



Nuclear Fuel Cycle Back-End: opportunities for expansion and support of non-proliferation objectives

Caroline JORANT

Director, Non-Proliferation & International Institutions

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- ▶ **Introduction**
- ▶ **Benefits of Recycling**
- ▶ **Criticisms of Recycling**
- ▶ **Responding to Criticisms**
- ▶ **Addressing the Challenges**
- ▶ **Conclusion, an Industry Recommendation**

- ▶ **The nuclear renaissance is happening worldwide**
- ▶ **Industry needs to support the responsible growth of energy while further improving nonproliferation objectives—it's a partnership**
- ▶ **We believe recycling can be implemented responsibly and in support of limiting the spread of this technology and materials**

- ▶ **Saving natural resources – uranium**
- ▶ **Making waste management easier - vitrification**
- ▶ **Minimizing waste volume and toxicity**
- ▶ **Neutral economics = compared to direct disposal**
- ▶ **Nonproliferation benefits**
 - ◆ **Reduce inventory of Pu by burning it**
 - ◆ **No plutonium mines**
 - ◆ **Waste does not require safeguards**
 - ◆ **Contributes to weapons reduction by disposing of Pu**

- ▶ **Recycling Technology and Pu separation**
 - ◆ Should be limited
 - ◆ Can be tweaked to separate plutonium
 - ◆ Theft and misuse are conceivable
- ▶ **Transportation**
 - ◆ Theft and misuse are conceivable
- ▶ **MOX**
 - ◆ Potential source for plutonium after additional treatment

Responding to Criticisms of Recycling

- ▶ **Recycling technology: a Multinational Approach**
 - ◆ Limiting the number of facilities worldwide
 - ◆ Limit the risks of misuse of facility if politics change
 - ◆ Limit safeguards efforts
 - ◆ Limit the security risks,

- ▶ **New plants enhancing non proliferation and security features**
 - ◆ Enhanced COEX™ process; no pure separated plutonium
 - ◆ Co-location of treatment and fuel fabrication plants
 - ◆ Overall robust safeguards schemes and ‘safeguards by design’ approaches involving industry know-how (burn up verification, process monitoring, design...)

Responding to Criticisms of Recycling

- ▶ **Safeguards and security approaches considered on a case-by-case basis**
 - ◆ **Assess risks in relation to material attractiveness and accessibility and the country's political environment**
 - ◆ **Assess implementation level (international body, national safeguards operator)**
 - ◆ **Adjust safeguards approach to improve efficiency and effectiveness globally**
 - ◆ **Robust safeguards schemes are implemented and 'safeguards by design' as well as new equipment will further facilitate safeguards implementation**
- ▶ **Transportation**
 - ◆ **Robust security practices have proven efficient and are improving through use of new tools and equipment**
- ▶ **MOX**
 - ◆ **Limit use to countries with strong nonproliferation credentials**
 - ◆ **Physical barrier and robust security practices to deter theft**

Addressing the challenges: Enhancing security and the recycling option globally

- ▶ **Strengthening guarantees of supply to dissuade countries from developing their own capabilities with Industry support**
 - ◆ **The commercial scheme: competition, profitability and reliability**
 - **Existence of a few competitors is the best guarantee of continuous supplies at reasonable prices**
 - **Large size profitable facilities and industries are therefore an important asset**
 - **Long term contracts**
 - ◆ **The political framework**
 - **The spread of reprocessing and enrichment technologies should be limited**
 - **Arrangement for the return of HLW (no need for safeguards)**
 - **Advance consent for re-exportation of used fuel for treatment and recycling in the country of origin or in another country depending on the country needs and nonproliferation and security credentials**

Addressing the challenges: Enhancing security and the recycling option globally

▶ New capacities needed

- ◆ **Today's capacities: La Hague, Sellafield, Rokkasho Mura plants amount to 3000 tHM/year**
- ◆ **By 2030, 400 000 tHM will have been unloaded**
- ◆ **Thereafter about 12 000 tHM will be unloaded yearly**

▶ Optimization concept

- ◆ **Extension of commercial capacities? Existing capacities should be better used and preserved**
- ◆ **Development of new commercial capacities where basic technology already exists: US, China, Russia**

- ▶ Nuclear industry must not be seen as part of the problem, nor as a passive actor but as an active part of the solution
- ▶ Industry brings security of supply and services to all who wish to receive the benefits of the atom.
- ▶ Industry partners with government to implement the policies that benefit the safe, secure and responsible expansion of peaceful nuclear energy.

Scope for international initiative; involve governments, involve industry, involve utilities to promote and enforce a sustainable recycling policy