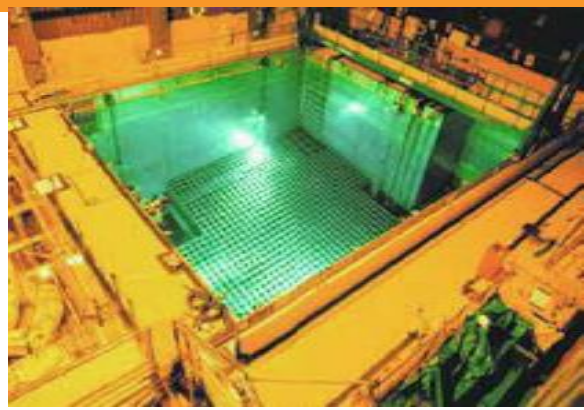
Multilateral/Regional Solutions for Nonproliferation of the Fuel Cycle

Sharon Squassoni
Senior Fellow & Director
Proliferation Prevention Program

Workshop on New Nuclear Order
Japan Institute of International Affairs
December 11, 2012, Tokyo

CSIS | CENTER FOR STRATEGIC & INTERNATIONAL STUDIES | Proliferation Prevention Program



OUTLINE

- Why multilateral?
- Why regional?
- Challenges
- Approaches to overcoming challenges

What are proliferation risks?

- The most sensitive parts of fuel cycle (enabling proliferation of nuclear weapons) are uranium enrichment, spent fuel reprocessing.
- United States does not encourage the spread of fuel cycle capabilities out of proliferation concern.
- Possibility that national fuel cycle capabilities will spread, particularly in Asia as nuclear power grows there.
- Will address both front end and back end of the fuel cycle here.

Current state of play

- **No legal restrictions on new enrichment or reprocessing facilities**
  - In NPT (Article IV) or elsewhere (e.g., FMCT)
  - For any state, regardless of status (nws vs. nnws)
- **Nuclear Suppliers Group**
  - Policy of restraint now has new criteria
- **"Frameworks" for nuclear supply**
  - GNEP, IFNEC, Angarsk, fuel banks
- **Actual nuclear supply/demand**
  - Surplus capacity for both enrichment, reprocessing globally
  - Need for repository but no current capacity

Why multilateral approaches to the fuel cycle?

- Diminish appetite for national sensitive fuel cycle capabilities
- Improve transparency in these facilities where they do exist
- Improve warning time
- This is not a complete solution, but fine-tuning

Example of Iran

- Multilateral solutions often held up to the "Iran standard" – would it solve the Iran problem or a future Iran problem?
- Ironically, Iran is an example of a failed multilateral approach (Eurodif).
- Multilateral solutions generally can't "force" a country not to pursue a national capability. Need to become an attractive alternative to national facilities or an international norm
- So, can we do better than Eurodif?

Why regional? Practical reasons

- Asia is the only region expecting more than minimal growth in nuclear power
- Mix of fuel cycle capabilities and resources among stakeholders
- Regional approach could minimize transportation of fresh and spent fuel

Historical preferences for multilateral approaches for fuel cycle

- **United States**
  - 1976 Symington amendment
  - 1978 Nuclear Nonproliferation Act (Section 104)
- **NSG**
  - Original paragraphs 6 and 7 of NSG guidelines (on enrichment, reprocessing transfers)
- **IAEA**
  - 2005 International Experts Group on Multinational Approaches to the Fuel Cycle

Definition of multilateral (per Carlton Stoiber, July 2011 for CSIS/NTI project)

- "A broader kind of arrangement which could involve participation by different types of entities (commercial, governmental or other) from several countries."
- The term suggests "significant flexibility in how such an arrangement might be structured in terms of investment, management, regulatory control and the like, as long as meaningful participation of entities from several States was involved."

FRAMEWORK: Assessing Alternatives to National Fuel Cycle Facilities (2005 IAEA MNA Report)

Nonproliferation Value

(global, "suppliers")

Diversion
Breakout
Technology Diffusion
Security

Assurance Value

("recipients")

Guarantees
Economic
Political/Public Opinion
Safety & Security

Siting
Access
Involvement
Safeguards
Other inducements

Nonproliferation Value

- Main nonproliferation benefits assessed on global basis (vice national basis)
- Advantages seen in reducing potential number of locations of fuel cycle facilities
- Elements are standard: diversion, breakout, technology diffusion and security of fissile material
- Objectives: prevent/reduce diversion, breakout and technology diffusion while not degrading security of fissile material

Assurance Value

- **Elements are**
  - guarantees of services
  - economic benefits (with focus on benefits of pooling resources, rather than direct disposal vs. recycling)
  - political acceptance and public opinion
  - safety and security considerations

Types of Multilateral Approaches

- Fuel Supply Assurances (fuel banks, fuel leasing, cradle-to-grave)
- Equity in Existing Facilities (ownership)
- Multilateral facilities in technology-holding states (joint management, operation)
- Multilateral facilities in “new” states (new facilities)

Nonproliferation & Assurances of Specific Choices

	Nonproliferation Value Diversion, Breakout, Diffusion, Security	Assurance Value Guarantees, Economics, Political Acceptance, Security & Safety
Siting •Technology holder •Extraterritorial •Non-technology holder	•No change unless full technology access •No change unless full technology access •Lower nonproliferation value	•Lowest assurance value •Better assurance value •Best guarantees, political (assuming host); economics? Lower security/safety?
Technology Access •None •Operational Know-how •Assembly/maintenance •Full	•Best •Good •Lower •Lowest nonproliferation value	•Lowest political acceptance (domestic) •Good political acceptance •Better political acceptance •Best political acceptance, security, safety?
Involvement •Minimum •Ownership •Management •Operation	•Best •Good •Lower •Lowest nonproliferation value	•Lowest assurance value •Good assurance value •Better assurance value •Best assurance value
Safeguards •AP •Special •Expanded •Continuity	•No change unless full technology access •No change unless full technology access •No change unless full technology access •Best nonproliferation value	•No change •Good assurance value •Better assurance value •Best assurance value

Challenges

- **Creating demand & supply, political momentum**
- **Government and industry collaboration**
- **Regional political dynamics**
  - Competition between Japan, South Korea and China for nuclear trade
  - Uncertain status of Japan's nuclear program

An integrated approach

- History of front-end fuel assurances shows little interest because the market works
- Real incentives lie in the back end (storage, disposal) but huge hurdles
- Most countries have indulged in magical thinking about repositories
- It's time to connect the dots if nuclear energy is to be sustainable

Elements of an integrated approach (CSIS-NTI project 2011-2013)

- Based on policy principles that apply to all aspects of the development and deployment of sensitive fuel cycle technologies;
- Connects front- and back-end approaches;
- Can begin to be implemented within the current market landscape without requiring revolutionary restructuring immediately;
- Step-by-step creates a fundamentally more secure global fuel cycle marketplace (with regard to proliferation and material security) even if the vision is not fully realized.

Principles (I)

- **Commercial operation of sensitive facilities with commercial feasibility as primary driver of expansion**
- **IAEA role, including safeguards on all sensitive fuel cycle facilities (even in nws)**
- **Provision of complete fuel cycle services (if not repository, then access to one)**
- **Equity ownership offered**
- **Enrichment supplied on black-box basis; reprocessing tied to use of advanced reactors, willingness to treat other countries' SNF, & agreements/licenses for repository**
- **Avoid plutonium separation; where it is necessary, principle of zero growth applied**

Principles (II)

- **Multinational and regional repositories -- pursued through cooperative, commercial endeavors that provide economic advantages for the siting state (e.g. preferential contract terms for fuel supply)**
- **Encourage creative approaches – e.g., governments can purchase enriched product from the market and supply it to utilities at low or highly subsidized rates.**
- **Diversification of suppliers/service providers for non-sensitive fuel cycle to increase interdependence in the market (e.g., fuel fabricators and spent fuel storage/repositories)**

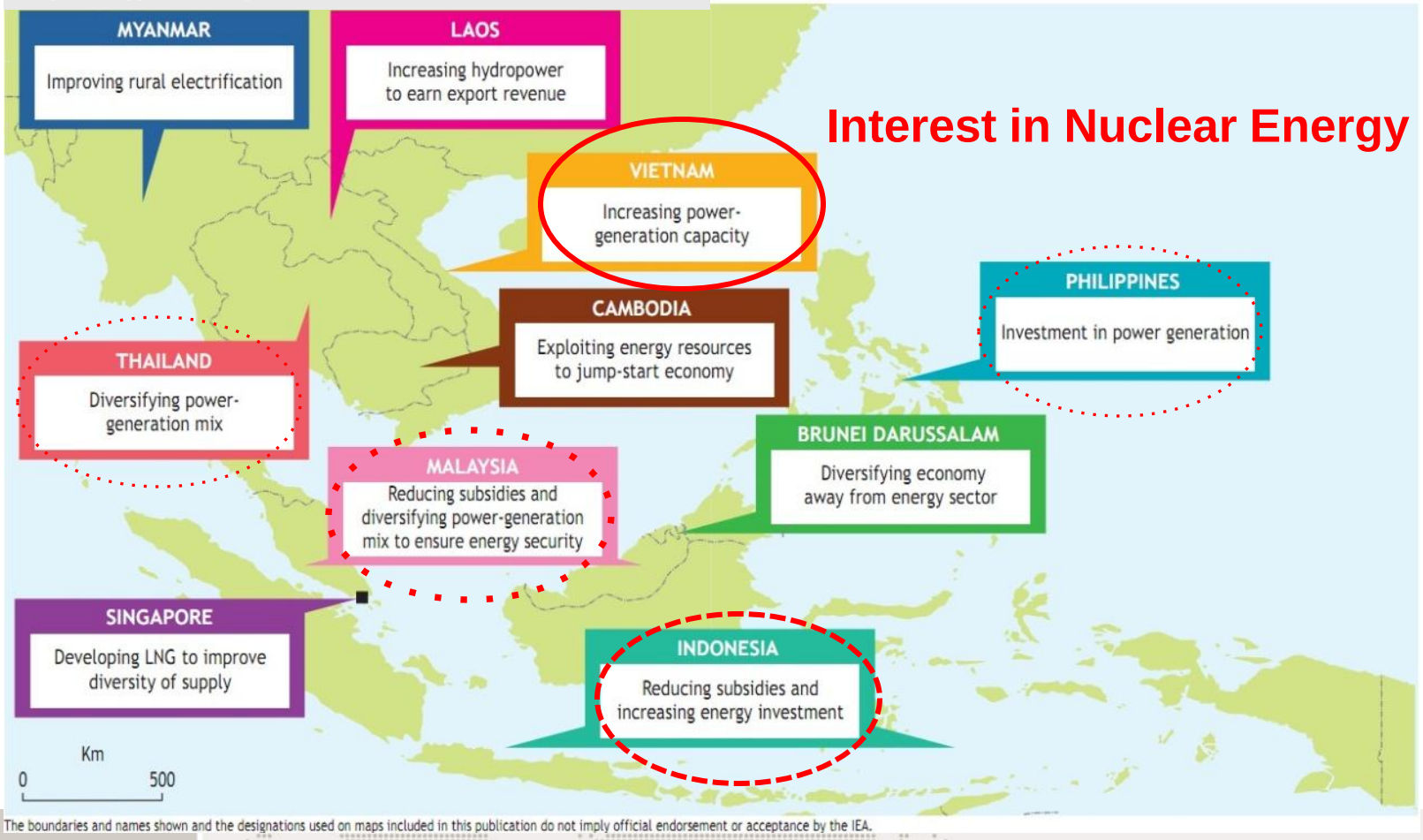
Some new thinking

- **Nuclear "coop" in NE Asia**
  - Mimic the structure set up in cooperative apartment buildings where there is individual ownership and collective ownership and management. Would require a treaty to set out legal roles, responsibilities.
  - Collective ownership/management of sensitive nuclear fuel cycle capabilities. Pool resources for big-ticket items (repository, burner reactor research)
  - Pool resources for safety, security, safeguards research, development & implementation

More specifics

- **Regional fuel cycle cooperation**
  - Participating states: J, ROK, Ch, US (+ R, Taiwan, Mongolia, perhaps SEAsian countries?)
  - Consider multilateral ownership/operation of Japan's fuel cycle facilities (at least Rokkasho)
  - Not all countries will have entire fuel cycle but have comparative advantage in what they provide
  - Back-end storage/repository must be a part of this. Need partners that can help provide solutions
- **Coupled with NWFZ in NEAsia**
  - Such a zone could help in any DPRK future (as long as DPRK was brought along)
  - Provide increased assurances about nw latency.

Key Energy Challenges in ASEAN countries



Interest in Nuclear Energy

Source: World Energy Outlook 2009

Contact information

Proliferation Prevention Program @ www.csis.org

ssquassoni@csis.org

202 775-3293