Volume 12 | Issue 50 | Number 3 | Article ID 4236 | Dec 14, 2014

Japan's Resilient, Decarbonizing and Democratic Smart Communities 燃料脱炭する日本のレジリエントで民主的なスマートコミュニティ

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On December 1, 2014 the rapidly expanding domain of renewable energy burst through a stubborn bottleneck of vested interests and outmoded ideas. Germany's biggest utility, E. ON, announced it would abandon fossil fuel and nuclear power to create "a new business model based on renewables, intelligent grid systems, energy management and other services."[2] If its plans go forward as proposed, E. ON's portfolio in what it calls "the new energy world" will include about 20 gigawatts of renewable generation in operation or in the pipeline, over 1 million kilometers of transmission infrastructure, and 33 million customers on the sales end.[3] In an era of paradigmatic changes in energy technology and business models, and particularly in all aspects of electricity (i.e., from generation through distribution and to consumption), E. ON's announcement still came as a surprise even to the German authorities. Experts are struggling to grasp the enormity of the implications of E. ON's move for power systems, climate policy, financial markets, regulatory regimes, and other important aspects.

E. ON's radical move is yet another wake-up call for Japanese energy policymakers. The E. ON shock seems potent evidence that electricity's paradigm shift is indeed towards resilient, decentralized and renewable generation and distribution, as well as other intelligent systems that comprise smart communities. At the same time, E. ON's immensity portends yet another threat that big capital might dominate and define the transition as well as monopolize its considerable opportunities. As one observer warns, "the determined entry of such a big player into the market will likely happen at the cost of Germany's decentralized, small-scale producers - the backbone of the *Energiewende* ["energy shift"] until now."[4]

E. ON Goes Green

E. ON's decision will certainly influence the Japanese debate and policymaking choices on power reform and smart communities. As we show below, Japanese mainstream energy technocrats have for years been diligently examining Germany. Their attention predates Japan's March 11, 2011 (3-11) natural and nuclear disasters. And even prior to E. ON's startling declaration, they had deemed the feed-in tariff (FIT), distributed generation, and other key elements of the *Energiewende* useful. The institutions through which Japan's energy technocrats are unfolding what they have learned, adapting Germany's lessons to Japanese circumstances, are potentially very powerful.

Though this declaration may seem a gross overstatement, it is indeed possible that Japan could overtake Germany as a model for rolling out renewables while bolstering inter-regional and interpersonal equity. This potential exists because of Japan's manifold incentives and capacities. In Japan as in Germany, the role of nuclear versus renewable, and centralized versus distributed energy, has long been a stumbling block due to sunk costs and political coalitions. But the dominance of vested energy interests in Japan's political economy is rapidly eroding, while the post-3-11 imperative of resilience continues to rise higher on the agenda and reshape options in the power economy. Japan is certainly disadvantaged by the lack of adept political leadership and a credible opposition. But in the face of a multifaceted crisis, technocratic vision and action appear to be creating a productive and rapid route to green and resilient smart communities, using some of the mechanisms that were key to Japan's startling postwar recovery. The concluding section offers suggestions on how to accelerate and amplify Japan's smart community paradigm through greater external engagement.

Learning the Stadtwerke Business from Germany

Japan's smart-energy technocrats – an expanding stream of intellectuals and bureaucrats – is in fact implementing a structural reform for diffusing a new paradigm of smart communities. The smart community paradigm is centred on distributed energy, but also encompasses other utility services, mobility, communications, governance, health care, and myriad elements of modern urban life. The most recent summary statement of the Japanese project is outlined (in Japanese) in *Smart Communities: A Smart Network Design for Local Government Infrastructure*. This important new book was organized by Japan's top mainstream energy intellectual Kashiwagi Takao and published October 15, 2014.[5] Its initial chapter, written by Kashiwagi, describes how Japan's energy technocrats are using the FIT, *stadtwerke* (municipal business), power-sector deregulation and other key elements of Germany's green energy transition as engines for something much more ambitious. The Japanese are linking the project to fiscal and financial policy, with the potential to revitalize industry, build resilience, and bolster local democracy.

Kashiwagi's chapter depicts smart communities as the key item in Japan's growth strategy. This is not the first time Kashiwagi has made this assertion. He has been making the argument for well over a year, in previous books as well as numerous articles and smart-community events. Kashiwagi is not a mere academic scribbler, awaiting a daring policy entrepreneur to put his ideas into action. Rather, he is himself an enormously influential figure in Japanese energy policymaking circles. In addition to his academic role as specially appointed professor at Tokyo Institute of Technology, Kashiwagi is also chair of Japan's Hydrogen/Fuel Cell Strategy Council,[6] chair of the Ministry of Economy Trade and Industry's (METI) new energy subcommittee of its Committee for Natural Resources and Energy, Project Leader of Tokyo Institute of Technology's Advanced Energy Systems for Sustainability,[7] to name a few of his positions of influence in policymaking. Through these positions, Kashiwagi appears to have helped realize Japan's June 14, 2013 New Growth Strategy's explicit commitment to ICT-led growth. He also had a hand in coordinating the expansion of smart-community projects and the increasing streams of finance flowing from various ministries of the central government plus their allied quangos (Quasi Autonomous Non-Governmental Organization) such as the New Energy and Industrial Technology Development Organization (NEDO).

Kashiwagi Takao

Kashiwagi's vision, as articulated in his book chapter, puts the motive force for rolling out Japan's smart communities in a vehicle akin to the German *stadtwerke* of municipally owned utilities. Germany's 900 or so *stadtwerke* that operate in energy - out of a total of 1420 that operate in water supply, sewage, waste management and other community functions[8] - were among the major winners from German power deregulation. They are also increasingly recognized as key to that country's ability to diffuse renewable energy, whose role in Germany's power mix has risen from about 6% in 2000 to 30% in 2014. The stadtwerke have helped drive this impressive progress because they have organizational, financial and other heft together with a central role in servicing community demand for power.[9] And their role appears set to increase further in quantitative as well as qualitative terms. For example, influenced by an "energy avant-garde," Dessauer Stadtwerke in Saxony-Anhalt is poised to replace its ageing coal-fired generation fleet with decentralized and renewable power, together with an innovative thermal-storage system.[10]

It is unclear at this point whether E. ON's aggressive move into renewable energy, smart grids and other elements of the new paradigm will weaken the expanding role of the German stadtwerke in the energy shift. The latter are generally popular with residents and are linked to the powerful community movements that have succeeded in renationalizing (or, more accurately "re-municipalizing") the power grids of such urban centres as Hamburg.[11] These grids and other assets, such as gas and district heating networks, are largely held by the big 4 energy giants, E. ON, RWE, EnBW and Vattenfall that dominate Germany. It remains to be seen how far remunicipalization reaches, but in some German communities the project aims at bringing not just power but also gas and district heating into community ownership.[12]

Old Dessau Mine Now a Festival Site For Digging Rock (Music) Rather than Coal

Stadtwerke and Japan's Local Public Corporations

The above is part of what Japanese energy technocrats have been watching. Their use of

the stadtwerke as the engine for rolling out Japanese smart communities is important. The Japanese vision appears to be more ambitious than that of their German counterparts: while Germany is a leader in diffusing renewable power per se, it appears to be rather a laggard on the EU rollout of smart cities, perhaps because it can export and import power.[13] Germany's FIT-driven energy shift in the world's fourth largest economy has had a profound impact on the global public debate and policymaking. Yet if Japan's incipient model finds traction, it may have an even larger impact. Japan is the third-largest economy, well over USD 1 trillion larger than Germany, and now in the midst of an unprecedentedly large technological experiment. Japan's unparalleled need for sustainable economic growth dovetails with an increasingly powerful role of innovative local governments working in tandem with smart elements of key central agencies. The stadtwerke approach not only puts the local community in charge of smart community deployment; it also institutionalizes that leadership in a vehicle with the financial, administrative and other means to take effective action. Japan's model may help turn us away from building smart communities led by behemoths of the private sector. Properly financed and incentivized local governments seem unlikely to allow large corporate actors simply to siphon income from core urban infrastructures and do as they will with data on the residents' consumption, movements and other interactions in the smart community.

Japan's history of local public corporations also offers a fertile basis for the insertion of energy-centred stadtwerke. Japan's 1700-plus local governments have long had their utility functions, especially water, serviced by local public corporations. Japan's local special corporations numbered only 45 in 1953, but grew to 3000 in the wake of the high-growth 1960s.[14] Japan has seen waves of expansion of local public corporations' roles and numbers, as the need arose. Their ranks swelled rapidly in the postwar years of high growth, due to the imperative of diffusing such basic infrastructure as waterworks and sewerage in cities and towns undergoing what was then an unprecedented pace of urbanization. The public corporations' welfarist role grew between 1975-1984, and their role in industrial promotion between 1985 and 1995.[15]

The total number of Japan's local governments sharply declined over those decades. Amalgamations between 1953 and 1955 saw their count more than halved from 10,520 in October of 1945 to 3,975 in September of 1956. They continued to merge afterwards, reaching 3,229 in 2000, and then dropped to 1,718 in April of 2014.[16] That decline in the number of local governments, even as the number of local public corporations increased, underscores the significance of the latters' role.

As of fiscal year 2012 (FY 2012), Japan's 1,718 local governments boast a total of 8,843 public corporations, of which 3,637 (41.1%) manage the sewer systems and 2,152 (24.3%) the water supply. The value of these businesses total (FY 2012) YEN 17.6 trillion in operations, and are managed through special accounts that are separate from Japan's local government general-budget (whose spending on sanitation, education, public works, and other categories is just under YEN 95 trillion). Of the public corporations' YEN 17.6 trillion in operations, the sewerage-works represent YEN 5.8 trillion (33%) and the water-works YEN 4.4 trillion. Local public corporations also operate in the black, earning a total of YEN 4.6 trillion (FY 2012), of which sewerages earn YEN 1.2 trillion and waterworks YEN 2.2 trillion.[17] These are, in short, significant local public service business operations that contribute to the economic activity of the local area as well as to the revenue base of the local governments.

It is interesting that Kashiwagi and others look to Germany with scant reference to their own country's developmental history. Certainly, the

proliferation of public corporations in Japan, both local and national, became a focus of administrative reforms, especially during former PM Koizumi Junichiro's (2001-2006) assault on wasteful spending and government finances. There is no denying that the money squandered on unneeded roads and bridges truly was prodigious, and reform essential. But at the same time, there are good reasons local public corporations remain in place. And it may be instructive to recall how linking finance to these vehicles can get important things done, and done well.[18]

Japan's local public corporations have almost no presence in electricity and gas, representing only 0.9% of the power supply and 2.6% of gas supply. These are key infrastructures for growing the smart community, as well as diffusing economic opportunity to nearby communities that could supply larger areas with power and energy. When it comes to power, postwar Japanese prefectures, cities and towns have been passive consumers of centralized privately-owned power delivered by 10 monopoly firms that also dominated their respective catchment areas' political economies. Going distributed, and fast, through smart public agency, is the surest way to disrupt the old business model of the power utilities. The E. ON example is just the latest evidence of how vulnerable old-line utilities are to distributed and renewable energy. Japan's private utilities know this, which is why they are desperate to water-down the power-sector deregulation slated for 2016 as well as place their people in charge of the Organization for Cross-regional Coordination of Transmission Operators (OCCTO), the new agency to police the grid.[19]

When viewed against this background, the technocrats' initiatives appear to have an unstated but potentially quite "political" dimension. As noted, the power stadtwerke in Japan offer a mechanism that puts the incentives to champion revolutionary change, leading smart communities, into the hands of the cities and towns. The Ministry of Internal Affairs and Communications (MIC), a fortuitous blend of ICT enthusiasm coupled with responsibility for local fiscal health, has in fact set a goal of establishing no fewer than 1000 local energy firms over the five years from 2015. The national government will not only allow local governments to finance investments in these firms, but it will pick up half the interest payments.[20] Moreover, Kashiwagi will help coordinate these initiatives as chair of a new MIC "Commission for Deploying a Local-Government-Led Community Energy System." This Commission was created by MIC on November 4 of this year, and held its first meeting on November 7. It will have 3 more meetings, seeking to devise a template for local-government decentralized energy systems, prior to the end of its tenure in March of 2015.[21] These and other moves suggest that smart-energy bureaucrats in the MIC are acting quickly, using the Abe regime's desperation to ignite sustainable domestic growth via a focus on "local Abenomics" and "regional revitalization" since mid-2014.[22]

Making Choices

The technocratic manoeuvres are fast, but have a long background. As noted earlier, Kashiwagi and his cohort, having been looking at the German city-business model for some time, evidently determined that German stadtwerke would make a handy vehicle for bundling post-deregulation expertise and institutional clout (e.g., to raise capital) without having to rely on unpredictable, distracted party politics or weak and fractious popular movements. In addition, the public-sector-led approach means that the smart community is not a construct of Hitachi, IBM and the other market players that would like to lead the smart city rather than be led.[23] Reading through the past few years of the technocrats' work (as well as work within the MIC[24]) suggests that their studies became increasingly detailed as they realized the

post-3-11 period offered an opportunity to break through the parasitism of the monopoly utilities and get the energy political economy focused on "prosumer" (power producer and consumer) cities.

Aside from the content of his recent activism and writing, what makes Kashiwagi especially significant is that he is both a core member of the so-called “nuclear village” as well as an enthusiast for renewable energy.[25]

Kashiwagi thus straddles both Japan’s deeply damaged paradigm of nuclear power as well as its rapidly emerging paradigm of distributed power and smart communities. He is evidently not yet ready to dump nuclear, but does he now write about its role in the smart community. This stance is a stark contrast to, for example, Hitotsubashi University Professor Kikkawa Takao, a staunch supporter of nuclear power who has argued that Japan’s remaining and approved nuclear reactors should be restarted and the sites made into smart communities.[26]

The severity of Japan’s economic and other crises also puts a premium on making smart choices in the midst of multiple constraints. In this context, Kashiwagi appears to have opted to side with the general interest rather than the sectoral interests that dominate Japan’s political economy. If so, this is hardly a surprise: Kashiwagi is the designer of Japan’s first smart community, a 100% renewable microgrid project, linking NEDO (New Energy and Industrial Technology Development) and other facilities, that went live at the 2005 Aichi World’s Fair.[27] He surely has a lot of emotional and intellectual capital invested in these initiatives, and does not want to see them undermined by vested interests.The power monopolies, with their focus on centralized power and control of the grid, as the core of their business model, stand in the way of a nationwide diffusion of smart communities. Hence actual deregulation of the power sector is key to Kashiwagi’s argument. So also is the diffusion of distributed renewable power supported by the FIT. Kashiwagi argues that, for starters, Japan's local governments stand to gain YEN 5 trillion of Japan’s YEN 15 trillion power economy through distributed renewable energy supported by the FIT. That would be a huge boost for their finances as well as their local economies.

Komiyama Hiroshi

Another potentially very important agent in this shift is Komiyama Hiroshi's explicit commitment to a 100% renewable goal by 2050. Komiyama is another top energy-policy intellectuals. He is not only former President of the University of Tokyo, but also Chairman of the Mitsubishi Research Institute and is networked throughout Japanese mainstream energy and environmental institutions. Before 3-11, Komiyama was vague on the role of

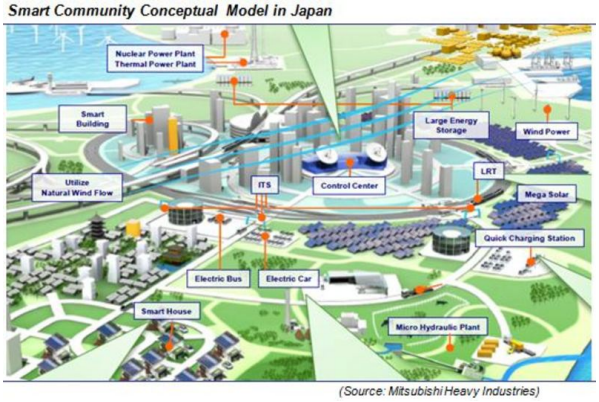
nuclear in the energy mix to achieve his emphasis on 70% energy self-sufficiency by 2050.[28] But in the mid-October "Great Energy Challenge" debate in Tokyo hosted by National Geographic and Shell Oil, Komiyama presented his vision as 100% renewable by 2050 and dismissed former IEA-chief Tanaka Nobuo's proposal to focus energy R&D on next-generation nuclear.[29]

Japan's two top mainstream intellectuals of energy, Komiyama Hiroshi and Kashiwagi Takao, are thus explicitly on the same page concerning the importance of green smart communities.[30] The two are most prominent among the thought leaders of Japan's mainstream technocratic energy expertise. Their stress on the role of local governments brings institutionalized democratic representation into the smart community concept. Japan's smart community concept is thus evolving into a city-led paradigm in the wake of 3-11 and the initial set of projects undertaken in Kitakyushu and elsewhere.[31]

Distributed Power Versus Vested Interests

Japan's growth agenda has long sought to develop smart communities, with many of the ideas developed by Kashiwagi and his cohort. Even before the March 11, 2011 (3-11) multiple natural and nuclear disasters at Fukushima and the larger Tohoku ("Northeast") region, Japan's growth strategies emphasized smart grids, renewable energy and related innovations. These innovations were focused on the cities in which over half of the world's population and over 90% of the Japanese population already live, and which are growing apace, because the Japanese recognized them as a massive business opportunity. For example, on June 18, 2010, the DPJ government of Hatoyama Yukio approved a New Growth Strategy that emphasized green innovation, centred on smart communities, in order to build YEN 50 trillion in new green business and 1.4 million new jobs by 2020.[32] The METI "smart city" elite were clearly prominent among the technocrats designing this approach, as is evident from their very detailed December, 2010 presentation (in Japanese) "Policy Evolution Towards the Realization of Smart Communities."

Pre-3-11 METI documents of course include nuclear in the centralized baseload power mix for the smart community. Japan's explicit energy policy at the time, embodied in the "Strategic Energy Plan" of June 2010, was to secure 50% of electricity (24% of primary energy) from nuclear power by 2030, up from a capacity of about 30% in 2010.[33] But the documents were even then clearly more enthusiastic about distributed generation, smart grids, power storage, smart meters and other devices that comprised the fast-emerging smart community paradigm. The smart-energy bureaucrats, keenly aware of developments in Germany and elsewhere, were also concerned that Japan might build yet another "galapagos" of over-engineered and uncompetitive technologies. Their 2010 "Policy Evolution Towards the Realization of Smart Communities" pointed to this risk in electronics, energy, and automotive technology, and highlighted the smart community as an export platform and a context for smart technologies that affords innovative engagement with global markets.[34]



Nuclear and Other Large-Scale Conventional Power in the pre-3-11 Smart Community

Pre 3-11 Japanese technocrats were working in an archipelago with minimal reserves of conventional fossil fuels. They wanted to maximize domestic energy independence, decarbonize much of the power mix, and achieve these goals at a reasonable cost. They sought to expand nuclear and renewables as much as possible, but with an emphasis on nuclear. They had to work, after all, in a context where the powerful electricity monopolies' business models privileged centralized power. Hence, prior to 3-11, designs for smart communities had large-scale thermal and nuclear generation arrayed on their outskirts as baseload power. The Fukushima disaster appears to have taken the nuclear role off the drawing board so far as smart communities are concerned. Indeed, after 3-11 nuclear reactors tend to disappear from the smart-community power schemes, while distributed generation – especially through renewables - moves to the fore.

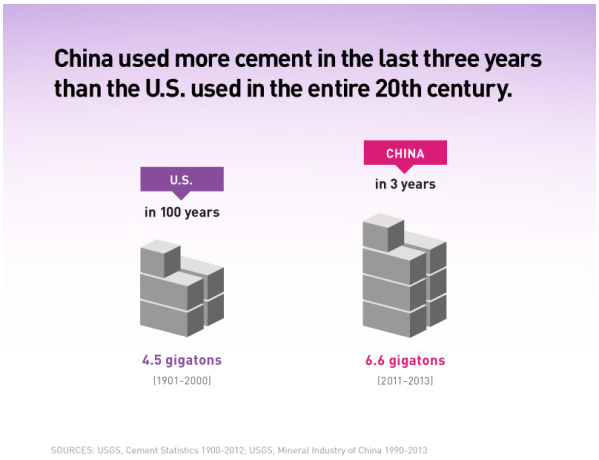
Post 3-11 Toshiba Smart Community

The technocrats do not explicitly declare that they are writing nuclear out of the power-mix for smart communities. But the patent, post-3-11 (and post-Sandy) need for distributed power and resilient communities seems to lead away from nuclear. This logic appears to have permeated the Japanese smart-community concept without anyone publicly stating it. Yet it makes complete sense: Unless one is prepared to offer the world smart communities with a small-modular nuclear reactor (SMR) underneath, low-carbon (or even no-carbon) smart communities mean maximizing renewable energy and efficiency. This appears to be what works best economically and environmentally. Indeed, Japan's blue-chip power-unit makers Toshiba and Hitachi's corporate PR videos and other media for promoting their smart communities emphasize that the projects are 100% renewable energy.[35] Neither are they alone in this: the US Navy's Office of Naval Research – hardly averse to nuclear, whether power or weapons – is taking a central role (via a DC smart grid and other gear) in such projects as 100% renewable Chiang Mai World Green City (ASEAN's first), with explicit aims to broaden that renewable collaboration elsewhere in Thailand as well as Vietnam, and explicitly as a little noticed part of the pivot to the Asia-Pacific.[36]

Smart Communities for Decarbonization and Democratization

Japan's new paradigm of smart communities thus emerges from its most authoritative circles, emphasizes equitable structural reform, and focuses on energy. This is very important. What has hitherto been absent from Japan's – not to mention the global – debate on smart communities is an explicit statement that their core is energy. What has also been missing is a powerful engine for their diffusion and democratization. We are now getting both from the Japanese, and at a time when these are undeniably urgent matters for all countries.

Songdo smart city design



Let's not try this in India

Consider the confused international debate over smart cities. LSE Senior Urban Fellow Adam Greenfield, in his "Against the Smart City," lambasted such corporate-led, resource-intensive smart cities as Songdo (South Korea) and Masdar (Abu Dhabi).[37] Greenfield's work lacks, however, engagement with the imperative of building resilient decarbonizing smart communities in the face of extreme weather, unsustainable energy, and the numbing prospect of large infusions of greenhouse gases associated with India's and China's mega-urbanization. China, in the course of accelerated urbanization, has consumed more cement in three years (2011-2013) than the US did in the entire century and played a large part in driving up the price of oil to levels where USD 70 now seems impossibly cheap.[38] China's resource-intensive urbanization involving hundreds of millions of migrants in a matter of decades is continuing apace. It cannot be repeated without blowing past even more planetary resource and environmental boundaries. If Indian PM Narendra Modi's proposed smart cities are to evolve as radically resource-lite and decarbonizing communities, as they simply must, Japan's emerging paradigm of smart communities will be one reason.

Japan's paradigm, as it is taking shape, stands out against most competing visions in being primarily about energy, the crucial and geopolitically fraught material flow. Kashiwagi's vision is focused on sustainable generation, smart and small-scale transmission, and maximizing efficiency on the consumption side. Moreover, that centrality of smart energy only makes sense in an archipelago with minimal conventional resources, one that is still reeling from a massive shock to a deeply entrenched power monopoly.

The Japanese model of the stadtwerke is technocratic, to be sure. But at the same time, it appears to be a realistic mechanism for achieving a rapid rollout of smart communities. Public corporations have access to finance, can collaborate on overturning regulatory obstacles (such as those impeding the fast diffusion of onshore wind) and otherwise have means of acting to further community interests. This stadtwerk mechanism also has the virtue of already existing in the local public corporations that the MIC is building on. This makes it possible to avoid having to replicate from scratch the German experience of building a political movement for renewables, something that took several decades.

Japanese civil society certainly has potential force, but lacks a narrative for constructive and consistent action on smart communities. In the wake of 3-11 Japanese people-power movements and public opinion played a valuable role in blocking a return to nuclear "business as usual." Despite Prime Minister Abe Shinzo's pressures, none of Japan's 48 nuclear power reactors has restarted. But popular movements have not been very successful in leading an energy shift or articulating a vision of resilient, decarbonizing and democratic smart communities. Yet as the stadtwerk-centred smart communities unfold, civil society may be empowered to act more decisively. That is, popular movements, local business, and other elements of civil society will create roles for themselves in the emerging institutional context and economic opportunity. Local politics in Japan, as elsewhere, is much easier for citizens to influence than its national-level counterpart because the incentives are stronger and transaction costs lower. And the emergent paradigm of smart communities seems likely to amplify these incentives.

So in the face of considerable inertia and a shortage of time to act on climate change and resilience, there is radical potential in Kashiwagi's vision and in what the MIC and other central agencies and many local governments are doing. Cities stand to be empowered to ensure that the community's interests are served by the interests running their core lifeline infrastructures. Kashiwagi also stresses that deregulated power and the FIT are essential to the Japanese-style stadtwerke, whose aim is to strengthen inter-regional equity as well as sustainable growth. He also wants to build on this, very fast, and make it regional, encompassing East Asia and beyond. It is difficult to overstate the importance of this vision for the geopolitically unstable Asia-Pacific region where much that happens on critical issues of urbanization, energy and CO2 emissions will be decided.

Japanese-Style Stadtwerk's Implications

The intellectual leadership as well as institutionalization of stadtwerk-centred smart communities open the way to a profound shift in R&D investment priorities within Japan's big-three conglomerate (Hitachi, Toshiba and Mitsubishi) power-unit operations and beyond. The makers are clearly aware of the business opportunity. Toshiba, for example, detailed its smart community growth strategy on December 16, 2011, declaring that the smart community market was to expand to YEN 163 trillion by 2015 and that they were aiming at Yen 8 trillion, or 5% of this total.[39] The big three's operations are at present clearly divided among those who want to stick with nuclear (as well as invest in next-generation technologies championed by Tanaka Nobuo and others), those who want to emphasize Carbon Capture and Storage (CCS)-equipped and other fossil fuel power units, and those who want to stress all of the technology involved in the smart community to promote renewables.

The latter technologies are core to the new E. ON company, whose December 1 announcement – described in the introduction to this article – surely did not go unnoticed by Japan's big three conglomerates. Moreover, the sustainable power systems include not just solar and wind, but also waste-heat recovery in sewerage as well as other advanced gear that is being deployed within Japan and in a host of other countries, including Denmark, Canada, and other smart city leaders.[40] The scale of smart-community infrastructure has expanded far beyond what Toshiba assessed it at just 4 years ago.

On the energy front, the smart community debate is thus rapidly evolving a model that elaborates beyond simply smart grids, energy management and some solar and wind. It is coming to include a myriad of advanced energy harvesting systems in development and deployment, engineered wood that is being

used in building high-rises,[41] and other emergent decarbonization technologies. The more this model evolves and diffuses, the greater the pressure within Hitachi, Toshiba and Mitsubishi to focus their R&D resources on that green paradigm in order to avoid galapagos effects.

Like what you see? Panasonic-led Fujisawa Sustainable Smart Town

The number of smart-community participants is increasing as well, opening up yet more room for local leadership, innovation, and engagement of universities as well as NGOs and other citizen groups. For example, the Tokyo Metropolitan Government and its 62 area local governments (wards, cities, and towns) are organized as EcoNet Tokyo 62. The EcoNet Tokyo 62 "Commission on Renewable Energy and Smart Communities" has been at work since 2012, developing a "smart community handbook" of best practices for local communities that have yet to initiate projects.[42] This commission is not a passive vehicle for distributing corporate PR. One of the three key members of the committee, Morotomi Tooru, Professor of Economics at Kyoto University, is a specialist on Germany. He is also head of the "Ider Project" at Kyoto University, which has been undertaking extensive research on the German model as a means of diffusing renewables, not just by the FIT but also by the stadtwerke as an institution.[43] Added to this leadership, the Kanto and other regional divisions of METI are also working on organizing area local governments, so as to accelerate the diffusion of smart communities centred on energy.[44]

Nippon Steel and Sumitomo Metal Group's Kitakyushu Smart Community

Japan has at least 100 smart city (aka "smart community," "smart town,") projects underway. At the end of the current fiscal year (March 31, 2014), the flagship projects in Kitakyushu, Yokohama, Keihanna (Kyoto) and Toyota graduate from their 4-year subsidy support, to emerge as full-fledged self-sustaining projects. These appear to be too strongly led by large corporate concerns, as the EU-Japan Centre for Industrial Cooperation's Clarisse Pham highlights in her detailed October 2014 analysis "Smart Cities in Japan."[45] Surely Kashiwagi and his cohort are well aware of those facts, and what they imply for the viability of Japan's smart communities in the global marketplace. But in the wake of Kitakyushu and other projects, there are dozens of other projects building on the flagship model but distinct from it. The newer projects are deepening their deployment of innovations in renewable energy (including renewable heat), ICT-enabled efficiency (in lighting, heating and cooling, etc.), mobility, health-care services and other core urban functions.

There appears to be plenty of scope for growth. The most recent survey of Japan's smart communities was undertaken by EcoNet Tokyo 62, and between June 19 and July 4th of this year.[46] The survey sampled all 62 of the EcoNet Tokyo 62 governments, with all of them complying. The survey results show a dramatic increase in awareness of smart communities. Moreover, whereas only 2 of the area governments were in the midst of deploying a smart community in 2012, the figure had risen to 10 by 2014. All told, this year 22 of the 62 member governments were either initiating projects or preparing to, versus a total of 14 in 2012.

The results also showed a consistent focus on energy throughout, even among governments that were initially simply thinking about smart communities. In 2012, there were 156 replies (with multiple choices allowed) on the desired goals of the smart community. Of these, 40 sought increased residential energy efficiency, 31 increased office-building energy efficiency, 17 community economic stimulation, 8 enhanced tourism, 11 increased industrial development, 8 area energy independence, and 36 opted for greater resilience of schools, hospital and other facilities. That means 79 of 156 replies focused on energy, either through efficiency or generation.

In 2014, the total number of replies had risen to 176. Of these, 38 sought increased residential energy efficiency, 29 increased office-building energy efficiency, 15 community economic stimulation, 11 enhanced tourism, 11 increased industrial development, 29 area energy independence, and 36 opted for greater resilience of schools, hospital and other facilities. In short, 86 of 176 replies focused on energy, either through efficiency or generation. Moreover, the desire for area energy independence leapt from 8 in 2012 to 29 in 2014, showing by far the greatest increase among all categories.

And as we have also seen earlier, the new projects are being given a vehicle – via the stadtwerke – to ramp up local governments' incentives and ability to lead the projects.

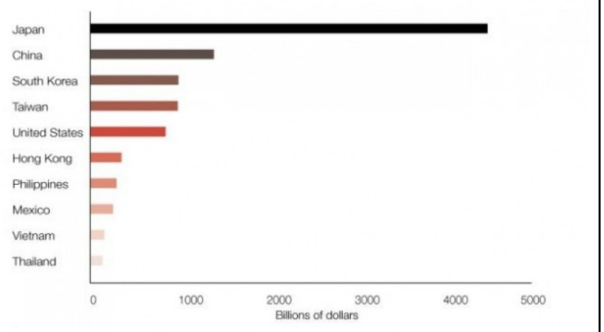
Why is this Unfolding in Japan?

Japan confronts the stark challenge of achieving resilient, decarbonizing, resource-lite growth in the world's most rapidly ageing society. The country faces among the direst threat-levels from climate change, the developed economies' most gargantuan public debt, extreme dependence on increasingly precarious fossil fuels, an unprecedented economic experiment (Abenomics) now clearly in deep trouble, dangerously poisoned relations with unstable neighbours, and a multiplicity of other crises that collectively have no precedent. All developed and developing countries face dense clusters of "wicked problems," particularly via the water-energy-food nexus in the midst of accelerating climate change. But Japan's crises appear to be among the most daunting.

Megacity*	Population* (millions)	Total risk index	Risk index components		
			Hazard	Vulnerability	Exposed values
Tokyo-Yokohama	34.9	710	10.0	7.1	10.0
San Francisco Bay	7.3	167	6.7	8.3	3.0
Los Angeles	16.8	100	2.7	8.2	4.5
Osaka-Kobe-Kyoto	18.0	92	3.6	5.0	5.0
Miami	4.1	45	2.7	7.7	2.2
New York	21.6	42	0.9	5.5	8.3
Hong Kong-Pearl River Delta	14.0	41	2.8	6.6	2.2
Manila-Quezon	14.2	31	4.8	9.5	0.7
London	12.1	30	0.9	7.1	4.8
Paris	11.0	25	0.8	6.6	4.6
Chicago	9.4	20	0.8	5.6	4.4
Mexico City	25.8	19	1.8	8.9	1.2
Washington-Baltimore	7.9	16	0.6	5.4	4.4
Beijing	13.2	15	2.7	8.1	0.7
Seoul	21.2	15	0.9	7.2	2.2
Ruhr area	9.6	14	0.9	5.8	2.8
Shanghai	14.2	13	1.1	7.0	1.7
Amsterdam-Rotterdam (Randstad)	8.0	12	0.9	5.6	2.3

Tokyo-Yokohama unmatched on risk index

In short, Japan has perhaps unparalleled incentives as well as technological foundations on which to build resilient, smart communities. Among incentives to secure a resilient future is the fact that Japan's Tokyo-Yokohama region's natural-disaster threat is rated by Munich Re at 710, compared to 167 for San Francisco, 42 for New York, and 15 for both Seoul and Beijing, as reported in the MEXT 2012 White Paper.[47] The US National Bureau of Economic Research (NBER) also assesses Japan's risk from typhoon damage, through 2090, as being a staggering USD 4.4 trillion of the global total of USD 9.7 trillion, with perhaps diminishing capacity to recover from repeated disasters.[48]



The top 10 countries suffering economic losses from increased storm strength by 2090

The Japanese have powerful incentives to act and are well-endowed institutionally and technologically to do so. Given a conventional-resource-poor archipelago, one still reverberating from the shock of 3-11, Japan's technocrats are now working with local governments and their intermediaries, to diffuse smart grids, energy-management systems and renewable power (among other advanced technologies) in the context of smart communities. They are doing this, it would seem, in part because many wanted to all along, which is implicit in a commitment to distributed generation. And now they have to do it, both because of the dangerous dependence on fossil fuels - a reality that no credible scenario of nuclear restarts will fix - and because they need to put a productive focus on all that Abenomics money that thus far has failed to jump start the economy.

Moreover, in contrast to the German smart-city enthusiasts, forced to work in a federal system dominated by what Wolfgang Streeck rightly derides as intellectually bankrupt managers of the "consolidation state,"[49] the Japanese work within a unitary state in which 2/3 of public spending is done locally. The central agencies, including METI (economy), MLIT (infrastructure), MEXT (education), MAFF (primary industries), and MHLW (health and

welfare), all have their respective reasons for favoring smart communities. These interests have in part been coordinated by the MIC that oversees local governments' fiscal health and is eager to put the stadtwerke model at the core of the smart community.

To be sure, the Japanese initiative is neither party-led nor people-led. This democratic deficit will disturb and dismay many observers who would prefer bottom-up initiatives to arise spontaneously. But that risks taking time we simply do not have. The UNEP, the IPCC, the IEA, the US military, Michael Mann and a rapidly lengthening list of agencies and experts warn that we must act now on climate change and energy.[50] Japan's technocratic initiative is centred on local governments, and is investing them with the incentives and means to act. In addition, local governments are the most democratically responsive and climate-sensitive agent in our era of dangerously dysfunctional national and international governance. Local-government-led smart communities, in this evolving paradigm using the FIT, distributed energy, and stadtwerke, have the potential to pull in yet more citizens, local businesses, universities and other elements of Japanese civil society. That is a very different dynamic from corporate-led smart communities.

Japan is in desperate need of sustainable growth as well as a credible, progressive vision for its citizens. The fact that the country is embarrassingly sidelined as a player in the COP 21 climate talks in Paris next year makes this all the more urgent. Japan is a story of dysfunction at the national level. And yet, looking beyond national politics, Japan has something very important to offer. As we have seen, the Japanese smart community project is deliberately aimed at building new industries, enhancing interregional equity as well as affording a means of mitigating and adapting to the profound climate and energy challenges of the Asian region.

But there is room for deeper external engagement through many international city-centred initiatives involving institutions taking action on climate change and urban resilience. These agencies include the C40,[51] ICLEI (Local Governments for Sustainability),[52] Metropolis,[53] Rockefeller Resilient Cities,[54] the Paulson Institute[55] and others.The Japanese have a great deal to teach the world on building resilient smart communities centred on energy and with a productive role for the public sector. The Japanese also have much to learn about avoiding galapagos and involving civil society in smart communities. What the Japanese energy technocrats have done with their learning from Germany and in their own evolving projects, suggests there are myriad other synergies to be gained through a broader exchange. The potential benefits of institutionalizing much more international exchange include opening new avenues for SME-level disruptive technology, business models and other innovations to flow past the gatekeepers and into this emergent paradigm. The more fluid and diverse these exchanges become, the more resilient, decarbonized and democratic the emerging smart community paradigm is likely to be. As we have seen, the potential scale of these projects is such that accelerating them, while maximizing their diversity and innovativeness, could assure a Japanese leading role toward sustainable and equitable growth.

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Power Policy in Japan" in Jeff Kingston (ed) *Natural Disaster and Nuclear Crisis in Japan: Response and Recovery after Japan's 3/11* (Routledge, 2012). He is lead researcher for a five-year (2010-2015) Japanese-Government funded project on the political economy of the Feed-in Tariff.

Recommended Citation: *Andrew DeWit, "Japan's Resilient, Decarbonizing and Democratic Smart Communities", The Asia-Pacific Journal, Vol. 12, Issue 50, No. 3, December 15, 2014.*

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Notes

[1] This article complements and expands on Andrew DeWit, "Japan's Radical Energy Technocrats: Structural Reform Through Smart Communities, the Feed-in Tariff and Japanese-Style "Stadtwerke," The Asia-Pacific Journal, Vol. 12, Issue 47, No. 2, December 1, 2014.

[2] Paul Hockenos, "German Fossil Fuel Giant Jumps on Renewables Bandwagon," Renewable Energy World, December 3, 2014.

[3] See E. ON's December 1 overview of its revolutionary organizational changes and distribution of assets here.

[4] Paul Hockenos, "German Fossil Fuel Giant Jumps on Renewables Bandwagon," Renewable Energy World, December 3, 2014.

[5] See Kashiwagi Takao (ed), *Smart Communities: A Smart Network Design for Local Government Infrastructure* (Tokyo: Jihyosha).

[6] On this, see Kenji Kaneko, "Japan Announces Roadmap for Hydrogen Introduction," Nikkei BP CleanTech Institute, July 3, 2014.

[7] Kashiwagi's leadership message is available on-line in English.

[8] On this, see p. 5 Caroline Julian, "Creating Local Energy Economies: Lessons from Germany," ResPublica, July 2014.

[9] See Paul Hockenos, "Local, Decentralized, Innovative: Why Germany's Municipal Utilities are Right for the Energiewende," Energy Transition, September 28, 2013.

[10] Jutta Schwengsbier, "The energy avant-garde: when coal mining goes green," DW, December 4, 2014.

[11] See Charleen Fei and Ian Rinehart, "The Re-Municipalization of the Hamburg Grid," Energy Transition, June 27, 2014.

[12] On this ambitious goal, see Claire Provost and Matt Kennard, "MSP Co-Director interviewed on remunicipalisation trend," Municipal Services Project, November 12,

2014.

[13] See p 32 European Parliament Directorate General for Internal Policies, "Mapping Smart Cities in the EU," January 2014.

[14] See p. 38 Richard Samuels, The Politics of Regional Policy in Japan: Localities Incorporated? Princeton: Princeton University Press, 1983

[15] See p. 139 Masaru Sakamoto, "Public Corporations in Japan, with Special Emphasis on Personnel Management," in All Farazmand (ed) Public Enterprise Management: International Case Studies. Greenwood Press, 1996.

[16] See (in Japanese) "The Particulars of Meiji and Showa-era Amalgamations and Changes in the Number of Local Governments," Ministry of Internal Affairs and Communications, (nd).

[17] The details on Japan's local public corporations are available (in Japanese) at the Ministry of Internal Affairs and Communications White Paper on Local Finance, 2014.

[18] For a good recent paper on Japan's financial reforms as a work in progress, which may move to Anglo-Saxon liberalism or revert back more towards traditional models, see Kenji E. Kushida and Kay Shimizu, "Syncretism: the politics of Japan's financial reforms," Socio-Economic Review (2013) 11.

[19] On the institutional details, not the politics, see Peter Weigand and Sumitaka Matsumoto, " Japan's New Electricity Market," Electric Light and Power, July 16, 2014.

[20] On this, see "Small-town Japan's big hopes for energy self-sufficiency," Nikkei Asian Review, October 28, 2014.

[21] See (in Japanese) "Opening of a Commission for Deploying a Local-Government-Led Community Energy System," Japanese Ministry of Internal Affairs and Communications (MIC), November 4, 2014.

[22] For a summary of the politics of "local Abenomics," see Linda Sieg and Tetsushi Kajimoto, "Japan's 'Abenomics' feared in trouble as challenges build," Reuters, September 2, 2014.

[23] On this very important question of whether the public sector will lead, see Alex Marshall, "Big Data, Big Questions," Metropolis, February 2014.

[24] The role of the stadtwerke in smart communities is especially well depicted in MIC's Local Revival Group's Local Policy Division's May 13, 2014 presentation (in Japanese) to the ruling LDP. See "Concerning the Project on Distributed Energy Infrastructure".

[25] In a March 19, 2010 presentation, for example, Kashiwagi argued that an energy system shift was underway, towards low-carbon sources including nuclear power, "clean coal," natural gas as well as renewables linked together via ICT and smart communities. See (in Japanese) Kashiwagi Takao "The Smart Community Concept and Environmental Business," Kanto METI March 19, 2010.

[26] Kikkawa voiced this idea during a September 3, 2013 event (in Japanese) "Towards a National-Government-Led Bolstering of International Standardization Strategies as well as a Diffusion of Japanese Smart Cities Globally," Nikkei BP (transcript), September 3, 2013.

[27] On this see (in Japanese) Kashiwagi's description of the project in his article for the Ministry of Land, Infrastructure and Tourism (MLIT), "The Smart City: Achieving Both Economic Development and Environmental Measures," MLIT Shinjidai, Vol 71, February 2011.

[28] See for example Komiyama's presentation on "Japan as Forerunner of Emerging Issues," December 6, 2010.

[29] The event is summarized by David Braun "Sustainable Cities: Challenges and Opportunities in Japan," National Geographic, October 21, 2014.

[30] They make this explicit in a Japanese-language discussion from October of last year, where they emphasize smart communities as core to growth. See Komiyama Hiroshi and Kashiwagi Takao, "The Outlook for Energy Policy and the Role of Heat Distribution Business," Japan District Heating Council, October 2013.

[31] These flagship projects are led by METI and grouped in the Japan Smart Community Alliance.

[32] See pp 14-17 of the Cabinet's growth strategy (in Japanese).

[33] The Japanese Ministry of Economy, Trade and Industry has an English-language summary of the country's energy plans here.

[34] See e.g. pp 8-12 for their keen awareness of developments in Germany and elsewhere and pp 40-41 for their awareness of the risk of building a Galapagos.

[35] Toshiba and Hitachi's smart community PR is readily available, in English and Japanese, in videos and documents. See, for example, "Smart Community Projects on "Eco-Island Miyakojima" of Okinawa," Toshiba Smart Community Blog, July 15, 2014.

[36] See Office of Naval Research, "Energy Action Month: ONR Expands "Green" Reach in Asia-Pacific," October 27, 2014.

[37] See an overview of Greenfield's work in "Dumbing down the smart city," London School of Economics and Political Science, May 19, 2014.

[38] On comparative cement consumption, see Bill Gates (citing Vaclav Smil) "Have You Hugged a Concrete Pillar Today?", June 12, 2014.

[39] On the basis of Nikkei BP's 2012 "Comprehensive Guide to Smart Cities," Toshiba projected a total of 36 projects in Japan and 485 globally (including Japan's), with 217 of the global projects being centred on smart grids and renewable energy (see in Japanese "Growth Strategy for Building Smart Communities"). Japan's projects have since then increased to over 100, at least, and the 5000-member Smart City Council's 2014 "Smart Cities Readiness Guide" suggests there are several thousand projects underway globally.

[40] See, for example, David Dodge and Duncan Kinney, "Waste heat - How Vancouver mined its sewage to heat an entire neighbourhood," Green Energy Futures, February 4, 2013.

[41] On engineered wood, see Paul Miles, "Why architects are now using wood to construct big buildings," Financial Times, September 26, 2014.

[42] See the website (in Japanese) for the EcoNet Tokyo 62 "Renewable Energy and Smart Community Research Commission," which is to produce the handbook.

[43] The Ider Project page and its numersous research reports (in Japanese) is here.

[44] See, in Japanese, the Kanto Meti's page on its "sumakomi" (smart community) collaboration group.

[45] See in particular, her arguments on pp 41-2 about the paucity of local leadership, citizen engagement and roles for universities and NGOs. Clarisse Pham, "Smart Cities in Japan," EU-Japan Centre for Industrial Cooperation, October 2014.

[46] The survey results (in Japanese), presented to the Commission on October 8, 2014, are available here.

[47] See also Stephen Voss "A Risk Index for Megacities," September 5, 2006, and a more comprehensive list in Japanese.

[48] See Jeff Spross, "Why Tropical Storm Vongfong May Just Be The Beginning For Japan," October 12, 2014.

[49] Streeck brilliantly and concisely explains how the Schumpeter-Goldscheid tax state became the debt state and is now (especially in Germany) a consolidation state that manifests an "uncompromising determination to place its obligations to its creditors above all other obligations" and a coalition of forces that stands in the ways of spending increases and indeed emphasizes cuts on all expenditure other than debt-service payments. See his "Buying Time: the delayed crisis of democratic capitalism," talk on October 20, 2014 at the LSE. The cited remarks are at the 35:00-minute mark.

[50] Michael Mann warns that deep cuts in CO2 have to start now, not sometime later, or humanity risks runaway warming and unimaginable, accelerating chaos. I'd mention McKibben and others.

[51] See here.

[52] See here.

[53] See here.

[54] See here.

[55] See here.