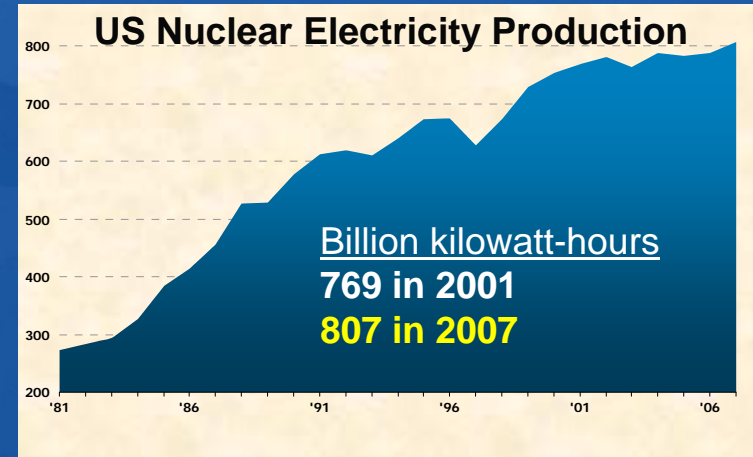


Integrated Used Fuel Management *Industry Perspectives*

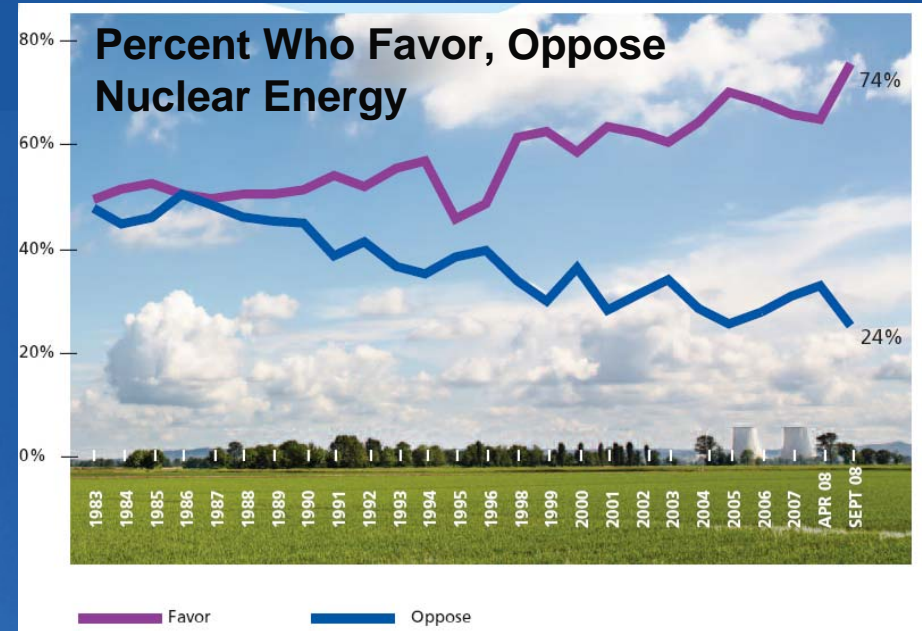
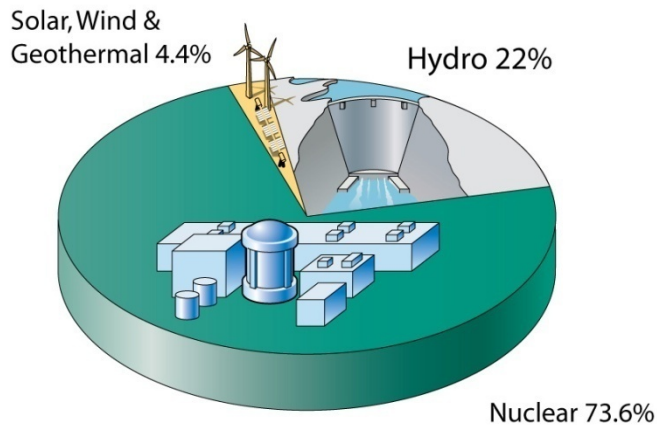
**Rod McCullum, Nuclear Energy Institute
Nuclear Waste Technical Review Board
Las Vegas, Nevada
June 11, 2009**

Nuclear Energy

- Driven by strong public and policy-maker support, nuclear energy is poised for significant growth



Sources of Emission-Free Electricity 2007



Potential New Nuclear Plants – 17 license applications submitted for 26 reactors, a total of 32 new reactors are under consideration



Integrated Used Fuel Management

- **Three-pronged approach to used fuel management**
 - **Interim storage at reactor sites and centralized location(s)**
 - **Recycling**
 - **consideration of present day reprocessing technologies**
 - **development of advanced used fuel reprocessing technologies**
 - **new fuel types and improved waste forms**
 - **new reactor designs**
 - **Permanent disposal facility**
 - **Yucca Mountain site judged suitable by Congress in 2002**
 - **Yucca Mountain licensing process underway**
- **Divided into short, medium, and long term goals**
 - **NRC's proposed waste confidence rulemaking and DOE contracts for new plant used fuel provide sound foundation on which we can pursue these goals**

Current Policy Framework

■ Obama Administration

- Yucca not an option
- Yucca licensing process to continue while alternative plan developed
- Blue Ribbon Panel to evaluate alternatives
- R&D should be conducted into advanced recycling technologies

■ Industry Position

- Yucca licensing process should continue
- Nuclear Waste Fee should be reduced to only that needed to cover current expenditures
- Industry endorses Blue Ribbon Panel
- Centralized Interim Storage should be pursued by private sector with DOE as a customer
- Both advanced and present day recycling should be considered, regulatory structure must be developed now

Used Nuclear Fuel Storage

- **12/08 used fuel inventory***

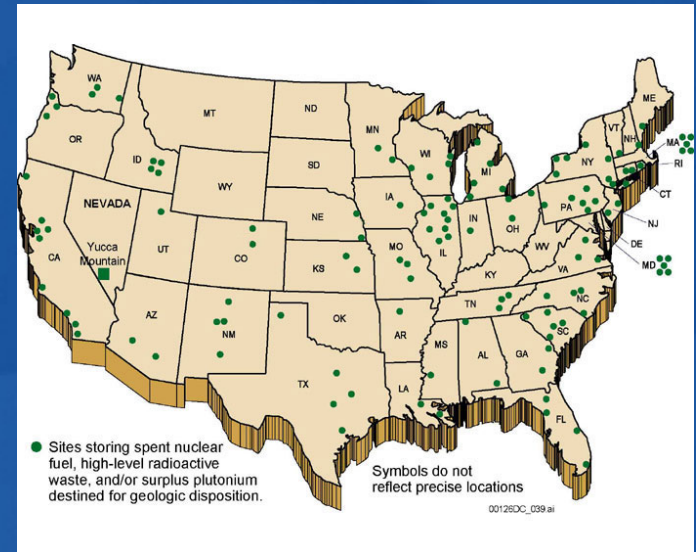
- Approximately 60,059 MTHM

- **12/08 dry storage inventory**

- 40,280 assemblies; 12,594 MTHM
- 1073 casks/canisters loaded
- At 44 plant sites in 31 states

- **Future dry storage by 2020**

- Estimating 30,110 MTHM
- 2,231 casks/canisters loaded (no TADs), or
- 2,894 casks/canisters loaded (switch to TADs in '13)
- At 73 plant sites in 34 states



Also in storage: GTCC –
between 10,000 and 30,000
lbs. per decommissioned plant

*Does not include commercial fuel at Morris, Fort St Vrain, or Idaho Nat'l Lab (313 MTHM)

Commercial Used Fuel Inventory Projections

- **The tables that follow represent a simplified model of projected inventories through 2040**
- **Simplifying Assumptions**
 - All current plants operate for 60 years
 - New reactors begin coming on line in 2016 at a rate of 4 per year, 2 per site, and discharge used fuel at 22MTHM/yr on 2 yr cycles. 3 green field new reactor sites are developed, rest are at existing sites
 - New reactors operate 15 years before needing dry storage
 - TAD scenarios assume all fuel loaded into TADs from 2013 on
 - DPC scenarios assume all DPCs loaded at today's highest capacity from 2013 on
 - No DOE waste acceptance prior to 2040
 - Data through 2008 are based on information from plant owners, beyond 2008 new dry storage is assumed as a percentage of used fuel discharges as follows
 - 50% through 2010, 60% 2011-15, 75% 2016-20, 90% 2021-25, 100% after 2026
- **Projections developed by ACI Nuclear Energy Solutions**

Dry Storage System Trends

Dry Storage System	Capacity per cask # of assemblies		Capacity per cask MTHM	
	BWR	PWR	BWR	PWR
Typical pre-2000 system	52	24	9.4	10.8
Typical present day system	65 (avg)	32	11.7	14.4
Future systems (max. currently licensed)	87	37	16.7	15.7
TADs	44	21	7.9	9.5

Used Fuel Inventory Projections

Scenario 1 – Current Plants/TADs in '13

Year	MTHM Total	MTHM Pools	MTHM Dry Storage	Dry Cask Systems							
				Total	Non-trans bare fuel	Non-trans, canister	Trans bare fuel	Trans bare fuel, trans license pending	DPCs	DPCs trans license pending	TADs
2008	60,059	47,465	12,594	1,073	29	199	41	87	571	146	0
2009	62,432	48,651	13,781	1,164	29	204	44	88	617	182	0
2010	64,461	49,666	14,795	1,242	29	209	47	89	651	217	0
2020	87,193	57,083	30,110	2,894	29	219	144	0	1069	0	1433
2030	110,383	58,207	52,176	5,431	29	219	144	0	1069	0	3970
2040	130,013	58,207	71,806	7,687	29	219	144	0	1069	0	6226

Used Fuel Inventory Projections

Scenario 2 – Current + New Plants/ TADs in '13

Year	MTHM Total	MTHM Pools	MTHM Dry Storage	Dry Cask Systems							
				Total	Non-trans, bare fuel	Non-trans, canister	Trans bare fuel	Trans bare fuel, trans license pending	DPCs	DPCs trans license pending	TADs
2008	60,059	47,465	12594	1,073	29	199	41	87	571	146	0
2009	62,432	48,651	13,781	1,164	29	204	44	88	617	182	0
2010	64,461	49,666	14,795	1,242	29	209	47	89	651	217	0
2020	87,721	57,611	30,110	2,894	29	219	144	0	1069	0	1433
2030	117,071	64,895	52,176	5,431	29	219	144	0	1069	0	3970
2040	143,741	65,599	78,142	8,415	29	219	144	0	1069	0	6954

Used Fuel Inventory Projections

Scenario 3 – Current + New Plants w/o TADs

Year	MTHM Total	MTHM Pools	MTHM Dry Storage	Dry Cask Systems						
				Total	Non-trans, bare fuel	Non-trans, canister	Trans bare fuel	Trans bare fuel, trans license pending	DPCs	DPCs trans license pending
2008	60,059	47,465	12,594	1,073	29	199	41	87	571	146
2009	62,432	48,651	13,781	1,164	29	204	44	88	617	182
2010	64,461	49,666	14,795	1,242	29	209	47	89	651	217
2020	87,721	57,611	30,110	2,231	29	259	176	0	1,767	0
2030	117,071	64,895	52,176	3,593	29	309	216	0	3,036	0
2040	143,741	65,599	78,142	5,196	29	356	252	0	4,759	0

Used Fuel Locations

	Shutdown Plants*				Operating Plants			
	Pool Storage		Dry Cask Storage		Pool Storage		Dry Cask Storage	
	Sites	States	Sites	States	Sites	States	Sites	States
1980	1	1	0	0	46	24	0	0
1990	4	3	0	0	69	33	3	2
2000	9	8	1	1	65	31	14	11
2008	3	3	7	7	65	31	37	27
2009	2	2	8	7	65	31	41	27
2010	1	1	9	8	65	31	45	27
2020	0	0	10	9	68	31	63	30
2030	4	4	10	9	64	31	59	30
2040	22	17	36	24	34	21	34	21

* Assumes all plants operate for 60 years

Ramifications of significant repository delay

- **Delay in DOE acceptance of used fuel is a commercial issue – albeit an important one**
- **Delay in DOE acceptance is also an enormous liability for the US taxpayers – we must get it right this time**
- **Outcome of Blue Ribbon Commission will be key to future success – we need an implementable and sustainable plan**
- **Industry is confident that existing dry cask storage technology, coupled with aging management programs already in place, is sufficient to sustain safe dry cask storage for at least 100 years in support of both existing and new nuclear plants**

Blue Ribbon Panel – Industry Vision

- **Needed to produce roadmap for sustainable long-term federal program to meet legal and contractual obligation to remove used fuel from reactor sites**
- **Independent, credible, and unbiased, with technical, organizational, and policy expertise**
- **Lay out a well defined path with firm milestones for recycling decisions**
- **Address eventual geologic disposal**
 - Learn from the Yucca Process
- **Provide actionable recommendations for DOE Energy Innovation Hubs**
 - Extreme Materials
 - Modeling & Simulation

Centralized Interim Storage

- **Efforts to move forward should not wait for Blue Ribbon Commission deliberations to be complete**
- **Near-term consolidation of used fuel (Interim Storage)**
 - **Volunteer sites**
 - **Private sector initiative with DOE as a customer**
 - **NRC Licensed**

Conclusion

- **The nuclear industry is pursuing an integrated approach to used fuel management**
- **Used fuel inventories in storage will continue to grow**
- **Dry Cask storage can safely accommodate this growth for a century or more**
- **The nation wants and needs more nuclear energy**
- **An implementable and sustainable federal used nuclear fuel management plan must be developed**
 - **Plan must address all elements of integrated approach – centralized interim storage, recycling, and disposal**