INTERNATIONALIZATION OF THE NUCLEAR FUEL CYCLE:
A SUMMARY OF AN NAS-RAS REPORT
(Multilateral Fuel Cycles, Frames, and Stability)

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Joint NAS-RAS Report: Internationalization of the Nuclear Fuel Cycle

Study to address technical and policy options for international nuclear fuel cycles. Report released 2008

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http://www.nap.edu/catalog.php?record_id=12477

Premises:

Nuclear power will likely spread to nations that do not now have it.

The more countries to which enrichment or reprocessing spreads, the greater the risk of proliferation of nuclear weapons will be.

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Findings Derived from the NAS-RAS Joint Consensus Report

Few countries will forgo forever a right to develop uranium enrichment or spent fuel reprocessing.

No single mechanism or strategy for assurance of nuclear fuel supply is likely to address every country's legitimate needs and desires.

New mechanisms for assured nuclear fuel supply may only modestly change countries' incentives to establish enrichment facilities.

It may become increasingly difficult to maintain a system in which nationally controlled facilities in only a few countries provide all enrichment and reprocessing services. Offering the opportunity to profit from these technologies may reduce the perception of unfairness and inhibit the spread.

Findings Derived from the Joint Consensus Report (cont.)

Arrangements that would provide assured return of spent nuclear fuel could provide a much more powerful incentive for countries to rely on international nuclear fuel supply than would assured supply of fresh fuel.

Implementation of what is feasible today should not be delayed while other options are being perfected.

- make assured fuel supplies available before there is a major commitment to new entrants.
- continue to support a broad menu of approaches
- establish additional incentives for countries to not pursue sensitive steps

Stability

- For stability, one would like to have a world in which breakout or clandestine rearmament is
  - Lengthy
  - Costly
  - Apparent
- Nationally controlled fuel cycles under tight international scrutiny and safeguards
- Multi or international facilities offer advantages and potential dangers
  - \+ Multilateral interests watching each other
  - \+ International security incident if host country took control
  - \- Potential for leakage of technology and functional knowledge

Incentives

- What are the incentives for enrichment and reprocessing technology holders?
  - Larger markets
  - Structured regime; difficult for new entrants to compete
- What are the incentives for states with nuclear weapons?
  - Reduce the number of virtual proliferants

Some Proposed Principles (Lowenthal*)

- Build toward international agreement on common goals and actions: Promoting a clean, safe, secure expansion of nuclear power for the benefit of all.
- Sovereign rights of states.
- Incentives: Push to increase
  - Benefits and a stake in promoting a safe, secure nuclear enterprise
  - Cost and effort to redirect toward weapons
  - Detectability of clandestine programs or diversion
  - Timeline to a weapon
  - Uncertainty of achieving weapon
- Recognize that rational for some is not rational for all.

*** The views expressed on this and the following slides are those of the author and do not necessarily represent the views of the National Academy of Sciences or the Committee on International Security and Arms Control.**

Frames and Narratives (I)(Lowenthal)

	Security and Economic Rationality	Science & Technological Progress	Rights, Respect, Nondiscrimination
Nuclear technology	Is complex, having both benefits and liabilities, especially security and safety. Each attempt to address drawbacks through improved technology has resulted in little improvement or significant new drawbacks.	Holds great promise for prosperity and is symbolic of a technologically advanced society. The liabilities can be mitigated. Technological progress is inevitable.	The current technology holders are conspiring to deny new entrants and growing enterprises the benefits of advanced nuclear technologies.
Trust	Trust is not enough: governments change and the only sure thing is physical reality.	Technological restrictions can reduce (or eliminate) the need to rely on trust.	Trust is due to nations that have earned it. Trust is not enough.
Spent nuclear fuel	May be a resource some day far in the future, but unless reprocessing becomes net beneficial from economical, environmental, and security perspectives, spent fuel is a waste.	Is a resource. It contains material that can be exploited for enormous benefits.	May be a resource or a liability. That determination is up to the sovereign state to decide.
Net economic benefits	Can be assessed (relatively) objectively and do not favor reprocessing, recycling fuel, or fast reactors. Major changes would need to occur for the conclusion to change.	Can be assessed but change once technology is developed and deployed. When circumstances change, those who are furthest along in development are best positioned to reap the benefits.	Assessments do not adequately account for intangible benefits.

Frames and Narratives (II) (Lowenthal)

	Security and Economic Rationality	Science and Technological Progress	Rights, Respect, Nondiscrimination
Nuclear weapons capability	Is a "forbidden fruit" that some people in each technologically advanced nation (and in many violent subnational groups) want to obtain. Nonproliferation is a security matter, and latent or virtual proliferation is nearly as bad as proliferation.	Nuclear energy technology is not nuclear weapons capability. Technological safeguards and other features can ensure non-proliferation.	Nonproliferation is only achieved through nations' enhanced sense of security, including energy security. No level of technological capability is equivalent to creating weapons, so latent proliferation is a biased term.
Fuel cycle flexibility	Is achieved through storage until a preferred fuel-cycle option is identified.	Is achieved through reprocessing.	Should not be constrained for nations in good standing.
Challenges in gaining public acceptance for disposal of high-level radioactive waste	Are mostly independent of the details of the details of the radioactive waste streams.	May be addressed through technological means by reducing the intensity and duration of the hazards that the wastes pose.	
Technical challenges in disposal of high-level radioactive waste	Are relatively small compared to the public acceptance challenges. May not be affected meaningfully by different fuel cycle options.	Are relatively small compared to the public acceptance challenges, but can be addressed through separations, recycling, and improved waste forms.	