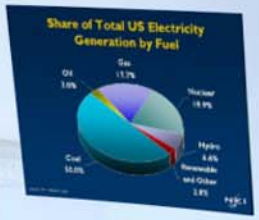
Nuclear Energy 2006

Status and Outlook



National Association of Regulatory Utility Commissioners 2006 Summer Meeting

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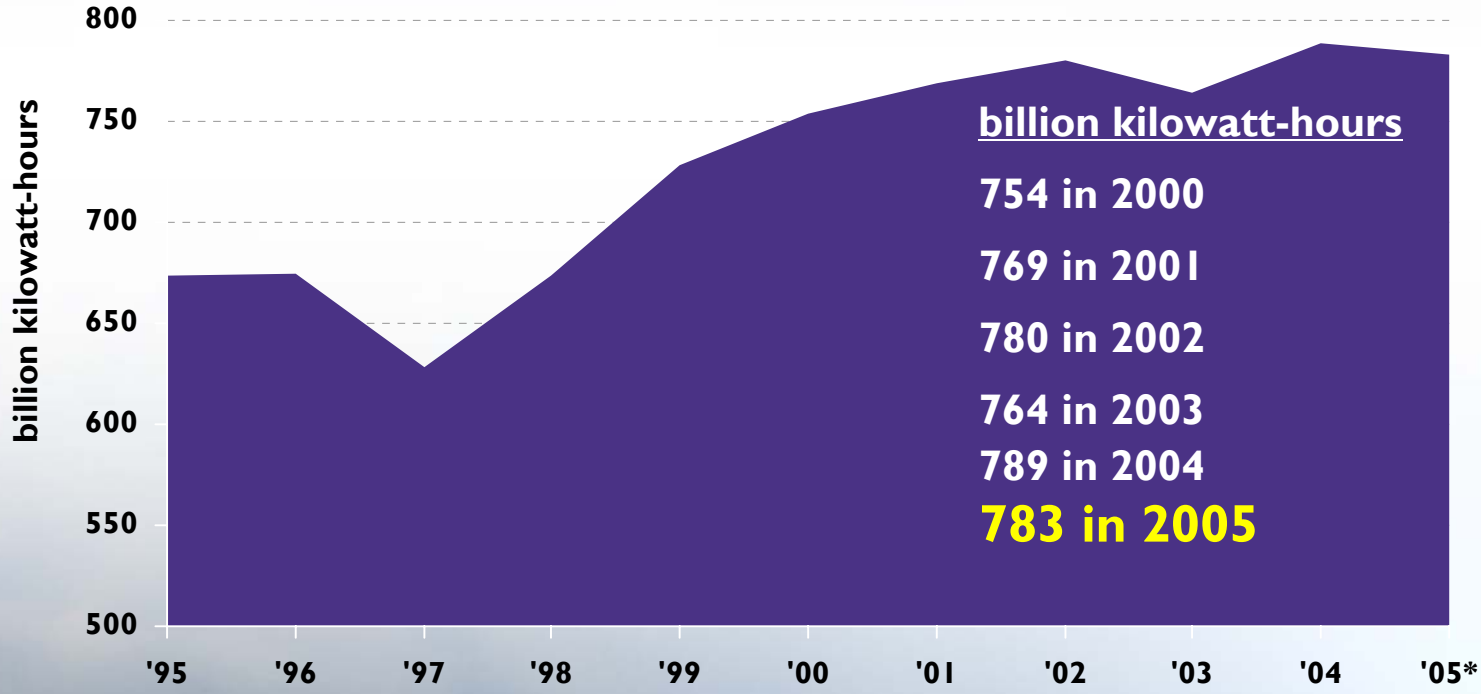
Outline

- Operating plant performance: Solid foundation for new nuclear construction cycle
- What is driving interest in new nuclear plants?
- Status of new nuclear plant development
- Status of used nuclear fuel management

Output from 103 Operating Nuclear Plants Sustained at Record Levels



Source: Energy Information Administration

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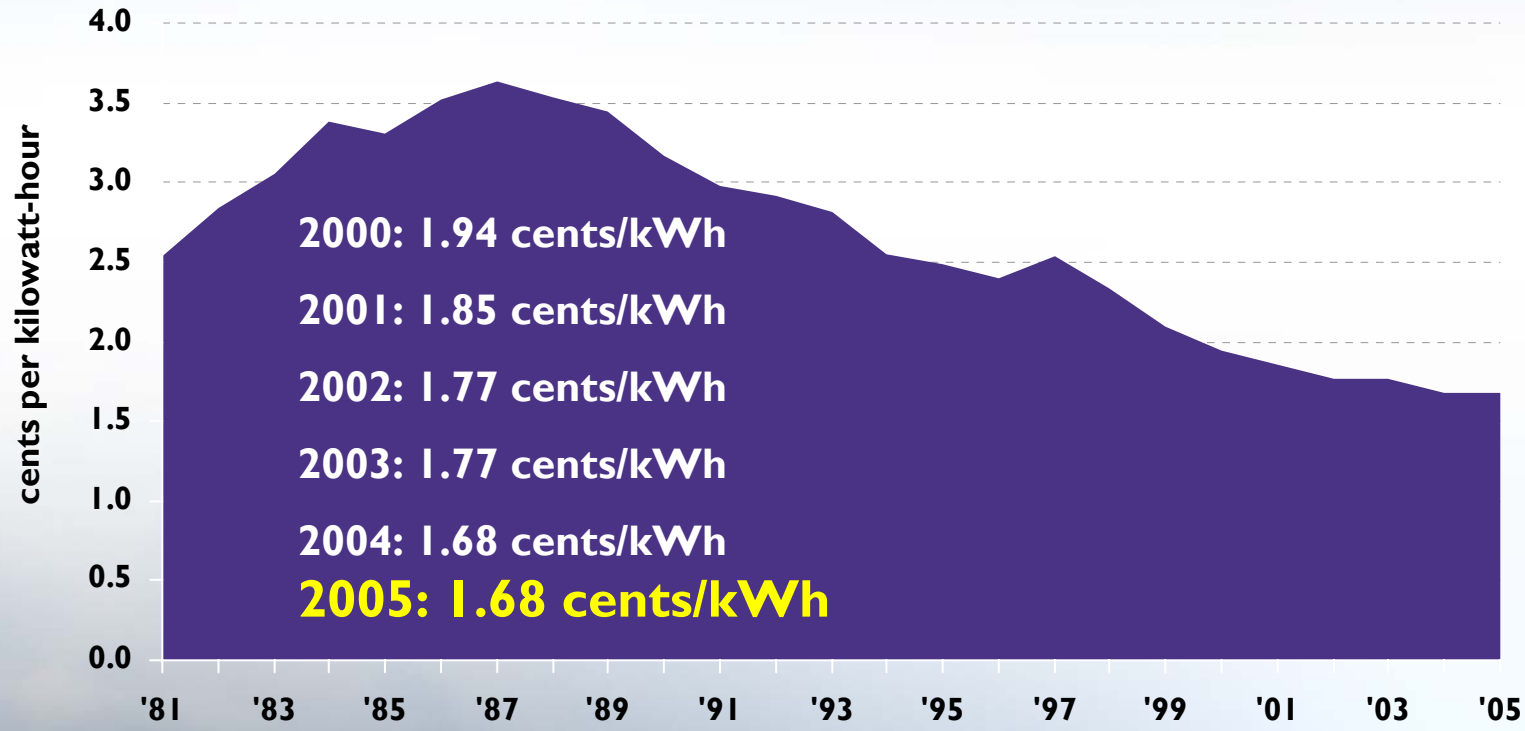
Solid Economic Performance Continues

U.S. Nuclear Production (O&M + Fuel) Cost



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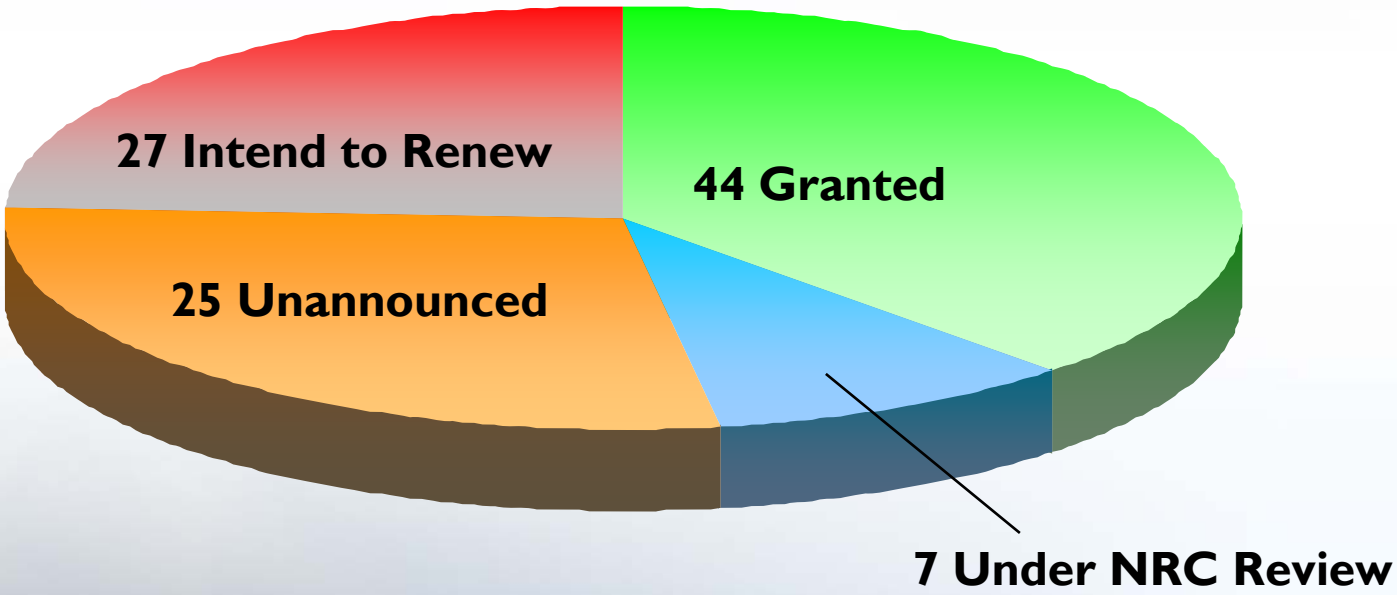
Source: Energy Information Administration

** NEI estimate for 2005*

License Renewal (Additional 20 Years) Is Now Routine Activity



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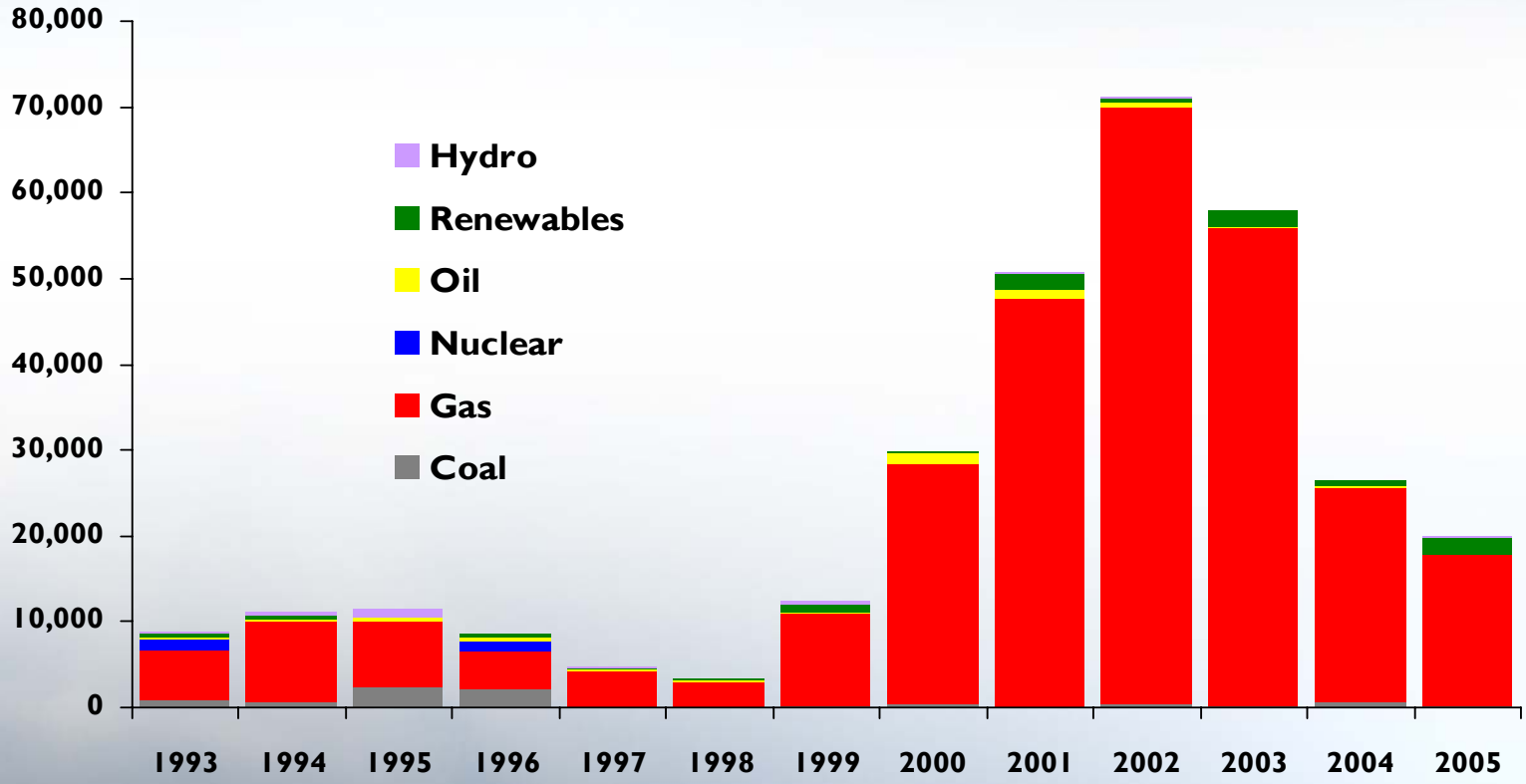
Source: U.S. Nuclear Regulatory Commission

New Nuclear Plants: The Bottom Line

- The lesson of the last 15 years in U.S. electricity policy:
  - Diversified fuel and technology portfolio is highly desirable, if not essential
  - All fuels and technologies (nuclear, coal, natural gas, renewables, efficiency) have a legitimate role
- The challenge for the next 15 years and beyond:
  - Preserving/restoring diversified portfolio
  - Defining appropriate roles for the various fuels and technologies
  - Ensuring resource adequacy, particularly in competitive markets

From EPAct 1992 to EPAct 2005: Generating Capacity Online *(1993-2005)*



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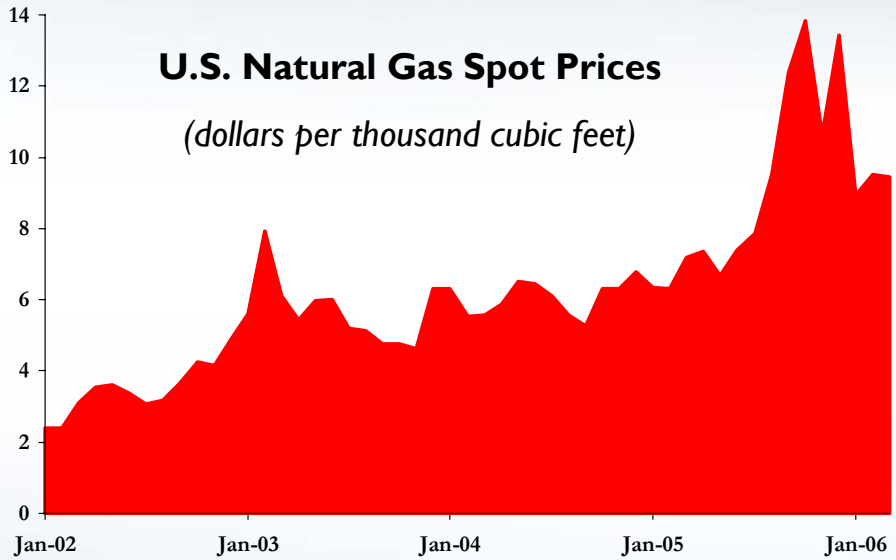
Source: Global Energy Decisions

The Gas-Fired Boom and Bust

- U.S. entered the 1990s heavy on baseload, needed mid-merit, peaking capacity
- At $2-2.50/million Btu, natural gas was inexpensive
- No recognition of supply constraints
- Gas-fired generating capacity represented lowest investment risk at a time of punishing business uncertainty
  - Industry structure
  - Market design



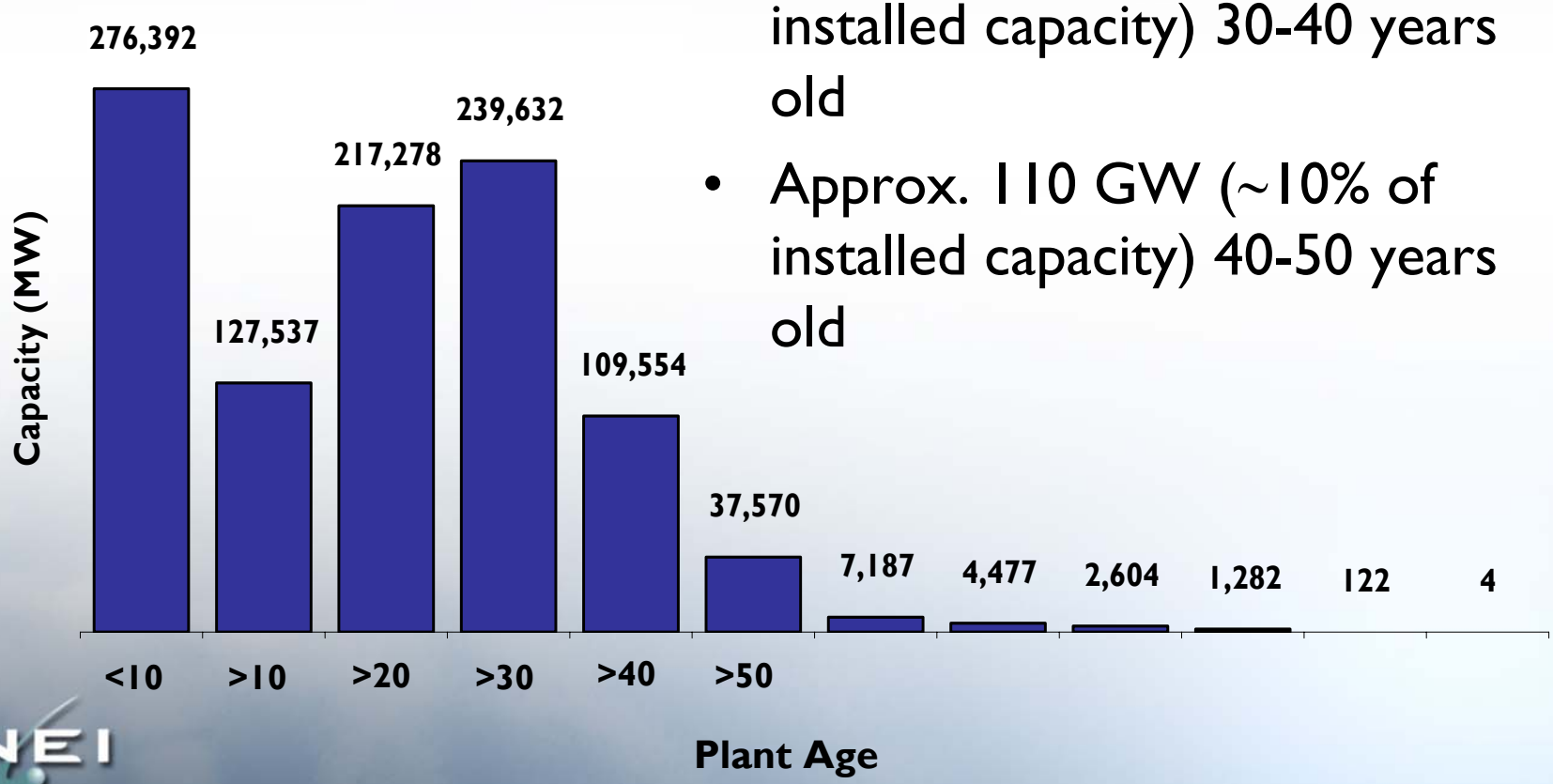
- Massive build of gas-fired capacity: Unsustainable pressure on gas supply and price
  - Periods of punishing volatility
  - Severe damage to other industries (chemicals, steel, plastics)

The Last 15 Years: Investment in Electric Infrastructure Collapsed

- With industry restructuring, significant investment, but only "churning" existing assets
- Investment in new coal and nuclear generating capacity all but disappeared, even though they represent ...
  - 70 percent of U.S. electricity supply
  - Greatest forward price stability
- Something wrong with this picture

New Generating Capacity: 1992-2005	
Coal	8,044 MW
Gas	288,576 MW
Nuclear	2,485 MW
Oil	4,933 MW
Renewables	9,983 MW
Hydro	2,629 MW
Other	223 MW

Age of Generating Capacity Demonstrates Lack of Investment in New Power Plants



- Approx. 240 GW (~25% of installed capacity) 30-40 years old
- Approx. 110 GW (~10% of installed capacity) 40-50 years old

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The Challenge Today: Addressing the Energy Investment Crisis

- Resurrecting coal and nuclear investment
  - Coal: 9 GW under construction, 33 GW in development
  - Nuclear: ~20 GW under consideration
- Resurrecting investment in electric and gas transmission:
  - Electric: Steady decline since late-1970s ($4.0-4.5 billion/year); bottomed out through 1990s (~$2.5 billion/year); now turning around
  - Gas: Averaged $2.8 billion/year 2000-2002; should increase to $8 billion/year (NPC study)

What Is Driving the Interest In New Nuclear Construction?

- Growing need for baseload generation
  - Reserve margins down in 2005 for first time in a decade
- Increasing environmental constraints and compliance costs, potential controls on carbon emissions
- Chronic volatility in natural gas prices

U.S. Electricity Supply: 2004 - 2005

New Supply: 15 GW

Peak Demand Growth: 33.5 GW
Retirements: 10.1 GW
Mothballed: 1.8 GW

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Energy Policy Act of 2005: Investment Stimulus for New Plants

- **Federal loan guarantees**
  - Covers up to 80% of project cost
  - Allows project financing, more highly leveraged capital structure, reduces project cost
- **Production tax credits**
  - $18/MWh for up to 6,000 MW
  - Worth up to $125 million in tax credits per year for 8 years for 1,000 MW of capacity
- **Federal standby support**
  - $2 billion of risk coverage for first six plants
  - Covers delays resulting from licensing or litigation

Market Values[1] of Companies Planning Nuclear Projects

Exelon	*$34.3 billion*
Duke Energy	*$27.8 billion*
Dominion	*$27 billion*
Southern	*$24.9 billion*
FPL	*$17.3 billion*
Entergy	*$15.9 billion*
Progress Energy	*$11.1 billion*
Constellation	*$9.9 billion*
NRG	*$6.5 billion*
SCANA	*$4.7 billion*

Electric power companies are small relative to the size of the $3-4 billion nuclear power projects they intend to build.

The companies planning new nuclear plants in the United States have a combined market cap of $179.4 billion, less than one-half the market cap of ExxonMobil ($396.8 billion)..

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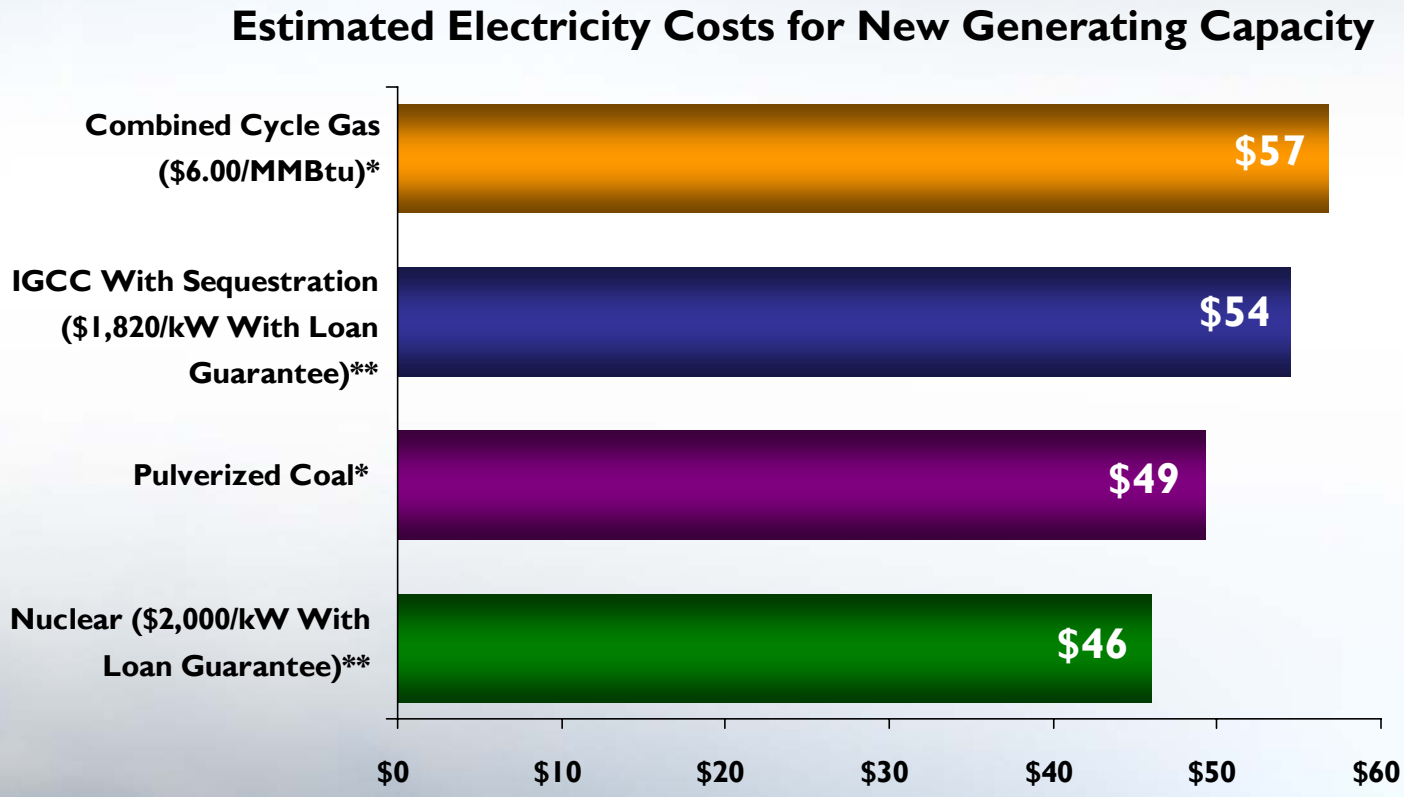
1. Market value or market capitalization = number of shares outstanding times share price on 7.20.2006

Investment Stimulus Offsets Higher Cost of First New Plants



*Assumes 15% cost of equity, 8% cost of debt and a 50/50 debt/equity structure.

**Assumes 15% cost of equity, 6% cost of debt and an 80/20 debt/equity structure.

Source: NEI analysis of first-year operating costs using EIA data

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Nuclear Plant Construction: "Then and Now"

Then	Now
Changing regulatory standards and requirements	More stable process: NRC approves site and design, single license to build and operate, before construction begins and significant capital is placed "at risk"
No design standardization	Standard NRC-certified designs
Inefficient construction practices	Lessons learned from nuclear construction projects overseas incorporated, and modular construction practices
Design as you build	Plant fully designed before construction begins
Multiple opportunities to intervene, cause delay	Opportunities to intervene limited to well-defined points in process, and must be based on objective evidence that ITAAC have not been, will not be, met
Technology still evolving	Technology mature, stable designs

Status of New Nuclear Plant Development

Company	Design	Units	Date for Filing COL Application
Dominion	ESBWR	1	2007
NuStart Energy (TVA)	AP1000	2	2007
NuStart Energy (Entergy)	ESBWR	1	2007/2008
Entergy	ESBWR	1	2008
Southern Co.	AP1000	1-2	2008
Progress Energy	AP1000	2-4	2007
South Carolina Electric & Gas	AP1000	1-2	2007
Duke Energy	AP1000	2	2008
UniStar Nuclear	U.S. EPR	1-4	2008
Florida Power and Light	TBD	TBD	2009
NRG (at South Texas Project)	ABWR	2	2007
Amarillo Power	ABWR	2	~2007

Growing Need for Additional Baseload Capacity

- Electricity demand in 2030 will be 45% greater than today
- To maintain current electric fuel supply mix would mean building:

50	Nuclear reactors (1,000 MW)
261	Coal-fired plants (600 MW)
279	Natural gas plants (400 MW)
93	Renewables (100 MW)

Source: 2006 Annual Energy Outlook, Energy Information Administration

Three Nuclear Energy Scenarios

2006 Annual Energy Outlook	New Nuclear Capacity by 2030
Reference Case *($2,014/kWe → $1,733/kWe)*	**6,000 megawatts**
Advanced Nuclear Case *($2,013/kWe → $1,387/kWe)*	**34,000 megawatts**
Vendor Estimate Case *($1,659/kWe → $1,136/kWe)*	**76,700 megawatts**

Source: Energy Information Administration, Annual Energy Outlook 2006

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More Nuclear Power = Lower Greenhouse Gas Emissions

2006 Annual Energy Outlook	New Nuclear Capacity by 2030	U.S. Electric Sector Greenhouse Gas Emissions in 2030	Reduced Greenhouse Gas Emissions Due to Higher Nuclear Build Rate
Reference Case *($2,014/kWe → $1,733/kWe)*	**6,000 megawatts**	**3.318 billion tons**	–
Advanced Nuclear Case *($2,013/kWe → $1,387/kWe)*	**34,000 megawatts**	**3.209 billion tons**	**109 million metric tons lower than reference case**
Vendor Estimate Case *($1,659/kWe → $1,136/kWe)*	**76,700 megawatts**	**2.992 billion tons**	**325.6 million metric tons lower than reference case**

Source: Energy Information Administration, Annual Energy Outlook 2006

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Nuclear Units Under Construction Worldwide

Country	Units	Total MWe
Argentina	1	692
Bulgaria	2	1,906
China	4	3,610
Taiwan	2	2,600
Finland	1	1,600
India	7	3,112
Iran	1	915
Japan	1	866
Pakistan	1	300
Romania	1	655
Russia	4	3,775
Ukraine	2	1,900
Total	**27**	**21,931**

Source: International Atomic Energy Agency

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Nuclear Reactors Proposed, Planned Or Under Construction Worldwide

Country	Units	Total MWe	Country	Units	Total MWe
China	29	25,000	Vietnam	2	2,000
India	32	16,762	Czech Republic	2	1,900
Japan	14	16,715	Finland	1	1,600
United States	21	27,300	France	1	1,600
Russia	13	14,075	Canada	2	1,540
South Korea	8	9,200	Brazil	1	1,245
Iran	6	5,665	Israel	1	1,200
Turkey	3	4,500	Bulgaria	1	1,000
South Africa	25	4,165	North Korea	1	950
Ukraine	4	3,800	Slovakia	2	840
Romania	4	2,650	Argentina	1	692
Taiwan	2	2,600	Egypt	1	600
Indonesia	2	2,000	Pakistan	1	300
Total		**169 Units**			**135,699 MWe**

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Source: IAEA, WNA and NEI

Under Construction = first concrete for reactor poured, or major refurbishment underway

Planned = approvals and funding in place, or construction well advanced but suspended indefinitely

Proposed = clear intention but still without funding and/or approvals

Used Fuel Management: Where We Stand Today

- Yucca Mountain site judged suitable in 2002
  - 20 years of scientific investigation
  - $6-7 billion of research
- License application expected in 2008
- Complex program with many moving parts:
  - A collision of science, politics, the federal budget, technology, federal versus state prerogatives, business imperatives, and international policy issues

"Closing" the Nuclear Fuel Cycle Is a New Imperative

- Worldwide expansion of nuclear energy prompting renewed interest in:
  - recycling used nuclear fuel
  - advanced used fuel reprocessing technologies
  - new reactor designs able to consume fissile materials recovered from used fuel
- Together, these advanced technologies reduce volume and toxicity of nuclear waste
- But ... still need Yucca Mountain disposal facility

Used Fuel Management: Short-Term and Long-Term Goals

- Long-term goal: License and build disposal facility for waste by-products at Yucca Mountain
- Short-term goal: Maintain flexibility as we move toward long-term goal
  - Accommodate advances in fuel processing and recycling technologies
  - Provide federal storage capability before shipment to Yucca Mountain
- Federal storage options:
  - Centralized storage at Yucca Mountain
  - State/regional storage sites to consolidate used fuel away from nuclear plant sites
  - Storage at sites that will host advanced fuel processing facilities