

# **Advancing the Business Case for Managing Commercial Used Fuel from a North American Perspective**

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# Topics

- **Lessons-learned from the U.S. Vantage Point**
- **Lessons-learned from the Canadian Vantage Point**
- **European Approach – Attributes**
- **Design of Program Going Forward**
- **Economic and Financial Considerations**
- **Fuel Assurance Mechanisms – IAEA Approach**
- **What to do? What not to do?**

# U.S. Program

- **Nuclear Waste Policy Act of 1982 (as amended)**
  - **Managed by U.S. Department of Energy**
  - **Funds collected into Nuclear Waste Fund, based on 1 mil/kWh fee and defense contribution**
  - **Funds expended, based on annual appropriations**
  - **To date, approximately \$30B collected; \$8B spent**
  - **1998 waste acceptance obligation?**
  - **Licensing and operational state?**



# U.S. Program (contd.)



- **Alternative Means of Financing and Managing (AMFM) program (1984, 2001)**
  - Management structures: FEDCORP
  - Dedicated cost and revenue structure
  - Run as a “Business” – Performance-based controls
- **Sustainability**
- **Movement toward public-private investment partnerships (PPIPs)**

# Canadian Program



- **Nuclear Waste Management Organization (NWMO) was established in 2002 in accordance with *Nuclear Fuel Waste Act (NFWA)***
- **Owned by waste producers: Ontario Power Generation, Inc., Hydro-Québec, New Brunswick Power Corporation and AECL**
- **NWMO responsible to recommend to Federal Government an approach to managing waste fuel**
- **NWMO recommended “Adaptive Phased Management (APM)” approach (2007) – has been accepted by government**
- **NWMO will continually review, adjust and validate plans against factors such as advances in technical learning, evolving societal expectations and values, and changes in energy and environmental policies**

# Canadian Program (contd.)



- Phase 1 (30 years): On site dry storage – plan for interim centralized shallow storage
- Phase 2 (30 years): Used fuel transferred to centralized repository – planning for final deep geological repository
- Phase 3 (60 years): Transfer to deep geological repository – depending on technology of the day – potential for retrieval for reprocessing

# Canadian Program Funding



- **Act specifies how much each participant must fund for long-term funding**
- **Funds are managed by each company in segregated trust fund, not by NWMO**
- **As part of its responsibility for providing financial surety for program delivery, NWMO will continue to assess external developments that may impact on amount of used fuel to be managed in Canada and potential implications for future costs**
- **As NWMO updates program cost estimates, member corporation contributions to their respective trust funds will be adjusted periodically**
- **Used fuel management is complete responsibility of its creators; however in Canada at this time, all of these companies are owned by government**

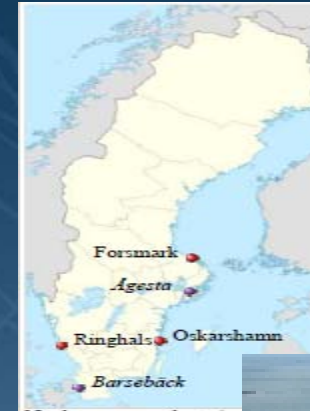
# Canadian Program Funding (contd.)



- **Should there be new reactors and/or new used fuel owners, it would necessitate review and potential revision to funding formula**
  - **Formula would reflect sharing of costs and investments already made by current waste owners, amongst other considerations**
  - **Future revisions to funding formula will be done in fair and equitable manner, balancing interests of current and new waste owners**
- **Difficult for new potential plant owners to assess their potential obligation**
- **Not structured to easily accommodate private sector**

# Attributes of the European Program – Significant Progress

- Sweden: SKB (owned and operated by the nuclear utilities) established a dedicated fund for managing spent fuel: two components of fee – generating (fees plus interest) and special assessment for the costs for past practices.
- Finland: State Nuclear Waste Management Fund – special purpose fund, law requires that the uncertainty of available information about costs and prices shall be taken into account, flexibility to have 10% supplemental contributions to the Fund as well as utilities holding contributions in escrow.
- UK Program: New build strategy being developed. Plan is based on once through fuel cycle. Owners are responsible for funding; government is responsible for implementation. UK is striving to build a model that will enable the private sector to build new nuclear plants while ensuring adequate funding for used fuel management.



# Design of U.S. Program Going Forward

- **U.S. program needs radical surgery**
  - DOE Energy Secretary is convening special commission that will report back by year's end
- **Technology and Logistics – Canadian approach – APM approach**
- **Management – Swedish approach**
- **Sustainability**
  - Finnish approach
  - UK approach
  - U.S. vision: technological innovation
- **Other Lesson-learned – adopt AMFM Report recommendations**

# Economic and Financial Considerations

- **Fuel cycle costs**
  - **Predictability**
  - **Accountability**
- **Needs to address technology choices – Finnish model is appropriate here**
- **Creative approach – having nuclear utilities maintain their own escrow account – model: U.S. D&D fund, Canadian approach**
- **Second creative approach – active updating of economic assumptions – model: U.S. D&D fund**
- **Third creative approach – spent fuel generators partner with public financing to implement advanced technology, such as recycle and actinide burning, as well as achieve favorable financial terms – PPIP approach is currently being used to address disposition of risky assets on books of U.S. financial institutions**

# Nonproliferation Component – Assured Fuel Supply Regime

- IAEA approach – standby real and virtual fuel supply, to guard against supply cutoff – limited
- Bilateral and Multilateral Approaches – International Uranium Enrichment Center (IUEC) – Russia, Kazakhstan and other IUEC partners
- Our earlier paper, more expansive than the IAEA approach, Terms of Reliable Uranium Supply Trust (TRUST) \*
  - “Cradle to casket” approach
  - Dedicated funding source and management entity to lease fuel to emerging nuclear utilities

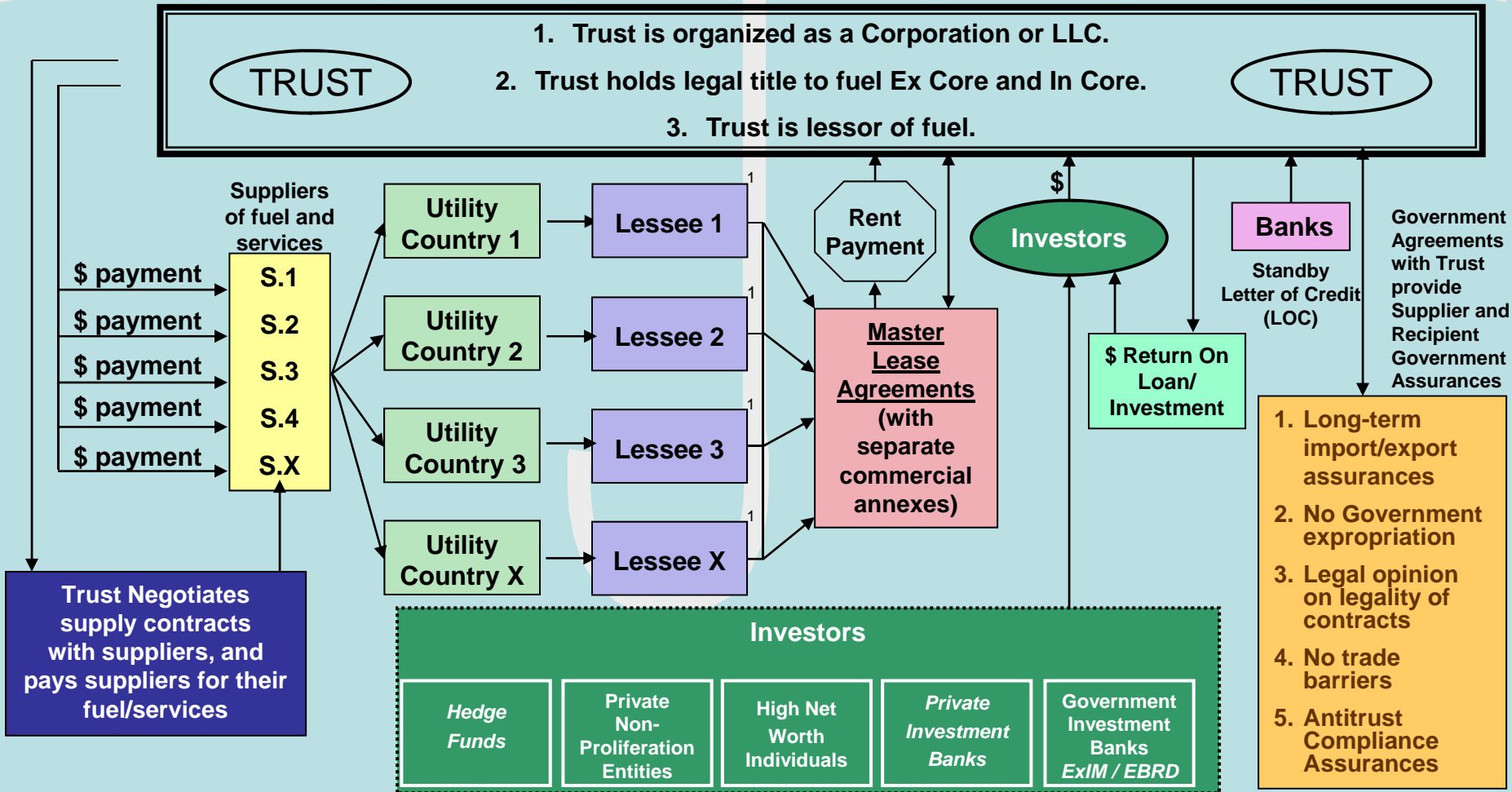
\* “TRUST,” An Innovative Nuclear Fuel Leasing Arrangement, Joint Paper for Presentation at NEI-WNA International Nuclear Fuel Cycle Conference in Budapest, Hungary, April 18, 2007

# Terms for Reliable Uranium Service Transactions (“TRUST”)

## TRUST for Emerging Nuclear Power Programs

(“Umbrella”)

International Government Framework Agreements between supplier and recipient Governments (§123 Agreement for U.S.) include advance consent provisions to facilitate import/export and retransfer of fuel



# Nonproliferation Component – Feedback – Business Principles

- Feedback received to date on TRUST – need to expand from “cradle to grave”
- Needs flexibility to address:
  - Centralized or regional interim storage
  - Advanced technology disposition pathways (i.e., actinide burning)
- Business principles
  - Flexible to address future disposition technology choices
  - Segregate funds

# What to do? What not to do?

- To do – business approach
  - To do – flexible back-end – technology innovation
  - To do – offer full service as important component to assured fuel supply and disposition regime
  - To do – dedicated funding/financing
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- Not to do – establish à priori price ceiling for back-end services
  - Not to do – “rush to judgment on final disposition”