

## Abenomics and Energy Efficiency in Japan アベノミックスと日本におけるエネルギー効率

Andrew DeWit

A signal flaw in Japan's much-debated "Abenomics" package of economic policies is the failure to include ambitious goals and fiscal support for energy efficiency. Many question whether Japanese PM Abe Shinzo's YEN 10.3 trillion fiscal stimulus and other measures will lift Japan from recession and deflation. But as this article will show, only a program that combines aggressive energy efficiency with a renewable energy drive can put Japan's economy on a sound, sustainable footing that maximizes job creation, domestic demand, and the nation's competitive prowess in advanced technology.

Japan is of course widely believed to be the global leader in energy efficiency.<sup>1</sup> So emphasizing ramped-up energy efficiency might seem low on the list of priorities for reviving the country's economy and enhancing its competitiveness. Yet Japan is not the global leader in energy efficiency, and it faces a range of problems for which energy efficiency could prove critical. Japan certainly *should* be in the first rank in efficiency, especially after the March 11, 2011 Fukushima shock; but it ranks fourth in the

most recent comprehensive ranking of major industrialized countries,<sup>2</sup> and risks slipping further down the list. That Japan lags in energy efficiency is perhaps counter-intuitive, given the reigning conventional wisdom together with such incentives as Japan's near-absence of conventional energy resources, its technical wizardry, and the spur from economic damage wrought by post-Fukushima power outages.<sup>3</sup>

But consider this: before the Fukushima shock and its many revelations, many observers simply assumed that Japan was out in front on renewable energy, and were surprised to discover that it lagged far behind the Germans and others. Moreover, just as renewable energy is in an accelerating and disruptive revolution,<sup>4</sup> the same is now true of energy efficiency.<sup>5</sup> The efficiency market is diversifying and growing apace, into the trillions of US dollars.<sup>6</sup> Japan risks losing more ground in this efficiency revolution because, I show below, its post-Fukushima policies have been inhibited, relative to its objective incentives, and the invaluable resource of widespread public willingness, even eagerness, to cooperate. In particular, Japan's

efficiency policy regime is surprisingly tentative. Efficiency measures have been in large measure piecemeal, ad hoc, and aimed at coping with short-run power-supply deficiencies rather than an aggressive deployment of technology and policy to drive down demand. On the governance end, there is a conspicuous lack of coordination by the central government and a seeming hostility from much of the business community, especially the peak association of Keidanren.<sup>7</sup> We should be simultaneously amazed as well as dismayed that post-Fukushima Japan has not presented the world with an efficiency miracle, including powerful lessons in technology and policy.<sup>8</sup>

Even so, the moment is not yet lost. Japan is unable at present to restart nuclear reactors or deploy compensating levels of renewable energy in the short run. Japan is also flush with yet more borrowed cash for a dash from deflation and recession. As we approach the end of the second year after Fukushima, Japan thus possesses the incentives, the capacity and the finances for a second chance to leap ahead of the accelerating competition.

### Abenomics

Debate continues both within Japan and overseas about the Abe regime's approach to reviving and revitalizing the recession-bound Japanese economy. The programme centres on fiscal and financial measures that are aimed at stimulating

Japan's economy and shaking it free of the deflation that has gripped it for 10 of the past 15 years.<sup>9</sup> The financial measures of the Abenomics programme, while important and indeed troubling for a host of reasons, are not our concern here.<sup>10</sup> This article focuses on two major points that have been missing from the discussion: 1) only YEN 200 billion of the YEN 10.3 trillion in immediate stimulus spending is directed at increasing energy efficiency (on business premises), 2) and no clear standard has been established for judging the actual efficiency of the projects these funds will be spent on.<sup>11</sup>

There also appears to be little prospect of a thorough Diet investigation of the deployment of the funds. We are warned of this by Mabuchi Sumio, former DPJ Minister of Lands, Infrastructure, Transport and Tourism (MLIT).<sup>12</sup> Mabuchi certainly knows what he is talking about, and not just because he used to head MLIT: Recall last fall's revelations of the scandalous LDP and DPJ cooperation on diverting funds for reconstructing the devastated Tohoku (Northeast) region to such unrelated projects as nuclear-power research and whaling.<sup>13</sup>

And note that the present stimulus is only part of a larger LDP goal of spending YEN 200 trillion over a decade to "bolster" Japan's economy and infrastructure.<sup>14</sup> This spending will focus on public works, a 180-degree turn from the hapless DPJ's 2009 election promise and subsequent efforts to shift spending from "concrete to

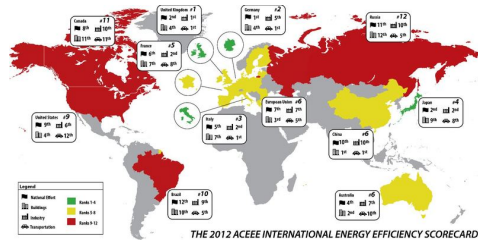
people.”<sup>15</sup> Indeed, the LDP government has already tabled a major boost in public works in the central government’s general budget. The YEN 92.6 trillion draft for Fiscal Year 2013 sees public works increasing by 15.6% from the previous year, to a total of YEN 5.28 trillion.<sup>16</sup> When this proposed total for public works in the general budget is added to public works in the fiscal stimulus as well as those slated at the local-government level, the overall sum exceeds YEN 10 trillion. Moreover, the local spending will be more readily directed by the central government through a retrograde reduction in “no strings attached” grants and an increase in directed grants.<sup>17</sup>

Certainly there are tunnels, roads and bridges that need to be strengthened against the ravages of time,<sup>18</sup> Japan’s exposure to earthquakes, and the increase in natural disasters and infrastructural wear and tear through accelerating climate change.<sup>19</sup> On the other hand, the LDP has a poor track record of making wise choices on productive public works expenditures.<sup>20</sup> With Japan’s national debt now over 200% of GDP, its household savings rates in decline and the MOF forced increasingly to seek overseas funding for the national debt, it is especially important to maximize the country’s (rather than particular interests’) benefits through the deployment of scarce public finance.<sup>21</sup> So it is all the more urgent to put robust goals on energy efficiency at the core of increased

infrastructure spending, lest the coming deluge be as wasteful as past practice.

Yet virtually all of the domestic and overseas commentary on the content of the Abenomics stimulus neglects the potential for smart, targeted investments in energy efficiency to provide immediate economic demand as well as foster innovation, reduce future energy costs, and provide a range of other benefits down the road.<sup>22</sup> In consequence, there is little apparent pressure on the Abe regime to raise the efficiency share of the stimulus as well as to use such policies as clear and robust efficiency standards to maximize the energy demand-reduction impact of the spending.

There are a range of positions from which it is reasonable to argue that the Abe regime should target even very radical energy efficiency gains. Since public discourse is dominated by mainstream economists’ highly circumscribed definition of costs and benefits,<sup>23</sup> let us first pay the requisite obeisance and address putting more efficiency into the stimulus on those grounds. The efficiency measures I shall itemize below (and it will hardly be an exhaustive list) include pipes, construction materials, power lines, and other items that can be deployed in short order. In other words, this efficiency work is “shovel ready,” thus perhaps satisfying the Keynesians who largely seem uninterested in the content of stimulus spending.<sup>24</sup>

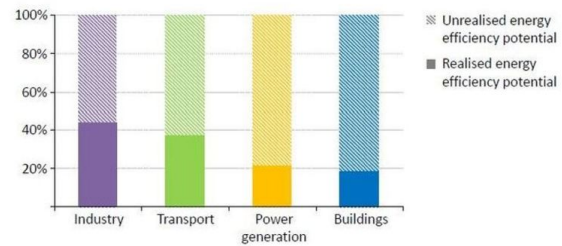


Next, let us turn to opportunity; specifically, whether Japan has room for additional efficiency effort. As alluded to earlier, the July 2012 “Energy Efficiency Scorecard” of the American Council on an Energy Efficient Economy (ACEEE) has ranked Japan 4<sup>th</sup> out of 12 countries/regions, including the UK, Germany, Italy, France, the EU, the US, China, Russia, Australia and Brazil. These 12 economies compose 78% of global GDP, 63% of global energy consumption, and 62% of global CO<sub>2</sub> emissions. The comparison treated 27 “metrics” (such as policy and performance) over 4 general areas of cross-cutting aspects of energy use at the national level as well as in the three categories of buildings, transportation and industry.

The ACEEE’s comparative analysis is probably the most credible and comprehensive available. It finds that Japan is only fourth among the major economies, behind the UK, Germany, and Italy.<sup>25</sup> Indeed, the vaunted (and very real) efficiency of Japan’s flagship auto exports, especially hybrids, is not reflected in the domestic fleet, which the ACEEE shows is eighth in its comparative ranking. But such is the power of image, and the role of the car in our collective thinking about energy and climate crises, that the Prius has come

to define Japan domestically and overseas.

Energy efficiency potential used by sector in the New Policies Scenario



*Two-thirds of the economic potential to improve energy efficiency remains untapped in the period to 2035*

I hasten to point out that we also know from the IEA, the Global Energy Assessment (GEA)<sup>26</sup> and other comprehensive analyses that the scope for energy efficiency improvements is enormous in all countries and in all sectors, not just Japan and the various areas of its economy and society. These sectors include manufacturing, power generation, buildings, and transportation. The International Energy Agency does some of the best work on this particular area, examining and quantifying the efficiency gains we can expect by using technologies already in hand. As we see the chart from their World Energy Outlook of 2012, the scope for efficiency gains is huge in the buildings, power generation, transport, and industrial sectors. Policy improvements among IEA member countries have raised efficiency increases to about 1.8% per year (through to 2035) versus 0.5% per year over the previous decade. But the IEA’s chart shows us that the “unrealized energy efficiency potential” in the four sectors runs from 80% in buildings, a little less than 80% in power generation, over 60% in

transport, and just under 60% in industry.

### Where Should Japan Spend?

The first area for Japan to prioritize with a smart efficiency stimulus is in the building sector, including offices and households. Buildings consume about 40% of primary energy consumption in most IEA countries, with Japan's final consumption of energy in the residential and commercial sector being about 36%.<sup>27</sup> The costs and benefits of building energy efficiency were given a very comprehensive study in 2009 by the World Business Council for Sustainable Development (WBCSD) in its "Energy Efficiency in Buildings: Transforming the Market."<sup>28</sup> The report observes that robust energy codes would add about 7% to the average cost of buildings worldwide. That extra cost would be a little more than America's burden of roughly 5% for building safety standards and inspections. Considering the benefits derived, the cost of safety standards is something few observers – other than extreme libertarians - would deem unreasonable. The cost of energy-efficiency standards seems something publics will also come to see as good value. This outcome is indeed made more likely by the fact that most energy-efficiency improvements pay for themselves, not to mention greatly helping to reduce greenhouse gas emissions. The WBCSD's calculations suggest that at a USD 60 per barrel price for oil (in 2012, oil's average price was USD 112/bbl), a total global investment of USD 300

billion annually would be paid back in 10 years or under as well as produce roughly 50% reductions in carbon emissions from this sector.

Focusing on Japan, the WBCSD data show us that "heating and cooling equipment have the highest potential to curb energy in office buildings."<sup>29</sup> Their report makes a series of recommendations for stricter building codes and more efficient space heating and cooling equipment. They bring up the potential for such energy supply-side aspects as renewable energy, smart grids, and district heating and cooling (DHC), to make significant contributions to greater efficiency and emissions reductions. But they centre their attention on the demand side, including building structures and components.

The WBCSD's recommendations for stricter building codes and more efficient components should indeed be core elements of the Abe regime's stimulus and related fiscal and regulatory policies.<sup>30</sup> The proportion of the stimulus devoted to efficiency (as noted, a mere YEN 200 billion) should be expanded, accompanied by stringent enforcement standards. Moreover, the support should be extended to households as well, augmenting programmes already in place for the accelerated diffusion of LED lighting, double-glazed or even smart windows,<sup>31</sup> and other means for reducing energy demand. McKinsey's study of lighting, which consumes 20% of global power and 16% in Japan, notes that 100% diffusion of LED lighting

in Japan would reduce power demand by the equivalent of 7 nuclear reactors (with each roughly 1gigawatt in output).<sup>32</sup>

In the wake of the 2009 WBCSD report, and the 2011 Fukushima shock, the diffusion of energy-efficient windows and curtains has begun to gain attention in Japan. Surprisingly, many of these latter are apparently already “well-known in Europe and the US.”<sup>33</sup> This is an example of slow and constrained policy response. Japan is nearing the close of a second year of tight power supplies and expensive increases in fossil-fuel imports. During this period, “green curtains” of lattice-worked plants (such as the Okinawan goya) became a major focus of attention. Even before Fukushima, in 2008, the world’s tallest green curtain had been installed by Sugunami Ward (a district of Tokyo), on its ward office building.<sup>34</sup> The green curtain became iconic of “setsuden” power savings after the Fukushima shock. These (quite literally) green projects have their own merits, of course, but few of them are as practical, durable and effective as smart blinds and glass.<sup>35</sup> Yet in the wake of Fukushima and its constriction of power supplies, the utilities,<sup>36</sup> the national and local governments, and other actors were quick to stress the shrubbery as opposed to these alternatives.

Rather than Japan catching up on energy-saving blinds, we should be seeing it far out in front on passive houses and green buildings.

Build “Innovation Ecosystem Infrastructure” for Energy and Power

Let us turn next to the supply side that the WBCSD leaves aside. Smart grids, DHC systems and other efficiency-enhancing systems have emerged as core infrastructures since the WBCSD drew up their report. These infrastructures are also innovation ecosystems because, akin to the internet, their deployment encourages follow-on innovation in a wide variety of fields. Japan is already undertaking smart grid and microgrid projects in a number of cities and projects, including Yokohama, Kitakyushu, and Sendai.<sup>37</sup> Wherever possible (without overlapping with existing finance), these should be accelerated as well as diffused to other local areas.

Moreover, the stimulus – not to mention the other streams composing the oncoming deluge of spending - offers Japan a chance to build a truly national grid. The monopolized utilities were reluctant to create a national grid, and reap efficiencies as well as bolster energy security.<sup>38</sup> According to former IEA chief Tanaka Nobuo, the utilities rejected the IEA’s advice to do this, arguing that it was cheaper to maintain a balkanized system and simply build more nuclear capacity.<sup>39</sup> But the Fukushima crisis revealed the weakness of that approach when power shortages caused “planned blackouts” and considerable economic damage, especially in the Kanto region that includes Tokyo. Expansion of the grid is indeed in part already underway, via a

METI request to appropriate funds for power lines between Hokkaido and Tohoku.<sup>40</sup> There is no reason not to link the balkanized nation through undersea cables.

Japan's poor deployment of DHC systems also needs to be remedied. DHC infrastructure essentially centralizes heating and cooling provision in one central plant and then distributes the energy via pipes to office building, residences, schools and other users in the district.<sup>41</sup> In other words, it is a system of distributed energy that reduces the inefficiencies of having heat and cooling generation capacity in each of a given district's buildings and residences. The attractiveness of DHC as public works is that there are high infrastructure costs (for the pipes, heat exchanges, and generation plant) that are compensated later on by very low operation and maintenance costs.<sup>42</sup> The METI Energy White paper of 2012 reveals that Japan's deployment of DHC totals a meagre 736 km of piping (with 22,997 TJ of energy heat delivered annually), whereas the Chinese have 110,490 km (and 2.63 million TJ of energy), the Russians 173,100 km (and 6.89 TJ), the US 3,206 km (and 365,818 TJ). Also significant is Sweden's total deployment of DHC, at 21,100 km (181,612 TJ).<sup>43</sup>

Another reason to invest heavily in DHC systems is that they are also in the midst of a revolution. The revolution encompasses the three aspects of energy input, energy throughput, and energy output. In the first, there is an increasing shift

away from fossil fuels to the use of waste heat,<sup>44</sup> renewable energy, and burned refuse. The throughput revolution, so to speak, involves new materials and more efficient means of producing and laying pipe. The output end is included because the use of IT and sensors allow heating and cooling to be more efficiently directed.<sup>45</sup> Among many locales in the EU that are racing ahead with innovations, the Dutch city of Amsterdam is aggressively expanding its DHC system to achieve its 40% CO2 emissions reduction goals by 2025. The system uses waste heat and waste incineration to power its DHC network, and is shifting to increasing reliance on green gas and biomass as well as solar heat, heat and cold storage, geothermal energy.

Japan's lack of action on the DHC front, as part of the stimulus, is difficult to comprehend, especially because there is a long-range plan to "bolster" infrastructure. Moreover, Japan has excellent technical capacity. Japan's DHC systems include the newly opened Skytree facility in Tokyo, whose DHC network reportedly reduces both primary energy consumption and CO2 emissions by over 40 percent, compared to conventional means of heating and cooling.<sup>46</sup> There is a clear need for the central government to more aggressively coordinate among the bureaucracies (especially MLIT, METI and the Environment Ministry) so that DHC projects already on the table or underway can be initiated and accelerated in the

short-run. As public-works projects, DHC is shovel-ready work that also reduces energy use and emissions and, on top of that, facilitates innovation and export opportunities. This point deserves emphasis because the ongoing revolution in this area is bringing IT into the infrastructure, targeting the delivered heat and cooling much more effectively. There is an expanding role for biotech as well, because the energy sources can include the nascent sustainable biofuels industries that a rapidly expanding list of countries and agencies (and particularly the US military)<sup>47</sup> is trying to create markets for. The DHC system can also help to balance the intermittency of renewables. Because the infrastructure is essentially a network of pipes that contain a lot of fluid used to heat and cool buildings, the entire network acts as energy storage capacity. Moreover, special thermal storage facilities can be built as part of the network.<sup>48</sup>

In addition, the potential for export seems immense. For example, much of the Russian and other infrastructure is very old and not being replaced and upgraded much.<sup>49</sup> Beyond that is the fact that the global population is slated to grow from its present 7 billion to 9 billion by 2050 as well as increase the rate of urbanization (and hence increase power consumption) from the present 50% to 70%. These present and future realities suggest a huge market potential for innovative and low-cost approaches in efficiency

infrastructure like DHC.

### Electric Motors

Electric motors offer another area for the Abe regime to engage in focused and effective spending. These motors are ubiquitous, in elevators, fans, pumps and the like, and consume fully 45% of global electricity production. Their efficiency can be increased by 20 to 30% simply by using technology, software and business know-how that we already possess.<sup>50</sup> So it is rather a surprise that Japan is not a leader in this area. But in fact the January 28, 2013 Nikkei (Japanese) reports that the METI, concerned about international competitiveness, is planning to make European and North American standards of efficiency for industrial-use electric motors compulsory for Japanese firms from 2015. The article also notes that domestically there is a stock of approximately 100 million motors in total, with 6,800,000 new motors shipped annually. The scale of the market is approximately YEN 2 trillion.

A recent comparative study quantifies the power-saving effect Japan can anticipate from the new standards. The current global international efficiency standard is IEC 60034-30, which mandates the use of IE2 and IE3 levels of efficiency in motors.<sup>51</sup> The study on Japan notes that if the country were to adopt the IE2 level of efficiency, “it would save 8.3 TW hours or 0.03 quads per year between 2014 and 2043, an



amount equal to about 0.8% of Japan's total power consumption in 2008." The study goes on to explain that adopting the more rigorous level IE3 of the IEC 60034-30 "would save about 13.3 TW hours, or 0.05 quads per year, an amount equal to about 1.3% of the total during the same period." The study then quantifies the power savings in terms of nuclear output: "The annual electricity savings for IE2 are also equivalent to the elimination of one 1 GW [gigawatt] nuclear power plant; and the projected savings for the IE3 standard are equivalent to the elimination of two 1 GW nuclear power plants."<sup>52</sup>

These are end-use efficiencies, meaning that the energy savings further up the chain, at the power production and transmission ends, are several multiples. The stimulus should thus clearly be targeting the adoption of the most efficient motors, along with an acceleration of the METI schedule for making the new standard mandatory and going beyond it. The competition is not waiting for Japan to catch up: American firms, grouped in their National Electric Manufacturers Association (NEMA), are already lobbying for even higher standards than the ones METI is debating for 2015.<sup>53</sup>

Whither Japan?

As noted earlier, this itemization of efficiency opportunities is hardly exhaustive. Nor is it an effort to point the finger at Japan. Rather the aim has been to show that energy efficiency projects

can provide quick economic stimulus plus long-term benefits and that Japan has plenty of room for such projects. Now let us look beyond the narrow economic benefits. Another reason for stressing efficiency in Japan is the projections for energy demand growth in Asia and other regions. These projections are nothing short of sobering in light of rising resource costs, accelerating climate change, and other challenges. On top of that are the ancillary crises of water shortages (due to the exacerbation of the water energy-energy nexus via conventional fuels), escalating food costs and declining harvests due to climate weirding, truly atrocious pollution problems such as has recently been afflicting Beijing, and a host of other reasons.<sup>54</sup> Indeed, the past year has seen a steady stream of increasingly dire warnings from the IEA, OECD, World Bank, Price Waterhouse Coopers, and other institutions and firms on the risk of truly catastrophic climate change. For its part, the IEA insists that the global community requires very aggressive energy efficiency measures within the next 4 to 5 years or faces runaway global warming.<sup>55</sup>

As noted in the introduction, Japan's post-Fukushima efficiency efforts afforded few notable lessons for the global economy. This is in itself a surprise. Japan is the world's third largest power market and lost nearly 30% of its generating capacity (the nuclear component) a little over a year into the continuing crisis. May 5

of 2012 saw the shut-down of the last operating reactor, and only 2 have been restarted since then. For a variety of regulatory and political reasons, it appears unlikely there will be any more restarts for at least half a year. Japan therefore has had, and continues to have, an abundance of objective incentives to enhance efficiency. It also has a population that is generally very eager to be active on efficiency, which is an enormous albeit unquantifiable asset.

Japan's failure to make rapid strides in efficiency is also something to be greatly lamented. Efficiency is always and everywhere a difficult area to get more than a 1 to 2 percent increase per year. As we have seen, this is not because technical potentials are rapidly exhausted, nor that economic practicalities are limited by high costs. In fact, there is vast potential for gains in efficiency using technology and policy approaches that are already, as it were, on the shelf. Disinterest and informational barriers are among the major factors that hinder countries from making progress on efficiency. Thus the Japanese public's post-Fukushima support for efficiency and conservation is incredibly fertile soil. Japanese policymakers had (and continue to have) an unrivalled opportunity to work with.

Still facing constraints on electric power supplies and now in a recession, Japan is in a good position for a smart efficiency drive. On power policy, the newly elected Abe Administration is in a twilight zone wherein restarting any of the

theoretically usable 48 nuclear reactors, out of a total of 50, is not at present possible. Nor is a sufficiently rapid diffusion of renewable energy in the cards to overcome the shortfalls resulting from the 3.11 nuclear disaster and subsequent plant closures. The Abe regime stresses a grab bag of stimulus spending ostensibly aimed at helping to ignite a sustainable recovery and build a stronger economy. Clearly the package is actually more carefully targeted at maximizing the LDP's electoral prospects in the Upper House elections this summer than at solving Japan's energy and environmental problems. That, of course, is politics. But it is in fact possible, as well as essential, that pork barrel politicking be superseded by a massive energy-efficiency campaign. Investment in efficiency would not only provide plenty of "shovel ready" work in the short run, but unlike roads and bridges would also increase Japan's global competitiveness, reduce its roughly YEN 24 trillion bill for fuel imports, and make a powerful contribution to showing rapidly growing Asia and the rest of the world a means towards sustainable growth. Indeed, an efficiency drive would help Japan find its feet, on a truly smart alternative path, two years after Fukushima.

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Policy in Japan,” in Jeff Kingston (ed.) *Natural Disaster and Nuclear Crisis in Japan* (<http://www.google.com/products/catalog?q=Natural+Disaster+and+Nuclear+Crisis+in+Japan&hl=en&client=firefox-a&hs=ut&rls=org.mozilla:en-US:official&prmd=imvnsu&biw=775&bih=766&um=1&ie=UTF-8&tbm=shop&cid=513355336218833864&sa=X&ei=7hBiT6bdK8X50gGRieStCA&ved=0CGYQ8wIwAA>).

*Recommended citation: Andrew DeWit, "Abenomics and Energy Efficiency in Japan," The Asia-Pacific Journal, Vol. 11, Issue 6, No. 2, February 11, 2013.*

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<sup>1</sup> Examples abound in the domestic and overseas press and academic literature. For example, the August 3, 2012 English Mainichi newspaper (<http://mainichi.jp/english/english/perspectives/news/20120803p2a00m0na001000c.html>) insists in a translated editorial that “Japan has become the world’s most advanced country in terms of saving energy as a result of efforts that both the government and the private sector have made since the 1973 oil crisis”

<sup>2</sup> More on this below, but see the press release (<http://www.aceee.org/press/2012/07/aceee-united-kingdom-tops-energy-eff>) at American Council For an Energy Efficient Economy, “United Kingdom Tops in Energy Efficiency, US Lags in 9th Place” (July 11, 2012).

<sup>3</sup> The IEA’s 2011 update ([http://www.iea.org/publications/freepublications/publication/Saving\\_Electricity-1.pdf](http://www.iea.org/publications/freepublications/publication/Saving_Electricity-1.pdf)) of “Saving Electricity in a Hurry” summarizes the plight Japan has found itself in. See pp. 32 to 37.

<sup>4</sup> On this, see Eric Martinot “REN21 Renewables Global Futures Report (<http://www.ren21.net/REN21Activities/GlobalFuturesReport.aspx>),” January 2013. Indicators of renewables’ disruptive revolution include rapid diffusion, rapidly falling prices, and the intense creative destruction of mass bankruptcies and mergers leading to consolidation. Critics of renewable energy routinely bring up these bankruptcies as “proof” that renewables are

uneconomic. The history of industrial revolutions suggests otherwise. For example, the US car industry alone had 272 producers in 1909, with about 500 firms entering the industry in its first 20 years of existence. Nearly all of them disappeared in the 1920s, but surely few would deny there was (and continues to be) an automotive revolution. On this see, “Automobile Industry

([http://www.encyclopedia.com/topic/automobile\\_industry.aspx](http://www.encyclopedia.com/topic/automobile_industry.aspx)),” in the International Encyclopedia of the Social Sciences, 2008.

<sup>5</sup> For example, McKinsey and Company, in their “Lighting the Way: Perspectives on the global lighting market (Second edition 2011) (<http://ja.scribd.com/doc/101616336/Lighting-the-Way>),” report a “disruption” of the global lighting industry’s structure due in particular to the rapid diffusion and continued innovation of highly efficient LED technologies.

<sup>6</sup> The most recent assessment is the market research firm SBI Energy estimate that the global energy efficiency market in 2012 totaled USD 595.4 billion, but that by 2023 the overall market for efficiency products and services will reach USD 3.3 trillion. See SBI “Energy Efficiency Global Products and Services Markets (<http://www.sbireports.com/Energy-Efficiency-Global-7241617/>)” (December 3, 2012). The SBI Energy study’s results are also broadly consistent with assessments done in a range of areas, and by such reputed agencies as Pike Research.

<sup>7</sup> Keidanren is dominated by energy-intensive industries that appear to have a different mindset from the business leadership that cooperated with the state in overcoming the oil shocks a generation ago. Why this is the case is for another paper. But the evidence of the mentality is seen in, for example, Keidanren's July 27, 2012 (in Japanese) "Opinions Concerning the Energy-Environmental Choices." (<http://www.keidanren.or.jp/policy/2012/057.html>)" Keidanren's hostility to even moderate efficiency goals is palpable in these and other documents.

<sup>8</sup> The IEA and domestic Japanese interests certainly continue trying to initiate aggressive action and use Fukushima as a teachable moment. See the PR for their February 25, 2013 workshop on "Energy Use and Green Buildings after Great East Earthquake in Japan" (<http://www.iea.org/newsroomandevents/workshops/workshop/name,34712,en.html>)."

<sup>9</sup> See Toru Fujioka, "Japan Learned to Love Deflation in Wage Malaise Facing BOJ" (<http://www.bloomberg.com/news/2013-01-17/japan-learned-to-love-deflation-in-wage-malaise-challenging-boj.html>)," Bloomberg, January 18, 2013.

<sup>10</sup> A concise summary of several of the risks of this financial aspect can be found in Teruhiko Mano "Inflation targeting easy to promote, but difficult to achieve without tools

(<http://www.japantimes.co.jp/news/2013/01/28/business/inflation-targeting-easy-to-promote-but-difficult-to-achieve-without-tools/>)," in Japan Times, January 28, 2013.

<sup>11</sup> This lack of standards has been highlighted (in Japanese) in Ohmae Ken'ichi "The Abe Cabinet's Emergency Economic Measures are Election Measures Made by the Authorities" (<http://www.zakzak.co.jp/economy/ecn-news/news/20130120/ecn1301200710001-n1.htm>)," ZakZak January 20, 2013. See also, again in Japanese, ""The Big Lie of the Abe Regime's Economic Growth Led by a Manufacturing Recovery" (<http://gendai.net/articles/view/syakai/140783>)," in Shukan Gendai, February 2, 2013.

<sup>12</sup> Mabuchi was DPJ Ministry of Lands, Infrastructure, Transport and Tourism Minister (September 17, 2010 to January 14, 2011). For his comments, see (in Japanese) Mabuchi Sumio, "Problems with the National Bolstering Draft Law's Return to the Era of Comprehensive National Planning" (<http://gendai.ismedia.jp/articles/-/34711>)," Gendai Bijinesu, February 3, 2013.

<sup>13</sup> The Economist's Banyan blog succinctly relates the details, in "A Pile of Pork" (<http://www.economist.com/blogs/banyan/2012/11/reconstruction-japan-s-disaste>)," November 1, 2012.

<sup>14</sup> On this, see the worried January 9, 2013 Japan

Times editorial “Wasteful spending must be avoided

(<http://www.japantimes.co.jp/opinion/2013/01/09/editorials/wasteful-spending-must-be-avoided/>)”

<sup>15</sup> To make matters worse, the Weekly “Spa!” magazine also relates how the Yakuza crime syndicates are looking forward to a revival, after having suffered several lean years due to tighter controls and cuts in public works. The article cites a Yakuza member who describes how much public work subcontracting is done by firms run by the syndicates. They excel at the critical business of rounding up sufficient numbers of low-cost labourers, and got a boost from Tohoku reconstruction, but are positively salivating at ongoing fiscal policy changes. See (in Japanese) “A War Without Mercy Breaks Out Over the YEN 200 Trillion National Bolstering (<http://zasshi.news.yahoo.co.jp/article?a=20130201-00000501-sspa-soci>),” February 1, 2013.

<sup>16</sup> See the January 30 edition of the Tokyo Newspaper (in Japanese), “The Abe Cabinet Signs Off on an FY 2013 Budget that Stresses Public Works and National Defence (<http://www.tokyo-np.co.jp/article/economics/news/CK2013013002000124.html>)”

<sup>17</sup> On the shift in grants, see the (in Japanese) January 31, 2013 editorial in Kahoku, “The FY 2013 Budget Proposal is a Big Shift of Responsibility to Future Generations

(<http://www.kahoku.co.jp/shasetsu/2013/01/20130131s01.htm>).”

<sup>18</sup> On Japan’s ageing infrastructure, see Mayumi Otsuna and Kyoko Shimodoi in “Japan Tunnel Collapse Threatens to Add to Fiscal Burden: Economy

(<http://www.bloomberg.com/news/2012-12-04/japan-tunnel-collapse-shows-repair-urgency-as-abe-vows-funds-1-.html>),” Bloomberg, December 4, 2012.

<sup>19</sup> The global community is only beginning to understand the costs of trying to adapt to the myriad challenges of climate change. A recent assessment can be found in the “Required infrastructure needs” of the World Economic Forum’s “Green Investing 2013” report (<http://reports.weforum.org/green-investing-2013/view/required-infrastructure-needs/>).

<sup>20</sup> See for example Gavan McCormack’s *The Emptiness of Japanese Affluence*, Armonk, New York: ME Sharpe, 1996.

<sup>21</sup> This is not an argument that Japan’s public finances are on the edge of collapse. But like Japan’s mismanaged economy in general, they can hardly be described as healthy. On the fiscal and other implications of Japan’s declining rate of household savings, see A Gary Shilling, “As Japan Stops Saving, A Crisis Looms (<http://www.bloomberg.com/news/2012-06-06/as-japan-stops-saving-a-crisis-looms.html>),” Bloomberg, June 7, 2012.

<sup>22</sup> However, Morgan Stanley's Robert Feldman stands out from the vast majority of his colleagues by noting (concerning Abenomics) that "if the money is spent well, on projects like energy-saving technologies, the rewards could be huge, bolstering efficiency and tax revenues (<http://www.economist.com/news/finance-and-economics/21569435-can-fiscal-and-monetary-splurge-reboot-japans-recessionary-economy-keynes>)," *Economist*, January 13, 2013.

<sup>23</sup> A brilliant, withering and concise critique of this dominance, in relation to the enormous threat of climate change, can be found in Naomi Oreskes and Erik M. Conway "The Collapse of Western Civilization: A View from the Future," *Daedalus*, Winter 2013, Vol 142, No. 1: 40-58.

<sup>24</sup> Sadly, we can include Paul Krugman in this group, as in his "Is Japan the Country of the Future Again" (<http://krugman.blogs.nytimes.com/2013/01/11/is-japan-the-country-of-the-future-again/>)?" Krugman is wise to the dangers of climate change and surely well-versed in LDP porkbarrel wastefulness. But in touting Abenomics as a model, he seems to be more interested in scoring points against the "Austrian orthodoxy" rather than paying attention to the potential for yet another Japanese policy failure. The latter eventuality would, among other things, not only risk giving the orthodoxy another weapon, but could potentially also cost all of us the chance to have a much more energy-efficient and greener

Japan helping to enhance the visibility of sustainability's benefits.

<sup>25</sup> See the ACEEE press release concerning the scorecard and its details at: ACEEE (<http://aceee.org/press/2012/07/aceee-united-kingdom-tops-energy-eff>)

<sup>26</sup> The GEA is perhaps the world's most internationally collaborative and comprehensive treatment of energy to date. For details, see the [description](http://www.iiasa.ac.at/web/home/research/researchPrograms/Energy/Home-GEA.en.html) (<http://www.iiasa.ac.at/web/home/research/researchPrograms/Energy/Home-GEA.en.html>).

<sup>27</sup> See International Energy Agency, "FAQs: Energy efficiency" (<http://www.iea.org/aboutus/faqs/energyefficiency/>)"

<sup>28</sup> The WBCSD comprises roughly 200 multinationals from 36 countries and in about 22 major industrial sectors. Their report (<http://www.wbcd.org/transformingthemarketeeb.aspx>) is available free and in several languages.

<sup>29</sup> See page 43 of the WBCSD report.

<sup>30</sup> Unlike Korea, the UK, Germany, and other locales, Japan's residential building standards have no legal binding authority, a problem that should be remedied in tandem with the ongoing programme of bolstering the political economy.

<sup>31</sup> A short summary of emergent "smart glass"

technology and market scale is available at ASDReports “Global Smart Glass & Smart Windows Market worth \$3.83 Billion by 2017,” January 25, 2013: [https://www.asdreports.com/news.asp?pr\\_id=1050](https://www.asdreports.com/news.asp?pr_id=1050)

<sup>32</sup> See p 12-13 of McKinsey and Company “Lighting the Way: Perspectives on the global lighting market (Second edition 2011) (<http://ja.scribd.com/doc/101616336/Lighting-the-Way>)”

<sup>33</sup> The curtains, for example, insulate the room via “creating a cushion of air between layers of material.” On this see Yusuke Hinata, “New curtains, advanced windows offer creative solutions,” *The Nikkei Weekly*, November 26, 2012

<sup>34</sup> See the brief explanation at the Tokyo Green Space blog (<http://tokyogreenspace.com/2009/03/31/government/>).

<sup>35</sup> One reason is that a lot of Japanese urban residents live in “manshon” condominiums where the balcony space is used for hanging out laundry to dry. A planted green curtain, as opposed to advanced blinds and window panes, would mean choosing to use the generally narrow balcony space for drying laundry or for shading the window.

<sup>36</sup> For example, see Kansai Power’s (in Japanese)

page on green curtains (<http://www1.kepco.co.jp/kankyou/greencurtain/>) as a means of cutting power demand.

<sup>37</sup> Many of these projects are outlined in a May 26, 2012 presentation ([http://www.irena.org/documentdownloads/OkinawaMay2012/19\\_Satoshi%20Morozumi\\_NEDO.pdf](http://www.irena.org/documentdownloads/OkinawaMay2012/19_Satoshi%20Morozumi_NEDO.pdf)) titled “Smart Community Demonstration” by Japanese New Energy and Industrial Technology Development Organization (NEDO) official Morozumi Satoshi.

<sup>38</sup> A national grid would especially bolster efficiency and security by allowing for more power-sharing among the regions.

<sup>39</sup> See (in Japanese) Tanaka Nobuo’s comments in “Now is a Good Time to Rethink Policy,” *Nikkei Bujinesu*, July 11, 2011, p. 40.

<sup>40</sup> The FY 2013 request is for YEN 25 billion. On this, see (in Japanese), “Hokkaido-Tohoku Region YEN 3.1 Trillion Power Grid Expansion: METI (<http://www.kensetsunews.com/?p=5768>),” in *Kensetsu Nyuusu*, January 23, 2013.

<sup>41</sup> A very good and brief animation (<http://www.youtube.com/watch?v=smirXWp6KTg>) of DHC is available on youtube. Note the number of pipes.

<sup>42</sup> A very readable and concise overview of DHC, from its origins in the Roman era to the present



revolutionary developments can be found in “Geothermal District Heating, (<http://eu-smartcities.eu/sites/all/files/docs/best-practice/Brochure-DISTRICT-HEATING1.pdf>)” European Geothermal Energy Council, September 2007.

<sup>43</sup> The White Paper is only available as yet in Japanese. See chart 223-3-1 in this short excerpt (<http://www.enecho.meti.go.jp/topics/hakusho/2012energyhtml/2-2-3.html>).

<sup>44</sup> Most waste heat anywhere comes from the firing of fossil fuels to generate electricity or for other purposes. Since only about 40% of coal and nuclear power stations’ heat is used in generating electricity, the rest is generally disposed of as waste heat. One area of the ongoing efficiency revolution is in using this waste heat, as well as the waste heat in sewerage systems and the like. That Japan is behind in this area has caught the attention of some observers, as we see in this online Japanese summary of an April 24, 2012 NHK broadcast on “Let’s Use the Sleeping Energy ([http://www.nhk.or.jp/gendai/kiroku/detail02\\_3203\\_all.html](http://www.nhk.or.jp/gendai/kiroku/detail02_3203_all.html))”

<sup>45</sup> Some of these items are discussed in Euroheat and Power’s “District heating and cooling (<http://www.euroheat.org/District-heating---cooling-4.aspx>).” See also the IEA discussion of DHC technology and agreements at “District Heating and Cooling, including the Integration of

Combined Heat and Power ([http://www.iea.org/techno/iaresults.asp?id\\_ia=9](http://www.iea.org/techno/iaresults.asp?id_ia=9))”. The signatory countries unfortunately (and tellingly) do not include Japan.

<sup>46</sup> A brief English-language overview is available here (<http://www.enecho.meti.go.jp/topics/hakusho/2012energyhtml/2-2-3.html>). A more recent Japanese PDF from METI, with visuals, is available here (<http://www.enecho.meti.go.jp/info/committee/kihonmondai/29th/29-1.pdf>).

<sup>47</sup> Note that the US military is acting as a spearhead, guaranteeing a short-term market for sustainable biofuel producers so they can ramp down prices and then become competitive in the enormous global markets for fueling aviation, shipping, and the like. See Amanda Peterka “Airlines piggyback on DOD’s test flights, push for expanded production (<http://www.eenews.net/public/Greenwire/2013/01/22/5>),” E&E News, January 22, 2013.

<sup>48</sup> One outstanding example of this is seen in Stockholm’s Arlanda Airport (<http://www.swedavia.com/arlanda/about-stockholm-arlanda-airport-/about-stockholm-arlanda-airport/environment/carbon-dioxide-emissions/energy/the-aquifer/>). The airport is probably the world’s greenest, in large part thanks to the use of the world’s largest aquifer-based energy storage unit.

<sup>49</sup> About 70% of the Russian system needs replacing, but a variety of financial and institutional problems hinder movement. See especially pp. 3 and 4 of V Roshchanka and M Evans “Playing Hot and Cold: How Can Russian Heat Policy Find its Way Toward Energy Efficiency?”

([http://www.pnnl.gov/main/publications/external/technical\\_reports/PNNL-21695.pdf](http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-21695.pdf))” Report Prepared for US Department of Energy, October 2012.

<sup>50</sup> On this, see Paul Waide and Conrad U Brunner, “Energy Efficiency Policy Opportunities for Electric Motor-Driven Systems ([http://www.iea.org/publications/freepublications/publication/EE\\_for\\_ElectricSystems.pdf](http://www.iea.org/publications/freepublications/publication/EE_for_ElectricSystems.pdf)),” IEA Working Paper, 2011.

<sup>51</sup> A note on the standards (mandatory in the EU since June 16, 2011) is available at NORD Drivesystems “Energy-Saving Motors IE2/IE3: New standards and legal requirements ([http://www.ien.eu/uploads/tx\\_etim/Page\\_25\\_34844.pdf](http://www.ien.eu/uploads/tx_etim/Page_25_34844.pdf))”

<sup>52</sup> See p. 744 of Chun Chun Ni, “Potential energy savings and reduction of CO2 emissions through higher efficiency standards for polyphase electric motors in Japan,” *Energy Policy*, Volume 52, January 2013, pp. 737-747.

<sup>53</sup> On this, see “NEMA Petitions for Energy-Efficiency Standards for Electric Motors (<http://www.nema.org/News/Pages/NEMA-Petitions-for-Energy-Efficiency-Standards-for-Electric-Motors.aspx>),” August 21, 2012.

<sup>54</sup> An excellent overview of these crises can be found in Coral Davenport “The Scary Truth About How Much Climate Change is Costing You

(<http://www.nationaljournal.com/magazine/the-scary-truth-about-how-much-climate-change-is-costing-you-20130207>),” in *National Journal*, February 7, 2013.

<sup>55</sup> See “Fatih Birol: Energy Efficiency is one of the last options after Kyoto (<http://www.euractiv.com/energy-efficiency/fatih-birol-energy-efficiency-op-news-516441>),” in *Euractiv*, December 17, 2012.