

Todreas Comment (2001) on Adamov Paper (Nuclear News, Nov. 2000)

The Adamov article (NN November 2000, pg. 38-42) proposes a burn-breed concept that recycles and transmutes minor actinides to achieve a "radiation-equivalent management" of radioactive waste.

This scheme may be a useful target in 100 years, but certainly beyond 50 years. Beyond the steps to taken on GEN 3+ reactors in the next 10 years, there is a 30-50 year window when other steps are more important to take since:

1. There is plenty of cheap U and prospects for more. Breeders are not needed in the near future. All the mineral commodities have decreased in cost (in constant \$) in contrast over the past century.
2. Reprocessing is too expensive - not doing so is doing the right thing (for the wrong reason).
3. Credits for CO₂ avoidance should be our #1 priority. This will help nuclear power more than any engineering innovations.
4. Repositories are really underground central fuel storage facilities for the next century (at least). There are several useful developments proposed now (Forsberg, Bowman) to enhance repository performance which could be usefully explored and exploited now.

For the long-term future, 100 years, it is not obvious that the Pb BREST reactor approach is the clear winner. True Pb versus sodium has safety and spectrum advantages but:

1. Gas and likely steam cooled breeders can be designed to give the same spectrum advantages, and gas may have safety advantages (except possibly for LOCA tolerance?).
2. It is yet not evident that Pb or LBE cooled fast reactors will be significantly cheaper than LWRs or MPBRs.
3. The utility of using thorium is constrained by need to denature the produced U₂₃₃ to 12w/o of total uranium. This requires introduction of considerable 30-50w/o U₂₃₈ in the fuel, which results in this

reactor spectrum of Pu production of weapons grade quality. Hence, this is a potential pathway without intrinsic safeguard.

Finally, in rebuttal to two key points of the article, be reminded that with regard to safety and proliferation resistance:

- A. There will always be a deterministic component to reactor safety assurance; no one can guarantee completeness in the identification of scenarios.
- B. There are no purely technological measures which can protect against misuse of any reactor facility by a nation to produce weapons material.

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