

Japan's Nuclear Imaginaries Before and After Fukushima: Visions of Science, Technology, and Society

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Abstract Two recent insights regarding social imaginaries are of particular relevance in thinking about the Fukushima disaster and its aftermath. First, social imaginaries are consequential for social resilience. Second, imaginaries play a significant role in the way a society addresses science and technology. In light of these insights, the chapter explores nuclear imaginaries in Japan before and after Fukushima, and presents several key historical factors that shaped such imaginaries in the lasting manner. It presents how Japan's nuclear imaginaries have persistently embraced certain ideals of science and technology, and excluded people subject to radiation risks. The chapter concludes by calling for explicit engagement with our nuclear imaginaries, in terms of social resilience, and also as an arena where we can explore more democratic approaches to science and technology. Such engagement is also consequential to larger visions of society.

Keywords Social imaginaries • Sociotechnical imaginaries • Resilience • Public engagement with science and technology • Fukushima nuclear disaster • Science, Technology, and Democracy

1 Introduction

For decades, scholars in humanities and social sciences have explored the role of imagination in social life. After influential works by Anderson [1],¹ Castoriadis [6], Appadurai [2] and Taylor [36], the concept of social imaginaries—imagined collectivities, together with shared assumptions about social relations and practices, as

¹In his seminal account of the emergence of nation-states, Anderson defined the nation as “an imagined political community”—the product of the shared imaginations of those who perceive themselves as members.

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well as collective representations and narratives about a society's past, present, and future—has become a common analytical tool in such fields as anthropology and sociology.

Two recent insights regarding collective imaginaries are of particular relevance in thinking about the Fukushima disaster and its aftermath. First, social imaginaries are consequential for a group's social resilience. Reviewing empirical works (including their own) on groups facing various adversities (e.g., poverty, health disparities, discrimination, marginalization), Hall and Lamont [11, 12] argue that social imaginaries are constitutive of the collective capabilities of a community or society, as they not only bind its members with narratives of its past accomplishments and a vision of what it means to belong to it, but also indicate how its members understand what they are capable of doing together. Defining social resilience as “the capacity of groups of people bound together in organizations, classes, racial groups, communities, or nations to sustain and advance their well-being in the face of challenges” [11], they argue that imaginaries can provide significant resources for such a capacity. For instance, social recognition and status of a group—i.e., where it stands in collective imaginaries—shape capabilities of its members by influencing how they can secure support from others, as well as how they perceive their own efficacy [11]. Put another way, how collective imaginaries specify and support group identities and define who qualify as valued members of the collectivity can be direct sources of resilience for group members [12]. Conversely, when these imaginaries stigmatize a group, they constrain capabilities of its members. At the same time, groups might turn to collective imaginaries for tool to cope with difficulties: In coping with discrimination, members of marginalized groups in the United States often rely on such cultural resources as principles of equality as a key American creed (e.g., [26]), whereas a strong group identity has been found to alleviate the impact of adverse experiences. In sum, imaginaries serve as important resources—or constraints—for social resilience, independently of *and* consequentially for a group's access to material resources.

Second, imaginaries play a significant role in the way a society addresses science and technology. Jasanoff ([17]; also see Jasanoff and Kim [18]) argues that visions of future developments in science and technology are inevitably and intricately connected to collective visions of good and attainable futures, positing a concept of “sociotechnical imaginaries.” Defined as “collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology” [17], this concept allows us to explore and better understand the complex interplay between developments in science, technology, and society. For instance, examining the development and regulation of nuclear power in the United States and South Korea, Jasanoff and Kim [18] identify different ways in which nationhood and nuclear power have been imagined together in the two countries, as well as how such different imaginaries illuminate their different responses to nuclear disasters and the spread of

anti-nuclear movement. Importantly, such imaginaries are variable across groups within society; they are durable yet changeable; and they are not only descriptive, but also prescriptive—engaging with what kinds of future should be pursued and how they should be achieved through science and technology. They also encompass shared fears of harms that might result from invention and innovation.

These recent insights both suggest that social imaginaries are consequential to the future of the collectivity, whether by affecting resilience of a social group and society as a whole, or by positing what futures are desirable and how to attain them using science and technology. This calls for an explicit examination of Japan's nuclear imaginaries, both before and after the 2011 disaster. What visions of society were pursued through nuclear technology? Who were imagined as relevant actors in the development and regulation of nuclear power? How did nuclear imaginaries enable and constrain capabilities of different actors? What visions do current politics and policy approaches embody? Do they facilitate resilience of communities affected by the disaster? In the following, I present a few findings from a larger project that systematically traces such imaginaries.² To clarify, different groups in society might harbor and advocate different, competing imaginaries, but some can be more dominant than others. Policy is a particularly important site that presents and institutionalizes certain imaginaries as authoritative and representative.

2 Nuclear Imaginaries in Japan: At the Time of the 2011 Disaster in Fukushima

Among the most striking aspects of the way nuclear technology was imagined by the general public in Japan right before the 2011 disaster are: (1) how decoupled and dissociated nuclear energy production was from nuclear weapons; and (2) how rarely the former was imagined at all. The public was overwhelmingly indifferent, and took it for granted that there were 17 nuclear power plants (NPPs), supplying 30 percent of the country's electricity. As former-nuclear-engineer-turned-opponent Tanaka [43] argued, nuclear energy solicited little public attention: "what supports the national policy to promote nuclear power more than anything is the unrecognized indifference of people in big cities" (my translation). Pointing out that none of Tokyo Electric Power Company (TEPCO)'s 17 reactors existed within the areas (including Tokyo) to which the company supplied electricity—all were located in Fukushima and Niigata Prefectures—he said, "We have 55 reactors, but most of us live our daily life as if they don't exist" (my translation). This was the climate in which any critiques or even reservations about nuclear power would have one

²Together with work with Jasanoff and Lamont, I am part of a multi-year project, "The Fukushima Disaster and the Cultural Politics of Nuclear Power in the United States and Japan," which traces the development of dominant nuclear imaginaries in Japan and the United States. Our data include media coverage, policy documents, organizational documents, interviews, and ethnographic data.

labeled as “unrealistic dreamer,” as Murakami [28] described after the disaster.³ Nuclear phase-out was unthinkable to many Japanese.

This paradigm was to continue: A month before the March 11 disaster, the Japanese government decided to extend the operation of existing nuclear power plants, partly as a measure to reduce greenhouse gas emission. At the time of the disaster, TEPCO had plans to start constructing two additional reactors at the Daiichi (or 1F, or *ichiefu*, as it has been locally called) site the following year. In general, the predominant political discourse about nuclear energy centered on the following ideas: (a) it is a source of stable supply; (b) it is economically efficient; (c) it produces zero carbon emission; and (d) by ensuring safety and gaining public understanding, we need to expand it. For instance, in the 2010 Basic Energy Plan, long-term energy plans announced every several years, nuclear energy was categorized as “non-fossil” and “zero-emission sources” together with “renewable energy,” and it was proposed that the ratio of these two types of energy be raised from the then 34% to more than 50% by 2020, and about 70% by 2030.⁴ The Plan stipulated that more nuclear power stations (“at least 14 reactors”) be built and the operating rate of the facilities be increased (to “about 90%”) by 2030, while gaining public understanding and trust, especially of local residents, and on the condition of ensuring safety.

At the time, for the government and other proponents of nuclear power production, it was linked to the nationhood both as an indispensable technology that allowed the country with scarce natural resources to prosper and as a technological domain in which Japan excelled. This is evident in the 2006 “Nuclear Power Nation-Building Plan,” a report submitted by the Nuclear Energy Subcommittee in the Advisory Committee for Natural Resources and Energy.⁵ The plan urges Japan to increase the share of nuclear power, spread its nuclear technology globally, and contribute to nuclear non-proliferation. Similarly, in his ill-timed book, writer-critic Toyota [37] argued that Japan’s nuclear technology was the safest in the world and that the country should promote it both for the economic gains and for the good of humanity, such as a solution to climate challenges.

Organized opponents existed throughout Japan, though marginalized as Luddites, hippies, or “unrealistic dreamers.” They had called attention to various issues of concern, such as unfounded “safety myth,” the insularity of the nuclear community as “village,” and the industry “capture” of policy processes (e.g., [10, 23])—many of these have become accepted as shared understandings after the 2011 accident, even presented by major investigative reports put out in 2012 by the Diet, the Cabinet, and a private foundation.

³Murakami’s speech in Barcelona on June 9, 2011, upon receiving the International Catalunya Prize.

⁴<http://www.enecho.meti.go.jp/topics/kihonkeikaku/100618honbun.pdf> (Last accessed on May 28, 2015).

⁵<http://www.enecho.meti.go.jp/topics/images/060901-keikaku.pdf> (Last accessed on May 28, 2015) Based on the Framework for Nuclear Energy Policy, approved by the Cabinet in October 2005.

Notably, not only the general public, but also many activists against nuclear power and weapons did not necessarily consider the two applications tightly connected. Even a great number of *hibakusha* and anti-nuclear weapons activists were uncritical of nuclear energy production.⁶ In a July 2011 interview, Terumi Tanaka, Secretary General of *Nihon Hidankyo* (Japan Confederation of A- and H-Bomb Sufferers Organizations), said: “I have been thinking since the nuclear accident, perhaps we *hibakusha* may not have thought very much about nuclear power. These days I think that we need to revisit and more thoroughly study the background of the technology, the system of management, how the industry and government addressed it, etc., and continue to debate about what we can say and do as *hibakusha*” (my translation).⁷

In sum, in the pre-Fukushima dominant imaginaries, future Japan is ecological, efficient, economically prosperous, and equipped with clean energy and strong science and technology, and these objectives are facilitated by nuclear technology. In this vision, technological prowess is an important part of the country's national identity (see Hecht [13] for the French case), and major social and economic problems are solved by advances in science and technology, which are supported by both the government and market forces.

Also implied in these imaginaries is the so-called “deficit model,” in which the public's skepticism toward and/or rejection of a specific scientific or technological development is attributed to its ignorance and incomprehension. In this model, knowledge is monopolized by experts, and solutions to the public objection consist of educating them with more and better information about science and engineering and raising their “literacy.” Scholars in the field of science and technology studies (STS) have presented various critiques to this model, showing how sophisticated and productive “lay” knowledge can be [9, 40, 41], how “local” and parochial—as opposed to “universal”—expert knowledge can be [41], and how increased scientific “literacy” does not always lead to acceptance and appreciation of science and technology [4]. These insights have problematized how decision-making about science and technology—enormously consequential to the whole society—is left to a small group of experts and the political and corporate elite, and challenged us to explore more democratic approaches to science and technology. For instance, critics of the deficit model have called for public engagement in various aspects of science and engineering: not only final assessment of a given option for policymaking objectives (e.g., public hearings, consensus conferences, deliberative polls), but also

⁶One of them, Gensuikin (Japan Congress against A- and H-Bombs), has long been calling for nuclear phase-out in energy production; it held its annual meeting in Fukushima in July 2013, clearly signaling its opposition to the two related applications of nuclear technology. Another group, Kakkin (National Council for Peace and against Nuclear Weapons), has long supported “peaceful use” of nuclear technology, even after the 2011 disaster. The other group, Gensuikyo (Japan Council against Atomic and Hydrogen Bombs), has been cautiously against certain aspects of nuclear power production, but has not opposed to the idea itself completely.

⁷“Hoshasen to mukiai nagara ikiru: Fukushima Genpatsu jiko—Hibakusha to shite dou uke-tomeruka” *Hidankyo Shimbun*, August 2011 issue (No. 391).

early stages of scientific research and technological development (e.g., [31, 39]; see Delgado et al. [7] for a review of current issues regarding public engagement).

Furthermore, lacking conspicuously in these imaginaries surrounding nuclear technology are certain actors, practices, and phenomena: workers at NPPs, local residents, day-to-day operations at NPPs, and risks of radiation for workers and residents. After the 2011 accident, it came as a great shock for many Japanese to learn about the precarious conditions of labor at the plants (as depicted in Higuchi [14], Asakawa [3], Jobin [19]), as well as how “manual” and low-tech some of the workings and physical realities of NPPs are—as opposed to the images of a clean control room, which was a typical representation of an NPP—and how much uncertainty surrounded a control of, and effects of, radiation. Urban Japanese were also largely oblivious to the risks that local residents bore as NPPs supplied energy to their cities. Moreover, decoupling from bombs prevented *hibakusha*’s postwar social, political, and physical struggles from being relevant to discussion of life with NPPs.

3 Historical Factors Behind the Pre-Fukushima Nuclear Imaginaries

While nuclear imaginaries described above are obviously a product of long-term, complex historical processes involving numerous actors, events, and cultural, political, and economic resources, below I highlight several key factors that have significantly shaped them in early postwar years in the way that have persisted since then.

First, in postwar Japan, the public discussion of nuclear technology—and the war experience in general—was significantly shaped by the systematic censorship carried out by the Allied Occupation. Under the censorship apparatus laid out by the United States, discussion or expression of the experience of the bombings was severely restricted, as well as criticism of the US or other Allied nations. Notably, the public had little awareness of censorship or the press code [5, 16, 24]. The insidious nature of this censorship had a profound impact on the way the Japanese talked about and thought about the atomic bombings. Kawamura [24] argues that this kind of manipulation contributed to the way the issue of atomic bombings became meaningless, hidden, and invisible to most Japanese in plain sight during these postwar years.

After the end of the Allied Occupation in 1952, many Japanese saw visual representation of victims of atomic bombs for the first time when *Asahi Graph*—a *Life*-like general interest photo magazine—published a series of photos in its August 6th 1952 issue. While the photos certainly were shocking by most standards, with charred bodies and badly injured children, strikingly missing was any critiques of the acts of bombings themselves. The brutality and inhumanity of the bombs were emphasized without an agent, and also portrayed as a deterrent of another war, or even a purveyor of peace. Remarkably enough, an organized

movement against nuclear bombs did not emerge until after the Bikini Atoll incident in March 1954, when the crew of a Japanese fishing boat was exposed to nuclear fallout from the American testing of thermonuclear bomb.

Second, in the Cold War context, Japan came to thoroughly embrace the concept of “peaceful” use of nuclear technology, which was aggressively promoted by the United States. With the 1953 “Atoms for Peace” speech, Eisenhower sought to recast nuclear technology for world redemption and incorporate it into the emerging Cold War order by promising to share it with non-communists countries. Japan’s nuclear energy industry came about in this context, simultaneously with the rise of anti-nuclear weapons movement. Here, the rejection of weapons not only did *not* contradict the excitement about “peaceful” use, but also served as a driving force of the latter [42]. In the name of turning a tragedy into inspiration, the US government even launched a campaign to build an NPP in Hiroshima in 1955 [35]. The US found powerful Japanese allies including young politician Yasuhiro Nakasone (later Prime Minister) and media tycoon and politician Matsutaro Shoriki, who ran the *Yomiuri Shimbun*, helped launch the Japanese professional baseball, and later came to be known as the father of nuclear power in Japan. For instance, Shoriki worked with the US government to organize the traveling exhibition on “the peaceful use of atomic power.” The exhibition started in Tokyo and visited nine other cities including Hiroshima, where it was co-sponsored by local municipalities, university, and newspaper, and received enthusiastically in spring 1956. While many *hibakusha* were initially cautious about this “peaceful” application of the technology, arguing that no solution had been found to the problem of managing radioactive materials, by summer 1956, even Moritaki Ichiro, an intellectual leader of survivors and nuclear weapons abolitionist, came to embrace the idea of “peaceful” use [35]. Importantly, this dichotomous view in which the tragedy of military use is contrasted to the prosperity of “peaceful” use, as well as eventual decoupling of the two, resulted from concerted efforts by the US government and Japanese supporters of nuclear energy. In the late 1950s, very little opposition existed to the ideas of nuclear power production or plans of building NPPs. Narratives of nation-building through nuclear energy were not hindered by the memories of the bombs or the growing anti-nuclear weapons movement; rather, they were supported by the exceptionalist idea that, as the “sole victim” of the bombs, Japan should lead the world in this technology.

Third, as some scholars argue, behind the de-politicized nature of nuclear energy production was the long-standing history of “internal colonialism” in Japan, whereby Tokyo and the power that be there have exploited and colonized the periphery such as the Tohoku region, of which Fukushima Pref. is part. As Hopson [15] points out, Tohoku-born intellectuals have long described the region a domestic colony of the center, whose subjugated and “backward” status resulted from official policy decisions during the Meiji period (1868–1912) of rapid modernization. These intellectuals were aware—some as early as in the 1890s—that the region’s often essentialized “backwardness” was a product of the exploitation of its resources and domination [15]. As the region turned into a significant provider of rice and labor for the growing Tokyo Metropolitan area, the narrative that the

backward region needed to be developed also became common, and local support for projects such as NPPs became strong. In this context, Tohoku became the primary provider of electric power for Tokyo, and the constructions of NPPs in Fukushima was an extension of this historical trend.⁸ (For more studies of exploitation of the periphery by the center, see Kainuma [22], Takahashi [32], Kawanishi [25]). With this unequal relationship as a backdrop, a sociotechnical system and imaginary that isolate NPPs, their workers, and local residents from urban areas came about, corroborated by narratives of nation-building as a noble goal.

Fourth, although Japan's science and technology nationalism preceded World War II [27], after the defeat marked by the atomic bombs, narratives of nation-(re)building through science and technology became an even more prominent constitutive element of government policy in various areas. Despite a number of debates on the relationships between science, technology and society in the 1950s and 1960s, often carried out by preeminent scientists and engineers such as Hideki Yukawa and Mitsuo Taketani (e.g., [8]), the ideas that science and technology belong to the elite and experts prevailed and survived multiple challenges, including pollution diseases and various NPP accidents both at home and abroad. While this deficit model has been prevalent globally, in Japan it had a particular elective affinity with the country's tradition of powerful bureaucratic elite and enduring scientific nationalism, contributing to the rise of safety myth and nuclear village and the systematic exclusion of lay voices.

4 Nuclear Imaginaries in Japan: After Fukushima

The 2011 nuclear disaster was a colossal event in Japanese history that has prompted unprecedented efforts to review and discuss what happened, how and why, as well as where we should go as society. Issues of nuclear power, long marginalized and depoliticized, have come into the spotlight in the Japanese public discourse. Numerous TV programs, magazine and newspaper articles, blogs, films, and books have explored a variety of issues, from historical backgrounds of Japan's NPPs to causes of the disaster to the effects of radiation on human health to the energy future of Japan. Furthermore, there have been multiple large-scale efforts to investigate the accident, while new regulatory framework was introduced (see Juraku in this volume on post-disaster investigative efforts and their impact).

However, despite these efforts at reflection and momentary openness to change that followed, much of the older imaginaries remain today, dictating policy and political debates, as well as the way the public can engage with decision processes.

⁸As an effort to unearth the region's rich culture and history and understand what its reality says about Japan's past and present, noted folklorist Norio Akasaka has been advocating "Tohoku-gaku," or Tohoku Studies.

In particular, the deficit model, the way the polity is imagined as centralized, and the way radiation risk bearers are concealed all persist.

For instance, despite the consistent majority opposition to restarting of reactors in opinion polls⁹ (all the commercial reactors in Japan were offline between September 2013 and August 2015), the 2014 Strategic Energy Plan has paved ways to restarting of NPPs whose safety has been confirmed by the Nuclear Regulation Authority (NRA) under “the new regulatory requirements, which are of the most stringent level in the world”.¹⁰ The Plan presented nuclear power still as a primary, “base-load” source for the country’s energy supply, emphasizing the same rationales as earlier (e.g., efficiency, stability, Japan’s scarce natural resources, less greenhouse gas emission than fossil fuel-based energy). In case of restarting a reactor, the government will “make best efforts to obtain the understanding and cooperation of the host municipalities and other relevant parties.” With this new framework, several reactors at three NPPs have been restarted since August 2015 (as of July 2017) regardless of fierce local and urban-area protests.¹¹

The new regulatory framework epitomizes the challenge of bringing about a fundamental change. On the one hand, it incorporates some new openness, emphasizing the significance of opening up the regulatory processes, increasing transparency over the energy policy planning process, and obtaining public trust. The 2014 Plan even calls for an end to the national government’s monopoly over many decision-making processes, as well as more open engagement with various stakeholders. On the other hand, the idea that the issue is communication with the public, rather than the public’s democratic participation, still prevails in the Plan. In this line of thinking, nuclear safety is presented as a domain exclusively for elite efforts, whether scientific or managerial, and the public’s concerns and anxiety as something to be resolved with explanation and communication. Such ideas of unproblematic expertise and the deficit model still predominate, despite much soul-searching that took place. Furthermore, as Juraku (this volume) points out, extensive post-disaster efforts at reflection and investigation failed to address such vital societal issues as ethics, responsibility, and social justice head-on.

⁹See opinion polls published by major newspapers: e.g., *Asahi Shimbun* (March 18, 2014); *Tokyo Shimbun* (September 20, 2015); *Nikkei Shimbun* (August 24, 2014; February 29, 2016); *Mainichi Shimbun* (August 9, 2015; March 8, 2016); and *Yomiuri Shimbun* (March 9, 2016).

¹⁰http://www.enecho.meti.go.jp/en/category/others/basic_plan/pdf/4th_strategic_energy_plan.pdf (Last accessed on May 29, 2015).

¹¹The case of Takahama NPP illustrates the tensions between opposition and support of NPP restarting. In April 2015, a district court issued a provisional injunction against the restarting of its two reactors on the basis of safety concerns filed by local residents. However, this was overturned by the same court in December 2015, and the two reactors were restarted in early 2016. In March 2016, however, another district court issued an injunction against their operation, siding with residents who lived within 70 km from Takahama and raised safety concerns. This unprecedented ruling, which led to the shutdown of an operating reactor, was followed by the June 2016 approval by the NRA to operate Takahama’s two other reactors (one 40-year-old and the other 39-year-old) for additional 20 years.

In this context, mothers who express concerns about the effects of low-dose radiation exposure on their young children are portrayed as irrational and pressured to be silent; uninformed workers are mobilized to participate in decontamination efforts in a precarious, exploitative manner (e.g., [20, 30]); official discourses continue to deny or undermine the harmful effects of radiation (e.g., [29, 38]); evacuees from some areas with decreased radiation are nudged to return, with financial support about to be reduced or cut; and municipalities within 30 km of a NPP, although now part of emergency evacuation plans, still do not have a formal say in its restarting. These are consistent with the earlier visions of nuclear technology, even though to some extent Japan's nuclear imaginaries have forever been changed by the accident.

5 Conclusions: Toward Democratic Imaginaries

If new nuclear imaginaries are to serve as resources for social resilience, they need to allow those affected by the negative consequences of the disaster to feel that their experience matters, that they are part of this social enterprise that explores new relationships to nuclear technology, and that they have a say. Japan's dominant nuclear imaginaries have consistently excluded their voice, before and after Fukushima, but new imaginaries need to include their voice, bolster their status, and support their identities. The current situation can also be used as an opportunity to reflect further on our general relationship to science and technology. While many countries have incorporated public engagement in their science and technology policy processes, Japan has generally lagged behind in this, although some provisionary attempts have been made since the disaster [34]. Nonetheless, the deficit model and technocratic approaches still prevail, and what kinds of public engagement would be productive in Japan needs to be explored. And if, in addressing nuclear technology, we are also signaling and performing where we are going as society, we should reexamine our approaches to nuclear governance more carefully and explicitly. After all, the key issues are not simply whether we want nuclear energy or not and how to proceed with the decision we make; it is also about whether we want a society that exploits and neglects the vulnerable [33], as well as about how we make decisions as a democratic society. At stake is what kind of future we are creating.

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