goods and skills, and support that members possess with the needs of other members.

Town stores	This is a fan page for stores operating in the community. Useful information such as store events and time-limited sales can be obtained.
Town groups	A fan page can be created with the participation of five or more individuals to share information.
Communication among members	You can check information from members or send messages.

Three Squares to Support the Town

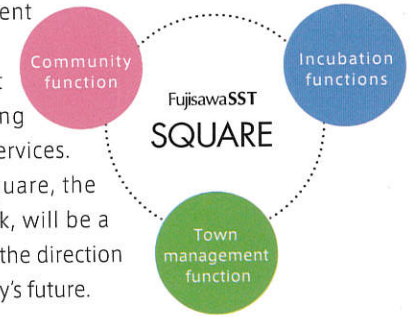
SQUARE 1

The town's landmark, is the base for a range of resident activities

Sustainable Smart Town

Fujisawa SST Square

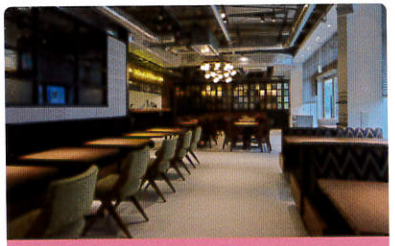
The Fujisawa SST Square is a site that maximizes value for town residents, neighborhood residents and companies who come to the square. Based on collaboration among a wide range of stakeholders, it is equipped with functions to "bring energy to life." It serves as the information transmission base of Fujisawa SST, welcomes guests, gives publicity and fulfills functions of incubating new businesses or services. The square has community functions that include helping Fujisawa SST and neighborhood residents, individuals working and gathering in the town to create communities, and organizing environmental education programs or events. It also offers management functions with the office of the town management company, lending support for town building as part of core services. Fujisawa SST Square, the town's landmark, will be a place for setting the direction of the community's future.



Cars & Bicycles: Rental, Insurance and Environmental Inspection Services

SQUARE Mobility

The SQUARE Mobility is a total mobility service base offering eco-friendly transport. You can rent electric vehicles (EVs) and electric-assisted bicycles and access various insurance consultation desks.



Meet, incubate and initiate

SQUARE Center (Cafe & Kitchen)

We will create an interactive communication café, featuring a system promoting the development of a community of FSST and neighborhood residents, creation and preparation of recipes utilizing home appliances and serving dishes. You can flexibly use the café for working space or events.

Ideas for Better Living

SQUARE Lab KURA_THINK

This is a place where ideas are proposed for new lifestyles and for better living through home appliances. In addition to experimenting with new home appliances, community services and living services are provided and events are held on the themes of food, health, and beauty.

Meet, incubate and initiate

SQUARE Center

This is Fujisawa SST's comprehensive communication base. This is a place for showing the town's appeal points and lifestyles to companies and government bodies around the world through video presentations or other tools. Partnerships will be created and new businesses and services will be incubated.

Discussing the town's future

SQUARE Future

This is a place where diverse stakeholders can gather, share issues with the town and discuss its future. A wide range of events, workshops and seminars will be held throughout the year.

Town management office

SQUARE Office

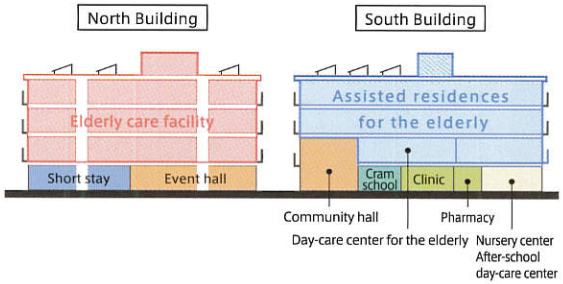
This is the base of Fujisawa SST Town Management Company. It also serves as the Community continuity planning (CCP) center in charge of planning and implementing disaster recovery measures in the event of emergency.

SQUARE 2

Health, Wellness, and Community Interaction for All Residents

Wellness SQUARE

The services provided at Wellness SQUARE are designed to perfectly match the needs of each resident, seamlessly integrating the services of diverse fields including special nursing homes and assisted living residences for the elderly, pharmacies, home care services, clinics, nursery schools, after-school activity centers, and cram schools. Residents interact at Wellness SQUARE, fostering communication and a sense of community, with older residents sharing their knowledge and experience with children and the children brightening the lives of the elderly. This is the type of community spirit that Fujisawa SST aims to create.



Wellness SQUARE, North Building

Wellness SQUARE, South Building

SQUARE 3

Heralding the Future of Parcel Delivery Services

Next Delivery SQUARE

Parcel delivery companies normally operate independently, so if a recipient is not at home for a delivery they must contact the respective delivery company for each parcel. But at Next Delivery SQUARE, all parcels—whether shipped via Yamato Transport or another delivery company—are gathered for combined delivery to residences within Fujisawa SST or to the SHONAN T-SITE commercial facility. Deliveries are made using bicycle-drawn carts and handcarts rather than motor vehicles, reducing environmental impact and prioritizing residents' safety and security.

Advanced information and communications technology ensuring smart, ecological parcel delivery services also contributes to Fujisawa SST's sustainable community activities. To enable Fujisawa SST to continue evolving as a livable and open community, additional services are being developed to make life more convenient, comfortable and secure, including support for on-demand logistics.

SHONAN T-SITE

Building a base for making the rest of the world aware of new lifestyles developed in this town

SHONAN T-SITE

The SHONAN T-SITE commercial facility
not just for selling goods. It's not a site ju
for selling goods. It's a base for inspirin
residents and visitors to the Shonan are
nurturing new lifestyles, and making th
lifestyle known to people outside the tow
Lifestyles born in the town called Fujisaw
SST have great potential to affect lifestyl
in Japan, and furthermore, in the world.

Ultimate cozy design
A complex cultural facility recommending Shonan lifestyles

The SHONAN T-SITE is not just for residents of Fujisawa SST. We aim to build a site that showcases Shonan culture, where visitors to Shonan will drop by before they go home. This includes ultimate cozy space design surrounded by the natural environment of the Shonan area, shops, products, and a wide range of other ideas, which will promote healthy Shonan lifestyles.

The SHONAN T-SITE will provide goods and spaces where individuals will be able to enrich their lifestyles.

At shops in the SHONAN T-SITE, only goods that appeal to persons of sensibility are selected and sold. For example, a wide range of books or magazines that provide new information on hobbies, jobs, cooking, child-rearing, and so on are selected. In addition, visitors can order coffee and read books or magazines before buying or enjoy lunch cooked with locally produced food at the slow food restaurant. Everyone can enrich their lifestyles with a visit to the SHONAN T-SITE.

Epoch-making action, anticipating the needs of the age and continuing sustainable evolution

People's demands for goods and services change as culture changes and develops. Instead of responding to these changes by re-fitting its shops, the SHONAN T-SITE will think about new lifestyles together with shop owners in the T-SITE before changes occur, always making proposals for lifestyles that are ahead of the times. Cooperation between shops may also offer extra value.

Fujisawa Town Parent Project

Community activities "Fujisawa Town Parent Project" is in action, including Fujisawa SST residents, companies, and people working in neighboring areas and in the town. All individuals involved with the town openly come up with ideas as parents who nurture the town and make the community grow. For the Fujisawa SST, the project will pursue the ideal goal of a new town and lifestyles, and promote relationships among people and between people and the town. We will establish good examples that serve as a good model for future smart towns around the world.

Community activities have already started, where all Fujisawa SST and neighborhood residents can play a principal role

Culture Fest Fujisawa SST

In this fun-filled event, people who live and work in Fujisawa SST gather to celebrate the charms of their community and share their affection for Fujisawa SST with residents of neighboring communities.

Career Experience

Various companies conduct a "Career Experience" event to offer children a glimpse of possible future professions and an opportunity to participate in community building.

Disaster prevention events

Participants visit sites where disaster prevention programs are held to learn about disaster prevention measures and equipment.

Community Care

A community care initiative encourages the people who live and work in Fujisawa SST to help support dementia sufferers and their caregivers, promoting a spirit of mutual assistance within the community.

Developing a Fujisawa SST Original Coffee Blend

Residents and companies hold meetings to discuss and bounce ideas off each other such as new services suitable for the town.

Music Salon and Surf Meet

Music and sports events representative of the Shonan district help to foster residents' love for their community.

Fujisawa SST
Future Co-creation

Fujisawa SST shifted from the development phase to the nurturing phase. It will promote Co-creation activities with diverse companies, and will meet the challenges aiming to establish new styles of society, town and life.

Activities will expand,
where the town nurtures businesses
and businesses nurture the town

Town Meetings

Residents and representatives of the companies doing business in Fujisawa SST gather to discuss the needs of the community and exchange ideas for new services to meet those needs.

Green Air Conditioner

A new air conditioner that reduces heat in outdoor areas for greater comfort is being developed as a product for countering the heat island effect.

Shared Garden

Providing an opportunity to grow food teaches important lessons about the bounties of nature and the value of farming, while building a sense of community among the people who live and work in Fujisawa SST and surrounding neighborhoods. Integrating the Shared Garden with other facilities and services will lead to the creation of new food and health related services.

Future Co-creation HOUSE

We will recommend smart houses and one-step-ahead lifestyles in Fujisawa SST. We will create next-generation homes that integrate the technologies and ideas of diverse companies.

Battery Sharing System

One of Fujisawa SST's initiatives for achieving a low-carbon society is an electric bicycle-sharing service that employs an eco-friendly and convenient battery-sharing system.

Delivery Lockers with Communication Functions

Delivery lockers equipped with advanced communications technology provide a new IoT service that improves user convenience and reduces the need for redelivery of packages.

Sleep Environment Support System

Through the cooperation of community residents, data on real-life conditions is being collected for use in developing new products and planning new services.

Roboneko Yamato

Focusing on the future of parcel delivery and realization of an autonomous vehicle society, experiments for a next-generation logistics service were conducted up through June 2018.

●Images are for illustrative purposes only.

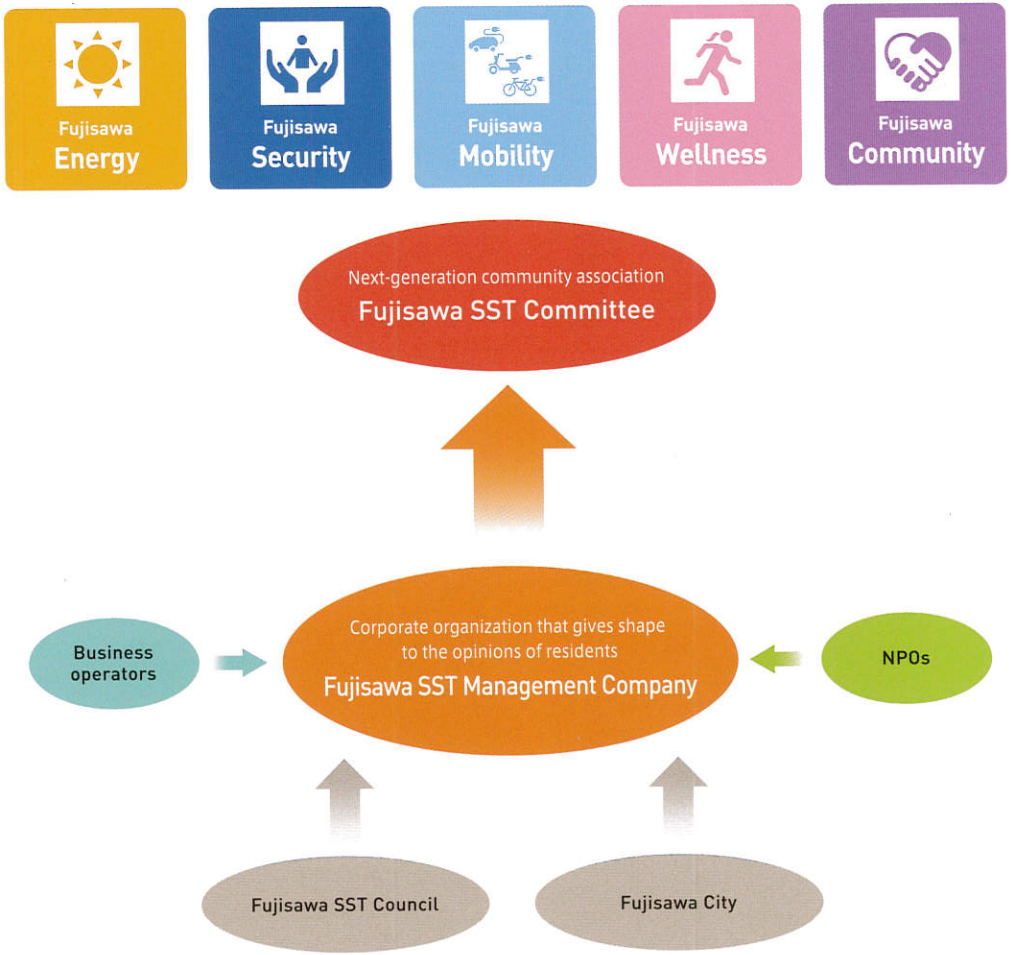
Sustainably developing the town by forming links between the next-generation community association and the town management company

The Fujisawa SST Committee, the next-generation community association, takes a central role in resident-led town development.

To continue developing and nurturing eco-friendly and smart lifestyles even a century from now, people and companies need to share their visions, establish systems and services needed on a moment-to-moment basis, and take actions that affect the entire town. To this end, Fujisawa SST has organized the Fujisawa SST Committee, a next-generation community association. In addition to the roles of a conventional community association, the Fujisawa SST Committee has prominent functions that include a wide range of activities related to the environment, energy, security, and safety, and the maintenance and management of properties owned. The Fujisawa SST Committee will act as the foundation for resident-led town development. It generates specific ideas and takes actions to achieve the goals of the entire town. Furthermore, the Fujisawa SST Committee will plan events, festivals, culture lessons, eco-seminars, and so on to enrich communication between residents of the town and nearby areas. A real community will be developed.

A corporate organization for realizing input from residents – Fujisawa SST Management Company

To provide specific services and systems based on the real opinions of residents found in the Fujisawa SST Committee, a corporate organization called the Fujisawa SST Management Company was established. This Company will be engaged to negotiate with partner companies, Fujisawa City, and peripheral communities; realizing specific demands of residents; and sustainably evolving the functions of the town. Even though the town may be more advanced than any other type of town at the time of opening, it will become a "historical relic" in five years, thirty years, or a hundred years unless it keeps evolving in line with needs of the times and of its residents. The Fujisawa SST Management Company is a system that adopts a "resident-led" perspective for continuously modifying the town in accordance with current lifestyles.



Fujisawa SST Council

Lead organizer

Panasonic Corporation

Organizers

Gakken Holdings Co., Ltd.
Gakken Cocofump Holdings Co., Ltd.

Culture Convenience Club Co., Ltd.

Koyama medical & welfare group

Dentsu Inc.

Tokyo Gas Co.,Ltd.

Panasonic Homes Corporation

NIPPON TELEGRAPH AND TELEPHONE EAST CORPORATION

Sumitomo Mitsui Trust Bank, Limited

Members

MITSUI & CO., LTD.

Mitsui Fudosan Co.,Ltd.
Mitsui Fudosan Residential Co.,Ltd.

Yamato Transport Co., Ltd.

AIN PHARMACIEZ INC.

Accenture

SUNAUTAS Co.,Ltd.

SOHGO SECURITY SERVICES CO.,LTD.

Advisory board

Keio Research Institute at SFC

TEPCO Energy Partner, Incorporated

NIHON SEKKEI, INC.

Fujisawa City

Fujisawa SST Management Company

Sustainable Smart Town FujisawaSST

As of December 2018

Town Development Timeline

Nov.	2010	Concluded agreement with Fujisawa City on basic concept.
Sept.	2012	Land reallocation work is begun.
Nov.		Fujisawa SST Council is established.
Mar.	2013	Fujisawa SST Management Company is established.
Mar.	2014	Residents begin moving into single-family housing.
Apr.		Fujisawa SST is officially opened.
Nov.		Fujisawa SST SQUARE community center is opened.
Dec.		SHONAN T-SITE commercial facility is opened.
Sept.	2016	Wellness SQUARE South Building health, welfare, and education facility is opened.
Nov.		Next Delivery SQUARE next-generation logistics center is opened.
Apr.	2017	Wellness SQUARE North Building health, welfare, and education facility is opened.

Sustainable Smart Town
FujisawaSST

Fujisawa SST Council

Lead organizer : Panasonic Corporation／1-5-1 Higashi Shimbashi, Minato-ku, Tokyo Japan 105-8301 Tel. +81-3-3574-5604

The concepts shown in this booklet are current as of December 2018. There are conceptual photos, illustrations and drawings.

Panasonic

Panasonic Solutions
Fujisawa Sustainable Smart Town

Sustainable Smart Town
FujisawaSST

Overview of the town

The Fujisawa Sustainable Smart Town is a complex smart town project that involves collaborations with commercial, governmental, and academic institutions and that includes companies like Panasonic, as well as universities and the city of Fujisawa.

Town development base
Fujisawa SST SQUARE

Building area: Approx. 1,055 m²
Total floor area: Approx. 1,485 m²
Construction: April 2014
Operations: Fujisawa SST Management Company Culture Convenience Club Co., Ltd.

Building area: Approx. 1,816 m²
Total floor area: Approx. 6,349 m²
Construction: April 2017
Operations: Social Welfare Corporation Camellia
- Elderly care facility (130 beds)
- Short stay (24 beds)

North Building

Healthcare, welfare and
Wellness SQ

Commercial facilities
SHONAN T-SITE

Building area: Approx. 3,517 m²
Total floor area: Approx. 5,897 m²
Construction: December 2014
Operations: Culture Convenience Club Co., Ltd.

Community center
Committee Center

Site area: Approx. 867 m²
Total floor area: Approx. 291 m²
Construction: March 2014
Operations: Fujisawa SST Management Company (Entrusted by Fujisawa SST Committee)

Fujisawa SST Council

Lead organizer

Panasonic Corporation

Organizers (alphabetical order)

Culture Convenience Club Co., Ltd. / Dentsu Inc. / Gakken Cocofump Holdings Co., Ltd. / Gakken Holdings Co., Ltd. / Mitsui & Co., Ltd. / Mitsui Fudosan Co., Ltd. / Mitsui Fudosan Residential Co., Ltd. / Nippon Telegraph and Telephone East Corporation / Panasonic Homes Co., Ltd. / Social Welfare Corporation / Camellia of Koyama Medical & Welfare Group / Sumitomo Mitsui Trust Bank, Limited / Tokyo Gas Co., Ltd. / Yamato Transport Co., Ltd.

Bringing energy to life.

ducational facilities UARE

Building area: Approx. 1,696 m²
Total floor area: Approx. 5,181 m²
Construction: September 2016
Operations: Gakken Group
- Residences for the elderly (care type: 21, independent type: 21, and independence support type: 28)
- Home care support, nursing care including home-visit care services
- Nursery center (60 children), cram school, and after-school day-care center

Ain Pharmaciez Inc.
- Pharmacy

Fujisawa Smart Town Clinic
- Clinic (internal medicine, pediatrics, orthopedics, rehabilitation, and medical visits)

Housing complex 400 households (Planned)

Smart house 600 households (Planned)

Site area: Approx. 126 m²
Total floor area: Approx. 110 m² (standard type)
Construction: From March 2014

Next-generation logistics center Next Delivery SQUARE

Site area: Approx. 1,072 m²
Total floor area: Approx. 471 m²
Construction: November 2016
Operations: Yamato Transport Co., Ltd.

Location: Tsujidomotomachi, Fujisawa City, Kanagawa Prefecture, Land area: Approx. 190,000 m² (600 m east and west x 300 m north and south), planned population: Approx. 3,000 people

Members (alphabetical order)

Accenture / Ain Pharmaciez Inc. / Sohgo Security Services Co., Ltd. / Sunautas Co., Ltd.

Advisory board (alphabetical order)

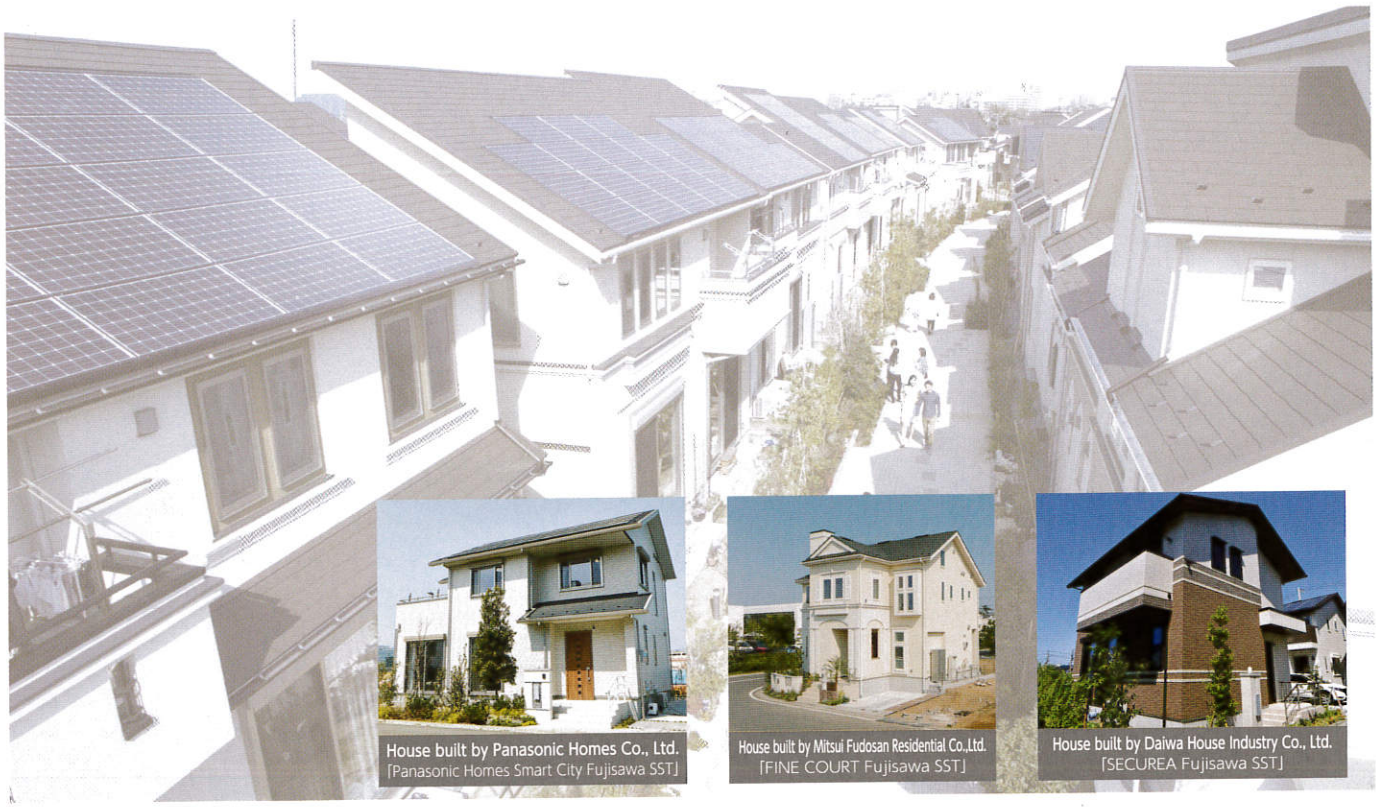
Fujisawa City / Fujisawa SST Management Company / Keio Research Institute at SFC / Nihon Sekkei, Inc. / TEPCO Energy Partner, Incorporated

* As of November 2018

Smart House

Eco-friendly and comfortable smart house that achieves virtually zero CO_2 emissions

We have created houses that generate and store energy, and reduce energy consumption using our advanced smart technologies.Aiming to make the most of the extensive views and various natural features specific to the site location, we designed the town in to maximize illumination by sunlight and to take advantage of the direction of the wind. A wide range of flat storage space designs improves the level of comfort in the houses.



House built by Panasonic Homes Co., Ltd.
[Panasonic Homes Smart City Fujisawa SST]

House built by Mitsui Fudosan Residential Co.,Ltd.
[FINE COURT Fujisawa SST]

House built by Daiwa House Industry Co., Ltd.
[SECUREA Fujisawa SST]

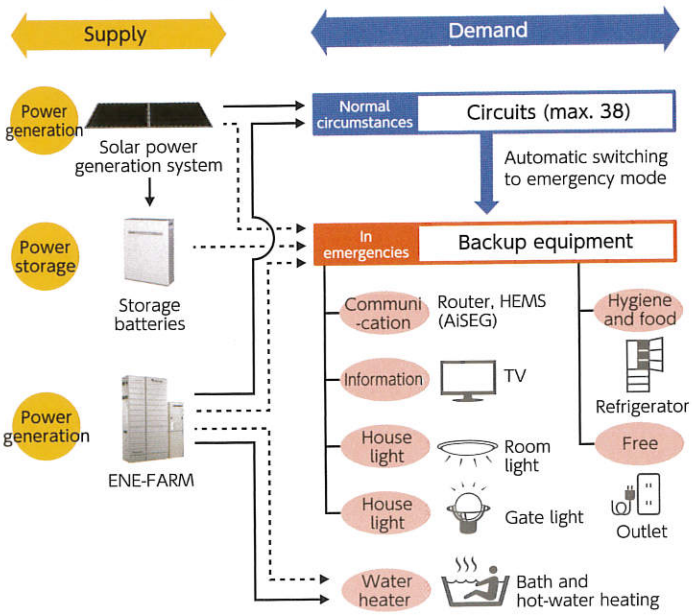
Eco-friendly and comfortable

Services and solutions developed in Fujisawa SST

Securing lifeline for three days based on CCP*1

Detached houses in Fujisawa SST are equipped with the Energy Creation-storage Linked System, which controls not only the solar power generation system and storage batteries but also ENE-FARM.*2 In emergencies, the system will continue to supply energy, such as continuing to provide power to lighting, refrigerators, TVs and other pieces of equipment essential for daily life for three days in accordance with the selected settings.

●Conceptual image of emergency backup power supply system for detached houses




Solar power generation panels


Smart HEMS™


Energy Creation-storage Linked System

*1. The CCP (Community Continuity Plan) is a plan designed to remain in effect until the recovery of normal conditions in the event of emergencies.
*2. This system is available only in houses with a double power generation system.

Eco-friendly and comfortable

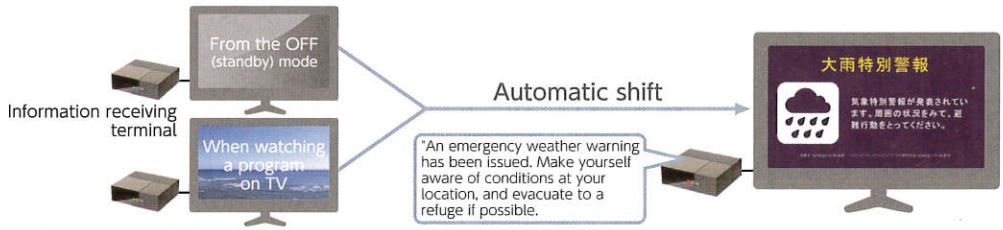
Services and solutions developed in Fujisawa SST

Town portal system

As an entrance to information linked to the town, residents can access a wide range of town services, such as information on energy consumption in each household in graphic form, emergency information and notices from town facilities, and service reservations, along with the use of a bulletin board that helps residents to create communities.

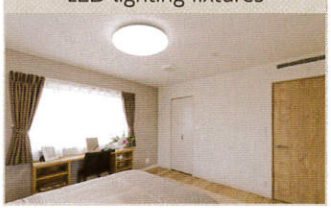
Disaster prevention push notification TV

The TV delivers diverse service information under normal circumstances. In emergencies, the screen will automatically be switched to display disaster-related information on screen, accompanied by voice announcements.



Air conditioners

LED lighting fixtures

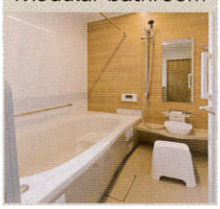


Fully automatic toilet (A La Uno)

Outdoor power socket for recharging EV and PHEV

Modular kitchen system

Modular bathroom



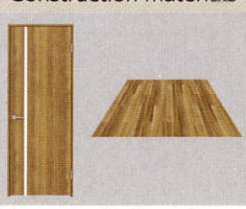
Lighting equipment (Symphony lighting)

This lighting system provides brightness tailored to individual situations as well as a comfortable atmosphere.

Nanoe™generator (air-e)

This equipment can be used to remove unwanted odors in various locations, such as closets and bedrooms

Construction materials



We have an abundant lineup of construction materials, including floor materials, doors, storage goods, and staircases.

Safety and security

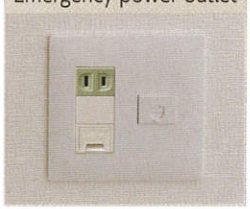
Video intercom system

Home security

Home security services are provided by ALSOK.

Entrance light

Emergency power outlet



Electricity stored in storage batteries can be used in the event of power outages.

* Equipment models and series vary according to house model

Community center

Committee Center

Serves as a community center that revitalizes communities, and works as a disaster prevention base

The Committee Center built in the Central Park located at the center of the town will revitalize communities through events for residents, and serve as a disaster prevention base that will maintain community activities. A comprehensive emergency structure has been established in this facility. It is built with the design strength to hold 100 individuals as an evacuation space if a tsunami crashes ashore, equipped with the Energy Creation-storage Linked System. It also stores food and drinking water.

Eco-friendly and comfortable

Designed by Panasonic Homes

This is a public community center that is the symbol of the town built based on a design created by Panasonic Homes Co., Ltd. Its iconic design has created a balanced landscape with a park design and trees.

Committee room usable as an evacuation space in emergencies

Kitchen studio for cooking classes and parties
IH cooking equipment and cooking appliances are available.

Kids' room for small children

Solar power generation system

Rooftop solar panels provide electric power in emergencies. They will be able to provide electricity for three days in emergencies.

Energy Creation-storage Linked System

LED lighting fixtures

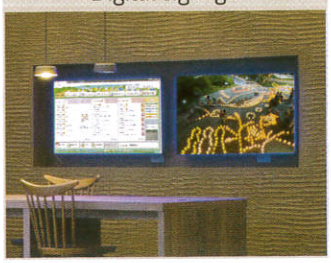
LED lighting fixtures are installed in the facility.

Fully automatic toilet (A La Uno)

Water- and power-saving fully automatic self-cleaning toilets are installed.

Safety and security

Digital signage



The town portal site and event information are displayed.

EV charger (ELSEEV)

Residents have access to an electric vehicle sharing service.

Monitoring with surveillance cameras

Videos sent from surveillance cameras installed throughout the town can be checked from the monitoring room.

Smart Infrastructure

Smart infrastructure

In an attempt to build a disaster-resistant town, we have adopted an energy infrastructure that can be used in both normal circumstances and in emergencies.

Eco-friendly and comfortable

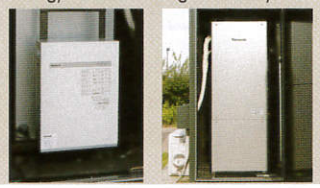
Community solar power generation system

In the south of the town, a community solar power generation system is installed on public land. Under normal circumstances, this system will feed power into electricity grid and contribute to the low-carbon lifestyle of the community. In the event of a disaster, it will act as an emergency power source for Fujisawa SST and neighboring areas.

Solar pergola

The pergola topped with solar power generation systems will serve as disaster prevention tents in emergencies.

Energy Creation-storage Linked System

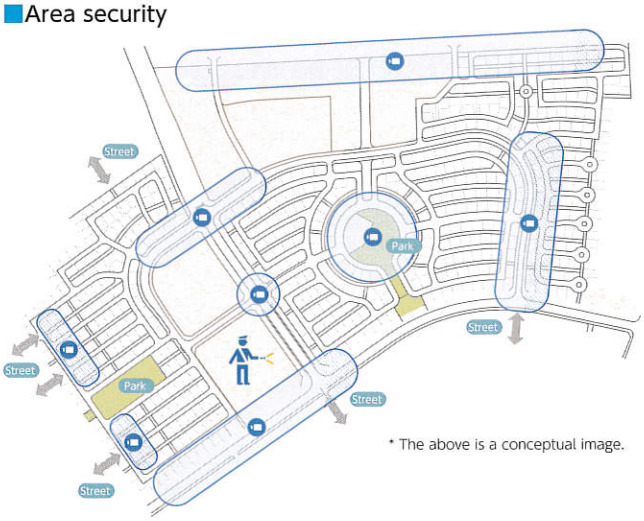


LED street lights with solar panels

Solar panels efficiently convert natural energy into electricity, and the LED lights brightly illuminates the streets.

Safety and security

Area security



* The above is a conceptual image.

Town security

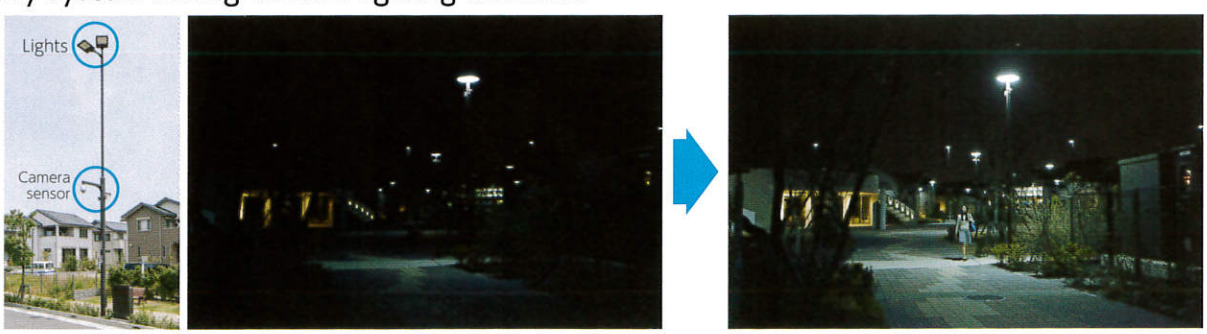
Home security

Security provided by personnel

There is an integrated "area + town + home + personnel" security system in place. We have designed a virtual gated town that delivers safety without hemming in the town with physical gates and barriers. The number of gateways is limited to prevent unnecessary entry into the town, and surveillance cameras are installed throughout the town. Houses are equipped with a video intercom system and a home security system. ALSOK security guards patrol the town, and will rush to the scene of any emergency.

Services and solutions developed in Fujisawa SST

Security system linking camera-lighting functions



Installed in optimal locations, LED street lights with sensors will dim when there is nobody around at night. But when a passerby or car is detected, they will provide sufficient brightness to illuminate not only the area directly beneath, but also a short way ahead, thus realizing both security and eco-friendliness. Furthermore, with cameras and lights connected to a wireless network, the system will illuminate security lights ahead of the movement of the vehicle or pedestrian.

Town development base

Fujisawa SST Square

Landmark of the town serving as the base for town development activities

The Fujisawa SST Square is a base that offers management functions with the office of the town management company. It serves as Fujisawa SST's comprehensive communication base, welcomes guests, provides publicity, fulfills the functions of incubating new businesses, helps Fujisawa SST and neighborhood residents, individuals working and gathering in the town to create communities, and has community functions to organize environmental education programs or events. By providing these functions, the facility serves as the base for town development activities.

Town management functions

SQUARE Office

This is the base of the Fujisawa SST Management Company. It also serves as the community continuity planning (CCP) center in charge of planning and implementing disaster recovery measures in the event of an emergency.

Surveillance system

Surveillance cameras throughout the town will be monitored.

Surveillance cameras throughout the town will be monitored.

Sending information to smart TVs

Disaster prevention push notification TV

Town portal system

The system sends town-related information under normal circumstances, and disaster-related information in emergencies.

Incubation functions

SQUARE Center

This is Fujisawa SST's comprehensive communication base. It is a place for showing the town's most interesting and engaging points to companies and government bodies around the world. Partnerships will be created and new businesses and services will be incubated.

Projection mapping

Digital signage

Spotlight-type projector (Space Player)

Audio equipment

Functions to help residents create a community

Shonan cooking school

Cooking classes and a kitchen studio operated by Shonan Tsutaya Books under the theme of "Slow Food, Slow Life."

Panasonic KURA_THINK

This space proposes better living through household appliances, while at the same time creating new lifestyles alongside customers.

SHONAN T-SITE

Recommendation of Shonan lifestyles and cultural information

This is a complex cultural facility offering Shonan lifestyles, where a bookstore and 30 unique, theme-based shops are seamlessly linked. The facility is like a mall of a type never before seen, in which all shops provide books and are organically linked to the bookstore.

Eco-friendly and comfortable

Space lighting

Shop space creation

Transparent screen

This screen has an approx. five times greater image contrast than that of conventional models, while maintaining high transmittance of approx. 70%. It provides unprecedented visual solutions to ensure a wide range of promotion.

Digital signage

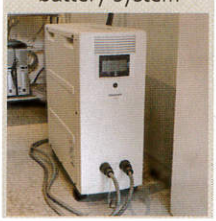
Meeting room equipment

HD visual communication system

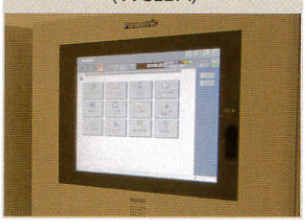
Eco-friendly infrastructure equipment

Solar power generation system

Lithium-ion storage battery system



Central monitoring system (WeLBA)



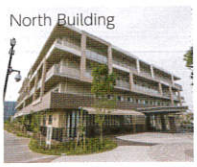
Packaged air conditioners

Safety and security

Network cameras

Disaster prevention information receiver and emergency broadcasting system

Emergency light

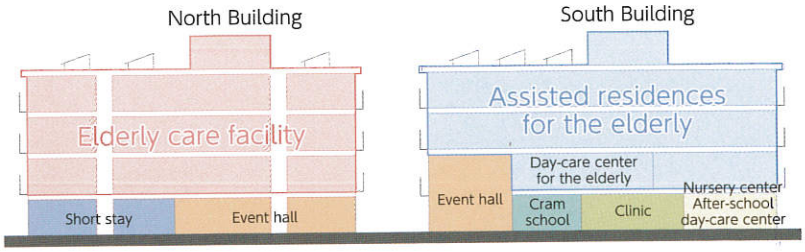


Healthcare, welfare and educational facilities that promote exchanges between different generations

Multi-functional complex facilities provide comprehensive care across boundaries among medical care, elderly care, education, and childcare at one site.

Facility outline

Elderly care facilities



Assisted residences for the elderly

Event hall

Cram school

Nursery center

Pharmacy

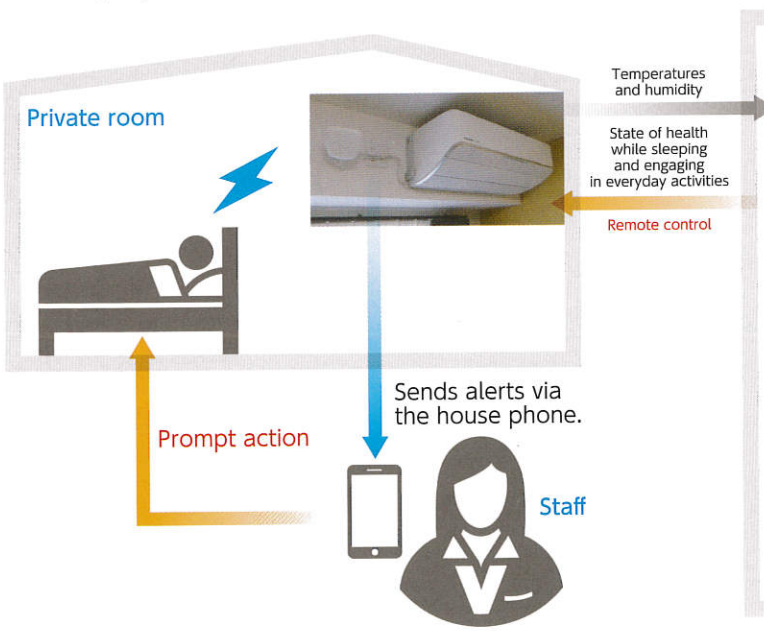
Clinic

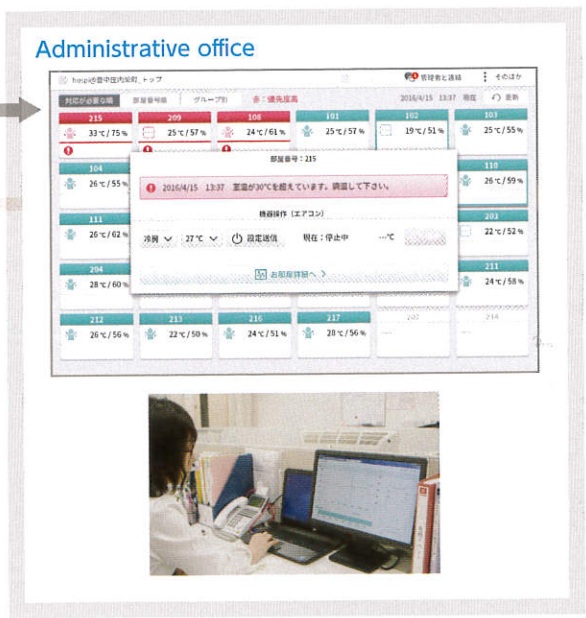
Safety and security

Services and solutions developed in Fujisawa SST

Smart air conditioner monitoring service

Based on the combination of an air conditioner compatible with a cloud service and a non-contact sensor, this system keeps an eye on residents' health and safety by detecting information about their living spaces and lives while at the same time guaranteeing their privacy. It detects information such as residents' body motions during sleep and their presence in their private room, and sends it to the nursing care staff. This will help improve nursing care services as well as the staff work efficiency.

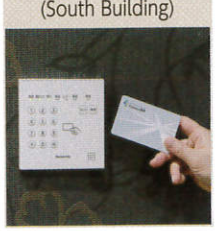




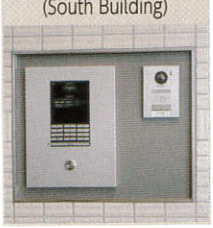
Security system

Fire alarm receiver

Access control system (South Building)



Video intercom system (South Building)



Emergency

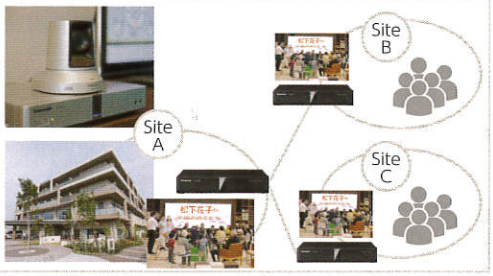
Eco-friendly and comfortable

■Space creation in facilities that promote exchanges

Multi-signage system

Six LED LCD displays are installed that can be combined to create a 55-inch multi-screen display. Pieces of signage created for different purposes can be linked in unexpected ways for events or times, and the front and back cameras can send seminar or event site videos.

HD visual communication system



Realistic interactive communications can be achieved by linking remote sites with full high-definition video and high-quality sound. This function will expand communications during events where separate sites are linked.

■Comfortable spaces within facilities for the elderly

Shared kitchen and cooking appliances (North Building)

Shared laundry (South Building)

Shared bathroom (South Building)

Toilet, bathroom, and wash stand in a private room (South Building)

Kitchen in a private room (South Building)

■Support for nursing care staff

Robot for assisting care recipients to rise from their bed (Resyone)

A portion of the bed can be reconfigured to serve as a wheelchair.
Physical load both on care recipients and assistants can be reduced.

Rehabilitation system for hospitals and facilities (Digital Mirror)

Care recipients work out while checking the video and their own movements displayed in the mirror, which enables effective rehabilitation.

Electric-assisted bicycles

These bicycles facilitate the movements of home care service staff.

Hypochlorous acid air purifier (North Building) (Ziaino)

This is a highly effective air sterilization and deodorization machine that uses chlorous acid (electrolyzed water).

■Pharmacy equipment

Electronic medication record system for insurance pharmacies

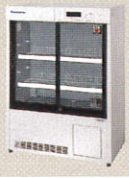
POS system

■Clinic equipment

Medical business computer for clinics

Patient registration card issuing machine

Refrigerated glass case for medicines



Business phone

■Eco-friendly infrastructure equipment

Solar power generation system

Lithium-ion storage battery system

Air-conditioning equipment Air conditioners

LED lighting fixtures

Next-generation logistics center

Next Delivery SQUARE

Community-oriented next-generation logistics center

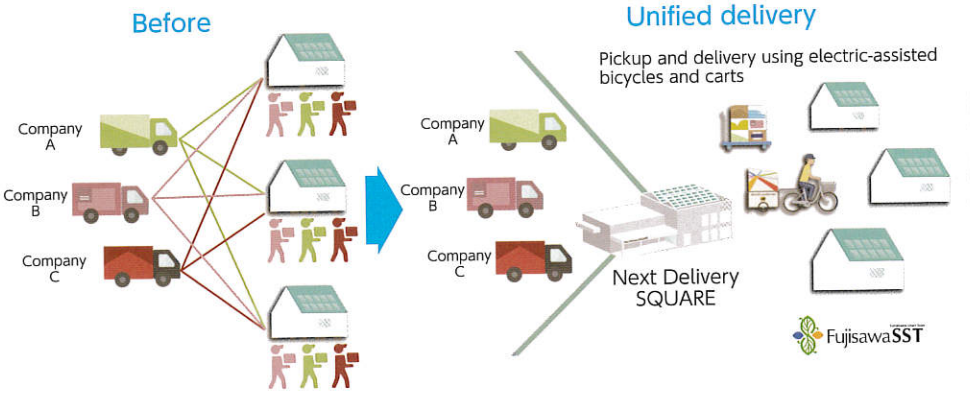
This is a next-generation logistics center operated by Yamato Transport Co., Ltd. This center provides Japan's first delivery service for detached houses that aggregates packages delivered by multiple delivery companies. It offers comprehensive logistics support, namely eco-friendly and smart package delivery, through links to the information network and communities of the town.

Eco-friendly and comfortable

Services and solutions developed in Fujisawa SST

Unified delivery service to aggregate packages delivered by multiple delivery companies

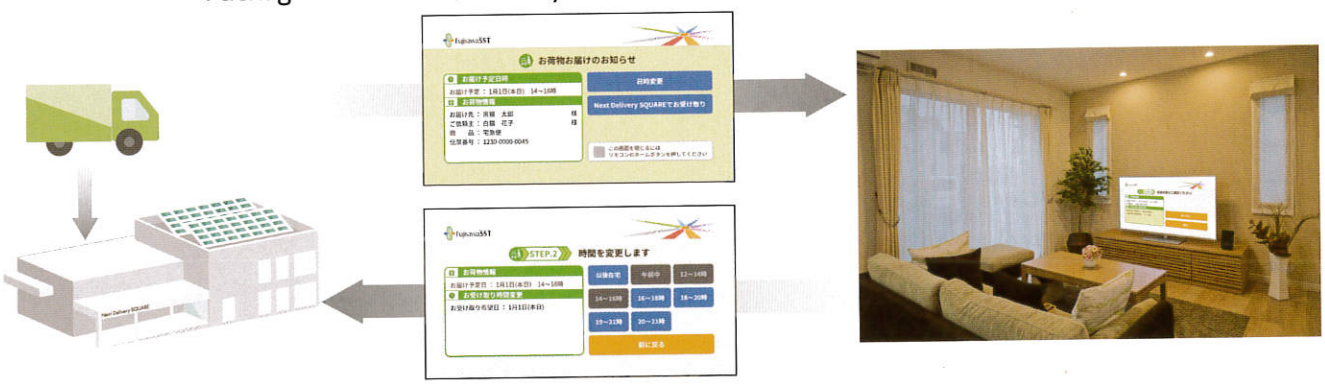
Yamato Transport aggregates packages delivered to Fujisawa SST by multiple delivery companies, then delivers to individual houses. The Next Delivery Square is making efforts to streamline logistics, improve safety and reduce the environmental load on the entire community by using electric-assisted bicycles and carts for pick-up and delivery.



On-demand delivery enabling on-demand logistics

Package delivery schedules and delivery notices are sent to smart TVs in recipients' homes. Recipients will be able to change delivery dates or designate delivery locations. This system will improve delivery efficiency by reducing redeliveries, and enhance recipients' convenience.

Package information, delivery schedules, and delivery notices



Date changes, etc.

■Cold chain equipment

Refrigerated-package sorting room

Cold storage agents contribute to high-quality freshness control and energy conservation.

Cold storage agent freezer

Freezing- and refrigerating-type cold storage agent can be quickly frozen.

Vending Machine

Eco-friendly and comfortable

Designed by Panasonic Homes　Design,management,construction

This is a next-generation logistics center that is built based on a design created by Panasonic Homes Co., Ltd. Its exterior design is coordinated with that of detached houses and the community center, fostering the unity of the town. Through the adoption of a solar power generation system and LED lighting as well as low-carbon building materials, CO_2 emissions from this logistics center are about 30% lower than those from conventional sites.

Bright and open reception space

Comfortable double-height waiting space

Entrance space sheltered from rain

Zoning and traffic line design facilitating shipping and clerical work

Facilities friendly to office workers and drivers: they include resting and locker rooms

Next Delivery Square's sign at the eastern entrance of the town

Eco-friendly infrastructure equipment

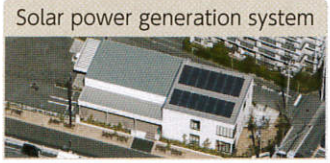
Energy consumption expressed in graphic form

Energy Creation-storage Linked System

Packaged air conditioners

Fully automatic toilet (A La Uno)

Solar power generation system



LED lighting fixtures

Using the town to innovate

The sustainable smart town aims to solve lifestyle and community problems and sustain smart living. The goal is to co-create with partner companies, residents, local governments, and universities associated with the town, to develop and test next-generation services and solutions in the town, and to create new innovations.

Proposal for residential spaces

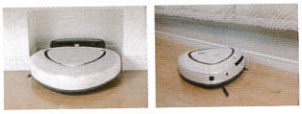
Next-generation model housing that aims to improve the value of time and space

Mitsui Fudosan Residential, Tokyo Gas, and Panasonic

In response to the growing need to reduce time spent on household chores coupled with the rise in two-income, child-rearing families, Mitsui Fudosan Residential, Tokyo Gas, and Panasonic have jointly proposed living spaces based on the concept of "housing where you can make your own time". Demonstrations and market research for this new solution are in progress. Time-saving designs and amenities have been adopted, such as floor plans and storage allocations that consider housework flow, spatial designs that make it easy to use robot cleaning, remote appliance controllers, and more. Furthermore, systems for bathrooms and sleeping environments have also been proposed in response to our customers' desires to use the time that they save for sleeping and bathing.

Creation of time value

Designing around smooth movement and storage for RULO (robot cleaner).



Creation of time value

Interacting with visitors remotely with appliance controllers while doing housework. Reference picture

Example intercom call

Creation of time value

Assisting homemakers with the stress of cooking. Weekcook Navi, a website suggesting everyday meals. Reference picture

Creation of space value

A new bathroom space idea. An extraordinary experience with Space Player projection. Reference picture

Creation of space value

Automatic control of brightness, temperature, and sound. Support system for a sleep environment. Reference picture

KODOMOTTO: A new lifestyle proposal for the child-rearing generation

Panasonic Homes and the Gakken Group

Through a cooperative development, housing developer Panasonic Homes and leading educational company Gakken Group are proposing a new way of living for the child-rearing generation. Based on the concept of "a home where all family members can grow together", we are building a foundation of growth to nurture children's health and lifestyles, to draw out a desire to grow to support learning with family, and to propose a living environment that is suitable for growth and that stimulates curiosity.

Photographs are provided for reference only.

■Example proposals

Foundation of growth

Using space and allowing the development of children's functions (physical and sensorial)

Desire to grow

Creating a functional space where family members can work together

Growth environment

Setting up a communication wall to share hobbies

Monitoring to collect data

Next-generation communication technology Service development via Cellular LPWA (IoT delivery locker).

NTT Docomo, Yamato Transportation, and Panasonic

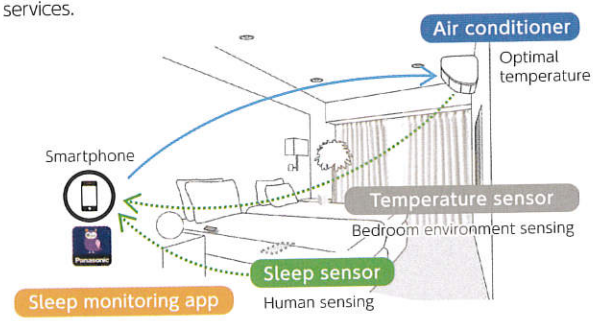
Development of new IoT services using Cellular LPWA, a next-generation communications technology that enables wide-area communications and lower power consumption Proof of concept for an IoT delivery box equipped with Cellular LPWA technology for market research and technical verification.

Overview of IoT Parcel Collection Service

IoT delivery locker

Support system for sleeping environments

Sleeping environment support systems are monitored with cooperation from the town's residents. Data and surveys from actual use are collected and used in the planning and development of future products and services.



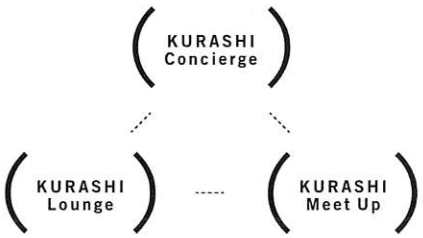
Service demonstrations and proposals

Panasonic KURA_THINK lifestyle co-op community shop

To support the realization of comfortable and convenient living rooted in the local area, we propose a better life supported by household appliances. At the same time, we strive to open shops with new business models to create lifestyles that have never before been experienced with our customers. Using household appliances, new services are developed and tested in collaboration with partner companies.

Panasonic

KURA_THINK



Three Everyday Living Spaces

■KURASHI Lounge

Experience a new lifestyle while drinking delicious coffee.

■KURASHI Concierge

Increase lifestyle satisfaction via consultations and professional advice.

■KURASHI Meet Up

Space for events or gatherings to experience a fulfilling life brought about by household appliances.

■Trial household appliances at home

Service that meets needs such as the testing out of new products at home before buying them.

■Skincare and beauty services

Visualize the skin's condition with skin-verification equipment developed by Panasonic. An exclusive service that allows customers to use beauty appliances and skincare products in the shop is also available.

■Health food concierge service

Visualize eating habits through a simple wellness check. Propose well-balanced menus based on the "Tabenaru Bento" healthy and balanced meals and an individual's clinical records.

■CAFE STAND

Coffee-roasting experiences and hot coffee provided by Panasonic's smart coffee roasting machine, "The Roast".

■Food and the community: A collaboration with KitchHike

A community food event "Everyone's Dining Table", where all people can come together to eat, is held in collaboration with KitchHike. This event links people with the local community for the development of communication through food.

Various demonstrations and tests

Solutions to combat heat

Delivery locker and charging locker

Bicycle-sharing service

Bringing energy to life.

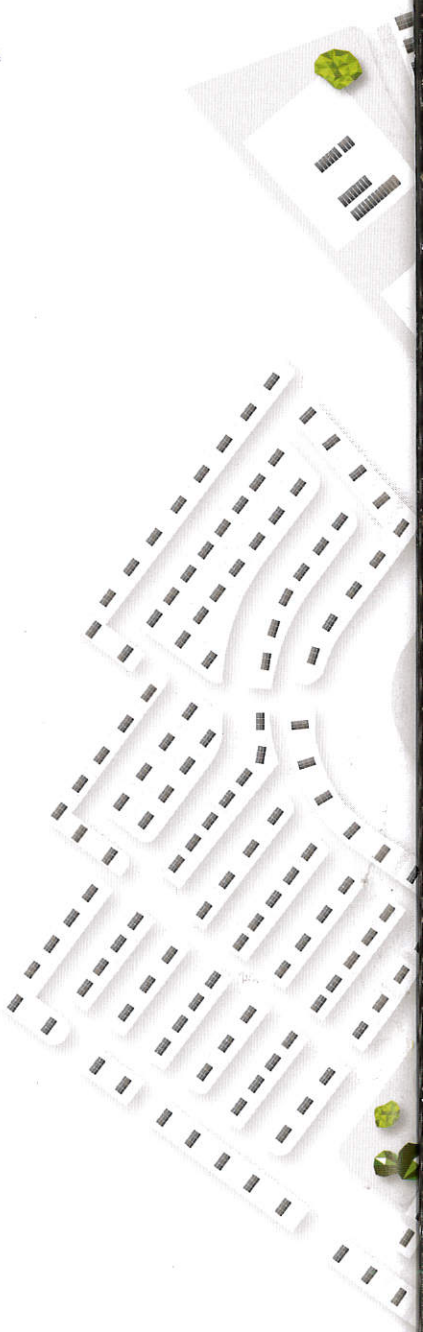
Sustainable Smart Town FujisawaSST

History of town development

	2009	Closed our factory in Fujisawa.
November	2010	Signed an agreement with the Fujisawa City government on the basic plan.
September	2012	Launched the land repurposing project.
November	2012	Established the Fujisawa SST Council.
March	2013	Established the Fujisawa SST Management Company as a town management company.
March	2014	Residents started to move in to detached houses.
April	2014	The town was officially opened.
November	2014	The Fujisawa SST Square was opened as an urban design center.
December	2014	The Shonan T-Site was opened as a town development base.
September	2016	The Wellness Square, South Building was opened as a healthcare, welfare and educational facility.
November	2016	The Next Delivery Square was opened as a next-generation logistics center.
April	2017	The Wellness Square, North Building was opened as a healthcare, welfare and educational facility.

Certifications and evaluations

- Adopted as a Model Project for Promoting CO2 Reduction in Housing and Buildings by the Ministry of Land, Infrastructure, Transport and Tourism.
- Adopted as a Business Promoting CO2 Reduction to Enhance the Value of a Low Carbon Society by the Ministry of the Environment.
- Obtained the Rank S certification in CASBEE (Comprehensive Assessment System for Build Environment Efficiency) for Urban Development.
- Certified as a Business for Promoting Town Development in Harmony with the Environment by Kanagawa Prefecture.
- Good Design Award 2015 (regional/community development and social contribution activities).
- Received the Zayed Future Energy Prize 2015 in the Large Corporation Category.
- Kanagawa Global Environment Award 2015 (Kanagawa smart energy plan)
- Received the 2016 Environment Minister's Award for Global Warming Prevention Activity (Countermeasure Technology Introduction and Dissemination Category).
- Received the Logistics Environment Conservation Award in the 18th Logistics Environment Awards.
- Received the Wellness Award of the Year 2017 (Municipal Division Award).



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