Decommissioning Nuclear Power Plants: What Congress, Federal Agencies and Communities Need to Know

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A backgrounder compiling information and views from public interest groups

An aerial picture of the Zion Nuclear Plant (Illinois), which is being decommissioned
(Photo courtesy of Daniel Rucci, April 2018)

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The following is a compilation of the views of various public interest groups and advocates who are following nuclear plant decommissioning closely and seeking to inform decision makers and the public on key dimensions of the issue, including at a Congressional briefing on decommissioning held July 16, 2018. This document is for informational purposes.

Decommissioning is complex, many of its dilemmas are unresolved. It's important to note that not every person presenting at the Congressional briefing or and not every group participating in the organizing committee for the event necessarily subscribes to each and every proposition below. But all do agree decommissioning is a critically important matter, and that its key issues urgently need to be raised and better understood in order to grapple with it effectively. To that end, this backgrounder discusses the main issues and current legislative and regulatory context surrounding decommissioning, pointing out what we know and what we don't, and reflecting a range of informed views.

Decommissioning is the technical term for remediating, to some agreed upon standard, massively contaminated industrial sites left in place when commercial nuclear power plants shut down. Eleven US reactors have already completed decommissioning. 16 are currently closed and are entering the decommissioning phase, two of which are in active decommissioning. Many more nuclear plants are becoming unprofitable, have significant and expensive safety-related challenges, and/or are simply nearing the end of their operational life. They will enter into decommissioning in the next few years.

As nuclear plant shutdowns accelerate, a coalition of non-profit groups representing many regions of the U.S. has been working with independent experts to educate decision makers and the public on very grave and pressing, but still not widely understood, dimensions of decommissioning. More than 80 reactor communities, as well as thousands of communities along transport routes for radioactive waste which cut through 75% of Congressional districts in 44 states, will face these issues.

Organizations active in the coalition include Beyond Nuclear, Clean Water Action New Jersey, Ecological Options Network, Hudson River Sloop Clearwater, Indian Point Safe Energy Coalition (IPSEC), Natural Resources Defense Council (NRDC), Nuclear Energy Information Service (NEIS),

Nuclear Information and Resource Service (NIRS), Riverkeeper, Safe Energy Rights Group, Unity for Clean Energy (U4CE), and many others.

Since 2015 groups in the coalition have put on several expert forums on nuclear plant decommissioning in the Northeast region for elected officials, appointed decommissioning task force members, concerned citizens and media. They feature independent nuclear scientists and regulatory and policy experts, as well as officials and advocates from reactor communities that have faced decommissioning, sharing their expertise and firsthand lessons learned.

There is an urgent need for similar forums at the federal level, because as these groups have learned, there are widespread, serious misconceptions and knowledge gaps around key decommissioning issues, even in Washington. To help redress them and to better inform key legislative and regulatory decisions now underway, these groups have partnered with the Environmental and Energy Study Institute to organize today's Capitol Hill briefing for members of Congress, their staffs, relevant federal agency personnel and the media.

KEY DECOMMISSIONING ISSUES

With the aging US nuclear fleet fast approaching the end of its operating life, and with shutdowns hastened by economic factors including competition from cheaper gas-fired plants and renewable sources of energy, we are facing an inexorable wave of decommissioning for which we're dangerously unprepared.

Five nuclear plants have closed since 2013, and at least ten more are expected to close in the next few years (including the three owned by FirstEnergy, which recently announced their closure within the next two years). Others will soon follow suit.

Many nuclear plant owners are seeking ratepayer subsidies as alternatives to shutdown or sale. Those subsidies are being challenged in federal and state courts. But regardless of what happens with them, widespread nuclear plant closures are happening now (e.g. Oyster Creek in New Jersey is closing in September) and will accelerate the next few years. According to Exelon, the largest nuclear operator, "In the next two decades, key economic and policy challenges threaten to close about half of America's reactors." Others predict most of the US nuclear fleet will shut down in the next two decades, and will enter the decommissioning phase. Over 80 reactor communities, associated taxing entities, and thousands of communities along proposed radioactive waste transport routes will be profoundly affected by how decommissioning is handled.

The stakes of getting decommissioning right – or wrong – couldn't be higher, not only for local economies and environments, but also for public health and safety, and security. The questions and quandaries decommissioning communities must face are as complex as they are consequential. Here's a brief synopsis of the main ones:

1. What are the risks?

In its 1996 rule on decommissioning (which is in the process of being updated), the Nuclear Regulatory Commission (NRC) argued "the degree of regulatory oversight required for a nuclear power reactor during its decommissioning stage is considerably less than that required for the facility during its operating stage." But reactor communities that go through it discover the risks they run during decommissioning are serious, albeit different than those of the operations phase.

The risk of a reactor meltdown does end when operations cease, but other risks remain after shutdown. Spent fuel pools, where the greatest amount of radioactivity is concentrated, are

aging, deteriorating and often leaking. During decommissioning risks of the fuel rods in the pools overheating or interacting and "going critical" (causing an uncontrolled fission reaction) remain and can increase over time. Neutron absorbers in the fuel pools are designed to protect against inadvertent criticality, but that protection degrades over time. As the fuel gets transferred out of the pools to dry casks, the risk of fuel handling accidents, such as dropping spent fuel rods, also increases. In most cases, spent fuel transferred to dry cask storage needs to be stored on-site for decades or longer. The possibility of leakage, explosions and failure of dry casks also poses risks of radiological releases.

As nuclear plants are dismantled, the irradiated components, which in turn irradiate adjacent material and make new radioactive waste, are cut apart, handled, and shipped through communities, posing new risks that weren't present in the operations phase. Some of these radioactive wastes will remain dangerous for over a million years and pose an ongoing threat of release to the environment, Depending on how plant components and spent fuel are handled in decommissioning, they can make less tempting or more tempting terrorist targets.

Plant workers are on the front lines of exposure from decommissioning. Radioactive materials that have soaked into a concrete wall or attached solidly to the inner surface of a pipe can be dislodged and made airborne by cutting, scraping, and moving during decommissioning.

Existing radioactive leaks and contamination into soil and water can continue after the operations phase, and, depending on the methods used, may not be fully remediated or even adequately detected and monitored in decommissioning. Spent fuel and other radioactive contamination will remain on the site long after decommissioning is complete.

Communities will have to live with long-term burdens of radiological risks, emergency planning, security threats from both physical terrorism and cyberattacks, and threats to public and environmental health. The decommissioning process usually takes decades, and many of these threats can persist at reactor sites long after that.

There are also severe economic threats, even beyond absorbing the tax and job losses from plants closing down. Communities must deal with the economic development impacts of hosting stored spent fuel and a reactor site that can never be fully decontaminated. They face the possibility that decommissioning funds may be inadequate to complete the process (many are). The licensee may go out of business in the long term, and leave local communities with stranded waste and other contamination whose costs they may have to bear themselves.

2. What's the best approach?

The basic options for decommissioning methods include:

- "DECON" where the plant is dismantled quickly, over 10 to 20 years (sometimes fewer) and the radioactive waste is shipped offsite;
- "SAFSTOR" where the site is 'mothballed' and major decommissioning activities are postponed for 50 – 60 years, so that some of the most dangerous radioactivity can dissipate before dismantlement;
- Entombment, where the site is basically encased in cement or other radiation-resistant materials and monitored until radioactivity decays to a level permitting restricted release of the property. Entombment is rarely done in the US, and has not been used for U.S. civilian commercial reactors, though it has been so used in other countries.

Of the 16 U.S. reactors undergoing decommissioning, 14 are using SAFSTOR, and two are using DECON. It is also possible to combine elements of the two approaches. DECON poses near term problems and risks as the site is dismantled and the resulting radioactive waste is handled and shipped on a relatively short timeframe, before half-lives of some of the most dangerous radioactive isotopes have elapsed. SAFSTOR with its longer timeframe poses greater risks of site degradation, continued radioactive leaks, loss of institutional memory over time depletion of decommissioning funds, and losing corporate liability for the waste due to bankruptcy or other discontinuities.

Beyond basic methodology, there are other public safety-related decisions to make on specific decommissioning practices. One important practice is conducting a nuclear "autopsy" -- strategic harvesting and analyzing of aged material samples (steel alloys, concrete, electrical cables, etc.) from components like reactor vessels, cooling systems and containment structures. An autopsy can yield observable and measurable scientific data important to understanding effects of age-related degradation on the safety margins for operating reactors of similar design, and offer valuable insights into the safety risks of extending those reactors' licenses.

3. What happens to the waste?

Among the thorniest questions is what to do with highly radioactive spent nuclear fuel and other radioactive waste from dismantling nuclear power plants. Spent fuel pools at nuclear plants represent some of the highest concentrations of radioactivity on the planet, which need to be secured against dispersal risks. There are many other types of chemical and radioactive wastes and other contaminated materials generated in decommissioning, some of it lethal for

timescales that no human society has ever planned for. How can it be safely managed and disposed of? How do we assess and mitigate the dangers of on-site storage vs. transport?

Practically speaking, spent nuclear fuel will likely stay on-site for many decades. Safeguarding the waste is a difficult, complex, long-term proposition. Private companies licensed to operate or decommission a plant currently lack requirements or incentives to do it adequately, or for very long. The NRC does not currently require moving spent fuel from unfortified, deteriorating, overcrowded fuel pools to dry storage as fast as possible. The NRC is also lowering safety standards for dry cask storage, including doubling the heat limits from previous allowable levels. Though they are directly impacted by how the waste is handled, state and local governments are preempted from exercising any regulatory authority over spent nuclear fuel or other radioactive contaminants.

Whatever ultimately happens in the debate over establishing a national geological repository for nuclear waste, we are years -- most likely decades -- away from publicly accepted and scientifically defensible solutions for shipping, storing and permanently disposing of it.

Currently available spent nuclear fuel canisters and dry cask storage are not reliable over many decades. The risks of storing spent fuel on site include leaking high-level radioactivity into the environment, spent fuel rods interacting and reaching criticality, or exploding from hydrogen gas buildup, and/or being subject to terrorist attacks. These risks are often downplayed but constitute significant threats to reactor communities. Yet the risks of transporting the waste offsite, whether to a permanent repository such as Yucca Mountain or to a consolidated interim storage site, threaten communities and ecosystems across the country. Off-site transport also raises acute questions of equity and environmental justice.

Most environmental groups and nuclear watchdogs advocate hardened on-site storage (HOSS), where stored waste is kept on the site and more robustly contained and defended than current Nuclear Regulatory Commission (NRC) regulations require. HOSS may be the best available way to mitigate the risks. According to the Nuclear Waste Technical Review Board, spent nuclear fuel and its containment must be retrievable, monitored and maintained to prevent hydrogen gas explosions in both short and long-term storage and transport. Currently, spent fuel storage does not meet these criteria. HOSS might correct these omissions, but it costs somewhat more in the short term. Companies in charge of decommissioning, and the NRC which regulates the disposition of spent nuclear fuel, have shown little interest in it.

The Clean Water Act and the Clean Air Act contain a “Best Available Technology (BAT)” standard which states that the best available technology must be used in order to comply with

the law. But currently there is no obligation for the NRC to apply a BAT or similar standard to decommissioning or nuclear waste handling and storage, or for a nuclear waste facility operator to use the best available technology to enhance safety and security at storage sites.

4. What happens to the site?

Whether or not the waste is transported off-site, the notion that reactor sites can be quickly restored to greenfield status and redeveloped as prime real estate is a misconception. Not only will land and water at these sites remain contaminated to some degree, there is a significant danger of local communities becoming de facto stewards of orphaned waste indefinitely, and getting stuck with the bill for long-term management of the site and other large costs not covered by decommissioning funds. To what standard should decommissioning sites be cleaned up and ongoing leaks into the environment remediated? Will current NRC cleanup standards be adequate to protect the public health and safety, let alone enable new economic development in orphaned waste communities? What are the ongoing monitoring needs?

5. Is there enough money, and how is it spent?

In public meetings and its own literature, the NRC has stated that safety is related to having sufficient funds available to conduct an acceptable decommissioning process. But the NRC has no requirement for complete, publicly transparent audits of the use of decommissioning funds, or that decommissioning contractors subscribe to U.S. Standard Accounting Principles and Practices. Public advocacy groups and federal government oversight agencies have repeatedly criticized the NRC's formula determining utility payments into existing decommissioning funds as being inaccurate and too low.

Congress has authorized the Government Accounting Office to periodically audit decommissioning funding. GAO generally concludes that funding is sufficient, but current independent estimates show decommissioning funds falling $40 billion short of projected costs. Congress has the power to enact legislation to ensure sufficient funds are collected and available, and that they are applied properly and audited annually.

6. Who bears the costs?

How can municipalities prepare and be compensated for predictable near term economic impacts, including loss of jobs and tax revenues? What are the best practices for just transition for workers and communities? How many plant operations workers can and should be retained? Where decommissioning funds fall short for necessary measures, who pays? What

are the longer-term risks that reactor communities will bear? For example, will they bear the cost if companies that have title to the site and waste go out of business in the future, while contamination and other on-site problems remain at the site? What steps could communities take to manage those risks?

7. Who decides?

Who gets to make or advise on decommissioning decisions? Currently, it's the plant owner or the company that acquires its license to implement decommissioning. Notably, the NRC has ceded its licensing authority, and neither approves or disapproves the licensee's decommissioning plan. There is often little or no enforcement of what minimal requirements exist for licensees undergo an audit or otherwise disclose or account for how decommissioning funds are being managed or spent. Nor are they required to disclose much about their plan for decommissioning post-shutdown. With decommissioning decisions and funds squarely in the hands of nuclear plant owners, who aren't accountable to state and local governments, how can citizens have a meaningful say? What role can local task forces or citizen oversight boards play?

As things stand now, the companies are in charge, their liability is limited, and their decommissioning decisions are based on their own financial considerations, not on what's best for the community as a whole. State and local government have a vital interest in their decisions, but as of today, have little to no power to intervene. Viable, effective channels for local oversight are badly needed but not yet in place.

These are serious dilemmas for communities, and the NRC has not solved them. Its regulatory scheme, a relic of the early years of the atomic age, has never acknowledged the need for state and local oversight of decommissioning or other impacts from nuclear reactors which are deeply felt locally.

Meanwhile, many states and local governments have been relatively unaware of the limits of their authority to protect their communities from these impacts. As long as nuclear plants brought jobs and tax revenues, and as long as the negative impacts of their operations weren't too severe, communities could choose not to confront these issues. But as plants shut down, that has to change.

HOW DECOMMISSIONING IMPACTS COMMUNITIES

The risks and stakes of decommissioning add up to acute threats for more than 80 reactor communities, and potentially to thousands more communities along radioactive waste transport routes, which run through most states and congressional districts. Here are several cases in point of reactor communities impacted by decommissioning.

Zion, Illinois

The Zion, Illinois nuclear plant, located on Lake Michigan, was operated by Exelon subsidiary Commonwealth Edison for 27 years and closed in 1998. Zion's Mayor Al Hill describes his city's experience with decommissioning as a cautionary tale for reactor communities.

The plant closure took away 75% of Zion's tax base, and the city has never recovered. Combined with the housing crash in 2009, the plant's closure left the community devastated, with high unemployment, 66% of housing becoming rental property (20% is a healthy ratio), a disproportionate amount of Section 8 housing, and attendant effects on property values, schools and crime. "That's our case study," Mayor Hill said. "We did a lot of things wrong."

The plant site has become a dump for 2.2 million pounds of radioactive waste, stored 300 feet from Lake Michigan, which supplies water for 16 million people. "We want [the waste] moved and we want to develop the site to increase our tax base," said Hill, "or else get compensated for being a de facto waste dump."

The 1982 Nuclear Waste Policy Act has provisions for federal payments to communities impacted by nuclear waste storage, as high as $15 per kilogram. In Zion's case, that would mean up to $15 million, which should be allocated to the units of local government most severely affected. But as of today, Hill's efforts to get the federal money haven't succeeded. The Stranded Act (S.1903) would compensate communities for spent fuel left on site, but current chances of enactment are low.

"Nobody cares about the local community – not Exelon, not DOE, not NRC," said Hill. "Exelon told us to go pound sand. My job is to make them care. I'm going to call every mayor and public official in reactor communities with spent fuel, and we'll ask you to support [the Stranded Act]." Hill's advice to reactor communities is to start planning for the impacts of nuclear waste fuel storage now.

Rowe, Massachusetts

Rowe, the site of Yankee Nuclear Power Station, was similarly impacted by decommissioning. The plant closed suddenly and unexpectedly in 1992 due to reactor pressure vessel embrittlement. Decommissioning was executed quickly using DECON, and was declared complete in 2007. But it was approached based on conservative assumptions about the extent of site contamination, which turned out to be false. For example, tritium ground water contamination was discovered to have traveled over 300 feet.

Decommissioning Yankee Rowe incurred gigantic cost overruns: the plant cost $39 million to build and about 18 times that to decommission. The money came from surcharges on ratepayers. The costs were consistently understated – first $250 million, then $325 million, but eventually the bill came to over $700 million. And that was for one of the smallest nuclear plants in the US – just 185 MW-e. Larger reactors will cost much more.

Rowe and the surrounding communities were excluded from the decision making process. Residents had concerns about radioactive waste leaking into the Deerfield River, which runs past farms and schools. As they interacted with the NRC, it became clear that citizens would be given no say in the process. NRC had streamlined its procedures, excluded the EPA from the decommissioning process (even though the National Environmental Policy Act requires EPA involvement), and denied Massachusetts and adjacent state governments any role.

Citizens Awareness Network sued the NRC and won. The court found decommissioning issues were in the states' vital interests, and that the NRC had violated the Atomic Energy Act, the National Environmental Policy Act, and the Administrative Procedures Act. It ruled the NRC had to hold a hearing on the cleanup of Yankee Rowe.

But that didn't mean the community's concerns were addressed, or that the outcome served the public interest. Rapid dismantlement and shipping of decommissioning waste unnecessarily increased the risk of radioactive dispersal. Yankee Rowe sent 100,000 curies of low-level radioactive waste to the Barnwell Disposal Facility in South Carolina. But if the process had been delayed a few years, it would have been just 14,000 curies. Barnwell is 49% African-American and one of the poorest communities in the U.S.

In the wake of decommissioning, Yankee Rowe contamination in soil and water persists, including radiological, chemical (lead, trichloroethylene, dioxin) and mixed waste (radioactive asbestos, e.g.) contamination. Also left behind are 533 spent fuel assemblies containing 40

million curies of high level nuclear waste, stored in thin-wall dry canisters sitting on a concrete pad. The Deerfield River valley where the plant was sited has some of the highest cancer incidence in Massachusetts. Rowe itself has the fourth highest cancer rate in the state.

Another legacy of Yankee Rowe is that after the NRC lost the Citizens Awareness Network case, it codified the rules it instituted for decommissioning Rowe, i.e. not following NEPA, eliminating hearing rights for states and citizens, and generally truncating the decommissioning process. Those rules subsequently applied to decommissioning other plants. There is a new NRC rulemaking process for decommissioning underway now, described in detail below. Massachusetts and other stakeholders have asked the NRC to correct these deficiencies, but the outcome is uncertain.

San Clemente, California

The San Onofre Nuclear Generating Station (SONGS) is located just outside San Clemente, California on a fragile Pacific Ocean beach. The site is in an earthquake and tsunami zone near the Newport-Inglewood and Rose Canyon faults. SONGS shut down unexpectedly in 2012 after premature wear was discovered in steam generator tubes, along with leakage of radioactivity into the environment. SONGS closed permanently in 2013, decades before it was scheduled for shutdown. Decommissioning began in 2014 and is expected to take 20 years and cost $4.4 billion. The plant's low-level radioactive waste is slated to be shipped to disposal sites in Texas and Utah. The utility proposed to store the 3.6 million pounds of spent nuclear fuel on-site; at least until a more permanent home, such as a geologic repository, is constructed.

But San Onofre's current spent fuel location, right next to the Pacific Ocean and in proximity to shipping ports, interstate networks, and the Camp Pendleton Marine Base, present unusual long-term storage risks and challenges. The plant has 51 Areva NUHOMS dry storage thin-wall canisters loaded in an above ground concrete system on-site. Some were loaded as early as 2003. Southern California Edison is in the process of storing the remaining spent nuclear fuel in 73 Holtec thin-wall dry storage canisters in a partially buried UMAX concrete monolith 108 feet from the beach. An additional 12 NUHOMS canisters will be used to store Greater Than Class C (GTCC) nuclear waste. All thin-wall canisters require vented concrete storage systems for convection cooling.

SCE claims the storage canisters exceed California's earthquake requirements and are designed to withstand tsunamis and fires. But studies show that the canisters are subject to corrosion cracking from ocean salt and moisture. It's unclear how cracks would be repaired, nor is there any plan for preventing or stopping radioactive leaks, explosions or criticalities in the canisters.

For now, canisters are to stay on-site in temporary storage until a more permanent home such as a geologic repository can be found, though that could be many decades from now. The canisters already have material damage and other problems, which has residents worried the they may prematurely fail and will not be transportable.

A number of facilities have taken delivery of Holtec canisters, which have a defective shim design the NRC never approved. At San Onofre, broken and bent standoff shim bolts were discovered inside canisters before they were even loaded. Four of the canisters with the defective shim design were loaded. Should they fail, San Onofre's Chief Nuclear Officer has admitted these canisters cannot be unloaded back into the spent fuel pool due to risks of reflooding a dry pool. The NRC is investigating the Holtec shim problem, but its unclear how SCE can meet the NRC's dry storage license requirements if it can't unload damaged canisters back into the spent fuel pool.

But if not into dry storage on-site, where else should the spent fuel go? When the public interest group Citizens Oversight sued in April 2017, a settlement was reached in which Southern California Edison (SCE) agreed to consider "commercially viable" options for moving the spent fuel off-site. SCE appointed an expert panel to debate the issue, but remains in control of the outcome, and favors options that limit its liability. It supports the very controversial option of consolidated interim storage (CIS), which would involve transporting the spent nuclear fuel off-site. That would remove SCE's liability, but would also expose communities along transport routes to the dangers of spent fuel.

Possible destinations for the waste that have been discussed include Yucca Mountain (eventually) and/or CIS sites in southeastern New Mexico and west Texas. But CIS facilities aren't yet built, funded or even authorized by law. There are no protective health, safety and environmental standards in place for them. The prospective host states have not demonstrated the long-term consent necessary to potentially accept the nation's nuclear waste. Even if they were authorized by law and under a protective regulatory scheme, consolidated interim storage facilities would compound the dangers of inadequate dry storage with the risks of transport.

Another proposal is to send the spent nuclear fuel to the Palo Verde Nuclear Generating Plant in Arizona, but so far Palo Verde has opposed that. For the community surrounding San Onofre, it's an unresolved dilemma as there is currently no place else to store the waste, yet residents say it cannot safely stay where it is.

Other Communities Across the US

Other reactor communities across the US face less acute versions of this same dilemma. Storing highly radioactive fuel on-site is dangerous, expensive, and (as communities like Zion, Illinois and Rowe, Massachusetts learned from experience) can threaten local economies and public health. Reactor communities currently don't get compensated for incurring these risks.

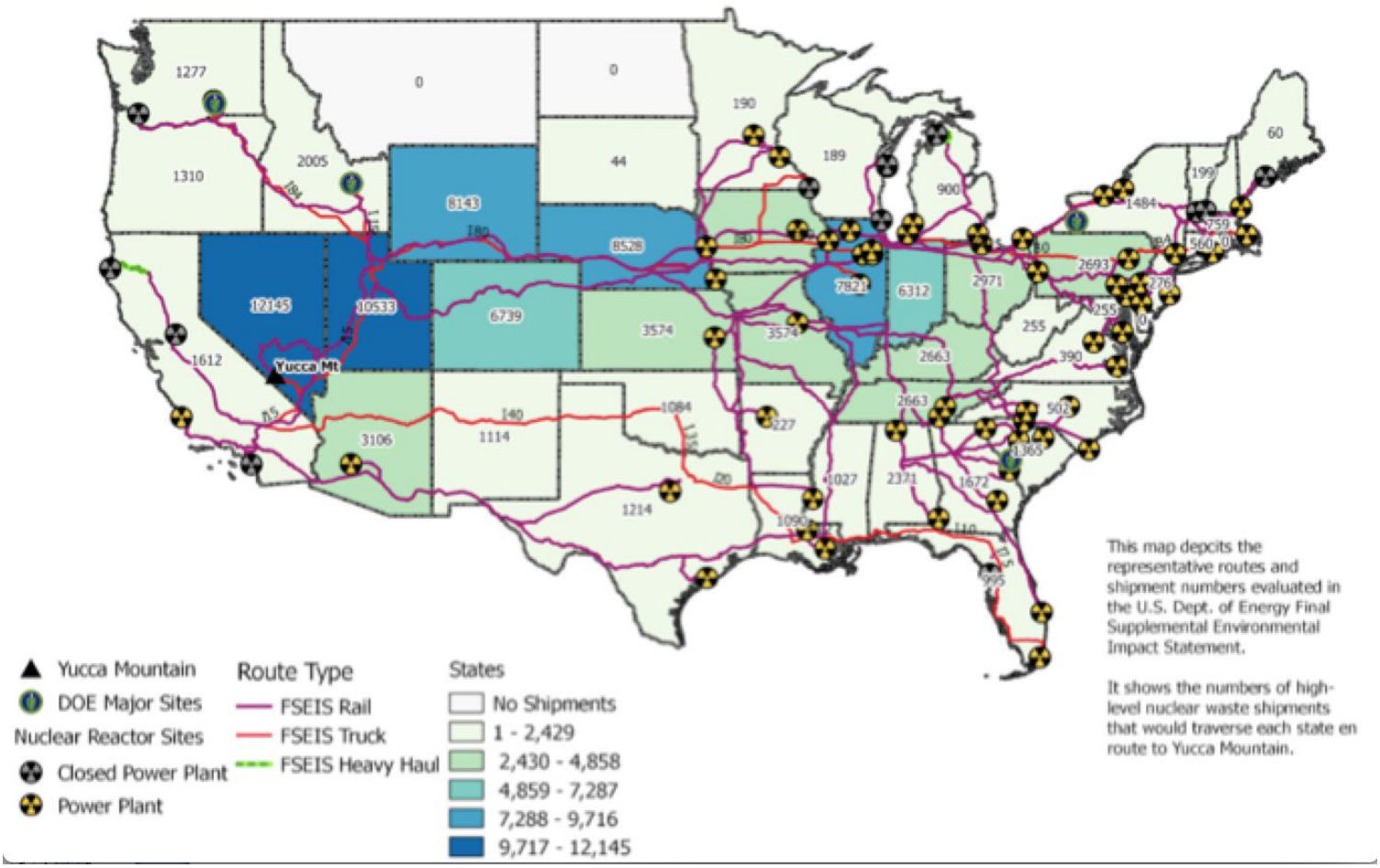
On the other hand, shipping highly radioactive waste off-site would only dump the problem onto a different community – most likely a low-income community or community of color already dealing with environmental justice impacts – that didn't generate the waste and didn't benefit from the electricity produced. It also extends serious risks of dispersal of radioactivity along transport routes across the country. If off-site shipping became an acceptable option, it would trigger thousands of shipments of spent fuel across the U.S. over decades.

When moved by heavy haul truck, these cask shipments travel at a top speed of 5 mph. The Department of Energy determined that where possible spent fuel canisters should be shipped by rail or barge, yet the canisters inside casks are a payload 40% heavier than the cargo most rail lines are designed for. Barges and cargo ships are also subject to accidents. In fact, all shipping methods would be vulnerable to accidents, terrorist attacks, and/or radioactive leakage from malfunctioning canisters.

On the following page is a map of proposed routes for transporting spent fuel and other radioactive wastes to Yucca Mountain, which would extend these risks to literally thousands of communities across 44 states and three quarters of congressional districts. For an updated list of Congressional districts that would be affected see
http://www.state.nv.us/nucwaste/news2017/pdf/Congressional_Districts_Affected.pdf

Reactor communities like Zion, Rowe, San Clemente, and others are examples of what can go wrong in the decommissioning process, and the consequences for communities. To avoid compounding those mistakes nationwide, federal, state and local government and the citizens' sector will have to close remaining gaps in their knowledge concerning key decommissioning issues and grapple with them seriously, starting now. They urgently need much better, more reliable information on these issues than they currently have.

Representative Transportation Routes to Yucca Mountain and Transportation Impacts (Cask Shipments by State)



CURRENT LEGISLATIVE AND REGULATORY ISSUES

Members of Congress, their staffs and other officials need more reliable information on key decommissioning issues and on-ground decommissioning experiences described above. This information has a significant bearing on the NRC rulemaking now underway and on legislation pending in Congress. Here is a breakdown of current bills and rulemaking:

H.R.3053 -- The Nuclear Waste Policy Amendments Act (NWPA) of 2017 sponsored by Rep. John Shimkus (R-IL), recently passed the House and could be taken up by the Senate. Timing and prospects for the bill in the Senate are uncertain. The House bill restarts the license application and hearing process and authorizes funding for the controversial proposed geologic repository site at Yucca Mountain. At the same time, it authorizes consolidated interim storage (CIS) facilities for nuclear waste, targeting southeast New Mexico (Holtec International/Eddy-Lea Energy Alliance), west Texas (Waste Control Specialists, LLC), and potentially other sites (e.g. Dresden nuclear power plant/General Electric-Morris Independent Spent Fuel Storage Installation in Morris, Illinois, and Nevada) for CIS facilities that proponents claim could open in the 2020s. But these sites fail to meet basic criteria of scientific site suitability, consent-based siting, environmental justice, regional equity (90% of nuclear reactors and nuclear waste are in the eastern half of the country) or even legality (for example, Yucca violates a ratified treaty with the Western Shoshone Nation).

The bill is highly controversial and enactment would no doubt trigger litigation, but it could also trigger massive shipments of high-level radioactive wastes across the country, despite the many unresolved issues and dangers. Enactment of the bill would enable building CIS sites without considering or mitigating transport risks. It would also undo existing storage, transport, and environmental safety requirements that are in the 1982 version of the NWPA, which for the time being remains in effect. It would enable transfer of ownership of and liability for the waste to DOE, and allow DOE to contract with private companies to manage the waste at private sites, eliminating government oversight, input, and transparency.

It does not include mandatory nuclear waste funding levels, but rather relies on Congressional appropriators' discretion, so that funding decisions must be annually authorized by Congress. That cuts two ways. Annual authorization in a way could be more accountable because it affords more opportunities for Congress to reevaluate and revise funding decisions as needed. But on the other hand, if Congress fails to authorize sufficient funding in a given year, it raises the question of whether and how DOE would be able to manage the waste. It could allow owners to offload their responsibility for interim storage of the waste, long understood to be a

key obligation of theirs, and transfer it to government and private entities that may not have adequate funding to manage it.

The bill would also do away with site-specific environmental reviews, and could preempt or jeopardize states' rights, potentially threatening Nevada's utility and water rights (a provision negatively impacting water rights was dropped from the version that passed the House but advocates worry it could resurface in the Senate or conference versions).

H. R. 474 – The Interim Consolidated Storage Act of 2017, sponsored by Rep. Darrell Issa (R-CA). It amends the NWPA to authorize DOE to make new contracts, or modify existing ones, to allow licensees to take title to high-level radioactive wastes, including highly radioactive spent fuel, and store it at CIS facilities which are not robust. They are de facto permanent surface storage facilities, which nuclear watchdogs term "parking lot dump" facilities. The bill also makes appropriations from the Nuclear Waste Fund to pay for CIS. Passage could trigger massive shipments of radioactive waste across the country. At this date, we have no information that it will move this year, but whether it does or not, Congressional appropriators have the power to authorize funding for CIS in the next spending bill which needs to be passed before the end of September, and some seem inclined to do so. That would enable DOE to move forward with CIS whether the bill passes or not.

S. 1903 and H.R. 3970 -- The Stranded Act of 2017, sponsored by Sen. Tammy Duckworth (D-IL), and Rep. Brad Schneider (D-IL), authorizes $100 million over seven years to compensate communities left to cope with storing high-level radioactive waste after reactors close. It also provides economic and tax incentives to attract new businesses to these communities, but the bill has been introduced and could possibly move this year if co-sponsors in both parties are found.

H.R. 4440 -- Redistribution of Fines to Our Communities Act of 2017, sponsored by Rep. Nita Lowey (D-NY). The bill requires DOE to retain and redistribute amounts collected for safety-related fines to local governments to mitigate any economic impacts in connection with the closure of a nuclear facility.

S. 2396 and H.R. 4441 – The Safe and Secure Decommissioning Act of 2018, sponsored by Sens. Kamala Harris (D-CA), Edward Markey (D-MA), Bernie Sanders (I-VT), and Kirsten Gillibrand (D-NY) and by Rep. Nita Lowey (D-NY), amends the Atomic Energy Act of 1954, which prohibits waivers and exemptions from NRC regulations on emergency preparedness, security, or spent fuel for civilian reactors that have permanently shut down. The bill is designed to expedite taking highly radioactive spent fuel out of fuel pool storage and putting it into dry casks. However, as explained above, dry casks currently in use are not robust; they are thin-walled and unreliable. Partially cracked canisters have no earthquake seismic rating. At the same time, spent nuclear fuel pools are aging, leaking, and undefended, and their boron shielding to keep spent fuel from going critical is deteriorating. These issues require much better informed debate than they have received.

H.R. 4442 -- Removing Nuclear Waste from Our Communities Act of 2017, sponsored by Rep. Nita Lowey (D-NY). It is designed to enable shipping of radioactive waste away from reactor sites to CIS facilities in Texas and New Mexico, and to put Indian Point and other reactors in highly populated areas first in line to transport their wastes off-site. It amends the NWPA to authorize DOE to enter into contracts for the storage of certain high-level radioactive waste and spent nuclear fuel, take title to certain high-level radioactive waste and spent fuel, and make expenditures from the Nuclear Waste Fund. It could trigger massive shipments of radioactive waste across the country.

This is another indicator of a push in Congress to jump-start CIS despite serious unresolved issues and dangers of transport and interim storage of high-level radioactive waste. It also points to a gap in knowledge on these issues in Congress that urgently needs filling. Several citizens groups met with Rep. Lowey's staff in December 2017 to explain the problems with waste transport and CIS, and were well received. Yet the bill was not withdrawn and was subsequently featured on Rep. Lowey's website and in e-blasts to constituents. That may or may not mean she intends to pursue this particular bill further, but it may also signal political support for shipping reactor wastes offsite to CIS, a proposition which needs a much wider and better-informed debate than it has received. Rep. Lowey is the ranking Democrat on the House Appropriations Committee, which also has the power to authorize funds for CIS in spending bills, whether or not H.R. 4442 or related bills pass.

FY19 Appropriations Bill -- At present writing the current version of the FY19 appropriations bill includes funding for a CIS pilot project to store, transport, and manage spent nuclear fuel until a permanent repository becomes available. Again, this would enable the establishment of a CIS site and trigger waste transport despite myriad unresolved safety problems, even if the Senate votes down legislation to establish CIS.

S. 2388 and H.R. 4975 -- Nuclear Plant Decommissioning Act of 2018, sponsored by Sen. Bernie Sanders (I-VT) and Rep. Peter Welch (D-VT). It would require DOE to retain and redistribute amounts collected for safety-related fines to local governments to mitigate economic impacts of closure of civilian nuclear reactors. It also creates channels for state and local advisory input on decommissioning decisions. It requires licensees to consult with the host state, as well as other state governments within 50 miles of the plant, when drafting a proposed decommissioning plan. It also requires the NRC to solicit public input on the proposed plan, and to evaluate and formally adopt, or reject, input from the affected states. If the host state does not support the decommissioning plan or license transfer proposal, the NRC must consider amending the proposed plan based on the host state's recommendations.

The bill was reintroduced in February 2018. It requires licensees to consult with state and local officials and to "consider" host state input, but not necessarily to act on it. We are also told that Entergy accepted these provisions regarding Vermont Yankee but warned that the funding would come out of the decommissioning fund, which is ratepayer money, and would lengthen the decommissioning process accordingly. While chances of enactment are currently low, the bill is significant as an acknowledgement of the unmet need for meaningful state and local oversight, and as an example of how legislation could address it.

H.R. 3671 – Off Fossil Fuels For A Better Future Act of 2017, sponsored by Rep. Tulsi Gabbard (D-HI). It is designed to engineer a just transition away from fossil fuel energy sources to 100 percent clean energy by 2035. It has a very low chance of enactment according to Skopos, though it attracted 28 Congressional co-sponsors and over 400 endorsements from clean energy, climate change, and environmental organizations since its introduction in September 2017. Most of its provisions aren't relevant to decommissioning, but it does include establishment of a Just Transition Fund for specified fossil fuel and energy efficiency programs. It's an example of legislation addressing just transition for workers and environmental justice for communities affected by shifts in the energy mix, and its just transition provisions might conceivably be extended to include nuclear reactor communities and plant workers affected by decommissioning.

NRC Rulemaking – The NRC is currently preparing to issue a draft for public comment of rules governing the decommissioning of nuclear power reactors. The new rulemaking has been an ongoing process for the last few years and may be completed in the calendar year 2019.

The last related public document issued for comment by the agency was the *Regulatory Improvements for Power Reactors Transitioning to Decommissioning Draft Regulatory Basis Document; Request for Comment*; Docket ID NRC–2015–0070, 82 Fed. Reg. 13778 - 13781 (March 15, 2017). It is essentially the NRC's statement of matters that will or will not be covered under its new decommissioning rule. The Draft Basis was controversial and received extensive comment from industry, states, and many NGOs.

In June 2018 NRC staff sent a proposed draft rule to the Commissioners, who will review it and decide whether to issue it as a draft rule in the Federal Register for public comment, or to send it back to staff for revision. The timing of the Commission's deliberations on the potential draft rule is unknown, but it's possible we will see a draft decommissioning rule in the fall of 2018 or early in 2019.

Citizens groups are reviewing the proposed agency draft now and awaiting the release of the draft rule. We don't know what it will contain, but like the Draft Basis, we expect the draft rule will spark widespread comment and controversy. For example, the proposed draft leaves NRC review and approval of the decommissioning plan weak at best. It seems consistent with previous agency findings that regulatory guidance, rather than rulemaking, would suffice for determining the role of State and local governments in the decommissioning process, leaving local oversight uncertain. It also leaves the issue of revising the 60-year time limit for power reactor decommissioning unaddressed.

Both the NRC rulemaking process now underway and legislation pending in Congress will help determine conditions for decommissioning as the U.S. enters a watershed phase of accelerating nuclear plant shutdowns. The consequences of decisions now before Congress and the NRC are far-reaching, will profoundly affect public health and safety, and we will be living with them for a long time to come. By organizing briefings with independent experts in Washington and in reactor communities, citizen groups are seeking to better inform members of Congress, relevant agencies, their staffs, and state and local officials and the public on the key issues, to help enable better decisions, and live up to the imperative to get decommissioning right.

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