

# Hållbara städer

Japan

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## Summary

The backbone in the concept of sustainable cities in Japan is energy management and so called smart communities, where supply, demand and storage of energy are managed by ICT based systems and integrated in households, industries and buildings as well as transportation and energy storage. Under the initiative of the Ministry of Economy, Trade and Industry, a variety of Smart-City-related demonstration projects are run in many places of Japan.

In this report, we have studied the Smart Community pilot project in the cities of Yokohama and Kitakyushu. Both cities have energy management systems as core of the projects, and include new renewable energy generation and electric transportation. Contribution from private sector is substantial in terms of investment and providing technology and know-how. The projects are seemingly well integrated in the overall city strategies for growth and attractiveness, in particular in Kitakyushu. Citizens' engagement and city-citizen dialogue are identified as critical success factors for long-term sustainability.

The results related to environmental and efficiency performance are positive, but a more systematic process for commercialisation and capturing lessons learnt is not easily identified. For export initiatives of existing technologies, both cities have already established network and organisations, mainly in Southeast Asia.

## Sammanfattning

Hållbara städer benämns i Japan oftare som ”smarta”, där effektiv energianvändning och styrning av efterfrågan/tillförsel är centrala komponenter. Hushåll, kommersiella fastigheter och industri involveras, liksom transporter och energilagring. Japans industridepartement METI driver sedan 2010 ett femårigt projekt med fyra ”pilotstäder” för smarta städer. Projektet är på väg att avslutas i mars 2015.

I denna rapport beskrivs pilotprojekten i Yokohama utanför Tokyo, och Kitakyushu i västra Japan. I båda projekten är IT-baserade styr- och övervakningssystem för energi centrala, och de omfattar också ny förnybar energigenerering och eldrivna transportslag (el- och bränslecellsfordon). Deltagande från privata sektorn är betydande i projekten och påverkar dess innehåll och utfall. Industrin bidrar med såväl investeringar som teknik och kunnande. Projekten verkar väl integrerade i städernas övergripande strategier för tillväxt och attraktionskraft, speciellt i Kitakyushu. Medborgardialogen lyfts fram både som det viktigaste och det svåraste för att få långsiktighet i projekten.

Resultaten vad gäller minskad miljöbelastning och energieffektivitet är goda, men en mer systematisk process för att fånga erfarenheter och potentiella innovationer har inte identifierats. För export av befintlig teknik finns redan idag etablerade organisationer i båda städerna, med kontakter och samarbeten främst i Sydostasien.

## 1 Background: Sustainable city projects and policies

The backbone in the concept of sustainable cities in Japan is energy management and so called smart communities, where supply, demand and storage of energy are managed by ICT based systems and integrated in households, industries and buildings as well as transportation. The projects initiated by the government and ministries have mainly been related to smart communities, and this is also the focus in this report. Lately, as a response to the demographic situation of aging and diminishing population and following the disaster in March 2011, a more general sustainability focus has been applied (maybe more economic and social than environmental). Recent initiatives are made in the context of regional development and restoration of disaster areas, but when it comes to the sustainable city concept, it is still mainly focusing on energy.

There are three important driving forces for developing and implementing smart communities on national level in Japan, all rooted in a dedication to secure the nation's supply of energy. The driving forces are i) to manage introduction of renewable, fluctuating sources such as wind and solar power, ii) energy savings and reduction of peak demand, and iii) introduce storage systems to provide local resilience in case of emergency. Japan has a long history of regulated and monopolised energy systems, and an ongoing reform on liberalising the electricity market will be an important step for the smart communities to leverage on the efficiency potential of demand-response systems.

Under the initiative of the Ministry of Economy, Trade and Industry (METI), a variety of Smart-City-related demonstration projects are run in many places of Japan<sup>1</sup>. These projects, some of which overlap each other, are being promoted within various METI-funded or the Cabinet-Office-funded policy frameworks such as:

- Eco-Model city, followed by the Future City Initiative. The Eco-model city started in 2011 by selecting 23 cities as showcases based on low-carbon structure to meet the duties according to the Kyoto protocol. In March 2013, the two initiatives were integrated, targeting 11 Future Cities out of the 23 Eco-Models, including Yokohama and Kitakyushu. The Future City has a comprehensive plan for low-carbon society and sustainability approach with social and economic aspects. The budget was about 120 million SEK in total for 2013 (JPY 1.8 billion).
- Subsidy for Projects Promoting the Introduction of Smart Communities (mainly targeting cities in Tohoku and budgeted 520 million SEK (8.0 billion JPY) in total for 2011.
- Smart Community Project (formally known as Projects for Demonstrating the Next Generation Energy and Social System). The project was initiated in April 2010 and will be continued until March 2015, targeting four cities: Yokohama, Kitakyushu, Toyota City in Nagoya and Keihanna Science City in Kyoto-Osaka-Kobe area. The project was budgeted 560 million SEK (JPY 8.6 billion) in total for 2013.

<sup>1</sup> See "Smartare Elnät för förnybar energi och ökad konsumentmakt", Tillväxtanalys Svar Direkt 2013:10 (Swedish only).

METI have provided financial and consultancy assistance to those projects, while also routinely receiving reports on the progress and achievements of each project from each city.

METI has also been active in promoting the international standardization of Japan's Smart-City-related technologies in cooperation with Japan Smart Community Alliance (JSCA) and New Energy and Industrial Technology Development Organization (NEDO).

## 2 Smart Community pilot projects

### 2.1 Policy initiative purpose

Among the projects mentioned above, the Smart Community Project attracts most attention from the government due to the, already achieved and further expected, results and lessons learnt from the four pilot projects. The approach is to conduct large-scale operational experiments on Smart Community-related technologies under the mutual cooperation between the municipality, local citizens and private companies. The aim is to create public awareness about the concept and benefits of smart community, and to spread the results of these experiments to the rest of Japan and foreign countries for upgrading the competitiveness of Japan's Smart-City-related industries.

The sustainable city projects in Japan are characterized by a combination of the strong bottom-up approach and the top-down-approach, where the local government proposes plans that are hopefully approved and financed by the central government. Japan has a so called centralized and integrated system, where the national government delegates certain functions but maintains authority and control of revenue streams and only entrust the local governments to implement its policies<sup>2</sup>. This is in contrary to e.g. Sweden, relying on a decentralized, integrated system. Thus the Japanese municipalities are highly dependent on the national government for their income, and the set-up, with municipalities and prefectures handing in proposals and implementation plans to be financed by the national government, is common standard in Japan.

### 2.2 Focus on smart cities and energy management

The four city pilot projects in Yokohama, Kitakyushu, Toyota City and Keihanna have different approaches, depending on the local conditions and prerequisites, and each city is responsible for its project plan and targets. However, all projects are seeking to create an ecosystem of mutually connected energy management systems (EMS), consisting of home EMS (HEMS), building EMS (BEMS) for commercial districts, factory EMS (FEMS) for manufacturing districts. The hub of the management system is the community EMS (CEMS) that provides a platform to integrate and control all of the systems together, including transportation system. The CEMS visualize, analyse and store various data from those systems, including metrological data and forecasts, and optimize energy use for the community as a whole. Furthermore, the standard for interfaces between HEMS and home appliances (called ECHONET Lite) has been developed through the Smart community project, although it is only a standard in Japan so far.

On the basis of the energy management systems, various experiments are being conducted in the four cities. It includes IT-based ways to make power consumption visible and a demand response system or the dynamic pricing system for reducing electricity usage during peak periods. Energy storage is also an important part of the smart community systems, with design of energy storage systems and the integration of Electric Vehicles (EVs) or Fuel Cell Vehicles (FCVs).

The projects of Yokohama and Kitakyushu are described in the next sections.

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<sup>2</sup> <http://www.nippon.com/en/in-depth/a01801/>

## 3 Case Study 1: Yokohama

### 3.1 Background and aim for the city

Yokohama is one of the world's largest suburbs, with about 3.7 million citizens and 1.6 million households. It is a city with a lively port and a history of rich influences from abroad, which has formed a city culture of openness, and a general curiosity to change and new ways of doing things. According to the city officials, this culture has contributed to the will to participate and develop the smart community.

Yokohama's efforts for realizing a low-carbon society have been widely recognized not only in Japan but also in the world. In fact, Yokohama is the only Japanese city that was selected to be an Eco2 City under the Eco2 Cities Initiative managed by the World Bank. It likewise won the award in the city category in the World Smart City Awards ceremony at the Smart City Expo World Congress 2011 held in Barcelona, Spain. Yokohama Smart City Project (YSCP), the largest-scale smart city experiment in Japan, has been in the core of Yokohama's such efforts for a low-carbon society. The importance of YSCP is also mentioned in the Open Yokohama Strategy, which Yokohama City published as part of its Future City Initiative in May 2012.

YSCP covers three areas in the city: the Kohoku New Town (residential area), Minato Mirai 21 (urban centre), and the Yokohama Green Valley (industrial area). The combined area of these three areas is approximately 60 km<sup>2</sup> with a population of around 420,000. With these areas as the core experimental sites, the project is now gradually spreading to other areas in the city. YSCP is comprised of many projects and experiments, and the total investments in them amount to more than 1.3 billion SEK (20 billion JPY) in 5 years from 2010. YSCP rests on collaboration between the Yokohama City Government and many large enterprises (including Accenture, Tokyo Gas, Toshiba, Nissan Motor, Panasonic and the regional energy utility TEPCO) as well as SMEs.

### 3.2 Content and results

To reduce CO<sub>2</sub> emissions in the city, YSCP sets a specific goal for each technology implemented in the project, such as installation of 27 MW photovoltaic (PV) systems, 2 000 electric vehicles (EV), energy management systems in 4,000 homes (HEMS) and 160 million m<sup>2</sup> commercial buildings (BEMS).

Over the past four years, most of these goals have already been reached or exceeded already one year before project end. At those sites, tests have been conducted, in cooperation with various private companies, for the purpose of making power consumption visible and encouraging households to save electricity and reduce CO<sub>2</sub> emissions through demand response and dynamic pricing practices. As a result, in the residential sector, the demonstration of HEMS in the summer of 2013 cut the power peak by a maximum of 15 percent. In the building sector, the demonstration cut the peak by a maximum of 22 percent in the winter of 2013 and summer of 2013.

About 2 400 EVs have been purchased by people living in the YSCP area, partly because of Yokohama City's as well as the national government's subsidies for the purchase of EVs. Yokohama has also been active in the creation of infrastructure for EVs within the YSCP area through public-private partnership with private companies. For example, JX Nippon Oil & Energy Corporation and Nippon Electric Company (NEC) has been

involved in an EV recharging system combining multiple quick chargers and large-capacity batteries, while Hitachi has been improving the efficiency of recharging EVs used for car-sharing purposes. Nissan Motor has been engaged in a V2H (Vehicle-to-Home) system, where household supply and demand is stored and supported by batteries in the EVs. Mercedes-Benz has offered a one-way car sharing service utilizing EVs, where customers can rent and return the vehicles at eight locations in the city, which is expected to curtail the use of private automobiles when neither necessary nor urgent. On the other hand, the deployment of FCVs in the YSCP areas is slow, due to the fact that Nissan, one of the major partners in YSCP, has concentrated on the deployment of EVs.

### **3.3 Governance and communication**

For the purpose of YSCP, the Yokohama City Government has an internal project office that coordinates the comprehensive project and is responsible for communication and information providing to the citizens. While the Yokohama City Government works as an overall project administration, Toshiba is said to take on a substantial share of the project management. There are several sub-projects, due to technology implementation in different parts of the city, and industries such as Toshiba and Panasonic (who are providing the EMSs), Nissan (providing EVs) are deeply involved in relevant activities. The vision from the city is that the companies work freely together with citizens to develop the city.

Communication with citizens is the most challenging aspect of the project, according to the city officials. They have many channels to involve and inform the public, with e-mail and mail, with town hall meetings and a “hot line” call centre where citizens can call to ask or comment on the smart technology. The official also mention the important “ambassador role” of the many SME service technicians who are installing and maintaining equipment. The engineers have frequent opportunities to meet customers and users in households in the project area, and thus have the contact and relation that is impossible for city officials to obtain. Thus, the engineers in their profession can educate the citizens not only about the management of HEMS but also about the importance of citizens’ involvement in the project to realize a truly sustainable society in Yokohama. Our impression is that the “smart city ambassadors” was an asset the city officials identified down the road, and that it was not a planned initiative.

On a direct question about the balance between (one-way) information and (two-way) communication, the city officials emphasise the importance of bilateral dialogue. In Japan, where the social control is strong, there is an element of officials “asking the citizens to save energy” and they will. However, through surveys and other methods, the local government try to measure the awareness change. The coming electricity reform is acknowledged as important for the continued behaviour, but “even with a market, we need communication”, indicating that the economic incentives will not be enough motivation for every citizen, but people also has to find a meaning with what they do.

### **3.4 Commercialization and international expansion**

In order to export Smart-City-related technologies and know-how and technologies to foreign countries, especially emerging economies in Asia, the Yokohama City government has developed the Yokohama Partnership of Resources and Technologies (Y-PORT) initiative based on the public-private partnership with private companies including SMEs. In order to promote the Y-Port initiative, Yokohama has formulated partnership with Japan International Corporation Agency (JICA), Japan Bank for International Corporation (JBIC) and Asian Development Bank (ADB). In cooperation with those organizations, Yokohama

is facilitating relevant technology transfer to such cities as Cebu in the Philippines, Danang in Vietnam and Bangkok in Thailand. However, in order for Yokohama to maintain a competitive edge on an international stage and to enhance the international competitiveness of its Smart City-related industries, further external engagement with developed countries may be necessary.

From April 2015 the Yokohama City government will further promote YSCP through its managerial roles at the Yokohama Smart Business Council, which consists of various private companies and aims to commercialize the Smart-City-related technologies and know-how, and spread them to other cities in Japan and around the world. The Yokohama Smart Business Council will work as a platform for energy business planning, matching and incubation, after the end of METI's financial assistance in 2015. In this regard, the Yokohama City Government seems to have some vague ideas of how to actually marketize Smart-City-related technologies and know-how, in such areas as the commercial utilization of big data stored in the CEMSs and the "negawatt" trading. However, whether or not the commercialization can be successful after the end of METI's financial aid in March 2015 and the full liberalization of retail electricity sales in 2016, depends not only on the Yokohama City Government's strong initiative, but also on relevant private companies' business capabilities in this field.

### **3.5 Comment**

The participating industries in Yokohama seem to be an important asset for the project, providing technology and investing in ICT systems, vehicles and expertise knowledge. The participation of national and local government gives credibility to the citizens, and thus makes the project possible. However, as the project come to an end, so will governmental funding, and it will soon be revealed how the industries value and leverage on their investment in the smart community business. Furthermore, it will be interesting to see the next steps for SMEs involved in service and installation. Their initiatives might be the key to a substantial growth of both domestic and export market for Japanese smart technology. It is possible that the humble prediction from the city officials about the post-project activities does not take into account the actual business potential that can be identified by vivid entrepreneurs.

## 4 Case Study 2: Kitakyushu

### 4.1 Background and aim for the city

Kitakyushu is the cradle of industrial Japan, with Yamata Steel Mill starting operation in 1901. As such the city has played an important role for the rapid economic development of Japan in the 20<sup>th</sup> century. However, as a consequence the city also experienced severe environmental problems. Colourful photos from the 1960 and 1970s show the “rainbow smoke” from factories and a dead, yellowish sea. By joining forces, the industry, local government and citizens managed the situation and today the environmental conditions have improved substantially. The tradition of working together to solve problems is put forward by the smart community project team as an important factor for current development towards low-carbon society in Kitakyushu.

Like Yokohama City, Kitakyushu City’s efforts and initiatives for promoting sustainable development and realizing a low-carbon society have long been highly evaluated not only in Japan but also in the world. Kitakyushu Smart Community Project (KSCP) has been one of the most important pillars to attain the city’s goal. KSCP is being conducted in the Higashida region in Yahata-Higashi ward of the City of Kitakyushu.

The Kitakyushu City Government has a comprehensive environmental plan titled the Kitakyushu Green Frontier Plan, which was made in 2009 after its designation as an Eco-Model City (the first of its kind in Japan). The main objectives of this plan are to decrease greenhouse gas emissions in the city by 30 percent by 2030, and by at least 50 percent by 2050 compared to 2005, while reaching 40 percent economic growth by 2050. Based on this plan, KSCP sets its goal of obtaining a 20 percent energy saving effect and reducing CO<sub>2</sub> emissions by 50 percent or more compared to the typical block in the city.

### 4.2 Content and result

Many different projects and experiments are being conducted in the KSCP area to reach the goals listed above.

KSCP has promoted Japan’s first independently operated system of “local consumption of locally produced energy”. This system has been promoted by energy generation from the large industrial neighbour, Nippon Steel Corporation, using cogeneration of electricity and heat from natural gas. Furthermore, an additional but small quantity of locally produced renewable energy from solar panels, geothermal energy and waste heat from factories, has in total supplies electricity to 230 households and 50 business establishments at lower prices of 0.45 to 2.0 SEK per kWh (JPY 7 to JPY 30) compared to the regional utility Kyushu Electric Company (0.52–2.30 SEK, JPY 8–35).

The heart of the KSCP is the community energy management system (CEMS), provided and managed by Fuji Electric. It controls the entire energy-saving system in the project area. HEMS have so far been introduced to 10 households, BEMS and FEMS introduced to 8 locations. Smart Meters are installed in 300 households and 70 companies.

Within the scope of the project, experiments have been conducted into a demand response system, based on dynamic pricing. This is Japan’s first public demonstration of dynamic pricing, and started in 2012. The experiments have statistically confirmed peak cut effects of 20 percent and energy-saving effects. However, the experiments have also shown that citizens’ demand response to the peak cutting program can be gradually slower as they get

used to the program. This clearly suggests that one of the most important issues to be solved in KSCP or other Smart City projects in Japan is how to incentivize citizens or consumers to continuously and positively respond to the demand response system to lower energy consumption. The result from the demand-response experiment is promoted by METI as an important learning from the project. The data is used as an input for the government in the ongoing liberalisation of the electricity market in Japan.

In parallel to the introduction of EVs, the installation of the infrastructure for FCVs is being particularly facilitated in KSCP. In this infrastructure, by-product hydrogen that is generated in the production process at Nippon Steel's factories is today providing fuel to fuel cells in households. Furthermore, the hydrogen is filling fuel cell vehicles at Kitakyushu Hydrogen Station, which is the first of this type in Japan and only the third in the world. This station is designed as the eastern fuelling base for the "Hydrogen Highway", a project led by the Fukuoka Prefecture Government. According to the Fukuoka Prefecture Government, a total of 100 such hydrogen stations are to be established in Japan, 10 of which are to be established in the Fukuoka area. By using this system, Honda R&D Co., Ltd. has conducted a verification experiment to reduce electric power peaks using Vehicle-to-Home supply of electricity from FCVs.

Overall, through various initiatives and efforts including the above-mentioned ones, the Higashida district has already achieved a 30 percent reduction in CO<sub>2</sub> emissions compared with the other areas in the city, and through the demonstration testing seeks to achieve a further 20 percent reduction, reducing CO<sub>2</sub> emissions to more than 50 percent less than other areas in the city.

### **4.3 Governance and communication**

The implementing body of this project is the Kitakyushu Smart Community Creation Committee, which is comprised of over 77 companies and organizations including Nippon Steel & Sumitomo Metal Corporation, IBM Japan Ltd., Yasukawa Electric Corporation and Fuji Electric Co., Ltd. The committee has been promoting KSCP on the basis of its master plan consisting of 38 projects, which are over 1 billion SEK (JPY 16.3 billion) in total in 5 years from 2010. About two-thirds of the budget comes from the government (METI), while about one-third of the amount comes from private companies. The Kitakyushu City Government's investments only account for 5 percent of the amount.

The city is the main player in the project organisation. The project is an important part of main environmental policy, and is a natural extension of the city's long environmental tradition and recent Eco-model city and Future city projects.

As expected, the communication with citizens is one of the main challenges for the project management. An important difference from Yokohama is that the KSCP includes one entire area, not several separated spots as in Yokohama. This is considered to be an advantage when building the comprehensive smart systems. The CEMS has the capacity to run much larger area than just the current project area and the provider Fuji Electric is looking for the opportunities to expand it.

According to the director of the KSCP the key words for successfully implementing the smart community is diversity - individual solutions depending on preferences among the citizens. The liberalisation of the electricity market is necessary – and has to be speedy from the government. However, he emphasise that there must be other driving forces than economy for citizens to engage, and other values. Once again he comes back to the

importance of history, the experiences of collaboration between different actors and the positive development that they have seen in the city.

#### **4.4 Commercialization and international expansion**

In a broader perspective, Kitakyushu aims to strengthen the competitiveness of Smart-Community-related industries by broadly deploying technologies and knowhow in Japan and overseas, and by promoting international standardization of their energy management technologies in accordance with IEC61850 of the European Committee for Electro-technical Standardization.

Importantly, the fact that KSCP is operated in an industrial city differentiates it from many other Smart City projects in high-tech and service-centred cities, and may make it particularly valuable as role model for future Smart City projects. From its history, Kitakyushu industries have developed technologies for waste and water treatment that can provide important contribution to the comprehensive systems for a smart and sustainable city. In order to promote international inter-city cooperation, Kitakyushu has long been active in expanding its international relationship with foreign cities. These efforts have been further intensified through the establishment of the Kitakyushu Asian Center for a Low-Carbon Society in 2011. However, Kitakyushu's international network is limited to the east and Southeast Asian countries. This means that Kitakyushu may risk finding itself with inadequate incentives to stay ahead of rapidly developing competitors in the swiftly evolving green city economy.

#### **4.5 Comment**

Kitakyushu has the same issue as Yokohama regarding how to commercialize Kitakyushu's Smart-City-related technologies and know-how in order for it to fully realize its green growth potential. Given the small size of its economy and the limited managerial capacity of its local government, Kitakyushu is more likely to need continuous financial and managerial supports from the central government in this regard than Yokohama. Also, even though Kitakyushu has long tradition of strong citizen engagement in environmental projects since the 1960s, it will need to provide further incentives for securing its citizens' participation in the continuous operation and promotion of KSCP after project ending in March 2015. It is also clear that the project management wants the government to "speedily" implement the ongoing liberalization of the electricity market to stimulate the engagement amongst citizens.

In any case, the Kitakyushu City Government expects the above-mentioned Kitakyushu Smart Community Creation Committee to continue to work as a platform for energy business planning, matching and incubation, after the end of METI's financial assistance in 2015.

## **5 Next steps for sustainable cities in Japan**

### **5.1 National and local initiatives to build on lessons learnt**

The Smart Community project is in its final stage and the cities are now working on final reports, although evaluation and reports have been done continuously. According to current presentations, METI consider the Yokohama Smart City Project (YSCP) and Kitakyushu Smart City Project (KSCP) as being particularly successful among the four projects. The reason is that results have been achieved that can be implemented in other cities and/or commercialised and exported.

As described above, the Yokohama City Government and the Kitakyushu City Government are taking initiative in promoting the commercialization in this respect, in cooperation with private companies including SMEs. The initiatives are made in order to enhance local growth and also finance their continued Smart City projects after the end of METI's financial assistance in 2015. Given the fact that the financial budgets of both of the local governments are very much limited to finance the entire parts of the Smart City projects, the issue of how possible the long-term financing of the Smart City projects in Yokohama and Kitakyushu can be is dependent on how successful the commercialization of their Smart-City-technologies and business models can be in each of the areas.

On a national level, it is basically the role of METI's Agency for Natural Resources and Energy to collect information and experiments from different Smart City initiatives and make them available to the public. The local governments in charge of the Smart City projects are also to conduct the same kind of tasks in this respect. In addition, there are also research conducted at some major Japanese universities regarding the technologies and knowhow derived from the Smart City projects in various areas of Japan.

The results from the pilot projects are serving as input for policy development, for example the result from dynamic pricing. METI is already preparing to start two projects worth nearly 270 million SEK (JPY 4.25 billion) in total from April 2015 in terms of further assisting the deployment and commercialization of Japan's Smart-City-related technologies and knowhow. For example, there will be promoting experiments into the "negawatt" trade, a power conservation and trading scheme where electricity conserved by consumers during times of peak power demand is traded as if it were generated electricity (negawatt power generation).

### **5.2 Reflections**

#### **5.2.1 Sustainable and smart**

The concept of sustainable cities in Japan is still, in practice, dominated by technology implementation for smart energy solutions, regardless of whether a relevant project is promoted in an urbanized area or in a local rural area. On the other hand, especially in local areas, much attention is drawn to social and economic aspects of regional development and revitalisation of depopulated areas, due not only to aging and diminishing population, but also people's interest in the quality of life. In order to deal with those issues in local cities, there are strong support from the government to regional urban planning for promotion of compact cities and integrated care communities for elderly living as well as local industry development to attract younger workers. Furthermore, in

the aftermath of the triple disaster in March 2011, the regions are also stimulated to strive for systems that make them more resilient. The Future City projects and the smart community projects of disaster stricken Tohoku area are already looking for a slightly more holistic approach of sustainability. Future initiatives may emphasise this even more to promote development of cities and regions that can meet challenges of energy security, aging population, sustainable resource management, upgrading of quality of life and the need for economic development.

### 5.2.2 Public and private driving forces

Although the governmental investments are large in the studied cases, the participation of the private sector is substantial, in relation to finance, technology and competence. The local industries, both large and small companies, have seemingly a large influence on content and deliverables in the projects. Although interviews with private sector have not been done for this study, the impression is that the driving force for the industry is to try new technologies, develop businesses and maybe also strengthen the brand. Thus, the smart community projects have been beneficial for both public and private interests and public-private partnerships are an indispensable element in the two cases.

From the central government, new innovations for export and knowledge sharing are requested as output from the Smart Community pilot projects. From the interviews with city officials, there is not much information about how to commercialize Smart-City-related technologies, and no systematic process seems to exist to capture and harvest potential innovations. However, it might be that the questions should have been directed to the business community instead – it is most probable that e.g. Toshiba, Nissan, Hitachi and Fuji Electric have gained some insights from being part of the testbeds in Yokohama and Kitakyushu. It would also be interesting to follow up if the small companies, such as the local firm service engineers installing EMS in Yokohama (promoted as “smart-city ambassadors” by the city officials) can leverage on their experience from the project and grow to become export companies in smart-city implementation.

### 5.2.3 Bottom-up and top-down

As mentioned in sec. 2.1, the sustainable city projects in Japan are characterized by a combination of the strong bottom-up approach and the top-down-approach. On the other hand, in the relation between local governments and their citizens, the impression is a very clear top-down approach with the city in our cases informing and telling the citizens what to do. In both projects, it is identified that a critical success factor for smart city implementation is to secure future citizen participations, not only the already engaged but also the wider general public in their regions. Both cities emphasise the need for sense of “meaning” to achieve long term engagement. A combination of means, such as new incentives (enabled by the market liberalisation), intensified dialogue between citizens and local government as well as user-friendly smart technology, may be used. The question is if this is enough to broaden the scope and establish the true sustainable communities (i.e. the mass-market), not just the niche smart neighbourhoods.

Finally, a remark on the essence of culture when building a sustainable city. Both Yokohama and Kitakyushu are acknowledging the importance of their history and tradition in the process of promoting their projects, and the fact that those elements have an important impact on the ambition, design and process of the individual project. As a foreigner, it is also tempting to notice the importance of more general elements of social control and responsibility in the Japanese culture, and that there is a strong will among the general

citizens in those cities “to do the right thing” or “to contribute to society”. The impact of specific and general culture is, as always, something to deal with in design and implementation of changes and when trying to learn from others.