# THE AGE OF DECOMMISSIONING – IMPLICATIONS FOR HIGH-LEVEL RADIOACTIVE WASTE (HLRW)

## When Reactors Close:

**Reactors Close:**
- License expires
- NRC orders
- Uneconomic/ Utility decision
- Natural disaster
- Accident/Emergency/ Terrorism

**Spent Fuel:**
- In pool, 5yrs. normal; 7-10 for hi-burnup
- In dry casks; NRC says safe for ~100 years

**Indefinite Storage**

**Permanent Deep-Geologic Disposal**

## Industry/Government Response:

**Reactors Close:**
- Utilities seek bailouts
- Failing bailout, reactors close over course of several years
- Safe-store or Decon (dismantlement)

**Spent Fuel:**
- In pool, 5yrs. normal; 7-10 for hi-burnup
- In dry casks, no HOSS; NRC says safe for ~100 years

**Indefinite Storage**
- **HR 3053**: construct one or more **CIS/MRS** facilities "as soon as practicable" (probably not before 2024)
- Candidates: TX; NM; IL; NV
- **Need for "Make Whole"**

**Permanent Deep-Geologic Disposal:**
- HR 3053 – re-open Yucca Mt., NV
- President's BRC states not likely before 2048, if all goes well; more than 1 site already needed

## Environmental/Safe-Energy Alternative:

**Reactors Close:**
- Close reactors
- No bailouts
- **Enact "Just-Transitions" prior to closure**
- Safe-store or Decon (dismantlement)

**Spent Fuel:**
- Retain wet pools
- **Use HOSS onsite** with dry casks;
- NRC says safe for ~100 years

**Indefinite Storage**
- **No CIS** facilities; onsite storage using HOSS
- **Need for "Make Whole"**
- **Establish independent, science-based *disposal* site search**
- **Strengthen NRC decom regs**

**Permanent Deep-Geologic Disposal:**
- Find, characterize, license first facility for opening by 2048
- **"Make Whole"** in place until waste moved for disposal

# THE AGE OF DECOMMISSIONING – IMPLICATIONS FOR WASTE

## *EXPLANATION OF THE GRAPHIC:*

This graphic is a representation of the issues that are triggered by the decision to decommission a nuclear reactor. What becomes evident is the interconnectedness among the issues of reactor decommissioning, high-level radioactive waste (HLRW) storage, transport and ultimately permanent disposal. Decisions made within any of these issues boxes have implications and consequences in all the other areas.

The first line of this graphic identifies the generic issues that are triggered by a decision to decommission a reactor. It objectively articulates the potential causes and reasons for reactor decommissioning; and the issues needing to be addressed by this decision to close a reactor.

The second line of **blue boxes** is a representative summary of the positions of the nuclear industry on "what to do and how to do it" regarding reactor decommissioning and the handling of the legacy HLRW.

The third line of **green boxes** summarizes the positions developed by safe-energy, environmental organizations in 2002, with revisions in 2010 and 2016, regarding decommissioning and the handling of the legacy HLRW. The bold-faced items are those requiring Congressional and regulatory actions.

## *SOME DEFINITIONS and ACRONYMS:*

- ***"BRC" (President's "Blue Ribbon Commission"):*** a panel commissioned by President Obama after the defunding of the Yucca Mt. Project, in part charged with making recommendations for a comprehensive national plan for HLRW storage, transport and disposal.
- ***Centralized Interim Storage (CIS):*** *temporary* dry cask *storage* at an away-from-reactor site pending *disposal* at a permanent disposal facility. Will require two rounds of transport, and eventual site clean-up/decommissioning.
- ***Decommissioning:*** the safe removal of a facility from service and reduction of residual radioactivity to a level that permits termination of the NRC license, and either: 1.) release the property for unrestricted use, and terminate the license, or 2.) release the property under restricted conditions, and terminate the license. Decommissioning must be completed within 60 years of the plant ceasing operations.
- ***Disposal: permanent*** sequestering of HLRW from the environment, currently thought of as ***non-***retrievable.
- ***Hardened On-Site Storage (HOSS):*** an enhanced use of dry-cask storage canisters designed to increase security and resistance to potential damage to the cry-casks from natural disasters and human-induced accidents/disasters/attacks.
- ***"High-burnup" (spent fuel):*** reactor fuel which is allowed to remain in the reactors for an extended operational cycle. It becomes both thermally and radioactively "hotter", with significant changes to the proportions of the radioactive fission products produced as a result of the extended use. It also requires more stringent designs for storage and transport dry-casks than "low-"burnup spent fuel.
- ***High-Level Radioactive Waste (HLRW):*** the highly radioactive materials produced as a byproduct of the reactions that occur inside nuclear reactors. High-level wastes take one of two forms: spent (used) reactor fuel when it is accepted for disposal; and waste materials remaining after spent fuel is reprocessed.
- ***"Just-Transitions":*** pre- and post-reactor closure planning efforts to protect a local community's tax base, economic infrastructure and jobs base/market, through establishing a closure fund before reactors close, and other economic incentives and jobs training/transition programs after a reactor closes.
- ***"Make Whole":*** compensation for communities that have become *de facto* HLRW storage sites due to reactor closures for the negative economic impacts due to holding that waste.
- ***Safe-Store:*** often considered "deferred dismantling," a nuclear facility is maintained and monitored in a condition that allows the radioactivity to decay; afterwards, the plant is dismantled and the property decontaminated.
- ***Storage:*** the ***temporary*** sequestering of HLRW from the environment, currently employing two acceptable storage methods for spent fuel after it is removed from the reactor core: 1.) ***Spent Fuel Pools*** - specially designed water-filled pools at individual reactor sites around the country; 2.) ***Dry Cask Canister*** Storage – air convection-cooled canisters for HLRW storage either at or away from reactor sites.