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CCST Nuclear Presentations 05 24 06

Attached find a set of California Council on Science and Technology (CCST) presentations from almost a decade ago. The conclusions of the presenters have been validated in the intervening years.

Additional submitted attachment is included below.

http://ccst.us/meetings/speakers/presentations/2006/May/052406Keuter.ppt

The Promising Potential of Nuclear Power

Dan R. Keuter

Vice President, Entergy Nuclear Business Development

California Council on Science & Technology

Sacramento, May 24, 2006

Entergy

Entergy's Nuclear Fleet

EN South (5)

Headquarters in Jackson, MS

ANO

Unit 1 836 MW B&W PWR
Unit 2 988 MW CE PWR

River Bend

967 MW GE BWR

Grand Gulf

1266 MW GE BWR

Waterford 3

1152 MW CE PWR

EN Northeast (6)

Headquarters in White Plains, NY

Indian Point

Unit 2 974 MW W PWR
Unit 3 965 MW W PWR

FitzPatrick

820 MW GE BWR

Pilgrim

665 MW GE BWR

Vermont Yankee

506 MW GE BWR

Cooper

764 MW GE BWR

Total Nuclear Capacity is 9903 MWe

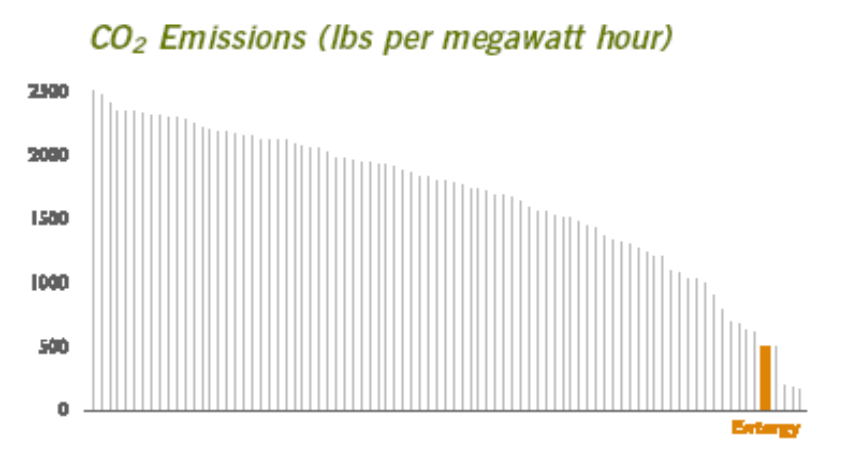
GO NUCLEAR!

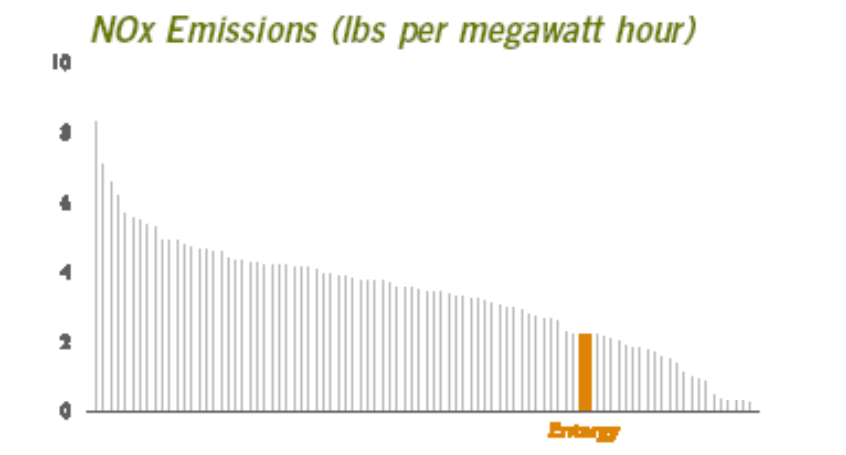
Because you **care** about the **Air**

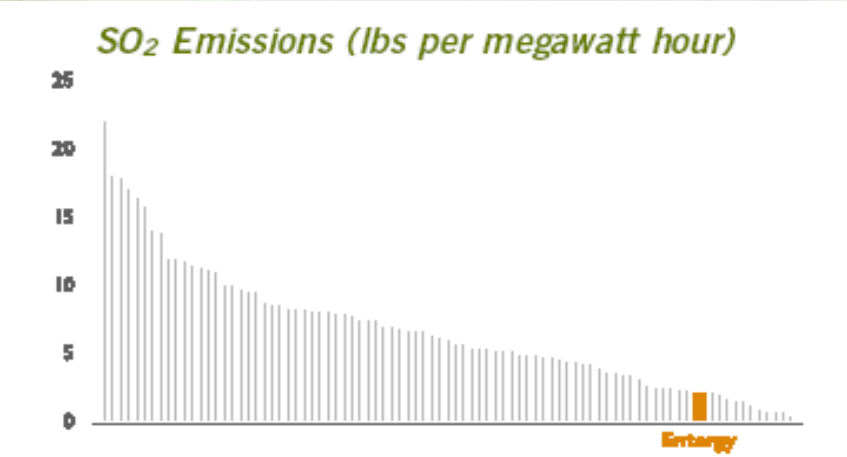
Entergy

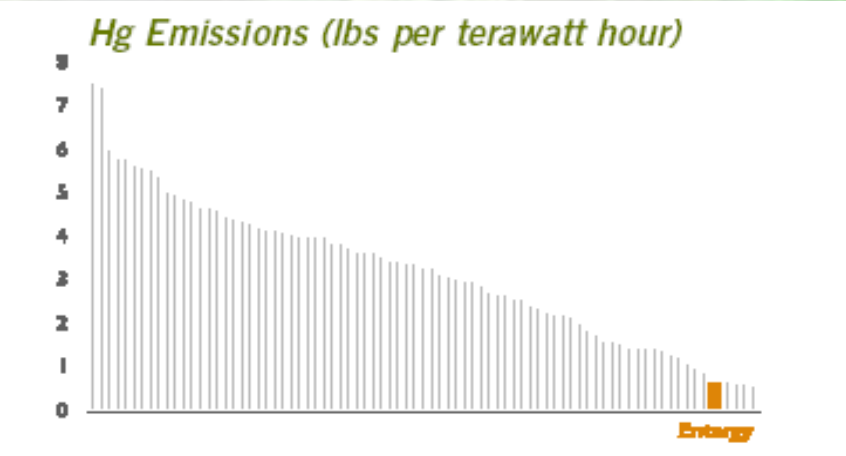
Entergy: One of the cleanest

Air Emissions Comparison, 100 largest U.S. utilities









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Entergy does not have a crystal ball

But we do know …

- **World needs more energy**
- **Finite supply of oil and gas**
- **Stricter environmental regulations**
- **America needs energy security, energy diversity**

Future of nuclear looks more promising than ever

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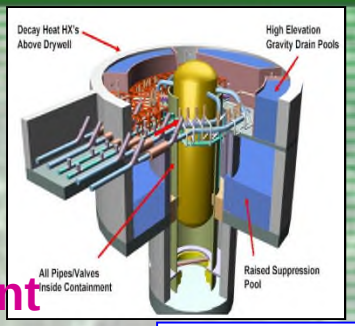
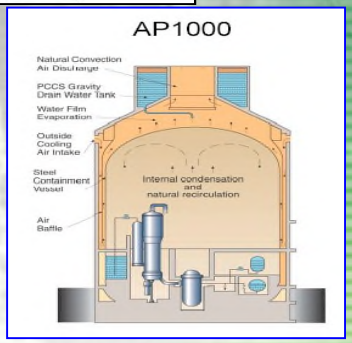
Entergy

Entergy's 2-track approach



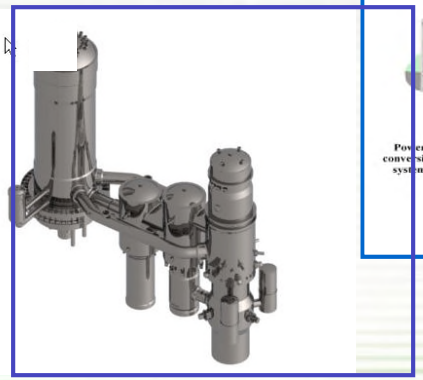
TRACK 1 - Advanced Light Water Reactor

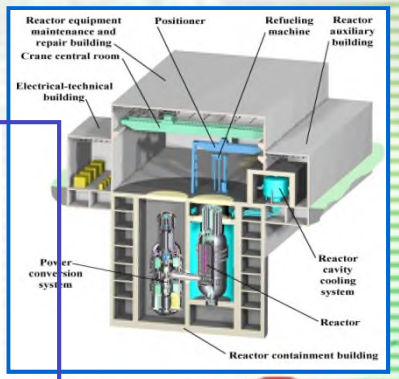
- Maturity of Technology – Permits earliest deployment
- Reduces Production of Greenhouse Gases
- Fuel Diversity and Reduces Foreign Reliance Sources
- Super Safe Economical New Designs



TRACK 2 – High Temperature Gas Reactor

- High Efficiency Brayton Cycle
- Suited for Economical Hydrogen Production
- Japan's HTTR ⇒ 30 MW
- China's HTR ⇒ 10 MW





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What is Needed to Build New Nuclear Plants?

National Energy Policy
- NP-2010
- Construction Incentives
- Environmental Policy
- Yucca Mtn / Price Anderson

10CFR52
- ESP
- Design Cert
- COL
- ITAAC

National Energy Policy

Regulatory Certainty

Risk Mitigation & Financing

Administration & Congress

NRC

DOE

Nuclear Renaissance

Reactor Vendors

Energy Companies

Safe / Economical Designs

Adequate Plant Financials

Gov / Industry Consortium

First New Plants

Mitigating:
- First-of-Kind Cost
- High Capital Costs
- Reg / Political Risk
- Earnings Dilution

ALWR
- AP-1000
- ESBWR
- EPR

Validation
- Design
- Construction
- Reg Process
- Operation
- Financials

Plant Economics
- Gas Price
- Mkt. Price
- Environmental Value
- Transmission
- Financing

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The new NRC licensing process

30 - 40 Months

Early Site Permit (ESP)

27 - 30 Months with ESP and DC

Combined License Application

Combined License Review, Hearing, and Decision

Verification of Regulations with ITAAC

Reactor Operation Decision

Design Certification

33 - 60 Months with ESP but no DC

42 - 60 Months

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The federal incentives

- **Risk insurance**
  - 100% for delays of first two plants up to $500M each
  - 50% for delays for next four plants up to $250M
  - No cost to government if licensing process works
- **80% loan guarantees (like FHA loan)**
  - No cost to government if new plant operates
- **Production tax credit of $18/MWH**
  - For first 6,000 MWs of new plants
  - For eight years only, $125M cap per plant
  - Same as windmills have had since 1992

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Why The Nuclear Option?

Economic$ - A look at an MIT study

New Nuclear (LWR, $/MWH)		$67
- Reduce Construction Cost, $2,000 to $1500/KW	- $12	55
- Reduce Construction Time, 5 to 4 Years	-2	53
- Reduce O&M plus Fuel, $15 to 13/MWH	-2	51
- Reduce Cost of Capital, 15% to 12%	-9	42
- Increase Capacity Factor (90%)	-2	40

Carbon Tax Effect ($/MWH)	$0/tn	$50/tn	$100/tn	$200/tn
Pulverized Coal	42	54	66	90
CCGT (Low Gas $3.77/MCF)	38	43	48	59
CCGT (Moderate Gas $4.42/MCF)	41	47	52	62
CCGT (High Gas $6.72/MCF)	56	61	67	77

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Licensing new nuclear units

	2005	2006	2007	2008	2009	2010	2011	2012	Units	MWs
AP1000 Program Review										
Design Cert										
Duke - Cherokee (SC)					Hearing				2	2234
ESP					ESP					
ESP					ESP				2	2234
Progress Energy - Harris (NC)						Hearing			2	2234
NuStart – Bellefonte (AL)						Hearing			2	2234
Progress Energy - TBD (FL)						Hearing			2	2234
South Carolina E&G-Summer						Hearing				
ESP			ESP						2	2234
Southern – Vogtle (GA)						Hearing				
ESBWR Program Review										
Design Certification			Design Certification						1	1520
ESP			ESP		Dominion - North Anna (VA)	Hearing			1	1520
ESP			ESP		NuStart – Grand Gulf (MS)	Hearing			1	1520
					Entergy – River Bend (LA)	Hearing				
EPR Program Review					Design Certification					
					Constellation-Calvert Cliffs (MD)	Hearing			1	1600
						Constellation-Nine Mile Pt (NY)	Hearing		1	1600
ABWR Program Review					Unannounced Applicant	Hearing			2	2900
				ESP						
Unspecified						Unannounced Applicant	Hearing		?	?
						FPL No Site or Vendor Specified	Hearing		?	?
						Part 50 Unannounced – No schedule specified				
									19	24,064

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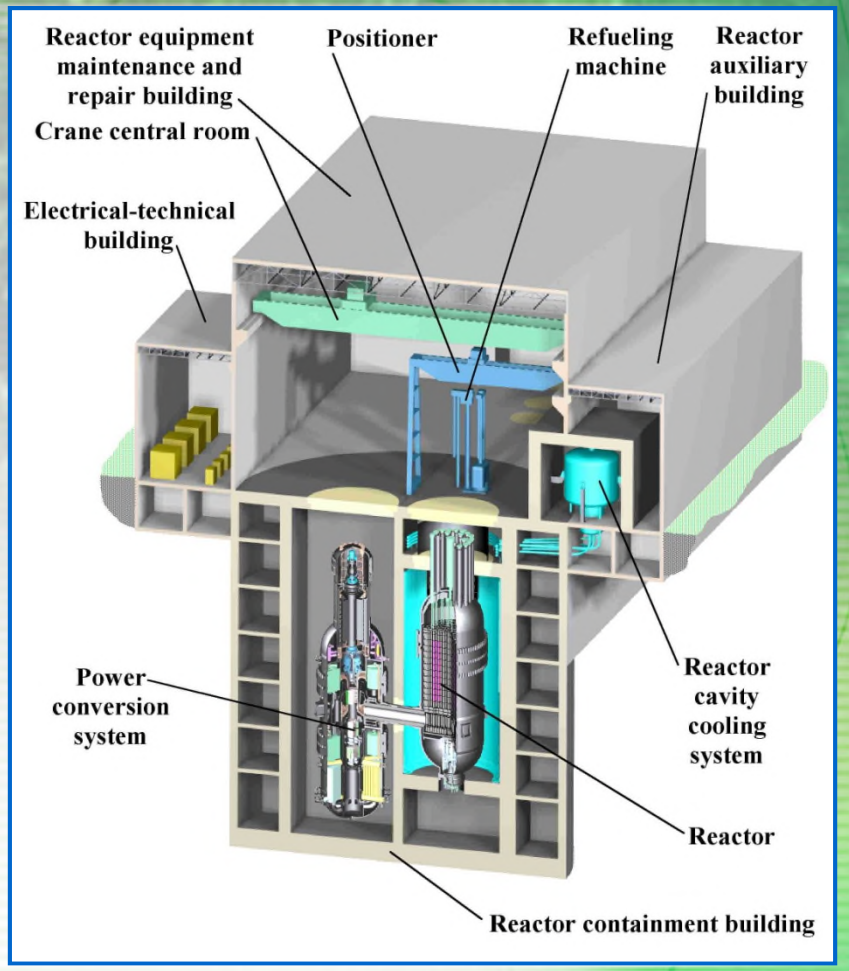
U.S. Nuclear Regulatory Commission,
from estimates provided by licensees

Entergy

The Freedom Reactor

- **Modular Construction**
  - 288 MWe / Unit - - 4 Units / Site
  - Simple Design & Factory Built
  - Significantly Less Expensive Equipment
  - Below Grade Silo & Terrorist Hardened
- **Low Cost**
  - Construction Time < 3 years
  - Capital Cost ~ $1120/kW ($n^{th}$-of-a-kind)
  - O&M + Fuel Costs < $15 / MWHr)
  - Low Staffing Levels
  - Low Decommissioning Costs
- **Proven Demonstrated Technologies**
  - 40 Years - Gas Reactor Experience
  - Core / Fuel Design - Fort St. Vrain
  - State-of-the-Art Large Turbine Design
  - New Compact Heat Exchangers



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The Freedom Reactor

- **Helium Cooled Reactor**
  - Inert / Non-corrosive gas
  - Not radioactive
  - High heat capacity
- **Gas Turbine**
  - Brayton Cycle vs. Steam Cycle
  - High Efficiency ~ 50%
  - Modern Gas Turbine Technology
- **Ceramic Fuel Particles**
  - High Temperature Capability >1600 C
  - Stable Graphite Core / Moderator
  - High Fuel Burn-up Capability
  - Low Power Density
  - Superior Radionuclide Retention
  - High Proliferation Resistance

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Nuclear: A realistic option?

Consider:

- Nuclear is the nation's largest source of emission-free electric energy
- Nuclear is among the lowest-cost energy
- Nuclear fuel costs are stable and a relatively small part of total production cost
- Nuclear's safety record is second to none

The answer is YES!

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NASA photo, Natural Resources Defense Council

Entergy

Advanced Reactor Technologies

California Council on Science and Technology
Sacramento

24 May 2006

Harold McFarlane
Deputy Associate Laboratory Director for Nuclear Programs
Idaho National Laboratory
&
Vice President / President-Elect
American Nuclear Society

http://ccst.us/meetings/speakers/presentations/2006/May/052406McFarlane.ppt

INL Idaho National Laboratory

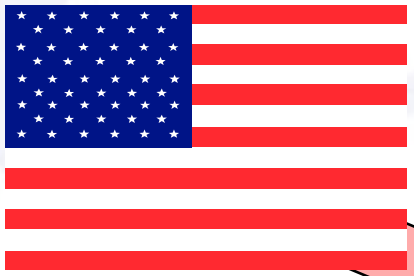
AMERICAN NUCLEAR SOCIETY

International nuclear electric production

	Number	% CF	% of Total Generation
United States	103	92	20
France	59	88	78
Japan	52	70	25
Russia	30	68	17
Canada	21	64	13
South Korea	20	92	40
China	9	84	2
Taiwan	6	88	22
Mexico	2	79	5

International ranking of nuclear capacity as percentage of total electrical production

Country	% of Nuclear Power to Total Output
Lithuania	80
France	78
Slovakia	57
Belgium	55
Sweden	50
Ukraine	46
South Korea	40
Slovenia	40
Switzerland	40
Bulgaria	38
Armenia	35
Hungary	33
Czech Republic	31
Germany	28
Finland	27
Japan	25
Spain	24
U.K.	24
Taiwan	22
U.S.A.	20



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Current unit expansion in Asia/Europe

Country	Operating Units	Number of Units Under Construction	Near-Term Plan (GWe)	By (year)
India	14	8	29.5	2022
South Korea	20	6	26.6	2015
Russia	30	4	40	2020
Japan	52	3	15	2025
China	9	2	40	2020
Ukraine	8	2	22	2030
Pakistan	2	—	8.5	2030
Iran	0	1	—	—
Romania	1	1	—	—
Finland	4	1	—	—

28

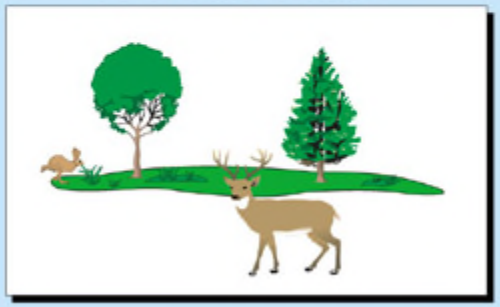
160

The Energy Policy Act of 2005

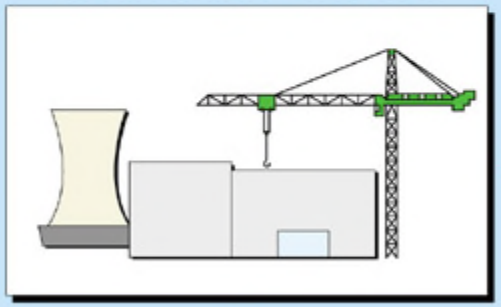
- Includes incentives for new nuclear plants
- Industry has responded with expressions of interest in 17 new nuclear reactors

Combined Licenses, Early Site Permits, and Standard Design Certifications

Early Site Permit*

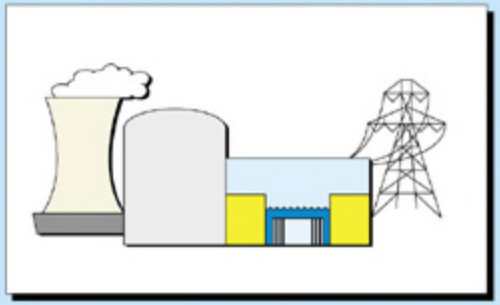


Reactor Construction



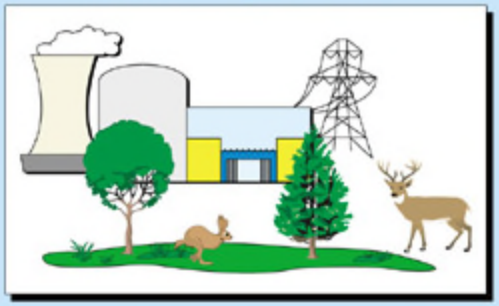
Verification of Inspection, Tests, Analyses, and Acceptance Criteria

Standard Design Certification*



Combined License Review and Hearing

Reactor Operation

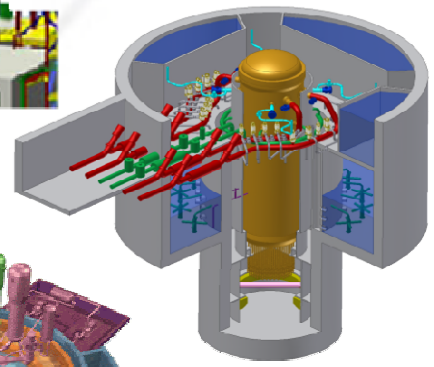


* or equivalent process

New designs available today—*Generation III+*

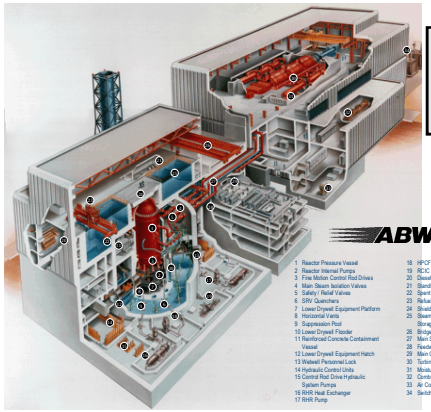
Advanced Light Water Reactors (ALWRs)

- Standardized designs based on modularization producing shorter construction schedules
- Passive or redundant systems to enhance safety
- Easier to protect from terrorist attacks



Gen-III+

further evolution



Gen-III

ABWR
Advanced Boiling Water Reactor

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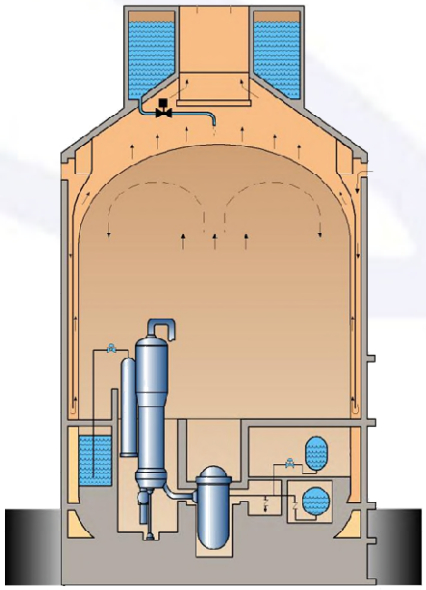
AMERICAN NUCLEAR SOCIETY

Westinghouse

- **AP 1000 (1,148 MWe)**
  - Passive safety systems
  - **NRC design certification** provides regulatory certainty:
    - AP 600—Approved December 1999
    - AP 1000—Approved early 2006



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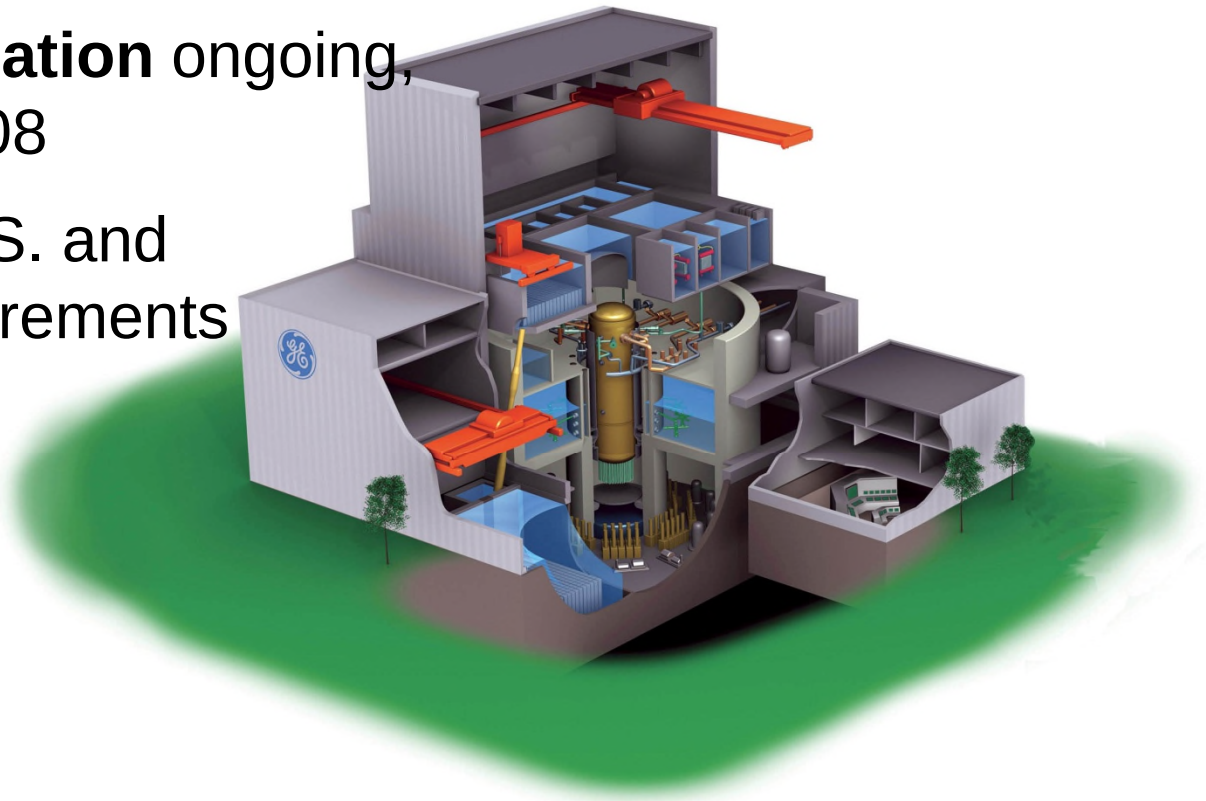
General Electric

- **Economic Simplified Boiling Water Reactor ESBWR (1,550 MWe)**
  - Passive safety systems
  - **Design certification** ongoing, expected in 2008
  - Designed to U.S. and European requirements



AREVA/Framatome ANP

- **Evolutionary Power Reactor EPR (1,600 MWe)**
  - Redundant safety systems
  - Preparing for certification
  - European version under construction in Finland
  - **Design certification** review to start in 2007; completion estimated in 2010

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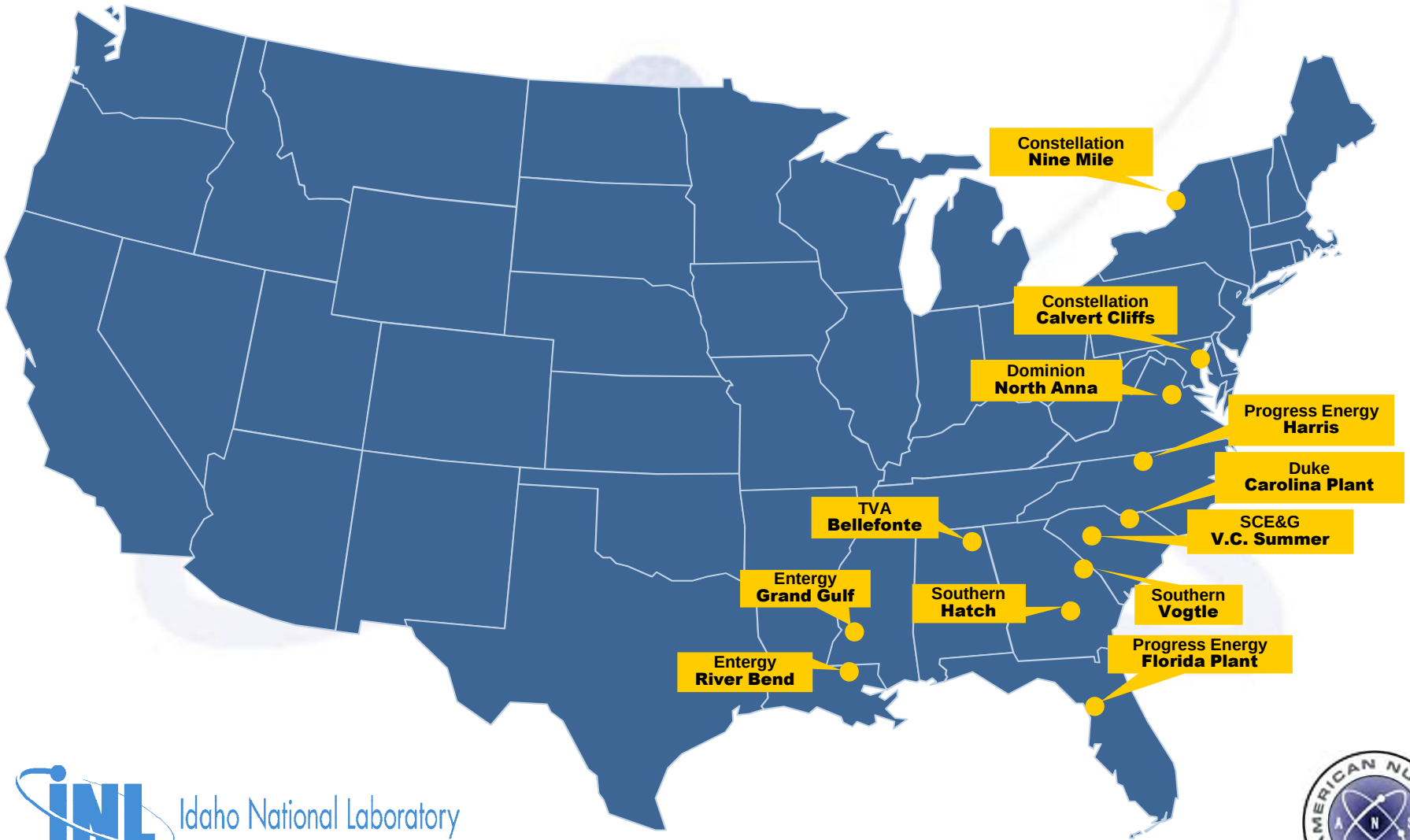
First movers for new nuclear plants



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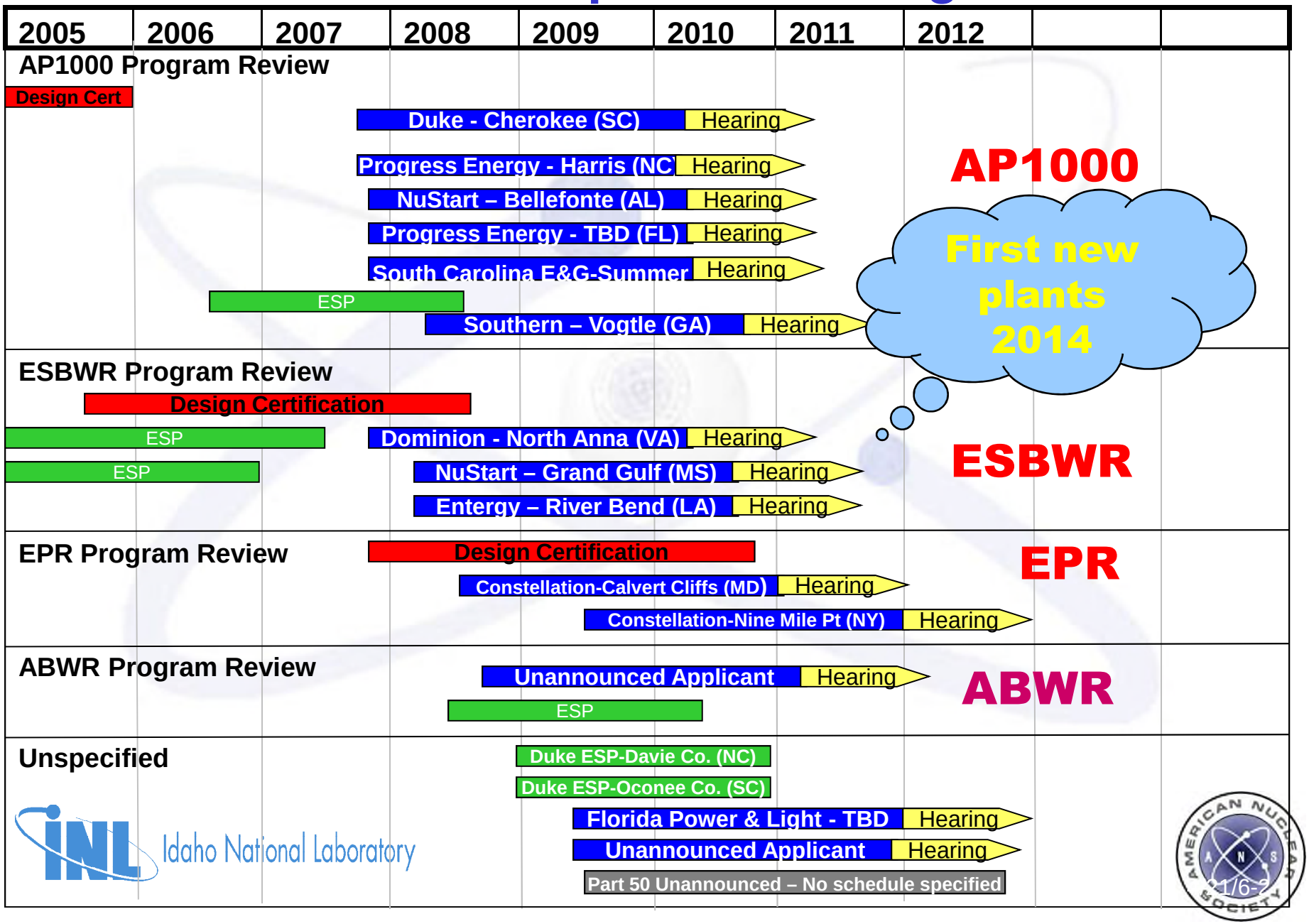
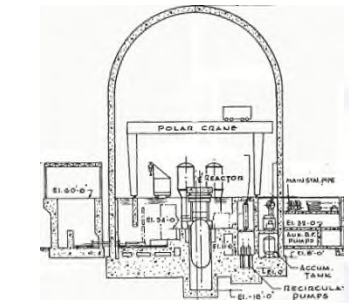
NRC's etimate of new plant licensing schedule

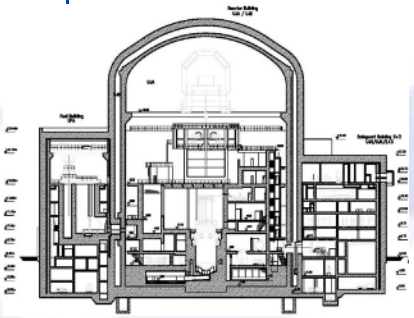


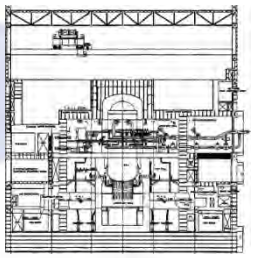
INL Idaho National Laboratory

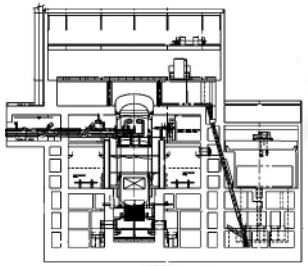
The new ALWR designs reverse the trend of increasing steel and concrete

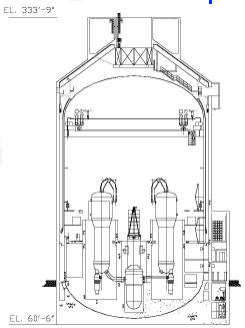
Gen II | **Gen III - Active** | **Gen III+ - Passive**

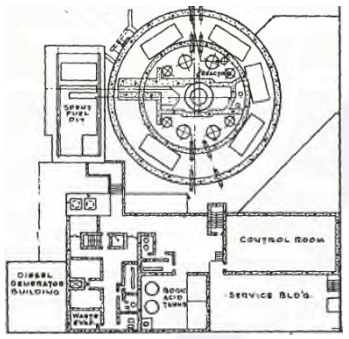


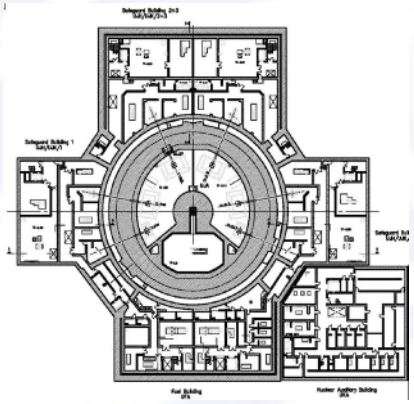


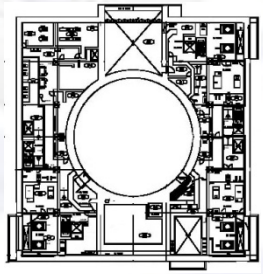


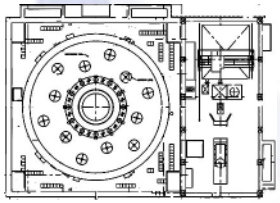


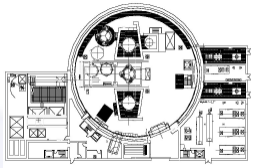












1970's PWR
1000 MWe
40 MT_{steel}/MW

EPR
1600 MWe
49 MT_{steel}/MW

ABWR
1380 MWe
51 MT_{steel}/MW

ESBWR
1550 MWe
__ MT_{steel}/MW

AP-1000
1090MWe
42 MT_{steel}/MW

Scaled Comparison

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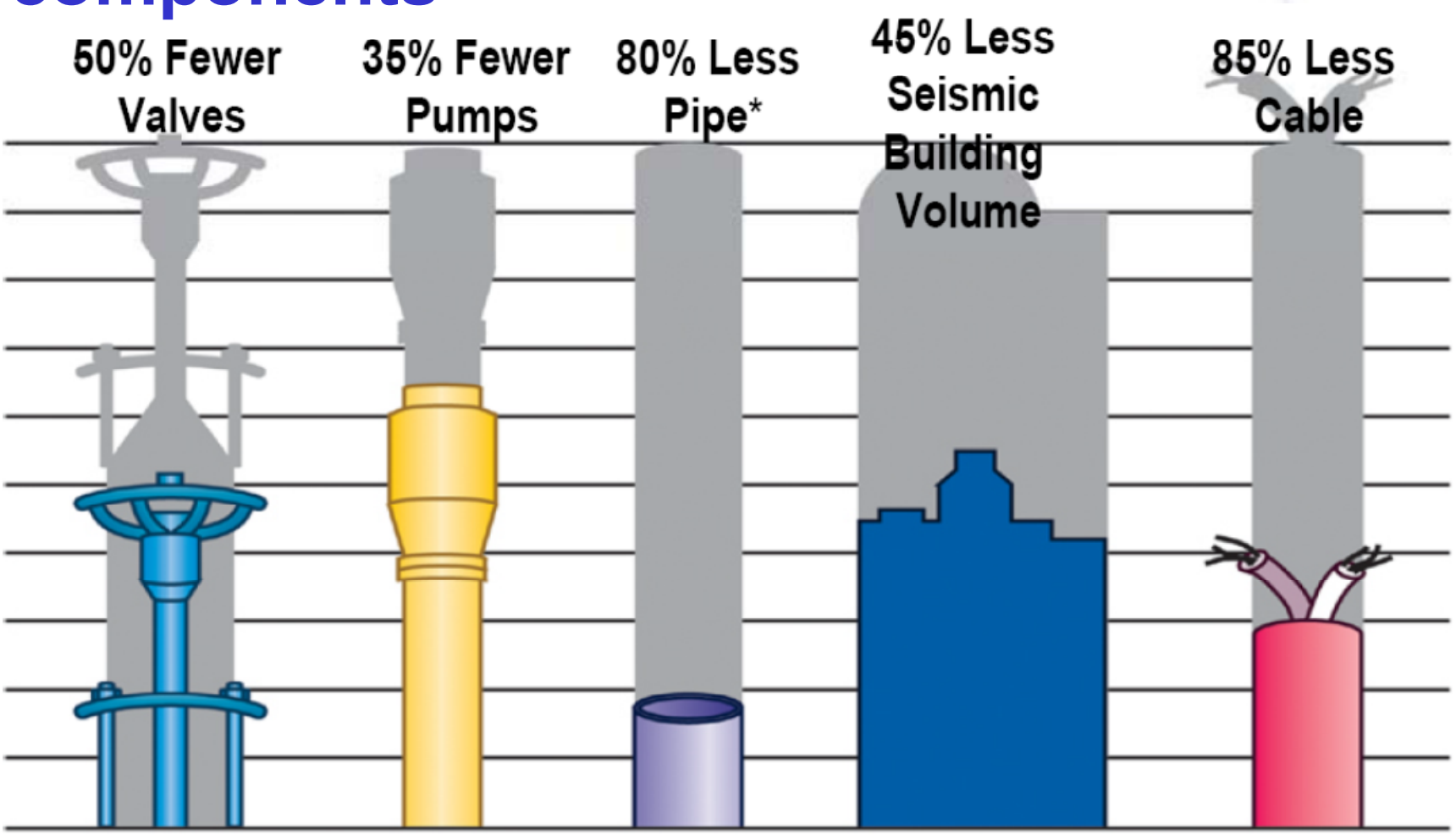
AMERICAN NUCLEAR SOCIETY

AP-1000 has large reduction in components



Sue Ion, GLOBAL 2005

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Generation IV Initiative – Mission

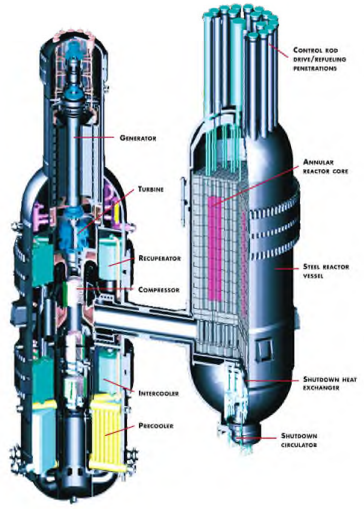
- **International initiative under DOE leadership**
  - DOE and other countries to plan next-generation nuclear technology R&D collectively.
  - Governed by Gen IV International Forum (GIF)
- **Vision**
  - Develop advanced nuclear technologies for deployment by 2030 in collaboration with GIF partners
- **Forward-looking technology goals established**
  - Economics, safety, waste/sustainability, proliferation resistance and physical protection
- ***Gen IV Roadmap***
  - Identified fuel cycles and reactors to advance goals and serve future energy markets
- **GIF selected 6 concepts as most-promising**

GFR -- Gas-cooled fast reactor
VHTR -- Very high temperature reactor
SCWR -- Supercritical water-cooled reactor
LFR -- Lead-cooled fast reactor
SFR -- Sodium-cooled fast reactor
MSR -- Molten salt reactor

- **U.S. now focused on Very-High-Temperature Reactor (VHTR) and Sodium Fact Reactor (SFR)**

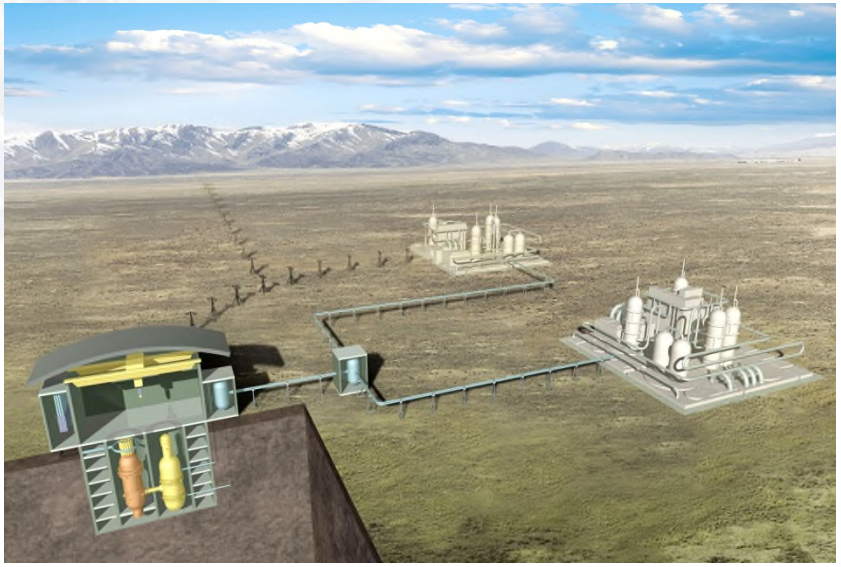
High-temperature Gen IV reactors may have multiple applications

PBMR
165 MWe



GT-MHR
286 MWe

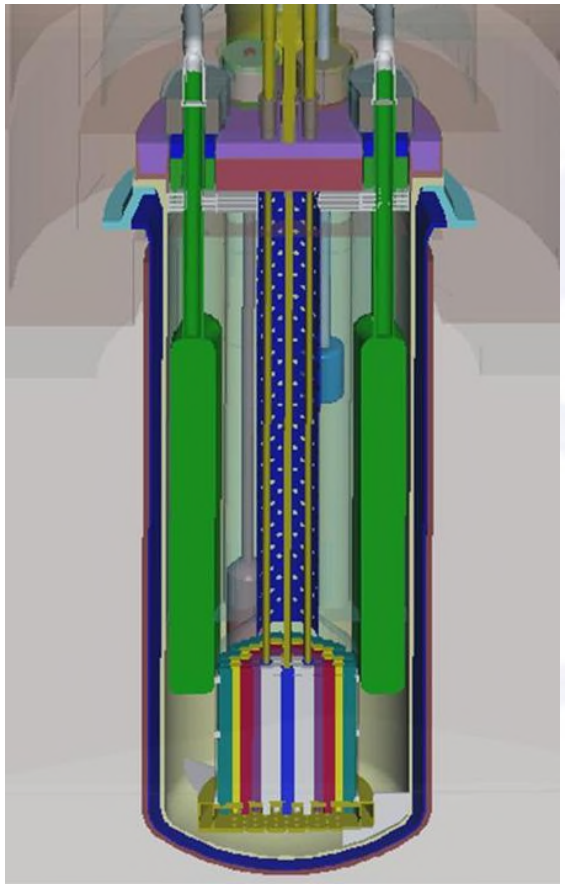
- NGNP technology not fixed until 2011
- Strategy due to Congress 8/8/08
- Idaho National Laboratory to provide support
- Flexible licensing strategy



Next Generation Nuclear Plant (NGNP)

Idaho National Laboratory

Sodium fast reactor development targets spent fuel management



R & D Objectives

- 200-MWt demonstration burner
- Cost reduction design features
- Co-located with processing facility
- Fuels and safety testing capability

Demonstration Focus Areas

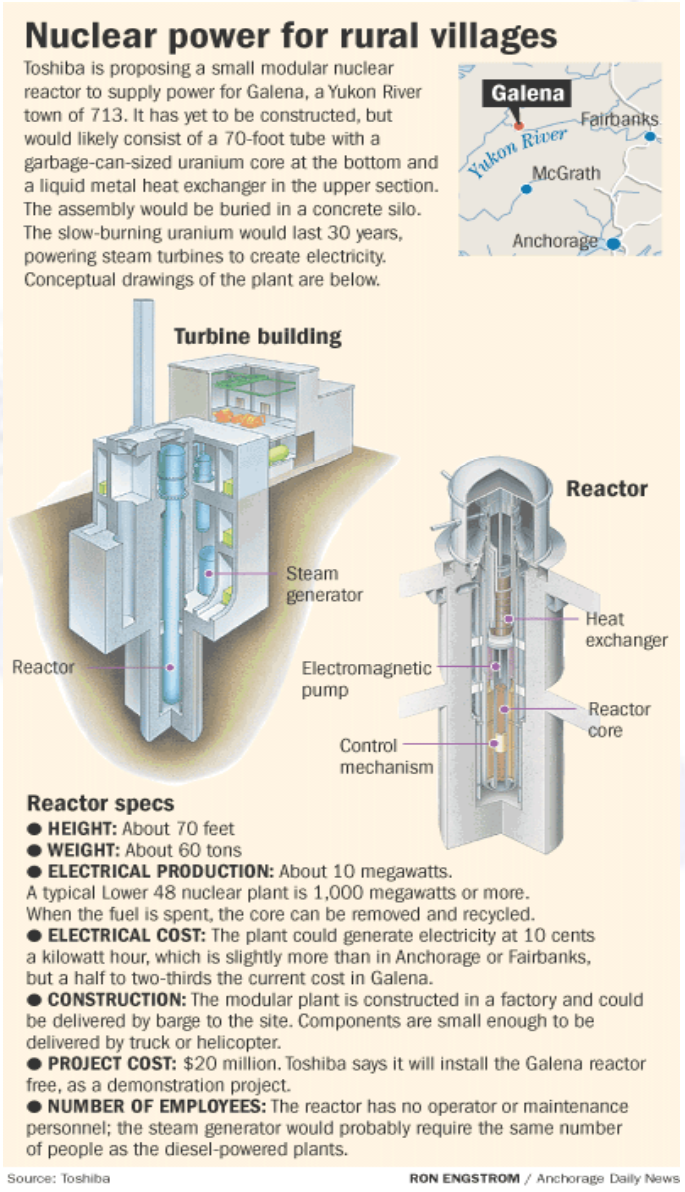
- Prototypical recycled fuel
- Verification of safety performance
- Remote handling refueling equipment
- Economics for deployed power reactors

Idaho National Laboratory

Phillip Finck, ANL

Toshiba 4S sodium cooled reactor targets small niche markets

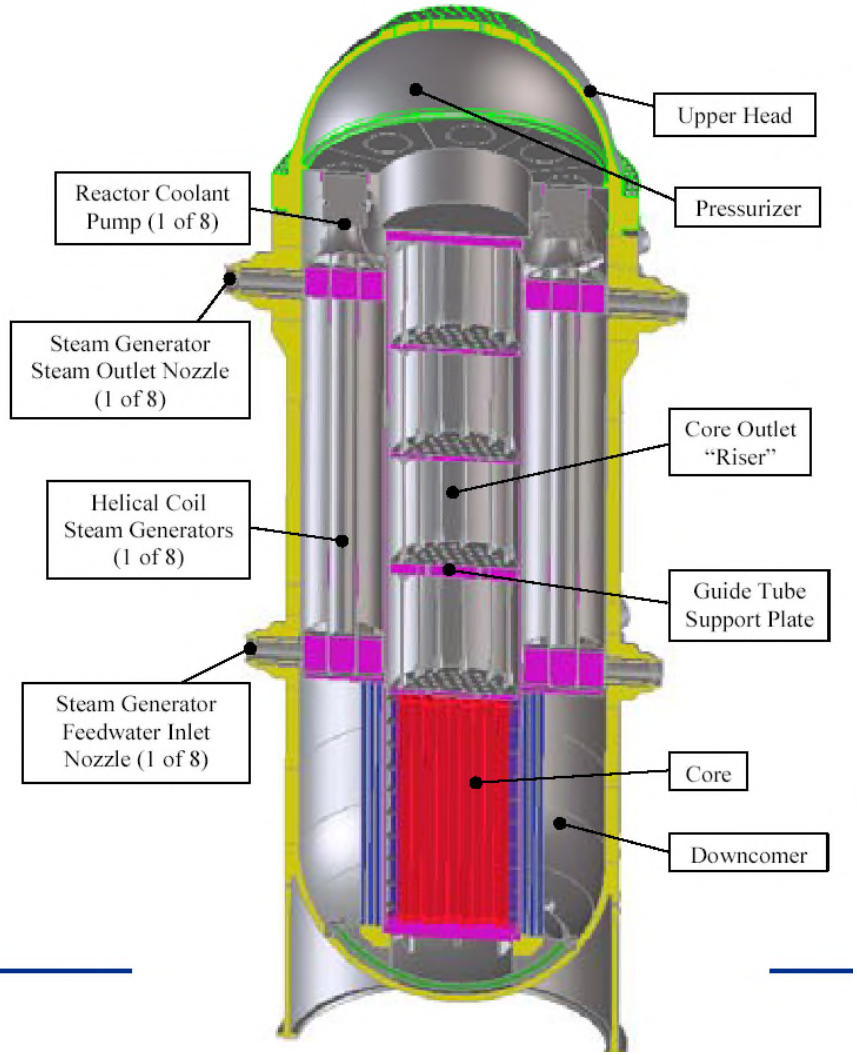
- **10 MWe**
- Designed for remote locations without much infrastructure
- **No refueling over 30 year lifetime**
- Reactivity control – movable reflectors
- Passive safety
- **NRC pre-application review pending**
- Galena, Alaska?



Idaho National Laboratory

[Westinghouse] International Reactor Innovative and Secure (IRIS)

- Integral LWR (335 MWe)
- Safety by innovative design features and passive safety systems
- 3 - 4 year core
- Modular fabrication and construction
- Spherical Containment
- Generation IV Objectives
  - Proliferation Resistance
  - Enhanced Safety
  - Improved Economics
  - Reduced Waste
- **NRC pre-application review underway**



Idaho National Laboratory

Office of Nuclear Energy,

Nuclear Energy – Advanced Fuel Cycles and the Global Nuclear Energy Partnership

Presentation to the California Council on Science and Technology

May 24, 2006

http://ccst.us/meetings/speakers/presentations/2006/May/052406Savage.ppt

Buzz Savage

Office of Nuclear Energy

U.S. Department of Energy

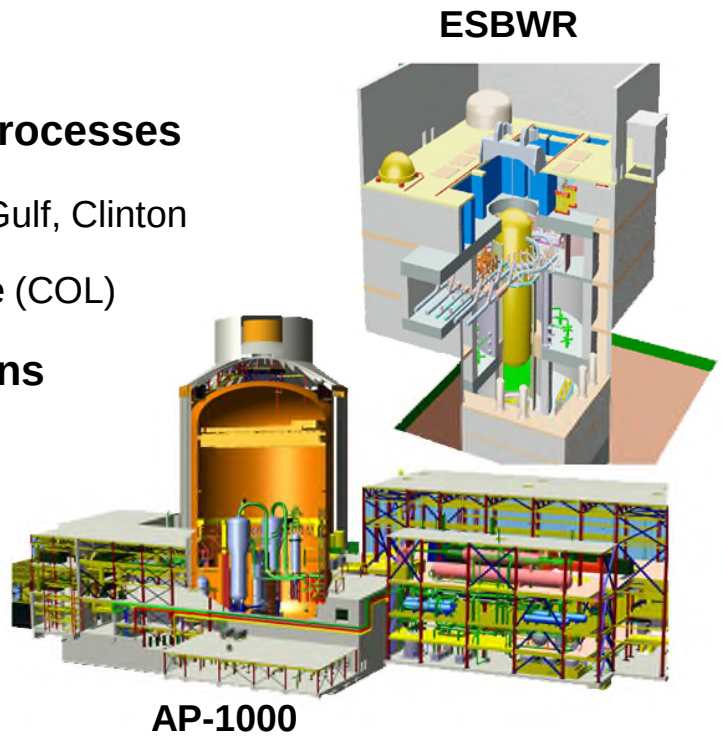
DOE's Nuclear Energy R&D Programs

- Nuclear Power 2010
- Generation IV Nuclear Energy Systems
- Next Generation Nuclear Plant
- Nuclear Hydrogen Initiative
- Global Nuclear Energy Partnership

Nuclear Power 2010

Working with Industry to Build New Nuclear Plants

- **Exploring sites for new nuclear plants**
- **Demonstrating key untested regulatory processes**
  - Early Site Permit (ESP) – North Anna, Grand Gulf, Clinton
  - Combined Construction and Operating License (COL)
- **Developing new light water reactor designs**
  - Design Certification for new technologies
  - First-of-a-kind engineering for new standardized nuclear plant designs
- **Developing concepts to mitigate financing risks**



Program Goal *Pave the way for an industry decision to build at least one new advanced light water reactor nuclear plant in the United States that would begin operation early in the next decade.*

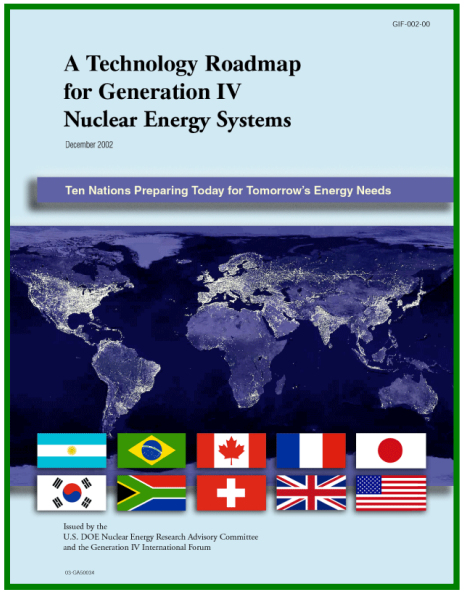
Latest Industry Outlook … *New Plant Licensing*

- **Three industry teams currently are pursuing new nuclear plant deployment**
  - **Dominion – North Anna**
  - **NuStart – Bellefonte and Grand Gulf**
  - **UniStar (Constellation, AREVA, Bechtel Power) – Calvert Cliffs or Nine Mile Point**
- **Eight U.S. power companies have announced intentions to apply for COLs (Dominion, Entergy, Southern Company, Progress Energy, South Carolina Electric & Gas, Duke Power, Constellation and FP&L)**
- **Minimum of 14 new nuclear plants are identified for potential license application**
- **The earliest construction date after COLs are granted is late 2010.**
- **The earliest completion date of the first plant would be late 2014.**

Generation IV Nuclear Energy Systems Initiative

Developing Next-Generation Research Technologies

- **Six candidate Generation IV systems selected by the U.S. led Generation IV International Forum and the U.S. Department of Energy's Nuclear Energy Research Advisory Committee for further development:**
  - Gas-cooled Fast Reactor (GFR)
  - Lead-cooled Fast Reactor (LFR)
  - Sodium-cooled Fast Reactor (SFR)
  - Molten Salt Reactor (MSR)
  - Supercritical Water-cooled Reactor (SCWR)
  - Very High Temperature Reactor (VHTR)



http://nuclear.gov/nerac/FinalRoadmapforNERACReview.pdf

- **Roadmap identifies R&D needs for all six systems**
- **Crosscutting R&D needs**
  - Fuels, materials, energy conversion, design and evaluation methods

Energy Policy Act of 2005 – Impact on U.S. Generation IV Program

- **Authorizes NGNP Project and associated funding**
- **Establishes 2 project phases**
  - Phase I (present -2011): R&D
  - Phase II (2011-2021): Design and construction
- **Names Idaho National Laboratory (INL) as the site of construction**
- **Charges INL with responsibility for integrating the project R&D and procurements**
- **Directs DOE to undergo periodic review**
- **Requires a licensing strategy be developed with NRC**

Nuclear Hydrogen Initiative

Nuclear Power for Transportation

- **Important piece of the President's *National Hydrogen Fuel Initiative* production portfolio, and included in the Energy Policy Act of 2005**
- **Developing hydrogen production processes for use with advanced nuclear energy technologies that can provide large amounts of hydrogen for a "hydrogen economy"**
- **Program Goal: By 2019, operate nuclear hydrogen production plant to produce hydrogen at a cost competitive with other alternative transportation fuels**

The energy from one pound of nuclear fuel could provide the hydrogen equivalent of 250,000 gallons of gasoline without any carbon emissions.

Global Nuclear Energy Partnership (GNEP)

- **The Global Nuclear Energy Partnership (GNEP) is a key element of the Advanced Energy Initiative announced by President Bush in his January 31, 2006 State of the Union Address**
- **GNEP is linked to the Advanced Energy Initiative and spent fuel recycling objectives of the Energy Policy Act of 2005:**
  - **Expand the use of safe, clean nuclear power to meet increasing global energy demand**
    - Nuclear Power 2010 Program
    - Demonstrate small, exportable reactors
    - Establish reliable fuel services
  - **Address the nuclear waste management concerns**
    - Volume, heat load, and radiotoxicity
  - **Promote non-proliferation**
    - Proliferation resistant fuel cycle technologies
    - Concept of fuel cycle nations and reactor nations

GNEP Major System Projects

- **GNEP implementation requires three Major System technology demonstration projects (capabilities):**
  - Spent fuel separations that provide a proliferation-resistant fuel material (UREX+ Engineering Scale Demonstration, UREX+ ESD)
  - Conversion of the transuranic fuel in an advanced test reactor that will reduce the long-term heat load and radiotoxicity of the fuel while generating power (Advanced Burner Test Reactor, ABTR)
  - Fabrication of the separated fuel material into proliferation-resistant fuel for use in a fast reactor (Advanced Fuel Cycle Facility, AFCF)

- **Other capabilities:**
  - Demonstration of advanced instrumentation and monitoring systems to enhance proliferation-resistance
  - Continued long-term research and development to improve the fuel cycle
  - International collaborations

- **The Department is planning to design, construct and operate these demonstration facilities in the next 10-15 years**

Global Nuclear Energy Partnership Activities

- **Since GNEP was announced on February 6, 2006 by Secretary Bodman with the FY 2007 budget request rollout, the following activities have been initiated:**
  - **On March 17, 2006 DOE issued a request for Expressions of Interest with regards to siting integrated spent fuel recycling facilities for GNEP technology demonstrations. 43 responses were received which are currently under review**
  - **On March 22 an Advanced Notice of Intent was issued for the GNEP Technology Demonstration Program covering the three planned demonstration projects – UREX+ Engineering Scale Demonstration (ESD), Advanced Burner Test Reactor (ABTR), and Advanced Fuel Cycle Facility (AFCF)**
  - **On March 28 Deputy Secretary Clay Sell approved initiation of conceptual design activities for the three demonstration projects**
- **DOE intends to issue a solicitation by June 2006 for detailed site proposals for integrated spent fuel recycling facilities. Up to $20 million in awards, each no more that $5 million, will be made**

Conclusion

- **The U.S. and the world are faced with a set of challenges related to energy supply, nuclear proliferation, and global climate change**
- **The Global Nuclear Energy Partnership uniquely addresses these challenges to:**
  - Meet rapidly growing energy demand
  - Reduce carbon emissions
  - Enable clean development
  - Avoid proliferation

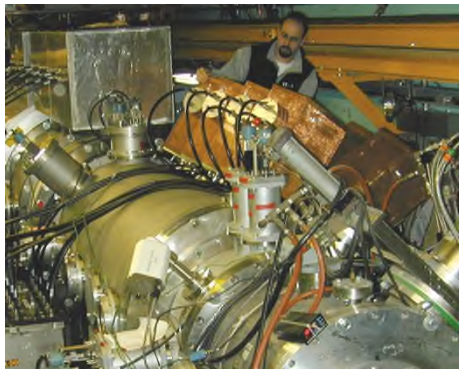
"So tonight I announce the Advanced Energy Initiative… We will invest more in… clean, safe nuclear energy."
President Bush, 01/2006

http://ccst.us/meetings/speakers/presentations/2006/May/052406Peterson.ppt

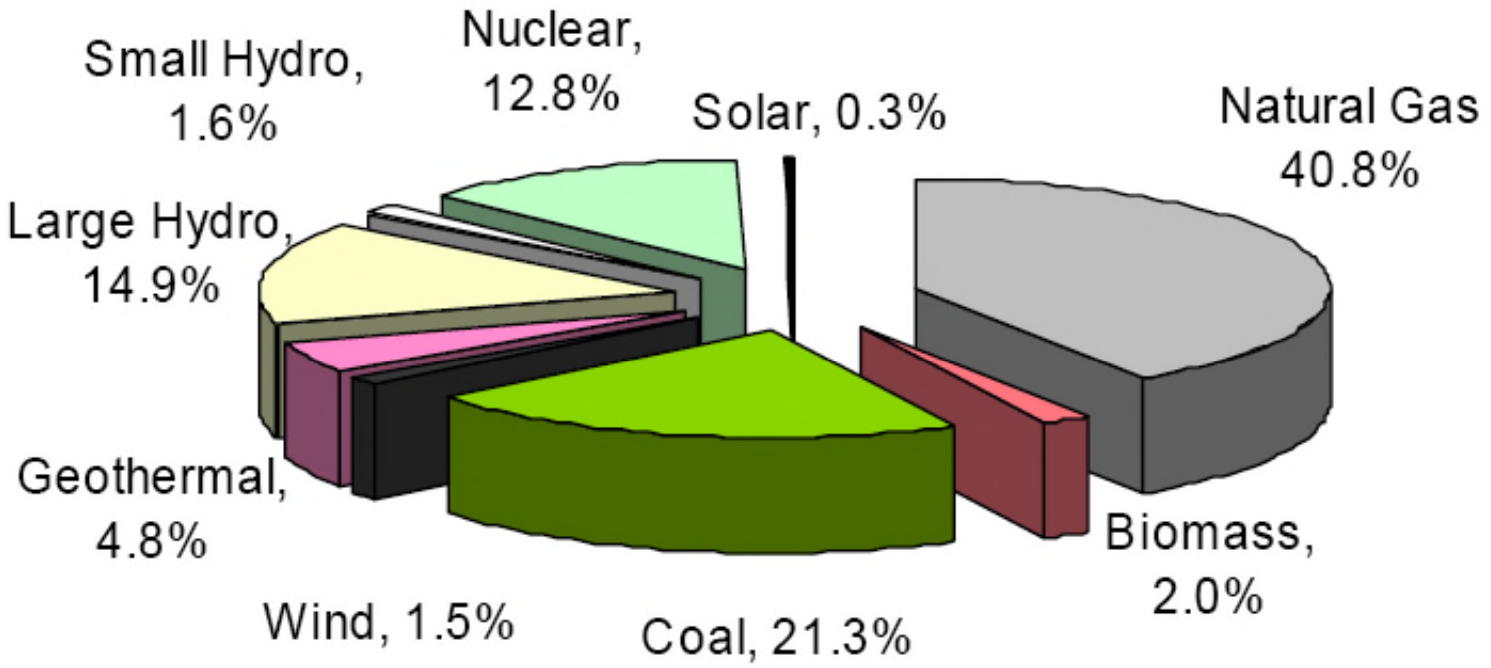
Spent Fuels and Yucca Mountain

Per F. Peterson
Professor
Department of Nuclear Engineering
University of California, Berkeley

California Council on Science and Technology
Governor's Meeting Room, Sacramento, California
May 24, 2006



California Electricity Consumption 2004



Nuclear is 34% of California's non-fossil energy (vs. 70% for U.S.). Solar, wind, small hydro and biomass are 14%.


Yucca Mountain
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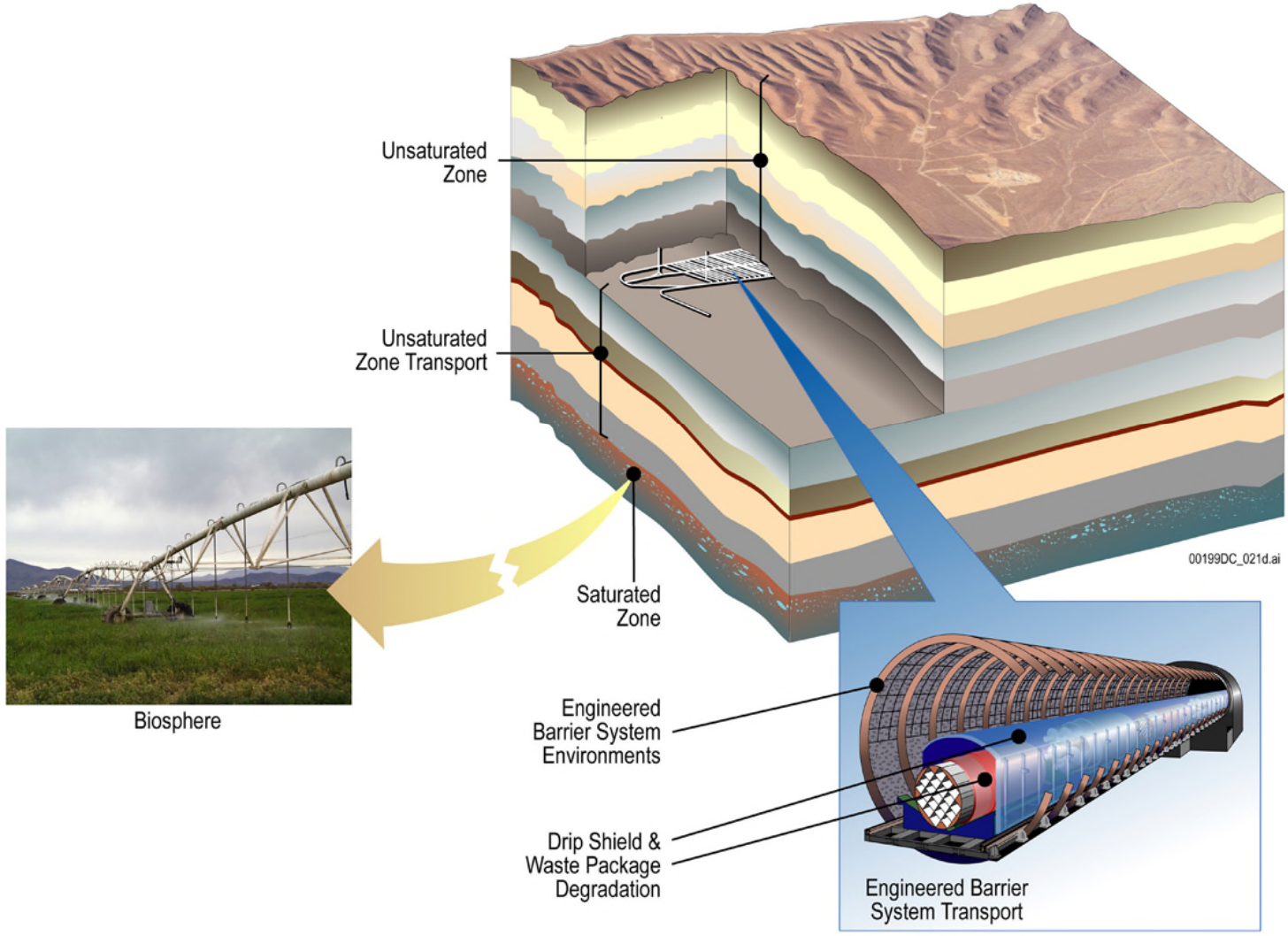
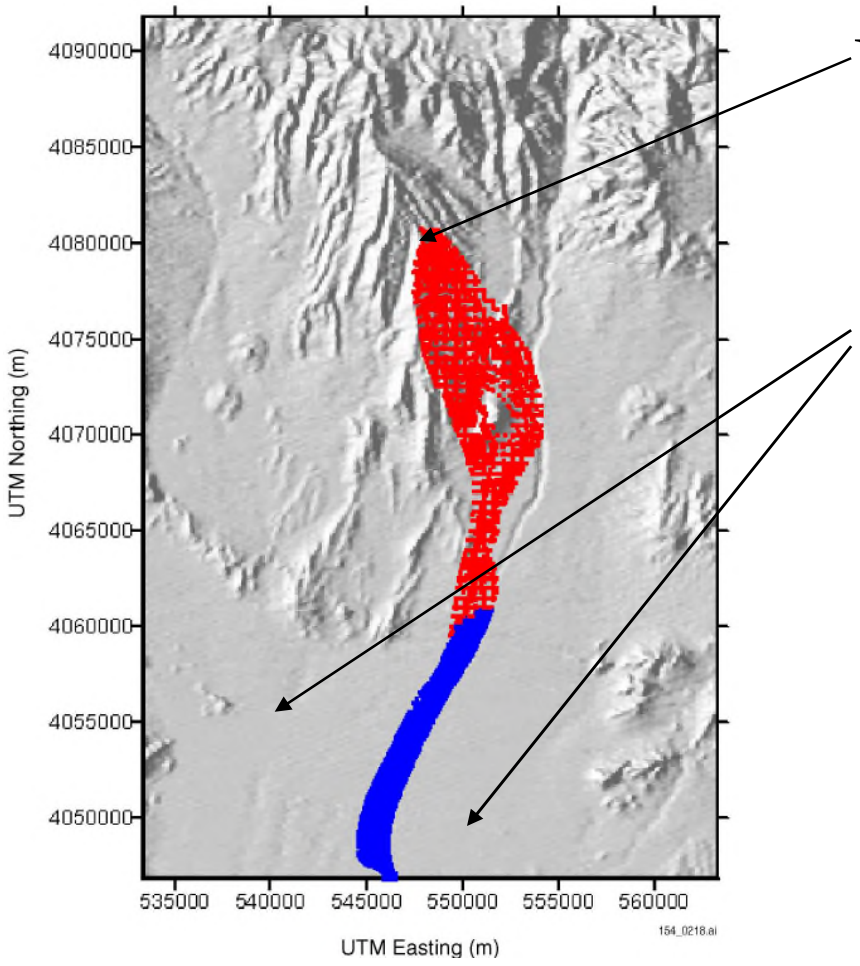
Overview of Yucca Mountain repository system



Current U.S. context for Yucca Mountain

- **Nuclear energy changes from 1986 to 2006:**
  - **Large improvement in reliability and economics of existing plants**
  - **Shift from decommissioning announcements to license extensions**
  - **10 utilities announce construction license applications for 16 new reactors (> 20 GW capacity)**
  - **Unambiguous evidence of global warming**
- **Major issues for Yucca Mountain**
  - **New draft 1-million year EPA safety standard**
    - » **15 mrem/yr to 10,000 years**
    - » **350 mrem/yr from 10,000 to 1-million years**
    - » **Vastly more protective than EPA long-term standards for chemical hazards**
  - **Nuclear Regulatory Commission construction license**
    - » **Can the DOE design for Yucca Mountain meet the EPA safety standard?**
    - » **Can a baseline license application be docketed by 2008?**

Projected Contaminant Path in the Groundwater



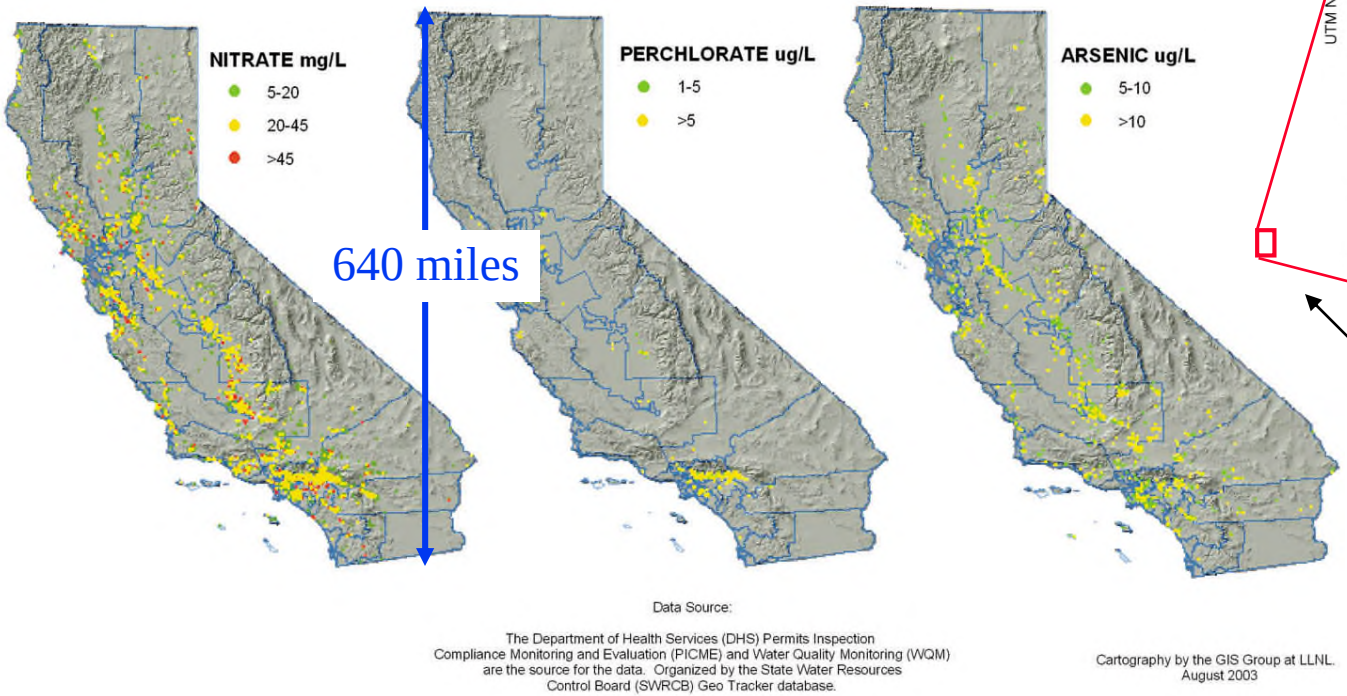
Yucca Mountain

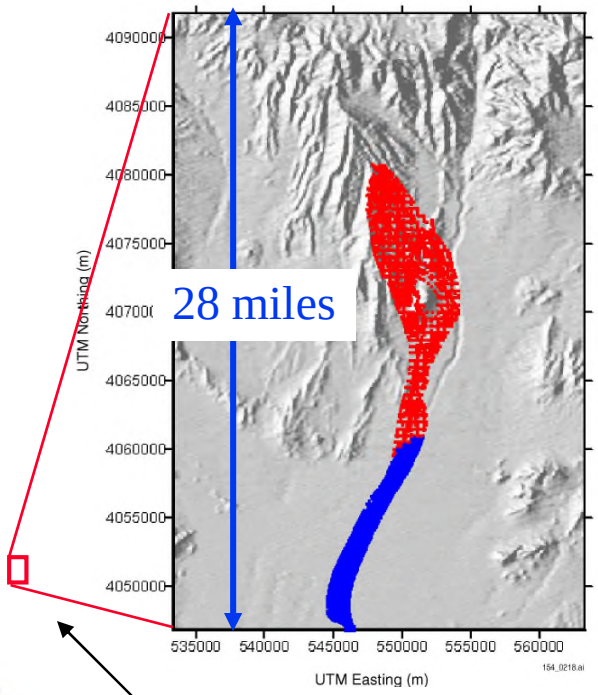
Amargosa Valley

Even if Yucca Mountain remains limited to the current legal cap of 63,000 MT, spent fuel in Yucca Mountain still displaces fossil energy equivalent to 5 billion tons of coal

The 1-million year EPA safety standard for Yucca Mountain should be viewed in the context of chemical hazards

Scaled comparison of California wells with current nitrate, perchlorate, and arsenic groundwater contamination

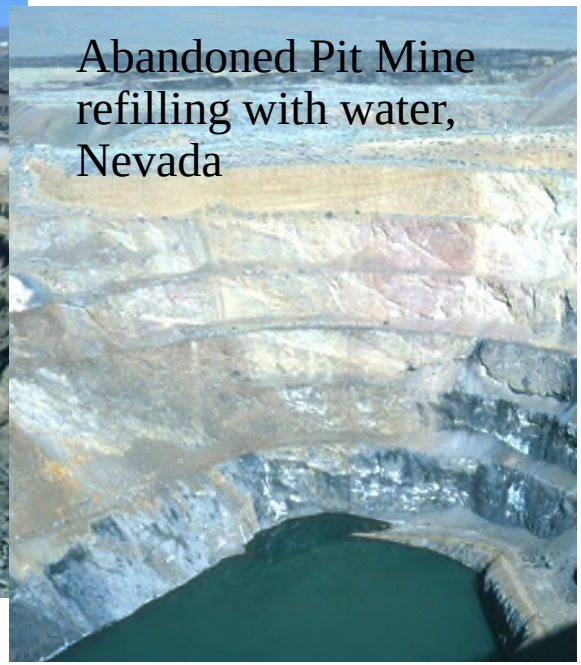




Yucca Mountain's potential additional impact in 10,000 to 1-million years, to scale

Nevada has 40 open-pit gold mines

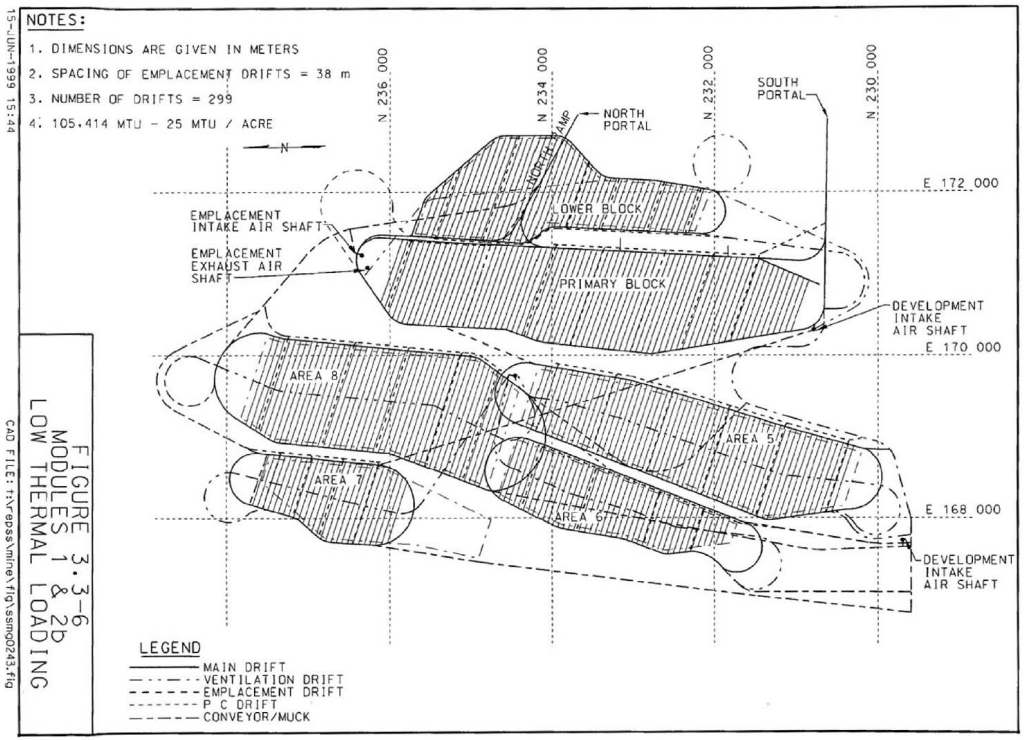

Barrick Goldstrike Mine, Nevada


Abandoned Pit Mine refilling with water, Nevada

- **Up to 1600 feet below the water table**
- **After pumping stops, take decades to centuries to refill**
- **Groundwater evaporation rates ~300 million gallons per year**
- **Concentrate selenium, arsenic, heavy metals and acid**
- **Long-term impacts unknown: NY Times, 12/30/05, "They will be like huge desert sponges, sucking from the aquifer eternally"**

How about a 1-million year safety standard?

The 1999 Yucca Mountain DEIS identified 4200 acres as potentially suitable for repository use



- **Legislation introduced recently would remove the 70,000 MTIHM cap,**
  - **Capacity remains limited by the 1-million year EPA safety standard**
- **With a baseline design for 60 MT/acre, site capacity might be ~ 252,000 MT**
  - **the 104 current U.S. reactors will produce 120,000 MT in 60 years)**
- **Further expansion potentially possible with further license amendments**

A tentative schedule for key Yucca Mountain activities

- **Yucca Mountain project is far behind the schedule set in the 1987 amendments to the Nuclear Waste Policy Act**
  - **Contracts to utilities called for waste receipt starting in 1998**
- **Current and Upcoming**
  - **4/06 Senator Dominici introduces DOE legislation to remove 70,000 MT capacity cap**
  - **5/06 EPRI study indicates maximum spent-fuel capacity, while meeting EPA 1-million year standard, may be 280,000 to 630,000 MT (current 104 U.S. reactors will produce 120,000 MT in 60 years operation)**
  - **2006 GNEP program initiated, one goal is elimination of the need for additional repositories to at least the end of the century**
  - **2008 DOE announced date to submit construction license application to NRC**
  - **2008 Presidential election year, new administration in 2009**
  - **2012 Required date for NRC to complete review of 2008 license application; if review is successful, issue construction license**

A NRC construction license should suffice to meet California's legal requirement for new nuclear construction