U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Where will we be in 2050?

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Overview

- Welcome
- Vision
- IAEA Conference Highlights
- Spent fuel in 2050
- Insights
- Bottom Line

Vision

- Essential in leadership
  - Communicate a better future
  - Inspire commitment and motivation
  - Leverage uncertainty
  - Assess the challenge and plan the journey
- Risky forecasts
  - "Energy too cheap to meter" *Lewis Strauss*
  - "200 NPPs by 2000"
- "If you don't know where you are going, any road will get you there." *Lewis Carroll*

IAEA Conference Highlights

http://www-ns.iaea.org/meetings/rw-summaries/vienna-2010-mngement-spent-fuel.htm

IAEA Conference

- Highlights
  - Impact of Yucca Mountain Withdrawal decision
  - Importance of access to fuel services, including spent fuel and disposal access
  - Value of a more flexible, realistic, resilient, integrated strategy
  - Opportunities for enhanced international collaboration and cooperation

Spent Fuel in 2050

- Number of nuclear power plants?
- Tons of spent fuel?
- Numbers of casks?
- Fuel burn-up levels?
- Reprocessed fuel?
- Operating geologic repositories?

Nuclear Power Plants

- World
  - Today – 438 operating plants
  - 2050 – 900?
- U.S.
  - Today – 104 operating plants
  - 2050 – 125?

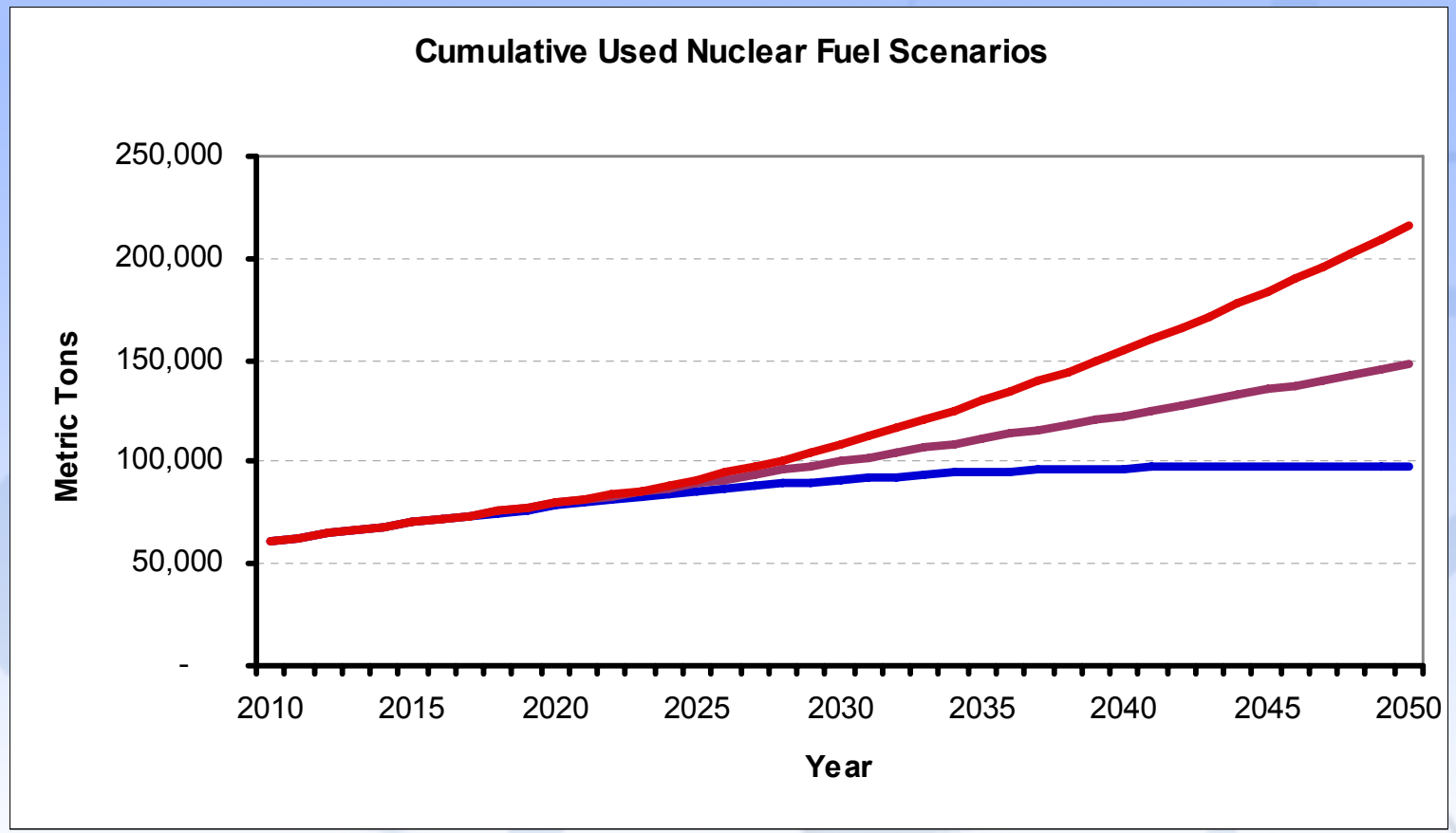
Source: Extrapolated from EIA, DOE/EIA-0383 (2010)

Tons of Spent Fuel

- World
  - Today
    - 325,000 tHM produced
    - 110,000 tHM reprocessed
  - 2050
    - > 800,000 tHM produced
    - > 300,000 tHM reprocessed

Source: Extrapolated from ARIUS (2010)

Growing Spent Fuel Inventory



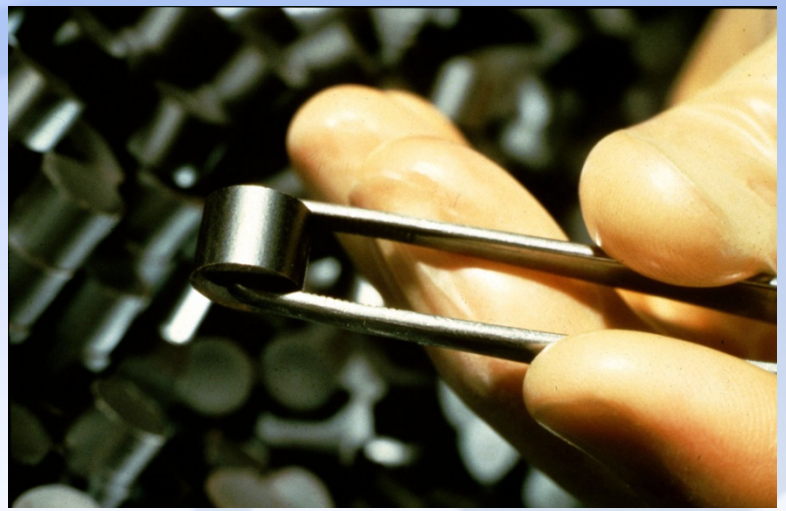
Reference: Crozat, March 2010

Numbers of Spent Fuel Casks

- U.S.
  - Today – 1200 casks
  - 2050 - > 2200 casks

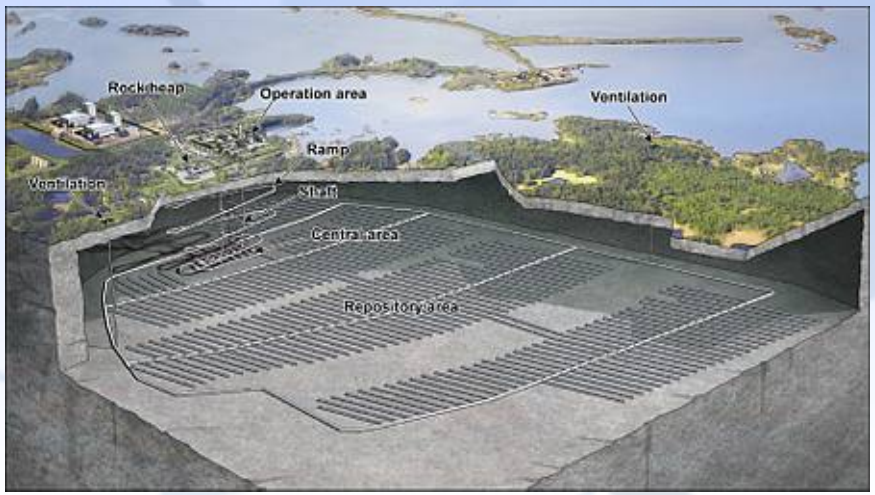
Burnup Levels

- Today ~ 40 GWD/tU
- 2050 – 80 GWD/tU ? (8% ^{235}U)



Geologic Repositories

- Today – U.S. – Waste Isolation Pilot Plant (only defense transuranic waste)
- 2050 – U.S. (WIPP) and several national repositories



Looking Back from 2050

- Fuel loaded in casks 70 years ago
- Fuel transported that is 80-90 years old
- Cooler and less radioactive, but more brittle?
- Optimum materials for baskets, seals, casks?
- Sufficient safeguards controls and measures when placed in the cask?

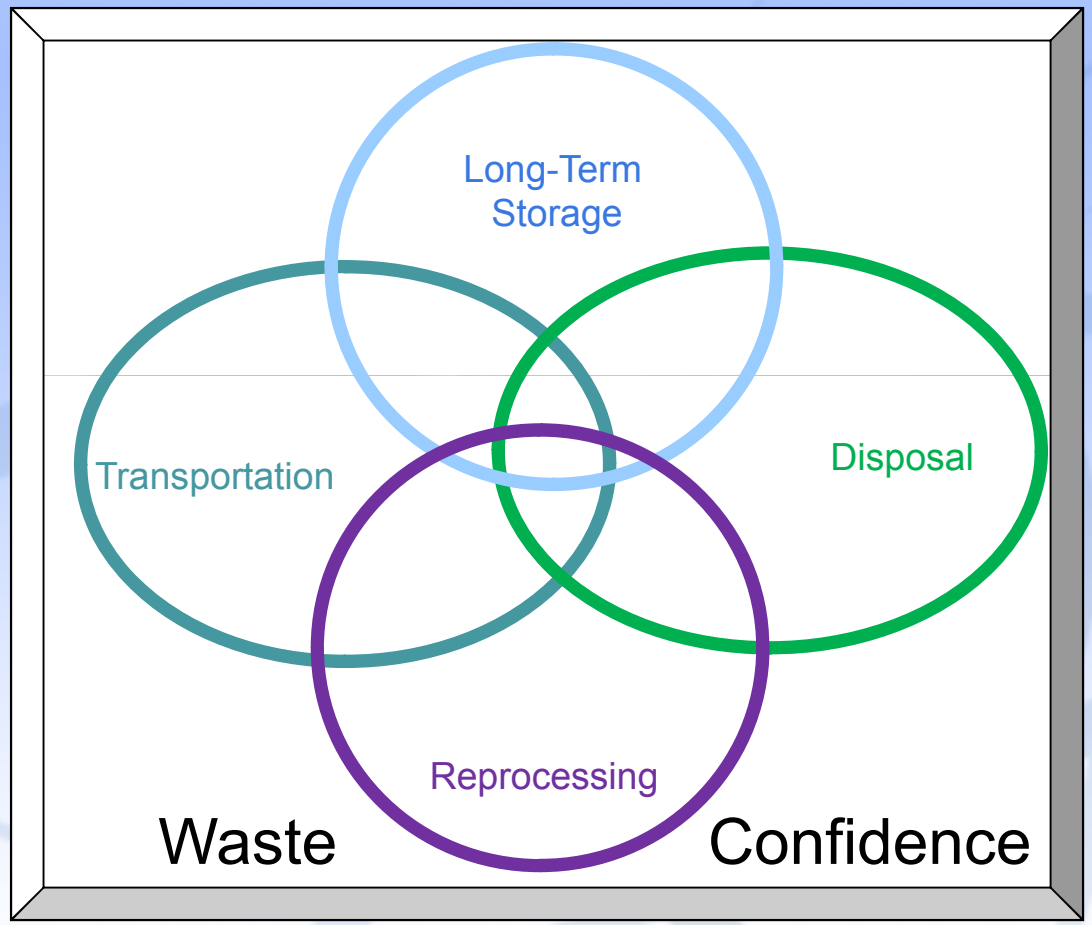
Insights from this Crystal Ball Exercise?

- **Safety and security remain paramount**
- **Environmental sustainability and energy security are important and complementary goals**
- **Spent fuel storage and transportation remain key elements of the fuel cycle**
- **An integrated approach today can enhance flexibility, efficiency, and coherency**

Bottom Line

- Given the importance of spent fuel and transportation, it is important that we "get it right"
- NRC's revisiting the paradigm and integrated spent fuel strategy provide ideal opportunities for stakeholder collaboration and engagement
- Help us help you by actively participating in this conference!

Thank You!


Long-Term
Storage
Transportation
Disposal
Reprocessing
Waste
Confidence