

Getting the Institutional Framework Right and Using it Well

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(1) As a reminder of the importance of institutional frameworks, I start presentations on spent nuclear fuel with a picture of Notre Dame. What kept this building maintained and standing is not so much the remarkable skill of its construction as the support of the enduring institutional framework set up in the flowering of the Middle Ages. The engineering of spent nuclear fuel storage casks with modern technology is much simpler. It is widely agreed that these casks can safely store spent fuel for at least a century. They can also be put in very durable overpacks and transported intact away from their point of origin. But without a sensible institutional framework, further R&D on spent nuclear fuel management is not well focused.

I have an appointment in Political Science partly because I directed our international security program. But as an elected official I also presided, by everyone else's default, over the final failure of our county to site a new landfill. I also supervised thesis projects on Illinois' failure to site a low-level radwaste facility. For both siting attempts the technical analysis was excellent. The problem was the institutional arrangements. In particular, the compensation offered local communities was either nil or less than 2% of project cost. So no willing and legally suitable local host sites could be found.

(2) This Commission is faced at the national level with the same dilemma. At the second Commission meeting the importance of building trust with local communities was well articulated. What has not come out quite as clearly is what will be necessary to avoid having state governments again actively oppose siting spent fuel facilities. What is critical to keep in mind is that states will view a good spent fuel management site as a valuable energy systems resource, just as Alaska views the oil and natural gas resources within its boundaries. Just as no private company would make an energy systems investment expecting a 1% return or less, no state is likely to willingly host long term spent nuclear fuel management for a just a few \$/kg in a context where other states might be willing to see nearly \$1000/kg paid to get rid of the stuff.

It follows that getting willing cooperation of host states is likely to require compensation to them in the range of tenths of total project costs, not just a few percent. This is worth repeating, because it is not clear that its implications have fully sunk in. A necessary condition for an institutional framework to deal with host state concerns is that it includes a mechanism for transferring to host states funds measured in tenths of total project costs.

(3) A framework for dealing with host state concerns is described in the report "Plan D for Spent Nuclear Fuel." This report is on the Commissioners' desks here and is available on the internet. The report describes the reason for its title. It also contains an appendix on just how the Nuclear Waste Policy Act could be changed to implement its recommendations. A key recommendation is that every shipment of spent nuclear fuel material should be accompanied by a payment into a Permanent Fund, to be held by the recipient state as long as that material stays in the state. Federal regulations would require

a minimum balance in each Permanent Fund. The required minimum would depend on whether the facility was a geological repository, a spent fuel aging facility, or a reprocessing site. States would receive interest earnings on the Permanent Fund balance beyond any needed to maintain the minimum balance. In the long run, the source of payments into Permanent Funds would be Escrow Fund balances associated with each storage cask.

(4) Payments into Escrow Funds instead of the national Nuclear Waste Fund would be required for spent fuel from newly licensed reactors. DOE could also negotiate the establishment of Escrow Funds to avoid continuing lawsuits over failure to take title to spent fuel from already licensed reactors. Utilities or their ratepayers would receive any excess Escrow Fund balances when spent fuel is shipped out of state.

(5) This approach allows for a strong incentive for states to take in spent nuclear fuel from other states. It also provides an incentive for utilities to ship spent fuel out of state when and only when it becomes economically optimal to do so.

Economics might well dictate that much spent fuel stays at operating reactor sites until there has been substantial decay of the circa 30 year half life fission products that initially dominate the decay heat in dry casks. However, expeditious geological repository siting would still be necessary. That is needed for confidence that a host state will take in spent fuel when utilities want to ship it.

(6) I now go beyond the 'Plan D' framework to discuss how best to make use of appropriate institutional arrangements. The first and most critical point to emphasize is the importance of avoiding a monopoly situation where only one repository is licensed. A monopoly situation would generate tension within the state and with the federal government over whether the state had obtained adequate compensation. This could lead to delays or even failure of the whole project again. Even with success, cooperatively negotiated payments to the host state would be higher in a monopoly situation.

(7) Next comes a reminder of where U.S. commercial spent fuel is generated and stored. The West houses 8 operating reactors and 3 additional sites with stranded spent fuel. The greater Midwest has 31 operating reactors and the rest of the country 65.

(8) The West also holds the majority of DOE wastes, which legally need to be removed by 2035 at the latest. The Midwest does not have a problem with spent fuel from defense reactors. The Midwest also does not have stranded fuel in states with no operating commercial reactors. The East and Gulf Coast states have substantial amounts of DOE wastes and of spent fuel likely to be stranded at sites with no operating reactors. This includes the only reactor sites in Maine and possibly Vermont.

As noted at the second Commission meeting, it is not necessary that all U.S. spent fuel have the same fate. Some of the material in the West is a good candidate for permanent burial in salt or retrievable emplacement in a repository in an oxidizing or reducing environment. Some of the material in states along the Gulf Coast and near the Eastern seaboard could be shipped to an aging facility pending a decision on reprocessing or burial. Many of the reactor sites in the Midwest are not in heavily populated communities and may have operating reactors with suitable fuel storage sites for the rest of this century.

By licensing as many as three repositories, competition would be enhanced, and eventual transportation costs and associated controversy reduced. However, there is no need to place most spent fuel in the repositories promptly. Indeed, the design and operation of repositories is much easier if most of the material placed in them has been aged for a few times 30 years. Some of the aging can occur at repository sites, and some of it elsewhere.

(9) There are three reasons why trying multiple site licensing can be both economically advantageous and more likely to lead to at least one or two successes:

(a) There is now extensive U.S.+ Scandinavian operating or design experience with salt, a retrievable oxidizing environment, and copper casing in a non-oxidizing zone. By drawing on this experience, costs associated with generic aspects of licensing can be reduced.

(b) With a cooperative process, lower payments to competing states should more than compensate for extra licensing costs.

(c) Without a cooperative process, states' opposition is likely to lead to extensive delays and risk overall failure.

(10) While the Commission will not recommend specific sites, the Commission does need to recommend a process that will lead to successful siting. In view of the comments just made, here are two suggestions for the Commission's recommendations.

(a) The Commission should recommend a process that has about 6 finalist states competing for granting 2 or preferably 3 repository site licenses.

(b) At least an equal number of spent fuel aging facilities should be similarly be licensed, some at repository sites.

If such recommendations are implemented, reprocessing will not be economically favorable for many decades, if ever. A new article explaining why has been submitted to the Commission. If a pilot scale reprocessing facility is nevertheless contemplated, it should be licensed as an aging facility. This is a consensus recommendation from the group that produced the 'Plan D' report. This suggestion is based on the observation that no reprocessing facility has yet both operated as planned and removed all high-level radioactive materials from site. It would be imprudent to simply assume that another U.S. reprocessing facility would be an unqualified success, and thus fail to plan for possible long-term on-site storage of high-level radioactive materials. With such planning, however, a prospective reprocessing facility site could play a role in removing DOE wastes and stranded spent fuel from other states.

I and the group that produced the 'Plan D' report do not expect that the Commission will adopt all of our suggestions exactly as is. Hopefully, however, the Commission will come up with something as good or better.

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