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Monitored this issue:

The black boxes of nuclear waste strategy

Christiana Mauro

How much radioactive waste is stored on our planet? According to the world's first nuclear waste report, we don't really know. We do know that nearly seven decades of civil and military reactor programmes have led to large stockpiles of waste, and that its volume is growing; we also know that our ignorance is vast, and there appears to be no responsible solution to the problem.

The systems delivering management strategies vary tremendously from one country to another, as do the range of authorities responsible for their management; so establishing volumes, risks and costs is no small task. When we add to this complexity national variations in both terminology and conceptual frameworks, a cross-country comparison becomes a Gordian knot. States don't just differ in their classification systems – they also follow different regulatory and safety procedures; the same applies to funding schemes, accounting measures, inventory reports and liability strategies. The European Commission is reportedly not able to make sense of the member state reports it receives, due to the extent of the anomalies. The commission has stated that it would consider taking measures to harmonize inventory reporting; it also expressed interest in finding ways to encourage states to secure appropriate financing options to pay for waste management.[1] Nuclear Waste Directive implementation failures have led to the launch of infringement procedures against 25 out of 28 member states.[2]

While Russia offers practially no useful information about its nuclear waste inventory, the data from Belgium and the Netherlands are out of date, and the quality of Slovakia's reports are so bad that they couldn't be used for the WNWR report. Together with Euratom and national supervisory bodies, the Commission may wish to look into the codification of reporting methodologies in order to loosen the Gordian knot somewhat. The question of safety is ultimately a matter of implementation, and one of the functions of EU bodies is to indicate where implementation problems lie.

Criteria: the basis for informed decision-making

The World Nuclear Waste Report 2019 – Focus Europe (WNWR) offers criteria by which some of the evident lapses in reporting and departures from minimum obligations can be identified and remedied.[3] It also provides estimated costs for the management, storage and disposal of nuclear waste. While the facts and figures are plentiful, the historical and social factors that have led to such a wide range of definitions, practices and taxonomies receive close attention as well.

As communities push for a greater say in energy and waste management decisions, such an overview is welcome. Environmental NGOs and individuals are also demanding information that will help them protect their access rights; they want to know what criteria their governments are using in the waste policy-making process, according to Miranda Schreurs, Chair of Germany's Civil Society Board. The German body is trying to facilitate access to energy decision-making models and create participatory processes that so far "have failed across the board". It is also currently lobbying for the introduction of legislation to ensure public access to comprehensive geological assessments.[4]

Without access to information in the hands of public and private entities that are very often reluctant to share it, communities cannot form evidence-based opinions or participate in the waste site selection process. While nuclear environmental impact assessment and licensing processes are gradually becoming clearer, the nuclear waste decision-making processes remain opaque.

Nuclear states tend to endorse shallow, interim solutions; this enables them to follow the wait-and-see strategy when dealing with the end of the nuclear fuel cycle. For this reason the development of safe systems for the final management of hazardous nuclear by-products is a challenge that is not being allocated the resources it requires. Remarkably, the WNWR reports that there is no country in the world that has "closed the gap between secured funds and cost estimates"; moreover, government estimates of nuclear power plant decommissioning and waste storage costs appear to be wide of the mark.

According to the first instrument to regulate the safety of radioactive waste and spent fuel, which entered into force in 2001, all of the contracting parties are obliged to provide adequate financial resources for the management of spent fuel and radioactive waste; they have also committed to limiting the extent to which the waste problem is bequeathed to future generations.

There appears to be no safe, sustainable or cost-effective solution for managing nuclear waste once it's been generated; nuclear waste is unique in that regard. These are sad, serious truths. Yet there are other, still more discouraging truths that must be confronted.

Is the problem managable?

What are we do with radioactive waste? This is an empirical question which has been pondered for the better part of a century without any clear solution. A responsible approach to the management of radioactive waste and spent nuclear fuel does not involve burying high-level radioactive material under the sea bed or launching it into space; it requires a repository site, which brings with it major public relations obstacles.

The Swiss geologist and former member of the Federal Commission for Nuclear Safety Marcos Buser has been working on the problem of nuclear waste disposal for 45 years, and believes that our present state of knowledge is one of near-complete ignorance. Buser sees no near-term solution in sight, and claims, suggestively, that the problem cannot be "too big to fail" – as societies will ultimately be forced to finance a solution – but it may very well be "too big to manage".

Disposal strategies are not reassuring

One's opinion about nuclear waste depends largely on what one thinks nuclear waste is. Definitional and categorical inconsistencies abound, as the WNWR illustrates.

The storage of nuclear waste occurs at a number of processing stages and at various levels of concentration; it is subject to different duration and, worryingly, considerably different safety standards (even among EU member states). Storage of radioactive waste can range from secure laboratory cabinets and facilities built for such purposes, to plastic bags[5] (Hungary) and containers susceptible to radioactive leakage after heavy rainfall[6] (Japan). The US uses waste canisters that may crack and leak, and are not properly maintained, properly inspected or even reparable.[7]

It ought to be apparent that some storage methods are not as good as others, especially for purposes of sustainability. But many of the methods in common use today are simply no good at all–for any purpose. Interim storage solutions are not a remedy, as they pose hazards of their own.

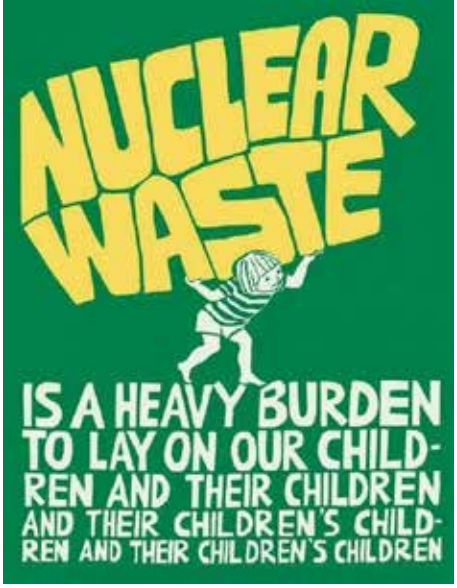
While deep geological disposal is the solution that the majority of experts favour for the final disposal of the most dangerous radioactive waste, the ifs, ands, and buts of the conditions of this scheme are considerable. Many in the climate justice movement are not in agreement with the concept. Finland is constructing such a facility with the hope that it will be operational by 2023, but currently there is still no country that operates a deep geological disposal facility.

Former Green MEP Rebecca Harms writes in the WNWR that deep geological disposal is "one of the most ambitious and most difficult tasks on earth." According to the Union of Concerned Scientists the search for a final repository site in the United States has "stalled".[8] And while national statutory deadlines for identifying a long-term storage solution come and go, governments continue to address the problem of nuclear spent fuel and waste in an abstract way - aware that society is facing a crisis, but ignoring it.

Access to data is crucial

The data sources energy modellers need access to are not so much withheld by the state but rather are held by commercial entities subject to statutory reporting.

The Aarhus Convention guarantees access to data related to the environment in most jurisdictions, but the barriers preventing public access to nuclear waste data are various



and considerable. To give one example, the WNWR is published under a Creative Commons CC-BY-NC-ND-3.0 license, but to be useful to energy modellers and analysts, code and data require a public domain waiver. The license is neither open, nor data-capable, nor international. Open energy modelling communities help to create tools, conduct assessments and develop models that enable innovative solutions. As civil society begins to conduct its own public policy analyses, these details are important. Robbie Morrison, a Berlin-based open data campaigner, asserts that organizations such as Europe's Project Drawdown[9] or the Open Energy Modelling Initiative (openmod)[10] are increasingly challenging institutions to offer more access to energy policy data. Openmod writes that at present "most energy models are black boxes – even to fellow researchers," but an energy modelling revolution may be underway.

The taxpayer burden for nuclear waste is heavier than it should be, as the polluter-pays principle is not being observed. And the need for a more democratic management of energy systems is indisputable. But while the idea of society seizing the reins of energy policy-making sounds terrific, civil society groups are only as powerful as their resources; a strategic political vision is necessary to address operational priorities and identify funding mechanisms to meet this historic challenge. The transparency of energy policy decisions will be crucial to public acceptance of waste management models.

Openmod's 10th European Workshop will take place at the Hertie School of Governance in Berlin on January 18, 2020.[11]

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Australia's nuclear fantasies: the technological creationism of nuclear power

Dr. Darrin Durant – Lecturer in Science and Technology Studies at the University of Melbourne

It is just a little past Nuclear Groundhog Day in Australia. A 2019 parliamentary inquiry[1] into the conditions under which future Governments might consider nuclear power in Australia recently concluded that emerging nuclear technologies were a clean energy pathway for Australia.[2]

This recommendation was immediately opposed by Labor and the Greens, and even opened up divisions within the Coalition, while also failing to resolve how partially lifting Australia's nuclear ban (for one type of nuclear generating technology) could practically work.

Much ink and even more pixels have been and will continue to be splayed everywhere on this polarized issue, but the untold story of the nuclear option is that it is in fact a technological form of Creationism. Let me explain.

Nuclear power is like a wild goose chase where the goose is a zombie that cannot be killed. The nuclear option in Australia has been buried at least three times previously, only to be brought back from the dead.

Nuclear power was originally prohibited by legislation. Section 10 of the Australian Radiation Protection and Nuclear Safety Act 1998 prohibits fuel fabrication, enrichment or processing, and nuclear reactors.[3] Section 140A of the Environmental Protection and Biodiversity Conservation Act 1999 prohibits the federal Minister from approving an action leading to such installations.[4]

Yet a federal Government review of 2006 (the Switkowski Report) considered the potential to establish such installations, although it concluded nuclear power in Australia was uneconomic.[5]

A 2016 South Australian royal commission to investigate the potential for SA to participate in the nuclear fuel cycle similarly concluded nuclear power in Australia was not commercially viable.[6]

Nuclear power does not affect its own resurrection by virtue of its own divine power. Instead, like Lazarus was said to have been resurrected by Jesus four days after retirement, nuclear power has divine ideologues on its side. Obviously not the Labor Party, which thinks resurrecting the nuclear option signals the indulging of political fantasies[7], nor the Greens, who think resurrecting the nuclear option is the stuff of crackpot lunatic cowboys.[8]

Instead, as Friends of the Earth wrote, it is right-wing ideologues who continually resurrect nuclear power, in a culture war trying to wedge the political Left.[9] Or as the economist John Quiggin wrote, support for nuclear power is de facto support for coal.[10]

Given the decades of lead time required for nuclear power to feed into the electricity grid and, assuming publics and politicians swallow the argument that renewables cannot satisfy base-load power requirements, coal is advertised as the only viable option until nuclear comes online.

The technological creationism of nuclear power

But the nuclear option has more than the business-as-usual commitments of right-wing ideologues on its side. The nuclear option has inherited an argumentative strategy from American Creationists, which the evolutionary biologist Eugenie Carol Scott coined the Gish Gallop.[11]

Named after the Creationist Duane Gish[12], Scott wrote that the strategy involves making "a simple declarative sentence, and you have to deal with not an easily-grasped factual error, but a logical error and a methodological error, which will take you far longer to explain… [Creationists present] half-truth non-sequiturs that the audience misunderstands as relevant points. These can be very difficult to counter in a debate situation, unless you have a lot of time. And you never have enough time to deal with even a fraction of the half-truths or plain erroneous statements".[13]

We can miss the Gish Gallop at the heart of pro-nuclear advocacy if we chase the controversy. We know nuclear power is politically polarizing and it is easy to report on clashing protagonists making seemingly alternate-reality claims.

Thus the Australia Institute's submission to the parliamentary inquiry dismissed nuclear power as uneconomic, climate unfriendly because of high water use in an already drought-prone Australia, and as lacking a social license.[14] In black mirror fashion, the Minerals Council of Australia strongly supported nuclear power as affordable, climate friendly because of zero-emissions, and as enjoying rising public support.[15]

Like chasing Creationists down the rabbit holes of their homespun Gish Gallops, opponents of nuclear power can spend a fruitless amount of intellectual and emotional energy rebutting half-truths and methodological sleights of hand. The fruitlessness stems from earnestly interpreting the opponents' claims 'straight' and tackling them head on.

The Minerals Council of Australia

For instance, the Minerals Council of Australia (MCA) argues that nuclear power is affordable and that Small Modular Reactors (SMR) represent a cheap and feasible option for Australia.[15] By contrast, the (independent) World Nuclear Industry Status Report found that nuclear power costs 5-10 times more per kWh than renewables, and that there is no sign of a technological or commercial breakthrough that would render SMRs viable.[16]

Similarly, the MCA argues that climate change is real, and that nuclear power is the only way Australia can meet our Paris Agreement goals without sacrificing jobs and prosperity. But are the MCA really climate defenders?

The thinktank InfluenceMap – which tracks climate policy opponents – ranks the MCA -59 (or 8th worst Trade Group) in its carbon policy footprint scores (-100 is highly and negatively influencing climate policy; +100 highly and positively influencing climate policy).[17]

Unfortunately, straight rebuttals matter little to technological creationists. Anything can be cheap, depending upon how you trim the costs. Everything can be feasible, depending upon your tolerance for fantasy. Anyone can be green, depending upon your degree of gullibility.

Gish Gallop

The difficulty presented by the Gish Gallop argumentative strategy is that only on the surface is the critic confronted by factual claims open to empirical challenge. Deeper down, we have pregnant misdirection, diversionary reframing, and strategic incompleteness. The strategy does not even have to be deliberate gaslighting[18], where the aim is to disorient and destabilize the audience in a quest to leave the speaker the beneficiary of the disenchantment of truth.

Instead, the Gish Gallop simply entices the audience to run off in multiple directions at once, earnestly looking for the grounding of a claim that is in fact a groundless fog.

For instance, are nuclear reactors zero emissions, as the MCA claims? There is a grain of truth there, if the nuclear life cycle is restricted to reactor operation. But as the energy analyst and environmentalist Mark Diesendorf has shown, to calculate the emissions from nuclear power one must account for fossil fuel use in every other aspect of the nuclear life cycle (mining, milling, fuel fabrication, enrichment, reactor construction, decommissioning and waste management). Moreover, the lower the grade of uranium ore, the higher the resulting emissions, so that nuclear power will emit more CO2 over time as higher-grade ores are used up.[19]

Some analysts try to be fair, concluding that emissions from nuclear power are neither zero nor high and made complex by multiple uncertainties[20], or that unstated assumptions about the carbon footprints of energy supplied in the non-operational phases of the nuclear fuel cycle strongly determine the ultimate carbon footprint.[21]

But notice how it is the audience that must supply the context for assessing pro-nuclear technological creationist claims? The necessary context for assessing claims – zero emissions, etc. – is willfully deleted from the message itself.

SMRs

Similarly, the MCA writes that SMRs 'are simply an evolution of a proven mature technology'.[15] Specific claims about an unproven technology (SMR) are then treated as general warrants for a technology which possesses an actual track record (where the track record is not supplied).

Again, straight responses are possible. The anti-nuclear activist Noel Wauchope lists seven reasons why SMRs are unwise[22], and Quiggin questions whether the plant that is supposedly going to manufacture the technology even exists.[23]

But it is the context deleted by the MCA that is of most relevance, so we must ask about the track record of this 'mature' technology and whether SMRs are just an unproblematic next step. The maturity claim typically means nuclear technology has benefited from economies of scale and social learning, so that construction times and costs would go down over time.

But as the World Nuclear Industry Status Report (and previous versions) shows, nuclear power lacks an upward learning curve.[16] Reactor cost blowouts in time and money have been the norm since the technology's inception. SMRs have inherited that legacy, with a survey of eight countries showing SMRs are even less economically competitive than large nuclear plants.

The Gish Gallop strategy here is simply to delete history from the evaluative criterion. But historically-informed judgments matter, as energy policy specialists like Benjamin Sovacool realize, writing that SMRs are almost entirely rhetorical fantasies built upon utopian expectations.[24]

Indeed, the broader case for nuclear power in Australia is similarly built upon a Gish Gallop strategy of strategic deletion perversely coupled with proliferating half-truths.

For instance, the MCA claims that surveys indicate increasing public support for nuclear power. But closer analysis shows that support varies if nuclear power is framed as a solution to climate change, indicating the support may reflect desired action on climate change itself.[25] Moreover, most have no desire to live near a reactor.[26]

Climate wedges

But this entire argument about a technology-neutral approach being premised on the need to pursue all elements in an energy portfolio at once rests on willfully deleting the context for assessing energy choices. The climate wedge idea derives from a 2004 paper by Stephen Pacala and Robert Socolow.[27] A wedge represents an activity that reduces emissions to the atmosphere starting at zero today and increases linearly until it accounts for one billion metric tonnes of reduced carbon emissions in 50 years.

But as Pacala and Socolow noted, "although no element is a credible candidate for doing the entire job (or even half the job) by itself, the portfolio as a whole is large enough that not every element has to be used".[27]

Not every element! The technology-neutral, all-of-the-above approach is both bad energy economics and deceptive politics, because passive and complacent business-as-usual masquerades as active and concerned political choice.

Was democratic debate really meant to be this way?

When we say democratic debate is about letting each side have its say, is the kind of argumentative sleight of hand practiced by pro-nuclear technological creationists really what we were imagining?

To anticipate a reply that might be offered as complementary but is a mistake: no, truth is not the answer. Truth can be despotic, as the political philosopher Hannah Arendt argued in 1967, peremptorily demanding to be recognized and precluding debate by relying on the coercive force of self-evidence.[28] Or put differently, truth is great when you have it on your side, until everyone claims it is on their side, and politics reduces to who coerces last.

But nor is the abandonment of truth to opinion the answer either. In the phrase of another political philosopher, Nadia Urbinati, to be unpolitical is to remove an issue in need of deciding from the open arena of competing political visions, political groups, and partisan views.[29] Urbinati advises we defend the merits of political deliberation, because it allows for contestation and revision, and be wary of forensic decisions by experts.

But is a little more of the unpolitical – a little less political deliberation – sometimes a wise move? Do you ever get the feeling that the continual resuscitation of the nuclear power option is just one more continual delay in meaningful reform of our energy portfolio? One more continual delay in meaningful reduction of CO2 emissions and the shifting of the electricity grid toward significant incorporation of renewables?

The nuclear power option has had its day but lives to tell another day because we tell ourselves that debating all the options is always good, even if we should really be saying some option needs to be retired.

The context at work making this continual resuscitation possible is not just the persistence of business-as-usual elites, but the political ecology in which those elites reside. Political populism radically polarizes public forums and delegitimates the independent advice-giving institutions of democracy. Media and cultural partisans have turned political deliberation into a spectator sport. The business-as-usual ethos exploits that weakened ground of consensus-formation to suggest old options are better than new options.

A crisis of truth, authority and legitimacy

As the historian of science Steven Shapin has suggested, we are facing a crisis of truth not because facts are being routinely contested or even because facts are being routinely made up, but because our institutions are suffering a crisis of authority and legitimacy.[30] We have lost track of who knows and does not know, which is a dearth of social knowledge about reputation and integrity.

Keeping the spectre of nuclear power at bay will require rethinking our institutions and how they can assist in making the objects of our political deliberation worthy objects. We can neither give up on experts nor citizens, but we do need to revisit how we think about each.

As myself and some fellow sociologists of science have argued, experts at the service of business-as-usual will never escape institutional delegitimisation effects, so we must look to expertise playing the role of a check and balance within our pluralist democracies.[31] Similarly, citizens do need to engage with public claims to test their contextual merits and coherency.

But as analysts of public participation like Matthew Kearnes and Jason Chilvers have warned, until organizations and institutions are more transparent and candid about their assumptions, values and interests, the burden of proof will fall unevenly on the less powerful.[32]

In each case, experts and citizens, what we need from them is interrogation of context. Not simply can they be our fact checkers, but can they be our redeemers of context, our arbiters of whether half-truths are masquerading as full claims, and our unmaskers of the pretenders at coherence?

Dr. Darrin Durant's research focuses on how experts and citizens interact in democratic debate, especially in debates about energy politics. Recent books include Experts and the Will of the People (2019) and previous work on the nuclear fuel cycle including Nuclear Waste Management in Canada (2009).

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South Australia's Flinders Ranges no longer targeted for nuclear waste dumping

Great news! The Australian government has ruled out dumping radioactive waste in South Australia's Flinders Ranges. The decision was announced the day after the result of a ballot of Flinders residents which found majority opposition.

In addition, Adnyamathanha Traditional Owners were overwhelmingly opposed. The day before the announcement, Vince Coulthard, Adnyamathanha Traditional Land Association (ATLA) chairperson, said: "The Adnyamathanha people have stood strongly opposed to the waste dump on our land from the start. In November this year at our AGM we again voted overwhelmingly to continue our opposition to this toxic dump on our land. The whole process has been flawed from the start. There was no proper process, no proper discussions and the views of the Traditional Owners were not given proper consideration. This flawed process has caused significant damage to our land and our community."

For many locals, this is the best Christmas present – one of Australia's most spectacular regions no longer faces the threat of radioactive rubbish and risk! Nation-wide efforts helped bolster local voices like ATLA and the Flinders Local Action Group who have been on the ground, campaigning to protect their homes from radioactive contamination for over four years.

Speaking on behalf of the Annggumathanha Camp Law Mob, Adnyamathanha Elder Enice Marsh expressed relief the process was finally over. "We are very relieved of course, after all of the torture and torment over the past four years and that›s what it really was; torture and torment by government and industry," she said. "I'm glad it›s over for this stage and I hope it›s over permanently."

Flinders Local Action Group spokesperson Greg Bannon said major concerns had included a lack of detail on factors including where waste would be stored long-term, and how long it would stay in the Flinders, which was flagged as a permanent disposal site for low-level waste and a temporary storage site for dangerous long-lived intermediate-level waste. "It's in a flood plain with seismic activity and the Adnyamathanha people have strongly said they don't want that waste on their traditional lands," Mr Bannon said.

But the federal government is still targeting South Australia – two sites on farming land near Kimba on the Eyre Peninsula are still in the firing line for a national nuclear waste dump. Locals are divided – some have been won over by implausible claims about job creation. The estimated job count has magically jumped from zero to 45 for no reason other than a political imperative to overstate benefits and downplay risks. Barngarla Traditional Owners recently held a ballot and 100% of respondents voted against the planned nuclear waste dump in Kimba.

Forgetting Fukushima

Jim Green – Nuclear Monitor editor

Japanese Prime Minister Shinzo Abe assured the International Olympic Committee in 2013 that "the situation is under control" in and around the stricken Fukushima nuclear plant. Now, with the 2020 Summer Olympics approaching, and some events scheduled to be held in Fukushima prefecture, all sorts of irresponsible and cruel tactics are being deployed to bury a myriad of social and environmental problems associated with the nuclear disaster.

Most evacuation orders have been lifted around the Fukushima plant, but 337–371 sq kms remain classified as restricted entry zones or 'difficult to return' zones.[1,2] There are hopes that all remaining evacuation orders could be lifted within a few years.

Lifting an evacuation order is one thing, returning the area to something resembling normality is quite another. Only 23% of those living in nine areas that were declared off-limits after the Fukushima disaster had returned as of March 2019, according to government figures.[3] Most people aged under 50 who used to live in the towns of Futaba, Namie and Tomioka have no plans to return, an official survey found in early 2019.[4] Among all age groups, 49.9% of Namie residents, 48.1% of Tomioka residents and 61.5% of Futaba residents said they would not return.

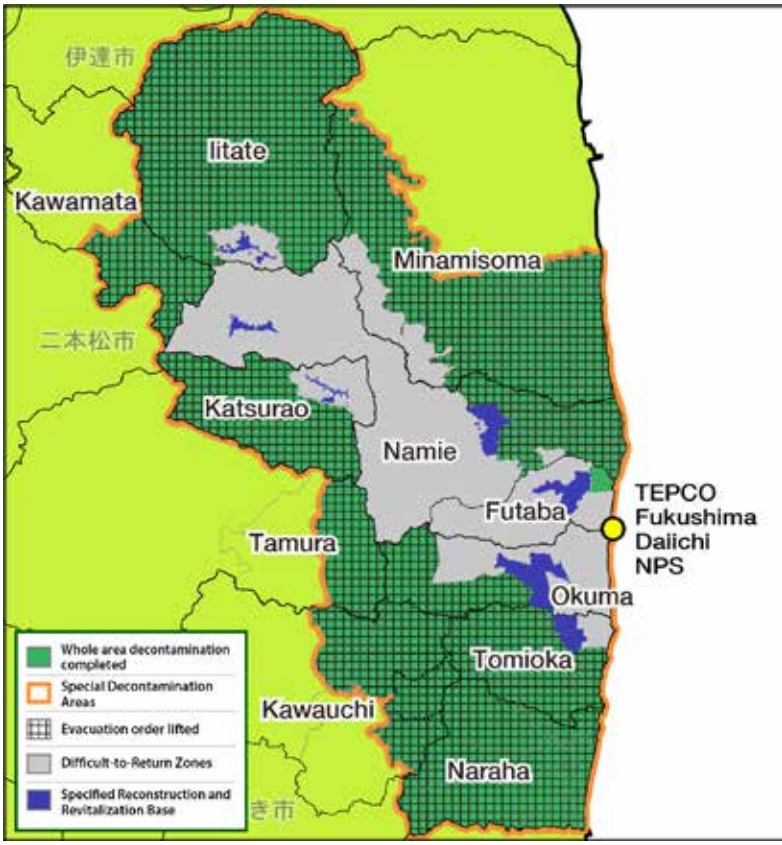
The partial lifting of evacuation orders in the town of Okuma in April 2019 illustrates how the rhetoric of progress masks inconvenient truths. Even after the lifting of the order, about 60% of the town's land area – covering 96.5% of the pre-Fukushima population – remains off-limits.[5,6] A 2018 survey found that only 10% of respondents expressed a desire to return to Okuma, while 60% had no plans to return.[7] Few people have returned since the evacuation order was lifted.[6]

About 17 million cubic metres of contaminated waste material has accumulated during decontamination work according to the Japanese Ministry of the Environment.[8] A new occupant in Okuma is a 'temporary storage facility' for some of the contaminated waste.[5]

Contamination

Decontamination work (outside of the Fukushima nuclear plant) has cost an estimated ¥2.9 trillion (US$26.5 billion).[8] A report by the European Geosciences Union, based on approximately 60 scientific publications, gives this assessment of decontamination efforts:[9]

"This synthesis indicates that removing the surface layer of the soil to a thickness of 5 cm, the main method used by the Japanese authorities to clean up cultivated land, has reduced cesium concentrations by about 80% in treated areas. Nevertheless, the removal of the uppermost part of the topsoil, which has proved effective in treating cultivated land, has cost the Japanese state about €24 billion. This technique generates a significant amount of waste, which is difficult to treat, to transport and to store for several decades in the vicinity of the power plant, a step that is necessary before it is shipped to final disposal sites located outside Fukushima prefecture by 2050. By early 2019, Fukushima's decontamination efforts had generated about 20 million cubic metres of waste.



Source: Ministry of the Environment, Government of Japan.

"Decontamination activities have mainly targeted agricultural landscapes and residential areas. The review points out that the forests have not been cleaned up – because of the difficulty and very high costs that these operations would represent – as they cover 75% of the surface area located within the radioactive fallout zone. These forests constitute a potential long-term reservoir of radiocesium, which can be redistributed across landscapes as a result of soil erosion, landslides and floods, particularly during typhoons that can affect the region between July and October."

Health risks

Greenpeace coordinated a study in the exclusion zone and lifted evacuation areas of Namie and Iitate and published the results in March 2019.[10] The study found high levels of radiation – ranging from five to over 100 times higher than the internationally recommended maximum of 1 mSv/yr – in both exclusion zones and in areas where evacuation orders have been lifted. The report documents

the extent of the government's violation of international human rights conventions and guidelines, in particular for decontamination workers and children (who are more vulnerable to radiation-related diseases than adults).

To give a sense of the scale of the risk, Assoc. Prof. Tilman Ruff, an Australian public health expert and co-founder of the International Campaign to Abolish Nuclear Weapons, states:[11]

"To provide a perspective on these risks, for a child born in Fukushima in 2011 who was exposed to a total of 100 mSv of additional radiation in its first five years of life, a level tolerated by current Japanese policy, the additional lifetime risk of cancer would be on the order of one in thirty, probably with a similar additional risk of premature cardiovascular death."

Moreover, there is evidence of sinister behavior to give artificially low indications of radiation levels, for example by placing monitoring posts in areas of low radiation and cleaning their surrounds to further lower the readings.[12-14]

Maxime Polleri, a PhD candidate in the Department of Anthropology at York University, wrote in *The Diplomat*:[12]

"In the end, state-sponsored monitoring and decontamination are remedial measures that manage the perception of radiation in the environment. However, this does not imply that radioactive contamination is gone – not at all. When we look at the official maps of radiation of northeastern Japan, levels are low, but there are many ways to make them appear low."

Ryohei Kataoka from the Tokyo-based Citizens Nuclear Information Centre said: "The government's insistence in lifting evacuation orders where heightened radiation-related health risks undeniably exist, is a campaign to show that Fukushima is 'back to normal' and to try to make Japan and the world forget the accident ever happened."[15]

The Japanese government is promoting next years' Olympic Games as the "Reconstruction Olympics". Hence the haste to lift evacuation orders and to skirt around the truth of residual contamination from radioactive Fukushima fallout and the health risks associated with that fallout. And yet, despite the spin, a poll conducted in February 2019 found that 60% of Fukushima region residents still felt anxious about radiation exposure.[16,17]

Deflating the number of evacuees

Approx. 165,000 people were forced to evacuate because of the Fukushima nuclear disaster in 2011, in addition to an estimated 26,600 'voluntary evacuees'.[18] More than 30,000 of the involuntary evacuees are still unable to return.[19] Those now in permanent accommodation have returned to their former homes (either willingly or because they had no choice), or resettled elsewhere, and some have purchased their previously temporary accommodation.

The number of evacuees has been artificially deflated. For example, the Japanese government's Reconstruction Agency sent a notice to prefectures in August 2014 stating that only those people who moved to different places because of the nuclear disaster and have the "will" to return to their original homes will be counted as evacuees.[20] The notice said that if it is difficult to determine people's will to return, they should not be counted as evacuees. Those who have purchased a home outside their pre-disaster locale, and those in public restoration housing or disaster public housing, are no longer counted as evacuees even if they want to return to their previous homes but can't for various reasons.

An April 2019 *Asahi Shimbun* editorial said that the number of people who regard themselves as evacuees is believed to be far higher than the official figure of 40,000 – but nobody knows the true figure.[21]

"This is an act to socially hide the real number of evacuees, which could lead to a cover-up of the seriousness of the incident," Akira Imai, chief researcher of the Japan Research Institute for Local Government, told *Asahi Shimbun*. "The evacuee number is an index that is used to consider measures to support evacuees. The current situation should be reflected properly in the numbers."[20]

Evacuees forced through the cracks

The typical experience of Fukushima evacuees has been a collapse of social networks, reduced income and reduced employment opportunities, endless uncertainty, and physical and mental ill-health. A growing number of evacuees face further trauma arising from the end of housing subsidies, forcing them out of temporary accommodation and in some cases forcing them back to their original homes against their will.[19,22,23]

Around 16,000 people who refuse to return to their original homes had been financially abandoned as of January 2019, according to the Citizens' Nuclear Information Center.[18]

In addition to fiddling with the numbers to artificially deflate the number of evacuees, an increasingly hostile attitude is being adopted towards evacuees to pressure them to leave temporary accommodation and thereby to reduce the evacuee count. The reduction and cessation of housing subsidies is the main component of this problem. Some years ago, the support structure was modest at best, and many evacuees fell through the cracks. Now, evacuees are being forced through the cracks to reduce expenditure and to create a sense of normality ahead of the 'Reconstruction Olympics'.[24]

The human impact of government policies – national and prefectural governments – are detailed by Seto Daisaku from the Evacuation Cooperation Center.[24] Some evacuees face a doubling of rental payments, some have been deemed "illegal occupants", some face legal action to have them evicted.[23-25]

National and local governments promote these policies as necessary to foster independence among evacuees, but as Seto Daisaku notes, "since their income in the places they have evacuated to has dropped precipitously, far from becoming independent they will fall deeper into poverty."[24]

The April 2019 *Asahi Shimbun* editorial noted:[21]

"After years of living away from home, many evacuees are also struggling with problems such as reduced incomes, the difficulties of finding jobs, deteriorating health and isolation. Some are suffering from poverty, anxiety about losing their housing due to the termination of public financial support

Decontamination work in Iitate, 2015.

and physical and mental illness. ... The government's response to the problem has been grossly insufficient."

In an October 2018 report, United Nations Special Rapporteur Baskut Tuncak urged the Japanese government to halt the ongoing relocation of evacuees who are children and women of reproductive age to areas of Fukushima where radiation levels remain higher than what was considered safe or healthy before the nuclear disaster in 2011.[26] Tuncak said the Japanese government's decision to raise by 20 times what it considered to be an acceptable level of radiation exposure was deeply troubling, highlighting in particular the potential impact on the health and wellbeing of children.

"It is disappointing to see Japan appear to all but ignore the 2017 recommendation of the UN human rights monitoring mechanism (UPR) to return back to what it considered an acceptable dose of radiation before the nuclear disaster," Tuncak said.[26]

TEPCO is also worsening the evacuees' plight. Yamaguchi Yukio, co-director of the Citizens' Nuclear Information Center, wrote in March 2019:[27]

"Although the fathomless suffering of the people affected by the accident cannot be atoned for by money, TEPCO has shown no intention of taking any responsibility for the consequences of the accident. In the incidents surrounding the petitions by Namie Town, Iitate Village and others to alternative dispute resolution (ADR), TEPCO has refused to agree to the compensation amounts, and rejected the mediated settlement proposal. The outlook for resolution of the compensation problem is bleak. This is in complete violation of the three pledges proclaimed by TEPCO: 1) Carry through compensation to the very last person, 2) Carry through rapid and detailed compensation, and 3) Respect mediated settlement proposals."

The death toll – direct and indirect

To add another insult to the injuries being inflicted on evacuees, the nuclear lobby is now arguing that the high incidence of ill-health and deaths among evacuees is proof that few if any people should have been evacuated in the aftermath of the Fukushima disaster.[28]

But of course, the catastrophically bungled 3/11 evacuation and the subsequent mistreatment of evacuees aren't 'givens' in the calculations. The extent of ill-health and deaths among evacuees is far higher than it would have been if emergency planning had been well designed and implemented, and far higher than it would have been if evacuees had been better supported.

Radiation biologist Dr. Ian Fairlie took up this debate on the seventh anniversary of the triple-disaster:[29]

"In the years after the accident, the longer-lasting effects of the evacuations have become apparent. These include family separations, marital break-ups, widespread depression, and further suicides. These are discussed in a recent publication[30] which relates the sad, often eloquent, stories of the Fukushima people. They differ sharply from the accounts disseminated by TEPCO.

"Official Japanese Government data reveal that nearly 2,000 people died from the effects of evacuations necessary to avoid high radiation exposures from the Fukushima disaster, including from suicides.

"The uprooting to unfamiliar areas, cutting of family ties, loss of social support networks, disruption, exhaustion, poor physical conditions and disorientation resulted in many people, in particular older people, apparently losing their will to live.

"The evacuations also resulted in increased levels of illnesses among evacuees such as hypertension, diabetes mellitus and dyslipidaemia, psychiatric and mental health problems, polycythaemia – a slow growing blood cancer – cardiovascular disease, liver dysfunction, and severe psychological distress.

"Increased suicide rates occurred among younger and older people following the Fukushima evacuations, but the trends are unclear. A 2014 Japanese Cabinet Office report stated that, between March 2011 and July 2014, 56 suicides in Fukushima Prefecture were linked to the nuclear accident.

"The above account should not be taken as arguments against evacuations as they constitute an important dose-saving and life-saving strategy during emergencies. Instead, the toll from evacuations should be considered part of the overall toll from nuclear accidents.

"In future, deaths from evacuation-related ill-heath and suicides should be included in assessments of the fatality numbers from nuclear disasters. For example, although about 2,000 deaths occurred during and immediately after the evacuations, it can be calculated from UNSCEAR collective dose estimates that about 5,000 fatal cancers will arise from the radiation exposures at Fukushima, i.e. taking into account the evacuations. Many more fatal cancers would have occurred if the evacuations had not been carried out.

"There is an acute planning dilemma here: if evacuations are carried out (even with good planning) then illnesses and deaths will undoubtedly occur. But if they are not carried out, even more people could die."

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Contaminated waste piling up in Fukushima Prefecture.

Nuclear mafia exposed in Kansai Electric Power Co. (Kanden) Scandal – METI pleads ignorance of bribes and kickbacks driving the nuclear industry

Ban Hideyuki – Co-Director of Citizens' Nuclear Information Center

Kansai Electric Power Co. (Kanden) has disclosed that 20 officials, mainly in its nuclear power division, received money and gifts worth more than ¥300 million (US$2.74 million) from Moriyama Eiji, the late former deputy mayor of Takahama Town, Fukui Prefecture, which hosts KEPCO's Takahama nuclear power plant. Those who received the gifts include the utility company's Chairman Yagi Makoto, former director of its nuclear power division Toyomatsu Hidemi, and the division's deputy director Suzuki Satoshi. The gifts were given in various forms, such as Japanese yen, U.S. dollars, gold coins, and vouchers for tailored suits. Kanden announced this at a news conference on September 27, 2019.

The money originated from Yoshida Kaihatsu, a construction company based in Takahama that had received contracts from Kanden. This company paid the amounts to Moriyama as rewards, and he donated the money to the Kanden officials later. These payments were made behind the scenes, which means that the money was off-the-book, under-the-table cash.

Moreover, additionally collected data have revealed that Yoshida Kaihatsu and Yanagida Sangyo, a maintenance service company based in Takasago, Hyogo Prefecture, for which Moriyama served as advisor, as well as several security companies he set up jointly with Kanden, received large numbers of contracts, totaling more than ¥20 billion (US$183 million), from the utility during the past five years. It was also disclosed that these security companies including Oing and Ivics and the other joint ventures handed cash and gifts directly to the Kanden officials without any involvement by Moriyama. As a result, the combined amount of such questionable cash and gifts far exceeded the ¥300 million mentioned above.

Kanden's top officials were forced to disclose this scandal in a press conference because the Tax Agency's Kanazawa office conducted an investigation into Yoshida Kaihatsu in January 2018. This investigation revealed that the construction company paid large amounts of money to Moriyama, which prompted the Tax Agency to conduct investigations into both Moriyama and Kanden. In an attempt to justify their position, the utility's executives explained to the tax investigators that they kept the money only temporarily, and returned part of the funds to Moriyama.

As for the remaining funds, which were determined by the tax investigators to be income, the utility officials filed the final tax returns and paid the imposed tax. Kanden then set up an in-house compliance committee, which conducted a fact-finding investigation into the irregularities and punished its chairman and other officials by cutting their salaries or by imposing other forms of punishment.

Whistleblower

On September 11, 2018, the committee compiled its investigation report, but the utility did not disclose the report to the public. However, there was a surprising development later when a whistleblower, who called himself a member of a group for improving the Kanden organization, leaked information about the scandal to the Kanden president, the Tax Agency, mass media, citizens' groups opposing nuclear power generation, and others. Confronted with this situation, the utility executives had no choice but to abandon their policy to conceal the scandal and were forced to disclose the details in the news conference.

Moriyama was one of those who aggressively promoted construction of Unit 3 and Unit 4 of the Takahama nuclear plant. He served as deputy mayor of Takahama Town for about ten years until 1987, when he retired and became an adviser to Power Plant Services, a fully-owned subsidiary of Kanden. He also served as counselor for Yoshida Kaihatsu at the same time. This means that he exerted great influence on both the contractees and the contractor. Although the utility asserts that its order-issuing process was appropriate and fair, the fact that Moriyama represented both sides constituted a conflict of interest and gives rise to suspicion about fairness. Kanden, on the other hand, seems to have actively taken advantage of Moriyama to win consent from local anti-nuclear residents.

The Tax Agency's investigation does not cover periods that go back more than seven years. Meanwhile, the period when Moriyama served as an advisor for a subsidiary of Kanden was much longer, around 30 years. Indications are that the cozy relations between Kanden and Moriyama might have continued for a long time, along with the flow of off-the-book funds from the deputy mayor to the utility.

Ministry of Economy, Trade and Industry

The Ministry of Economy, Trade and Industry (METI) claims that they had no knowledge of the 2018 report on Kanden's in-house investigation concerning the flow of gifts and cash from Moriyama to its executives until Kanden held the press conference in September 2019.

Despite this comment, it has recently been disclosed that METI has been seconding its officials to the Takahama Town office regularly since 2008. At present, the fourth official is on loan to the town office. Former METI Minister Sugawara Kazuhide admitted this in the lower house's Budget Committee questioning session on October 11, 2019. He resigned from the post later, on October 25.

Falsification of MOX safety data in the UK

The year 2008 was when the plan to introduce MOX (mixed plutonium and uranium oxide) fuel to the Takahama nuclear plant first surfaced. In September 1999, local residents discovered the falsification of safety data on the MOX fuel manufactured by Britain's BNFL for use in Takahama Unit 3, and waged a strong protest against the project. Confronted with this situation, METI transferred an official to the Takahama Town office to strengthen ties with former Takahama Town deputy mayor Moriyama and Kanden in an attempt to promote the MOX operation as a national project. In 2010, two years after METI had begun transferring officials to Takahama, the ministry's efforts produced favorable results and Takahama NPP began to use MOX fuel.

Considering such close relations between METI, Moriyama and Kanden, we can hardly believe that the ministry remained ignorant of the Tax Agency's investigations into Yoshida Kaihatsu in January 2018, or the ensuing searches of both Moriyama's house and Kanden premises.

Parliamentary deliberations and joint hearings

Some Diet members have repeatedly demanded that Kanden participate in parliamentary deliberations and joint hearings by the ruling and opposition parties on this scandal, but the utility flatly refuses to comply with their demand. This should be handled by METI, because it is within the ministry's jurisdiction. But the only thing the ministry did was to say that they would convey the lawmakers' demand to Kanden. METI does not show any signs of forcing the utility to meet this demand, apparently because they want to defend Kanden. The ministry insists that it has ordered Kanden to conduct hearings of its officials concerned in the scandal before compiling its investigation report, and that they are waiting for the arrival of the report.

Meanwhile, Kanden says it will set up a third-party committee chaired by Former Attorney General Tadagi Keiichi that will conduct investigations into the scandal and compile the investigation report. The committee is scheduled to complete the report in December, but it is predicted that the report will be come out in the new year

since the scope of the committee's investigation will cover a large number of people. METI says it wants to wait until the report is completed before taking any action.

Amid this situation, a preparatory meeting for the projected "energy research committee" was held in the Diet on October 31 and economist Kaneko Masaru and former METI official Koga Shigeaki were invited. This meeting was organized by a group of ruling and opposition party members demanding establishment of a formal parliamentary committee that will deliberate on such matters as Japan's Basic Energy Plan.

Professor Kaneko maintained that the third-party committee organized by Kanden itself cannot be considered genuinely "third party," and that the third-party committee should be set up by METI. This demand was also voiced by a participant in the joint hearing on the scandal organized by the opposition parties. METI, however, is obstinately ignoring this demand.

Donations to former trade minister

Professor Kaneko also pointed out that during the 2012-2015 period former trade minister Seko Hiroshige received political donations totaling ¥6 million (US$55,000) from Yanagida Sangyo, the maintenance service company for which Moriyama served as an advisor. This means that the off-the-book money was funneled back not only to Kanden but also to METI. Additionally, Koga hinted at the possibility that some Diet members might have received questionable gifts and money from companies linked to Moriyama.

Kanden's stance in the September 11 report was to strongly emphasize Moriyama's hair-trigger temper and claim that it was impossible for the utility executives to return the gifts and money to him. This excuse makes it sound as though Moriyama was to blame and not the Kanden executives.

In any case, there is no reference to why and how the compliance committee was set up for the in-house investigation. Since the chairman and the top officials of Kanden's nuclear power division had received the gifts

and money, it is difficult to imagine that they organized the committee and compiled the report for the sake of the company employees. Although METI categorically denies the view that the committee was established for the purpose of submitting its report to the ministry, it would be natural to presume that that was what was happening. It is quite certain that as soon as they learned that the agency had launched the tax investigation, METI pressed Kanden to deal with the Tax Agency's investigation and to work out measures to prevent recurrences.

Citizens' group launched

On October 24, a citizens' group was launched to demand that KEPCO be charged for its illicit money transactions and the group is currently trying to recruit as many as 1000 people who wish to participate in a class action lawsuit against the utility. They plan to file a lawsuit against Kanden with the Osaka District Court in December. This is a new move, emerging from the citizens' side, aimed at demanding a thorough investigation of the Kanden scandal, and it may give momentum to the moves already organized.

The basic reason why this cozy relationship emerged between the electric power company and the local town official was that the nuclear power plant is an unwelcome facility for local governments. In the 1970's, no sites were available for building new nuclear power plants and the utilities had no choice but to build more nuclear reactors within the premises of their existing plants. Since local residents do not approve of the existence of the nuclear plant in their community, the utilities are being forced to take measures to alleviate the residents' feelings of aversion.

One such measure taken by the utility this time was to appoint an influential local person to the post of executive or adviser of the utility's subsidiary, and another measure was to donate massive amounts of money to the person or to entertain him repeatedly. For these purposes, KEPCO used off-the-book funds. In 1974, the government introduced a system to allocate subsidies to local governments that allowed electric power utilities to build nuclear power plants or other types of electric power generation facilities in their community. This system was also aimed at easing local residents' reluctance to accept such facilities. The then Minister of International Trade and Industry, Nakasone Yasuhiro explained it in this way in the Diet deliberations on the relevant bill.

The reason why Kanden was easily able to create off-the-book funds is that the utility is adopting an electricity-rate calculation system called the "overall cost method." Under this system, the electricity rate is calculated by adding an appropriate amount of profit to the overall cost. This is the system generally used for calculating utility charges. Although electric power companies are private firms in Japan, they are allowed to monopolize the electric power supply business in each district. METI is checking their business operations, but it is impossible for the ministry to check the validity of the price in each contract. This enabled the utility to include kickback funds in their contract prices. Thus consumers are being forced to pay for illicit money, as it is passed on to their electricity rates.

The Electric Power Monster System

A novel entitled "Tokyo Blackout" was published in 2014. The author of this novel is said to be an incumbent METI official whose penname is Wakasugi Retsu. The story describes the trick of creating off-the-book funds. According to the author, utilities place an order at a price 20% higher than the market price, and force local businesses to funnel back the profits. He pointed out that the illicit funds are distributed not only to the utility itself but also to the Federation of Electric Power Companies, local governments, Diet members, and many others. The author dubbed this system the "Electric Power Monster System." The Kanden scandal has unveiled a part of this monster system.

Kanden's third-party committee is scheduled to publish its report early in 2020. We would like to observe closely METI's response to the report, Diet members' moves, and future developments involving lawsuits against the utility. In the current circumstances, where liberalization of the electric power supply business is expanding, we would like to create popular movements to stop the illicit 'nuclear money' that is hampering the progress of liberalization.

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