JAPAN, MARCH 11, 2011, AND ITS AFTERMATH: REFLECTIONS ON ISSUES OF ENVIRONMENTAL ETHICS AND SOCIETY

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1. Introduction: Facts, aspects and issues of March 11, 2011

More than one and a half years have passed since March 11, 2011, when a massive earthquake followed by a disastrous tsunami devastated Japan's northeastern coastal area. Soon after the tsunami hit the Japanese shore apocalyptic images of drowned coastal regions, villages and towns received worldwide media attention. The outcome of the disaster was present and could be seen everywhere: fortunate people were able to flee on rooftops and hills for safety; unfortunate people were swept off by strong current while fording streets, which suddenly turned into rivers; houses, ships, cars and trucks were swept away by torrents of water. Most of the seawalls, which had been erected to prevent tsunami damage proved insufficient. Shocking news about the natural disaster were followed by disturbing news about the nuclear disaster in Fukushima. In particular Western Europe was painfully reminded of the Chernobyl disaster of 1986. In the subsequent weeks and months in many parts of the world the fate of the survivors receded into the background in the face of the nuclear crisis. However, since then, irrespective of pressing problems due to the simultaneous meltdowns at three reactors, news about Fukushima have almost disappeared from the global TV screens. Only in March 2012, on the anniversary of the catastrophe, the Fukushima nuclear crisis got wide media coverage for a short period of time. Many TV channels ran programs about Fukushima–the region, its people and their present situation as well as the current state of the nuclear power plant. Visual and print media reported about the progress of rebuilding

measures and took a look at how the crisis shaped the role of nuclear power around the world.

Since March 11 Japan is relentlessly fighting on two fronts at the same time: 1) The elimination of the horrible devastation caused by the tsunami, that is the reconstruction of the North-east coast of Honshu, 2) stabilizing the severely damaged Fukushima Daiichi nuclear plant and the radiation crisis. Up to this day, the situation is far from being under control. Northeastern Honshu is frequently experiencing earthquakes with varying degrees of severity. As there are no appropriate measures to gain control over the reactors, radiation is still being released into the environment and large-scale radioactive contamination continues to spread. To give but one example, end of September 2011 plutonium and strontium were detected 50 kilometres away from the Fukushima power plant.[1] In 2012, a highly radioactive black substance kept appearing in places across Japan and was found at Harajuku station in Tokyo.[2]

"Fukushima" has not only attracted extremely wide media coverage but also academic attention. In the meantime, a plethora of studies has been published on March 11 and its aftermaths, covering an impressive range of topics, methods and materials. There is such an abundance of publications in both Japanese as well as Western languages available that neither a complete overview of the status quo nor the relevance of data and information is hardly possibly any more.[3] In addition, numerous movies and documentaries about the catastrophe have made it to the screens and film festivals.[4] Countless literary works have been published

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1 See Sekiguchi T., „Japan Discovers Plutonium Far From Crippled Reactor", *The Wall Street Journal*, October 2, 2011.

2 See http://www.best-worst.net/news_7G6EZbiGK.html and http://ameblo.jp/datsugenpatsu1208/entry-11343533666.html.

3 For a comprehensive analysis of the Fukushima nuclear disaster from various perspectives, see H. Kainuma, *"Fukushima" ron: Genshiryoku mura ha naze umareta no ka,* Seidosha, Tokyo, 2011, J. Kingston (ed.), *Natural Disaster and Nuclear Crisis in Japan: Response and Recovery after Japan's 3/11*. Routledge, New York 2012, L. Gebhardt and S. Richter (eds.), *Japan nach "Fukushima": Ein System in der Krise*, Leipziger Universitätsverlag, Leipzig 2012. The online journal *Japan Focus* has published an impressive number of well-researched articles on the disaster and related debates, cf. http://www.japanfocus.org.

4 In February 2012, the Berlin Film Festival (*Berlinale*) screened three Japanese movies about the Fukushima nuclear disaster: *No Man's Zone*, directed by Fujiwara Toshi, *Nuclear Nation*, directed by Funahashi Atsushi and *Friends After 3.11*, directed by Iwai Shunji.

which engage in the current debate and attempt to respond to the disaster from various perspectives.[5] To name but a few examples: One approach is to reexamine Japanese history with regard to the question of how central Japan and its large metropolitan areas have suppressed and / or exploited remote and sparsely populated areas for their own purposes.[6] Another approach is to investigate the nuclear disaster from a more historical perspective and to relate it with the dropping of the atomic bomb on Hiroshima and Nagasaki in August 1945 on the one hand, and Japan's growing dependence on nuclear energy and its close links with the USA since the post-war period on the other. Against this backdrop, the notion of "Cold War love affairs between the United States and Japan" has been introduced, thus investigating the extent to which the causes of the Fukushima nuclear disaster are to be found within national boundaries and to resituate them in an international context.[7]

In spring 2012 a number of interim reports on the Fukushima disaster were published, giving the impression that the catastrophe might be over to some extent. In fact, however, because stricken areas extend widely and radiation continues to be released all aspects of the disaster are still far from being comprehended. In short, it is far too early to take stock of the situation and to draw concluding opinions. Against

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[5] For an anthology of Fukushima literature translated into English, see E. Luke and D. Karashima (eds.), *March Was Made of Yarn: Reflections on the Japanese Earthquake, Tsunami, and Nuclear Meltdown*, Vintage, New York 2012. For an in-depth review of Fukushima literature anthologies published so far, see L. Gebhardt, „Ein Jahr nach Fukushima: Reaktionen der japanischen Literaturszene auf die Dreifachkatastrophe", 2012. For an investigation of post-Fukushima works by Wagô Ryôichi and Furukawa Hideo and their political implications, see T. Kimoto, „Post-3/11 Literature: Two Writers from Fukushima", *World Literature Today*, 86:1, 2012; see also R. Wagô „Pebbles of Poetry: The Tôhoku Earthquake and Tsunami", *The Asia-Pacific Journal,* Vol 9, Issue 29, No 4, 2011. The interview given by the writer Yû Miri to the literary scholar Kristina Iwata-Weickgenannt provides important insights, cf. K. Iwata-Weickgenannt, „'Vieles wird man nur begreifen, wenn man es langfristig verfolgt' – Interview mit der Autorin Yū Miri zur Atomkatastrophe von Fukushima", *Minikomi* (Vienna), Vol. 81, 2012, pp. 34-41.

[6] The term *Tôhoku gaku* (studies of the northeast) has been labelled to define a local, i.e. north eastern school of thought that reassesses Japanese history in questioning the relationship between the centre and the periphery and exploring how central Japan has suppressed and / or exploited the more remote areas.

[7] In March 2011 Lisa Yoneyama held a lecture entitled *Dialectical Images of History After Fukushima: Cold War Amnesia and the Transpacific Anti-Nuclear Counter-Citizenry.* In her abstract she used the expression „Cold War love affairs between the United States and Japan", cf. http://www.usfca.edu/templates/as_davies_home.aspx?id=6442474338.

this backdrop, I will concentrate on a few of the many issues, namely those, which are of special interest for me from the point of view of Japanese studies.

2. Social aspects and historical backgrounds of the disaster

2.1 Devastation and destruction, displacement, fear of stigmatization and trauma

March 11 caused huge material damage and irreparable human losses. It is estimated that the reconstruction of the era damaged by the tsunami will take at least 10 years. The costs of the disaster can hardly be calculated, estimates vary between 100 and 300 billion euros. The scale of human victims and material damage is enormous: More than 15,000 people died in the tsunami. Nearly 7,000 people are still missing, more than 6,000 have been injured. An area of more than 130 square kilometres around the power plant is expected to be uninhabitable for an unknown period of time. Around 2,400 square kilometres of soil are contaminated. The immense waters of the tsunami with waves up to 38 meters high travelled in some cases up to 10 kilometres inland, devastating a surface of 470 square kilometres. More than 100,000 houses were completely destroyed, more than 100,000 have been badly damaged. More than 90 per cent of the victims were drowned in the flood, a quarter of them was older than 70 years. Countless families have been dispersed or decimated. More than 100,000 children have lost their home, more than 100 children their parents. More than 500,000 people lost their homes and all of their possessions, some counts even put the number of homeless people at 700,000. Place names such as Kesennuma and Rikuzentakata have been indelibly etched into the global memory as synonyms of the catastrophe: These and other villages were literally washed away by the tsunami and reduced to debris and ash. Large areas of agricultural land are flooded by saltwater and are not usable for agriculture for an unforeseeable time. The public infrastructure has been badly destroyed. Countless historical and cultural landmarks, among them many shrines and temples, are heavily damaged.

Due to the ongoing nuclear crisis in the Fukushima region tens of thousands of people are still displaced. 160,000 of the refugees have their home in the 20 kilometres no-go zone around the nuclear plant and therefore had no choice but to leave. In fear of nuclear radiation an unknown number of people, including more than 10,000 children, have left Fukushima on their own accord.[8] One year later, an estimated 80,000 of so-called Fukushima nuclear refugees or nuclear evacuees (*Fukushima genpatsu nanmin*) are living in government-issued temporary housing or elsewhere.[9] A number of evacuees fled abroad and some of them even tried to get refugee status. For example, a Japanese woman who claimed exposure to radiation from the damaged nuclear reactors was denied refugee status in Canada in February 2012.[10] All these people have fled the earthquake, the tsunami and the nuclear disaster. Being caught between an uncertain future and a broken past they often have to endure harsh judgements of their countrymen who see their choice to flee their homes in the disaster-hit area as "un-Japanese". Those who chose to seek safety for themselves were accused of betrayal by those left behind.[11] Consequently, large numbers of people are under constant physical and mental stress, many of the survivors are discouraged, lonely, and emotionally spent.

Extreme loneliness and suicide have become issues in post-tsunami Japan. Concerns about suicide and Post Traumatic Stress Disorder (PTSD) are growing among mental health specialists working in the region. The initial trauma of the devastating earthquake and tsunami in March 2011 may be dying down, but the hurdles for victims to overcome have only become more varied.[12] While shelter and food have been immediate needs seven months ago, people now seem to be most desperate for hope and dignity. After many of the disaster relief volunteers and

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8 http://www.stromtarife.de/archiv/11/07/0103.html.

9 Cf. http://www.boston.com/bigpicture/2012/03/japans_nuclear_refugees.html.

10 Cf. http://www.torontosun.com/2012/02/18/japans-nuclear-evacuees-denied-canadian-refugee.

11 Cf. http://www.youtube.com/watch?v=d_hl93aRoDs.

12 Cf. http://www.asianscientist.com/health-medicine/fukushima-disaster-radiation-exposure-psychological-distress-ptsd-2012/ and http://www.theaustralian.com.au/in-depth/japan-tsunami/suicide-rates-in-japanese-region-most-effected-by-the-tsunami-and-nuclear-disasters-have-jumped/story-fn84naht-1226076940518.

outsiders have gone, it is easy for the feelings of abandonment to come in. The displacement has been traumatic, and now loneliness is an even more serious problem. Many of the survivors are now living in small homes built in parking lots and school playgrounds. Quite a lot of them had lived on their coastal land for generations until the tsunami hit. In particular older people who have left the temporary shelter and now live on their own in the newly built houses commit suicide.[13]

The fear of radiation was prevalent after the Hiroshima and Nagasaki bombings and stigmatized the survivors, known as *hibakusha*, or people exposed to radiation. Many *hibakusha* concealed their past for fear of discrimination that would prevent them finding work or marriage partners. Similar prejudices may emerge again and there are signs that stigma might become a serious problem for the people in the Fukushima region. For example, in April 2011 Fukushima schoolchildren were being bullied at their new school in Chiba prefecture near Tokyo for "carrying radiation." An 11-year-old Fukushima boy was hospitalized in Niigata prefecture after being bullied at his new school.[14] In September 2012 the chairman of Ecosystem Conservation Society-Japan recommended that people from Fukushima prefecture to Kanagawa prefecture, located south of Tokyo, should avoid marriage to prevent births of deformed babies. This statement was heavily criticized because of its discriminatory meaning.[15] However, it is an indication that an enormous number of people are still far from normal life.

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[13] See M. Segawa, „After The Media Has Gone: Fukushima, Suicide and the Legacy of 3.11," *The Asia-Pacific Journal*, Vol. 10, Issue 19 No 2, 2012.

[14] Cf. http://www.bloomberg.com/news/2011-09-26/fukushima-desolation-worst-since-nagasaki-as-population-flees.html.

[15] Cf. http://sankei.jp.msn.com/politics/news/120912/lcl12091216260001-n1.htm, http://ajw.asahi.com/article/behind_news/AJ201208300072.

2.2 The Fukushima nuclear crisis and Japan's "nuclear village"

2.2.1 Downplaying the extent of the disaster and the impact of radiation on humans and the environment

Apart from the reconstruction of the vast area hit by the tsunami the ongoing nuclear disaster will occupy Japan for many decades to come. In 2011 *TEPCO*, the owner of the damaged nuclear plant, announced to gain control over the reactors in January 2012. In December 2011 the Japanese government declared the Fukushima nuclear plant to be in a state of „cold shutdown", meaning that nine months after the worst nuclear accident since Chernobyl the Fukushima plant has now been stabilized.[16] In contrast to such soothing statements Murata Mitsuhei, Japan's former ambassador to Switzerland, told a news conference at the foreign correspondents' club of Japan in June 2012, that the Fukushima Daiichi plants are „not under control at all... and the situation with nuclear reactors in Japan is like vehicles being driven without a license".[17] In particular Reactor Number 4 is the cause for the alarming picture concerning coming disaster scenarios. This reactor holds large quantities of cooling waters surrounding more than 1,500 spent fuel rods, all bound by a fragile concrete pool located 30 metres above the ground, and exposed to the elements. If an earthquake or other event were to cause this pool to drain this could result in a catastrophic radiological fire involving nearly 10 times the amount of Cesium-137 released by the Chernobyl accident.[18] In other words, „[T]he Fukushima Daiichi Nuclear Plant Number 4 reactor presents a security problem for the entire world".[19]

Conflicting opinions not only exist about the state of the Fukushima plant but also about the extent of radioactive contamination in the Fukushima region and their health-related implications and long-term

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[16] Cf. http://www.telegraph.co.uk/news/worldnews/asia/japan/8960420/Fukushima-reactors-finally-brought-under-control.html, http://www.bbc.co.uk/news/world-asia-16212057.

[17] See B. Shaun, A. Matsumura and M. Murata, „The Highest Risk: Problems of Radiation at Reaction Unit 4, Fukushima Daiichi," *The Asia- Pacific Journal,* Vol. 10, Issue 17 No 4, 2012.

[18] Cf. http://www.ctvnews.ca/fukushima-reactor-4-poses-massive-global-risk-1.829254#ixzz2BQhTQ4O8, http://www.japantimes.co.jp/text/nn20120908f1.html.

[19] Ibid.

effects. Before March 11 Fukushima Prefecture was a densely populated area with more than two million people and one of the agricultural heartlands of Japan.[20] It's half the size of Belgium. The extent of radioactive contamination in the Fukushima region is at the centre of important debates as some scientists, NGOs, and citizen's groups argue that the Japanese government has not gone far enough in dealing with the radioactive fallout from the Fukushima Daiichi accident and has deliberately downplayed the potential health effects of radiation. This is reflected by the fact that much attention focuses on the Fukushima region, while there is less consideration of the impact of the nuclear crisis on other parts of Japan.

According to Fujioka Atsushi, Professor of Economics and a specialist on the US nuclear economy, space and intelligence strategy, not only the Japanese government but also journalists and media who are loyal to the government and to Japan's nuclear industry, try to downplay the consequences of the Fukushima accident.[21] Fujioka illustrates his arguments with the following observation: On March 14, 2011 in reactor Nr. 3–in which so-called MOX fuel, that is plutonium and uranium mixed fuel was used–an explosion took place, which was accompanied by a violent thundering sound and emitted a mushroom cloud several hundred meters high. This horrifying spectacle was widely reported abroad, including video footage.[22] But NHK, Japan's public broadcaster would not permit the airing of this video or others like it. The other major mass media outlets also consistently played down the scope of the ongoing nuclear catastrophe, minimizing the threat it posed. According

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[20] It is estimated that if all people who evacuated to other prefectures remain outside of Fukushima Prefecture, its population in 2040 would be 1,225,000, compared with 1,989,000 in October 2011 (http://ajw.asahi.com/article/behind_news/AJ201208300072). Over the next 10 years, the OECD projects that Japan's population will fall by 5 million people and 32 million over the next 40 years, but a disproportionate amount of that decline will occur in the six prefectures of Tohoku. According to Japanese government statistics, Tohoku's population fell by 3.2 per cent in the 2005–2010 period, the exact opposite of the Greater Tokyo area (Tokyo, Chiba, Kanagawa, Saitama), which rose 3.2 per cent in the same period. The earthquake is likely to spur an even greater exodus out of Tohoku into more developed areas with better job prospects (http://accjjournal.com/remapping-re-envisioning-revitalizing/).

[21] Cf. A. *Fujioka, „Understanding the Ongoing Nuclear Disaster in Fukushima: A ‚Two-Headed Dragon' Descends into the Earth's Biosphere," The Asia-Pacific Journal, Vol. 9, Issue 37 No 3, 2011.*

[22] Cf. for example http://www.youtube.com/watch?v=ZE_87wRXsDg.

to Fujioka it was thus foreigners who were first made aware and fully informed that in "the country of Hiroshima" a catastrophe on a par with Chernobyl was taking place. Fujioka further points out that in the first stages of the crisis its true nature was not fully reported even to the rulers of the USA: "From data collected by an unmanned Global Hawk spy plane, the U.S. realized that temperatures in the reactors were extraordinarily high. It reached the conclusion that 'the nuclear fuel had already melted down' and pressed its Japanese counterparts for accurate information."[23] In the early morning of March 16, with this information still being withheld from the public, the USA issued a threat: "We'll issue an emergence evacuation order for all 90,000 Americans in Tokyo to leave Japan. Do you really want to plunge Tokyo into panic?" In response, the Japanese government finally permitted the dispatch of a large number of U.S. specialists to crisis headquarters.[24]

Many observers argue that the Japanese government agencies are in a conflict of interest as they are responsible for promoting nuclear power and simultaneously are supposed to regulate it. Japan's nuclear industry has a long history of lying and hiding facts about nuclear failures and accidents and downplaying the risks. Since the 1950s, Japan's nuclear politics have been controlled by the main promoters of nuclear power, also known as Japan's „nuclear village" (*genpatsu mura*) spanning industry, government, and academia. However, despite strong connections between the members of this Iron Triangle of nuclear power, politicians and firms have rushed to frame events and push responsibility for incompetence or mishandling of the Fukushima disaster onto others. This complex mixture of economic and political interests and influences persists in the present and certainly will continue in the future. Jeff Kingston summarizes the situation as follows:

„The Village's perimeter defenses may have been breached, but the ramparts remain well defended. Japan's new national energy strategy 2012 may call for phasing out nuclear power, or significant downsizing, but there will be opportunities for the Village to reverse this reversal. It has the resources and resilience to overcome its opposition and has much riding on the outcome. Just

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[23] Cf. A. Fujioka 2011.
[24] Cf. ibid.

as the 2010 strategy was scrapped due to an unanticipated nuclear accident, some shock such as an energy supply disrupting war in the Middle East or a financial crisis could derail phasing out of nuclear energy."[25]

2.2.2 Narrowing down disaster-affected areas and creating a climate of uncertainty and distrust

The Japanese government has taken the position that no one outside of the vicinity of the Fukushima Daiichi plant is likely to suffer health effects from the radiation that has been released since March 11. However, since then food safety has become a serious issue. The Fukushima coastline has been famous for its rich fishing grounds. Soon after March 11 there was a ban on fishing along the Fukushima coast due to the contamination of fish. The ban was lifted in June 2012, but fish captured near the Fukushima nuclear plant still show to be carrying high and even record levels of radiation. In August 2012 fish captured in this area were contaminated with 25,800 becquerel of cesium per kilo, i.e. 258 times the level government deems safe for consumption.[26] In 2011 Japanese green tea, esteemed around the world for its purity and health-enhancing properties, has become contaminated with radiation, too. Shizuoka prefecture is Japan's biggest tea-growing area and is located southwest of Tokyo, 360 km from Fukushima. Green tea from Shizuoka but also from other outstanding tea cultivation areas such as Chiba, Ibaraki, Kanagawa and Tochigi contains radiation higher than the officially permitted level. The contamination opened a furious argument among local and national officials about how to measure the radiation, and what constitutes a safe level of contamination. Particular attention is placed on the Kanto region, a large area of central Japan that includes Tokyo and nearly 1/3 of Japan's population. In December 2011 radioactive cesium was detected in breast milk from mothers in Hiroshima Prefecture, located more than 840 km from the Fukushima plant.[27]

As shown by these examples, the Fukushima disaster is not limited to the Fukushima region at all, instead radioactive material is spread

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[25] J. Kingston, „Japan's Nuclear Village," *The Asia-Pacific Journal,* Vol. 10, Issue 37 No 1, 2012. *See also* G. Clark, „My Time in Japan's Closed Nuclear Village", 2012.

[26] Cf. http://rt.com/news/fukushima-nuclear-radiation-fish-238/.

[27] Cf. http://news.oneilbrooke.com/2011/10/radioactive-cesium-from-breast-milk-from-mothers-in-hiroshima-prefecture-840-km-from-fukushima-i-nuke-plant/.

across all parts of Japan. Critics of the Japanese government frequently point out that we simply do not know what effects low levels of radiation and the presence of isotopes in the human body will have on long-term health. A climate of distrust, concern and even suspicion among the public towards official statements has been created. Many Japanese, especially parents of young children, are doubtful and worried, and, for example, arrange in the absence of direct government support, to have samples of their children's urine tested, often with disturbing results. The following story has been reported in various media in September 2011. A mother in Saitama Prefecture located in the north of Tokyo arranged to have a sample of her daughter's urine tested. The test indicated that despite stringent efforts to protect her daughter from exposure to contaminated food and airborne radiation, the result was 0.4 becquerel of cesium 137 per kilogram of urine. Cesium 137, with a half-life of just over 30 years, is one of main radioactive isotopes released from the Fukushima Daiichi plant. Measures that the mother took to protect her daughter from exposure included hunting down produce from Kyushu–the southernmost of Japan's major islands and the furthest from Fukushima–even going so far as to buy 80 eggs at a time from a mail order company in the far south. She has also used bottled water exclusively and washes clothes, umbrellas, and the walls and floors of her home daily.[28] Stories like this one are by no means uncommon as many in the Kanto area have become increasingly mistrustful of the safety of their food supply, despite government claims that health risks are negligible. The story also alludes to the strength of alternative information networks in the wake of the March crisis. After announcing her daughter's test results on Twitter, the mother's number of followers jumped from a number of close acquaintances to 700 people asking for details and advice about how to have their own children tested.[29]

There are reports of mothers who have strictly controlled their children's behaviour (such as not allowing them to play in parks and making them always wear a mask outdoors) finding trace amounts of ce-

[28] Cf. M. Penney, „Contamination Outside Fukushima," *The Asia-Pacific Journal*, September 4, 2011.

[29] Cf. http://www.brc.gov/index.php?q=generalcomment/what-pisser-cesium-137-found-urine-child-near-tokyo.

sium upon arranging urine tests with private companies. Urine tests conducted on children in Fukushima show considerably higher levels of radioactive isotopes than anything that has been seen in Kanto, over three times as much in some cases. The Japanese Ministry of Education, Science and Technology has deemed these levels "extremely small" and claim that they will not result in health effects. Sakiyama Hisako, an influential radiation health researcher, disagrees: "We cannot simply state that there are no potential health problems because the amount detected is low. We simply do not know what happens when even extremely low levels of radiation move through internal organs, the nervous system, and the brain".[30]

In June 2012 it was reported that of more than 38,000 children tested from the Fukushima Prefecture 35 per cent have abnormal thyroid growths likely from radiation exposure.[31] However, these results have not been widely reported. The Australian pediatrician Dr. Helen Caldicott noted that Japanese officials are not sharing ultrasound results with foremost experts of thyroid nodules in children and accused the media of "practicing psychic numbing," saying that she does not understand why media outlets are choosing to ignore the nuclear fallout. She further explains that the high rate of abnormal growths in Fukushima children is very unusual—it usually takes five to 70 years to see what the medical implications of radiation are—and insisted that the international medical community become involved.[32]

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[30] Cf. M. Penney, 2011.

[31] Cf. http://www.businessinsider.com/a-stunning-36-percent-of-fukushima-children-have-abnormal-growths-from-radiation-exposure-2012–7#ixzz27eddmR6W, http://www.businessinsider.com/fukushima-children-have-abnormal-thyroid-growths-2012–7#ixzz27ebHTkbs, http://www.japantimes.co.jp/text/nn20110706a2.html.

[32] Cf. http://www.businessinsider.com/fukushima-children-have-abnormal-thyroid-growths-2012-7#ixzz217FKkN3C; cf. also W. Iwata W., N. Ribault and T. Ribault, „Thyroid Cancer in Fukushima: Science Subverted in the Service of the State," *The Asia-Pacific Journal*, Vol. 10, Issue 41 No 2, 2012.

3. My earthquake experience in Tokyo: Issues of earthquake resistance and preparedness

3.1 Some facts about the metropolitan area of Tokyo

The metropolitan area of Tokyo is inhabited by more than 35 million people and is said to be the world's largest metropolitan economy. Most of Japan's major political, economical and cultural institutions are located in Tokyo. Nearly one third of Japan's economic output is produced in Tokyo. Various definitions of Tokyo exist: 1) The urban core area consists of 23 wards, covering an area of 621 square kilometres. More than 8,5 million people live here, the population density exceeds 14,000 people per square kilometre. 2) In a wider sense there is the Greater Tokyo Area, consisting of most of the prefectures of Chiba, Kanagawa (including Yokohama), Saitama and Tokyo at the centre. More than 35 million people live here, making it the world's most populous metropolitan area by far. It covers an area of approximately 13,500 square kilometres, giving it a population density of more than 2,600 person/km^2. From above, Tokyo looks like a maze made up of buildings, roads, waterways and green spaces, without defined boundaries. Driving through Tokyo gives the visitor the impression of an unlimited urban entity, where the urban areas and their hinterland no longer constitute a clearly demarcated unit. The only limits to Tokyo's expansion are the ocean in the east and the mountains in the west.

At this point, I will reflect on observations and issues that have concerned me since March 11. I was supposed to spend March and April 2011 in Tokyo for doing research about the slow city movement in Japan, in particular the revitalization of some of Tokyo's backstreets and waterways. One of these areas is Yanaka, one of Tokyo's old town areas that have been successful in preserving their local character. At weekends, Yanaka is flooded with people who are on leisurely strolls or shopping. In the morning of March 11, I went downtown Tokyo to explore Yanaka. After noon, I went to Ikebukuro, one of Tokyo's central areas, where there are a huge train station and great shopping facilities. Around a quarter to 3 p.m. the earth started shaking, for a couple of minutes. During the earthquake I was in the ground floor of a restaurant. Very

soon it became clear that this was not one of the small earthquakes that occur quite frequently in Tokyo, but a very massive one. Plates flew off the shelves, some of the customers stayed calm, others tried to control their fears.

3.2 The complete standstill of Tokyo on March 11

The complete standstill of Tokyo immediately after the quake not only was a very impressive experience for me, but certainly also will enter the collective memory of Tokyo's residents. Tokyo holds a special position among the world's mega cities due to its extremely efficient public transport system, not only in terms of capacities but also in terms of disaster preparedness. During the earthquake trains that run like clockwork were shut down immediately, stranding hordes of commuters carrying mobile phones rendered useless by widespread outages. While residents can usually rely on a huge and perfect network of train and subway lines, authorities were forced to scan the entire web for quake damage and cancelled nearly all train service for the day. The quake shook buildings in Tokyo and left millions of homes across Japan without electricity. Japan's mobile phone network was severely disrupted, and even telephone landlines were hit. Tokyo's post-quake standstill makes aware of the vulnerability of mega-cities to natural catastrophes. Tokyo is considered to have one of the most efficient public transport systems of the world. More than 40 million trips by subway and railway are conducted each day. In case of a strong earthquake Tokyo's public transport system is shut down automatically. In 2005 a study showed that a strong earthquake occurring on a weekday at 6 p.m. would make four million commuters to walk home. More than 600,000 of them would attempt to reach one of the bigger train stations to stay there. More than 140,000 of them would stay in Tokyo Station.[33] This situation occurred on March 11. After the shutdown of Tokyo's transport system most of the hotels were booked up in a few minutes. More than six million people started walking back home. A huge number of people

[33] Cf. https://infocus.credit-suisse.com/app/article/index.cfm?fuseaction=OpenArticle&aoid=198296&coid=263&lang=en.

spent the night in their office or in public buildings that were kept open for this night. Many commuters reached their home only the next day. The Japanese media created for those people who tried to reach their home by foot the term *kitaku nanmin*, „refugees on their way home". I myself also was a *kitaku nanmin* and walked back home in the night, in the midst of the moving masses. I was in particular impressed by the calm and self-controlled mood of the walkers. People walked with brisk steps, without being rushed. Everybody seemed to have known what to do. The earthquake has shown that Tokyo's people are well prepared for an earthquake and that most of Tokyo's buildings are earthquake resistant.

3.3 Ecologically sustainability and energy efficiency of large buildings

The main quake had the enormous duration of nearly five minutes. Skyscrapers such as the 238 metres high Mori Tower swayed for up to 13 minutes, without receiving bigger or serious damages. In recent years, in response to the disastrous Kobe earthquake in 1995, immense amounts of money were spent to make buildings more earthquake resistant. The March 11 earthquake damaged only a few buildings in Tokyo. Seen from the point of view of earthquake resistance Tokyo's skyscrapers are very sustainably constructed. An impressive example is the so-call Sky Tree in the east of Tokyo, a television and radio broadcasting tower, which is still under construction. It reached its full height of 634 metres on March 18, seven days after the earthquake. During the quake around 500 workers were at the construction site, nobody of them was injured. However, how about the ecological sustainability and energy efficiency of Tokyo's skyscrapers – and skyscrapers in general? Tokyo's skyscrapers and infrastructure such as its railway system lay the foundations for its functional efficiency, but both are very energy hungry. The power consumption of the elevators and lifts alone resembles that of little towns. Signs of renewable energy such as photovoltaic systems or solar panels are still difficult to find.

In fact, current rankings of energy efficient skyscrapers list no building in Japan. However, in recent years progress has been made in this

field in Japan.[34] In 1998, an internationally recognized green building certification system, the so-called *Leadership in Energy and Environmental Design* (LEED) has been incepted in the USA. This system provides third-party verification that a building or community was designed and built using strategies of sustainability such as energy savings, water efficiency, CO_2 emissions reduction, improved indoor environmental quality, etc. Other countries followed to introduce comparable certification systems for green building. In 2001, Japan introduced the *CASBEE*, the *Comprehensive Assessment System for Built Environment Efficiency*.[35] Currently, there are only a few buildings in Japan, which accomplish the required standards. A representative example is the Breezé Tower in Osaka, completed in 2008. It has a double glass front, the space in-between serves as a natural air-conditioning system. However, apart from a few exceptions most of Japan's large buildings have a high energy requirement. In Japan – and elsewhere – it is still a long way to go before green architecture is becoming standard.

3.4 Politics and ethics of "energy saving" (*setsuden*)

The quake and its aftermath clearly demonstrate Japan's large dependence on nuclear energy and unveiled the country's failure in investing in renewable energy. It also shows how fragile and vulnerable Tokyo's supply of energy is in the event of an earthquake. Japan's electricity supply is provided by a few companies, which have monopoly in their respective regional markets. The biggest of them is TEPCO, which produces 27 % of Japan's electric power. TEPCO enjoys a quasi monopoly in the metropolitan area of Tokyo and its surroundings, supplying an area with 45 million people. In other words, the electricity supply of one third of Japan's population is secured by one company only. Since March 11 electricity has become a scarce source in the metropolitan area of Tokyo and electricity supply is severely restricted. The Fukushima Daiichi plant is irretrievably damaged. Its destruction led Japan to shut down its 54 nuclear reactors for regular maintenance or stress testing

[34] Cf. http://hubpages.com/hub/Top-10-Energy-Efficient-Skyscrapers.
[35] Cf. http://ja.wikipedia.org/wiki/CASBEE.

after the Fukushima accident in the course of a year. On May 2012, the third reactor at the Tomari plant, in Hokkaido prefecture, was shutting down for routine maintenance, leaving Japan without energy from atomic power for the first time for more than 40 years.[36] However some of Japan's nuclear power plants are supposed to be restarted in the near future, but due to the growing resistance at the local level against their reopening nobody knows when this will be going to happen.[37] In June 2012 the Japanese government gave final approval for the restart of two nuclear reactors of the Ôi nuclear power station in western Fukui prefecture thus taking a 180 degree turn to its post-Fukushima aim of abandoning nuclear power.[38]

As summer 2011 approached the only way to avoid a national energy emergency was through drastic conservation. The Japanese powered down. *Setsuden*, or "energy saving," has become a major buzzword of the year. *Setsuden* stands for an ambitious and strikingly successful campaign to conserve electricity after March 11. Subways were running with fewer trains. Industries, offices and private households turned lights off and thermostats up. Street lighting was reduced. Many escalators were turned off. The government required big power users to reduce peak consumption by 15 per cent. Japan's carmakers agreed to work on Saturdays and Sundays and move their weekend break to Thursdays and Fridays in order to use energy at off-peak times and help to avoid power shortages. Office workers moved their shifts to early mornings and weekends, climbed the stairs and worked by the dim glow of computer screens and LED lamps. Families stopped doing laundry every day. Department stores and subway stations turned off the air-conditioning. Posters of happy cartoon light bulbs urged everybody to pitch in. In September 2011, the government lifted restrictions on power use, weeks ahead of schedule. Tokyo lit up again, having avoided blackouts

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[36] Cf. http://www.bbc.co.uk/news/world-asia-17967202.

[37] Cf. http://www.berlinerumschau.com/news.php?id=23982&title=Japan+will+ruhende+Atommeiler+wieder+ans+Netz+lassen+-+AKW+Genkai+kurz+vor+Neustart&storyid=1001309769173.

[38] Cf. http://www.ft.com/cms/s/0/98112586-b832-11e1-86f1-00144feabdc0.html#axzz27emRymfH.

by keeping peak use well below last year's levels.[39] However, the challenges are far from over. As Japan debates when or whether to bring nuclear plants back to life, it is firing up old oil- and gas-powered plants, a setback in its battle to curb greenhouse emissions. Some worry that the *setsuden* spirit will wear off. Against the background of Tokyo's enormous electricity demand I was deeply impressed by the energy-saving measures that were taken immediately after the quake to prevent blackouts. To give an example: In March 2011, friends of mine didn't use their electric heating, even it was pretty cold at that time and their apartment reached not more than 14 degrees.

4. The world's first *nuclear power plant (genpatsu) earthquake disaster (shinsai)* and the Post-Fukushima era

4.1 Warning voices

The worst-case scenario of March 11 has been anticipated for many years. In Japan, countless books have been written about the risks and dangers of nuclear power. One of the most well known anti-nuclear activists is Hirose Takashi. Since the early 1980s he has written a whole shelf full of books and articles, mostly on the nuclear power industry and the military-industrial complex. Hirose's warnings are well known in Japan. Probably his best-known work is *Nuclear Power Plants for Tokyo!* (*Tôkyô ni genpatsu wo!*), published in August 1986, in the year of the Chernobyl disaster.[40] In this book he took the logic of the nuke promoters to its logical conclusion: if you are so sure that they're safe, why not build them in the centre of the city, instead of hundreds of miles away where you lose half the electricity in the wires?[41] Soon after March 11 Hirose wrote *Fukushima Meltdown: The World's First Earthquake-Tsu-*

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[39] Cf. http://thestar.com.my/lifestyle/story.asp?file=/2011/9/5/lifefocus/9392307&sec=lifefocus, http://www.japantoday.com/category/lifestyle/view/summer-of-setsuden.

[40] Cf. http://fukushima.over-blog.fr/article-l-inhalation-de-la-plus-infime-particule-radioactive-72991443.html and T. Hirose, *Tôkyô ni genpatsu wo!*, Shûeisha, Tokyo 1986.

[41] Cf. T. Hirose, *Fukushima Meltdown: The World's First Earthquake-Tsunami Nuclear Disaster*, Kindle Books, 2011. See also T. Hirose T., „Japan's Earthquake-Tsunami-Nuclear Disaster Syndrome: An Unprecedented Form of Catastrophe," *The Asia-Pacific Journal*, Vol. 9, Issue 39 No 1, 2011, and T. Hirose and C. D. Lummis, „The Nuclear Disaster That Could Destroy Japan:

nami-Nuclear Disaster (Japanese title: *Fukushima genpatsu merutodaun*), which has become a best seller in Japan and also has been translated into English.[42] In *Fukushima Meltdown* he makes clear the absurdity of putting nuclear power plants anywhere on the earthquake and volcano prone Japanese archipelago–and by extension, anywhere in the world.[43] Japan's nuclear power plants are all exposed to high seismic risk.

Ishibashi Katsuhiko, a specialist of seismotectonics, warned in response to the 6.8 magnitude temblor of July 2007, which caused considerable damage to the Kashiwazaki-Kariwa nuclear power plant, which is said to be the biggest in the world, about the fundamental vulnerability of nuclear power plants. Already in 1997 Ishibashi coined the term *genpatsu shinsai* to describe an unprecedented phenomenon: a combined *nuclear power plant (genpatsu) earthquake disaster (shinsai).*[44] The first *genpatsu shinsai* in Japan's history took place on March 11, 2011.[45] Such warnings recall a conversation I had with a Japanese sociologist at a conference in Tokyo in 2008. He was very concerned about Japan's dependency on nuclear energy and that the risks related to Tokyo's energy demand were shifted to its hinterland. He used the expression *Tôkyô no gaibusei* (externality of Tokyo) to point out that 70 per cent of Tokyo's energy supply is produced outside Tokyo. He explained that in the case of a nuclear accident the Fukushima region would be in great danger. However, Tokyo is no exception: most cities produce their energy outside. In fact, many nuclear power plants are in the vicinity of cities.

On the Danger of a Killer Earthquake in the Japanese Archipelago", *The Asia-Pacific Journal*, Vol. 9, Issue 21 No 2, 2011.

42 Cf. T. Hirose, *Fukushima Meltdown: The World's First Earthquake-Tsunami Nuclear Disaster*, 2011.

43 For a review, cf. R. Pulver, 2011.

44 Cf. K. Ishibashi, „Why Worry? Japan's Nuclear Plants at Grave Risk From Quake Damage", http://www.japanfocus.org/-Ishibashi-Katsuhiko/2495.

45 Cf. T. Suzuki, "Deconstructing the Zero-Risk Mindset: The Lessons and Future Responsibilities for a Post-Fukushima Nuclear Japan," *Bulletin of the Atomic Scientists*, Vol. 67, Issue 5, 2011, pp. 9–18.

4.2 The end of "the safety myth of nuclear energy" (*anzen shinwa*) in Post-Fukushima Japan

Soon after March 11 the term "Post-Fukushima era" was coined. This term suggests a departure from the past. What expectations do people in Japan pin on this term? Since March 11 there has been a profound reversal of sentiment on nuclear power in Japan. The *myth of the nuclear safety* (*anzen shinwa*), as it was created in post-war Japan under the impact of the nuclear politics of the USA, is loosing credibility. Over several decades Japan's nuclear establishment has devoted vast resources to persuade the public of the safety and necessity of nuclear power. Plant operators built lavish, fantasy-filled public relations buildings that became tourist attractions. Bureaucrats spun elaborate advertising campaigns through a multitude of organizations established solely to advertise the safety of nuclear plants. Politicians pushed through the adoption of government-mandated school textbooks with friendly views of nuclear power. The result was the widespread adoption of the belief — called the "safety myth" — that Japan's nuclear power plants were absolutely safe.[46] The belief helps to explain why in the only nation to have been attacked with atomic bombs the acceptance of nuclear power was so strong that the accidents at Three Mile Island and Chernobyl were barely registered.

However, since March 11 a dramatic shift-around in Japanese attitudes to nuclear energy is taking place. Even conservative thinkers have started to contemplate a Japanese energy future without nuclear energy. A newspaper poll of May 2011 suggested that 74 per cent of Japanese want to gradually phase out nuclear power completely. Another poll found that only 5 per cent of Japanese had confidence in the safe operation of the nation's nuclear power plants, while 60 per cent had little or no confidence in them.[47]

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[46] Cf. N. Onishi, „'Safety Myth' Left Japan Ripe for Nuclear Crisis", *The New York Times* (June 24, 2011) and the editorial "Obsession with a Safety Myth", *The Japan Times*, July 26, 2012, http://www.japantimes.co.jp/text/ed20120726a1.html; cf. also Y. Tanaka, and P. Kuznick, „Japan, the Atomic Bomb, and the ‚Peaceful Uses of Nuclear Power'," *The Asia-Pacific Journal*, Vol. 9, Issue 18 No 1, 2011.

[47] Cf. J. Kingston, „Ousting Kan Naoto: The Politics of Nuclear Crisis and Renewable Energy in Japan," *The Asia-Pacific Journal*, Vol. 9, Issue 39 No 5, 2011.

4.3 The gearing up of Japan's anti-nuclear movement

The gearing up of Japan's anti-nuclear movement expresses peoples' hope that the post-Fukushima era will lead to a move towards alternative energy sources and to the shut down of Japan's nuclear power plants. Furthermore, it expresses the hope that the future will bring the strengthening of civil rights. Japan has a long history of non-governmental organizations and citizens' initiatives that take on the concerns of the environment. Japan's anti-nuclear movement is very diverse in terms of organization and modes of expression. For example, since the Chernobyl disaster a number of pop songs have become classics in Japan's anti-nuclear pop culture. Recently, rap songs with anti nuke content have become popular.[48] Since March 11, Japan's anti-nuclear movement is gearing up. Company workers, students, and parents with children regularly rally across Japan, venting their anger at the government's handling of the crisis, carrying flags bearing the words „No Nukes!" and „No More Fukushima". While soon after March 11 only some hundred protesters staged demonstrations, during the summer of 2011 more and more people participated. In August 2011, about 2,500 people including farmers and fishermen marched in Tokyo. They are suffering heavy losses following the Fukushima nuclear disaster, and called for prompt compensation from TEPCO and the government.[49] On September 19th, 2011, Japan's anti-nuclear movement reached its temporary peak. In Tokyo more than 60,000 protesters marched to the beat of drums, waved banners and chanted "Sayonara nuclear power" to call for a complete shutdown of Japan's nuclear power plants and to demand a shift in government policy toward alternative sources of energy. Among the event's supporters were the politically active writer Ôe Kenzaburô, who won the Nobel Prize for literature in 1994, and the musician Sakamoto Ryû'ichi.[50] However, the police are attempting to suppress the protests

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[48] For a list of japanese songs on nuclear power and music of resistance in Post-Fukushima Japan, cf. http://ja.wikipedia.org/wiki/原子力発電を主題にした楽曲の一覧. The list covers songs from the early 1980s until now.

[49] For issues of compensation, cf. D. McNeill, „The Fukushima Nuclear Crisis and the Fight for Compensation," *The Asia-Pacific Journal*, Vol. 10, Issue 10 No 6, 2012.

[50] Cf. http://sayonara-nukes.org/english/.

and media linked to Japan's nuclear village try to downplay the extent of the demonstrations. During a No-Nukes demonstration in Shinjuku, Tokyo, on September 11, 2011 twelve participants were arrested without any reasonable grounds. The well-known writers and critiques Karatani Kôjin, Ukai Satoshi and Oguma Eiji published in response to this event a *Joint Statement for the Freedom of Demonstration and Assembly* on September 29, 2011.[51] As reaction to the government's attempts to restart Japan's nuclear industry in 2012, demonstrations against atomic power have begun to generate serious steam. During the summer of 2012, on several occasions, mostly on a Friday afternoon, ten thousands of people gathered in Tokyo thus forming huge anti-nuclear events never seen before in Japan. On July 16, an estimated 100,000 people demonstrated against nuclear power in Tokyo, followed by a series of similar large demonstrations. November 2012, more than 10,000 people from across Japan were seeking criminal charges against officials of Japan's government and the utility that operates the Fukushima No. 1 nuclear power plant, after a similar mass complaint this summer accused 33 officials of causing death and injury through negligence. The complainants argue that a broadly backed complaint would show that the general public is seeking criminal accountability for those who promoted nuclear power—and hold them responsible for damage from the disaster and for exposing victims to radiation.[52] Japan's anti-nuclear movement is triggered by fierce debates about restarting selected nuclear power plants such as Ôi nuclear power plant in Fukui prefecture.[53]

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[51] Cf. http://associations.jp/archives/584, http://radioactivists.org/2011/statement-by-japanese-critics-for-the-freedom-of-demonstration/.

[52] Cf. M. Honda, „Second Mass Complaint Coming over Fukushima Disaster", *The Asahi Shimbun*, November 2, 2012.

[53] For a comprehensive overview of Japan's anti-nuclear movement cf. E. Oguma, „Japan's Nuclear Power and Anti-Nuclear Movement from a Socio-Historical Perspective" , 2012.

4.4 Japan's energy options after Fukushima

Until March 11 nuclear energy was seen in Japan as the way forward to securing a clean energy future and becoming a "low carbon society".[54] The government planned to boost nuclear power to 50 per cent of the total from its pre-Fukushima share of just over 30 per cent by 2030.[55] However, the Fukushima disaster led to a complete turn-around on energy politics in autumn 2012. As of September 2012, most Japanese support the call to halt all use of nuclear energy. September 14 the Japanese government announced a dramatic change of direction in energy policy. It would seek to phase out nuclear power by 2040. This statement marks a historic shift for a country that has long staked its future on nuclear energy, however, it falls far short of the decisive steps the government had promised in the wake of March 11. At least, according to the recent announcement there will be no new construction of nuclear power plants, a 40-year lifetime limit on existing nuclear plants, and any further nuclear plant restarts will need to meet tough safety standards of the new independent regulatory authority. Furthermore, the new approach to meeting energy needs will also involve huge investments to commercialize the use of renewable energy sources such as wind power and solar power.

With the growth of hostility towards nuclear power, Japanese energy policy is now in a state of considerable disarray. There are no clear ideas about how the looming shortages in energy supply will be filled without re-starting of Japan's currently offline nuclear power plants. There are no clear ideas about how the gap in energy needs would be covered if nuclear power were to be phased out over the longer term. Following March 11 the government has begun a process of reviewing its energy policy and specifically the role of nuclear power in the country. The choices that Japan makes will have important implications for energy and climate change policy for Japan and globally. In summer 2012 two of the four

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[54] Cf. http://2050.nies.go.jp, http://www.mofa.go.jp/policy/environment/warm/cop/lowcarbongrowth_vision_1111.html.

[55] Cf. T. Furukawa „How Japan's Low Carbon Society and Nuclear Power Generation Came Hand in Hand: The ‚Egoism' of TEPCO ‚Ecoism'," *The Asia Pacific Journal*, Volume 9, Issue 23 No 2, 2011.

reactors of Ôi Nuclear Power Plant in Fukui Prefecture were restarted, provoking fierce anti-nuclear protests. Can there be a speedy transition to renewable energy sources in Japan? The problem is that there is not much clarity on anything right now. Solar and wind currently account for less than 3 per cent of Japan's energy capacity. The hope is that energy supplied from these sources will quintuple in ten years, but that solves less than half the problem.[56]

4.5 Two decades of bad news for Japan and the hopes of the post-Fukushima area

The last 20 years have been difficult times for Japan. Since the bursting of the bubble in the late 1980s Japan has been faced with difficult political, social and economic problems and issues. To give but a few examples: 1995 was the year of the disastrous Kobe earthquake and the sarin gas attacks in Tokyo's subways; since the late 1990s Japan's suicide rate is one of the highest in the world; since 2005 Japan's population is shrinking; the financial crisis of 2008 led to a recession in Japan in 2009; in 2010 Japan lost its 42-year ranking as the world's second-biggest economy to China; Japanese national debt is one of the highest in the world and a real burden to the economy. At the start of 2011, just before March 11, Japanese national debt was 228 % of its GDP.[57] End of April 2011 Standard & Poor's lowered Japan's rating outlook to negative due to the tremendous rebuilding costs. It is assumed that these costs will hinder the recovery of Japan's economy from two decades of stagnation.[58] Since 1991 fourteen prime minister have been appointed. One bright spot, however, is the ending of more than 54 years of nearly unbroken rule by the Liberal Democratic Party in 2009. The biggest positive result of the Fukushima disaster could be the end of the nuclear power and an

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[56] Cf. A. DeWit, „Japan's Energy Policy at a Crossroads: A Renewable Energy Future?," *The Asia-Pacific Journal*, Vol. 10, Issue 38 No 4, 2012, A. DeWit, A., „Megasolar Japan: The Prospects for Green Alternatives to Nuclear Power," *The Asia-Pacific Journal*, Vol. 10, Issue 4 No 1, 2012, and M. Son M. and A. DeWit, „Creating a Solar Belt in East Japan: The Energy Future," *The Asia-Pacific Journal*, Vol 9, Issue 38 No 2, 2011.

[57] Cf. http://www.staatsverschuldung.de/japan.htm.

[58] Cf. http://www.bloomberg.com/news/2011-09-26/fukushima-desolation-worst-since-nagasaki-as-population-flees.html.

energy turnaround for ecological sustainability. Since March 2011 there is a complex power struggle underway over the future of nuclear energy in Japan involving political, governmental, industry, and union groups. Despite the seriousness of the Fukushima crisis, Japan's commitment to nuclear power – and a fuel cycle that includes reprocessing and breeder reactors – still has powerful supporters. Since the quake, however, a growing number of private businesses and local governments aren't waiting on politicians and bureaucrats but forging ahead with plans to create a post-nuclear power nation.[59]

5. Global aspects

5.1 The end of the nuclear age or the renaissance of nuclear power?

There is no doubt that the Fukushima disaster has provoked major worries worldwide about nuclear power, however, it seems that now that the dust has settled atomic energy still has a rosy future. This at least was the main message of the annual gathering of the 151-nation International Atomic Energy Association (IAEA) in Vienna in September 2011.[60] Despite the permanent closure of reactors in Japan and Germany and slowdowns in some programs in response to Fukushima there are signs that the global situation for energy supply and demand remains effectively unchanged. Developments in the USA, China, India and Russia will remain particularly crucial in determining the overall role of nuclear power in global electricity supply, while prospects for nuclear new build remain strong in China, India, and South Korea. In France and the UK criticism against nuclear power seems to be growing. With just few exceptions, most notably Germany, governments have moved to reassure themselves that their nuclear power is safe and that its two main advan-

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[59] For an overview of future options for Japan, cf. McKinsey & Company, C. Chandler, H. Chhor, B. Salsberg (ed.), *Reimagining Japan*: *The Quest for a Future that* Works, VIZ Media LLC, San Francisco, 2011 and McKinsey & Company, C. Chandler, H. Chhor, B. Salsberg (ed.). *Nippon no mirai nitsuite hanasou*, Shogakukan, Tokyo. The volume is available in an English and in a Japanese edition.

[60] Cf. http://www.dailytimes.com.pk/default.asp?page=2011 %5C09 %5C24 %5Cstory_24-9-2011_pg4_1.

tages remain: it is not fossil-fuel based, and it is cheap. The arguments are well-known: A substantial increase in the amount of electricity generated with renewable sources like solar or wind power requires huge investment and is not possible overnight. After Fukushima, the IAEA trimmed its forecasts for nuclear power usage in the coming decades, but its minimum projection is still for 90 new reactors to spring up worldwide by 2030, there may even be 350 more.[61] The debate's framework largely has been the same: Is nuclear energy worth the safety risk? Is it worth it for a country not to have nuclear power? In other words, the safety myth of nuclear energy still persists on a global scale. Both, the safety myth and the myth of cheap nuclear energy are being built on very shaky foundations. In all these arguments the problem of the final storage for the deadly radiating nuclear waste is not mentioned at all. This means that one of the most important issues related to the future of nuclear energy is suppressed and cut off.

5.2 Costs of the risk–who pays?

As mentioned above, both the consequences and the costs of the Fukushima nuclear disaster are unpredictable. Estimates vary between 100 and 300 billion euros. Such projections assume that only evacuees within a 20 kilometre radius of the plant receive income support, and that the government buys land within that area. There are suspicions that politicians put economic cost above public health when they withheld projections about the spread of radiation. In any event, the clean-up bill will rise depending on the cost of decontaminating farmland and residential areas near the plant, some of which will be uninhabitable for decades. A huge number of Japanese people are exposed to unpredictable health risk. Large sectors of the population are accumulating significant levels of internal contamination, probably setting the stage for a public health tragedy. These are mere assumptions and estimations. The end of the road has not been reached, by any means. Since the Chernobyl disaster insurer refuse to offer energy companies full coverage against the risk of a severe nuclear accident. This means that both

[61] Cf. S. Sturdee, „Post-Fukushima UN ‚Action Plan' Approved", 2011.

the financial as well as the human costs of a nuclear accident have to be paid by the taxpayer.

5.3 Modern societies in the 21st century: Torn between the risk of nuclear death zones, nuclear waste and the perils of climate change

According to the sociologist Ulrich Beck the Fukushima disaster is a catastrophe without boundaries.[62] Radiation does not stop at national borders. Radioactive fall-out from Fukushima has been detected in China and South Korea and even at the west coast of the USA. The unlimited scope of the Fukushima disaster affects Japan's relationship to its neighbours. Jasmina Vujik, professor of nuclear engineering at Berkeley states that „regardless of where in the world a nuclear crisis happens, it affects everybody. Fukushima definitely did affect the entire nuclear energy community."[63] The endorsement of nuclear energy is part of a vision of modernity, which has its roots in Europe. This narrative of modernity even can culminate in nuclear disasters for the sake of progress and growth.[64] It means further that in the case of a nuclear accident the transformation of civilized areas into inhabitable death zones is assented and accepted. Since the Fukushima meltdown a radioactive zone has come into existence bigger as that left by the 1945 atomic bombings at Hiroshima and Nagasaki. While nature reclaims the 20 kilometre no-go zone, Fukushima prefecture's farm industry is being devastated and many people in the effected area have to face the reality that they cannot go back to their homes for decades. Critics state that the acceptance of such incalculable risks is tantamount to the moral bankruptcy of a civilized society.[65]

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[62] Cf. http://m.faz.net/aktuell/feuilleton/risikoforscher-ulrich-beck-im-gespraech-was-folgt-auf-den-oekologischen-sieg-11627679.html.

[63] Cf. http://articles.cnn.com/2011-09-10/world/japan.quake.anniversary_1_fukushima-daiichi-japan-s-fukushima-nuclear-power?_s=PM:WORLD.

[64] Cf. S. Hansen, „Atomkraft in Asien: Der Preis des Fortschritts", *TAZ*, April 27, 2011.

[65] Cf. R. Zion, „Der schleichende Bruch: Briefe an die Ethikkommission, Teil I," *Der Freitag*, 1.4.2011, R. Zion, „Fukushima/Japan oder–Sicherheit, Territorium, Bevölkerung: Briefe an die Ethikkommission, Teil II," *Der Freitag*, 19.4.2011, and R. Zion, „Konservatives Delirium – Sicherheit, Dienst, Fehlbarkeit, Schöpfung: Briefe an die Ethikkommission, Teil III," *Der Freitag*, 26.4.2011.

Modern societies are torn between the risk of nuclear death zones and nuclear waste on the one hand, and the perils of climate change on the other. The supporters of nuclear power are sticking to the view that nuclear power is the energy source that can save our planet from another possible disaster, namely catastrophic climate change. Compared to coal and other fossil fuels nuclear power is regarded as climate neutral. The opponents of nuclear energy argue that the risks of nuclear power are incalculable and that the question of the final storage of waste products of nuclear power is still far away from any reasonable solution. The unsolved issue of what to do with nuclear waste is one of the most important ethical issues. In not solving this fundamental problem our generation places enormous burdens on subsequent generations.

6. Conclusion

The earthquake, the tsunami, and the Fukushima meltdown are a compound disaster, which gives rise to complex ethical, social and economic issues. Economic and social analysis of the disaster, in particular the failure of TEPCO, the owner of the Fukushima power plant, to handle the nuclear crisis and the lack of transparency of Japan's nuclear village, the Iron Triangle of nuclear power, politicians and firms, have shed light on entanglements and interconnections between various segments of society and the power structures on which they are based. Such linkages and mechanisms make transparency and controls of the nuclear power industry and nuclear research institutions more difficult to secure. Since the Manhattan Project of the 1940s and in particular the atomic bombings of Hiroshima and Nagasaki and the cold-war nuclear armament the political and social implications as well as the consequences for the environment in case of a nuclear incident have paved the way for an intellectual and philosophical debate that evolved a highly critical stance towards nuclear matters. In investigating the social and ethical consequences of scientific and technological progress the protagonists of this movement identified possible risks and unforeseen results for the future of humanity. Well-known examples are works of the Austrian journalist and writer Robert Jungk (1913–1994), such as *Der Atomstaat: Vom Fortschritt in die Unmenschlichkeit* (1977, English edition

published in 1979 under the title *The Nuclear State*) and Holger Strohm's *Friedlich in die Katastrophe: Eine Dokumentation über Atomkraftwerke* (*Heading Peacefully to Catastrophe: A Documentation of Nuclear Power Plants*, 1973), a detailed, technical, 1300-page study on civilian nuclear facilities that sold more than 600,000 copies in West Germany in the 1970s. Stimulated by the Fukushima nuclear disaster Strohm's work has been put into a powerful documentary film in 2012, however, probably because of its highly critical content only a few cinemas will show it.[66]

The almost-catastrophe at Three Mile Island in 1979 and the nuclear GSA (greatest supposed accident) of Chernobyl in 1986, which left thousands of people dead and deadly radiated, have triggered the global debate on the consequences for the environment in case of a nuclear incident and the limitation of human rights and civil liberties required by the nuclear industry and the state in order to develop and extend the use of nuclear power. The Fukushima nuclear disaster is intensifying and sharpening the global debate on targets, pathways and priorities of the energy supply of the future and its interactions and relations with civil society. The post-Fukushima age seems to mark a watershed between the nuclear-friendly old Japan and a new Japan, which has developed a highly critical stance towards nuclear matters. However, it is far too early to foresee the precise results of the developments and tendencies since March 11, 2011.

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