Used Nuclear Fuel Management

Midwestern Radioactive Materials Transportation Committee
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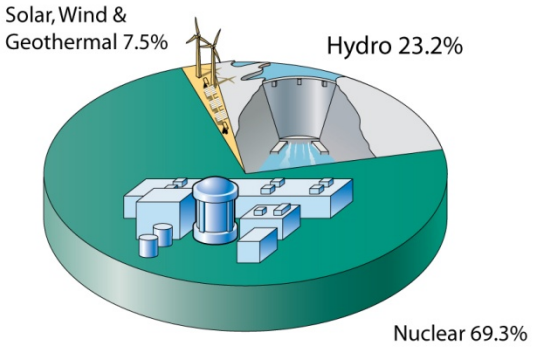
NUCLEAR ENERGY INSTITUTE

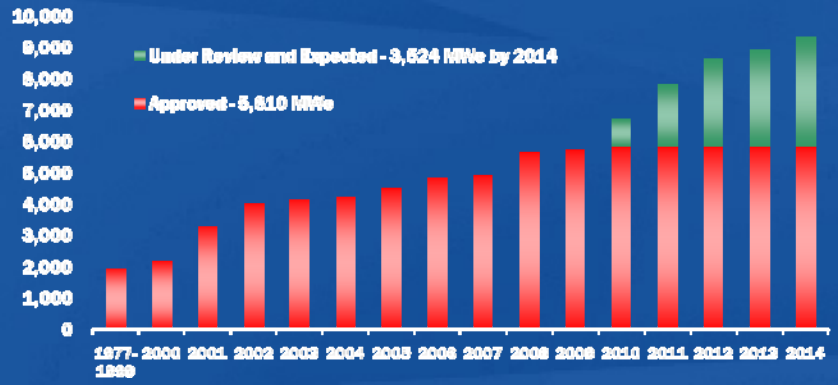
Nuclear Energy

- **Sustained exemplary levels of safety and operational performance provide sound basis for confidence in nuclear energy**
- **Public support for nuclear energy is strong and growing**
- **New Plant Development is proceeding in step with economic conditions**
- **Industry success is undergirded by considerable experience with the safe management of used nuclear fuel**

Sources of Emission-Free Electricity 2009

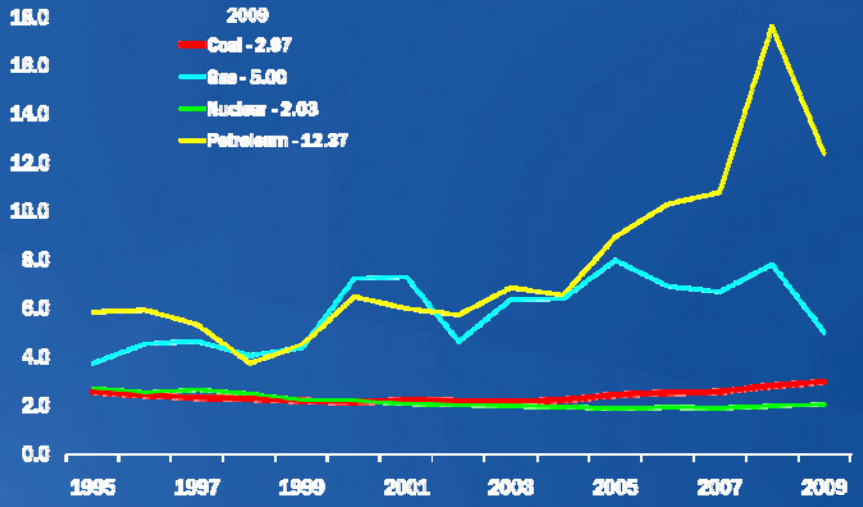


Cumulative Capacity Additions at U.S. Nuclear Facilities
1977-2014



U.S. Nuclear Industry Capacity Factors
1971 – 2009, Percent

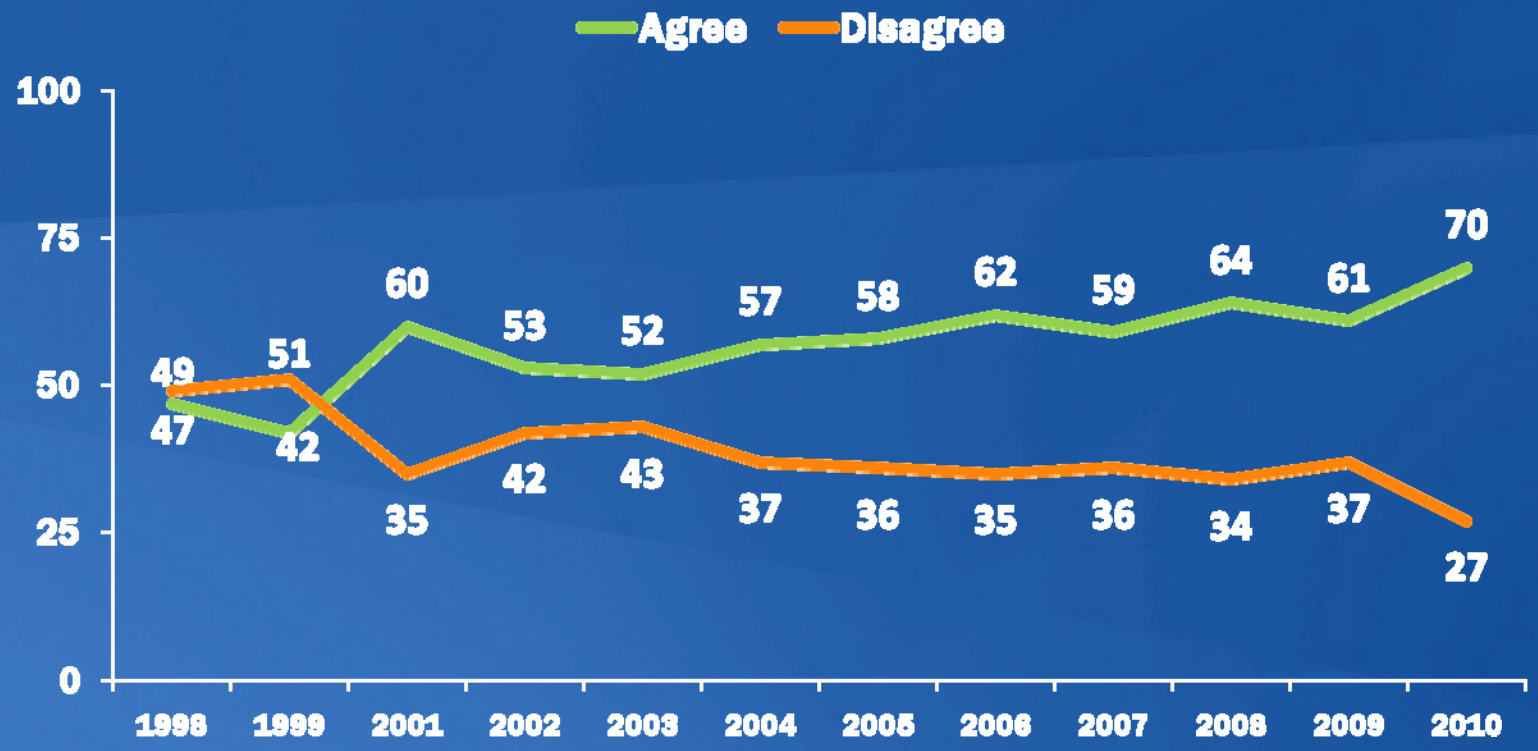
U.S. Electricity Production Costs
1995-2009, *In 2009 cents per kilowatt-hour*



In 2009, nation's 104 nuclear reactors produced 800 Billion kW-hrs of electricity – enough to power 80 million homes

U.S. Public Opinion 1998-2010: Agreement with Definitely Building More Nuclear Power Plants

Percentages



Bisconti Research Inc. survey of 1,000 U.S. adults; annual averages; margin of error +/- 3 percentage points

New Nuclear Plant Status

Company	Location (site)	Design	# of Units	Early Site Permit (ESP)	Construction / Operating License Submittal	Docket Date	Number of Units Under Active NRC Review
Alternate Energy Holdings / Unistar	Payette County, ID	-	1	-	4Q 2011		
Amarillo Power / Unistar	Vicinity of Amarillo, TX	EPR	1	-	TBD		
Blue Castle Holdings, LLC	Green River, UT	-	-	-	-		
Constellation / UniStar	Calvert County, MD (Calvert Cliffs)	EPR	1	-	7/13/07 & 3/14/08	1/25/08 & 6/3/08	1
Constellation / UniStar	Oswego County, NY (Nine Mile Point)	EPR	1	-	9/30/08	12/12/08	
Detroit Edison	Fermi, MI (Fermi)	ESBWR	1	-	9/18/08	11/25/08	1
Dominion	Louisa County, VA (North Anna)	APWR	1	Approved November 2007	11/27/07	1/28/08	1
Duke	Cherokee County, SC (William States Lee)	AP1000	2	-	12/13/07	2/25/08	2
Entergy	West Felciana Parish, LA (River Bend)	NYD*	-	-	9/25/08	12/4/08	
Entergy (NuStart)	Claiborne County, MS (Grand Gulf)	NYD*	-	Approved April 2007	2/27/08	4/17/08	
Exelon	Clinton, IL (Clinton)	NYD*	-	Approved March 2007	NYD*		
Exelon	Victoria County, TX	NYD*	-	Submitted March 2010	NYD*		
Florida Power & Light	Miami-Dade County, FL (Turkey Point)	AP1000	2		6/30/09	9/8/09	2
Luminant	Glen Rose, TX (Comanche Peak)	APWR	2	-	9/19/08	12/2/08	2
NRG Energy / STPNOC	Matagorda County, TX (South Texas Project)	ABWR	2	-	9/20/07	11/29/07	2
PPL Corp. / Unistar	Luzerne County, PA (Bell Bend)	EPR	1	-	10/10/08	12/19/08	1
Progress Energy	Wake County, NC (Harris)	AP1000	2	-	2/19/08	4/17/08	2
Progress Energy	Levy County, FL	AP1000	2	-	7/30/08	10/6/08	2
PSEG	Lower Alloways Creek, NJ (Salem/Hope Creek)	-	-	Submitted May 2010	NYD*		
South Carolina Electric & Gas	Fairfield County, SC (V.C. Summer)	AP1000	2	-	3/27/08	7/31/08	2
Southern Company	Burke County, GA (Vogtle)	AP1000	2	Approved August 2009	3/31/08	5/30/08	2
Southern Company	TBD	NYD*	NYD*	NYD*	NYD*		
Southern Ohio Clean Energy Park Alliance	Piketon, OH	-	-	Under consideration	Under consideration		
TVA (NuStart)	Jackson County, AL (Bellefonte)	AP1000	2	-	10/30/07	1/18/08	2

* Not Yet Determined

Updated: 5/10

NRC New Nuclear Plant Review Schedules:

http://www.nrc.gov/reactors/new-reactors/new-licensing-files/consolidated-col-schedule.pdf

http://www.nrc.gov/reactors/new-reactors/col.html

Small Reactors

- **Interest in small innovative reactors is growing**
  - **Designs vary between 10 and 350 MWe**
  - **Modular Construction**
  - **Factory Built**
  - **Potential for increased manufacturing efficiency to reduce cost and construction time**
- **Seven vendors targeting Design Certification applications to NRC in 2012**
- **Industry working to address regulatory framework needs in support of small reactors**
- **Small reactors have the potential to compliment the development of traditional large reactors**

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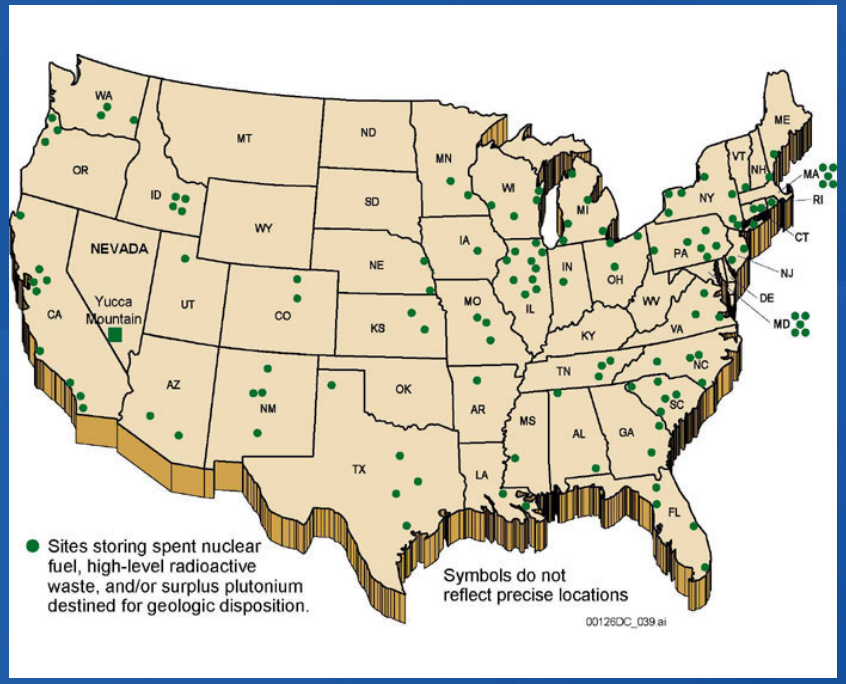
Used Nuclear Fuel

- **Used fuel inventory thru 2009**
  - Approximately 62,500 MTU
  - Increases 2 - 2.4k MTU annually
- **ISFSI storage thru 2009**
  - 14,000 MTU
  - Over 1200 casks/canisters loaded
  - 49 Operating ISFSIs
- **ISFSI inventory by 2020**
  - Estimating 26,200 MTU
  - 2,600 casks/canisters loaded
  - At 75 ISFSIs
  - Fuel from 118 reactors
  - Harris – lone plant site w/o ISFSI
- **ISFSI inventory by 2040**
  - Likely to exceed 70,000 MTU



Waste Confidence

- **Commission approved revised Waste Confidence Rule on September 15, 2010**
- **Rule is an explicit endorsement of industry's safe and secure management of used nuclear fuel at 104 reactors across the country**
  - **Concluded that used nuclear fuel can be safely stored for at least 60 years beyond the licensed life of any reactor (120 years total), without significant environmental impacts, and that sufficient repository capacity will be available "when necessary."**
  - **Reaffirmed that used fuel management is most appropriately addressed in a generic context, and not subject to challenge in individual licensing proceedings on new reactors or license extensions for existing nuclear plants**
  - **Instructed staff to address impacts of storage beyond a 120 year time frame with the ultimate timeframe, which could be two or three hundred years or more**

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Integrated Used Fuel Management

- **Industry supports a three-pronged approach to used fuel management**
  - **Interim storage at reactor sites and centralized location(s)**
  - **Research, Development & Demonstration of advanced fuel cycles and recycling technologies with deployment at the right time**
  - **Permanent disposal facility**
- **Federal approach to date has been inconsistent and has lacked policy and management accountability, impeding ability to pursue needed facilities**
- **Blue Ribbon Panel considering options**

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Centralized Interim Storage

- **Can provide a safe, near-term solution by consolidating used fuel from shutdown commercial reactor sites and storing used nuclear fuel away from operating sites.**
  - **Should be licensed by the Nuclear Regulatory Commission, take advantage of past projects, as warranted, and be deployed in a region where it has broad based public and political support**
  - **Should be used by the federal government to meet its statutory and contractual obligation to accept and remove used nuclear fuel from reactor sites while reducing or eliminating the liability for taxpayers.**
  - **Could be a complementary, near-term element of disposal, recycling and advanced fuel cycle technologies.**
  - **Should be developed in a way that increases public confidence in used fuel management**

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Recycling

- **Recycling enhances the sustainability of nuclear energy in the long-term**
- **Recycling technology should be deployed at the appropriate time**
  - **Technology decisions must consider market realities**
  - **Regulatory uncertainty affects designs and market conditions**
- **Regulatory infrastructure to support recycling is needed**
  - **Must be available to inform future decision-making**
  - **Regulatory framework should be built on what we have learned from U.S. and international experience**
  - **The framework should be structured so that it can evolve to accommodate advanced technologies**
  - **Industry is actively engaged with NRC in support of this objective**

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Disposal

- **Geologic disposal is required for the multiple waste forms — including defense material — that already exist and may not be suitable for recycling or other advanced fuel cycle technologies.**
- **Future disposal efforts should endeavor to build broad based public support (local, state, and national) by considering a step-wise approach to demonstrate the viability of final disposal and cultivate public confidence.**
- **The licensing process for Yucca Mountain should be completed, even if the facility is not ultimately used, to demonstrate the regulatory process and provide lessons learned for future repository programs.**

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Yucca Mountain 2010

What a long strange trip its been

- **February:** DOE budget request zeros out funding for the project
- **March:** DOE files motion with NRC Licensing Board (ASLB) to withdraw License Application (LA)
- **March through June:** Multiple Stakeholders oppose motion to withdraw before ASLB and in U.S. Court of Appeals
- **June:** ASLB rules DOE ***does not*** have legal authority to withdraw LA
- **June - December:** NRC Commissioners consider review of ASLB ruling, but have yet to issue a decision while courts await final agency action
- **October:** DOE Office of Civilian Radioactive Waste Management "ceases to exist", all project records turned over to DOE Office of Legacy Management
- **October:** NRC initiates "orderly closeout" of LA review

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Governance

- **Nearly 30 years experience with DOE management of used fuel indicates the need for change**
  - **Excessive exposure to political intervention allowed for termination of Yucca Mountain**
- **Transformative change needed – e.g. Fed-Corp**
  - **Effective and stable leadership to assure sustained success**
  - **Access to funding sufficient to support sustained long-term commitment**
  - **Accountability to industry, ratepayers, and public**
  - **Operate like a private company, not DOE – driven by sound business practices, not political whim**
- **Industry supports recent Voinovich (Senate) and Upton (House) legislative proposals**

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Conclusion

- Multiple options exist for the safe and effective long-term management of used nuclear fuel
- Dry cask storage will continue to be deployed safely and securely
- A fully integrated suite of options should be pursued
  - Centralized Interim Storage
  - Recycling RD&D with deployment at the right time
  - Disposal
    - Blue Ribbon Commission will provide framework
- An independent Fed-Corp should be established
- If Centralized Interim Storage is successful – transport opportunities may occur sooner than you might think

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