

# ***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

## International Conference on Management of Spent Fuel from Nuclear Power Reactors

31 May – 4 June 2010,  
VIC, Vienna, Austria



<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***

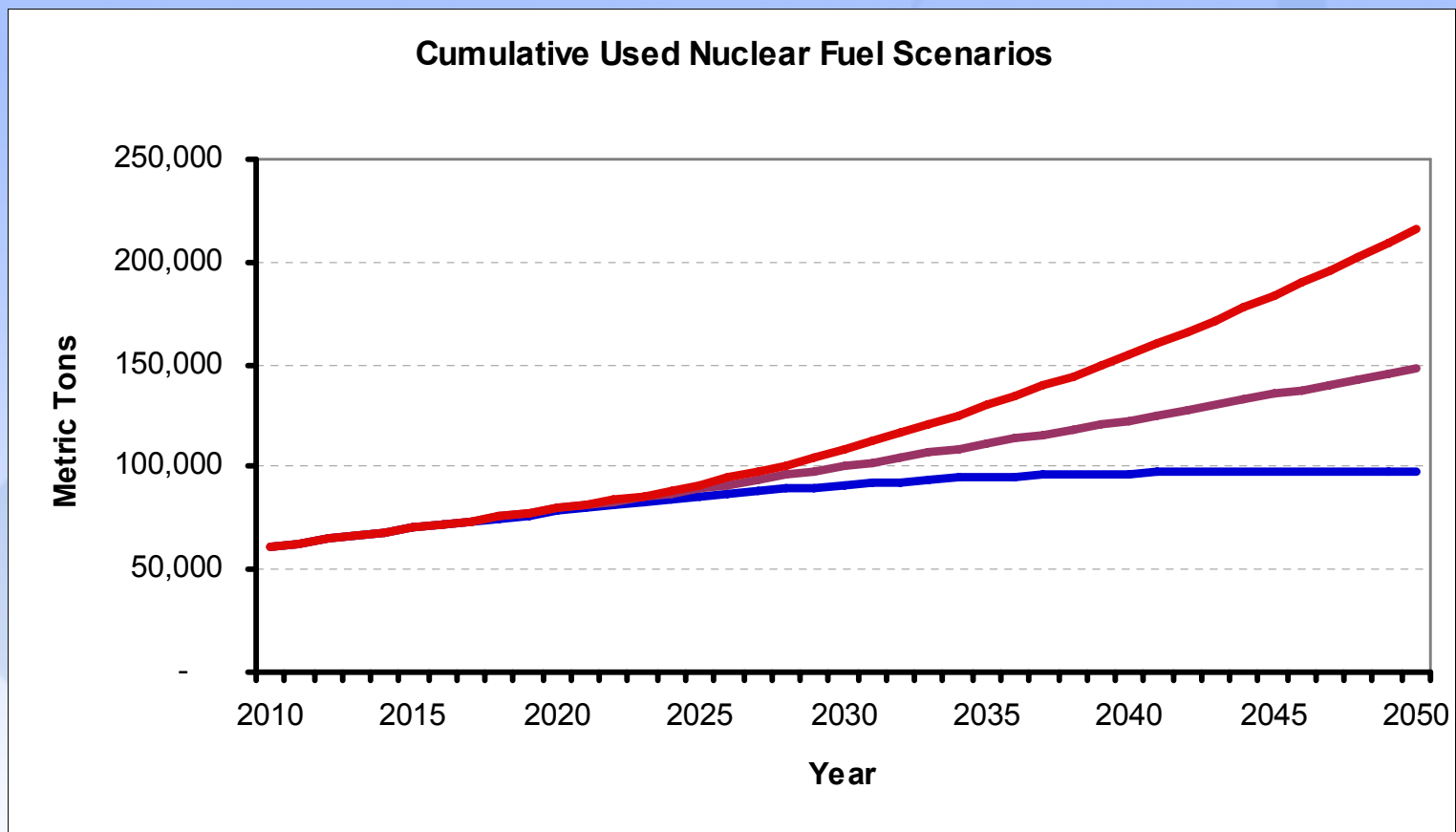
- **World**
  - **Today**
    - 325,000 tHM produced
    - 110,000 tHM reprocessed
  - **2050**
    - > 800,000 tHM produced
    - > 300,000 tHM reprocessed

Source: Extrapolated from ARIUS (2010)





# Growing Spent Fuel Inventory



Reference: Crozat, March 2010



# Numbers of Spent Fuel Casks

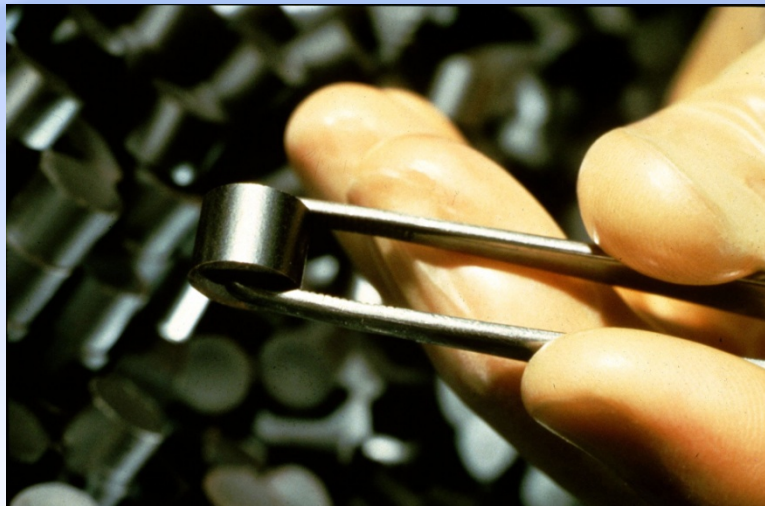
- **U.S.**
  - Today – 1200 casks
  - 2050 - > 2200 casks





# Burnup Levels

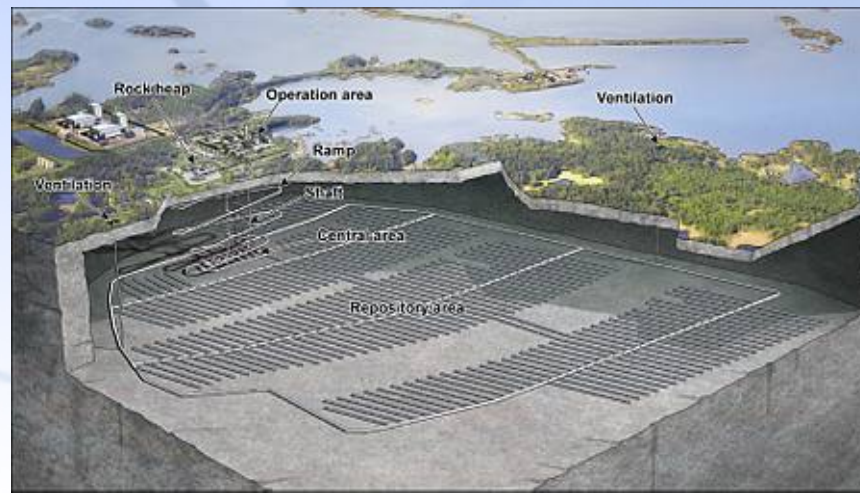
- Today ~ 40 GWD/tU
- 2050 – 80 GWD/tU ? (8%  $^{235}\text{U}$ )





# 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!*

