"If Not Gas, Then ..."

The Role of Nuclear Power in a Diversified Electricity Supply Portfolio

27 March 2006

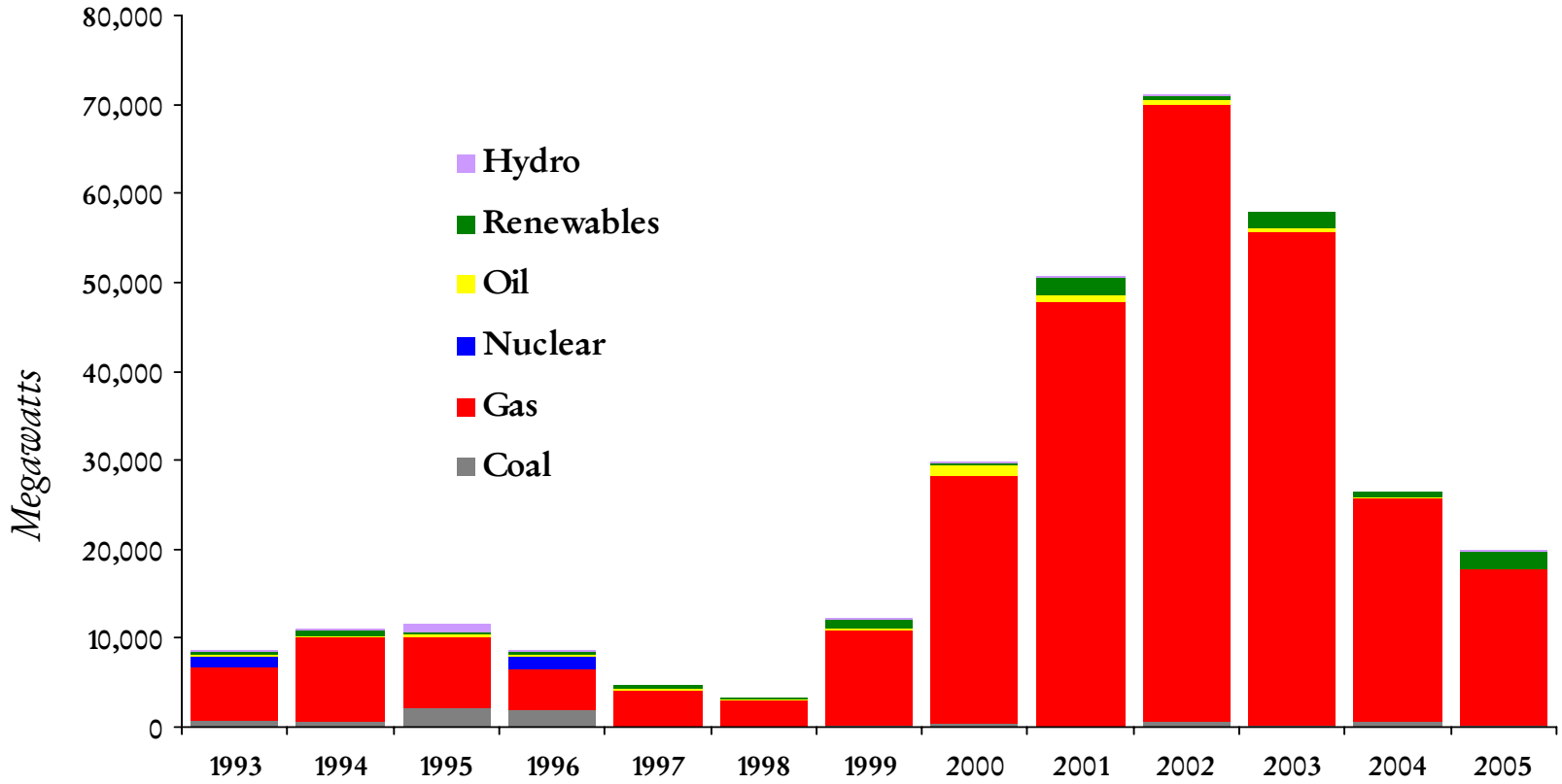
Outline

- From EPAct 1992 to EPAct 2005: Lessons learned
- Nuclear power and the Energy Policy Act of 2005
- New nuclear plant construction: Current status and prospects

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

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



Source: Global Energy Decisions

The "Dash to Gas" Since '92: Why?

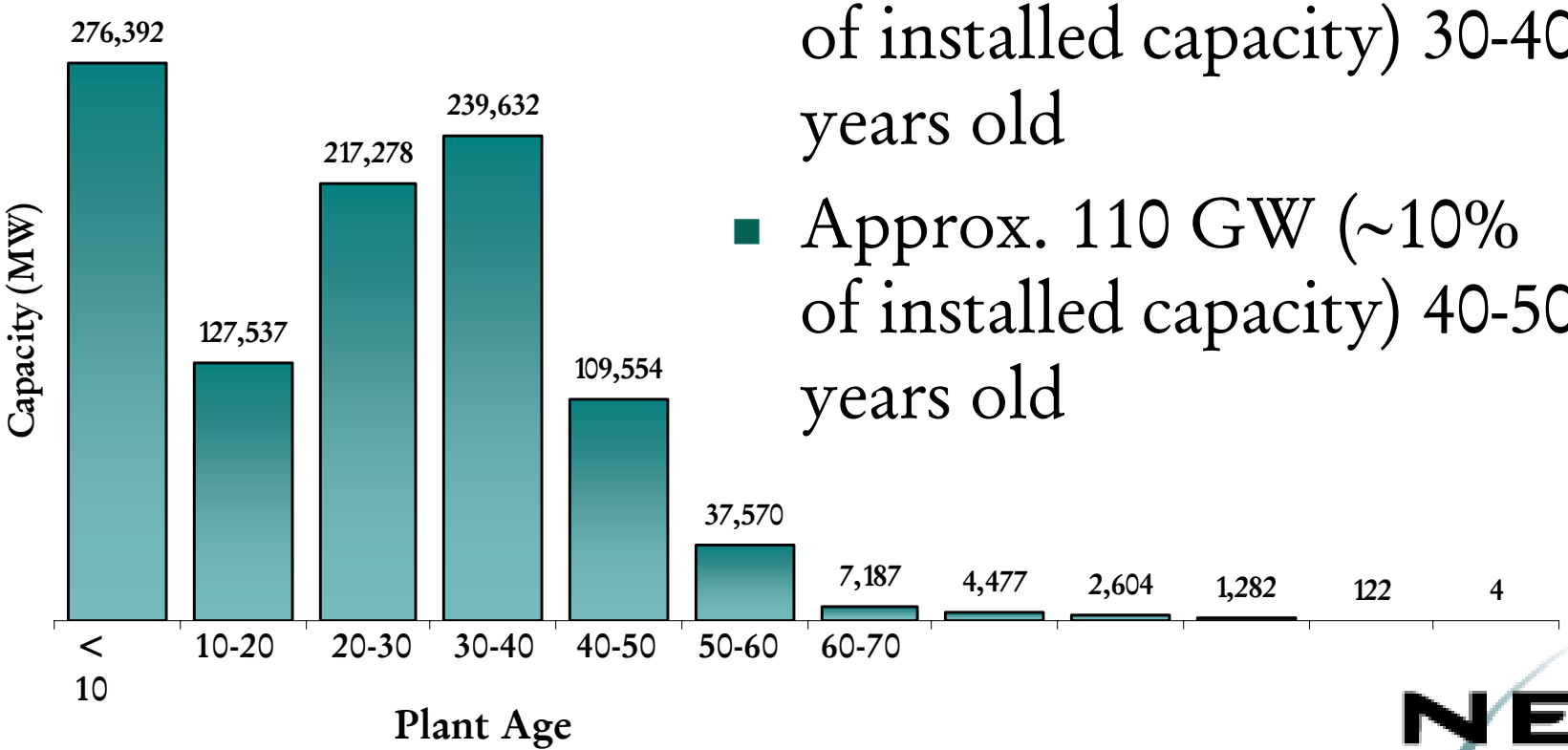
- U.S. entered the 1990s heavy on baseload
  - Needed mid-merit, peaking capacity
- At $2-2.50/million Btu, natural gas was inexpensive
- No recognition of supply constraints
- But mostly, gas-fired generating capacity represented lowest investment risk at a time of punishing business uncertainty
  -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

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 represented 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

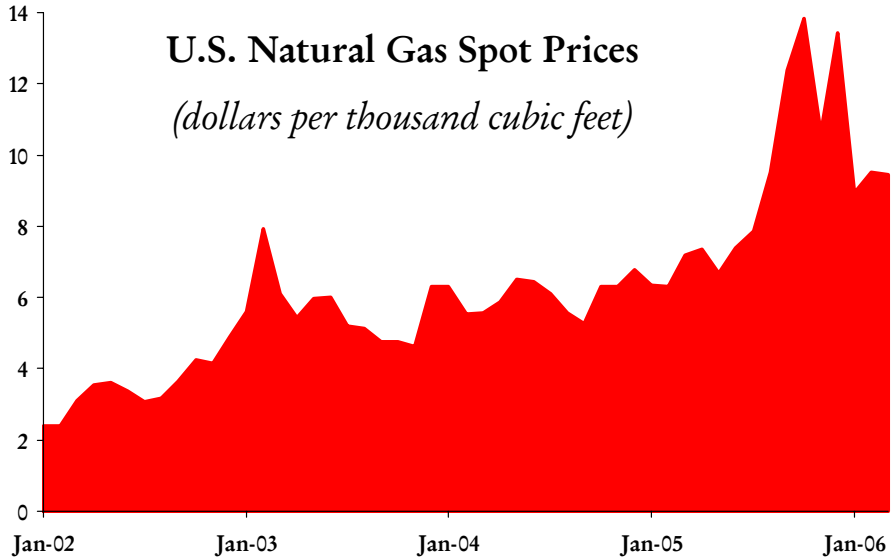
The "Graying" of the Infrastructure: Age of Generating Capacity



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

The Gas-Fired Boom and Bust

- Massive build of gas-fired capacity: Unsustainable pressure on gas supply and price
  - Periods of punishing volatility
  - Damage to other industries (chemicals, steel, plastics, etc.)
- New gas-fired combined cycle capacity running today at ~35% capacity factor



The Challenge Today: Addressing the Energy Investment Crisis

- Resurrecting coal and nuclear investment
  - **Coal:** 4 GW under construction, 70 GW in development
  - **Nuclear:** 20 GW in development
- 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)
- Developing workable approaches to ensure resource adequacy

NEI

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

Near-Term Need for New Capacity

Projected Excess Capacity by NERC Region, 2005–12, Including Power Plants Under Construction
(megawatts)

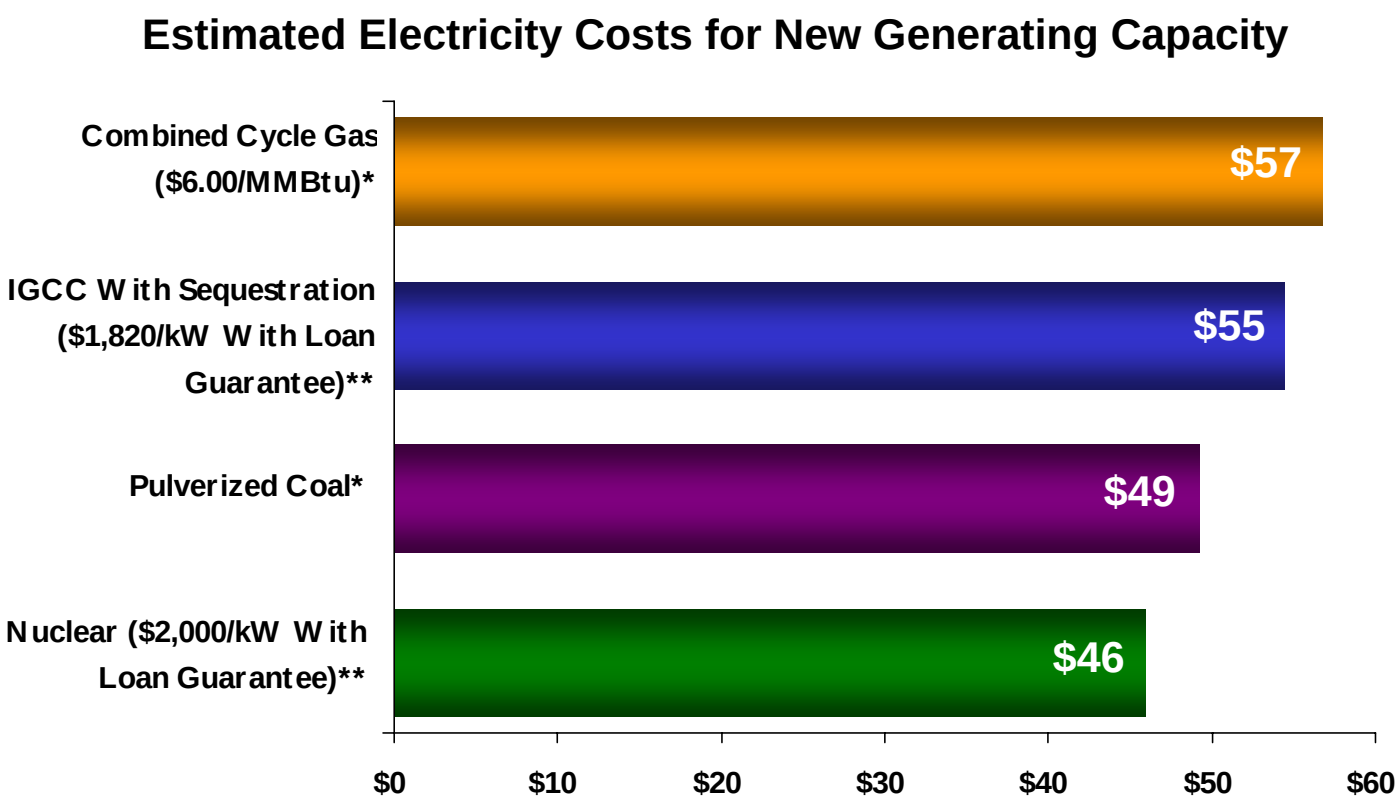
Region	2007	2008	2009	2010	2011	2012
New England	1,933	1,241	535	0	0	0
New York	1,099	0	0	0	0	0
MAAC	0	0	0	0	0	0
ECAR	10,876	8,759	6,998	4,827	2,251	0
MAIN	5,809	5,715	5,061	4,431	3,660	2,246
MAPP-US	2,267	1,319	906	205	0	0
VACAR	0	0	0	0	0	0
Southern	3,079	1,762	1,173	0	0	0
TVA	2,190	1,318	427	0	0	0
Entergy	16,134	15,111	14,500	14,458	13,788	13,105
FRCC	2,086	862	0	0	0	0
SPP	5,681	4,759	3,825	2,879	1,836	792
ERCOT	6,665	5,242	3,783	1,995	468	0
WECC-US	14,191	9,808	7,521	4,469	1,238	0
US Total	**72,010**	**55,897**	**44,729**	**33,265**	**23,241**	**16,143**

Source: Cambridge Energy Research Associates and EV Power ®, Global Energy Decisions, Inc.
Notes: (1) Required reserve margin assumed to be 18 percent in New England, New York, PJM, WECC, and FRCC; otherwise it is 15 percent; (2) Includes only known scheduled retirements.

Energy Legislation Provides Investment Stimulus for New Plants

- Federal loan guarantees
  - Covers up to 80% of project cost
  - Allows 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

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

Containing the Perceived Risk Of First New Nuclear Plants

- New licensing process reduces risk of delay
  - Project developers will have regulatory approvals before significant capital spent
- Federal standby support
  - Provides $2 billion of risk coverage for first six plants
  - Covers delays resulting from licensing or litigation

Substantial Flexibility in Structuring, Financing New Nuclear Projects

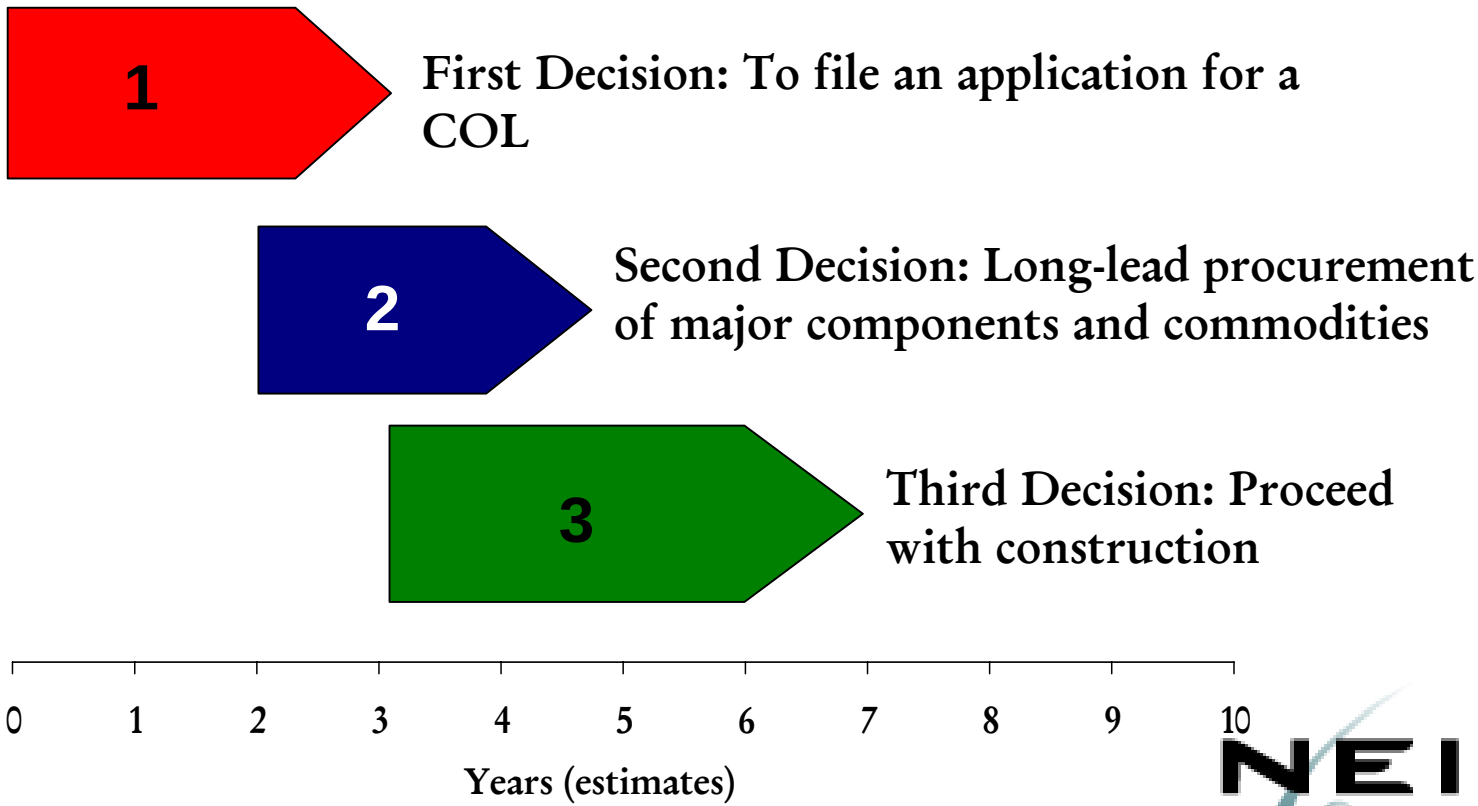
- Regulated companies:
  - in cost-of-service states, companies will build new nuclear plants as rate-base projects
  - conservative capital structure (50/50 debt/equity)
  - Substantial investment protection: Reasonable assurance that all costs prudently incurred recovered through electric rates
- Unregulated generating companies:
  - merchant projects, highly leveraged (80/20 debt/equity)
  - financing supported by long-term power purchase agreements and federal loan guarantees

Status of New Plant Licensing

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

Roadmap to Commercial Operation

Building a new nuclear plant is not a one-step process or decision: It is a sequence of 3 successive decisions



Nuclear Plant Build Rates

AEO 2006	2020	2030
Reference Case *($2,014/kW → $1,733/kW)*	6 GW	6GW
Advanced Nuclear Case *($2,013 → $1,387/kW)*	8.9 GW	34 GW
Vendor Estimate Case *($1,659 → $1,136/kW)*	13.3 GW	76.7 GW

CERA ($2,000 - $2,350/kW)	2020
Shades of Green	9GW
World in Turmoil	0
Technology Enhanced	18 GW
Rearview Mirror	7 GW

How Much Nuclear Power Do We Need?

- 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

Looking Ahead: What's the Next Big Thing?

- On the verge of a major build cycle in the U.S.:
  - ~75 GW of new coal-fired capacity
  - ~20 GW of new nuclear capacity
  - ~10-15 new LNG regasification terminals
  - Gas pipeline from Alaska, plus significant expansion of lower-48 pipeline network
  - And other critical infrastructure (roads, bridges, cities)
  - And around the world (China, India, etc.)

Materials, Manufacturing: The Next Big Thing?

- To support a major build cycle takes:
  - Commodities (structural and specialty steels, concrete, etc.)
  - Pipe, compressors, valves, tubing, vessels, steam generators, pumps, steam turbines, reactor vessels, forgings, etc.
- Has anyone done a global inventory of capacity available to support new build cycle across entire energy sector?
- Example: Only one supplier (Japan Steel Works) worldwide for ultra-large ring forgings used to fabricate reactor pressure vessels

24' Diameter x 13' High: 127 Tons