



EU-Japan Centre for Industrial Cooperation

Tokyo Smart City Development in Perspective of 2020 Olympics

Opportunities for EU-Japan Cooperation and Business Development

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Abstract

In 2020, Tokyo will host the Summer Olympic and Paralympic Games. As a result of their preparations, urban development has accelerated as the 2020 Olympics approach. Environment and sustainability are more and more promoted by the International Olympic Committee; and the Tokyo 2020 Committee in charge of organising the Games is cooperating with Tokyo Metropolitan Government to ensure the Games are as sustainable as possible. This partially builds on the existing smart city strategy, which includes the upgrading of energy efficiency in buildings via installations of Energy Management Systems, fostering take up of renewable energy sources such as solar PV and hydrogen, and a number of other measures to ensure a stable energy supply and lower carbon dioxide emissions.

The 2020 Olympic and Paralympic Games will provide an opportunity to increase awareness of renewable energy, energy saving and waste management. The mega-event will also be the opportunity for the EU and Japan to cooperate further in terms of smart city development. This report investigates Tokyo's smart city policy and assesses the potential for further partnerships in business, research and city-to-city cooperation. There is a wide range of sectors which offer market and cooperation opportunities, from sustainable construction to renewable energy production and urban consulting. Complex business practises and competition can make market access difficult, however these opportunities can translate into long term business in the smart city sector in Japan.

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List of Abbreviations

AMI	Advanced Metering System
ANRE	Agency for Natural Resources and Energy
BDC	Business Development Centre
BEMS	Building Energy Management System
BoE	Bureau of Environment (TMG)
CGS	Co-generation System
DR	Demand Response
EMS	Energy Management System
EPCO	Energy Power Company
EUR	euro
EV	Electric Vehicle
FCV	Fuel Cell Vehicle
FIT	Feed-In Tariff
FTA	Free Trade Agreement
FY	Fiscal Year
GHG	Green House Gas
GNSS	Global Navigation Satellite System
GPCI	Global Power City Index
HEMS	House Energy Management System
IBEC	Institute for Building Environment and Energy Conservation
ICT	Information and Communication Technology
IOC	International Olympic Committee
JPY	Japanese Yen
LG	Local Government
METI	Ministry of Economy, Trade and Industry
MEXT	Ministry of Education, Culture, Sports, Science and Technology
MIC	Ministry of Internal Affairs and Communications
MLIT	Ministry of Land, Infrastructure, Transport and Tourism
MOE	Ministry of Environment
NEPC	New Energy Promotion Council
OG	Olympic and Paralympic Games
PV	Photovoltaic
QoL	Quality of Life
R&D	Research & Development
RE	Renewable Energy
SEZ	Special Economic Zone
TEPCO	Tokyo Electric Power Company
TMA	Tokyo Metropolitan Area
TMG	Tokyo Metropolitan Government (only over Tokyo)
TOCOG	Tokyo Organising Committee for the Olympic and Paralympic Games

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Introduction

A. Background

In September 2013, Tokyo was selected by the International Olympic Committee as the host city for the Olympic and Paralympic Games in 2020. These will take place from 24 July to 06 September 2020. There are many disadvantages to hosting Olympic and Paralympic Games, ranging from massive additional organisation and disturbance of normal activities, to increased risk of financial mismanagement and environmental degradation for what is a 6-week event. A number of international and local opponents are sceptical about the very existence of benefits in hosting the mega-event. Nonetheless the Games are both a huge challenge and opportunity.

The Olympic and Paralympic Games act as a stimulus for urban, economic, environmental and social developments unlike any other event. While the link between such a mega-event and urban development can be seen as tenuous, the Games are often used as vehicles for achieving “substantive positive outcomes that are not necessarily linked to the sports field”, ranging from public health to environmentally friendly construction (Gold and Gold, 2014). 2020 is a convenient goal and deadline for plans in Tokyo, because it is immediately understandable and gives visibility. The Games are not only an opportunity for delivering the sight and comfort of a high quality mega-event and urban life to athletes, tourists and a worldwide audience. The mega-event also provides “a means for formalising local development strategies, because it generates a political catalyst for pursuing planning strategies, it opens financing options for implementing the plans, and it allows local planners to access transnational networks of planning expertise”¹. Significant changes were achieved for the 1964 Tokyo Games: Road construction, residential redevelopment, the opening of new metro lines (the Toei Asakusa and Hibiya lines), the launch of the Shinkansen, entry into the OECD and the IMF – the prospect of the 1964 Games accelerated the pace of urban development and at the same time Japan made its come back to the international sphere after its previously low key post war economic situation².

The Tokyo 2020 Games are the opportunity for Japan to prove itself again, and to stimulate the economy. Whether it is possible or not is another debate. Assessment of global success or failure should wait until 2020 at least.

Nevertheless, the construction and redevelopment plans as well as operating the Games can have heavy impacts on the environment, and long-lasting consequences on the public economy (such as debt). In the face of growing concerns about the sustainability of hosting the Olympic and Paralympic Games, this report looks at potential for smart city development in Tokyo in the perspective of 2020. How can the 2020 Games influence the policies and development of Tokyo as a smart city? And to what extent? There is no mention of “smart Games” in the strategies issued by the Government of Japan, the Tokyo Metropolitan Government and the Tokyo Organizing Committee for the Olympic Games (TOCOG) so far. However terms like smart energy city, sustainable/green Games, energy efficiency and security, Games’ legacy, environment friendly transportation (among others) are

¹ Lauermann, John, March 2014. “Legacy after the bid? The impact of bidding to host Olympic Games on urban development planning”, <http://doc.rero.ch/record/209795>

² Japan Times. 2014, October, 10th. <http://www.japantimes.co.jp/sports/2014/10/10/olympics/olympic-construction-transformed-tokyo/>

recurrent in the discourse of public representatives. The opportunity to push for smart city development and to invest in the smart technology sector in Japan is boosted by the prospect of the 2020 Games in Tokyo.

This report was commissioned in order to assess the opportunities and challenges to partnerships between Japan and the European Union in the smart city sector, as the prospect of the Tokyo Olympic and Paralympic Games in 2020 boosts the chances for market access as well as research and municipality cooperation. Firstly, this report looks at the policy side and the plans for a smart Tokyo and sustainable Games in 2020. Secondly, it investigates the market and the conditions of cooperation between Japanese and European smart city stakeholders in the perspective of 2020.

B. Methodology

This report was produced in the scope of the Minerva Fellowship, a six-month research programme hosted by the EU-Japan Centre for Industrial Cooperation. The policy analysis as well as the cooperation opportunity assessment are based on desk research and analysis of data and information available on the websites of relevant ministries, local governments, and firms. This report's findings are also based on presentation materials of public events and seminars, and on insight provided during interviews with public officials, company representatives and academic researchers. While most information gathered for this report is provided in English for the reader's convenience, some sources could only be found in Japanese. In addition, all analysis is based on the limited information available: at the time this report is written, five years before the opening of the Games, the planning is still at an early preparatory stage of decision.

C. Definition

Goals

The smart city is a model of urban development, also called “smart community” and “smart town” among other terms. As defined by Japan Smart Community Alliance (JSCA): “A smart community is a community where various next-generation technologies and advanced social systems are effectively integrated and utilized, including the efficient use of energy, utilization of heat and unused energy sources, improvement of local transportation systems and transformation of the everyday lives of citizens”³. The number of smart city initiatives in Japan has surged since the Fukushima accident in March 2011, as most projects aim at achieving three goals⁴:

- fostering energy security and efficiency
- boosting local development in social and economic terms
- enhancing regional and local competitiveness.

Energy self-sufficiency and resilience is a priority for Japan, which is not autonomous in terms of energy production: the country can produce a maximum of 20% of its final energy consumption. And since the Fukushima accident in March 2011, Japan has produced 11% of the domestic energy demand

³ JSCA. <https://www.smart-japan.org/english/index.html>

⁴ Pham, C. 2014. “Smart Cities in Japan. Assessment of cooperation opportunities for the EU and Japan”.

on its own⁵, as it cannot rely on nuclear generation.

Tools

Smart city realisation relies on a wide range of technologies and solutions, as well as on governance. Most projects rely on high technology and ICT such as House Energy Management System (HEMS), solar PV and Electric and Hybrid Vehicle (HEV). Nonetheless low key technology is equally important to improve energy efficiency. For example, building insulation material is necessary for the overall structure to be actually efficient: reducing heating and cooling electricity consumption is a difficult choice for users living or working in poorly-insulated buildings.

Governance of projects is also key in determining the success of a smart city projects. Governance refers to the way stakeholders of all sectors and all levels interact, make decisions and carry out their plans. The consortium structure and hierarchy play a key role in determining priorities and the rollout of the projects.

Issues in definition

Besides being a very large concept which is often used for marketing purposes more than for actual definition, the word “smart” can be difficult to differentiate from “sustainable” and just “more efficient”. Projects and technologies called “smart” often tend to refer to the use of Information and Communication Technology (ICT), enabling better data collection and treatment for an optimization of functioning and response, especially in energy management. However, “smart” is not data collection and treatment alone, but a combination of ICT and existing sustainable development technology (such as solar PV). Moreover, improving any kind of process (of production, data treatment, etc.) by making it faster or more efficient can be considered as making the process smarter. For instance, comparing existing data about areas well lighted by the sun, building rooftop surfaces and electricity distribution lines can help map buildings with a potential for rooftop solar PV and thermal generation.

While this report is about the development of Tokyo as a smart city, it uses the term “sustainable” and “smart” alternatively because of these issues in definition. In addition, so far the IOC and other Olympic authorities refer mostly to sustainability and not to ‘smartness’.

⁵ EDMC Handbook of Energy and Economic Statistics. 2014. p.40-43

I. How 2020 opens the door to many opportunities – the convergence of goals

A. Tokyo's background

Economy

Tokyo is a hub in terms of economic activity. According to the OECD (2013), Tokyo contributes to about 40% of the national GDP. Tokyo's GDP (at Purchasing Power Parity, PPP) in 2014 amounted to €1.5 trillion EUR, and the GDP per capita (at PPP) to €40,528 EUR⁶. It stands as the 14th largest Gross Product in the ranking of national GDPs, between Australia and Mexico⁷. The Japanese capital hosts over 2,000 foreign affiliated companies and hosts the headquarters to 50 companies ranked in the Fortune Global 500 within a five kilometre radius of the centre⁸. Tokyo has been ranked as one of the most global cities in most international benchmarks on urban attractiveness for decades. In 2014, FDI Intelligence⁹, A.T. Kearney¹⁰, and the Mori Memorial Foundation¹¹ all ranked Tokyo as the fourth most global city, after New York, London and Paris. The market size, its economic dynamism and its highly qualified human capital make Tokyo a major business hub.

Population

Tokyo is also a major urban centre in terms of population. The area under the Tokyo Metropolitan Government's (TMG) jurisdiction (from now on called Tokyo) covers about 2,000 km² and is made up of 62 municipalities: the 23 central wards and 30 other municipalities (the latter is called Tama Area)¹². Tokyo's population has been slowly but steadily growing, from 12.1 million in January 2005 to 12.6 million in January 2010¹³ and to nearly 13.3 million in January 2015¹⁴. Nine million inhabitants live in the 23 central wards¹⁵. As projections do not show any more significant increases, the population in Tokyo should remain quite stable for the next few decades. Besides, it is necessary to consider the Tokyo Metropolitan Area (TMA): it ranks as the largest urban agglomeration in the world according to the UN (2014), and hosts 42 million people (about one third of the total Japanese population). The TMA includes Tokyo as well as the seven neighbouring prefectures¹⁶, from where some 2.5 million workers daily commute¹⁷. The TMA is not under the TMG's jurisdiction in spite of the confusing designation (it only covers Tokyo's central wards and the Tama Area). However it is covered by Tokyo Electric Power Company (TEPCO) in terms of production and transmission.

⁶ Brookings Institute. 2014. <http://www.brookings.edu/research/reports2/2015/01/22-global-metro-monitor>

⁷ TMG. 2014. p.5 http://www.zaimu.metro.tokyo.jp/bond/en/ir_library/ir/ir_document/ir_document2014.pdf

⁸ TMG SEZ. http://www.seisakukikaku.metro.tokyo.jp/invest_tokyo/english/why-tokyo/merit.html and GPICI. 2010. p.30 <http://www.mori-m-foundation.or.jp/english/research/project/8/index.shtml#report>

⁹ FDI Intelligence. December 2014/January 2015. https://www.google.co.jp/url?sa=t&rct=j&q=&esrc=s&source=web&cd=9&ved=0CEsQFjAI&url=http%3A%2F%2Fwww.fdiintelligence.com%2Fcontent%2Fdownload%2F58115%2F1574300%2Ffile%2FGlobal%2520cities%2520awards.pdf&ei=TIYVbCYG-PbmAWK7YHIDQ&usq=AFQjCNF6VaLZC_1aKYYGK3Vu5uHQkERiTiQ&bvm=bv.89381419,d.dGY&cad=rja

¹⁰ A.T.Kearney. 2014. <http://www.atkearney.co.jp/documents/10192/4461492/Global+Cities+Present+and+Future-GCI+2014.pdf/3628fd7d-70be-41bf-99d6-4c8eaf984cd5>

¹¹ MMF. 2014. Global Power City Index. http://www.mori-m-foundation.or.jp/gpci/index_e.html

¹² TMG <http://www.metro.tokyo.jp/ENGLISH/ABOUT/HISTORY/history02.htm>

¹³ TMG, Bureau of General Affairs (in Japanese). <http://www.toukei.metro.tokyo.jp/juukiy/jy-index.htm>

¹⁴ TMG, Bureau of General Affairs (in Japanese). <http://www.toukei.metro.tokyo.jp/jsuikai/js-index.htm>

¹⁵ TMG. 2012. <http://www.metro.tokyo.jp/ENGLISH/ABOUT/HISTORY/history03.htm>

¹⁶ Namely Chiba, Gunma, Ibaraki, Kanagawa, Saitama, Tochigi and Yamanashi prefectures.

¹⁷ TMG. 2010. Calculation based on "Population Commuting into Tokyo Metropolis by Prefecture", see footnote 4

B. Tokyo's governance: city planning, sustainability and the 2020 Games

1. Tokyo's urban development governance

a. Local scale

The TMG is one of the largest local governments (LG) in the world: its budget in FY2014 amounted to ¥6.7 trillion¹⁸. As of 2014, it employed 165,425 members of staff¹⁹, and the number is unlikely to decrease as the city prepares for the 2020 Olympic Games, and additional staff and capital are needed²⁰. The TMG holds a special status compared to other municipalities in Japan, as it acts as a “metropolitan prefecture”: it is in charge of administrative functions that are normally provided by a municipality (such as ward municipality) under the Local Autonomy Law. Nevertheless the TMG has centralised some competences and it is responsible for the water supply, the sewage system, the final waste management and the fire-fighting apparatus among others²¹. In spite of its size, the TMG is quite flexible and has initiated innovative measures to tackle environmental issues and promote sustainable development since the 1990s, such as the first emission Cap and Trade Program applied to the urban scale in the world, achieving a 22% reduction in GHG emissions in 2014²².

The TMG is composed of a Governor (Yoichi Masuzoe as of April 2015), a Metropolitan Assembly, 13 Bureaux, three Public Enterprise Bureaux (see Glossary), and seven Administrative Commissions. The following table lists some of the offices with the relevant decision making powers for this report: it has a large scope as it includes Bureaux involved in the Olympic and Paralympic Games preparation and sustainable development, but also in the traditional sectors of city planning that have a potential for smart development or upgrading, ranging from transportation infrastructures to water and waste networks.

Bureau	Operations
Office of the Governor for Policy Planning	<ul style="list-style-type: none">- Planning and total coordination of important policies- Promotion of city diplomacy and Asian Network of Major Cities 21 activities- Cooperation with the central government and neighbouring local governments- Promotion of the Special Zone for Asian Headquarters
Bureau of General Affairs	<ul style="list-style-type: none">- Disaster reduction and crisis management
Bureau of Tokyo 2020 OG Preparation	<ul style="list-style-type: none">- Implementation of preparations for the 2020 Olympic and Paralympic Games- Realisation of a “Sport City Tokyo”
Bureau of Urban Development	<ul style="list-style-type: none">- Formulation of total urban development policies and housing policies- Construction of roads, railways and other urban infrastructure

¹⁸ TMG. 2014. <http://www.metro.tokyo.jp/ENGLISH/ABOUT/STRUCTURE/structure04.htm>

¹⁹ TMG. 2014. http://www.metro.tokyo.jp/ENGLISH/ABOUT/FILES/2014_en_11-26.pdf

²⁰ Japan Today. 2014. <http://www.japantoday.com/category/national/view/1806-new-employees-start-work-for-tokyo-metropolitan-govt>

²¹ Aoyama, Yasushi. 2008. “Urban Policy in Post-war Tokyo: Features and Issues” in Journal of Governance Studies no.5, Meiji University

²² TMG BoE. <http://www.kankyo.metro.tokyo.jp/en/attachement/Tokyo%20C%26T%203rd%20Year%20Results.pdf>. For further information see, “Environment White Paper 2013” p.7

	<ul style="list-style-type: none"> - Improvement of built-up areas through land readjustment and urban redevelopment projects - Guidance for housing land development and architectural structures
Bureau of Environment	<ul style="list-style-type: none"> - Provision of guidance for housing land development and architectural structures - Assessment of environmental impact (IEA) and environment protection
Bureau of Construction	<ul style="list-style-type: none"> - Construction of the three loop roads and arterial roads of the capital region - Upgrading of rivers to protect the city from floods - Development of parks and other spaces that not only provide relaxing places for Tokyo's residents, but serve as temporary refuge and bases for rescue efforts in the event of a disaster - Construction and management of facilities such as zoos and aquariums for the enjoyment of the citizens - Construction and management of cemeteries - Implementation of proper maintenance and management and systematic renewals to ensure that the facilities are performing at their best
Public Enterprise Bureau of Transportation	<ul style="list-style-type: none"> - Operating the public transit systems of Toei Subway (Asakusa, Mita, Shinjuku, and Oedo lines), Toei Bus, Toei Streetcar, Nippori-Toneri Liner, and the Ueno Park Monorail
Public Enterprise Bureau of Waterworks	<ul style="list-style-type: none"> - Supplying water to 12.85 million residents - Treating water (6.86 million³ a day) - Conducting industrial use water business to eight wards
Public Enterprise Bureau of Sewerage	<ul style="list-style-type: none"> - Implement of system reconstruction, flood control, earthquake measures and other policies that help the residents of Tokyo feel safe and secure - Undertaking measures including combined sewer system improvement, advanced treatment, and global warming measures that contribute to the realization of a city with a good water environment and low environmental impact

Table 1. Tokyo Metropolitan Government's Bureaux with competences in relation to environment, Olympic and Paralympic Games and 2020 urban development project

b. National scale and private sector

The TMG is not the only authority when it comes to the governance of Tokyo in the field of sustainability. Especially when it comes to the Olympic and Paralympic Games-related planning, it shares competences with other institutions from local, national and international levels, from the public and private sectors alike.

In terms of urban infrastructure development, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) is involved in various areas of urban planning, ranging from urban renewal regulations and railway networks to disaster prevention and low carbon policies²³. The MLIT is also the authority to which the Urban Renaissance Agency (UR) belongs as an Incorporated Administrative Agency. The UR is a semi-independent public body that manages real estate and urban redevelopment projects (for instance urban regeneration but also post disaster reconstruction). It is involved in major projects of urban regeneration in Tokyo, such as the Otemachi district and Minato Mirai 21 in Yokohama²⁴.

²³ MLIT. City Bureau. <http://www.mlit.go.jp/en/toshi/>

²⁴ UR. http://www.ur-net.go.jp/profile/english/pdf/profile_en_all.pdf

In terms of economic urban development, the Prime Minister's Office outlines general goals such as a ¥35 trillion FDI increase by 2020²⁵ and promotes Abenomics. The Cabinet Office is another authority of the central government that holds some influence over Tokyo's economic development goals, for instance through the FDI promotion programme "Invest Japan"²⁶ and the National Strategic Special Zone initiative, which target many urban zones including Tokyo. It runs in parallel with the TMG's Business Development Centre and their Special Zone for Asian Headquarters initiative (developed in [Section I.D.](#)).

Real estate developers (such as Mitsubishi Real Estate, Mitsui Fudosan, Sumitomo Realty & Development, and Mori Building) and railway companies (such as JR, Tokyo Metro and the Tokyu Group) are also influential in land development as they are key land owners and/or leading negotiating players in land redevelopment planning.

2. Tokyo's sustainable development governance

The TMG's Bureau of Environment (BoE) is the main player in charge of drafting the sustainable policies for Tokyo. The targets and strategy of the BoE are conceived with the advice and promoted with the support of two public research institutes: the Tokyo Metropolitan Institute of Environmental Science²⁷ and the Tokyo Metropolitan Centre for Climate Change Actions²⁸. The TMG's green and smart policies are developed in [Section I.C.](#) Ultimately the TMG has to comply with the framework issued at the national level in terms of economic and environmental policies. The selection of Tokyo as the host city for the 2020 OG has increased the pressure put by the central government on the TMG to meet goals of urban development set for the coming 5 years.

When it comes to sustainability and energy management, the Ministry of Economy, Trade and Industry (METI) retains the authority and issues national guidelines for municipalities to follow. Two METI agencies are relevant in this context. The Agency for Natural Resources and Energy (ANRE) is the main body in charge of drafting the policies, such as the Fourth Strategic Energy Plan (April 2014), while the New Energy and Industrial Technology Development Organisation (NEDO) is "Japan's largest public R&D funding and management organisation"²⁹ which promotes Smart City and other RE and energy efficiency related projects.

The 2020 Games also offer a window of opportunity to the Ministry of Environment (MoE), as it sees the mega-event as a way to promote sustainability in the capital by holding environmentally friendly Games, by realising a green city Tokyo and by enhancing Japan's environmental technology and information transmission³⁰. Another institution with influence over the TMA in regards to energy is TEPCO, in which 50% shares are state-owned.

²⁵ PM Cabinet. 2014. Japan Revitalization Strategy. p.138 <http://www.kantei.go.jp/jp/singi/keizaisaisei/pdf/honbunEN.pdf>

²⁶ Cabinet Office. http://www.invest-japan.go.jp/en_index.html

²⁷ 東京都環境科学研究所 *Tokyoto kankyo kagaku kenkyuusho* (in Japanese) <http://www.tokyokankyo.jp/kankyoken/>

²⁸ 東京都地球温暖化防止活動推進センター *Tokyoto chikyuuondanka boushikatsudou sentaa* (in Japanese) <http://www.tokyo-co2down.jp/>

²⁹ Yairme and Karlson. 2014. "Technological Innovation System of Smart Grid"

³⁰ MoE. 2014. (In Japanese) "Tokyo 2020 Olympic and Paralympic Games – the opportunity to promotion of environmental concerns" (2020年オリンピック・パラリンピック東京大会を契機とした環境配慮の推進について) <http://www.env.go.jp/press/files/jp/24949.pdf>

3. Tokyo 2020 governance: Games and sustainability

At present, the budget of the Olympics is based on the estimations made during the candidacy, in other words JPY ¥341,191 million at the estimated value of the yen in 2020 (Tokyo 2020 Committee, 2013, chapter 6). The Games Foundation Plan's budget is under review, as fewer Olympic venues will be built, and other costs and cuts will be made.

Half of the budget is provided by the IOC, while the rest must be provided by the Japanese Government, the TMG, and the partners of the 2020 Games (see Table 9 in Section II). The budget is managed by the Tokyo 2020 Committee. The TMG's Bureau of Tokyo 2020 Olympic Games Preparation has a budget of ¥10 billion in FY2014 dedicated to the OG preparations exclusively³¹.

a. Public sector players

As for 2020 Games related decision making, the immediate institutions with authority over planning and management are the TMG's Bureau of OG preparations and the Tokyo Organising Committee for the Olympic and Paralympic Games (officially TOCOG, and branded as Tokyo 2020; for clarity purposes, from now on referred to as the Tokyo 2020 Committee). The TMG's Bureau of Tokyo 2020 OG Preparation, which used to be the Sports Bureau, is in charge of planning for the permanent venues of the Games as well as procurement call processes. The Tokyo 2020 Committee is in charge of the arrangement for temporary venues and overall organisation and execution of the Games. The Committee was founded by the TMG and the Japan Olympic Committee (JOC) and comprises six Councillors, 35 Officers of the Executive Board (with final decision powers over plans and budget) and about 170 Advisory Meeting members from the private, public and academic sectors³². As of February 2015, there were about 220 secretariat staff working in ten departments. The TMG's interests are represented mainly by vice governors and Assembly Members present in all sub-committees of the Tokyo 2020 Committee.

While the International Olympic Committee (IOC) and the JOC do not play forefront roles, they cannot be excluded from the sphere of influence over the Games. The Tokyo 2020 Committee includes members from the JOC and it had to submit the Games Foundation Plan to the IOC to be approved. The IOC is also responsible for the recent emphasis on sustainability in the Games bidding, preparation, management and legacy. The Tokyo candidate file to host the OG was designed in such light, and the Compact Games vision was part of the reasons why Tokyo was selected. The Olympic 2020 Agenda released by the IOC in December 2014, which indicates "20+20 recommendations" also puts forward sustainability and cost reduction. The legacy of such mega-events (including environmental impact, financial matters and urban structures) is a recent determining factor for planning committees and Tokyo is no exception, especially considering the current economic situation of Japan.

At the national level, many ministries can be related to the planning of Tokyo Olympic and Paralympic Games. Initially the MEXT is directly involved as it is the Ministry in charge of sports. The creation of a post of Minister of the Olympic and Paralympic Games in September 2013 (occupied by Hakubun Shimomura³³) has pulled responsibility closer to the Prime Minister and his Cabinet. The PM's Cabinet

³¹ TMG. 2014. <http://www.metro.tokyo.jp/INET/KEIKAKU/2014/02/DATA/70o2i116.pdf>

³² For further details about roles of these sub-committees, see the Tokyo 2020 Games Foundation Plan, p.151-160

³³ PM Cabinet. http://japan.kantei.go.jp/96_abe/meibo/daijin/shimomura_e.html

is further involved in the Games planning, with PM Shinzo Abe as Chairman of the Advisory Committee, and Taro Aso, Minister of Finance, as a Special Advisor of the Tokyo 2020 Committee.

b. Private sector players

The private sector also plays an important role. The IOC and the OG are financially supported by official partners which often end up as the preferred company if there is any business opportunity directly related to the mega-event preparation and operations. Panasonic, as an official and long term partner of the OG, has quite a few market opportunities ahead. Besides, the system of sponsorship established for the support of each Games puts the Gold and other Partners a step ahead in the planning process and in market assessment, as they get clearer visibility of developments of the Games. Additionally, the close ties between the government and the large industrial groups in Japan influence the policy orientation both at the national and local scales, including for 2020. The composition of the Tokyo 2020 Committee also shows the strong interest of the private sector in the Games preparation and management, as well as all related development that could arise. The Keidanren (Japanese Business Federation) sits in the Executive Board Committee, as well as a number of companies such as Sumitomo Electrics and Toyota (via the Toyota Foundation President).

Some research institutes and universities also influence the policy making process related to the urban development in perspective of the Games. The Daiwa Institute of Research specialises in consulting for business management and development, and its current CEO has a strategic position as the Director General of the Executive Board. Another private research institution holds some influence (albeit lesser and less Games specific) over the planning of Tokyo in perspective of 2020 and 2030: the Mori Memorial Foundation (tied to the real estate developer Mori Building) is the first Japanese institute to have released an international ranking of cities (the Global Power City Index, GPCI) in parallel with recommendations to boost Tokyo's competitiveness.

c. Academia and research sector players

Some universities are also recurrently represented in various (sometimes temporary) advisory committees of the TMG and the Tokyo 2020 Committee, such as the city planning department of Tokyo Metropolitan University. Senior university professors in Japan, who are often former civil servants of the central or local government (or both), sit in various committees of private and/or public institutions, and establish strong networks. They are thus able to advocate some policies with more power than others. An example would be Hiroo Ichikawa, who used to be in various urban redevelopment committees and council under the MLIT, who is the Head of the Governance Studies Department in Meiji University, but who is also the Executive Director of the Mori Memorial Foundation and co-author of the 2014 GPCI, as well as a member of the Expert Board on Overseas City Public Relations under Governor Masuzoe's authority, and who has recently given many talks about Tokyo's development in perspective of 2020 and beyond³⁴. A number of senior professors are thus key sources and conveyors of ideas and trends, by holding a position in the strategic committees and institutions. In the case of smart city policy trends, two leading figures are Takao Kashiwagi

³⁴ Meiji University. Expert Board on Overseas City Public Relations (海外に向けた都市広報を考える有識者会議 *kaigai ni muketa toshi kouhou ni kangaeru yuushikisha kaigi*) <http://www.kisc.meiji.ac.jp/~ichurban/professor/profile>

(Professor at the Tokyo Institute of Technology, who sits on various committees of MIC and METI, including the Hydrogen and Fuel Cell Strategic Council, and is also chairman of the Advanced Cogeneration and Energy Utilization Centre Japan) and Hiroshi Komiyama, as noted by Andrew DeWit³⁵.

³⁵ Japan Focus. 2014 December 15. <http://www.japanfocus.org/-Andrew-DeWit/4236>

C. Tokyo's energy and environment situation and policy

1. Energy supply and consumption in Tokyo

Japan's electricity grid is divided between 50Hz (in the East) and 60Hz frequency (in the West). It has also historically been fragmented between ten utilities with regional monopolies (Electric Power Companies, EPCOs). Reforms have been conducted since 1995 and allowed for the entrance of new utilities, often called Power Producers and Suppliers (PPS). However the total market share of the PPSs remains low (3.4% in 2014³⁶).

In the TMA, TEPCO has a total of 195 power generation facilities, most of which are hydroelectric generating facilities (164), with a few thermal power plants (25), RE power plants (4), and non-functioning nuclear power plants (3)³⁷. TEPCO's electricity sales make up 30% of all electricity sales in Japan³⁸, however Tokyo itself accounts for about 10% of the national consumption, with 80 billion kWh consumed annually. TEPCO's generation (purchased power included) relies mostly on LNG (38%), hydro (19%), oil (15%), and coal (9%)³⁹. Tokyo total consumption in electricity relies on the sources indicated as in the graph below: 87.4% of hydroelectric power, 7.2% of waste combustion, 4.9% of solar PV and 0.5% of biomass. In 2012, RE represented about 6% of the total energy consumption in Tokyo⁴⁰. The graph below displays the TEPCO's and PPS' cumulated production capacity of RE, amounting to about 660 MW.

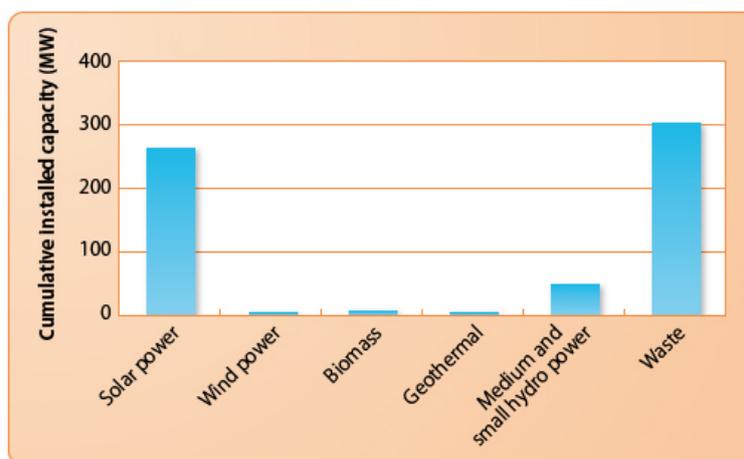


Figure 1. Cumulative installed capacity for renewable energies installed in the Tokyo Metropolitan Area (up through FY2012)⁴¹

While this generating capacity is now increasing in response to the Feed-in Tariff initiated in July 2012 by the Japanese Government, most of these generation facilities are solar farms installed outside of

³⁶ Vigot, Victoria. 2014. p.5 "The Japanese Clean Energy Sector Development" <http://www.eu-japan.eu/sites/eu-japan.eu/files/Japanese-Clean-Energy-sector-development-2014.pdf>

³⁷ TEPCO. 2013. <http://www.tepco.co.jp/en/corpinfo/illustrated/electricity-supply/facilities-e.html>

³⁸ TEPCO. 2013. <http://www.tepco.co.jp/en/corpinfo/illustrated/business/business-scale-area-e.html>

³⁹ TEPCO. 2013. <http://www.tepco.co.jp/en/corpinfo/illustrated/electricity-supply/generation-capacity-include-e.html>

⁴¹ Asia Biomass. http://www.asiabiomass.jp/english/topics/1408_02.html

Tokyo in the TMA, for instance in Chiba prefecture. No data has been found about the actual rate of residential solar PV produced within Tokyo.

The largest consumers are the commercial and residential sectors, as indicated in the following table.

	Commercial	Residential	Transportation	Industry	Total consumption (PJ)
FY2000	30.6%	25.2%	32.1%	12%	802
FY2010	35.9%	30.6%	23.8%	9.8%	723
FY2012	35.1%	31.5%	23.8%	9.6%	674

Table 2. Shares of total energy consumption in Tokyo per sector⁴²

Tokyo also ranks as the 33rd largest emitter of CO₂ in the world, between Finland and Singapore⁴³. In order to meet CO₂ emission reduction targets set by Japan in agreement with the Kyoto protocol, the TMG contributed to the national effort by delocalising factories from the metropolitan areas and by launching policies targeting the transportation sector especially. Until 2010, these initiatives led by the TMG's Bureau of Environment (BoE) proved efficient in stabilizing emission quantity, if not in reducing the carbon footprint of Tokyo. However since March 2011 and the stopping of nuclear power generation, Japan has gone back to using fossil fuels. In Tokyo also, the use of carbon dioxide intensive fuels has increased and despite its efforts, CO₂ emissions have risen above 2000 levels, as indicated in the following table (as a means of comparison, the national figures are indicated for the FY2012).

	Commercial	Residential	Transport	Industry	Total emissions (million tons CO ₂)
FY2000	32.1%	24.3%	30%	11.5%	58.9
FY2010	38.2%	29.8%	20.5%	8.9%	58.7
FY2012	39.5% (Japan 21.4%)	31.7% (Japan 16%)	18% (Japan 17%)	8.3% (Japan 32.7%)	65.9 (Japan 1,276)

Table 3. Tokyo average of relative shares of total CO₂ emissions per sector⁴⁴

Just as energy consumption has increased since 2000 for the commercial and residential sectors, carbon dioxide emissions of those two sectors have also surged. It also shows TMG's policy focus on industry and transport related emissions. Quite naturally, Tokyo followed the national trend with decreases and increases of emissions in the same sectors as the national average. However the metropolis differs from the national ratio as the latter has larger industrial related emissions, and smaller shares of commercial and residential related emissions. Transport related emissions are similar. As construction for OG venues and urban redevelopment projects accelerates to finish by 2020, the energy consumption and the rate of CO₂ emissions are most likely to increase drastically further rather than stabilise or drop.

⁴² TMG BoE. 2014. Based on "Total energy consumption and GHG emission study in Tokyo – 2012 preliminary results" <https://www.kankyo.metro.tokyo.jp/climate/other/attachement/2012sokuho.pdf>

⁴³ TMG BoE. 2014. "Total energy consumption and GHG emission study in Tokyo – 2011" p.1 <https://www.kankyo.metro.tokyo.jp/climate/other/attachement/2111GHGsummary.pdf>

⁴⁴ Ibid.

2. Energy efficiency measures in Tokyo

a. Tokyo energy targets

In 1997 Japan agreed to the Kyoto protocol and to achieve a 25% cut in CO₂ emissions by 2020. Following the stopping of the nuclear plants in 2011 and the renewed use of fossil fuels, Japanese officials declared at the UN talks on climate change in November 2013 that Japan would not reduce its emissions but increase them by 3.1%⁴⁵. However the TMG did not alter its 2020 target set in 2006: to reduce GHG emissions by 25% compared to 2000 levels⁴⁶. For that purpose, the TMG aims to lower energy consumption by 20% by 2020 (as of 2012, energy consumption had decreased by 16% compared to 2000 levels), and by 30% by 2030 as announced in January 2015⁴⁷. It also aims to increase the use of RE to 20% in the total consumption by 2024.

Prior to the Great East Japan Earthquake in March 2011, various initiatives were initiated by the TMG to achieve those goals. The main concern was to lower CO₂ emissions and levels of waste. After the Fukushima disaster, the insecurity of Tokyo's energy supply pushed the LG first towards energy-saving measures, and then distributed energy systems to enhance Tokyo resilience. The fact that such measures also help achieve CO₂ emission reduction targets gave more weight for strategies like the Smart Energy City to be supported and promoted. While some initiatives officially fall under that particular strategy⁴⁸, this report also looks at other measures introduced prior to May 2012 and projects related to energy efficiency enhancement.

As mentioned before, in terms of decision making the TMG has to follow the framework set by the national government to some extent. The fourth Strategic Energy Plan⁴⁹ was released in April 2014 and emphasises the 3E + S strategy (Energy Security, Energy Efficiency, Environment Sustainability and Safety) through the use of energy efficient measures and solutions including the use of RE, nuclear power, and hydrogen. The Feed-In Tariff initiated in 2012 has undoubtedly boosted solar PV installation in the TMA, and although there has been a recent national push for wind power, solar generated energy remains the most widespread and supported RE in Tokyo. In February 2015, the TMG announced that solar power generation capacity of Tokyo would be quadrupled from 260,000kW in 2013 to one million kW by 2024⁵⁰. It also announced that the cogeneration system capacity would be raised to 600,000kW, in order to reach the goal of 20% RE energy use by 2024⁵¹. The realisation of a "Hydrogen Society" as part of the Smart Energy City vision is also a key goal of the Energy Strategic Plan to achieve energy security and safety, and is actively promoted by the TMG (the hydrogen society initiative in Tokyo is developed in Section I.D.2.a.).

⁴⁵ Bloomberg. 2013. <http://www.bloomberg.com/news/2013-11-15/japan-sets-new-emissions-target-in-setback-to-un-treaty-talks.html>

⁴⁶ TMG BoE. 2006. <http://www.kankyo.metro.tokyo.jp/en/climate/index.html>

⁴⁷ TMG BoE. 2015. (in Japanese) http://www.kankyo.metro.tokyo.jp/climate/attachement/2030tokyo_energy_target.pdf

⁴⁸ TMG BoE. 2012. http://www.kankyo.metro.tokyo.jp/en/other_issues/attachement/Tokyo_Initiative_Smart_Energy.pdf

⁴⁹ See References.

⁵⁰ Mainichi. 2015 January 3rd. <http://mainichi.jp/english/english/newsselect/news/20150103p2g00m0dm004000c.html>

⁵¹ TMG BoE. November 2014. RE expansion study Group (in Japanese) http://www.kankyo.metro.tokyo.jp/energy/renewable_energy/attachement/houkokugaiyou.pdf

b. Tokyo Smart Energy City targets

The Smart Energy City strategy⁵² is based on measures taken following the Fukushima disaster and the resulting failure of generation plants to supply Tokyo to the same level as before. The Tokyo Emergency Power Saving Program was drafted in May 2011⁵³ and enforced the summer of the same year. It followed the rolling blackout plans that were implemented from March to end of April 2011 and which affected all seven prefectures of the TMA⁵⁴. The Program included lowering the brightness standard, shifting to LED and keeping appliances on energy saving mode, and it targeted large facilities, small and medium facilities, households and TMG buildings. In May 2012, the Smart Energy City concept was published on the grounds that some measures of the Emergency Power Saving Program should be carried beyond 2011 in order to achieve a Smart Energy City where energy efficiency enables Tokyo inhabitants and businesses to avoid a situation similar to March 2011, and to carry on business and basic daily activities, even in case of power failure (in limited power usage conditions), thanks to distributed power generation and energy savings.

⁵² Section was written based on information from TMG BoE. “Environment White Paper 2013” and Smart Energy City http://www.kankyo.metro.tokyo.jp/en/other_issues/attachement/Tokyo_Initiative_Smart_Energy.pdf

⁵³ TMG BoE. 2011. http://www.kankyo.metro.tokyo.jp/en/climate/attachement/Tokyo_Energy_Saving_Program.pdf

⁵⁴ Japan Times. 2011 March 14th. <http://www.japantimes.co.jp/news/2011/03/14/national/rolling-blackouts-set-for-nine-prefectures/>

① Smart energy saving that makes maximum use of energy saving technologies and knowhow

■ Enhancement of environmentally-friendly buildings to promote low carbon

- Improve both the insulation performance and the “passive energy utilization capability” of buildings and facilities, that is the capability to make effective use of natural energy and environment such as solar heat and light, wind and greenery.
- Installation of energy efficient building facilities (air conditioners, lighting, venting and hot water supply systems)

■ Meticulous energy saving and power demand reduction in the operation of equipment and facilities

- Continuously improve the operation of equipment and facilities
- Use energy efficient OA equipment and home appliances, make power consumption visible and ensure meticulous individual control of equipment and facilities by linkage of BEMS, HEMS and storage batteries, etc.

② Expansion of use of low carbon, independent distributed energy systems

■ Expansion of use of renewable energy

- Promote and expand the use of renewable energy available in Tokyo, mainly solar energy (photovoltaic and solar thermal energy).
- Make aggressive use of mega-solar, wind and geothermal power systems; energy sources which have huge potential in regions outside Tokyo.
- Curb power usage according to changes in power output and make efficient use of power and heat storage equipment.

■ Enhancement of disaster resistance by using diverse energy sources

- Ensure the continuity of business activities and everyday life by using diverse energy sources and systems, including electricity, gas, oil, renewable energy and storage batteries.
- Expand the use of independent distributed energy systems that can be utilized in normal times as well as in emergencies, such as energy efficient cogeneration systems.

③ Optimal control of urban energy supply and demand via smart energy management

■ Creation of a low-carbon, highly disaster-resistant city that incorporates energy management.

- Ensure optimal energy control of a large number of users by grouping them by zone and community. etc.
- Use incentive programs that encourage energy users to continuously cooperate in curbing power usage, such as the demand response program.
- Enhance low carbon capability and disaster resistance by taking advantage of economies of scale in office zones through the introduction of large-scale and energy efficient cogeneration systems. etc.

Figure 2. The Tokyo Initiative on Smart Energy Saving – Toward a Smart Energy City (2012). Source: TMG, BoE

The following figure sums up all the goals in terms of energy efficiency, at the national and local scale. Goals announced after the 2020 Games were attributed to Tokyo in September 2013 are displayed in orange.

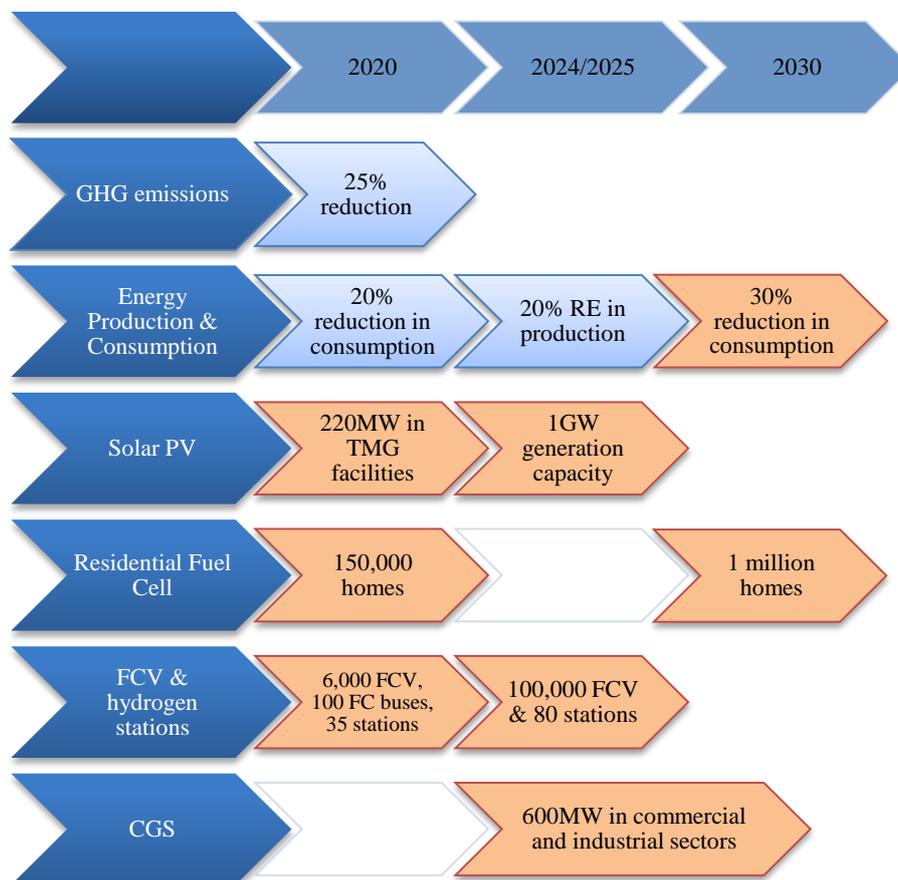


Figure 3. Tokyo Metropolitan Government’s Bureau of Environment roadmap (2015). Source: EU-Japan Centre, TMG BoE

D. Energy efficiency measures in the TMA

In response to the targets set at the national and local level, programmes and projects have been launched to promote energy resilience through distributed energy systems, efficiency devices and various other measures such as smart community initiatives. This section looks at the public policies of the TMG's BoE, at the smart community projects which involve public and private partners, at inter-municipality cooperation initiatives to share energy management related best practises, and finally at steps taken by the private sector.

1. Public programmes

Since May 2012, the TMG has adapted its energy policy. In the last Environment White Paper released in October 2014⁵⁵, the Smart Energy City strategy has gained a larger scope: it now includes the initiatives covered in the table below, even when these were launched before 2012. The following table is a non-exhaustive list focusing on energy sources and energy efficiency measures promoted by the BoE. The line emphasises the break between tools launched ante and post March 2011 (or “3/11”). Prior to 3/11, most measures aim at enhancing facilities' energy performance and expand RE. After 3/11 the policies shifted towards massive RE and cogeneration system expansion, as well as transportation. Additional initiatives are launched starting from April 2015; details are kindly provided by the TMG's BoE.

In addition to the programmes supported by the TMG over the whole 62 municipalities, a number of subsidies exist at the ward level⁵⁶, promoting mainly new energy and energy saving equipment installation in residential and SME buildings. Most central wards and many municipalities of the Tama area provide subsidies and grants. It is noteworthy that three central wards are not offering such options so far: Edogawa, Shibuya and Toshima wards. On the contrary, the Chiyoda ward is very active and diverges from the mainstream measures of RE expansion and energy efficiency enhancement. In their Eco-model City, the Operation Green Stock targets existing commercial buildings, where energy efficiency assessment is offered along with follow up recommendations, for which realisation facility owners can apply to a subsidy programme⁵⁷. Like a number of other wards (like Koto ward), Chiyoda ward has launched a bicycle sharing system test project (October 2014 – March 2017)⁵⁸.

⁵⁵ TMG. BoE. 2014. http://www.kankyo.metro.tokyo.jp/basic/plan/white_paper/index.html

⁵⁶ Business kankyo. <http://www.kankyo-business.jp/subsidy/p-saving/state.php?state=tokyo>

⁵⁷ Chiyoda ward municipality (in Japanese) <http://www.city.chiyoda.lg.jp/koho/machizukuri/kankyo/ondanka/greenstock/index.html>

⁵⁸ FCI. http://future-city.jp/pdf/forum/04/2014_forum04_panel_ecomodelcity_en.pdf

Table 4. Initiatives under the Smart Energy City strategy⁵⁹

Title	Target	Initiative	Launch
Environmental Energy Plan Report	TEPCO and PPS	Annual report on CO ₂ emission target and RE share target, and on steps taken to lower CO ₂ emission factor and introduce RE (reports available to consumers)	2005
Energy Plan Status Report	TEPCO and PPS	Annual report on state of progress toward targets in energy plan report	2005
3R	Residents	Recycle, reuse and reduce waste campaign, based on Tokyo Slim campaign launched in 1989	2005
Tokyo Green Building Program	Buildings with a surface more than 5,000m ²	Submission of a Green Building Plan before construction, that demonstrates “rational” energy use and heat island effect reduction (expanded the coverage to include buildings with a surface more than 2,000 m ² for voluntary submission)	2002 (2010)
	Condominiums with a surface more than 2,000 m ²	Green Labelling Programme for Condominium: display of a label on environmental efficiency, including RE use	2005
	Non residential	Energy performance certification programme: compulsory certificate for selling, buying and leasing	2010
RE expansion	Residential rooftops	Installation of solar PV and/or solar heat systems	2009
Tokyo Carbon Reduction Reporting Program	Small & medium facilities	“Global Warming Action Report”: annual report on CO ₂ emissions	2010
		Benchmark of facilities under the program	2012
Tokyo Cap and Trade Program	Large facilities	Upgrading of facility for better energy efficiency, mandatory emission reduction and emission trading system (ETS)	2010
TMG Initiatives in Government Operations	TMG owned facilities	Tokyo Energy Efficiency and RE Specifications and Requirements: introduction of RE and LED	2009, 2011
RE expansion	Residential rooftops	Subsidies for installation of solar PV and/or solar heat systems	2011, 2013
	New residences and condominiums	Selecting promising technological solutions of solar heat systems and Subsidy Program for developers who install them	2011
	Business rooftops	Roof Lease Business Matching Program	2012
	All rooftops	Providing a quantitative assessment of the rooftop solar energy potential by TMG’s “Solar Cadaster Map”	2013
	Parking lot	Promotion of SOLAR PV installation in parking lots	2015

⁵⁹ With the kind revision of the TMG BoE

Title	Target	Initiative	Launch
Energy Saving Advisory Program	Residence	Energy auditing and equipment adaptation counselling	2011
EV and PHV promotion	Transportation	Subsidies to car and station makers (2011 only) and mapping efforts	2011
Toward electricity reform	TMG facilities	Expansion of electricity purchase from PPSs for TMG owned facilities supply	2013
EMS introduction	Residential, offices, small & medium tenant buildings	Subsidies for houses with cogeneration system (e.g. fuel cell), storage battery system/EV or offices with cogeneration system, LED or solar power system	2013
Hydrogen society	Residence	Expansion of home fuel cell “Ene-farm”	2013
	Transportation	Deployment of FCV, FC buses and hydrogen stations	2015
Bike Sharing	Transportation	Promotion of bike sharing system in central Tokyo	2015
Residential retrofit	Residential	Subsidies for insulation retrofit and solar PV installation	2015

2. Smart community projects in the TMA

Unlike subsidies and grants allocated by the government to eligible targets in a top-down fashion, smart community projects involve public and private players from the conception stage. A consortium of companies and LG is formed. While the government might provide subsidies, some coordination between consortium members is expected in order to achieve a concerted plan. Some initiatives are also completely led by enterprises only.

a. Hydrogen society initiatives

Hydrogen society vision

In their search for safer, cleaner, more reliable and economy boosting energy systems, the Japanese Government and other policy makers, from industrial groups to academia and research centres, decided to bet on hydrogen. Hydrogen has many advantages: it can be produced within Japan (reducing dependency on the external market), it does not necessarily produce GHG (reducing the environmental burden) or untreatable toxic waste (like nuclear does), and could compensate for other RE's variability if technology is properly developed (fuel cell batteries use can balance solar and wind energy variability out). It fits within the "local production for local consumption" model that is gradually used as much as "distributed energy generation". In August 2014, METI released a Strategic Roadmap for Hydrogen and Fuel Cells⁶⁰. The roadmap runs until the 2040s and includes the expansion of residential fuel cell units in Japan (1.4 million by 2020, up to 5.3 million by 2030), hydrogen stations for fuel cell vehicles (100 stations by 2025, with the commercialisation of fuel cell private vehicles and buses by 2017), as well as Carbon Capture and Storage technology use.

Tokyo is often a testing ground for innovative policies with the TMG as a forefront runner: in May 2014, the TMG's BoE had already held the first Strategic Council meeting, aimed at establishing a roadmap for the realisation of a hydrogen society in Tokyo⁶¹. The Strategic Council brings together TMG members and company representatives, including energy companies, such as Tokyo Gas, and industrial groups like Toyota and Panasonic. In January 2015 the sixth session was held, and a report on 2014 activities was released⁶²: hydrogen is part of the smart community vision, acting as a clean fuel for hybrid vehicles (individual cars but also bus), and for residential fuel cell batteries.

The hydrogen powered Olympic Village

Three main projects have been announced so far, and are scheduled to be completed by 2020. One project is the Olympic Village in Harumi (Chuo ward) which should be hydrogen powered⁶³: hydrogen should be distributed to support the activities of some 17,000 athletes and other guests. Residential facilities, training centres and buses should be hydrogen powered. After 2020, the Olympic Village will be converted to a high class residential area. A number of technical issues yet remain to be solved, such as affordable pipeline network construction. The Strategic Roadmap for Hydrogen and Fuel Cell

⁶⁰ Nikkei BP. Nikkei BP. 2014, July 3rd. http://techon.nikkeibp.co.jp/english/NEWS_EN/20140703/362860/?ST=msbe

⁶¹ TMG BoE. 2014. (in Japanese) <http://www.kankyo.metro.tokyo.jp/energy/hydrogen/index.html>

⁶² TMG BoE. 2015. (in Japanese) http://www.kankyo.metro.tokyo.jp/energy/tochi_energy_suishin/attachement/26torimatome.pdf

⁶³Fuel Cell Works. 2015, January 5th. <http://fuelcellworks.com/news/2015/01/06/tokyo-2020-olympic-village-to-be-powered-by-hydrogen/>



also outlines the cost, stability and safety of hydrogen generation, and the integration of hydrogen in the energy mix alongside RE, as serious challenges.

Figure 4. The hydrogen powered Olympic Village plan. Source: Yomiuri Shimbun

Fuel Cell Vehicle deployment

The second major project launched in Tokyo has broader targets: the deployment of 6,000 fuel cell vehicles (FCV) and 35 stations by 2020 in a ¥45.2 billion plan⁶⁴. Since January 2015, subsidies from the national and local governments are available so that the FCV costs ¥4.2 million to the buyer⁶⁵. As the first carmaker to commercialise a FCV with the launch of its Mirai in December 2014, Toyota Motor Co. benefits directly from this initiative. Toyota is represented in all three sub-committees of the Tokyo 2020 Committee, and the long term close ties between the TMG and Toyota Motor Co. are making the latter a champion of the hydrogen cause. Competition will gradually grow on that section, as Honda and Nissan Motor Co. plan to release their own FCV respectively this year and in 2017⁶⁶. Tokyo Gas and JX Nippon Oil & Energy are the two main competitors present on the market for the hydrogen supply of the stations, as Tokyo Gas launched the first hydrogen filling station at the same time the Mirai was released⁶⁷ and JX Nippon Oil & Energy became a Gold Partner of the Tokyo 2020 Committee in March 2015.

Hydrogen use will also be promoted in Saitama prefecture with the deployment of 60,000 FCVs by 2025, with a subsidy of one million JPY per vehicle⁶⁸.

Residential fuel cell generated energy

The third hydrogen based initiative is the hydrogen fuel cell production of electricity in the residential sector. The goal is to equip 150,000 new houses by 2020, in order to reach a generation capacity of 100 MW, and to have one million new apartment blocks provided by hydrogen FC, amounting to a

⁶⁴ Climate Action. January 2015.

http://www.climateactionprogramme.org/news/japan_commits_385m_to_clean_transport_with_2020_olympics_in_site

⁶⁵ TMG BoE.(in Japanese) <http://www.kankyo.metro.tokyo.jp/energy/hydrogen/fcv.html>

⁶⁶ Japan Times. 2014, November 17th. <http://www.japantimes.co.jp/news/2014/11/17/business/corporate-business/honda-to-release-fuel-cell-vehicle-in-japan-next-business-year/>

⁶⁷ Japan Times. 2014, December 18th. <http://www.japantimes.co.jp/news/2014/12/18/economy-business/tokyo-gas-takes-wraps-first-hydrogen-filling-station/>

⁶⁸ IT media. 2015, April 15th. (in Japanese) <http://www.itmedia.co.jp/smartjapan/articles/1504/15/news023.html>

700 MW capacity in Tokyo. The use of FC generated electricity in the commercial and industrial sectors will be introduced by 2017⁶⁹. The main fuel cell generation system in Japan is the Ene-farm (“energy farm”, see glossary).

b. Smart community consortiums

Moreover, some municipalities of Tokyo are members of the Future City Council⁷⁰, leading the Future City Initiative (FCI), a continuation of the Eco-model City programme from 2009, which now includes some smart city projects. The FCI is supported by the Cabinet Office since 2011 and promotes the green innovation in cities. In Tokyo, the wards of Arakawa, Chiyoda, Chuo, Itabashi, Koto, Minato, Toshima, as well as Musashino and Chofu cities (in Tama area) are members of this network. Quite a few cities from the neighbouring prefectures in the TMA are also part of the Prefectural governments are also contributing to the promotion of distributed energy system introduction. For instance, the Gunma prefectural government tries to facilitate business matching between land owners willing to rent or sell their lands to solar PV companies⁷¹.

The following table lists a few smart city projects in Tokyo and in the larger TMA. Many municipalities are also part of the FCI. The table does not include feasibility studies, but reports on projects financed by 2012 and 2013 budget for selection of projects expanding smart community initiative (marked with a *). The main industrial group involved is indicated in brackets.

Municipality (prefecture)	Smart City Project
Arakawa ward (Tokyo)	Minami Senju: Smart Energy Network (SMAENE) for the optimization of heat and electricity use between buildings and communities based on ICT (Tokyo Gas) ⁷²
Itabashi ward (Tokyo)	EMS introduction and DR in schools and residence*
Ota (Tokyo)	Tokyo Institute of Technology, Okayama campus: minimum power system with advanced social infrastructure initiative
Otemachi, Marunouchi and Yurakucho wards (Tokyo)	OMY smart city: low carbon and Business Continuing District (Mitsubishi Real Estate)
Suginami (Tokyo)	Kugayama: emergency energy security (Tokyo Gas)*
Toshima ward (Tokyo)	Ikebukuro Fukutoshin district smart community: local production for local consumption with a emission trading goal for businesses (Tokyo Institute of Technology)*
Remote islands (10)	RE expansion (TEPCO)*
Ashikaga city (Tochigi)	Smart City based on local generation, energy saving & storage
Fujisawa (Kanagawa)	Sustainable Smart Town (Panasonic)
Funabashi city (Chiba)	Smart Share Town Project (Mitsubishi, Nomura Real Estate) ⁷³
Ichikawa Shiohama (Chiba)	District smart community*
Hitachi city (Ibaraki)	Smart industrial city: EMS (Hitachi)

⁶⁹ TMG BoE. 2015 February. (in Japanese) <http://www.kankyo.metro.tokyo.jp/energy/hydrogen/docs/0203-tokyo-to2.pdf>

⁷⁰ Future City Initiative. 2012. http://future-city.jp/pdf/reference/Pamphlet_H24futurecity_Council_en.pdf

⁷¹ Gunma prefecture (in Japanese). <http://www.pref.gunma.jp/07/b0100062.html>

⁷² Tokyo Gas. http://www.tokyo-gas.co.jp/techno/challenge/002_e.html

⁷³ Kashiwa no Ha. <http://www.kashiwanoha-smartcity.com/en/>

Kashiwa no Ha (Chiba)	Smart City (Mitsui Fudosan)
Koshigaya Lake Town (Saitama)	Smart city block: micro grid project (Toshiba)
Odawara (Kanagawa)	Smart Community: collective supply and RE*
Yokohama (Kanagawa)	Smart City: RE, EV, EMS, DR (Toshiba)
Yukarigaoka (Chiba)	Smart community: distributed energy system(Chiba Gas)*
Tsunashima (Kanagawa)	Smart City for Apple Inc. R&D Centre: FCV, hydrogen stations (Panasonic, Nomura Real Estate)

Table 5. Smart City Initiatives in the TMA⁷⁴

3. LG coordination on energy efficiency and environment

Tokyo level

At the level of Tokyo, various projects exist to foster communication and cooperation between the LGs. One of them is the Environmental Revitalization through cooperation between Local Municipalities initiative⁷⁵ aims at fostering municipal efforts for wide area environmental issues (focusing on residential energy conservation through cooperation with NGOs, eco point program and LED use, SMEs facilities energy conservation assessment), at promoting the creation of an environment that is utilising regional resources (especially geothermal heat, biomass, small hydroelectric power and solar PV) and promoting innovative efforts as a model business for wide area deployment (through promotion of use of small and medium sized credits in the metropolitan area, energy conservation measures in existing apartment building, community electric bus introduction, promotion of bike sharing system).

Another initiative at Tokyo scale is the All 62 group, launched by all the municipalities under the TMG's jurisdiction to promote cooperation on urban and business planning (with an emphasis on local SMEs) of smart communities⁷⁶.

TMA level

At the level of the TMA, a regional initiative was launched in February 2014 by the Kanto Bureau of METI. Following a Working Group in Kansai initiated in October 2013 (the Kansai Smart Community Forum, or KSCF⁷⁷), the Kanto Sumakomi Cooperation Body ("sumakomi" stands for smart community – *sumaato komyuniti*) was launched. It is a platform for municipalities and businesses to cooperate on the development of smart communities with a focus on the best practises in terms of business model⁷⁸. The Kashiwa no Ha Smart City project is the flagship project, as it is considered as a model of public private coordination and financial viability. Most municipalities involved in the smart community projects listed in [Table 4](#) are part of the Kanto Sumakomi Cooperation Body.

⁷⁴ Kanto METI. http://www.kanto.meti.go.jp/seisaku/smacom/jirei_ichiran.html#tokyo

⁷⁵ TMG BoE. http://www.kankyo.metro.tokyo.jp/policy_others/municipal_support/docs/%E5%AE%9F%E6%96%BD%E8%A6%81%E7%B6%B1.pdf

⁷⁶ All 62. (in Japanese) <http://all62.jp/>

⁷⁷ Kansai METI. <http://www.kansai.meti.go.jp/5-1shiene/sumakomi-forum/25kansaisumakomi.html>

⁷⁸ Kanto METI. <http://www.kanto.meti.go.jp/seisaku/smacom/index.html>

4. Initiatives with the private sector

TEPCO smart meter deployment & real estate developers' efforts

In 2013 TEPCO selected Toshiba for a partnership on a smart metering project⁷⁹: 27.68 million smart meters, should be deployed by the time the Olympic and Paralympic Games open, in areas covered by TEPCO as declared by a company representative in February 2015⁸⁰. 10 million should be deployed by end of FY2016, and a test project for water and gas smart reading will take place in FY2015⁸¹. TEPCO also plans to increase its hydroelectric power station output up to 4GWh, but makes no mention of increasing the grid capacity for variable RE such as solar and wind power.

Furthermore, some real estate developers are contributing to the development of a smarter Tokyo by providing energy management equipment. For instance Mitsui Fudosan promotes the use of EMS, gas cogeneration and Ene-farm⁸², while Mori Building has introduced BEMS, thermal storage, and district EMS⁸³. The diverse measures under the Tokyo Green Building Program also encourages facility owners to conduct assessment of their buildings as they gain market value with higher levels of energy performance in green labelling certificates.

Public Private Funding

In addition to existing public private financing schemes initiated by the TMG in 2012 (TMG, 2013, p.34-35) to “contribute to stable supply of electric power, promote the development of PPPs, and support proof-of-concept initiatives in RE”, the Public Private Partnership Renewable Energy Fund was launched by the TMG in October 2014 to finance projects promoting RE in Tokyo, but also other service areas covered by TEPCO and Tohoku EPCO. The fund is managed by Sparx Asset Management and Jag Energy with JPY ¥ 1 billion provided by the TMG, and the rest to be provided by other investors in Tokyo⁸⁴. Projects such as indicated in the following table are funded by the above mentioned fund.

Implementing body	Installed capacity	Start of operations	Total operating expenses	Amount invested by the TMG
SGET Ichihara Mega Solar LLC	About 2.9 MW	February 2015 (scheduled)	About 1.1 billion yen	About 34 million yen
SGET Fukushima Matsukawa Mega Solar LLC	About 2.7 MW	March 2015 (scheduled)	About 900 million yen	About 17 million yen
SGET Toyama Mega Solar LLC	About 7.7 MW	March 2015 (scheduled)	About 2.8 billion yen	About 153 million yen
SGET Kurihara Mega Solar LLC	About 15 MW	April 2016 (scheduled)	About 4.8 billion yen	About 119 million yen

Table 6. Examples of investment and lending destinations for the TMG's Public Private Partnership Renewable Energy Fund. Source: http://www.asiabiomass.jp/english/topics/1408_02.html

⁷⁹ Toshiba. 2013 May 1st. http://www.toshiba.co.jp/about/press/2013_05/pr0103.htm

⁸⁰ Metering. 2015 February. <http://www.metering.com/smart-meters-japan-tepco-to-deploy-27m-by-2020-olympic-games/>

⁸¹ TEPCO. 2014. p.20 http://www.tepcoco.jp/en/press/corp-com/release/betu14_e/images/140331e0201.pdf

⁸² Mitsui Fudosan. <http://www.mitsui-fudosan.co.jp/english/corporate/csr/2014/special/smart/index.html>

⁸³ Mori Building. http://www.mori.co.jp/en/company/urban_design/environment/energy_saving.html

⁸⁴ Techon. 2014, October 29th. http://techon.nikkeibp.co.jp/english/NEWS_EN/20141029/385666/?ST=msbe

E. Olympic Paralympic Games in 2020 and related urban smart development in Tokyo

Since September 2013 when the 2020 Games were awarded to Tokyo, there has been an acceleration in the pace of decision making both in the public and private spheres. For instance, the promotion of the hydrogen society vision in Tokyo has undoubtedly sped up thanks to the prospect of hosting the Olympic Paralympic Games. It is hard to measure the extent to which the mega-event has mobilised more support and resources than if there had been no Games in Tokyo in five years. However the choice of 2020 as a deadline for the implementation of initiatives such as the upcoming expansion of residential fuel cell cogeneration systems, the launch of FCVs and hydrogen filling stations, is a good illustration of the impact the Games can have on policy making: the timeline is shortened. It has also been the case for the private sector with TEPCO bringing forward the expansion of the 27.68 million smart meters from 2024 to 2020. This section looks at the further influence the Games can have on Tokyo's development as a smart city.

1. Green Games plans for Tokyo Games in 2020

a. Third pillar of Olympic and Paralympic Games: sustainability

In the past 20 years, the Olympic and Paralympic Games have become more than a competition based on values of international cultural understanding and education through sports. In 1996, the IOC amended the Olympic Charter to include a third pillar to the Games values in addition to sports and culture: sustainability. The IOC then released guidelines for cities to include sustainability in their projects, and the candidature file of Tokyo reflects this trend. It emphasises the reduction of costs and of the environmental burden, through the use of existing facilities, the concept of compact Games, and various green policies (Tokyo 2020 Committee, 2013, chapter 5). A more recent trend in the Olympic Movement is the promotion of Games legacy, most often defined as the venues and infrastructures left after the mega event, but which comprises environmental, economic, urban and sporting legacies in terms of structures, infrastructure and practises. While the 1994 Lillehammer Winter Games are often viewed as the first Games endorsing sustainability, the 2012 London Games are now considered as the first Games focusing on the legacy. As the London Games are used as a reference by the Tokyo 2020 Committee, and as concerns about long term returns on investment in the Games preparation are getting stronger, the Games legacy is becoming a determining factor in the planning of the mega-event. In December 2014, the IOC issued the Olympic Agenda 2020 alongside a set of 40 recommendations and guidelines for the Olympic Movement. These include suggestions on environmental and financial sustainability, especially in regards to reduction of bidding and managing costs of the Games and to the development of a sustainability strategy. The Evaluation Commission which selects host cities calls candidates to produce “a more explicit risk and opportunity assessment with a strong focus on sustainability and legacy” (IOC, 2014). While these recommendations come after the announcement of September 2013 of Tokyo as a host city for 2020 Olympic and Paralympic Games, the gradual shift of the Olympic movement towards sustainability translates into stricter selection of candidate cities, and closer scrutiny of plans and management of the host cities. There is no legal penalty that the IOC can apply to host cities which mismanage Games; nevertheless the condemnation of the institution can be a serious blow to a city's reputation and attractiveness.

b. Tokyo 2020 Committee plans

In January 2014, Tsunekazu Takeda, president of the JOC and vice president of the Executive Office of the Tokyo 2020 Committee, renewed the pledge to hold a green Games⁸⁵. This engagement is official and outlined in the Games Foundation Plan published in February 2015 (chapter 6): an “Action & Legacy Plan” will be established in 2016 and based on 5 pillars for which specific legacy sub-commissions will be created in order to monitor the efforts. The five pillars are sports and health; urban planning and sustainability; culture and education; economy and technology; and recovery from the Great Earthquake, and national benefits and global communication. Keys for the Legacy sub-committee include energy efficiency and security, financial viability (through limited and transparent budget), and transport sector (relying especially on low carbon emissions vehicles as a key policy to reduce environmental impact on the city). The integration of sustainability and urban planning (p.167-168) is described as in the following figure:

6.2.2 Urban Planning and Sustainability

(1) Effective utilisation of Games-related facilities (Examples of actions)

- ① Envisioned development of Games-related facilities, such as their efficient use after the Games and collaboration with urban planning in surrounding areas
- ② Active consideration of the post-Games usage of materials and facilities used for temporary facilities

(2) Implementation of Urban Planning to Ensure Secured and Comfortable Living for Everyone (Examples of actions)

- ① Development of venues and the Village focused on accessibility
- ② Incorporate barrier-free design in transport systems and public facilities
- ③ Advancement of multilingual supports which will remove language barriers for visitors from other countries/regions
- ④ Development and improvement of transport infrastructure such as roads, railway networks, airports and ports around the venues
- ⑤ Preservation and development of beautiful landscapes, parklands, green spaces and waterfront areas around the venues
- ⑥ Establishment of security systems and enhancement of security infrastructure through public-private partnerships, in preparation for disasters, terrorism, cyber-attacks, etc. during the Games
- ⑦ Implementation of elimination of utility poles in central areas, around venues, around roads adjacent to major stations and around roads for emergency transport

(3) Communicate the Importance of Sustainability through Efforts Triggered by the Games (Examples of actions)

- ① Integration of sustainability into Games preparation and operations by full implementation of 3R (reduce, reuse and recycle) and by applying environmental technologies such as fuel cell vehicles and the use of renewable energy
- ② Further promotion of energy-saving measures modelled on Games efforts
- ③ Implement countermeasures against summer heat, for athletes and spectators, such as the development of a pavement which suppresses a rise in surface temperatures
- ④ Implementation of efforts to introduce smart energy such as hydrogen

Figure 5. Games Foundation Plan for Tokyo 2020: Urban Planning and Sustainability. Source: Tokyo 2020 Committee

⁸⁵ Climate Action. 2014. http://www.climateactionprogramme.org/climate-leader-interviews/the_green_games_tokyo_2020

2. Green Games initiatives

a. Concrete measures

As the Games are five years away, there are few steps taken by Tokyo 2020 Committee and the TMG with concrete sustainability goals directly linked to the Games. Decisions are still under discussion. At the moment, a dialogue is underway between the Tokyo 2020 Committee, the Bureau of Preparation for the Olympic and Paralympic Games, and the BoE to establish a more detailed plan for the Games. It is expected to be released in 2016. Although there have been talks of stadia powered by renewable energy sources, or producing zero waste, no official goal has been announced so far. As the figure above shows, the Authorities have set general principles, but they have not provided details about implementation and promotion yet. The “actions” build on existing policies of the TMG, such as the 3R full implementation goal. It relies on a policy initiated in 1989 by the TMG via the Tokyo Slim Campaign, aiming at reducing waste by promoting recycling. The only appreciable project is the Olympic Village, envisioned to be hydrogen powered, and the equipment of each Olympic stadium with an energy management centre, according to an interviewee from the TMG’s Bureau of Tokyo 2020 Olympic Games Preparation.

Olympic Environmental Impact Assessment

Furthermore, a measure based on the current Environmental Impact Assessment (EIA) will be established: an Olympic EIA. The regular EIA is a lengthy process that takes place in Tokyo before any major urban redevelopment project: it takes about two years, involves a comprehensive assessment of the consequences of an urban project on the local environment (ranging from air and noise pollution to the impact on green space), and is based on a dialogue between the developer and the local civil society, which is invited to give their opinion about the project and the proposed revisions. The EIA is initiated before the project is fully launched, and is over only after the project is completed, in order to take into account both estimated and actual impacts on the environment. A similar EIA is planned to be applied to Olympic venues.

The Olympic EIA is part of a larger 2020 Olympic and Paralympic Games Environment Assessment Index released in February 2014⁸⁶. On March 20th, EIA projects were submitted for three Olympic venues: the Olympic Stadium, the Musashino forest venue, and the Olympic Village⁸⁷.

Legacy Committee

The legacy sub-committee of the Tokyo 2020 Committee has also taken upon themselves to promote sustainability to some extent as mentioned in the previous section. More concrete measure plans are still expected. In the case of London, the Committee for a Sustainable London 2012 was in charge of monitoring the efforts and “it had the power to interrogate policy-makers, had access to documents, and produced annual and thematic reports which analysed progress and action against the sustainability principles and targets.” (Gold and Gold, 2013).

⁸⁶ TMG, BoE. <http://www.kankyo.metro.tokyo.jp/assessment/attachement/%E3%82%AA%E3%83%AA%E3%83%91%E3%83%A9%E5%AE%9F%E6%96%BD%E6%AE%B5%E9%9A%8E%E3%82%A2%E3%82%BB%E3%82%B9%E6%8C%87%E9%87%9D.pdf>

⁸⁷ TMG, Tokyo 2020 Olympic Games Preparation. http://www.sporttokyo.metro.tokyo.jp/taikaijyunbi/assess/hyoukasyo_an.html

b. Games potential for sustainability

That does not mean that no efforts will be made towards sustainable Games, or that achieving some measurable targets in terms of resource management efficiency and environment conversation is not possible by 2020 and during the Games. The Games and Tokyo's environmental achievements are not two separate spheres: the sustainability of the Games partially depends on the measures and ambitions of the TMG and other local stakeholders, while Tokyo's smart strategy has already been affected by the selection of the capital as the host city for the 2020 Games.

Besides, various decisions and measures have an indirect impact on the sustainability of the Games themselves, for instance the decision to build fewer venues, and to use existing facilities. In February the Tokyo 2020 Committee announced a budget cut of 890 million euros⁸⁸ as venues for basketball, canoe-slalom and equestrianism will not be built; existing facilities will be used instead. Up to 14 sport venues could be changed in total. A sub-committee of the Tokyo 2020 Committee in charge of Games legacy was created this January to examine how the Games could have a lasting positive impact on the city after September 2020⁸⁹. While building fewer venues is definitely a financially-motivated decision, it also impacts on the GHG emissions and the amount of solid waste produced by construction works, and thus directly affects Tokyo's emission and waste rate.

In addition the Games have acted as a catalyst for the hydrogen strategy of Tokyo: while it is unlikely that Japan would not have launched its hydrogen and fuel cell policy, the fact that the Games are coming to Tokyo has gathered the necessary political support to accelerate the decision making process. The Olympic Village in Harumi was a window of opportunity for the demonstration project. This is not an established nor measurable fact, but it draws on the experience of previous host as well as candidate cities and the literature about mega-event impact on urban policy.

3. Challenges to sustainable 2020 planning and implementation

There are a number of challenges to a smarter development of Tokyo in perspective of 2020.

Legacy over sustainability

All construction, directly and indirectly related to the mega-event will degrade the environment as CO₂ emissions and construction waste production are very likely to increase. Considering the recent surge in carbon dioxide emission because of the shift back to fossil fuels, and the enduring problem of waste treatment and illegal dumping (TMG, 2013, p.41), it will be a challenge for the TMG and Games organisers to achieve both an impressive and green Games in those two aspects. As of 2011, illegal dumping of Tokyo construction waste accounts for about 77% of national cases.

Another challenge for the TMG and Games organisers is carrying out the EIA: it is not compulsory for the developers and companies to submit the data needed for the evaluation of pollution etc. – there is no penalty nor binding regulation. Although it is a common practise for the TMG (for instance for most building energy efficiency schemes are voluntary except the Cap and Trade Programme), for the

⁸⁸ Inside the Games. 2015 February 27th. <http://www.insidethegames.biz/olympics/summer-olympics/2020/1025865-tokyo-2020-set-to-save-1-billion-as-venues-moved>

⁸⁹ Inside the Games. 2015, January 10th. <http://www.insidethegames.biz/olympics/summer-olympics/2020/1024802-government-study-underway-to-reassess-tokyo-2020-legacy-aims>

Olympic and Paralympic Games, constant negotiations will need the cooperation of firms and receive full access to information.

A last major challenge is that the 2020 legacy may not be sustainable: the past experience of host cities demonstrates the risk that authorities, in a hurry to deliver a grand Games on time, lower the priority and investments of sustainability over legacy, and a smooth running of the Games. For instance, regeneration and economic growth gradually replaced terms such as sustainability in the official discourse of the British Authorities as the 2012 Games approached (Gold and Gold, 2013).

Tokyo 1964, London 2012, Tokyo 2020: different cases

There is no public discourse defending the position that the 1964 and 2020 Games will have the same effects. Nevertheless many people, including present day Olympic organisers, remember the great changes that Tokyo underwent to welcome the 1964 Games, as well as the economic boom of the same period. But 2020 Tokyo is different from 1964 Tokyo: the economic situation has changed and the 2020 Games will not have the same impact on a city with already set structures and networks, in contrast to the 1964 Games.

Similarly, the London 2012 Games took place in a different economic and political context: while referring to their case is a good basis to assess what could happen in Tokyo, some caution needs to be applied when considering the possible effects of the Games on Japanese economy (direct and indirect). For instance, the flow of visitors cannot be expected to be the same following 2012 and 2020: while London is easily accessible from neighbouring countries (and inversely, it is relatively easy to go to any part of continental Europe from London, by train, plane or bus), so much cannot be said about Japan. While the airport capacity is scheduled to be increased by 2020 to accommodate more international flights (especially from Haneda airport, closer to central Tokyo than Narita airport), Japan remains a costly country to access from without, and to travel from within.

Financial viability

Some initiatives launched with a 2020 target may lack long lasting schemes and solid foundations. For instance the hydrogen powered Olympic Village plan relies on the overcoming of technical difficulties by 2020, and on the baseless assumption it will become an attractive, highly expensive district. While it is said to be a demonstration project, for now there seems to be little plan for the pilot to be up-scaled or commercialised: while it is not a negative point, it means there is little at stake for enterprises to make this a financially sustainable project. Although it is still early to be definitive, there is a risk that this project faces the same issues as existing smart city projects in Japan: an unviable business model where average buyers find products above affordable prices.

II. Assessment of cooperation opportunities between the EU and Japan

A. Assessment of the market's attractiveness in Tokyo

Japan remains a major global player in green technology development despite the current economic situation. Tokyo is a hub for innovation and an all the more attractive market since the Olympic and Paralympic Games have been awarded to the metropolis. Tokyo is building on London's 2012 experience and has already started boosting its green economy with its hydrogen society vision. There are pitfalls ahead, ranging from financial viability to market uncertainty. Nonetheless opportunities for EU-Japan cooperation in smart city development remain strong.

1. Tokyo economy and smart city market

a. Smart city market

Abenomics

While Japan remains a major market for green technology and solutions, it is a fact that it has known better times in terms of economic performance. Prime Minister Shinzo Abe's plans to stimulate Japan's economy have been under growing criticism since the January 2013 launch of 'Abenomics' (a three part strategy relying on monetary regime change – with a 2% inflation goal, a fiscal stimulus –with JPY ¥ 10.3 trillion injected in the economy, and a series of structural reforms aimed at boosting long term growth). While the first two arrows have been successful to some extent (the inflation rate has yet to reach 2%), the small achievements of the third arrow have been most heavily criticised. Recently the whole Abenomics concept has been questioned as Japanese households' income have not kept pace with the inflation and taxation (VAT increased from 5% to 8% in April 2014). Benefits are mostly shared within the corporate sector. Thomas Piketty's visit to Japan in February 2015 further stirred the public opinion, as the economist pointed out Abenomics could be restored if a fourth arrow of wealth redistribution was introduced in Japan⁹⁰.

Smart city market size

In spite of the severe attacks on the results of the Abenomics and other shortcomings of Japan's public finance, the current Japanese economy presents attractive opportunities for business and cooperation between Japanese and European companies in the smart city sector.

Japan remains a significant market for smart technology and solutions with a boom in the number of new smart city projects since the Great East Japan Earthquake. The market includes numerous sectors from RE, grid operation and waste management, to sustainable construction, smartphone applications, energy management systems and EHV. As a result, it may be difficult to define and to accurately calculate the market size of this sector, but it has the advantage of offering business opportunities to a wide range of companies. Various figures can be found about the Japanese domestic market, ranking from 108 trillion JPY estimated by Smart City Planning Inc. and BP Clean Tech in 2012⁹¹, to

⁹⁰ Japan Times. 3rd March 2015. <http://www.japantimes.co.jp/opinion/2015/03/03/commentary/japan-commentary/thomas-piketys-japanese-tour/>

⁹¹ Smart City Planning Inc. 2012. <http://www.smartcity-planning.co.jp/outline/>

1.5 trillion JPY estimated by Fuji Keizai in 2013⁹² and barely 120 billion JPY as estimated by the North American consulting company Navigant Research in 2014⁹³. As Fuji Keizai regularly updates their reports, and occasionally provides details about the market segments included in the final figures, this report relies on its data. The following table presents the smart community related market size and projections in Japan⁹⁴. It is noteworthy that a year later, these figures were revised by Fuji Keizai: the 2013 smart community market size was estimated to be 1.544 trillion JPY and that 2025 projection amounted to 3.255 trillion JPY.

	2012 (JPY)	2020 (JPY)
Energy infrastructure	869 billion	2,892 trillion
Community ICT services	354 billion	670 billion
Total	1.223 trillion	3.562 trillion
Total including component technology market	8.556 trillion	12.883 trillion

Table 7. Japan Smart City Market (2012). Source: Fuji Keizai 2012

A fast-growing segment of the smart city market in Japan is the smart house service sector. Initially, smart house service providers such as Mitsui Fudosan and Fujitsu focused on offering solutions that contribute to global warming mitigation and low carbon society realisation. However since March 2011, there has been a shift in market demand and companies now offer smart services that help achieving energy self-sufficient houses in the face of blackouts⁹⁵. The HEMS deployment in Japan has accelerated since 2011: the table below displays all EPCOs' plans for smart meters (see Annex)⁹⁶. TEPCO's announcement in 2013 that it will install 27.68 million smart meters confirms the shift from high tech equipped houses aiming at achieving Quality of Life (QoL) and environmental protection, to demand side management and high tech equipped houses designed to be disaster resilient. Thus, in Tokyo, the HEMS market is growing rapidly, boosted by the local demand, TEPCO's ambitions, and subsidies from the national and Tokyo governments. Beside the expanding HEMS market in Tokyo, the solar and hydrogen based energy generation sectors are also growing thanks to the subsidies of the Tokyo Metropolitan Government (Section I.D.1).

Research and innovation in the TMA

Additionally, many research institutes and R&D centres are located in the TMA. Tokyo is ranked as the second metropolis submitting patent applications, right after San Francisco, with 5,138 applications (OECD, 2013). In terms of environmental innovation, Aichi prefecture is the leading region in Japan, and Osaka is also very well ranked. Nevertheless the TMA (especially Tokyo, Saitama, Kanagawa, Ibaraki prefectures) is extremely active too, as the graph below demonstrate. The sectors where most patents are delivered are transport impact mitigation, potential or indirect contribution to emissions mitigation and general environmental management (air, water, waste). The low number of patents delivered in energy efficiency for buildings and lighting is indicative of the margin for progress in this sector in Japan.

⁹² Tenbou. 2014 <http://tenbou.nies.go.jp/news/jnews/detail.php?i=14997>

⁹³ Navigant Research in Geospatial blog. 2014. <http://geospatial.blogs.com/geospatial/2014/03/smart-cities-market-in-asia-projected-to-grow-rapidly-through-2023.html>

⁹⁴ Fuji Keizai. 2012. (in Japanese) <https://www.fuji-keizai.co.jp/market/13090.html>

⁹⁵ Tamai, Hisatsugu and Yamada, Akitsugu, April 2014. Fujitsu Science and Technology Journal, 50-2. p.35-40

⁹⁶ BNEF. October 2014. "Japan's approach to demand side management"

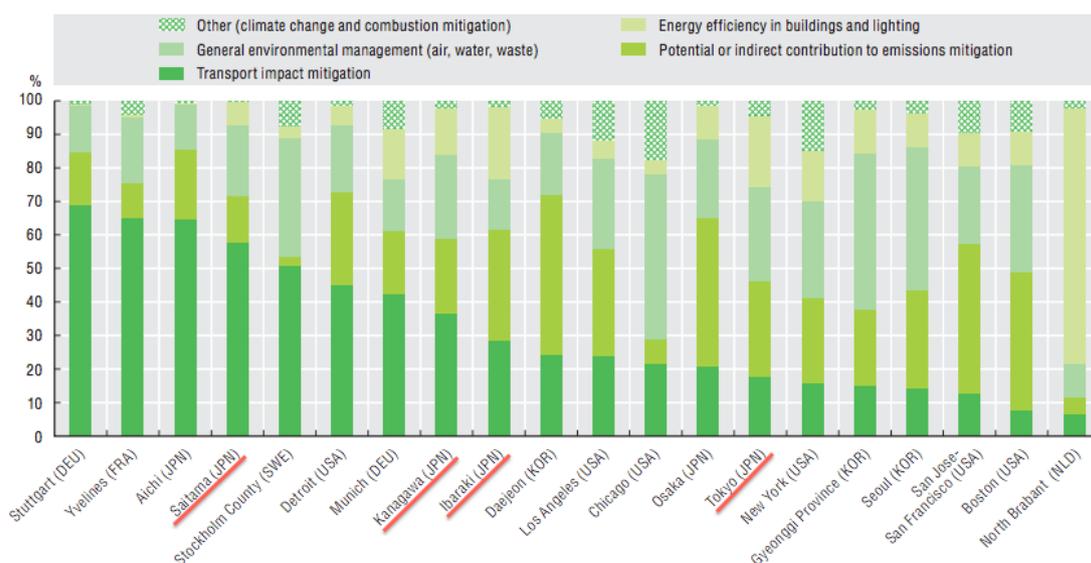


Figure 6. Patents in environmental related industries in the top 20 environment patenting metropolises, share by type of technology, average 2008-10. Source: OECD, 2013.

All major companies of the sector are present in Tokyo: Toshiba, Hitachi, NEC, Toyota, but also Schneider Electric, Siemens, CISCO and IBM. As seen previously (Section I.D.2/3), the number of projects in the TMA shows the keen interest of municipalities in smart community development and the potential for business and research cooperation, as well as best practice exchanges.

b. Olympic and Paralympic Games market and impact on Japanese economy

The Olympic effect

As mentioned in the introduction, hosting the Olympic and Paralympic Games has both tremendous advantages and drawbacks: the large costs to the host city are rarely compensated by the revenues or the legacy of Olympic venues. So why do cities bid to host such a costly event? What are the benefits for them besides a display of wealth? Rose and Spiegel (2011) investigated the Olympic effect and whether any economic benefits existed for the country: they found that both exports and overall trade are permanently boosted by events like the Olympic and Paralympic Games and the FIFA World Cup. Countries which have hosted the Games benefit from a 20% increase in exports. It is noteworthy that Rose and Spiegel also found that the bidding process, and not the hosting itself, “is part of a costly strategy that signals trade liberalisation and results in increased openness”. Indeed hosting a mega-event does not cause an increase in trade by itself, but sends a global signal of policy intentions. Thus even candidates which do not host the Games are also likely to be more open and to experience an increase in exports.

The authors also precise that Olympics are usually preferred to other mega-events because their incidence is larger, as the Games are “highly visible, infrequent and have long lead times”. In the case of Tokyo, the potential effects of the 2019 World Cup of Rugby must be added to the 2020 Games. As for liberalisation, Tokyo’s bid for the 1964 Games coincided with the entry of Japan in the IMF and the OECD. At present, regardless of the success of the policies, the bidding of Tokyo to the Olympics coincides with schemes to liberalise Japan. These include the 2020 FDI target (to increase it from JPY

¥ 18 trillion to 35 trillion), as well as renewed attempts at attracting foreign enterprises through SEZ launch, a number of FTA agreements (with Australia for instance) and negotiations (with the EU), and with energy market liberalisation, among other policies. The discourse of the political figures supporting the Games also indicates the long term policy intents of Tokyo. 2020 is a step in the plans for Tokyo, as Governor Masuzoe stated in his fourth Assembly Speech in November 2014: “I need not reiterate that 2020 is not our final goal. It is a passage point for the future development of Tokyo”⁹⁷.

The example of London

In addition to the Olympic effect, the local economy is actually stimulated by the mega-event. For every Olympic and Paralympic Games there are concerns that only the host city will reap benefits from the mega-event, while the rest of the country must bear the costs. Besides the positive effect on overall trade, it is actually difficult to measure the direct consequence of the Games on cities other than the host city. Indeed Tokyo is at the forefront to receive the profits – but also to bear the costs, as the city must provide a quarter of the initial funds, and absorb the long term expenses. The sectors linked to tourism such as hospitality, and the sectors linked to urban redevelopment, such as real estate and construction firms, are the most likely to gain from the preparation and hosting of the Olympics in Tokyo. The case of London has demonstrated the positive effect on the economy, and is the main example called for by the organisers and proponents of the 2020 Olympic and Paralympic Games. In July 2014, economic benefits were estimated to be GBP £14.2 billion (far above the 2016 target of GBP 11 billion), with 3,418 jobs created, and a 1.3 million increase of tourists in 2013 (UK Government and Mayor of London, 2014. pp.46-54). The authors of the 2014 GPCI drew upon such figures from the London case to evaluate the impact of the 2020 Games on Tokyo, and estimated that by 2020 the 2013 GDP per capita may be multiplied by 1.03, the total market value of listed shares on stock exchanges may be 1.3 times higher, visitor numbers may be increased by 2.4 times, and total unemployment rate may decrease from 4.5% to 3.7%. The GPCI estimates an upgrade in accessibility with more international flight connections for passengers and freight.

Trend for a greener Tokyo 2020

Although there is no specific mention of a direct effect of the Olympic and Paralympic Games on Japan’s green economy in estimates so far, the market for smart technology has swelled since September 2013. The heavy investments of the TMG and national government in the hydrogen society initiatives demonstrates the commitment to the enhancement of energy efficiency. In addition to being a powerful signal of trade policy intentions, the Games is also a vehicle to raise awareness about a particular issue in the population. The mega-event has significant potential in its educational value⁹⁸: in the case of Tokyo, the 2020 Olympics are the opportunity for increasing existing awareness about renewable energy, energy saving and waste management as is stated in the Games Foundation Plan. That also means opportunities for investments in that sector, in terms of business but also in research. The high visibility of the Games means that the government is bound to take actions to support the above mentioned courses of action, which represent sectors of investments. At present one enterprise from Ireland is in the process of accessing the Japanese market: SIP Energy sells insulated panels that

⁹⁷ TMG. 2014. <http://www.metro.tokyo.jp/ENGLISH/GOVERNOR/SPEECH/2014/1128/contents03.htm>

⁹⁸ Preuss, H. 2013. “The contribution of the FIFA World Cup and the Olympic Games to green economy”. Sustainability 2013, 5, 3581-3600. <http://www.mdpi.com/journal/sustainability>

have the advantages of being ready to be shipped and assembled, light and earthquake proof. Another firm from Finland specialising in waste managements is about to enter Tokyo's market: Enevo offers a system of bin sensors and data treatment which enables waste collection companies to optimize their collecting vehicles routes, by indicating which bins are full and must be emptied, and which bins are not ready to be emptied.

2. Ongoing and upcoming changes in Tokyo

Real estate value

While the real estate prices for sale and rental are already rising in Toyosu where the Olympic Village will be built⁹⁹, all wards where most of the Olympic venues are located can be expected to have higher land prices by 2020¹⁰⁰, making central Tokyo less and less attractive for renting, keeping or buying an office in Tokyo. Many other areas in Tokyo are increasing in land value, such as Tsukishima area in Chuo ward (0% to 3% rise) as the Tsukiji market nearby will be destroyed, and Toranomon area in Minato ward (3% to 6% rise) with a new station to be built there by 2020 on the Hibiya metro line (see Annex).

New energy mix: by December 2015

The Government of Japan is preparing a new energy mix plan by the end of the year. In December 2015 the COP21 (Framework Convention on Climate Change Conference of the Parties of the United Nations) will be held in Paris, where country leaders will be negotiating for a new agreement with binding terms to struggle against climate change, and especially to keep the temperature below a 2°C increase¹⁰¹. As of now, the Japanese Government is still debating the best energy mix to ensure better energy security and safety, and lower CO₂ emissions, which have increased since the Great East Japan Earthquake and the stopping of the nuclear power plants (which provided about 30% of national electricity beforehand), as fossil fuel imports have surged. There are a number of possibilities for renewable energy, all of which involve the return of nuclear power. The present debate within the government relates to the proportion of energy produced by nuclear power plants.

In January 2015, the Institute of Energy Economics of Japan (IEEJ) released a report with five scenarios about the country's energy mix and the impact on economic growth and carbon dioxide emissions by 2030, as the two tables below indicate.

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
RE	35 %	30%	25%	20%
Thermal	65%	55%	50%	50%
Nuclear	0%	15%	25%	30%
Electricity Generation (PWh)	1.1	1.2	1.2	1.2

Table 8. Outline of scenarios and power generation mix (2030). Source: IEEJ¹⁰²

⁹⁹ Japan Property Central. 2015, April 1st. <http://japanpropertycentral.com/2015/04/why-rental-yields-in-tokyo-are-falling/>

¹⁰⁰ Kavetsos, G. 2012. "The impact of London Olympics announcement on property prices". *Urban Studies*, 49-7, 1453-1470

¹⁰¹ COP21. <http://www.cop21.gouv.fr/en/cop21-cmp11/climate-change-and-decisions>

¹⁰² IEEJ. January 2015. <http://eneken.ieej.or.jp/data/5886.pdf>

		2010	2013	20130			
				Scenario 1	Scenario 2	Scenario 3	Scenario 4
Economy	Power generation related costs (JPY/kWh)	8.6	14.8	21.0	19.0	16.4	14.8
	Real GDP (JPY ¥ 2005 trillion)	512	531	684	690	693	694
	Fossil fuel imports (JPY trillion)	17.8	28.1	33.7	32.2	31.6	32.0
Environment	CO ₂ emissions (% change from FY2005)	-7	2	-20	-24	-26	-26
Energy security	Energy self-sufficiency ratio (%)	18	7	19	25	28	28
	LNG imports (Mt)	70.6	87.7	84.4	69.7	65.3	70.0

Table 9. Comparison of impacts of the energy mix in 2030. Source: Ibid

The Ministry of Environment defends scenario 2 with about 30% of RE¹⁰³. The Keidanren, Japan's largest business federation, advocates a return to nuclear power, with a 25% share in the future energy mix against 60% of thermal and 15% of RE¹⁰⁴. Their position is between scenarios 3 and 4 of the IEEJ. This is in line with the discourse of Abe's Government which has been advocating a return to nuclear power. While 43 reactors out of 50 (52 if scheduled construction had taken place) are operable, they must still undergo evaluation, standard upgrading and validation of the Nuclear Regulation Authority (NRA), with the full approval of the local government¹⁰⁵ (see Annex for nuclear power plants state as of March 2015). So far 16 plants have requested to restart application, and are under safety reviews. Only the reactors of Sendai 1&2 plant have received the NRA and municipality's approval; they are expected to restart in July 2015. Moreover, public opinion is still mostly opposed to the restart of nuclear power plants in Japan: although a few local governments are proponents of the restart of local plants because it is a source of employment, many neighbouring municipalities (which do not necessarily have to give their approval because they are located further away from the plant) are reluctant to take the risk of restarting nuclear power plants again.

Electricity market reform: 2015 onwards

The electricity market reform was approved in 2013, and the first phase started from April 2015, with the establishment of the Organisation for Cross Regional Cooperation of Transmission Operators

¹⁰³ IT media. 2015, April, 7th. (in Japanese) <http://www.itmedia.co.jp/smartjapan/articles/1504/07/news033.html>

¹⁰⁴ NHK. 2015, April 7th. <http://www3.nhk.or.jp/nhkworld/english/news/2015040714.html>

¹⁰⁵ World Nuclear. <http://www.world-nuclear.org/info/Country-Profiles/Countries-G-N/Japan/>

(OCCTO)¹⁰⁶. The OCCTO has two functions: “to aggregate and analyse the EPCO’s supply-demand plans and grid plans, and order to change EPCO’s plans such as tie lines construction; and to order EPCOs to reinforce generations and power interchanges under a tight supply-demand situation”¹⁰⁷. The reform aims at liberalising the market in order to ensure a more stable energy supply following the mishaps after the Fukushima accident. The second phase will be launched in 2016 with full retail competition, and the third phase will be the legal unbundling of transmission and distribution sectors, initially planned between 2018 and 2020. While this three step reform will bring significant changes in the market structures (with TEPCO and Chubu already in an official joint venture agreement since February 2015 for instance¹⁰⁸), the reform rollout is still under discussion: the third stage may take later than announced, and start only in 2020 as declared by a TEPCO representative at the World Smart Energy Week in Tokyo in February 2020. As a result of this reform, TEPCO’s outlook for the next 10 years is negative growth, with a 0.6% decrease in sales per year from now on¹⁰⁹.

In addition, EPCOs are not the most cooperative players on the market. They are very conservative companies with regional monopolies, which the reform intends to remove. The Feed-In Tariff for solar and wind power introduced in July 2012 has further stirred up resistance among the EPCOs: because of constraints related to grid stability and inertia, but also because of vested interests, the EPCOs are reluctant to grant grid access to more solar mega projects: as grid parity is about to be reached with the cost of solar PV rooftop electricity steadily decreasing¹¹⁰, Kyushu, Hokkaido, Tohoku, Shikoku, and Okinawa EPCOS are suspending the approval of new projects¹¹¹.

¹⁰⁶ OCCTO. (in Japanese) <http://www.occto.or.jp/jigyosha/shisutemurenkei/index.html>

¹⁰⁷ METI. 2014.

http://www.meti.go.jp/english/policy/energy_environment/electricity_system_reform/pdf/201410EMR_in_Japan.pdf

¹⁰⁸ Chubu. 2015. http://www.chuden.co.jp/english/corporate/ecor_releases/erel_pressreleases/3255765_18939.html

¹⁰⁹ IT media. 2015, April, 6th. <http://www.itmedia.co.jp/smartjapan/articles/1504/06/news018.html>

¹¹⁰ JREF. December 2014. http://jref.or.jp/en/column/column_20141204_02.php

¹¹¹ BNEF. 2015, March, 4th. <http://about.bnef.com/bnef-news/utilities-stymie-japan-s-solar-developers-over-grid-connections/>

B. Cooperation opportunities for the EU and Japan

Japan and the EU have common concerns in terms of energy efficiency. The 2030 framework for climate and energy policies of the EU was released in January 2015¹¹², and aims a reduction of GHG by 40%, an increase in RE and energy efficiency and savings up to 27%, and a reform of the Emission Trading System. The framework is also designed to encourage better governance in energy policy making and implementation. In the meantime, energy self-sufficiency and resilience is a priority for Japan, which is not autonomous in terms of energy production: the country can produce a maximum of 20% of its final energy consumption. And since the Fukushima accident in March 2011, Japan has produced 11% of the domestic energy demand on its own¹¹³, as it cannot rely on nuclear generation. Smart city initiatives are increasing both in Japan and the EU.

The two partners could learn from one another's experience, improve their models of urban and business development, and foster their respective competitiveness at the same time. The prospect of the 2020 Games is a catalyst for environmental policies and business in a number of sectors, directly (such as Olympic venues) and indirectly (such as smart meters) related to the Games.

1. Business

a. Support to enterprises

EU support to SMEs

The COSME programme is designed to promote the Competitiveness of Enterprises and Small and Medium Enterprise, running from 2014 and 2020 with a total budget of EUR € 2.3 billion. COSME aims to support SMEs in the following four areas: improving access to finance, improving access to markets, supporting entrepreneurs and improving conditions for competitiveness (for further information see http://ec.europa.eu/growth/smes/cosme/index_en.htm). For instance the Enterprise Europe Network (EEN) offers services including assistance in finding partners abroad and in advice on access to EU programmes (<http://www.een-japan.eu>). This network is also accessible to Japanese companies looking for a European partner. The EU Japan Centre for Industrial Cooperation which finances this report also provides non-financial assistance to European SMEs, via services such as Cluster missions (covering market specific business seminars and group company visits for instance) and a Japan Tax and Public Procurement Helpdesk¹¹⁴. The website EU business in Japan <http://www.eubusinessinjapan.eu/you-want/export> provides much information as well. A number of business training programmes for European companies exist. Managers are given a comprehensive and practical experience of the Japanese market, business culture and language basics through the Executive Training Programme (<http://www.euetp.eu/>), and the Human Resource Training Programme (<http://www.eu-japan.eu/detail-business-programmes/H RTP>).

¹¹² European Commission. 2015. http://ec.europa.eu/clima/policies/2030/index_en.htm

¹¹³ EDMC Handbook of Energy and Economic Statistics. 2014. p.40-43

¹¹⁴ EU-Japan Centre for Industrial Cooperation. <http://www.eu-japan.eu/smes-support>

National Embassy and CCI in Tokyo

Embassies are a good first contact for European enterprises intending to enter the Japanese market or looking for a partner: not only do Embassies know the local market, they have also contacts with Japanese firms and other relevant agents on the market (experts for legal matters, for interpretation, etc.) and are well acquainted with Japanese business culture. This is valid for Japanese companies as well: Embassies in Tokyo can give relevant introductions in Europe to Japanese companies requesting their assistance. Chambers of Commerce and Industry also provide very good business support to companies which have the budget to afford their services. The Annex includes a list of contact points in Embassies and other related organisations in Tokyo.

JETRO and municipality agencies

The two European firms which are in the process of accessing the Japanese market are supported by JETRO (Japan External Trade Organization) and the TMG's Business Development Centre (BDC). SIP Energy receives the support of JETRO to sell in Japan, and Enevo is supported by the BDC. JETRO (<http://www.jetro.go.jp/en/invest/>) is a government agency aimed at the promotion of Japanese companies on foreign markets, and inversely at the entry of foreign companies on the Japanese market. There are 16 offices in Europe which can be contacted for information and application to the assistance programme¹¹⁵. In Tokyo, the Invest Japan Business Support Centre (IJBSC) offers a comprehensive support package of market information, business matching sessions, assistance in registration to administrative procedures and application to local subsidies among other services throughout the country. Many municipalities throughout Japan also have a bureau dedicated to international business, such as Yokohama¹¹⁶. While JETRO is a national bureau, the BDC is part of an initiative at the Tokyo level (<http://www.bdc-tokyo.org/?cat=3>). It offers services similar to the IJBSC, with a more local approach in market and networks. It offers support for market entry via various services such as free business consultation and introduction to Tokyo based experts.

SMEs looking for office space for a first market entry in Japan can apply to the Special Economic Zones of Tokyo http://www.seisakukikaku.metro.tokyo.jp/invest_tokyo/. There are two types of SEZs – National Strategic Special Zones and Special Zones for Asian Headquarters.

b. Key sectors for business opportunities

This section first highlights a few sectors which development is supported by Japan's Cabinet Office, and looks at a few other sectors with market potential for European companies. Besides energy efficiency related business, a wide range of sectors in the smart city are considered, such as IT contributing to a more connected city. The opportunities may be directly linked to the Olympic and Paralympic Games operation, for example the smart hospitality sector. Other opportunities may not be directly related to the Olympic and Paralympic Games, but are linked to the acceleration of green initiatives in Tokyo by 2020, as it is the case for the demand side management sector.

While many business opportunities are concentrated in Tokyo, there are also many possibilities outside of central Tokyo, and areas which are not directly affected by the hosting of the Games. The prospect of 2020 may not be a catalyst as strong as for Tokyo, nonetheless that does not mean other Japanese municipalities have smaller interest in smart city development.

¹¹⁵ JETRO offices in Europe. <http://www.jetro.go.jp/en/jetro/worldwide/europe/>

¹¹⁶ Yokohama. <http://www.city.yokohama.lg.jp/keizai/yuchi/sinsyutu-e/>

Based on the Tokyo Conference on Science and Technology Innovation (STI) of efforts to Task Force held in 2014, the Cabinet Office defined this month 9 areas of STI to develop in perspective of the Games. These areas include the following¹¹⁷ and represent areas of with potential for business:

- energy
- next generation urban mobility
- big data & sensors
- weather forecast
- smart hospitality
- health monitoring
- accessibility for handicapped individuals
- audio visual technology
- green and flower arrangement

Clean energies: hydrogen, solar PV and thermal

Hydrogen production is a key sector for Japan, and business opportunities exist in that sector for instance in fuel cell storage batteries. Innovation to reduce the cost of production, in terms of funds and initial energy input, would be key to accessing the market. However the cost of development is huge and the investment risky, so it may be difficult for European SMEs to enter Japan via the hydrogen sector. RE, especially rooftop solar PV and thermal generation, remain a key sector of investment thanks to the FIT and the TMG's Public Private Fund for RE introduction in areas covered by TEPCO and Tohoku EPCO, but also thanks to the additional subsidies that are available at the municipality level. For further information on the solar market in Japan, see Hahn (2014). Any other clean source of energy and cogeneration systems are also likely to be welcomed in Japan. It is the case for instance of cogeneration wood processors. It is noteworthy that TEPCO Procurement Department releases tender calls at the beginning of each fiscal year¹¹⁸.

Nuclear power plant decommissioning

Many existing nuclear power plants do not meet the standard regulations of the Nuclear Regulation Authority (NRA), established after the 3/11 disaster. Therefore they must be either upgraded (which is extremely costly) or decommissioned. Nuclear power plant decommissioning and waste management are potent business opportunities for companies in the EU with the required expertise in these areas (see the Annex for further information on the nuclear situation in Japan).

Energy management and efficiency: demand side management

During Games especially, the energy supply must be stable so that the competition can go smoothly. Energy management for this is critical. Considering Japan's energy situation in general, any tool and solutions which contribute to achieving carbon dioxide reduction, energy savings, cost reduction, compensating for RE variability and maintaining productivity at its highest have potential to access the Japanese market before and after 2020. The demand side management sector is booming

¹¹⁷ IT media. 2015, April 13th. (in Japanese) http://www.itmedia.co.jp/smartjapan/articles/1504/13/news039.html#1_km_olympic1.jpg

¹¹⁸ For further information see <http://www.tepco.co.jp/en/corpinfo/procure/procedure/1-stand-e.html>

throughout Japan with the upcoming massive deployment of residential smart meters (see Annex for further information about the EPCOs' plans).

The battery market is also an important one: as not only residential and commercial users are keen to access technology to secure a stable energy supply, but many municipalities are also supporting such measures in public facilities. While the technology offered in Japan is already quite advanced, incremental changes are still possible and could reduce production costs and increase the efficiency of the products. While the hardware may require existing expertise and significant R&D funds, the software segment of the demand management market is far more accessible to European companies, especially to SMEs and would offer great flexibility to adapt their products to local demand.

There is also potential for business in the Corporate Social Responsibility (CSR) sector: technology alone is not enough to ensure efficient energy management, and consulting services optimise business consumption practises through better use of premises and available technology. While many efforts have successfully targeted industrial buildings to improve energy use efficiency, there is a considerable margin for improvement in commercial and office buildings.

Sustainable construction

In consideration of the upcoming construction and urban redevelopment projects, there are business opportunities in the sustainable construction sector. European companies approved under the Construction Business Act are entitled to take part in the tendering process. For Olympic venues, it is conducted by the TMG's Bureau of Tokyo 2020 Olympic Games Preparation. The Bureau is in charge of organising the bids in accordance with WTO's agreement on government procurement, in cooperation with the TMG's Bureau of Urban Development and the Tokyo 2020 Committee¹¹⁹.

There are also opportunities for sustainable construction for projects indirectly related to the 2020 Games. The bids are accessible on <http://www.e-procurement.metro.tokyo.jp/indexPbi.jsp> (in Japanese). The Japan Tax and Public Procurement Helpdesk is translating tenders (related or not to the Games), and national Embassies located in Tokyo can also provide some information. While many programmes have targeted the industrial sector and achieved better energy efficiency, fewer initiatives are successful in regards to the commercial and residential sectors. The TMG has launched a number of measures in those two sectors, but several interviewees of foreign companies located in Japan have agreed to say that there is a significant margin for progress yet, thus offering business opportunities in that field.

Since the Great East Japan Earthquake in 2011, there has been a surge in the offer of Business Continuation Plans (BCP), a new key comparative advantage for securing construction contracts. BCPs are emergency schemes of energy supply and consumption, which ensure a minimal energy supply for office and commercial buildings in case of electricity shortage, for businesses to be able to carry out basic activities. Storage batteries and cogeneration systems are the main technologies used in such plans.

Waste management

Japan is already in advance in terms of management. For instance Tokyo has been doing remarkably well in reducing waste production (Fujita and Hill, 2007). The Olympics require further organisation,

¹¹⁹ DLA Piper. <https://www.dlapiper.com/~media/Files/Insights/Publications/2013/12/Tokyo%202020%20Olympics%20Part%2020%20Procurement/Files/tokyoolympicsprocurement/FileAttachment/tokyoolympicsprocurement.pdf>

especially because of the massive flow of tourists in public areas, and because some points of the current system need to be upgraded, such as the communication about waste sorting. Nonetheless, the waste management is a sector with a good market potential for European SMEs, as Tokyo and Japan in general have a keen interest in better solutions to deal with waste in a limited land area.

Health monitoring

With an ageing population, severe weather conditions and poorly insulated buildings, remote health monitoring is a key sector in Japan. It can also be applied to check on athletes. A major sector of health monitoring is related to elderly care and the use of ICT to facilitate remote health supervision as well as the daily life of this growing part of the Japanese population. In May 2015, IBM, Apple and Japan Post (a major insurance and bank holding company in Japan) signed an agreement to ‘improve elderly care’¹²⁰. In addition to these sectors, this report identified the following businesses with market potential in the smart city sector in perspective of 2020: sustainable construction, waste management, cyber security and urban consulting.

Smart hospitality

Smartphone applications for translation, geolocalisation, information access and any other devices (such as translatable menus on tablets to order in restaurants) to facilitate the stay of foreigners in Tokyo are high in demand as improving the friendliness of the city to non-Japanese is a priority of the TMG in perspective of 2020.

Cyber security

The mega-event requires massive preparation and with the quantity of online information is increasing with each Olympic and Paralympic Games, with online sales, online results, and maybe online competition watching by 2020. Such data requires top notch protection.

Big data & sensing

Big data, in other words centralising data from multiple sources and processing it, can contribute to identify patterns, define problems, and making decisions. For example, traffic can be better regulated thanks to large data gathering about real time congestion level by street and preferred and alternative GPS routes. In case of earthquake, it can also be useful to map the damage in terms of building and transportation networks, to access information about the evacuation routes and zones, the weather forecast, and the remaining available RE sources, and so on.

Such information are extremely valuable for metropolis as large as Tokyo where data is massive, because of the population figures and the number of sources. Sensors are key in gathering data. Structures and infrastructure need to be maintained and sensors can be used to make the maintenance more efficient, for instance to detect where defects in roads are by measuring the vibrations made by vehicles with sensors.

¹²⁰ Japan Today. 2015, May 1st. <http://www.japantoday.com/category/technology/view/apple-ibm-japan-post-team-up-to-improve-elderly-care>

Urban consulting

As there are issues with the integration of RE in many municipalities, as well as the development of smart city project, urban consulting companies with international experience have prospects in Japan. Municipalities outside central Tokyo are more likely to look for such services than the TMG, as they have less experience than the capital's Local Government. The newly launched subsidiary of Japanese West Holding Corporation, Stadtwerke, specialises in such consulting¹²¹.

2. Research cooperation

Horizon 2020 is a research and innovation grant programme running from 2014 to 2020 with about EUR 80 million budget. There are a number of calls designed to promote smart city research projects¹²², including a few specifically dedicated for Japanese participation.

Energy: hydrogen

As mentioned in Section ID2.a, the use of hydrogen is new key sector, and related technology development is supported by the Strategic Innovation creation Programme (SIP)¹²³ in five sectors: RE derived from hydrogen production technology, ammonia hydrogen station technology, organic hybrid hydrogen station technology, ammonia directly use fuel cell technology development, ammonia directly use turbine power generation technology. However technical issues remain. Both the EU and Japan could benefit from cooperating in that sector, considering there is a European initiative to develop such technology and solutions, the Fuel Cells and Hydrogen Joint Undertaking (FCHJU)¹²⁴.

Connectivity

There are two existing projects funded by the EU and Japan, which are related to Tokyo or the 2020 Olympic and Paralympic Games: ClouT¹²⁵ and the 1 gigabit Olympics initiative¹²⁶. Inaugurated in 2013, the ClouT is a joint research initiative aiming at empowering citizens through a collaborative communication platform. It involves industries, research centres, universities and municipalities from Japan and three EU Member States: Italy, Spain and France. The 1 Gigabit Olympic project goal is to deliver 1 gigabit connection during the 2020 Games. It was launched in November 2014.

3. City-to-city cooperation

Establishing a municipal partnership with Japan

City-to-city cooperation with Tokyo may be complicated in the upcoming five years. Tokyo has partnership agreements with a few European cities, such as London and Paris. With the exception of London which recently hosted the Olympic and Paralympic Games and can thus offer expertise, such partnership agreements are cultural rather than a platform for political and economic exchanges. Tokyo has been looking towards East Asian cities rather than Europe¹²⁷. It also faces already many challenges

¹²¹ Tüv Süd. <http://www.tuev-sued.de/company/press/news/tuev-sued-signs-consultancy-contract-with-stadtwerke-japan>

¹²² Jeupiste. <http://www.jeupiste.eu/horizon-2020-and-around/horizon-2020-calls-proposals>

¹²³ IT media. 2015, April 15th. (in Japanese) <http://www.itmedia.co.jp/smartjapan/articles/1504/15/news021.html>

¹²⁴ FCHJU. <http://www.fch-ju.eu/page/what-we-do>

¹²⁵ ClouT. <http://clout-project.eu/>

¹²⁶ EU. http://europa.eu/rapid/press-release_IP-14-1175_en.htm

¹²⁷ TMG. <http://www.metro.tokyo.jp/ENGLISH/ABOUT/APPENDIX/appendix03.htm>

with the organisation of the Games; after 2020, there may be more opportunities for city to city cooperation.

Nonetheless there are many opportunities of cooperation with other Japanese cities. The Tokyo Metropolitan Area is comprised of a number of municipalities, and the rest of Japan is also very dynamic in terms of smart city development. As resources and attention flow to Tokyo, there may be more margin for negotiations with cities outside central Tokyo.

While Japan-EU municipal coordination has so far been limited, the global trend has been going towards more city-to-city cooperation. Both within Europe and Japan, LGs are expanding their networks and sharing their respective experience. At the moment Japan is somewhat resistant to international urban collaboration, because municipalities can be reluctant to take part in unprecedented models of partnership and Japan's central government is not supportive of such joint initiatives. However European cities which have existing ties with Japanese cities may have a good foundation to build on for further collaboration (Pham, 2014). Furthermore, a European city capable of a constant and demonstrable commitment to establish a long term association with a Japanese municipality also has chances to start a partnership. Amsterdam for instance is very active.

Examples of sectors

Sectors of city-to-city cooperation may be more specific than best practice exchanges in municipal management. Here are two examples of sectors on which European and Japanese cities could focus: sustainable construction and bicycle sharing. The sector of focus should naturally depend on the cities' respective policies.

Sustainable construction is a key policy of the TMG's Bureau of Environment, and one of the sectors where international cooperation is quite active, the BoE is part of the C40 network for instance. There are also other best practise sharing networks in which the TMG's Bureau of Environment is taking part¹²⁸.

Additionally, bicycle-sharing systems are spreading in European cities as well as Tokyo. There are opportunities for cooperation and experience sharing in that field: the management of the bicycle-sharing systems is challenging for any municipality, and the Local Governments could learn from others' strategies, for instance in regards to the financial tools used in such policy.

¹²⁸ TMG BoE. <http://www.kankyo.metro.tokyo.jp/en/int/index.html>

C. Barriers and obstacles to business

1. Complexity of networks and business practises

Difficulty to identify the decision maker

So many public entities, enterprises and organisation are involved in the preparation of the Olympic and Paralympic Games that it is quite difficult to know which institution to contact when looking for information about direct involvement in the 2020 Games. Between the public sector (various departments of the TMG, the Ministry of Finance, the Ministry of Land, Infrastructure, Transport and Tourism, the Ministry of Environment, the Ministry of Economy, Trade and Industry, the Ministry of Education, Culture, Sports and Technology, the Cabinet Office and a number of other ministries which are indirectly involved), the Olympic and local sport organisations (the International Olympic Committee, the Japan Olympic Committee, the Tokyo 2020 Committee and the Japan Sports Council), and the companies involved in Games and urban redevelopment projects (official partners of the Games, and firms from the sectors of real estate, transportation and construction among others), the decision making process is not very transparent.

Lack of transparency from government agencies offering support

Services offered by the BDC and JETRO are available to a very restricted number of candidates, selected by the two organisations. While the details of selection criteria is indicated on the websites, there is also a lack of other information about the available office space for instance, and about the organisation responsible for information and management: it is hard to distinguish which entity to contact between JETRO and the National Strategic Special Zone (located in Tokyo, but run by the national government), and the BDC¹²⁹ and Tokyo Special Economic Zones¹³⁰ (run by the TMG), and the One Stop Business Establishment Centre¹³¹ (a joint initiative). Other concerns add up about the actual effectiveness of such zones which are not a recent practise in Japan¹³², but rather a repeated and failed attempt at responding to international pressure about the complex market access in Japan.

Tendering process in Japanese

Although the procurement process should respect the WTO convention, most tenders are in Japanese. All tenders can be found on JETRO's website¹³³, but there is no specific category for tenders related to the Olympic and Paralympic Games. For the construction sector especially, the language is an issue as the application to the Business Construction Law approval (necessary to access the Japanese market for construction companies) is in Japanese only¹³⁴.

¹²⁹ BDC. <http://www.bdc-tokyo.org/?cat=3>

¹³⁰ TMG. http://www.seisakukikaku.metro.tokyo.jp/invest_tokyo/

¹³¹ OSBEC. http://www.seisakukikaku.metro.tokyo.jp/invest_tokyo/english/business-support/one-stop.html

¹³² The Economist. 2014. <http://www.economist.com/blogs/banyan/2014/03/economic-zones-japan> and Japan Business Press, 2014 <http://jbpress.ismedia.jp/articles/-/41109>

¹³³ JETRO. <http://www.jetro.go.jp/en/database/procurement/>

¹³⁴ Swiss Global Enterprise. October 2014. http://www.s-ge.com/de/filefield-private/files/167599/field_blog_public_files/64649

Complexity of business practises

In the sustainable construction sector for instance, there is a wide range of standards to be followed in order to meet legal regulations and business labels from different associations. Although business labels are not legally compulsory, they are absolutely necessary to have in order to sell on the market. The absence of a clear guideline classifying all labelling and clearances needed to enter the market makes it all the more complicated for foreign companies trying to access the Japanese market: business practises are as important as law. It is noteworthy that this is not discriminatory to foreign companies in particular: Japanese companies face the same hurdles of applying to all kinds of standards. The only difference is that they speak Japanese and are familiar with such practises whereas it seems overly complicated for foreign firms.

2. Competitiveness of the market

Competition with Japanese and US companies

Japan is a mature market. The competition with Japanese companies and already present foreign companies is tough. Therefore a European company intending to access the market should make sure they have a “unique selling point” (as recommended by the UK Trade and Investment Department), that makes the firm different by offering a product or a solution that is not on the market already. For further information on setting up a business in Japan, refer to the Annex.

The Olympic and Paralympic Games are first an opportunity for Japanese companies to boost their activities, as clearly stated in the Games Foundation Plan (Tokyo 2020 Committee, 2015. p.119): the mega-event is the time for “showcasing Japanese innovation utilising leading edge technology”.

The original reason for the launch of smart grid and similar initiatives in Japan is closer to the situation in the US: grid failure and blackouts. Therefore Japanese companies tend to look to the US, and a partnership was signed between the Smart City Planning consortium and Portland about smart city conception¹³⁵. While that does not mean that Japanese companies are not interested in European products and practises, the competition is tough.

Competition with “Olympic” companies

The Olympic and Paralympic Games are a market. Considering the massive funds required for any project directly related to the Games, few enterprises have the necessary resources to invest in the large projects on their own. In addition some companies have provided structures and infrastructures for many previous world events, and it is difficult to compete with such firms, especially if they are official Olympic partners. The 2020 Games Gold Sponsors are also already ahead in the race for business opportunities¹³⁶. Below are listed the main companies directly and indirectly involved in the Tokyo Olympic and Paralympic Games, with existing or potential link to smart city business (as of April 2015).

Company	Project	Status	Origin
Aecom	Venue and infrastructure development consulting ¹³⁷	Consultants for TMG and Tokyo 2020 Committee	US

¹³⁵ Smart City Inc. <http://www.smartcity-planning.co.jp/en/news/details/140123.html>

¹³⁶ The list of partners is available at <http://tokyo2020.jp/en/marketing/sponsors/index.html>

¹³⁷ <http://www.insidethegames.biz/olympics/summer-olympics/2020/1023258-aecom-to-advise-on-tokyo-2020-venue-and-infrastructure-development>

Arup		Lead consultants to TMG and Tokyo 2020 Committee		UK
Atos	AV and IT solution design and management ¹³⁸	IOC partner		FR
Bitmedia	Internet broadcasting		JP	
Dentsu	Marketing agency ¹³⁹		JP	
East Japan Railway (JR East)	New station on the Yamanote line ¹⁴⁰		JP	
Fujitsu	Data centre hardware (such as servers and storage for Atos ¹⁴¹)	Gold partner	JP	
JX Nippon Oil & Energy	Fuel for Games related vehicles and stations ¹⁴²	Gold partner	JP	
Mori Memorial Foundation	Real Estate Management		JP	
NEC	Specialist public safety equipment and software; network equipment ¹⁴³	Gold partner	JP	
Nomura Holdings	Financial services and securities ¹⁴⁴	Gold partner	JP	
NTT	Telecommunications ¹⁴⁵	Gold partner	JP	
Panasonic	AV and IT solutions ¹⁴⁶	IOC partner	JP	
TEPCO	27 million smart meter installation		JP	
Tokyo Metro Co.	Hibiya line new station ¹⁴⁷		JP	
Toyota	FCV	IOC partner	JP	
Urban Renaissance Agency	New station on Hibiya line ¹⁴⁸		JP	
Zaha Hadid Architects	Olympic new national stadium design ¹⁴⁹			UK

Table 10. Companies involved in 2020 projects (March 2015). Source: EU-Japan Centre

UK's advance

¹³⁸ <http://aroundtherings.com/site/A49623/TitleAtos-and-Panasonic-Agree-to-Jointly-Develop-AV-and-IT-Solutions/292/Articles>

¹³⁹ <http://www.insidethegames.biz/olympics/summer-olympics/2020/1019515-tokyo-2020-announce-dentsu-as-marketing-agency>

¹⁴⁰ <http://ajw.asahi.com/article/business/AJ201406040047>

¹⁴¹ <http://www.insidethegames.biz/olympics/summer-olympics/2020/1025685-fujitsu-and-nec-corporation-named-tokyo-2020-gold-partners>

¹⁴² <http://www.insidethegames.biz/olympics/summer-olympics/2020/1026208-tokyo-2020-continues-to-prove-gold-plated-choice-as-sixth-domestic-sponsor-signs-up>

¹⁴³ <http://www.insidethegames.biz/olympics/summer-olympics/2020/1025685-fujitsu-and-nec-corporation-named-tokyo-2020-gold-partners>

¹⁴⁴ <http://www.insidethegames.biz/olympics/summer-olympics/2020/1026363-tokyo-2020-signs-up-nomura-holdings-to-gold-partner-programme>

¹⁴⁵ <http://www.insidethegames.biz/olympics/summer-olympics/2020/1025128-tokyo-2020-sign-up-telecommunications-giant-ntt-as-first-gold-partner>

¹⁴⁶ <http://aroundtherings.com/site/A49623/TitleAtos-and-Panasonic-Agree-to-Jointly-Develop-AV-and-IT-Solutions/292/Articles>

¹⁴⁷ <http://www.japantimes.co.jp/news/2014/10/15/national/hibiya-line-get-new-station-olympics/>

¹⁴⁸ <http://www.japantimes.co.jp/news/2014/10/15/national/hibiya-line-get-new-station-olympics/>

¹⁴⁹ <http://www.jpnsport.go.jp/newstadium/Portals/0/NNSJ/en/ceremony.html>

The competition with companies and organisations from the UK involved in the 2012 Olympic and Paralympic Games is tough. The London Games in 2012 are an example of well-prepared and managed Olympics, which is very appreciated by Japanese national and local authorities. As a result, the cooperation between Japan and the UK is closer than with other countries which recently hosted the Games. The Tokyo 2020 Committee and the TMG are not only looking closely at the plans for the London Games, but are very active in concluding agreements. This is taking place at an ideal timing as the 400 year anniversary of UK-Japan business cooperation was celebrated in January 2014¹⁵⁰. In May 2014, a Host2host agreement was finalised for sharing the experience of the expertise of the UK (UK Government and Mayor of London, 2014, p.48). In September 2014, a Memorandum of Understanding between the Japanese and British Tourism Boards was signed¹⁵¹. In October 2014, the GPCI (the only international city ranking released by a Japanese institute, the MMF) ranked London ranked as the second most global city, behind New York. In GPCIs of previous years, London was ranked third, and the Olympic and Paralympic Games of 2012 are pinpointed as the main cause of the economic growth boost that enable London to overtake Paris. In addition to the British public and private sectors' expertise directly related to the Games in terms of organisation, communication, transportation, security and sustainability, it is most likely that the TMG is looking at the financial management of the mega-event.

Although there is no specific agreement between the UK and Japan about sustainability or smart urban development, it is possible that the Japanese Authorities would look more closely at the London case more than other cities. It does not exclude other European cities and smart city involved firms from potential partnerships with Japan, but London definitely has a comparative advantage with the recent experience of the Olympic and Paralympic Games. In addition to the sustainability measures in the Olympic Village and venues, the London Greater Authority announced in March 2013 a Smart London Vision board¹⁵². In Japan as well, the British Authorities are among the most active players: the UK Trade and Investment Department (UKTI) of the British Embassy is extremely dynamic, and uses a well informed and practical online platform, the website Export to Japan. It offers regular webinars, market assessments, networking, and introductions Business 2 Business. The UKTI is also in charge of carrying out the Host2Host agreement between the UK and Japan mentioned above¹⁵³.

¹⁵⁰ <http://www.jlgc.org.uk/en/category/japan400/>

¹⁵¹ http://www.seejapan.co.uk/jnto_consumer/media/press-releases/press-release-detail/14-09-26/visitbritain-and-japan-national-tourism-organization-sign-mou-to-promote-tourism-between-the-two-countries

¹⁵² <https://www.london.gov.uk/priorities/business-economy/vision-and-strategy/smart-london/smart-london-board>

¹⁵³ <http://www.publications.parliament.uk/pa/cm201011/cmselect/cmfaff/581/518we02.htm>

III. Conclusions and recommendations

The smart city strategy in Tokyo, the “Smart Energy City”, was launched in May 2012 and builds on the emergency measures of energy savings which were enforced following the Fukushima accident in March 2011. Tokyo has further developed as a smart city through the promotion of renewable energy sources and smart meters in the central wards and the larger metropolitan area, along with several smart community initiatives. The Tokyo Metropolitan Government’s (TMG) Bureau of Environment is very active in promoting energy efficiency, and has achieved a 15% cut in CO₂ emissions in the industrial sector for instance. In spite of such measures though, energy efficiency and carbon dioxide emission targets may be difficult to achieve by 2020. Indeed the current energy mix translates into Japan relying on fossil fuels. While a new energy mix will be decided by the end of 2015 with an almost certain return of nuclear power, the transition will take time. The energy production and consumption in Tokyo and throughout Japan is also at an uncertain stage, as the energy market liberalisation has just started and may carry on beyond 2020.

Another decisive element for Tokyo in terms of energy efficiency performance is the 2020 Olympic and Paralympic Games. The prospect of the Games already influences TMG’s environmental and economic policies. While there is no talk of a ‘smart Games’ as such, the 2020 mega-event is accelerating the sustainable development of Tokyo, for instance with the hydrogen powered Olympic Village project and the massive deployment of Fuel Cell Vehicles (FCVs) and residential fuel cell cogeneration systems by 2020. The TMG is cooperating with the Tokyo Organising Committee for the Olympic and Paralympic Games (Tokyo 2020 Committee) to build on the existing green policies of the TMG and elaborate a concrete strategy for sustainable Games preparation and operation. In addition, the TMG interacts with various ministries (such as the METI, the MOE, the Cabinet Office and the MOF among others), the International Olympic Committee, and major companies like Toyota, Panasonic and Tokyo Gas.

As smart city projects are gaining momentum in Japan, cooperation opportunities between the EU and Japan are also multiplying in terms of business, research and city-to-city experience sharing. Smart city projects are also a key focus for the European Union, as a tool for fostering economic development, energy production and management, and urban data use optimisation. The market for smart technology and solutions is growing globally and advancing European-Japanese collaboration in the smart community could benefit the two partners by boosting their respective competitiveness and achieving better project performance. The smart city sectors with the potential for EU-Japan industrial cooperation include clean energy production and demand side management, big data and sensors, smart hospitality, health monitoring, sustainable construction, waste management, cyber security, urban consulting.

A number of obstacles can slow down enterprises’ market access in Japan. The complexity of Japanese regulations and the lack of transparency of business practises can be challenging in some sectors for new companies which are unfamiliar with the language and the business culture. More importantly the market directly linked to the 2020 Olympic and Paralympic Games is extremely competitive, as Olympic partners and official sponsors occupy market segments with significant financial means and

expertise that can hardly be rivalled. London has a comparative advantage as it successfully hosted the 2012 Games, and the Tokyo Authorities look a lot at the London model. However there are business opportunities for smart technology and solutions at a larger scale than the Olympic Games in Tokyo. The larger metropolitan region and other Japanese cities have potential for industrial cooperation. While 2020 is a catalyst and deadline for projects that are approved by the central and local government, it does not slow down the development of other smart community projects elsewhere in Japan.

This report's recommendations and observations are the following.

1. To enterprises

- *Advantages of entering the Japanese market: long term business*

Once an enterprise has entered the Olympic market, it has very good chances of accessing the market for other future Olympics and mega-events, as it gains expertise in a very narrow sector.

While it takes time to enter the Japanese market because of the length of the regulatory requirements, and because gaining trust from Japanese partners is a long term process, once a firm has entered the Japanese market, the strong relations which have been established are an excellent foundation for business activities.

Lastly, Tokyo can be an entry port to the Asian market. Although other Asian countries may offer easier access to establish Asian headquarters, the advantage of Japan is that once a foreign company has gone through all levels of Japanese regulatory clearance, it can also access most other Asian markets, where regulations are not as strict as Japan.

- *Importance of experience and partnership*

If the enterprise already has experience with mega-event organisation or operation, it has a significant comparative advantage and better chances of entering the Tokyo Olympic market.

If the enterprise has a partnership with a company involved in the Games organisation or operation, and no official partner of the Olympics can supply the product offered by the enterprise, it can have good chances of accessing Japan's market.

If the enterprise has a partnership with a Japanese company involved in the Games organisation or operation, it has even better chances of accessing the Japanese market.

- *Invest beyond 2020*

Accessing the Japanese market is a lengthy process, but long term commitment is rewarded in Japan. Besides, trying to access the Japanese market only because Tokyo is the host city of the 2020 Olympic and Paralympic Games is not an appreciated discourse.

- *For firms trying to access the market*

Contact your national Embassy in Tokyo for advice and access to networks is a good first step. Depending on your field, the EU-Japan Centre provides free information about market segments such as the solar PV market and the IT sector. Another report will be available by the end of the year about waste management.

2. To public authorities

- *To Tokyo 2020 Committee and the TMG's Bureau of 2020 Olympic Games Preparation*

Establishing a sustainable Games plan as soon as possible would be ideal: goals and standards must be clear in major projects from the beginning (and not added later, as suggested by CSL, 2012). Planning and preparation have a substantial impact on the Games' legacy and sustainability.

Establishing an energy management and conservation plan as early as possible would be a great step forward as well: in the case of London, it was done too late in May 2012 just before the Games and there was no time for implementation (CSL, 2012).

Establishing an independent agency is necessary to promote and monitor that the Games preparation and operation are in harmony with the goals of sustainability.

Ensuring a tendering process accessible both in English and Japanese is imperative for fair competition.

- *To the Government of Japan*

Fostering compliance with global standards of sustainable construction etc. would greatly contribute to achieving the environmental goals.

- *To the EU*

Supporting the SMEs in improving their visibility by taking part in trade shows and fairs (Hahn, 2014) is necessary.

Ensuring that European SMEs have a good access to information about support programmes is essential to help the enterprises take advantage of their opportunities abroad.

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Glossary of technical terms

Ene-farm

“Energy farm”, residential fuel cell cogeneration system developed by Tokyo Gas and first commercialised in 2009. It pumps natural gas from a local utility into its fuel cell, which uses a processor to extract the hydrogen and mix it with oxygen from the surrounding air. The reactions produce enough power to cover about half the demand of an average family and the by product is excess heat that can supply a home with hot water.

http://www.tokyo-gas.co.jp/techno/stp1/00h1_e.html

Incorporated Administrative Agency/Local Public Enterprise/Public Enterprise Bureau

Agency responsible for indispensable public services the government does not have to do by itself but that the private sector is likely to neglect for various reasons.

In the case of Tokyo, an agency delivering a public service, with a self-supporting accounting system where expenses are covered by revenues from service charges. The Tokyo Metropolitan Assembly has the authority to make decisions on the budget, approve account settlements and make revisions of charges imposed on users.

Olympic Movement

“The Olympic Movement is composed of three main constituents: the International Olympic Committee (IOC), the International Sports Federations (IFs) and the National Olympic Committees (NOCs). In addition to these three constituents the Olympic Movement is made up of all the organisations which recognise the IOC’s authority: the Organising Committees for the Olympic Games (OCOGs), the athletes, judges and referees, associations and clubs, as well as all the IOC-recognised organisations and institutions.” <http://registration.olympic.org/en/faq/detail/id/44>

Tokyo 2020 Committee (TOCOG)

Tokyo 2020 is the common denomination for the Tokyo Organising Committee for the Olympic Games (TOCOG), the local authority in charge of the global organisation and operation of the Games. While it must cooperate with the TMG, the Government of Japan, the JOC and the IOC, it does not answer to them. Before the Games were attributed to Tokyo in September 2013, it was the Tokyo 2020 Bid Council.

Tokyo

Area made of 62 municipalities: the 23 central wards (ku), and 39 municipalities. The 39 municipalities comprise the Tama area (26 cities, 3 towns and 1 village) and the Izu and Ogasawara Islands (2 towns and 7 villages).

Tokyo Metropolitan Area (TMA)

Area comprising Tokyo and the 7 neighbouring prefectures, namely Chiba, Gunma, Ibaraki, Kanagawa, Saitama, Tochigi and Yamanashi prefectures. Also called the Greater Tokyo Area (GTA). It is larger than the Kanto region, which comprises all above mentioned prefectures except Yamanashi.

Annexes

A. Olympic and Paralympic Games

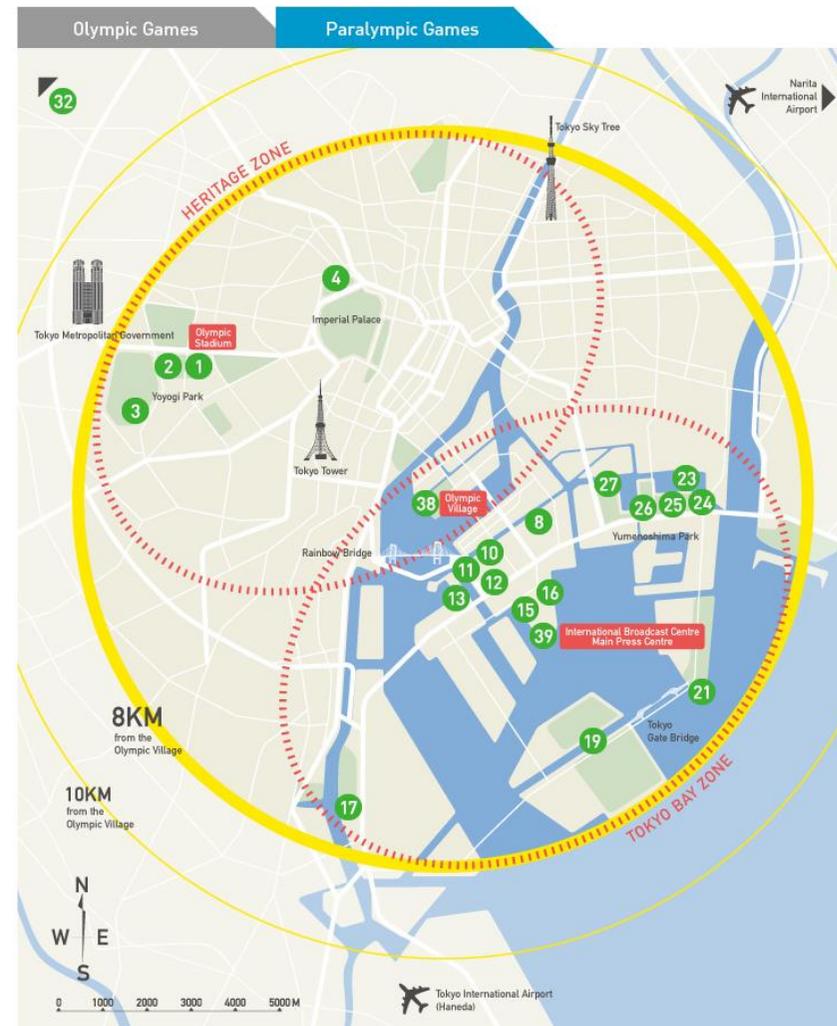
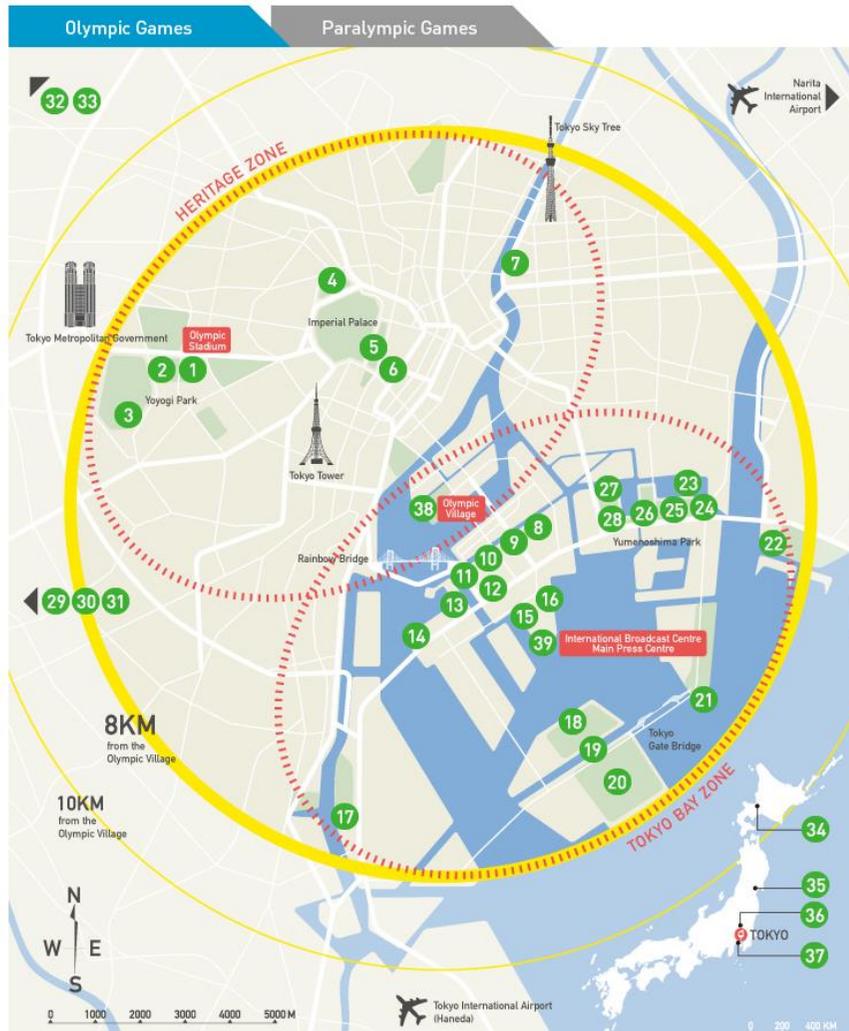
1. Tokyo Olympic and Paralympic Games venues

Source: <http://tokyo2020.jp/en/plan/outline/index.html>

1. Olympic Stadium
 - Opening and Closing Ceremonies
 - Athletics
 - Football
 - Rugby
2. Tokyo Metropolitan Gymnasium
 - Table Tennis
3. Yoyogi National Stadium
 - Handball
4. Nippon Budokan
 - Judo
5. Imperial Palace Garden
 - Cycling (road : start)
6. Tokyo International Forum
 - Weightlifting
7. Kokugikan Arena
 - Boxing
8. Ariake Arena
 - Volleyball (indoor)
9. Olympic BMX Course
 - Cycling (BMX)
10. Olympic Velodrome
 - Cycling (track)
11. Olympic Gymnastic Centre
 - Gymnastics (artistic)
 - Gymnastics (rhythmic)
 - Gymnastics (trampoline)
12. Ariake Tennis Park
 - Tennis
13. Odaiba Marine Park
 - Triathlon
 - marathon swimming
14. Shiokaze Park
 - Volleyball (beach)
15. Tokyo Big Sight Hall A
 - Wrestling
16. Tokyo Big Sight Hall B
 - Fencing
 - Taekwondo
17. Seaside Park Hockey Stadium
 - Hockey
18. Sea Forest Cross-Country Course
 - Equestrian (eventing : cross-country)
19. Sea Forest Waterway
 - Rowing
20. Sea Forest Mountain Bike Course
 - Canoe-Kayak (sprint)
 - Cycling (mountain bike)
21. Wakasu Olympic Marina
 - Sailing
22. Kasai Slalom Course
 - Canoe-Kayak (slalom)
23. Youth Plaza Arena A
 - Badminton
24. Youth Plaza Arena B
 - Basketball
25. Dream Island Archery Field
 - Archery
26. Dream Island Stadium
 - Equestrian (jumping, dressage, eventing)
27. Olympic Aquatics Centre
 - Aquatics (swimming)
 - Aquatics (diving)
 - Aquatics (synchronised swimming)
28. Waterpolo Arena
 - Aquatics (waterpolo)
29. Musashino Forest Sport Centre
 - Modern Pentathlon (fencing)
30. Tokyo Stadium
 - Modern Pentathlon (swimming, riding, running, shooting)
 - Football
31. Musashino Forest Park
 - Cycling (road : finish)
32. Asaka shooting Range
 - Shooting
33. Kasumigaseki Country Club
 - Golf
34. Sapporo Dome
 - Football
35. Miyagi Stadium
 - Football
36. Saitama Stadium
 - Football
37. International Stadium Yokohama
 - Football
38. Olympic Village / Paralympic Village
39. IBC/MP

2. Tokyo Olympic and Paralympic Games venue map (as of March 2015)

Source: <http://tokyo2020.jp/en/plan/outline/index.html>



3. Tokyo 2020 Games Roadmap (as of February 2015)

	2014	2015	2016	2017	2018	2019	2020	2021		
Phase	Foundation Phase	Planning Phase (before Rio 2016 Games)	Planning Phase (after Rio 2016 Games)			Readiness Phase	Games Operations Phase	Dissolution & Legacy Phase		
Key Events	Sochi 2014 ● Establishment of Tokyo 2020 Organising Committee	● Shift to Public Interest Incorporated Foundation	Rio 2016		PyeongChang 2018	Test Events	Tokyo 2020 Games	● Dissolution of Tokyo 2020		
Games Planning/Preparation	Coordination Commissions, Project Reviews and various meetings with IOC and IPC						Olympic and Paralympic Games Operations	Official Report (Reports /Films)	Legacies for the Future	
	Games Foundation Plan	Planning of client services, functions and venues → Planning improvements based on lessons learnt at Rio 2016 Games			Readiness enhancement					
	Coordination with relevant entities/preparation (Sport/Broadcast Services/Energy/Security/Paralympic Integration/Sustainability/Brand Protection, etc.)									
	Promotions aimed at creating excitement and enthusiasm in the build up to the Games; domestic and international Engagement activities toward the successful delivery of the Games									
Ceremonies, Torch Relay			● Handover Ceremony at Rio 2016 Games			● Torch Relay route announcement	Torch Relay	● Opening Ceremony		
Games Brand, Ticketing Sales		● Launch of Tokyo 2020 Games emblem		● Launch of Tokyo 2020 Games mascot		● Ticketing sales announcement				
Games Volunteers					Announcement of application process; Recruitment procedure; Training					
Universities/Junior Colleges Partnerships	University Cooperation Forums; Collaborative activities (e.g. Olympic/Paralympic education, development of global human resources, etc.)									
NOC/NPC Pre-Games Training		Requests for information to candidate pre-Games training camps			Publish guide to candidate pre-Games training camps (guides to be regularly updated)					
	(Relevant Regional/Local Governments will conduct direct discussions, and conclude separate agreements and contracts)									
Collaboration with Disaster-affected Areas and Regional/Local Governments	Support for recovery efforts (Actions to be coordinated by the Liaison Committee to Support the Recovery Effort in Tohoku); Coordination with Regional/Local Governments (e.g. Education/Cultural Programmes, promotion of local products, etc.)									
Venue Development	Venue locations confirmed; Basic plans; Design; Construction; Renovation of existing venues									
Action & Legacy Plan		Establishment of Action & Legacy Plan		Annual updates of the plan; carry out respective actions				Legacy Report		
	-Sport and Health -Urban Planning and Sustainability -Culture and Education -Economy and Technology -Recovery, Nationwide benefits, Global communication									

Source: http://tokyo2020.jp/en/plan/gfp/Tokyo_2020_Games_Foundation_Plan_EN.pdf (p.141)

B. Urban developments in Tokyo by 2020

1. Land prices in central Tokyo

Source: JPC, 2015. <http://japanpropertycentral.com/2015/03/land-prices-continue-to-rise-mlit-look-report/>

RESIDENTIAL LAND
<p>Bancho area, Chiyoda-ku: 0 ~ 3% rise</p> <p>Sales for both brand new and existing condominiums [apartments] in the Bancho area have been positive but future supply has been limited by a lack of development sites. As one of the leading luxury residential neighbourhoods in Japan, demand from both Japanese and foreign investors has been strong. High demand from investors has pushed sale prices upwards while apartment rents remain relatively flat. As a result, rental yields, especially for family-type apartments, have been falling.</p>
<p>Minami Aoyama area, Minato-ku: 0 ~ 3% rise</p> <p>Demand from wealthy buyers is very strong, particularly for luxury condominiums. Supply, however, is limited and it is a sellers' market. There have been cases of second-hand apartments selling for higher than their original price when new. The supply of brand new apartments is also at a very low level. Demand for rental apartment buildings from both J-Reits and private funds has been pushing up sale prices and pushing down yields. Vacancies in mid-to-high end rental apartments is starting to improve, but rents have remained relatively flat.</p>
<p>Daikanyama area, Shibuya-ku: 0 ~ 3% rise</p> <p>The supply of residential property in the Daikanyama is at a severely low level, while buyers are forced to compete over the small supply. Prices have been moving upwards but there are some in the industry who believe they are nearing their peak.</p>
<p>Tsukuda, Tsukishima area, Chuo-ku: 0 ~ 3% rise</p> <p>Since the Olympic announcement in 2013, both demand and prices have been rising in these areas, although the market does not appear to be overheating. The relatively convenience to central Tokyo has provided a relatively stable rental market, which may continue to appeal to investors. Strong pricing, however, has slowed down some sales activity. The market for second-hand apartments over 70 million Yen is especially dull.</p>

COMMERCIAL LAND
<p>Marunouchi, Otemachi, Yurakucho, Hibiya areas, Chiyoda-ku: 0 ~ 3% rise</p> <p>Most of the land in these areas is controlled by a small number of major real estate companies and there is very little data on recent transactions. These are prime office areas and office rates have been declining as the commercial property market recovers.</p> <p>Supply is extremely limited in these areas and multiple bids are made on properties.</p>
<p>Ginza area, Chuo-ku: 0 ~ 3 % rise</p> <p>Ginza is Japan's leading retail area and stores have benefited from an increase in foreign tourists. Land price increases were a little slower from the previous quarter (3 ~ 6% rise), but demand for real estate remains high.</p>
<p>Roppongi area, Minato-ku: 0 ~ 3% rise</p> <p>Rents in A-Class office buildings have been showing signs of increasing. There are expectations that land prices will continue to improve as various commercial projects continue to be developed in the area.</p>
<p>Toranomon area, Minato-ku: 3 ~ 6% rise</p> <p>The Toranomon area saw a 3 ~ 6% rise in the fourth quarter of 2014, up from a 0 ~ 3% rise in the third quarter. The area continues to undergo some massive redevelopments, which have been spurred on by the completion of Toranomon Hills in 2014. The Tokyo Government also announced plans for a new station on the Hibiya Line which would have a direct connection to Toranomon Hills.</p>

2. Major construction works planned by 2020 (as of March 2015)

This is a non-exhaustive list. Some of these works had been planned regardless of the awarding of the Olympic and Paralympic Games to Tokyo.

Airport facilities

- Haneda flight capacity will be increased in terms of international flights: more landing corridors (MEIJI UNIVERSITY WORKSHOP)

District redevelopment

- Tsukiji market currently located at Tsukiji station in.... ward will be destroyed. The new fish market will be constructed in Toyosu by November 2016
http://ajw.asahi.com/article/behind_news/social_affairs/AJ201412180071
- Otemachi, Marunouchi, Yurakucho redevelopment plan

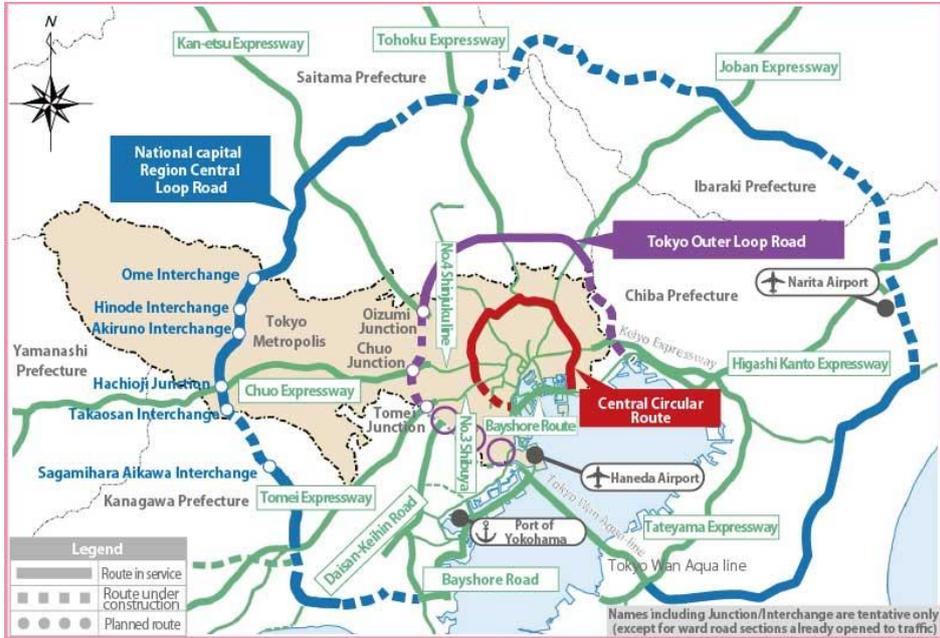
Metro network

- A new station will be built on the Yamanote line between Tamachi and Shinagawa stations
<http://sudy.co.hu/index.php/en/news/652-new-station-to-boost-shinagawa-s-international-role>
- A new station will be constructed on Hibiya line
- Line will be extended for JR connections to Haneda airport

Road network

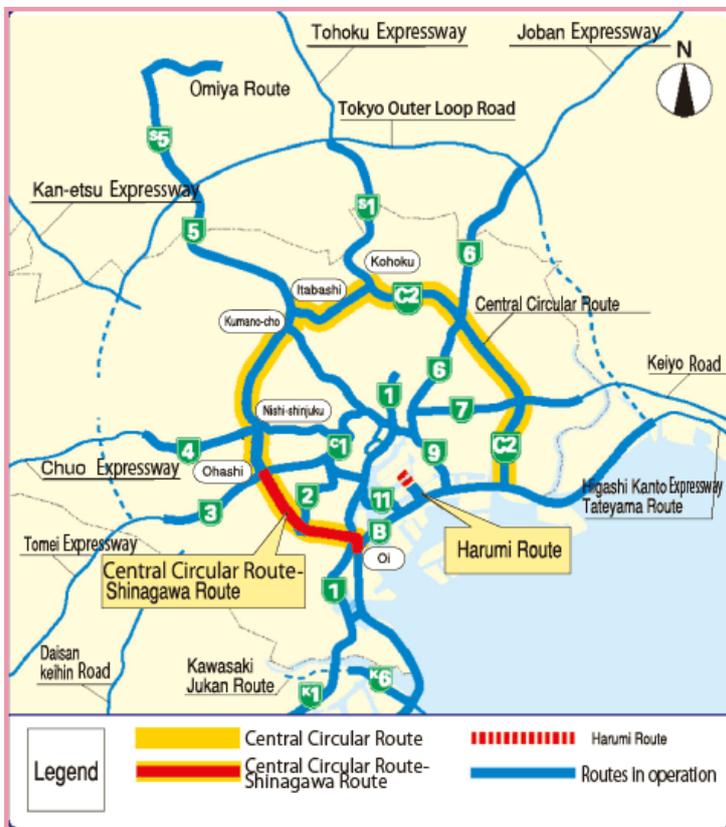
Source: TMG. <http://www.kensetsu.metro.tokyo.jp/english/douro/gaiyo/01.html>

- 20km of major roads of the centre of Tokyo will be widened.
- 28km of motor ways and major roads will be constructed



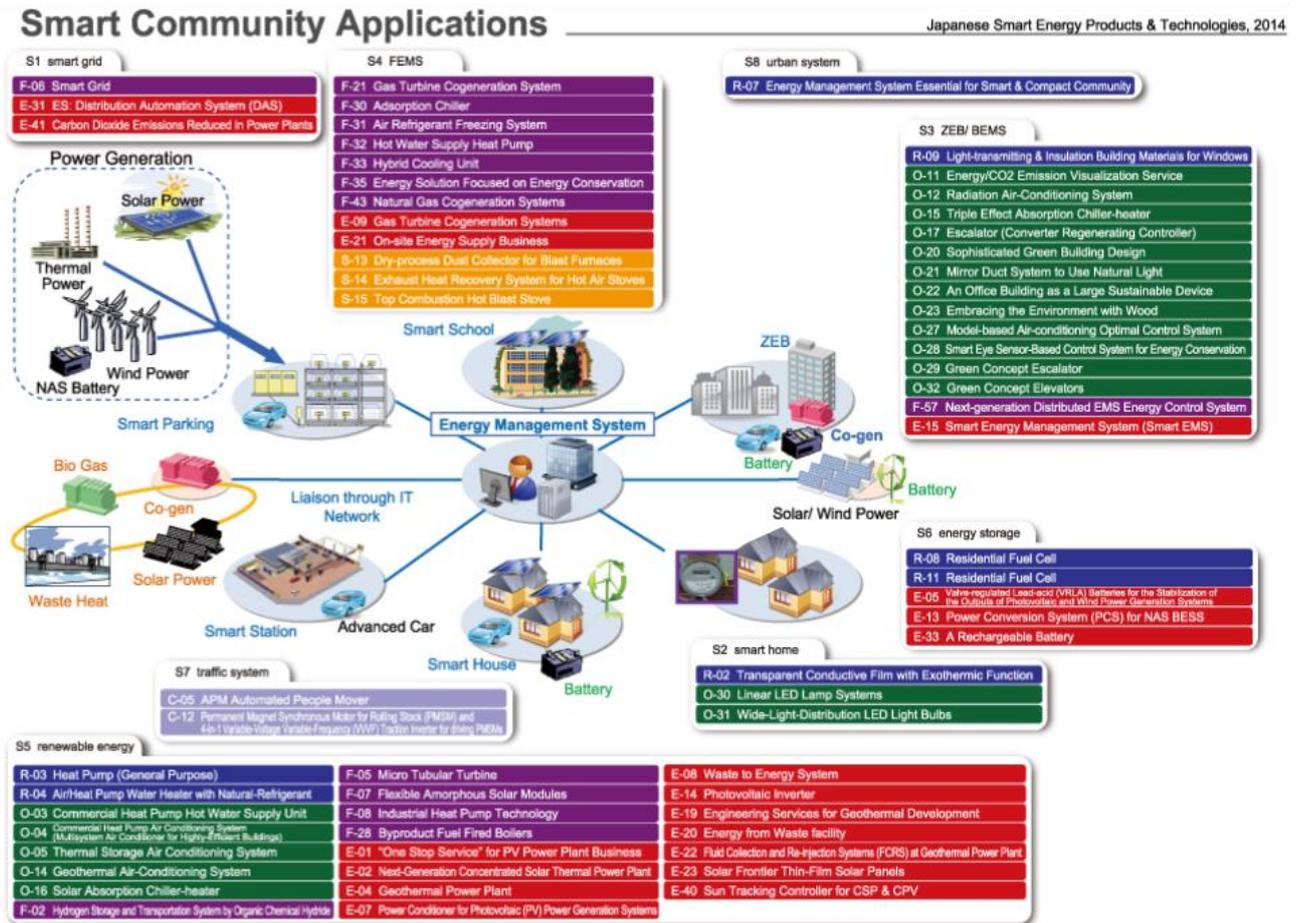
Major road works in Tokyo Metropolitan Area.

Major road works in Tokyo.



C. Smart community technology

Source: JASE-W. 2014. http://www.jase-w.eccj.or.jp/technologies/smart_community.html



D. Energy sector in Japan

1. Summary of Japan's power industry players

Source: BNEF, "Japan's approach to demand side management", October 2014

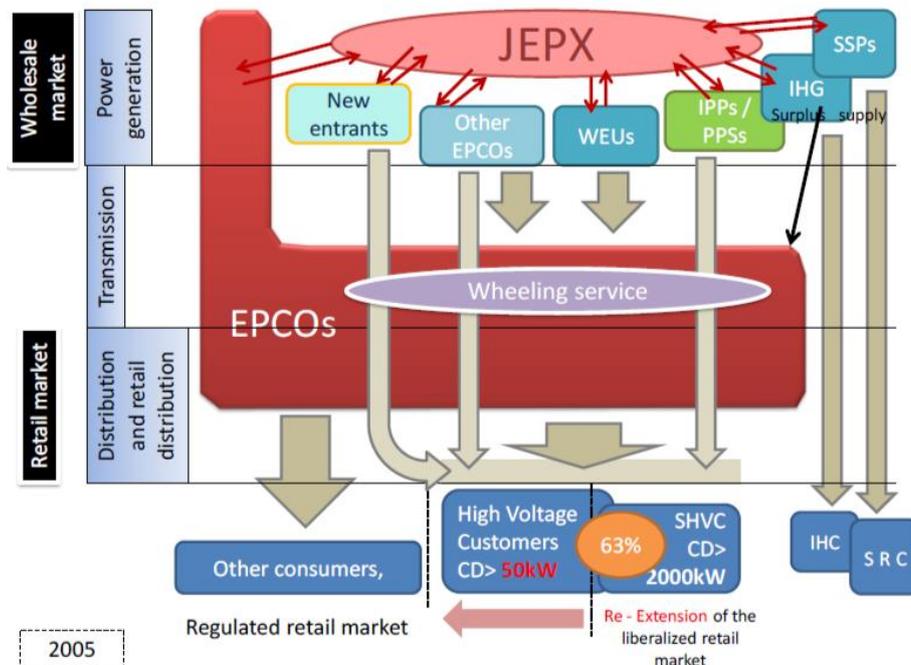
<http://about.bnef.com/white-papers/japans-approach-to-demand-side-management/>

Category	Generation	T&D	Retail	Description
General electricity utilities (GEU)	✓	✓	✓	10 vertically integrated utilities originally formed as regional monopolies
Wholesale electricity utilities (WEU)	✓	✓		Two large wholesalers with minimum 2GW of power generation capacity: J-Power, Japan Atomic Power Co.
Specified-scale electricity utilities called "Power Producer and Supplier" (PPS)			✓	New entrant after deregulation in 2000. Some companies own generation capacity. Examples include: Ennet and Summit Energy
Specified electricity utilities	✓	✓	✓	Entities that generate and sell power in a specified areas; consist less than 1% of power demand and supply. Examples include: JR East, JFE Steel
Wholesale suppliers	✓			Municipality-owned hydro and independent power producers. Examples include: Kimitsu Cooperative,

Source: Bloomberg New Energy Finance. Note: T&D stands for transmission and distribution

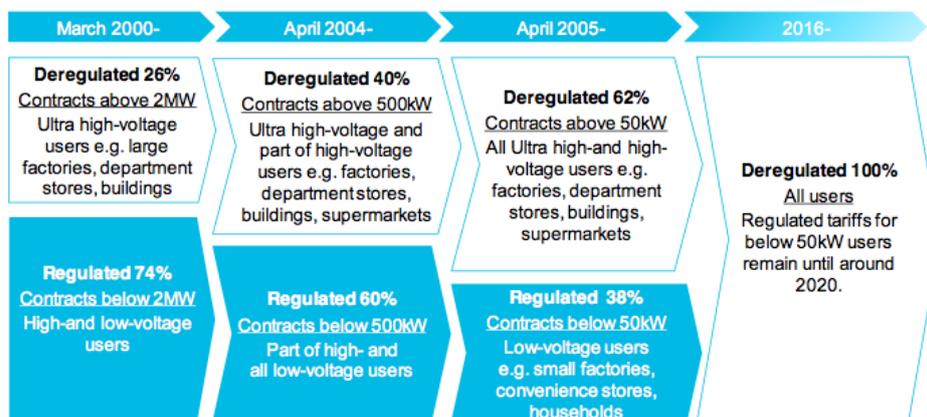
2. Electricity market structure in Japan

Source: Vigot, Victoria. "The Japanese clean energy sector development". 2013. <http://www.eu-japan.eu/sites/eu-japan.eu/files/Japanese-Clean-Energy-sector-development-2014.pdf>



3. Japan history of retail market reform

Source: BNEF, “Japan’s approach to demand side management”, October 2014
<http://about.bnef.com/white-papers/japans-approach-to-demand-side-management/>



Source: Bloomberg New Energy Finance

4. Summary of smart metering plans of Japanese electricity utilities (as of September 2014)

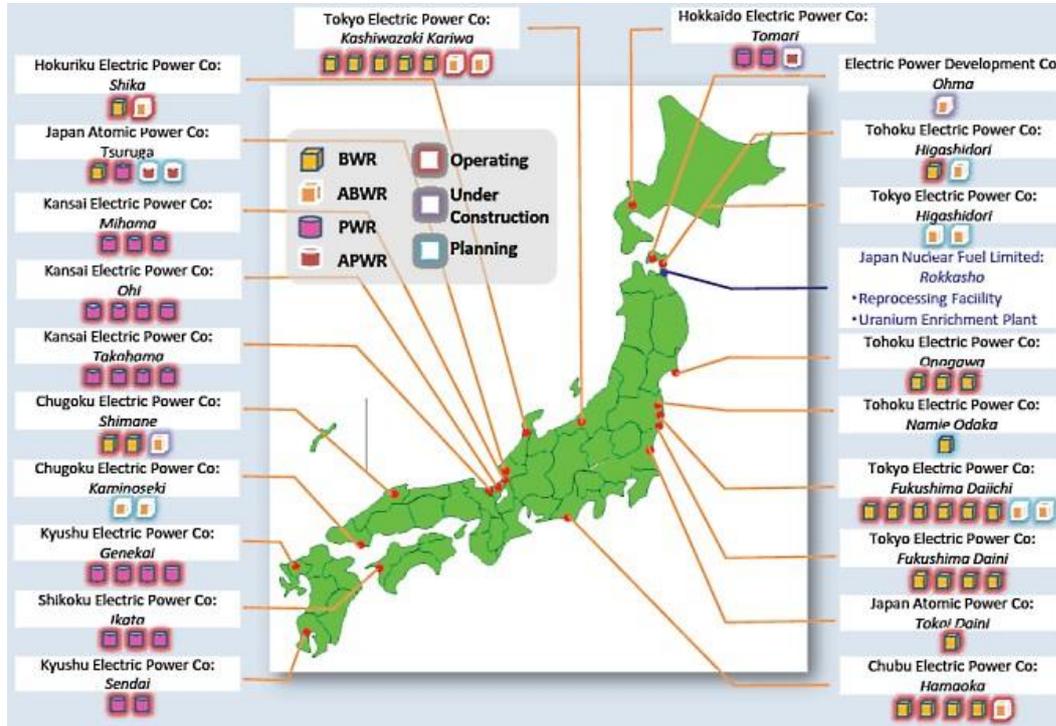
Source: Source: BNEF, “Japan’s approach to demand side management”, October 2014
<http://about.bnef.com/white-papers/japans-approach-to-demand-side-management/>

Utility	Total meters	Vendors	Deployment plan
TEPCO	27.68m	<ul style="list-style-type: none"> Comms & MDMS: Toshiba-led consortium (includes NEC, NTT Group) Meters: GE Fuji Electric Meter (30A, 60A), Mitsubishi Electric (60A, 120A), Osaki Electric (30A, 120A), Toshiba Toko Meter Systems (30A, 60A) 	TEPCO has selected all vendors and started deployment with the goal of deploying 1.9m by the end of FY2014: 30A (residential): 460,000, 60A (residential): 1,260,000, 120A (C&I): 180,000. It plans to achieve complete deployment by the end of FY2020.
Kansai EPCO	13.14m	Current vendors: Enegate, GE Fuji Electric Meter, Mitsubishi Electric, Osaki Electric, Toshiba Toko Meter Systems	Kansai initially started deployment in 2002. It plans to reach 50% deployment by the end of FY2017 and 100% by the end of FY2022.
Chubu EPCO	9.5m	<ul style="list-style-type: none"> Comms: Mitsubishi Electric (Itron) MDMS: Hitachi Meters: TBD (preferred vendor is Osaki Electric) Note: group firm Chubu Seiki has primary responsibility for smart meter network O&M.	RFP process concluded in 2013. Chubu has already installed smart meters at industrial customers (above 500kW) and since January 2012 has been installing smart meters at C&I customers with the goal of completion by the end of FY2016. It started installation for residential customers in October 2014 and plans reach 100% deployment by the end of FY2022.
Kyushu EPCO	8.17m	<ul style="list-style-type: none"> Comms: Fujitsu MDMS: Hitachi Meters: GE Fuji Electric Meter, Mitsubishi Electric, Osaki Electric, Toshiba Toko Meter Systems 	RFP process launched in July 2013. Kyushu has already equipped all C&I customers with smart meters, and plans to reach half of its residential customers by the end of 2019, and 100% by the end of FY2023.
Tohoku EPCO	6.75m	TBD (preferred vendors are Hitachi and Osaki Electric)	RFP process for meters and comms launched in October 2013; and RFP for MDMS started in June 2014. Tohoku plans to start installation in January 2015, reaching all its customers by the end of FY2023.
Chugoku EPCO	4.95m	TBD (preferred vendors are GE Fuji Electric, Mitsubishi Electric and Toshiba)	RFP process launched in November 2013. Plans to commence deployment from October 2015, reaching 100% of its customers by the end of FY2023.
Hokkaido EPCO	3.68m	TBD (preferred vendors are GE Fuji Electric, Mitsubishi Electric and Toshiba)	RFP process launched in January 2014, and winners to have been informed by August 2014 (winners have not been publicly disclosed). Plans to commence deployment in FY2015 and achieve completion by the end of FY2023.
Shikoku EPCO	2.72m	TBD (preferred vendors are GE Fuji Electric, Mitsubishi Electric and Toshiba)	Shikoku EPCO launched its RFP process in August 2013 and conducted an information session on meter specifications in January. It plans to start deployment in the second half of FY2014, reaching 100% of its C&I customers by the end of 2016 and 100% of all customers by the end of FY2023.
Hokuriku EPCO	1.81m	TBD (preferred vendors are GE Fuji Electric, Mitsubishi Electric and Toshiba)	RFP process launched in September 2013. It plans to commence deployment in July 2015 and reach 100% deployment by the end of FY2023.
Okinawa EPCO	0.86m	TBD (preferred vendors are GE Fuji Electric, Mitsubishi Electric and Toshiba)	RFP process launched in June 2014. It plans to start deployment in FY2016 and reach all its customers by the end of FY2024

5. Nuclear power plants in Japan: location and safety reviews

Source: <http://www.world-nuclear.org/info/Country-Profiles/Countries-G-N/Japan/>

Nuclear power plant locations in Japan



Status of restart applications and safety reviews

Type	Utility	Reactors	Applied	Final plan	Notes
PWR	Kyushu	Sendai 1&2	July 2013	Oct 2014	NRA final approval and local govt. approval, NRA pre-operation inspection, expect restart July
	Kansai	Takahama 3&4	July 2013	Oct 2014	NRA final approval, awaiting local govt. approval
	Kansai	Ohi 3&4	July 2013		Quake & tsunami scenarios
	Hokkaido	Tomari 1-3	July 2013		Quake scenarios pending
	Shikoku	Ikata 3	July 2013		Quake & tsunami scenarios
	Kyushu	Genkai 3&4	July 2013		Quake & tsunami scenarios
	Kansai	Mihama 3	March 2015		
	Kansai	Takahama 1&2	March 2015		
ABWR	TEPCO	Kashiwazaki Kariwa 6&7	Sept 2013		NRA doing inspection
	J-Power	Ohma 1	Dec 2014		NRA reviewing
BWR	Chugoku	Shimane 2	Dec 2013		NRA reviewing
	Tohoku	Onagawa 2	Dec 2013		NRA reviewing

	Chubu	Hamaoka 4	Feb 2014		NRA reviewing
	J-Power	Tokai 2	May 2014		
	Tohoku	Higashidori 1	June 2014		Question re faults nearby
	Hokuriku	Shika 2	August 2014		

PWR: Pressurized Water Reactor BWR: Boiling Water Reactor ABWR: Advanced BWR

E. Smart community related networks and research organisations in Japan

Advanced Cogeneration and Energy Utilization Center Japan (ACEJ)

http://www.ace.or.jp/web/en/aboutus/aboutus_0010.html

Central Research Institute of Electric Power Industry (CRIEPI)

<http://criepi.denken.or.jp/en>

Future City Initiative (FCI)

Japan Renewable Energy Foundation (JREF)

<http://www.jref.or.jp/en/>

Japan Smart City Alliance (JSCA)

<https://www.smart-japan.org/english/>

Smart City Planning Inc

<http://www.smartcity-planning.co.jp/en/>

F. Business in Japan

1. Routes to market

Source: UKTI. <http://www.exporttojapan.co.uk/doing-business/finding-best-to-route-market-in-japan>

The key question most exporters ask themselves is can we do this ourselves, or do we need a local partner to make it in Japan. Although in the past, Japan's traditional business culture would have usually involved multiple layers of intermediaries until your products or services reached end-users, this business style has changed dramatically over the past decades. Appreciation of cost cutting, easier communication and a rise in English-capable employees has increased the potential for entering Japan directly yourself. That said, the majority of small and medium overseas companies enter with the support of local partners.

Doing it by yourself

A minority of UK companies enter the Japanese market by themselves. It can work for your company – this depends very much on the nature of your business and your considerations around the risks versus benefits of such an approach.

Going direct involves you supplying your products or services to your clients without involvement of any intermediaries. This way, you will gain knowledge of who you are selling to, obtain end users' direct feedback and understand customer needs better; cutting-down the number of middlemen also enables cheaper price. However, you will need to be prepared to deal with a large amount of communication with the client directly in Japanese leading to potential communication difficulties and misunderstandings. This way can work efficiently with companies who are fluent in English and/or where the issue is very technical or specific (e.g. drug licensing to pharmaceutical companies).

Using a Local Partner

The majority of UK companies that enter the Japanese market do so through a Local Partner. There are three main ways to go about this:

- Indirect business with clients via agent

You will talk to an agent and they identify your potential clients for you. Generally speaking, they operate small scale and have specific industry expertise and do not hold any stock. These agents can be based in Japan or the UK. For example, this works efficiently in the case of identifying licensing partners of specific technologies in the ICT sector. If you manage to identify the most suitable person for your business, it can turn out to be very effective, but finding the right intermediary is not an easy process; strong and proactive management of this relationship will be important.

- Indirect business with clients via non-exclusive distributor(s)

You may talk to more than two distributors at any time. As they identify and speak to your end-user clients, the potential for communication issues or misunderstandings will be less than talking to your clients direct. You may wish to bear in mind, however, that your distributors could approach the same end-user client and introduce the same products for a different prices. Allocation of different products or regional coverage to each distributor may be an idea, but the latter may not work as most Japanese distributors with an import function operate nationwide.

- Indirect business with clients via sole-representative:

You will select and appoint one Japanese distributor as your sole-representative. At the outset you will discuss all aspects of your business in Japan with them, including identification and selection of appropriate clients, and product / service marketing (e.g. price and brand image controls). This will be the simplest way of doing business with Japan, but if you find their performance unsatisfactory and decide to terminate, this can bring complications as you extricate yourself from the relationship. Just as appointing a sole agent above, finding the right company for you is not an easy process – and strong, proactive management of this relationship will be important.

Identifying the right partner

In general, you will need to invest time and energy into finding the right partner in Japan if you are to give yourselves the best chance of success in the market. Like most of Asia, Japan is a business culture built on relationship-building and nurturing.

You will wish to assess potential partners' appropriateness from various aspects including following points:

- Their Sector knowledge, experience and evidence of a clear marketing strategy at the outset (short-mid-long term)
- Their Network in Japan with prospective end-user clients
- Their Market coverage – are they nationwide or regional?
- The Language skills you can call on

In addition, if your products or services are subject to specific regulations (e.g. medical devices, cosmetics, footwear, financial services, etc.), you will wish to check your potential partner's level of expertise with handling regulatory affairs. The presence of a section committed to regulatory issues may be one way to judge this.

UK Trade & Investment Japan can provide insight into helping you make this important decision. Please feel free to speak to one of our Market Specialists in Tokyo or Osaka.

Partnership Options

Although similar to other markets, and of no surprise to those who export elsewhere, there are a variety of partnership options available when you do business with Japan:

- Export of finished products to Japan
- Contract manufacturing at your production site to Japanese client's specifications
- Licensing including brand licensing and technology licensing
- R&D collaboration
- Cooperation agreement involving Japanese and overseas companies' marketing of their products and services each other in their own sales territories

And finally...

When you speak to potential partners, you should be aware that it will be a two-way assessment: it is not only you who will be trying to assess suitability; they will be assessing you. Japan is a very competitive, sophisticated and information-oriented market. The right partner can make all the difference. But Japanese partners can be discerning and there may be a host of issues which prevent them from entering into a partnership which on the surface may look obvious for them as well as you.

You should be sensitive to their concerns, answer their detailed questions patiently and promptly, and come to these meetings prepared to provide information and strong unique selling points in the best way possible.

2. Setting up a business in Japan

Source: UKTI. <http://www.exporttojapan.co.uk/doing-business/setting-up-a-business-in-japan>

There are the 4 options for setting up a business in Japan.

Representative Office

A Representative Office does not require registration with the legal affairs bureau and tax forms. It is only permitted to carry out functions such as market research, PR etc. and no sales activities may be undertaken. It may be suitable if Japanese clients already have established a good relationship with the UK exporter and the sales transaction and paperwork is being carried out entirely between the UK exporter and the Japanese client and the Japanese Representative Office's role is limited. It is not possible to open a bank account or sign a tenant agreement with this status.

Japan branch office

A branch office may engage in sales activities. Once you have representatives in Japan (at least one must be resident in Japan) and an office address you can register a Japan branch office. You will need to create an affidavit document concerning establishment of a branch office and have it notarised at the British Embassy. You will then need to register the branch office at the legal affairs bureau and register the company seal. This is often regarded as an easier option compared to setting up a Japanese incorporation.

Japanese subsidiary

This could be in the form of either a joint-stock corporation (KK) or a Godo Kaisha (LLC).

The KK is the most prevalent form of entity and can enjoy credibility and a good social standing. An LLC is less recognised but the number of such incorporations has been rising rapidly including adaptation by some of the large foreign companies e.g. Apple, Walmart.

Since the shareholders and managers of the companies are not separated in the case of an LLC, it has the benefit of having more management freedom e.g. sharing of profits. It is necessary to have at least one director who is resident in Japan to set up a KK. For setting up an LLC, it is necessary to have a personal seal certificate of a representative member who has to be resident in Japan.

Limited Liability Partnership (LLP)

An LLP is formed when two or more individuals/corporations conclude a limited liability partnership agreement, pay the investment as agreed and register at the legal affairs bureau. At least one member of an LLP must be resident in Japan. It is not possible to convert an LLP to a KK and nor does an LLP have the authority to be an applicant for licenses/approvals required in regulated business sectors.

G. Contact points in Tokyo for EU companies intending to invest in Japan and for Japanese companies intending to invest in Europe

The following list indicates the contact points of Embassies to Tokyo, which can provide information to European companies to access the Japanese smart city market.

This list was established based on information provided by the Embassies and information available on Embassies' websites as of March 2015.

The contact details of representatives are shared with their approval.

Country	For EU companies intending to invest in Japan	For Japanese companies intending to invest in Europe
Austria	Mr. Marcel RASINGER, Commercial Section – Head of Technology Affairs T: +81-3-3403-1777 tokio@advantageaustria.org	Embassy of Austria Commercial section T: 03-3796-1331 Aba-tokyo@advantageaustria.org
Belgium	Embassy of Belgium T: +81-3-3262-0191 - For companies located in the Walloon region: Walloon Trade and Investment Office (AWEX) Ms Claire GHYSELEN, Walloon Economic Representative Ms Yuka MORITA, Economic and Commercial Attaché (for trade inquiries) awextokyo@belgium-wallonia.jp - For companies located in the Brussels-Capital-Region: Brussels Invest & Export (BIE) Ms Yuko MIYAKE, Economic and Commercial and Attaché tokyo@brussels-japan.or.jp - For companies located in the Flemish region: Flanders Investment and Trade (FIT) Mr. Dirk DE RUYVER, Japan Representative Mr. Ben KLOECK, Technology Director Mr. Georges NAGELS, Trade Commissioner (for trade inquiries) tokyo@fitagency.com	T: 03-3262-0191 tokyo@diplobel.fed.be Flanders Investment and Trade T: 03-5210-5884 tokyo@fitagency.com Invest in Brussels T: 03-3556-2431 tokyo@brussels-japan.or.jp Wallonia Foreign Trade & Investment Agency T: 03-3262-0951 tokyo@awex-wallonia.com
Bulgaria	Embassy of Bulgaria Mr. George KOSTOV, Head of Commercial and Economic Section T: + 81-3-3465-1021 g.kostov@mee.government.bg iba@investbg.government.bg	InvestBulgaria Agency T: +359-2985-5500 iba@investbg.government.bg

Croatia	Embassy of Croatia Mr. Sanjin VLASTELICA Mr Igor MERLIN T: +81-3-5469-3014 svlastel@mvep.hr igor.merlin@mvep.hr	Agency for Investments and Competitiveness T: +385-1628-6800 info@aik-invest.hr
Cyprus	Embassy of Cyprus T: +81-3-3592-0611 info@cyprus-hcg.jp	Cyprus Investment Promotion Agency T: +357-2244-1133 info@investcyprus.org.cy
Czech Republic	Embassy of Czech Republic Mr. Marcel SAUER T: +81-3-5456-5283 commerce_tokyo@mzv.cz	Czech Invest Ms Eliska NOVAKOVA T: +81-3-5485-8266 tokyo@czechinvest.org
Denmark	Royal Danish Embassy Mr. Ole BOISSELIER-MALMGREN, Senior Commercial Officer T: +81-3-3496-3001 oleboi@um.dk	Invest in Denmark
Estonia	Embassy of Estonia T: +81-3-5412-7281 Embassy.Tokyo@mfa.ee	Estonian Investment Agency T: +81-3-6721-8255 yamaguchi@estonia.or.jp
Finland	Embassy of Finland T: +81-3-5447-6000 sanomat.tok@formin.fi	Finpro Japan, Finland Trade Centre T: +81-3-6859-6810 japan@finpro.fi
France	Embassy of France Mr. Jerome DESQUIENS, Export Department – Head of Infrastructure, Transports, Heavy Industries and IT services T: +81-3-5798-6130 jerome.desquiens@businessfrance.fr	Invest in France T: +81-3-5798-6140 japan@investinfrance.org
Germany	Embassy of Germany T: +81-3-5791-7700 info@tokyo.diplo.de	Germany Trade & Invest Mr. Iwami ASAKAWA T: +81-3-5275-2072 iwami.asakawa@gtai.com
Greece	Embassy of Greece Mr Dionyssios PROTOPAPAS, Head of Economic & Commercial Section T: +81-3-3404-5853 dprotopapas@mfa.gr Ecocom-tokyo@mfa.gr	Enterprise Greece T: +30-210-335-5700 info@enterprisegreece.gov.gr

Hungary	Embassy of Hungary T: +81-3-3798-8801 mission.tio@mfa.gov.hu	Hungarian Investment and Trade Agency (HITA) T: +81-3-3798-8801 tokyo@hita.hu
Ireland	Embassy of Ireland Ms Reiko HIRUMA (Enterprise Ireland) T: +81-3-3263-011 reiko.hiruma@enterprise-ireland.com	Ireland Investment Promotion Agency T: +81-3-3262-7621 idotokyo@ida.ie
Italy	Embassy of Italy T: +81-3-3453-5291 ambasciata.tokyo@esteri.it	Invitalia T: +81-3-3453-5291 ambasciata.tokyo@esteri.it
Latvia	Embassy of Latvia Ms Alina ASCEPKOVA T: +81-3-3467-6888 alina.ascepkova@liaa.gov.lv jp@liaa.gov.lv	Investment and Development Agency of Latvia (LIAA) T: +81-3-3467-6888 jp@liaa.gov.lv
Lithuania	Embassy of Lithuania Ms Violeta GAIZAUSKAITE, Minister Plenipotentiary T: +81-3-3408-5091 violeta.gaizauskaite@urm.lt	Invest Lithuania T: +370-5262-7438 info@investlithuania.com
Luxembourg	Embassy of Luxembourg Luxembourg Trade and Investment Office T: +81-3-3265-9621 tiotokyo.amb@mae.etat.lu	Luxembourg for Business Ms Yuriko MATSUNO T: +81-3-3265-9261 yuriko.matsuno@mae.etat.lu
Malta	Embassy of Malta T: +81-3-3460-2392 malta@ipsj-tokyo.org	Malta Enterprise T: +356-2542-0000 info@maltaenterprise.com
Netherlands	Embassy of the Kingdom of the Netherlands Mr. Chuji AKIYAMA, Trade & Industry – Economic Officer TOK-EA@minbuza.nl	Netherlands Foreign Investment Agency (NFIA Japan) T: +81-3-5776-5520 tokyo@nfia-japan.com T: +816-6944-9234 osaka@nfia-japan.com
Poland	Embassy of Poland T: +81-3-5794-7020 tokio.amb.sekretariat@msz.gov.pl	Polish Information and Foreign Investment Agency (PAIiIZ) T: +48-2234-9800 post@paiz.gov.pl

Portugal	Embassy of Portugal T: +81-3-5212-7322 portugal@embportjp.org Portuguese Trade & Investment Agency (AICEP) T: +81-3-3511-2871 aicep.tokyo@portugalglobal.pt	Portuguese Trade & Investment Agency (AICEP) T: +81-3-3511-2871 aicep.tokyo@portugalglobal.pt
Romania	Embassy of Romania T: +81-3-3479-0411 economic@ambrom.jp	Department for Infrastructure Projects and Foreign Investments (DPIIS) T: +402-1316-3194 dpiis@gov.ro
Slovakia	Embassy of Slovakia Mr. Branislav POCHABA, First Secretary, Economic and Commercial Section T: +81-3-3451-2200 Branislav.pochaba@mzv.sk emb.tokyo@mzv.sk	Slovak Investment & Trade Development Agency T: +421-5826-0100 sario@sario.sk
Slovenia	Embassy of Slovenia Ms Rie KOTARI, Economic Affairs Assistant T: +81-3-5468-6275 rie.kotari@gov.si	SPIRIT Slovenia T: +386-1589-1870 invest@spiritslovenia.si
Spain	Embassy of Spain T: +81-3-3583-8531 emb.tokio@maec.es	Invest in Spain T: +81-3-5575-0431 tokio@comercio.mineco.es
Sweden	Embassy of Sweden Mr. Takuya NAKAGAWA T: +81-3-5562-5050 takuya.nakagawa@business-sweden.se ambassaden.tokyo@gov.se	Business Sweden T: +81-3-5562-5014 japan@business-sweden.se
United Kingdom	Embassy of the UK Mr. Etsuo WATANABE, UK Trade & Investment – Senior Commercial Officer T: +81-3-5211-1100 etsuo.watanabe@fco.gov.uk	UK Trade and Investment T: +4420-7215-5000

H. News about smart city related development in Japan

Some websites are in Japanese only. It is possible to use an online translating application (such as Google automatic translation) to read a basic English translation. While such translation is useful for an introduction, it is necessary to rely on more professional translations for accurate market information.

Bloomberg New Energy Finance (BNEF)

Energy and finance in Japan

<http://about.bnef.com/?cat=0&s=japan>

Eurobiz

Monthly magazine about business in Japan.

<http://eurobiz.jp/category/columns/green-biz/>

Federation of Electric Power Companies of Japan (FEPC)

Monthly bulletins about Japanese electricity demand, generation and purchase

<http://www.fepec.or.jp/english/news/index.html>

Fuji Keizai

Market reports (in Japanese)

<https://www.fuji-keizai.co.jp/market/index.html>

Inside the Games

2020 Olympic and Paralympic Games in Tokyo

<http://www.insidethegames.biz/olympics/summer-olympics/2020>

Japan for Sustainability (JFS)

Energy and climate change, resilience, corporate sustainable responsibility

<http://www.japanfs.org/en/news/energy.html>

Japan Renewable Energy Foundation (JREF)

<http://jref.or.jp/en/column/>

Nikkei BP

Solar energy market

<http://techon.nikkeibp.co.jp/solar-power-plant/news/>

Smart City (in Japanese)

<http://bizgate.nikkei.co.jp/smartcity/>

Smart Japan

Urban trends <http://www.itmedia.co.jp/smartjapan/subtop/city/>

Industrial trends <http://www.itmedia.co.jp/smartjapan/subtop/trend/>

I. Upcoming smart city events in Japan

Smart City Expo, Kyoto

2015, May 20th – 22nd

<http://www.kyoto-smartcity.com/e/index.html>

Smart Cities and Sport, Summit 2015

2015, October 12th-14th

<http://summit.olympiccities.org/>

World Smart Energy Week, Osaka

2015, September 2nd – 4th

<http://www.wsew.jp/en/>

Keio Techno Mall, Tokyo

2015, December 4th

<http://www.kll.keio.ac.jp/ktm/en/index.html>

World Smart Energy Week, Tokyo

2016, March 2nd – 4th

<http://www.wsew.jp/en/>

Seminars

EU-Japan Centre for Industrial Cooperation <http://eu-japan.eu/events>

Webinars

EU Business in Japan <http://www.eubusinessinjapan.eu/events> (IoT webinar 2015, May 5th)

UKTI Export to Japan <http://www.exporttojapan.co.uk/events>

Event database for Japan

http://www.jetro.go.jp/j-messe/?action_enFairList=true&type=v2&v_2=009&v_3=002

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