

Moving to a new nuclear regime: Key issues at the back end of the nuclear fuel cycle

Tom Isaacs

Stanford University LLNL

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of Nuclear Power**

In the Beginning...

- Nuclear weapons secrets were known by very few
- There were extremely small amounts of SNM in very few, secure places
- Required knowledge and infrastructure only available to most developed countries
- Terrorists lacked motivation to use WMD
- Terrorists weren't willing to sacrifice themselves
- Terrorists couldn't attract technically sophisticated members
- Terrorist groups would be small or discovered

The World has Changed

- Many nations have access to enrichment and reprocessing technologies and know-how
- A small, but crucial set of nations have moved close to weapons under guise of peaceful uses and by covert means - DPRK, Iran, India, Pakistan . . .
- Closed fuel cycle seen as “Latent Proliferation” concern
 - Osirak, Syria, Iran
 - Potential knock-on regional escalation?
- Pu commerce a security concern
- Threat of terrorist WMD, possibly aided by “Rogue” nations
- If they have the material, is it reasonable to assume they can make a weapon?

The Situation Today

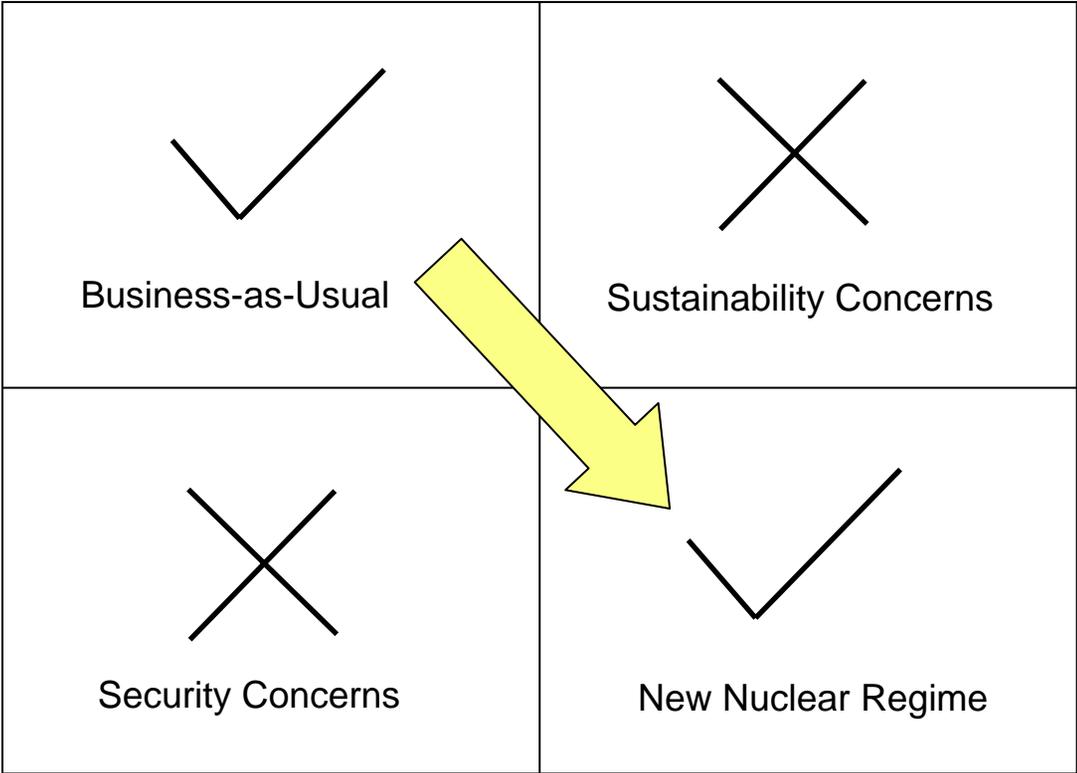
- Spread of nuclear power likely
- Spread of enrichment/reprocessing technologies
- Growth of SNF
- Excess materials/wastes from defense programs
- No operating HLW/SNF repositories
- Many countries planning on SNF storage/disposal
- Repository programs difficult and expensive

What are the concerns?
What are the opportunities?

Working toward a New Nuclear Regime (NNR)

Nuclear Power w/
Enrichment &
Reprocessing
Limiting to
Existing facilities
(Bush & ElBaradei)

Nuclear Power w/
A network of
Enrichment &
Reprocessing
Facilities, and
Repositories



Short Term

Long Term

Moving toward a network to provide fresh fuel supply assurance and spent fuel & waste management

The Intersection of Nuclear Power, Security, and Waste Management

Can we devise and move toward a
“New Nuclear Regime”

That allows the growth and spread of nuclear power while reducing security and waste management concerns?

Is it possible that we may better solve the energy, security and waste management elements as part of a whole than each one separately?

The Back-end of the Fuel Cycle
The Achilles' heel?
Or challenges and opportunities?

Some Possible Futures

- Business as usual
- Modified business as usual
- Punctuated equilibrium/crisis management
- New nuclear regime
- ?

What are the salient features?
What are the criteria for success?
How can we move with effect?

Some Elements of a New Nuclear Regime

- Countries have access to nuclear power at market prices
- Nuclear fuel supplies are assured at competitive prices
- Rationale for enrichment/reprocessing eliminated for all but selected few under international control/oversight
- All excess weapons-usable material is secured, put in unattractive form, burned where sensible, and brought under international control in appropriate countries
- SNF is returned to appropriate countries for management and disposal under international control
- Any moves toward weapon development or nuclear material acquisition are surely, quickly, and clearly apparent

The Crucial Role of Waste Management

- Providing a secure home for SNF from commercial and research reactors, defense materials, etc.
- Offering a potential win/win for developed and developing countries regarding nuclear power
- Regional/international solutions driven by energy, security, and environmental considerations

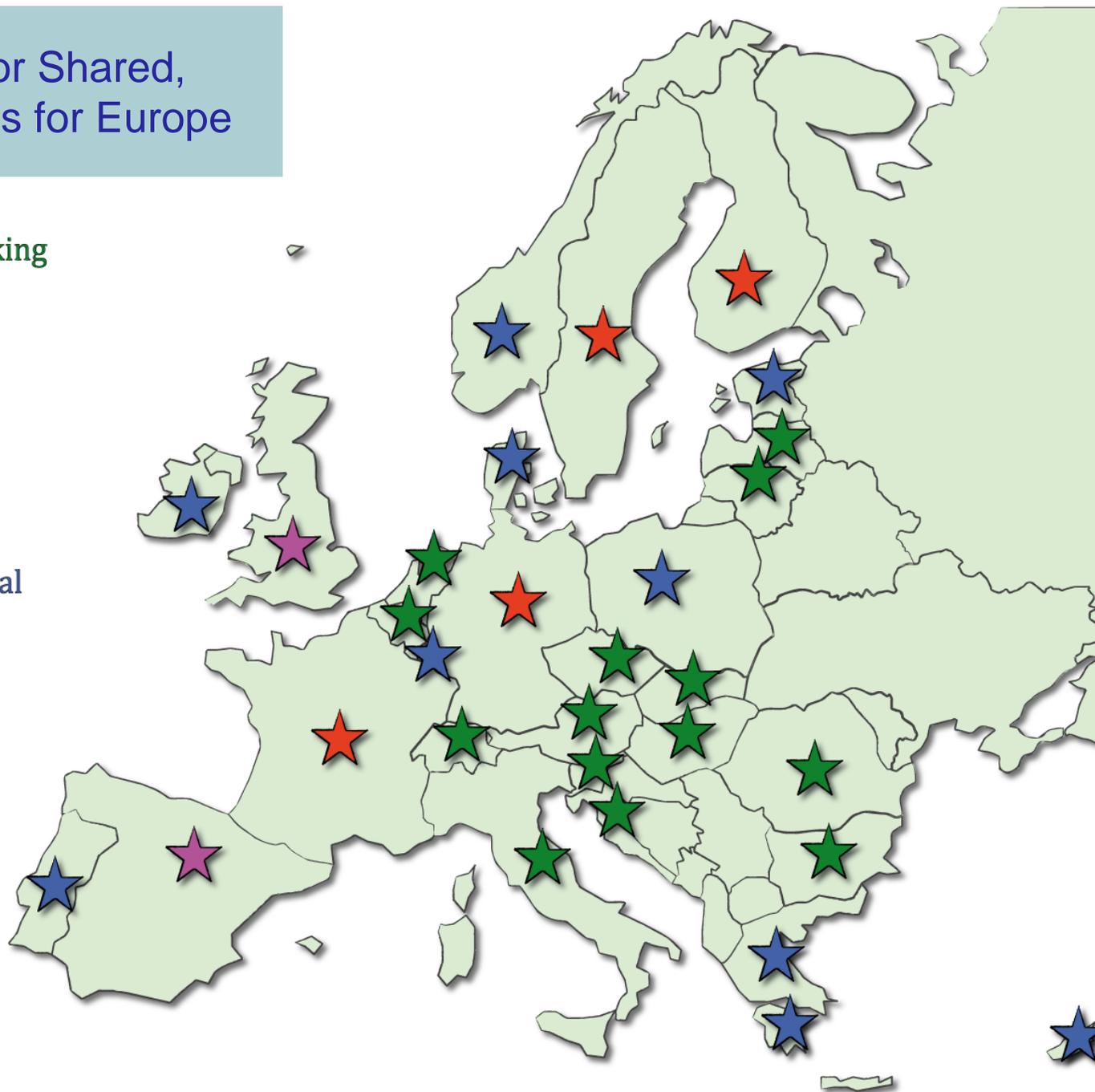
Repositories and storage become instruments of security, more than utility dumping grounds

Recent Initiatives

- IAEA Multilateral Nuclear Approaches (MNA)
- GNEP/GPRI
- NAS Internationalization of the Fuel Cycle Report
- European Repository Development Organization

The Potential for Shared, Regional Solutions for Europe

- ★ The 14 SAPIERR working group members
- ★ National disposal programme only
- ★ No formal official policy
- ★ No NPP but some waste for deep disposal



European Repository Development Organisation (ERDO)

- 2009: Ad-hoc working group of interested countries to agree organisational framework and project plan and allocate funds
- mid-2010: earliest establishment of ERDO as a self-sufficient, non-commercial, non-profit organisation: probably an IGO, Co-operative or Consortium
- 2012: develop and agree with participating states and publish a voluntary siting strategy
- 2012-2020: locate European site(s); interact with other regional partnerships
- ~2020: Possible conversion to market-led commercial **European Repository Development Organisation (ERDO)** as move towards licensing

Challenges

- Can we live in a nuclear have/have not world?
- Should “we” provide assurances to avoid the spread of enrichment/reprocessing?
- How do we deal with concept of take-back or take-away?
- Are there appropriate metrics?
- What are the security risks, institutional and operational features for multi-party repositories?
- What are the roles of IAEA and others?

Is there a new bargain?

Select Findings from May, 2009 Global Nuclear Future Workshop

- Need better and more consistent definitions and responses regarding “lines” re proliferation – “hedging” is key
- Need better appreciation of user priorities and concerns
- Diversity of views on who should be able to enrich/reprocess
- Incremental, adaptive approach is needed
- Need to appreciate new vulnerabilities of cooperation
- Black swans
- Packaged sales could unleash competition

Take back/take away can be the linchpin