

THE UNINTENDED SOCIAL RISKS OF NUCLEAR WASTE DISPOSAL

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The issue of nuclear fuel waste disposal, as it has been argued and asserted over the last fifteen years or so, arises from the perception of a wide spectrum of risks to individuals, society, and the environment. Yet, although ostensibly the spectrum is broad and the duration of the potential radiological hazard long, it is not to be thought that the risk is necessarily large or is more uncertain than many other risks. When the proponents of disposal projects report their calculated risks arising from radiological consequences predicted over time-scales greater than 10,000 years or so, we can be quite sure in advance that the risk will be a small one. And this is necessarily so because a vast investment burden embedded within a gold-plated technical fix is promoted as part of the solution to the "nuclear waste problem." This asymmetric and disproportionate allocation of the scarce resources available to society today results in a new risk: the social risk of nuclear waste disposal. Thus, it is instructive to place any technical analyzed risk in a broader social perspective.

To begin with, spent fuel can be stored most economically on the power plant site or, if necessary, at a centralized facility where it can be monitored. If the need arises, it can also be retrieved for useful by-products at a later date. This is, likely, also the safest option. The storage of nuclear waste either for the medium term (50 to 100 years) or the longer term (100 to 500 years) requires a minimal level of care and a basic acceptance of the view that responsible institutions will continue to exist.

Continuous vigilated storage of nuclear waste is viewed by some as a burden on future generations. Disposal is thus a mandated but preemptive solution to a potential problem. Much of this being driven by the perception that future generations cannot or will not manage the safe storage of nuclear wastes. The current disposal technology proposed for nuclear waste disposal is a "technical fix" intended to resolve an unforeseen and unforeseeable future social problem. It could even be argued that the proposed technical solution is a grotesque overkill at least in terms

of the requirement on current resource expenditure. It is intended to pacify those who have the means to express their unease or outrage through the political process. Such appeasement will not work because it is this very audience that views technical fixes with extreme suspicion on the grounds that the nuclear waste debate is really about the longevity of existing societal institutions, treatment of social inequality, individual rights, the future of democracy and so on.

These nuclear waste disposal projects will be costly. In the case of Canada's CANDU unenriched but partly utilized fuel "waste", a major energy source will be taken out of the reach of future generations, too. Should we make this commitment for them *in loco parentis* to solve our own problem of conscience?

The cost of a nuclear waste disposal project is large, in excess of \$10,000,000,000 (ten billion dollars; more rigorous estimates are in the \$14-15 billion range). To spend such an amount on the disposal of waste is equivalent to committing in the order of \$ 500,000,000 (five hundred million dollars) every year in perpetuity to an unproductive investment. The permanent loss to any nation is roughly equivalent to foregoing half a dozen new hospitals, a new university, several opera houses, and or substantive renewal of the urban infrastructure such as public transit facilities: every year - forever!

The wisdom certainly resides within the body politic for not committing such a transparent act of folly. But then, one can never be sure. It is worth emphasizing that the resources directed at reducing a very small hypothetical risk from nuclear waste storage will most certainly result in our inability to pursue other important educational, social and cultural goals.

Dollars five hundred million of income foregone for to-day's citizens is a large amount: in terms of lives, it is an amount equivalent to not being able to save approximately 250 lives per year. Given that there exist inequalities of income in our society, the disproportionate share of the burden on the poor is even larger. As has been shown, an equivalent \$100 loss of disposable income increases the annual risk to individuals in low income groups by a factor of about two hundred compared to high income group (Keeney, 1990). The cost induced indirect fatalities that arise from efforts to "improve safety" or "reduce risk" by regulations is a real phenomenon such that the impacts on the poor turn out to be the most negative aspect of an otherwise "well-meaning" concern for the future generations.

There is further new evidence to support the view that individuals discount future lives in much the same way as we discount the value of money. One of the striking revelations of a study conducted by the Resources For the Future (Cropper and Portney, 1992) shows how present-oriented individuals are.

"The overwhelming majority of the respondents attach a lower priority - sometimes much lower- to lives saved in the future, even when the time horizon was quite short (5 to 10 years). For example, for a program that would save lives 25 years in the future to be preferred to a program that saves lives immediately, it had to save at least six times as many lives. When faced with a choice between 100 lives today and 7000 lives in 100 years, respondents chose to save 100 lives to-day."

For the case of a nuclear fuel waste disposal program, it would be a profound consolation if it were possible to show any measurable savings of lives without conceding the point that the net benefit to society from an expensive waste disposal program is negative by a very large margin.

It is therefore not to be expected that any government will lightly commit such resources to the putative risk of social breakdown and loss of supervision of storage on site. Conventional risk analyses of such facilities overlook, of professional and scientific necessity, some broad social and technical scenarios. At least two of these scenarios are likely and crucial: chronic energy shortage and emergence of more urgent social needs.

Chronic energy shortage will arise within the next millennium (a) if the human world population growth is not brought under control, indeed if it is not reduced by disaster or design to a 19th century level, (b) if some wonder energy source does not become viable, or (c) if human desires and wants are not moderated drastically. All fossil and fissionable fuel will become high-priced, and the nuclear waste will become a "fertile" resource. This family of scenarios is quite plausible and must not be overlooked (Nathwani et al. 1992).

In the short term perspective demand side energy management, conservation, more economical energy use, "sustainable development" and so on will be helpful. These problem-solving techniques can buy valuable time, at least, so that the best permanent solutions become evident. But one is reminded of the Russian joke:

A question was put to Radio Yerevan, "Can you make a sharp turn in a Volga at 100 km/hr?". The answer was: "Yes you can - but you can only do it once!"

By even the most optimistic belief, demand side management will not do more than what 50 years of world population growth at the present rates will again undo. Ultimately (it could well take a few hundred years) energy shortages are likely. Today's waste will then become a valuable resource. Nuclear waste disposal will be seen as a costly error: *showing the kids we care for them by burying their treasure and spending their inheritance to do it.*

Urgent social needs will always be present. New ones will become salient, and politicians will be committed to their solution. That is as it should be. It is plausible that future generations will become less concerned over nuclear waste and more concerned over other issues, issues that we are not even aware of today. Historical hindsight teaches us that many human concerns are perishable. Topics of serious debate, such as whether it is the Sun or the Earth that stand still, often dissolve with time and are seen as misphrased trivial questions.

That today's concerns are forgotten tomorrow is so well understood by our decision-makers that the decision to commit to a nuclear waste disposal project will likely be deferred. You get a lot more political mileage, for a fraction of the cost, by merely funding another study. Every year that the decision can be deferred will free hundreds of millions of dollars for more popular undertakings yielding higher perceived or more immediate benefit. Never has there been a better opportunity for creative procrastination.

Unless the issue of nuclear waste were to rise to the highest prominence among public concerns, other problems of the day will command the resources, year after year. This will continue until the societal risk of storage on site becomes evident.

Present technical risk analyses are just small elements of a great international process reviewing the question: "Can our generation satisfactorily discharge all the moral obligations to the world of the future that may arise out of the peaceful use of nuclear fission?" If the answer is "Yes we can," it should not be thought that we also should just because it is feasible. Nuclear waste disposal is not necessarily in the best interest of the world of the future.

REFERENCES

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