



Constellation Energy

activity responsibility
teamwork
community
ENERGY
expertise



value creation
MATTERS
growth results produ
excellence
innovation

Prospects for Expansion
of Commercial Nuclear Energy
in the United States
CSIS - November 28, 2007

Michael J. Wallace

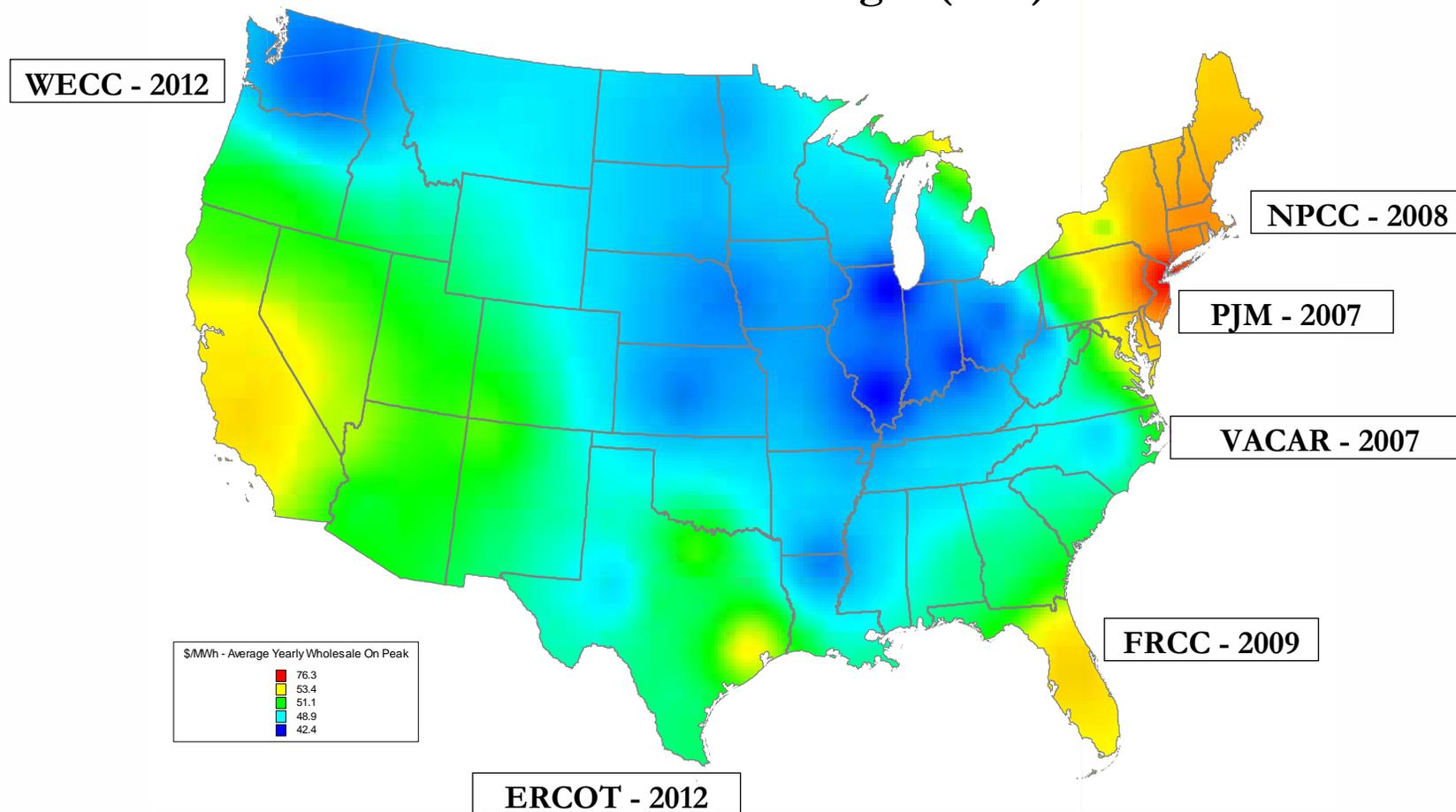
President and CEO Constellation Energy Nuclear Group
Chairman, UniStar Nuclear Energy

Agenda

- 1. Energy Demand and the Nuclear Solution**
2. Challenges then and now
3. Regulatory Changes
4. Workforce and Infrastructure Issues

Supply and Demand Fundamentals

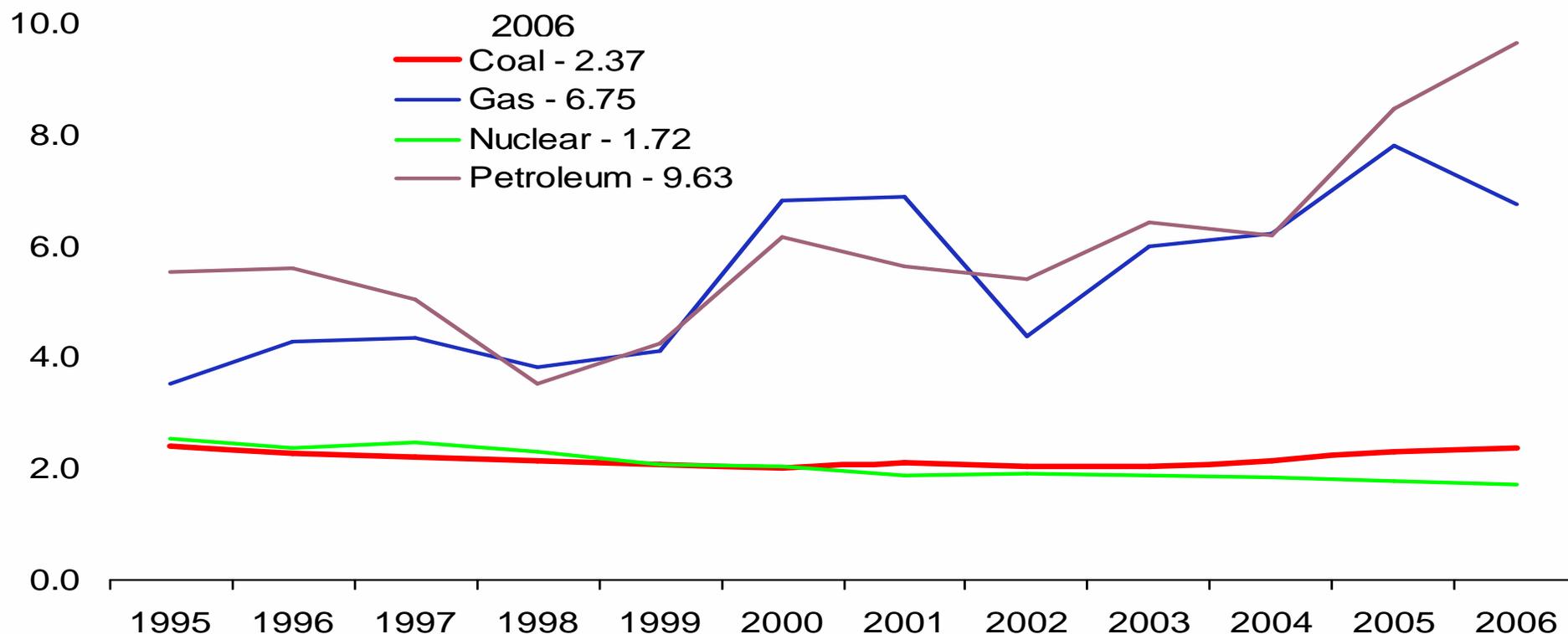
Date when minimum reserve margin (18%) is reached



The U.S. has a growing need for new generation

U.S. Electricity Production Costs

1995-2006, In 2006 cents per kilowatt-hour



Production Costs = Operations and Maintenance Costs + Fuel Costs

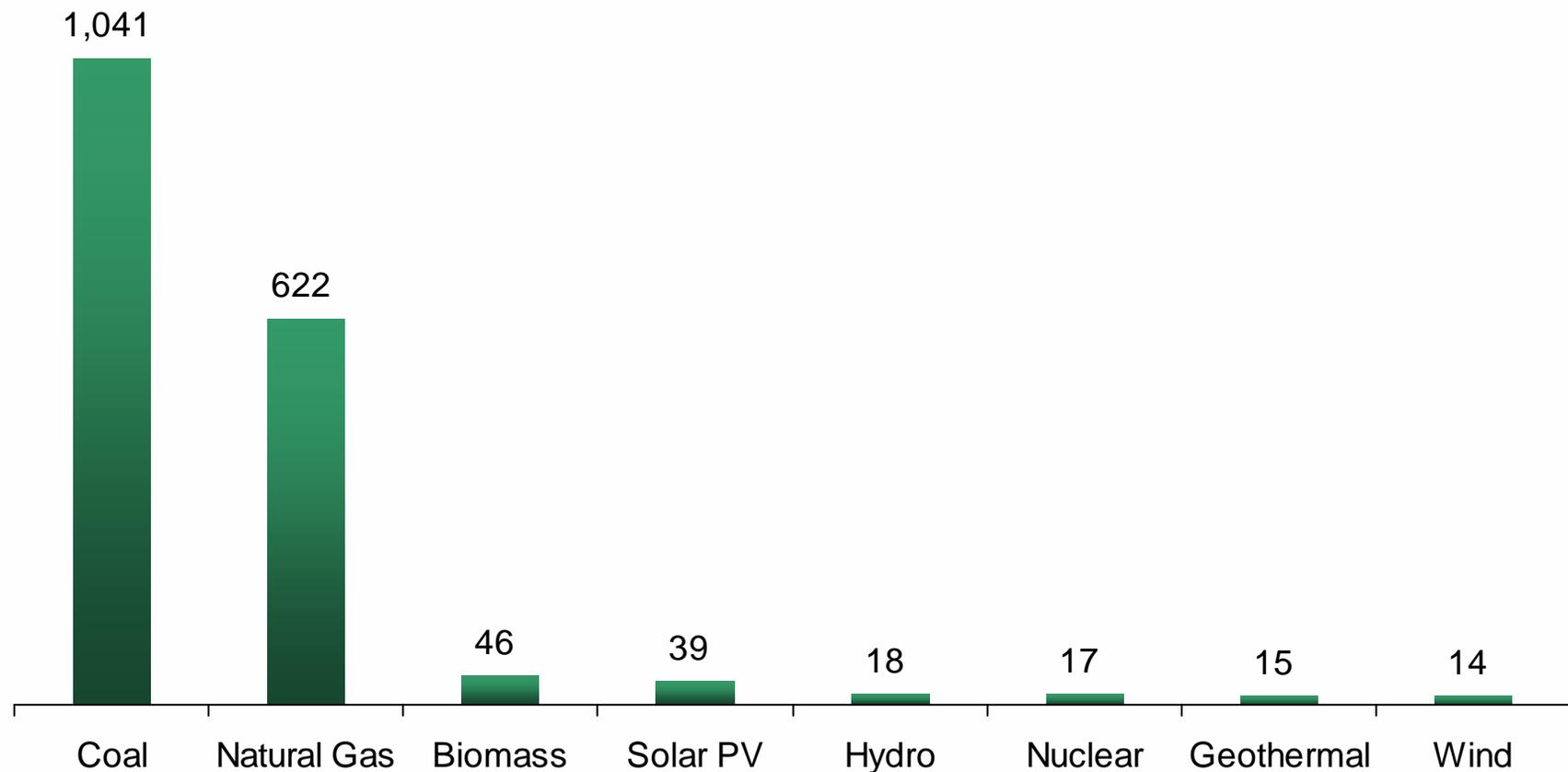
Source: Global Energy Decisions

Updated: 6/07

Nuclear Production Costs Per KWH Reflect Increased Output

Comparison of Life-Cycle Emissions

Tons of Carbon Dioxide Equivalent per Gigawatt-Hour



Source: "Life-Cycle Assessment of Electricity Generation Systems and Applications for Climate Change Policy Analysis," Paul J. Meier, University of Wisconsin-Madison, August 2002.

Production Alternative Comparison

Alternative	Production Costs (Cents per kw)	CO2 Emissions (Tons per Gigawatt-hour)	Estimated Capital Costs (all - in) (\$s per KW capacity)*
Oil	9.63	809	~900
Gas	6.75	622	~1000
Coal	2.37	1041	~2,900
Nuclear	1.72	17	~5,000

*Source for Capital Cost Estimates: October 2007, Moody's Corporate Finance – New Nuclear Generation

Agenda

1. Energy Demand and the Nuclear Solution
2. **Challenges then and now**
3. Regulatory Changes
4. Workforce and Infrastructure Issues

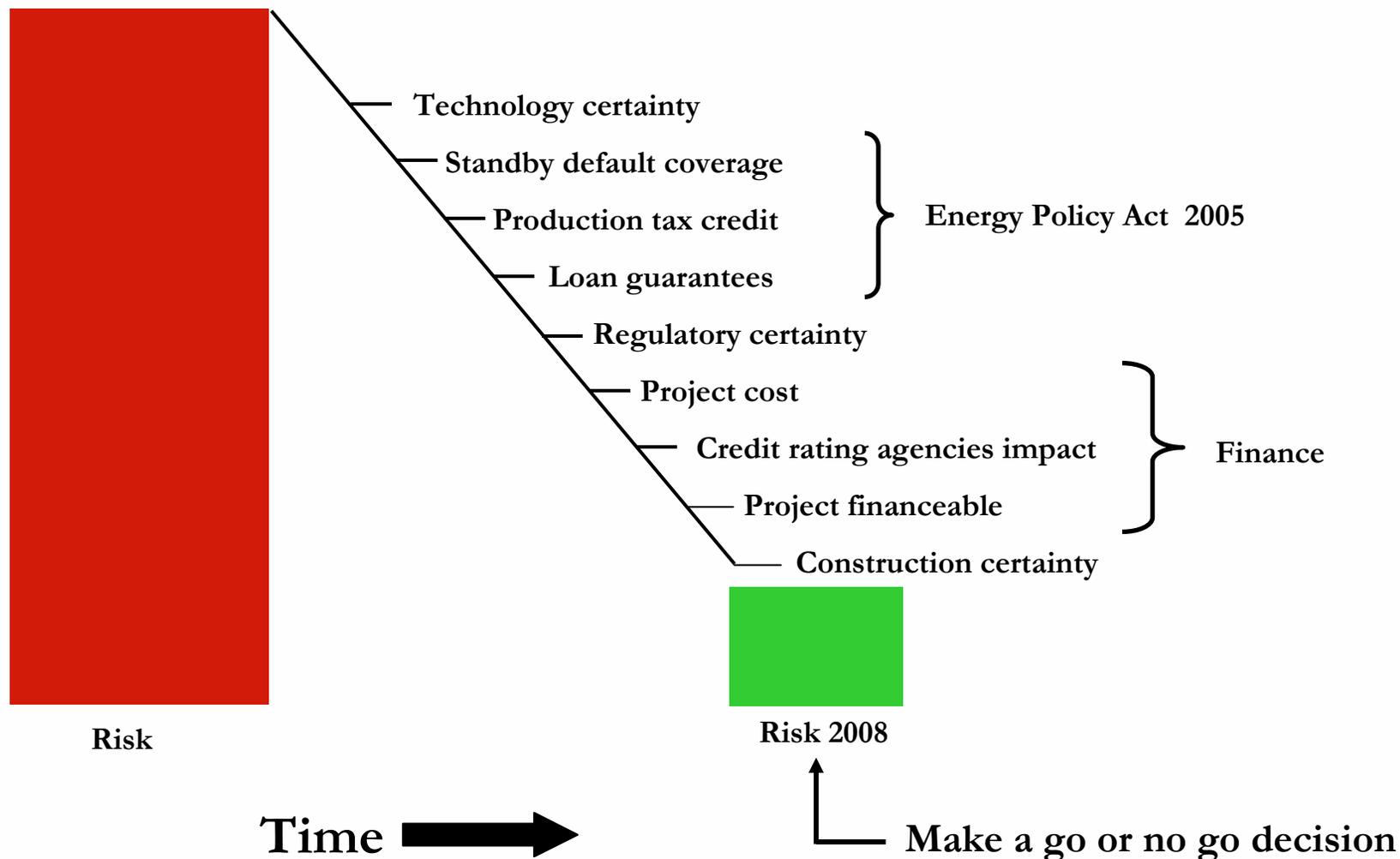
“New Nuclear U.S.” – Why such a challenge then?

- 25 Years since last construction start
- The ‘70s and ‘80s saw:
 - Three Mile Island inspired changes
 - Physical Plant Design
 - Construction Requirements
 - Operating Processes/Procedures
 - Large cost and schedule overruns
 - Plants abandoned (Marble Hill)
 - Plants completed/don’t operate (Zimmer, Shoreham)
 - ‘Prudency’ issues and financial distress for many utilities
- Challenging plant operations in ‘80s and ‘90s
 - Extended outages
 - Early shutdowns (Zion, Connecticut Yankee)

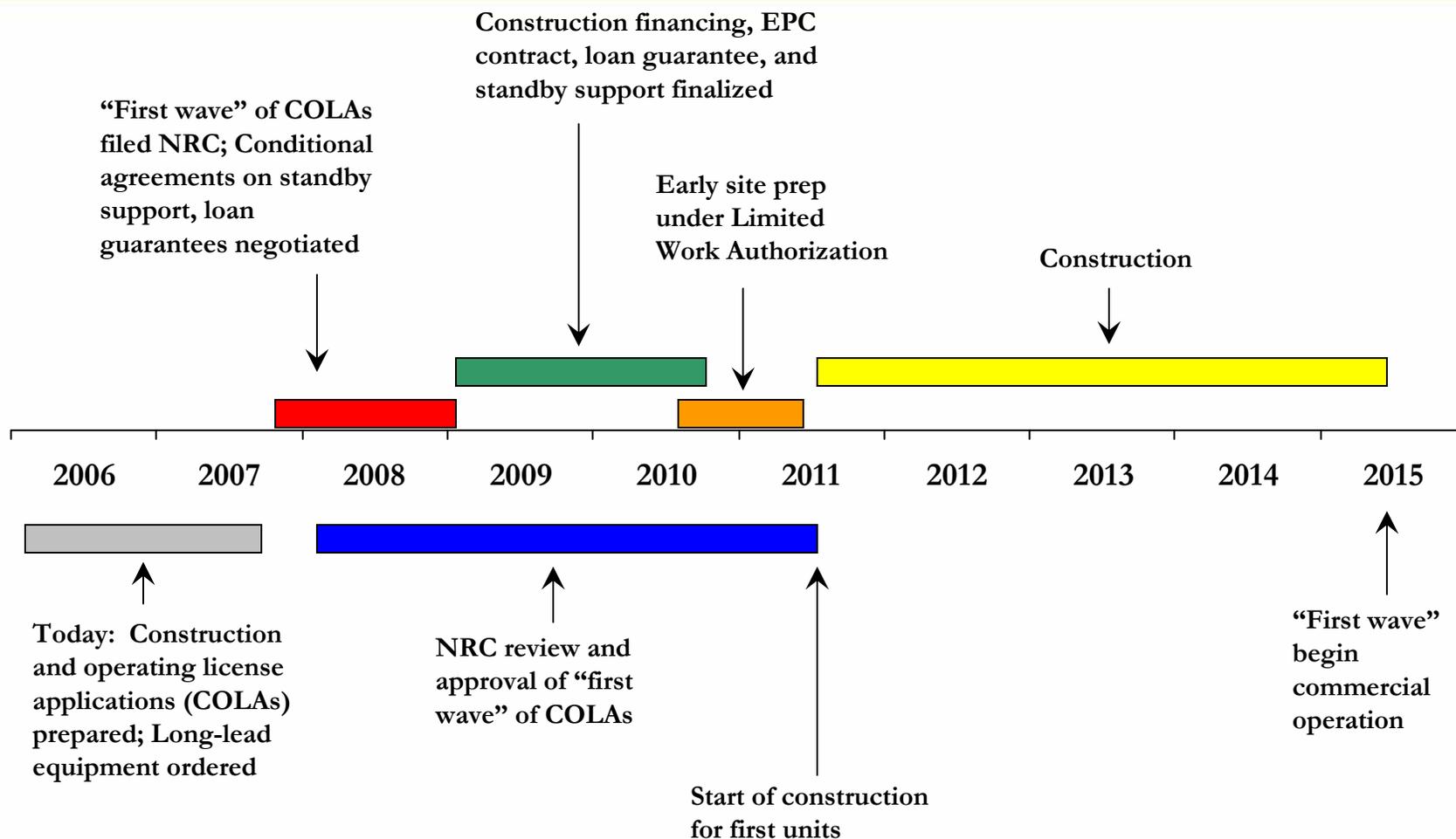
“New Nuclear U.S.” – Why such a challenge now?

- Lack of U.S. nuclear infrastructure
 - Manufacturing
 - Services
 - Craft labor force
- Untested licensing process
 - Two-Step process should cure many issues
- Knowledge and experience of nuclear construction from “last time” seriously diminished
 - Abundance of caution
 - Many risks
- Global competition for resources
- Spent fuel storage is a political issue, not a technical issue

Driving down the level of uncertainty



Timing of New Nuclear Plant Deployment



Agenda

1. Energy Demand and the Nuclear Solution
2. Challenges then and now
- 3. Regulatory Changes**
4. Workforce and Infrastructure Issues

Energy Policy Act of 2005

- Jump starts the nuclear industry by providing:
 - Loan Guarantees
 - Production Tax Credits
 - Standby Default Coverage

Energy Policy Act of 2005 Incentives

	Standby Support	Production Tax Credits	Loan Guarantees
Function	<ul style="list-style-type: none"> Limited financial protection against licensing/litigation delays 	<ul style="list-style-type: none"> Provide tax-based incentive to construct own and operate new nuclear plants 	<ul style="list-style-type: none"> Provides credit enhancement for debt-financing that should facilitate nuclear plant construction
Availability	<ul style="list-style-type: none"> \$500 M – first 2 units \$250 M – next 4 units 	<ul style="list-style-type: none"> \$18/MWhr – first 8 years of operation 6,000 MW eligible \$125 M per 1,000 MW installed 	<ul style="list-style-type: none"> Available to all plants
Proposed Conditional Queue	<ul style="list-style-type: none"> COL docketed by NRC 	<ul style="list-style-type: none"> COL docketed by NRC on or before Dec 31, 2008 	N/A
Proposed Firm Queue	<ul style="list-style-type: none"> COL issued by NRC Construction commencement 	<ul style="list-style-type: none"> COL issued by NRC Construction commencement on or before Jan 1, 2014 Facility expected to be placed in service prior to Jan 1, 2021 	N/A
Rulemaking Timeline	<ul style="list-style-type: none"> Interim Rule Published May 8, 2006 (30 day comment period) Final Rule – Aug 2006 	<ul style="list-style-type: none"> Interim guidance published May 1, 2006 	<ul style="list-style-type: none"> “Trial balloon” draft solicitation issued by DOE in 2006 Rulemaking issued October 2007

Government incentives reward early movers; rulemaking process still in progress

Loan Guarantees

- Federal Loan Guarantees are imperative to the New Nuclear solutions
 - Capital requirements would likely strain balance sheets of the largest regulated and merchant nuclear power generating companies
 - Perceived risk by financial community requires federal government risk mitigation
- Fundamental benefits of Loan Guarantees is creating:
 - Access to capital at attractive rates
 - Opportunities to leverage equity
- Loan Guarantees also helpful in:
 - Dealing with new technology risk
- Energy Policy Act
 - Driven by significant public policy benefits, including generation at attractive prices
 - Policy must be applied effectively in a sustained fashion over a long period of time

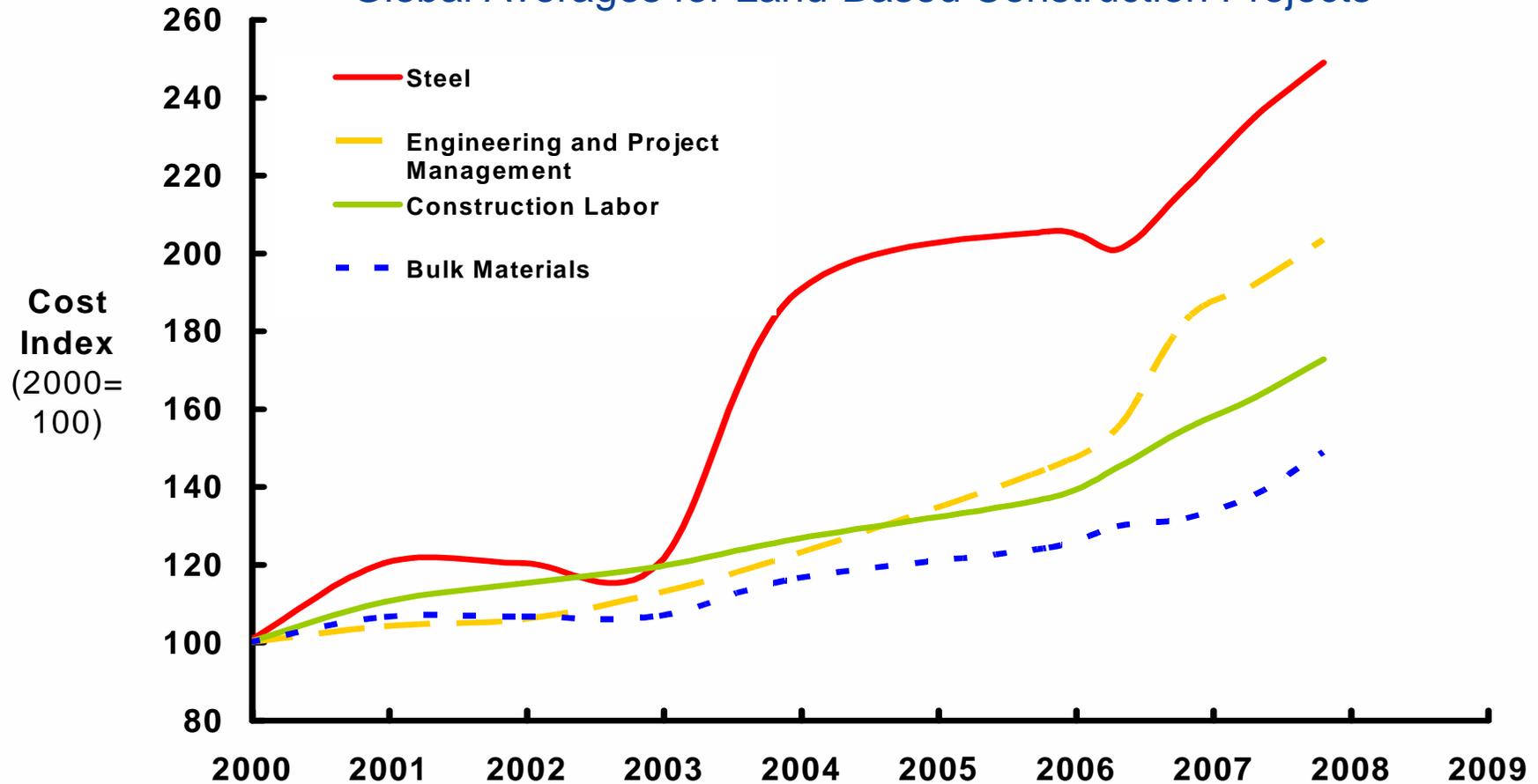
Loan Guarantees are a critical topic in the New Nuclear effort

Agenda

1. Energy Demand and the Nuclear Solution
2. Challenges then and now
3. Regulatory Changes
4. **Workforce and Infrastructure Issues**

Escalation Of Construction Cost Components:

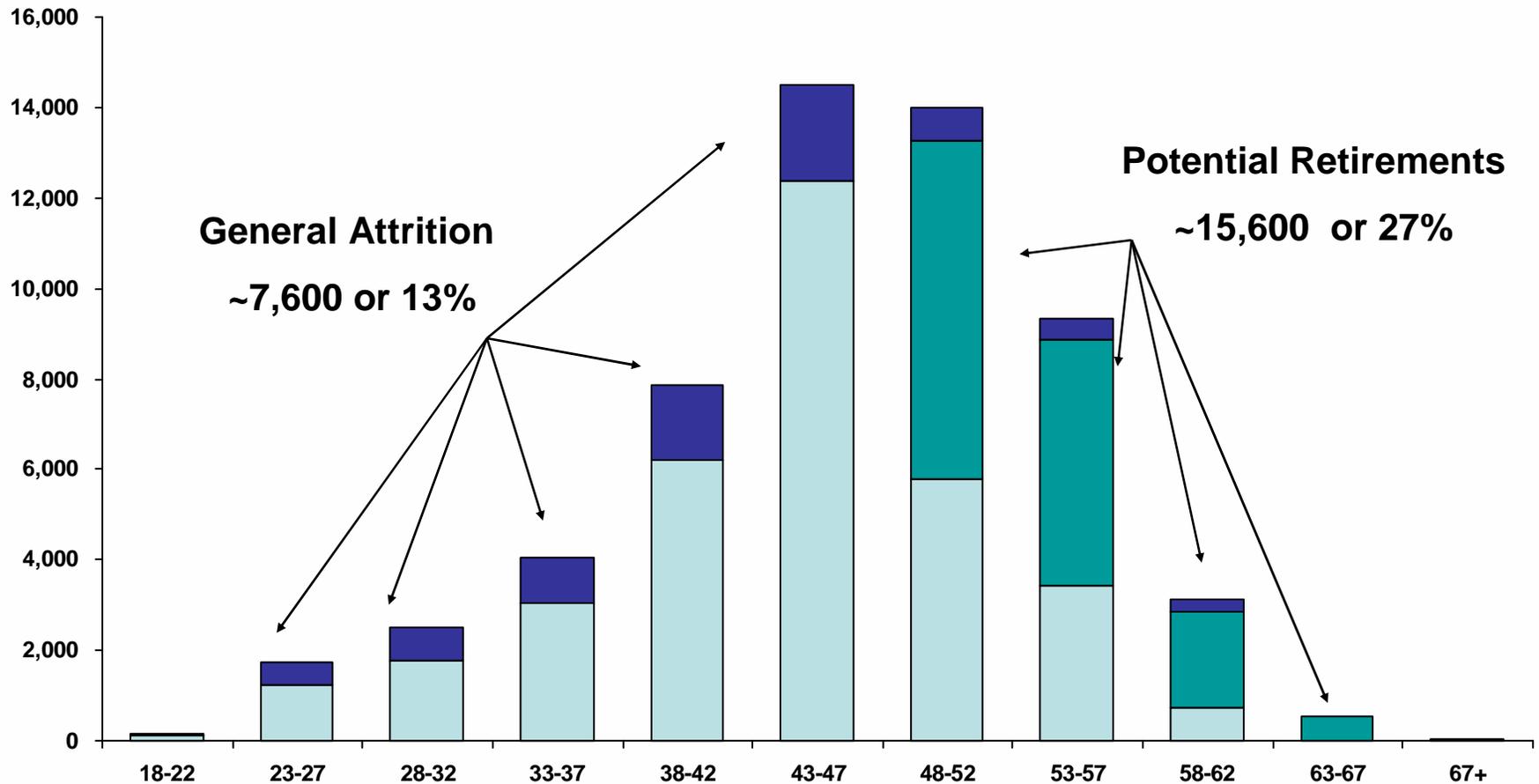
Global Averages for Land-Based Construction Projects



Source: Cambridge Energy Research Associates Capital Costs Analysis Forum (CCAF).
 Note: "Bulk Materials" includes cement, steel rebar (for cement castings), wiring, asphalt, low-level valves, etc.
 Construction_Costs_CCAF

Upward Cost Trend Demands Rigor In Project Management And Supply Chain

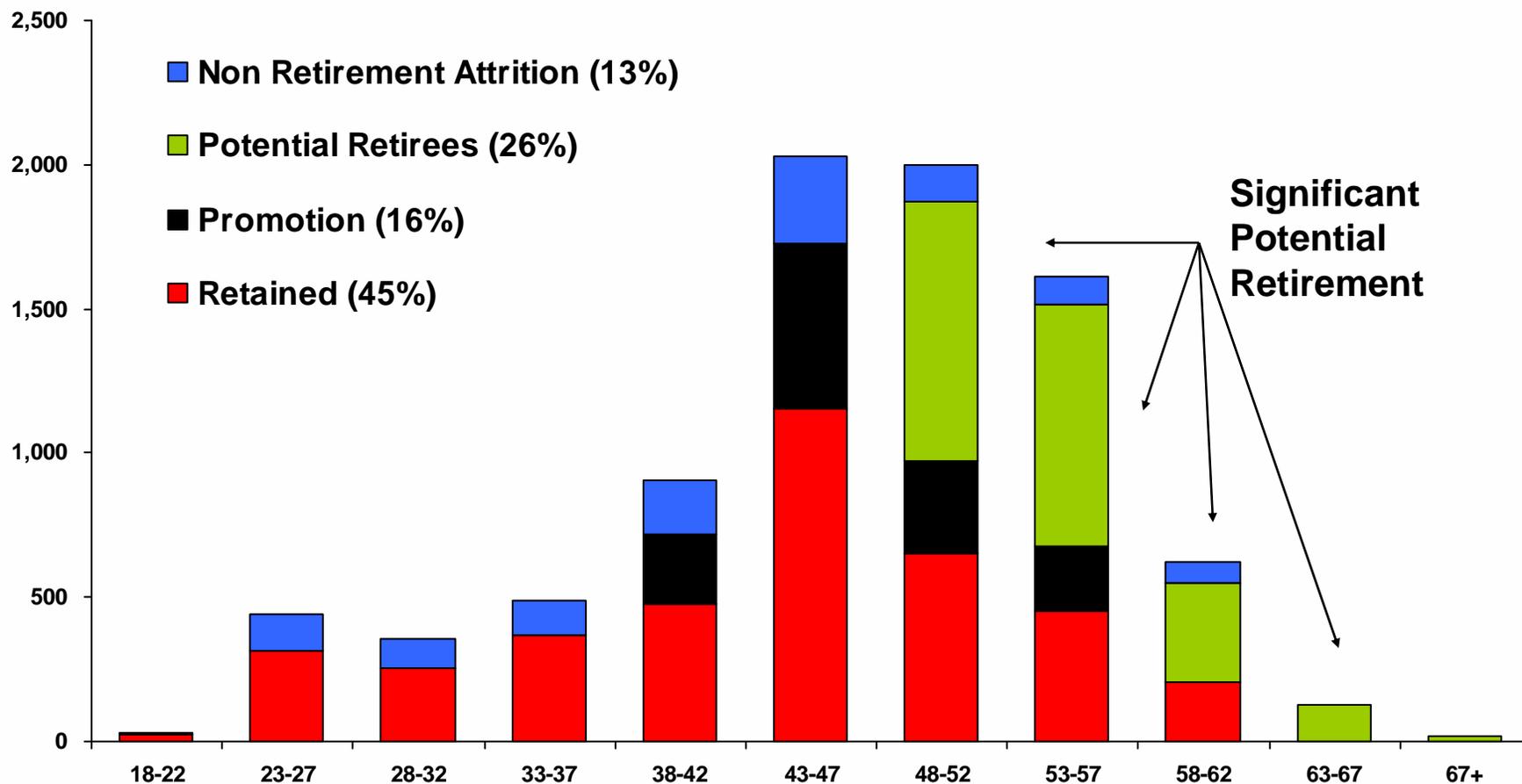
Nuclear Generation 5-Year Attrition



1. Potential Retirees are defined as employees that will be older than 53 with 25+ years of service, or older than 63 with 20 years of service, or older than 67 within the next five years.

Source: 2005 NEI Pipeline Survey

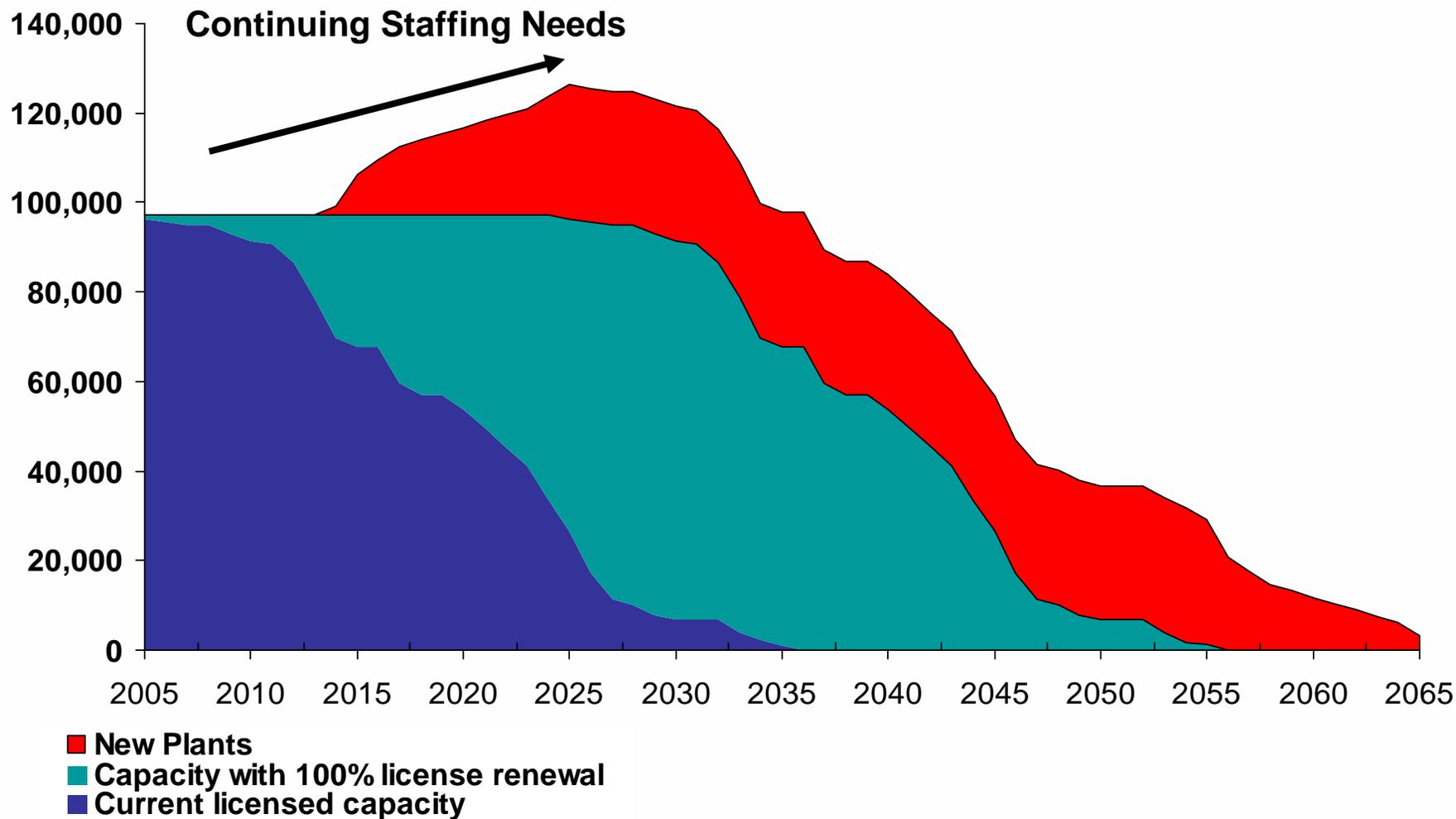
Nuclear Generation Engineering 5-Year Attrition



1. Potential Retirees are defined as employees that will be older than 53 with 25+ years of service, or older than 63 with 20 years of service, or older than 67 within the next five years.

Source: 2005 NEI Pipeline Survey

US Nuclear Generating Capacity License Renewal and New Plants



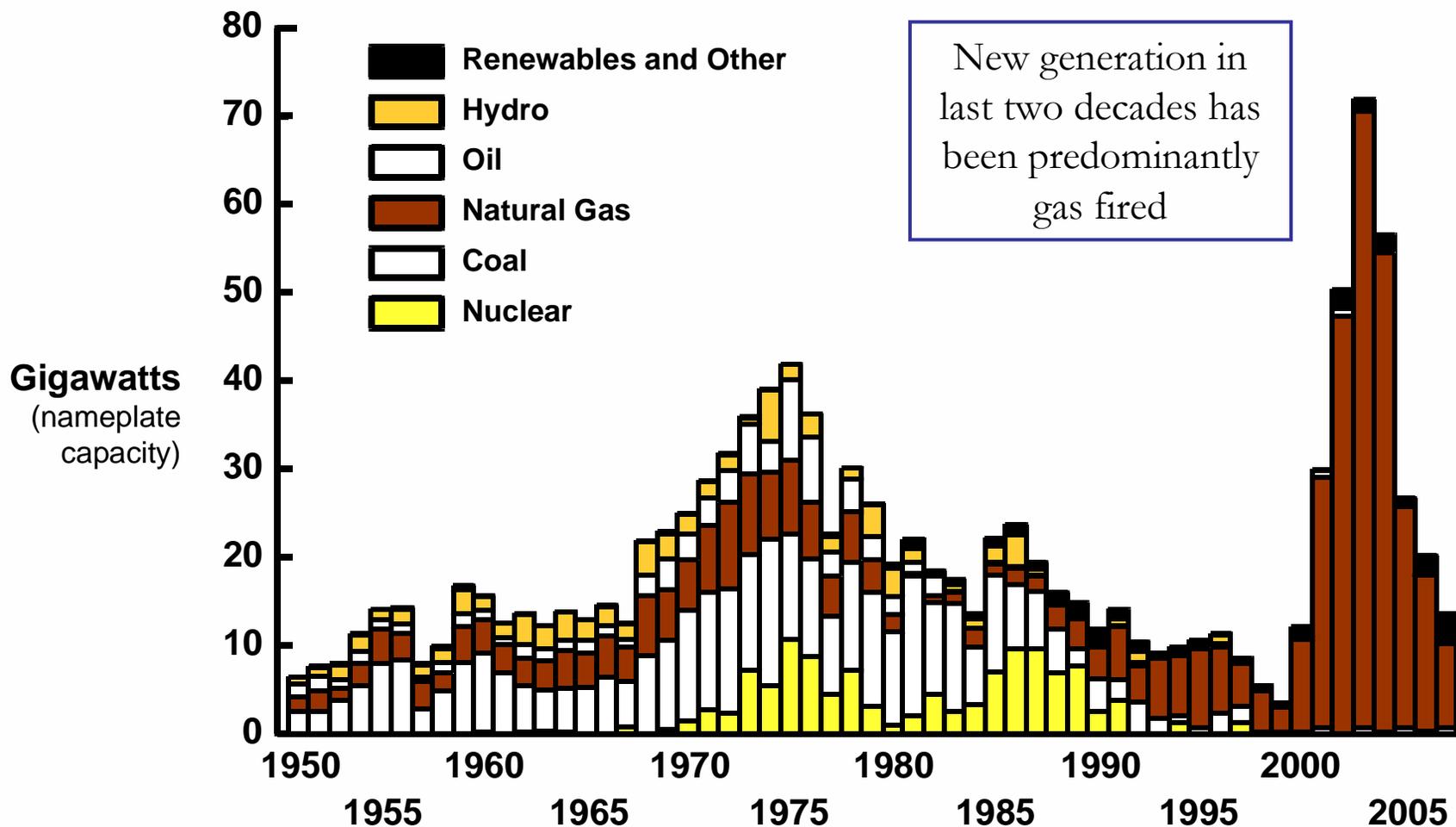
Supplemental Slides

Industry Overview

- **US demand is beginning to outstrip capacity** - reserve margins are shrinking especially in certain regions of the country / most capacity additions this decade have been gas but gas prices remain high
- **Commodity prices are rapidly escalating** - competition for resources is now global / fossil fuel cost are trending upward while uranium prices which had spiked are now falling
- **Real retail energy prices are trending higher after two decades of decline**
- **Nuclear generation is a viable, cost competitive technology when all aspects considered (higher construction investment but significantly lower production costs and CO₂ emissions) - greenhouse gas regulations continue to be implemented across the country further weighing on fossil generation**

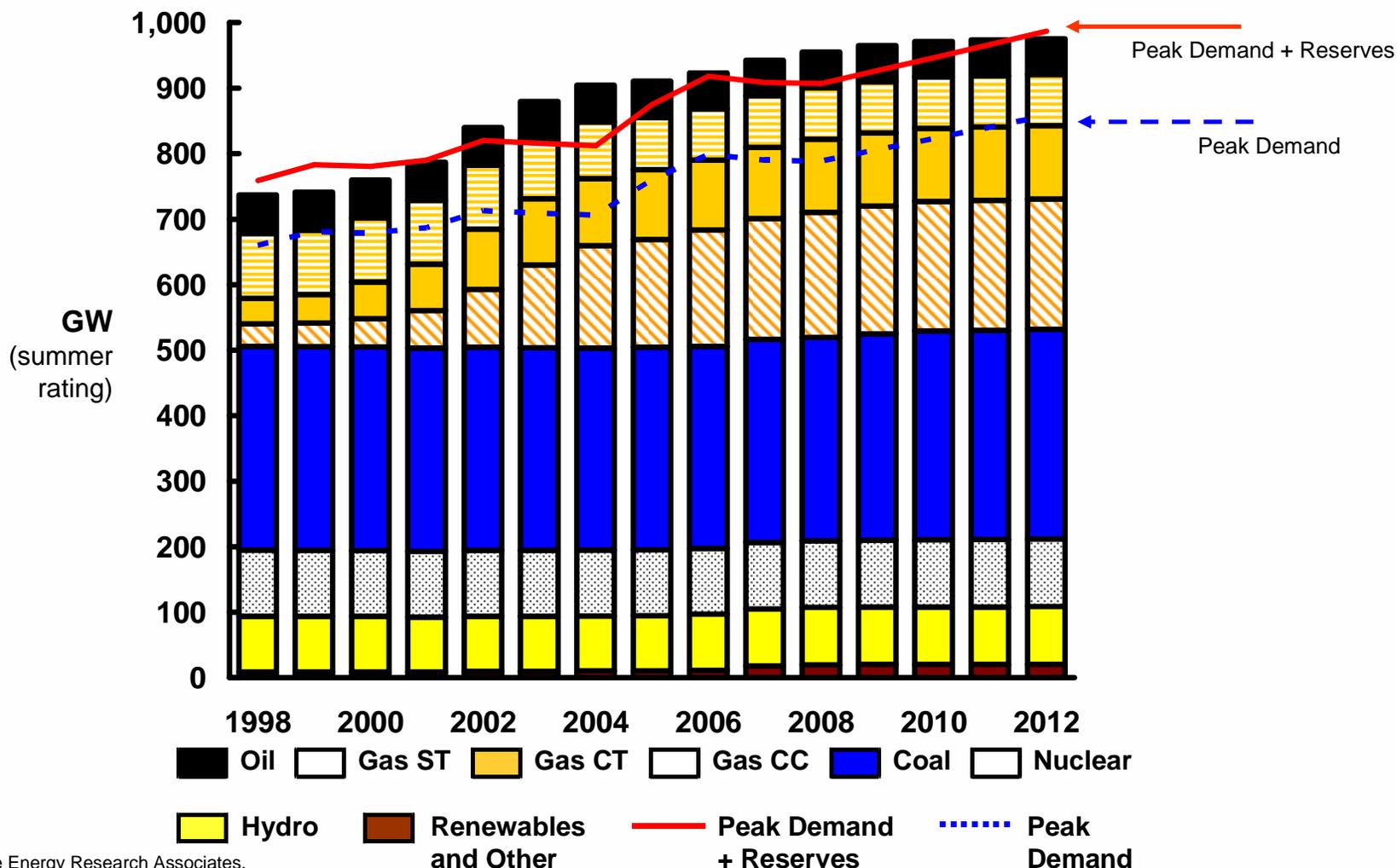
The Current Environment Supports a Balanced Nuclear Policy for the US

US Power Generating Capacity Additions, 1950–2006



Source: Cambridge Energy Research Associates and EV Power®, Global Energy Decisions, Inc. 70408-2

US Generating Capacity & Peak Demand, 1996–2010

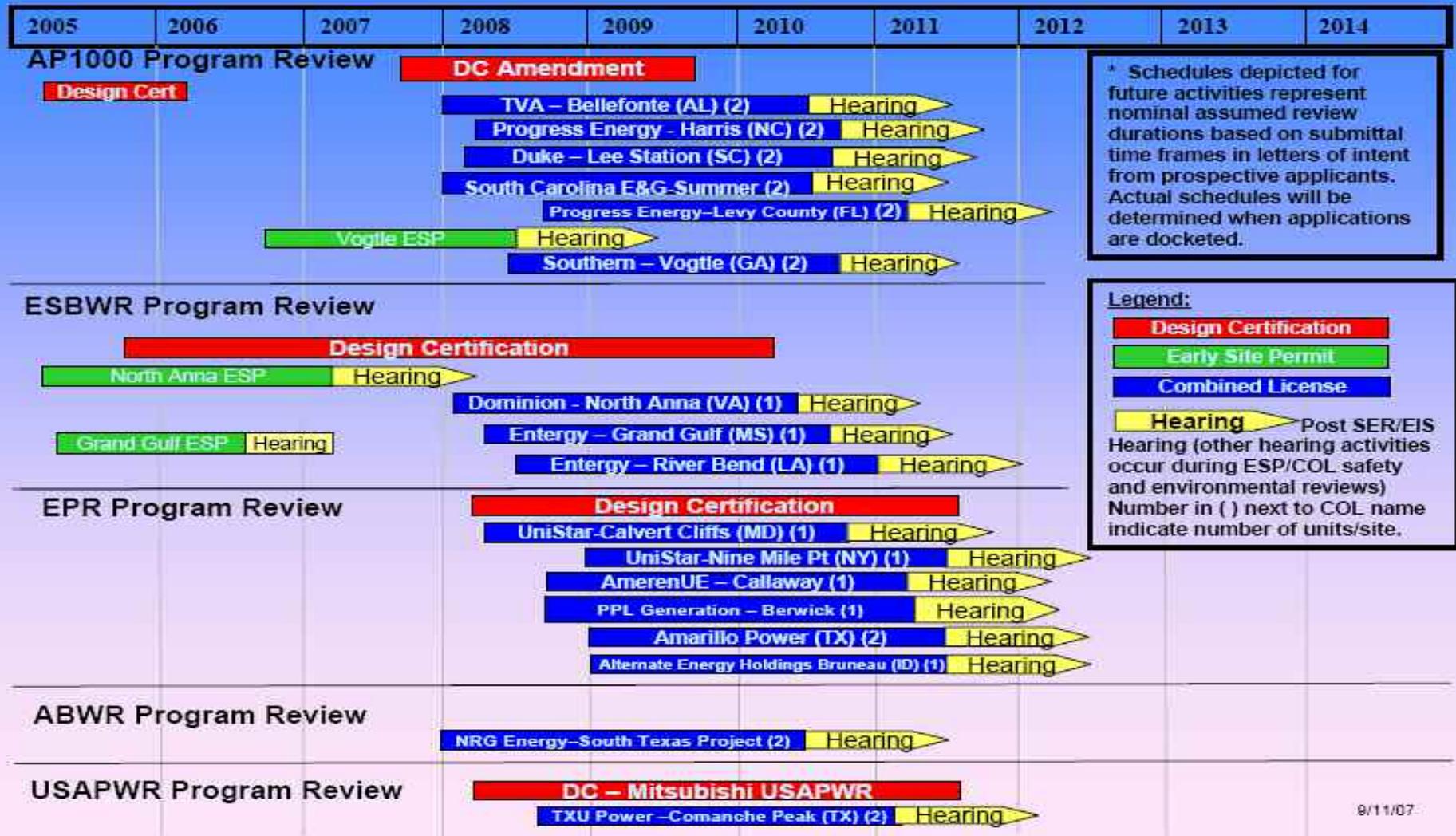


Source: Cambridge Energy Research Associates.
 Notes: ST = steam; CT = combustion turbine; CC = combined cycle.
 Operating capacity for 2006–10 includes only capacity currently under construction and announced retirements.
 60512-6_1804_UO supply stack.xls_1007

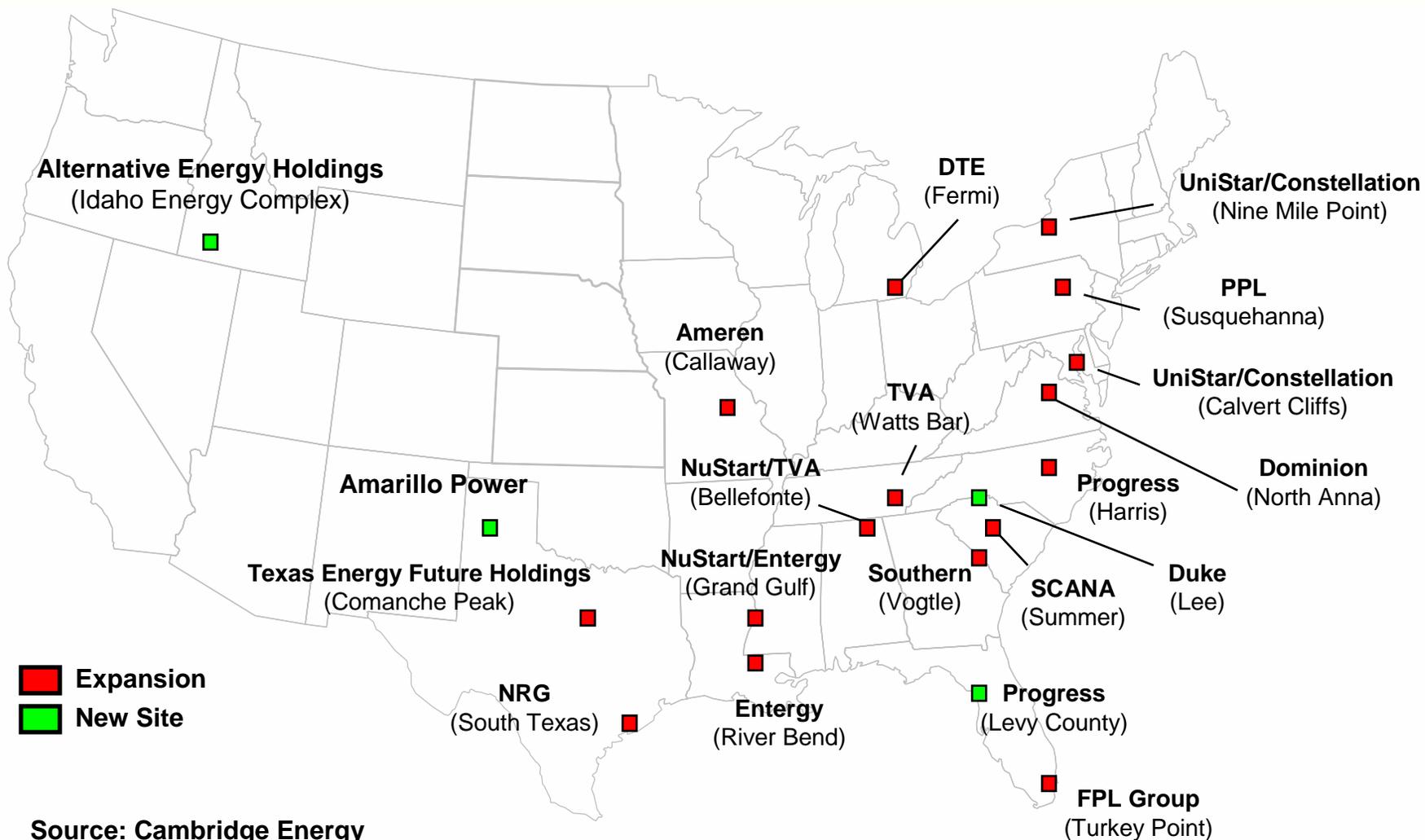
New Nuclear in the U.S.

New Reactor Licensing Applications (Site and Technology Selected)

An estimated schedule by Fiscal Year

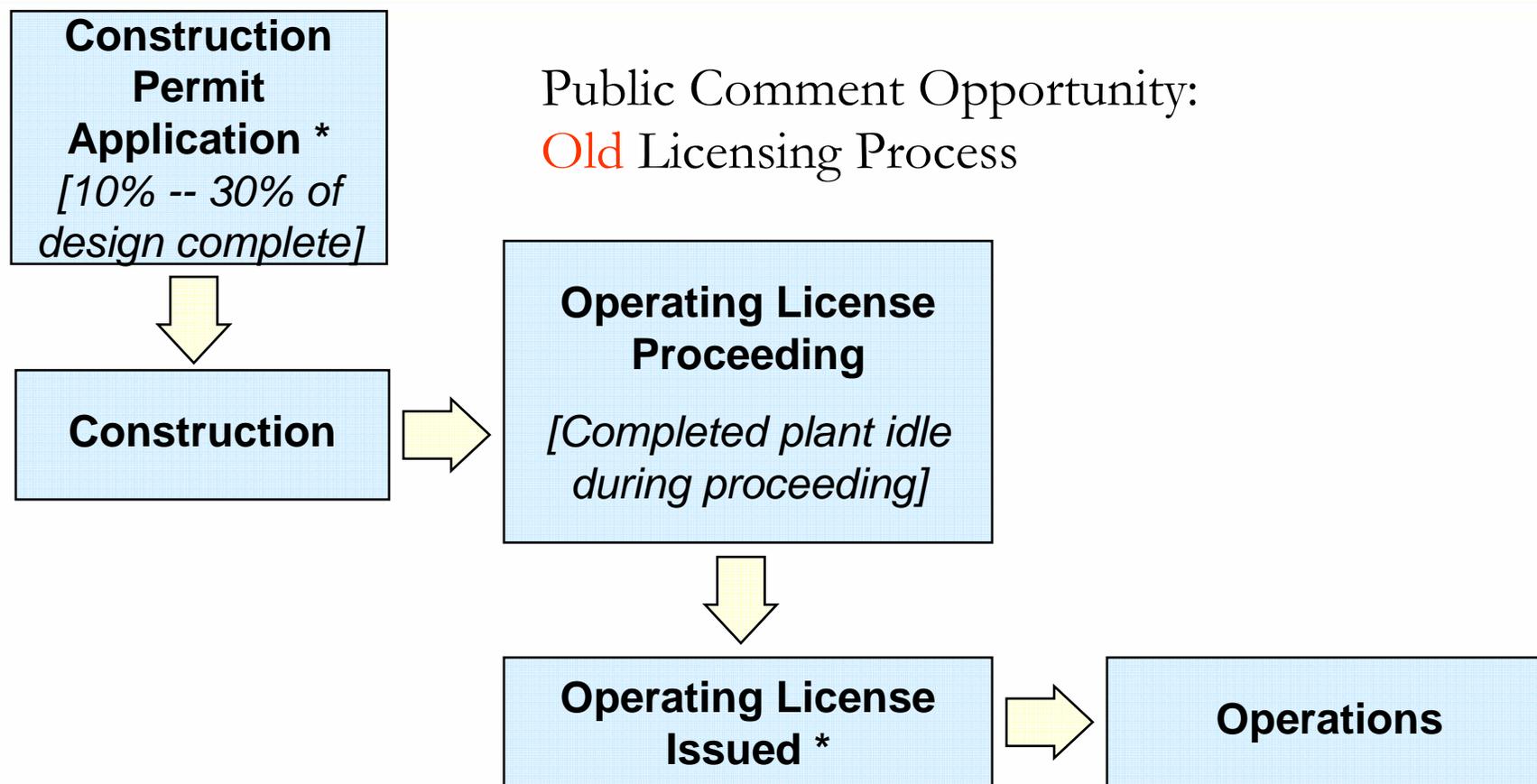


Proposed New Nuclear Plant Sites



Source: Cambridge Energy Research Associates.

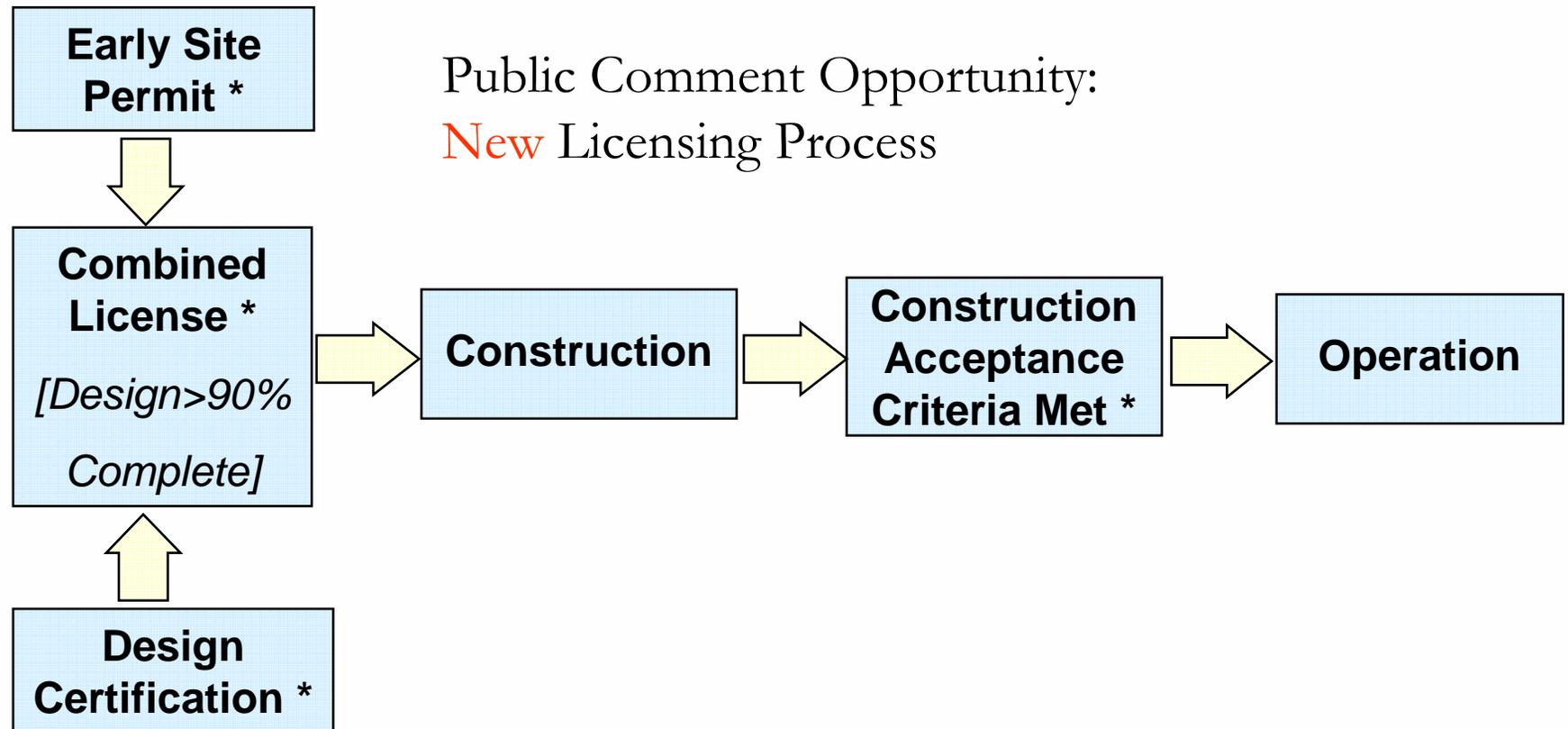
Background - Licensing Process "Old"



*** Public Comment Opportunity**

Note that in this sequential process reviews are overlapping, producing a process that is both inefficient and unpredictable.

Background - Licensing Process "New"



Public Comment Opportunity:
New Licensing Process

* Public Comment Opportunity

Note that regulatory reviews regarding suitability of the site and design of the plant, once completed, are not revised prior to the issuance of the COL. Comments concerning construction acceptance are limited to issues associated with inspections, tests, analyses, and acceptance criteria (ITAAC)