FUTURE FRONT END FUEL CYCLE?

Mining → $U_3O_8$

Conversion → $UF_6$

Enrichment

Fabrication

Deconversion

Reactor

$UO_2$

Metal

Triso

Salt

$U_3O_8$

$UO_2$

$U$ metal

Other Materials

Spent Fuel

Plutonium
ENRICHMENT ISSUES

- Low Enriched Uranium < 20 wt.% U-235

Needs
- Fleet considering up to 8 wt.% U-235 – higher burnup improved economics
- Many, but not all, advanced reactors and an advanced fuel design for LWRs need up to 20 wt.% U-235

Challenges
- Domestic enrichment only goes to 5%
- How to justify investment needed to go to 20%?
- Where to obtain HALEU in the interim?
### INDUSTRY HALEU NEEDS

- Values in MTU
- Current fleet uses about 2000 MTU/year
- Letter to Secretary Perry July 5, 2018
- Data from eight companies
- Not all ARs or advanced fuels need HALEU

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PATHWAYS TO DOMESTIC HALEU

- Surplus HEU not currently available
- Spent EBR-II fuel being processed
- Processing of spent ATR and navy fuel being pursued
  - Impurities in processed spent high enriched fuel
  - Affects reactor design and fuel fabrication
  - Cost and timing
- DOE enrichment demonstration with Centrus
- Potential URENCO USA investment
TRANSPORTATION ISSUES

Needs

• UF6 cylinders for commercial quantities up to 20%
  • 30B cylinder – 2200 kg UF6 – 5 wt.% limit
  • 8A cylinder – 115 kg UF6 – 12.5 wt.% limit
  • 5A cylinder – 25 kg UF6 – 100 wt.% limit
  • Version of 30B for 10% and 20% being designed

• Packages for different forms

Challenges

• Criticality design above 5 wt.%
• Impurities in processed spent fuel
CROSSCUTTING ISSUES

- Category III material is less than 10 wt.%
- Category II material is 10 to 20 wt.%
- Category I material is greater than 20 wt.%

Needs

- MC&A guidance for Category II material
- Security guidance for Category II material
QUESTIONS?
elr@nei.org

By Third Way, GENSLER