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# **A Multilateral Cooperative Framework 2012 International Forum on Nuclear Energy, Nuclear Nonproliferation and Nuclear Security**

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*This presentation is based on the research performed as part of the American Academy's Global Future Project Initiative. The presentation and views expressed therein by the authors are solely the responsibility of the authors and are not necessarily those of the Officers and the Fellows of the American Academy of Arts and Sciences or the foundations supporting the Global Nuclear Future Initiative. In addition, the presentation and views therein by the authors do not necessarily state or reflect those of the United States Government or any agency thereof, Argonne National Laboratory, or the University of Chicago.*



## Summary of the Study

- Preliminary regional multilateral storage concept
  - [www.amacad.org/publications/backEnd.aspx](http://www.amacad.org/publications/backEnd.aspx)
- Expanding analysis to include input from stakeholders
  - industry ( members of the World Nuclear Association)
  - potential participants (collaborating with leading scholars and policymakers and with Association for Regional and International Underground Storage (Arius))
- Update the preliminary concept with a significantly more robust business-oriented and public-participation model.

Question 5 – Merits and demerits (challenges) of participating in a MNA framework from the vantage point of all stakeholders



# Excerpt from Outline, re: JAEA's 12/2012 International Forum

“Feasibility” of establishing multilateral cooperation framework

- Incentives encouraging voluntary participation
- Significance of multilateral approaches in the Asian region
- Regional framework ensuring 3S – Question #7

.....

Underlying question: How to facilitate the transition from “now” to the desired asymptotic regime



## Question 5: Key Issues

- What is the range of possibilities for collaboration on the back end of the fuel cycle for both recipients and suppliers?
  - *The marketplace is key*
  
- What are the options for transforming back-end facilities from “dumps” into a national/community/energy asset?
  - *The deal is the key: can there be a value above and beyond the direct \$\$?*
  - *But: how do we value the intangibles?*



## Additional Considerations ...

- What are the prospects for establishing international control of nuclear fuel enrichment (and other sensitive fuel cycle technology)? What are the likely alternatives?
- Given the relative imbalance today between costs and benefits, why do some countries continue their desire to have commercial capability to reprocess spent or used fuel?
  - Do the intangibles outweigh the “micro” economics, i.e., at the end of the day, are factors such as preserving options to enhance one’s security (= serving his or her own interests) all conspiring to negate the economic arguments?
  - Is there a perceived or real insurance premium to preserve all available back-end options?



# “El Baradei’s Vision” – Moving to an Asymptotic Regime

- Step #1: Establish a system for assuring supply of fuel for nuclear power reactors – Panel 1
- Step #2: All new enrichment and reprocessing activities in the future put exclusively under multilateral control
- Step #3: Convert all existing enrichment and reprocessing facilities from national to multilateral operations



# Current Consensus in Fuel Supplier Community

- Any multilateral mechanism *should not disturb the international market for nuclear fuel cycle services*
- The establishment of multilateral fuel cycle arrangements should be implemented *step-by-step*
- There would be *no uniform approach that would be satisfactory for all technologies and all countries*, and successful implementation of the multilateralization would depend on the flexibility of its application
- The obvious question: *How does one transition from the 'Three Stage Process' from where we are today, while recognizing the fuel supplier community consensus?*



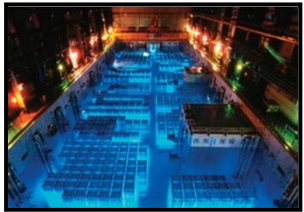
# Authors' Incremental Proposal – Basic Tenets

- Offering interim storage as an option to existing fuel supply/take-back arrangements, such as Rosatom and AREVA
  - Added option to existing commercial fuel contracts
- “Economies-of-Scale” regional facility – 10,000 MT – up to 100 years
- Manageable and transparent business arrangement
- Breathing room for future deployment of advanced technology

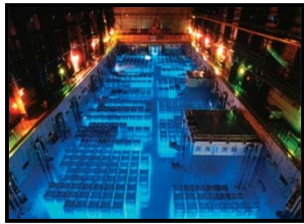




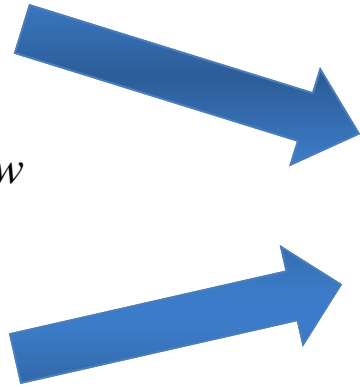
# A Proposed Storage Concept



*Used Fuel Pool-New*



*Used Fuel Pool-Legacy*



*Regional Facility*



## Merits

### Host Country:

- High-tech infrastructure development
- High-value job creation
- Revenue stream

### User States:

- Reduced used fuel pool inventory
- Reduced burden to manage their interim storage needs

### Existing market players:

- Market conditions maintained

### International Community:

- Enhanced proliferation resistance

- *Used fuel can be accepted from both legacy and new-aspirant countries after pool cooling.*
- *Regional facility is owned and operated by a management entity that utilizes best safety and safeguards practices .*
- *Concept provides time for ultimate disposal options to mature.*
- *Concept is technology-neutral on the back-end.*

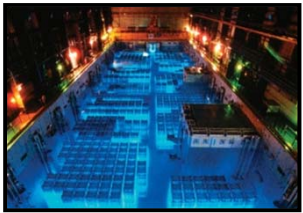


# Benefits

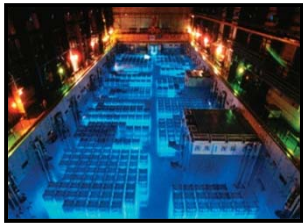
- Non-proliferation and security
  - Aspiring States and legacy States “could” forego reprocessing and enrichment interest
  - Centralized, safeguarded, secure, and safe (3S) storage facility
- Political challenge for nuclear consumer countries – “selling” multiple in-State storage/disposal sites



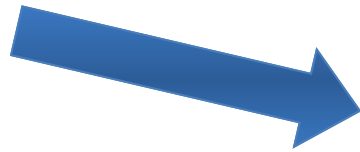
# The challenges ...



*Used Fuel Pool-New*



*Used Fuel Pool-Legacy*



*Regional Facility*



## Challenges

### Host Country:

- Public acceptance
- Long-term sustainability
- Legal rights and privileges

### User States:

- Timeliness and reliability
- Legal rights
- Risk of reacceptance

### Existing Market Players:

- Private financing
- Unintended disruption of existing contractual relationships

### International Community:

- Composition of the Deal



## Further challenges ...

- Attractiveness to the host – no “extraterritorial” back-end entity in operation used as a model
- Preservation of a State’s inalienable rights
- Complex organizational, legal, financial, and funding structure
- Fusing once-through and recycle interests
- Stowaway *not* tantamount to permanent disposal



# Three Key Economic Questions

1. How much front-end investment is required and over what time frame to site, design, construct and operate a back-end facility?
2. What is the nature, scope, and appropriate value of the contracts and agreements required and when are they necessary to secure the necessary commercial financing to facilitate construction and operation of a regional facility?
3. What are the estimated costs and benefits to all parties – the host, the nuclear utility operators, the investors, and the other parties?

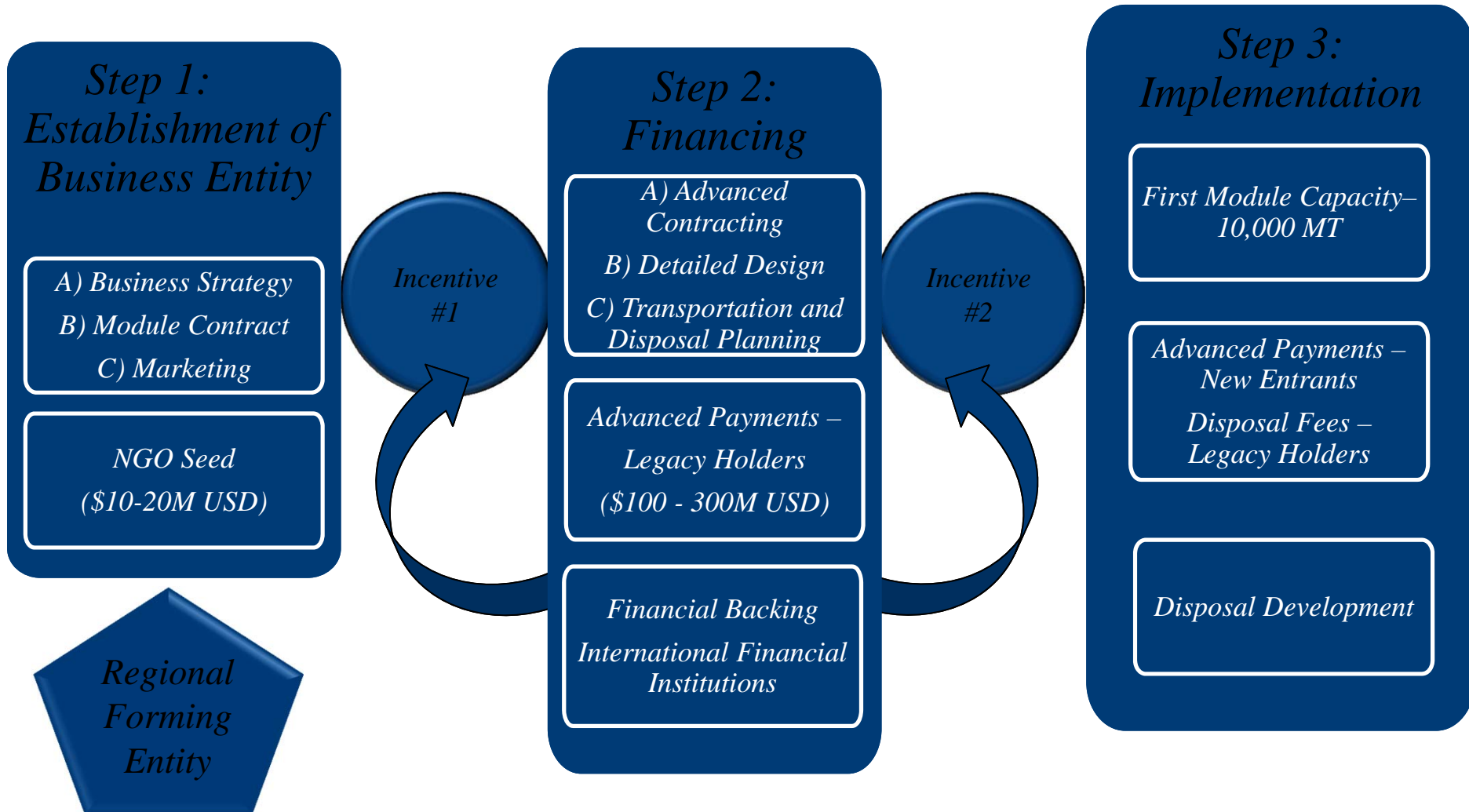


# Other Important Considerations

- Legal aspects of the Business Case
- Definition of Multilateral Agreements, Treaties, etc.
- Key Issues for Host Community
- Technical considerations – the character of the R&D
- Linkage to final disposal
- Linkage to the institutions in the region (i.e., setting up the infrastructure)



# Possible Financing Structure





# Suggested focus of the discussions

- Stakeholders role and responsibilities
- Regional entity as a leader
- Sustainable business practice
- Assurance of supply and disposition
- Assurance of safe, secure, and fully safeguarded approach