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# Supporting New Build and Nuclear Manufacturing in South Africa

ASME Nuclear Codes and Standards Workshop

Sandton, South Africa

October 7 – 8, 2008

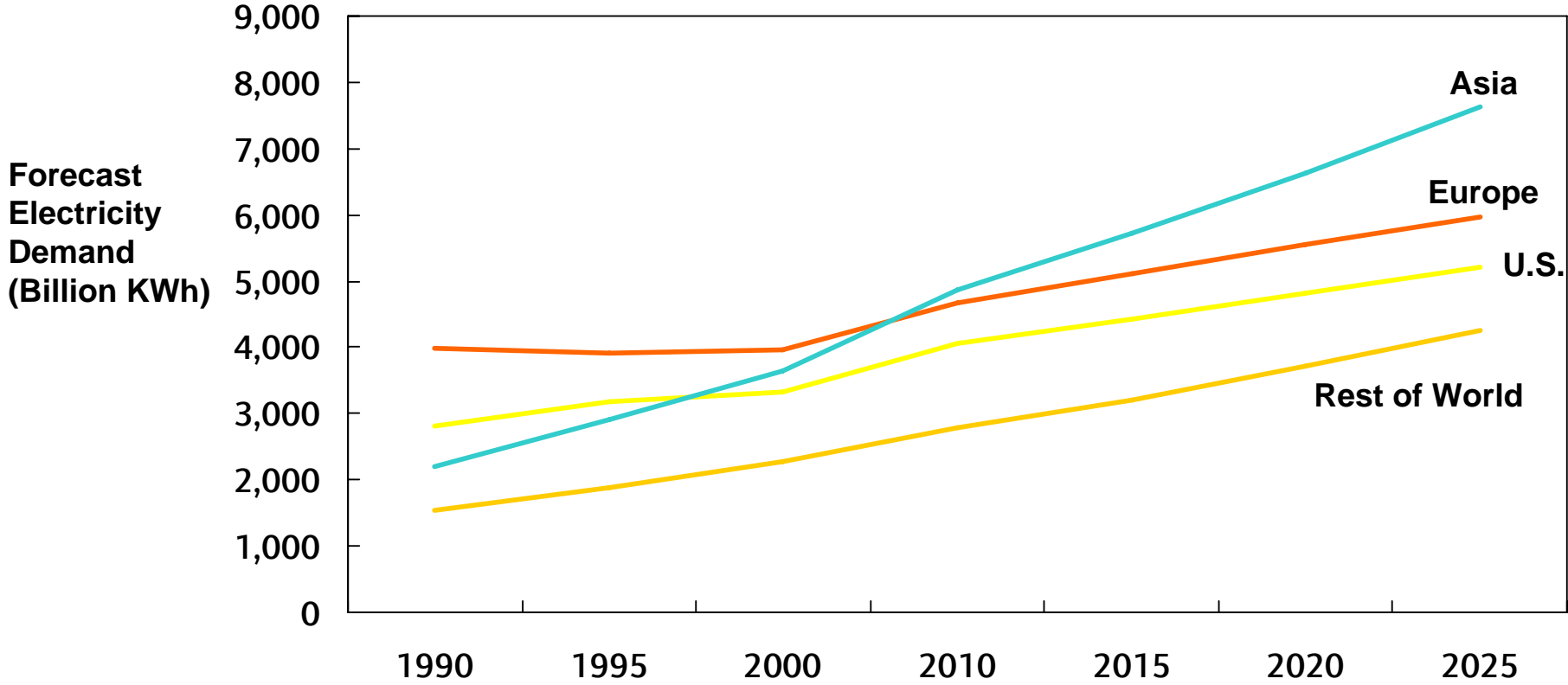
Dr. Mahendra Patel

Westinghouse Nuclear Power Plants

Supply Chain Management



# Growing Energy Demands



Source: Energy Information Administration (EIA)



# Nuclear Renaissance

When?  
Right now!



# The Nuclear Renaissance

## Where? Just About Everywhere!



# Drivers of Global Market for Nuclear Plants

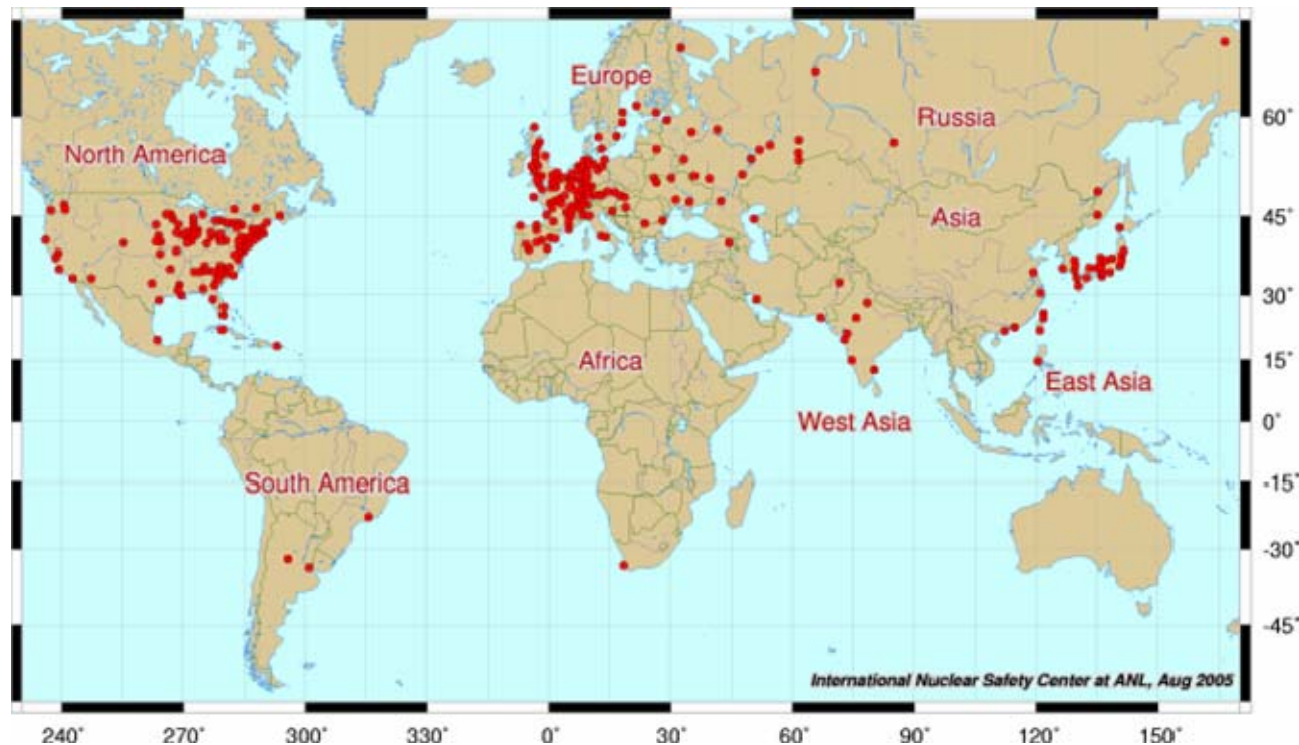
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- Rapidly growing economies - Asia
- Coal transport limits
- Need for fuel supply security, price stability – natural gas deliveries cut by Russia in contract dispute
- Kyoto Accords – reduce greenhouse gas emissions
- Old plants retiring



# Nuclear Power Reactors, Worldwide

- **439 reactors operating in 30 countries**
  - Generate about 15% of world's electricity



# Current and Future Construction

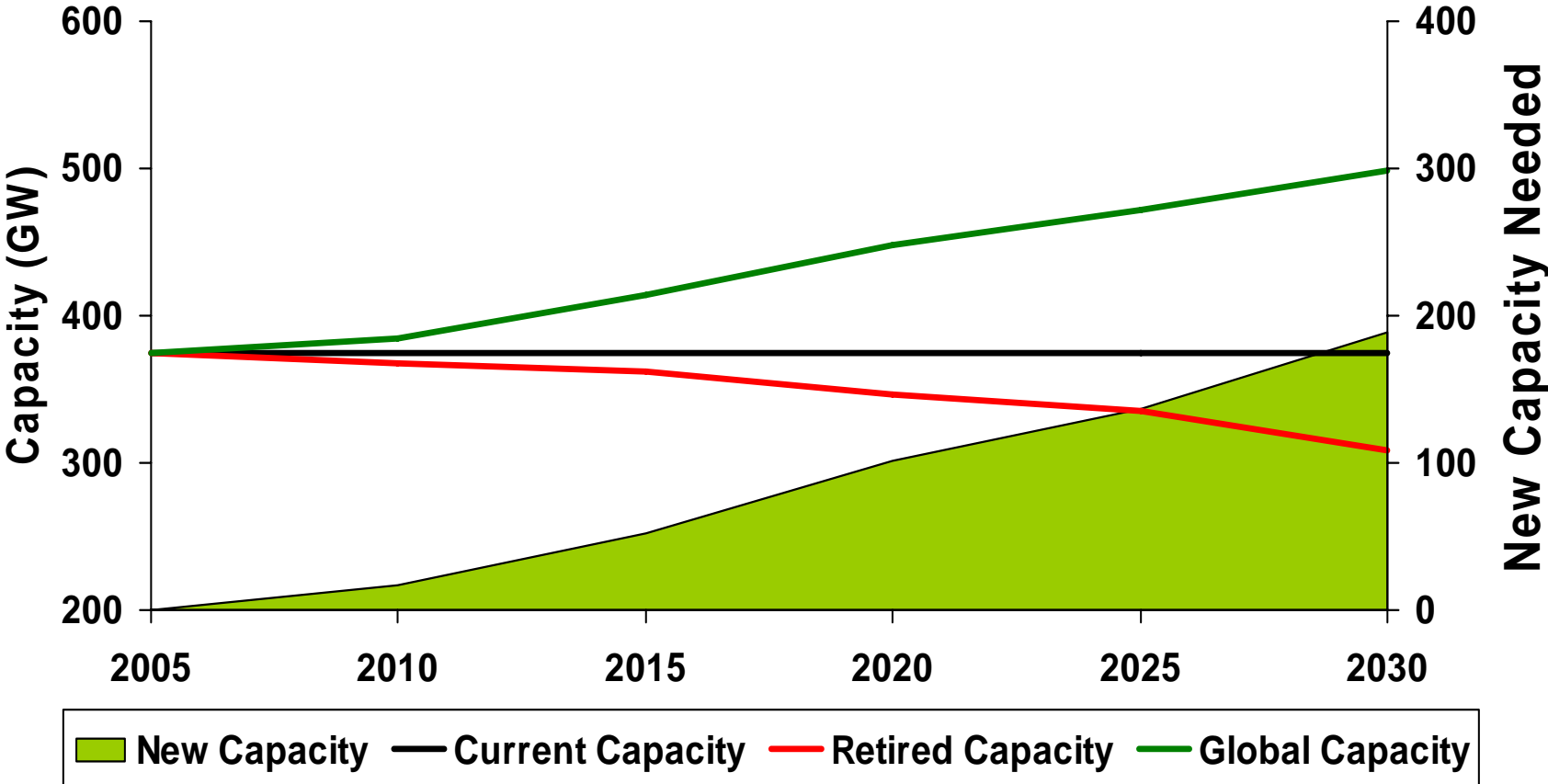
- **35 power reactors currently being constructed in 14 countries** *(source: Nuclear Energy Institute)*
- **90 reactors with total net capacity of almost 100,000 MWe are planned, 200 more are proposed** *(source: World Nuclear Association)*



*Shin-Kori 1&2 under construction in 2007*



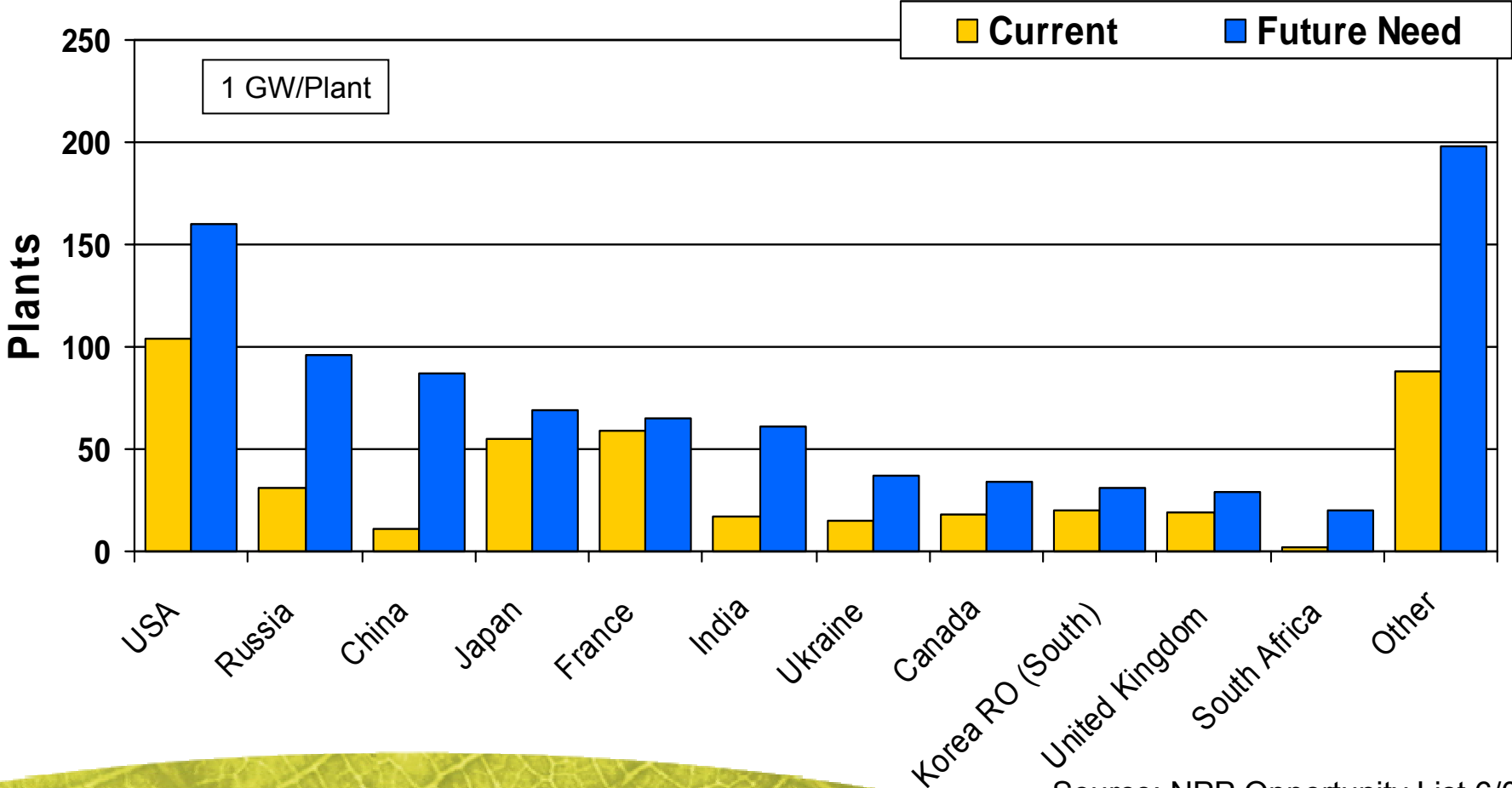
# Global Capacity Forecast (in GW)



Source: EIA 2008 data



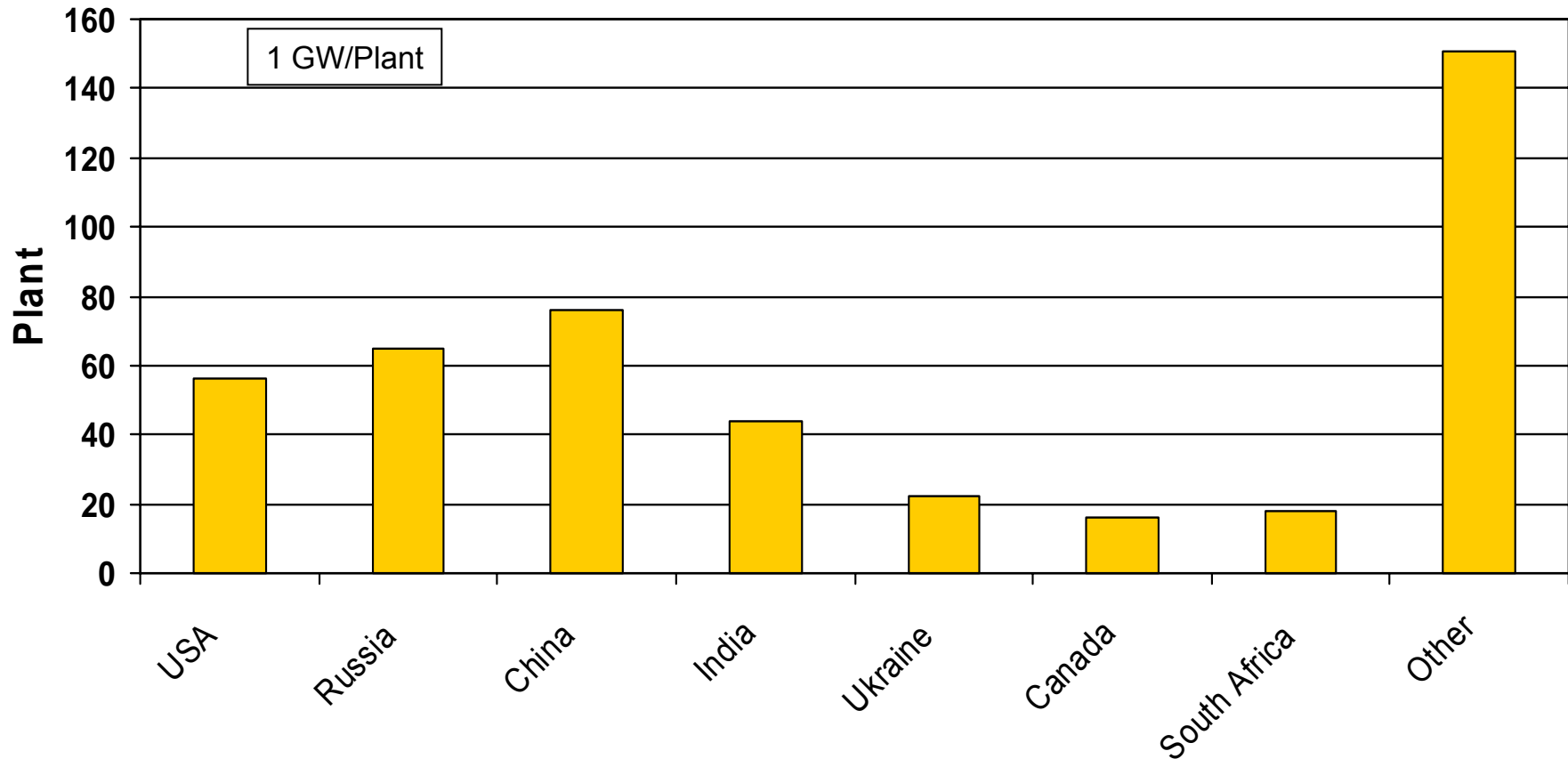
# Demand by Country through 2030



Source: NPP Opportunity List 6/08



# New Capacity Forecast by Country through 2030



Source: NPP Opportunity List 6/08



# AP1000™

The Nuclear Renaissance Starts Here.™



# Key Developments

## Renewed U.S. Interest in Nuclear

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- Natural gas prices soar
- Existing nuclear plants running safely and cheaply
- NRC develops new licensing process (avoid another Shoreham)
- Energy Policy Act 2005
- Concerns about greenhouse gas emissions
- Electricity demand grows



# Energy Policy Act of 2005

## Key Nuclear Energy Provisions

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- Renewal of Price Anderson Act for 20 years
- Production tax credits
- Loan guarantees
- Standby support for delays beyond owner's control



# Notable Quotes

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- “Toshiba expects to have orders for 33 AP1000™s and ABWRs worldwide by 2015”
  - by President and CEO Atsutoshi Nishida May 8, 2008 in Tokyo during a 2008 strategies for growth presentation.
  - Nishida said that projection “is rather conservative.”
- US Presidential Candidate John McCain said “he wanted 45 new nuclear reactors built in the United States by 2030” on June 18, 2008

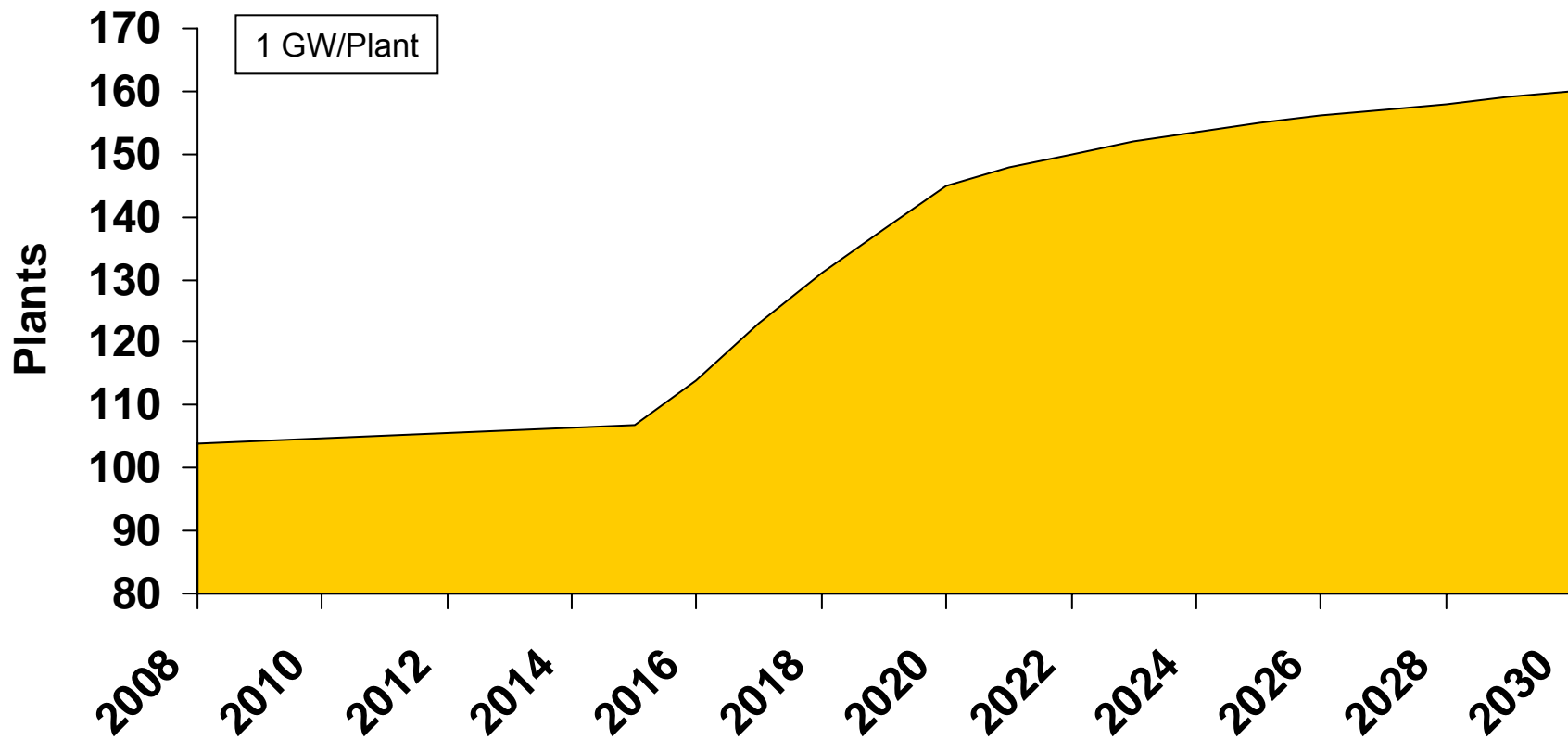


# Nuclear Power Reactors, United States

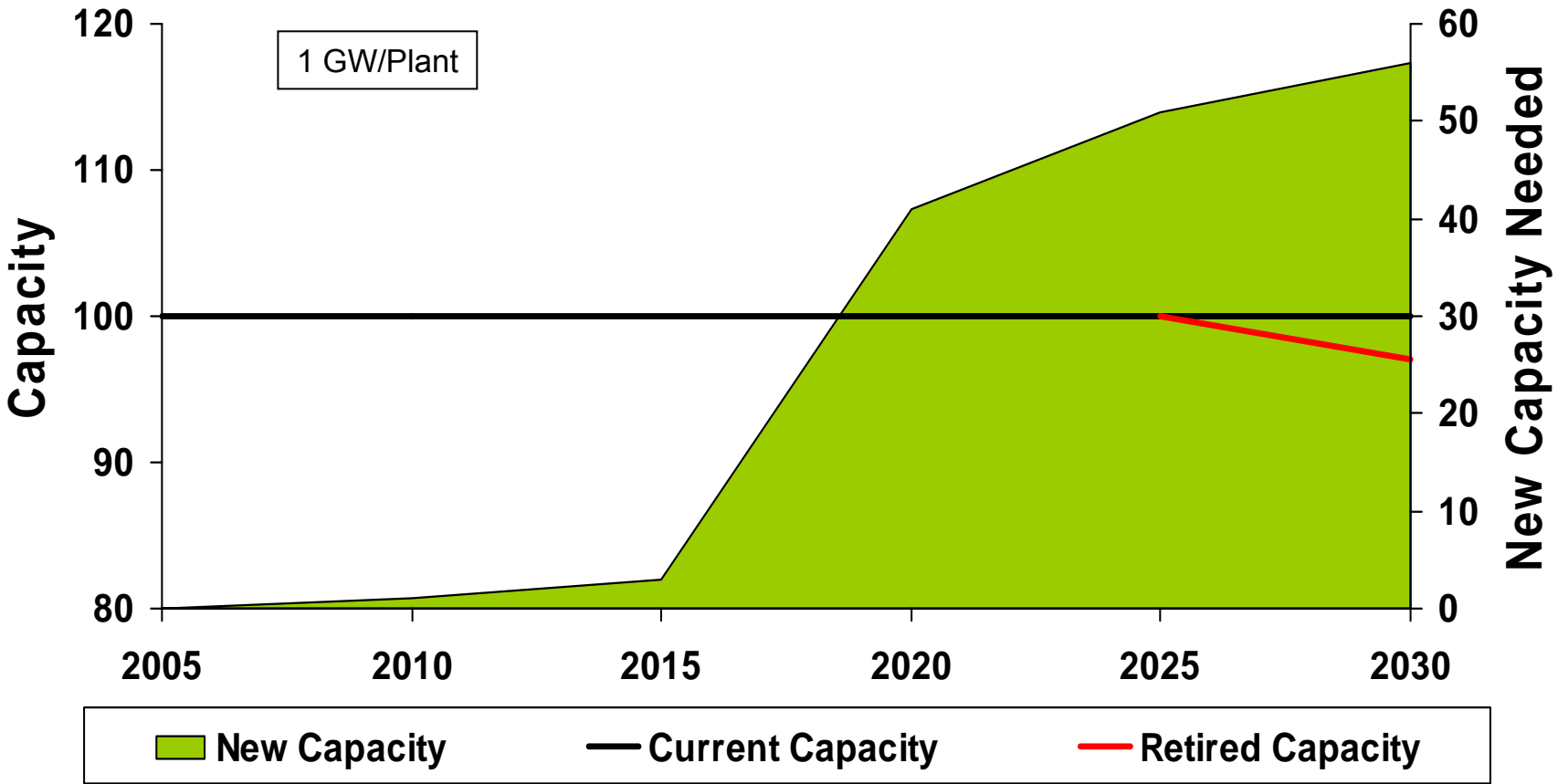
- **104 reactors operating in 31 states**
  - Generate about 19% of nation's electricity



# Total US Plants Forecast



# US Capacity Forecast (in GW)



Source: EIA and Westinghouse data



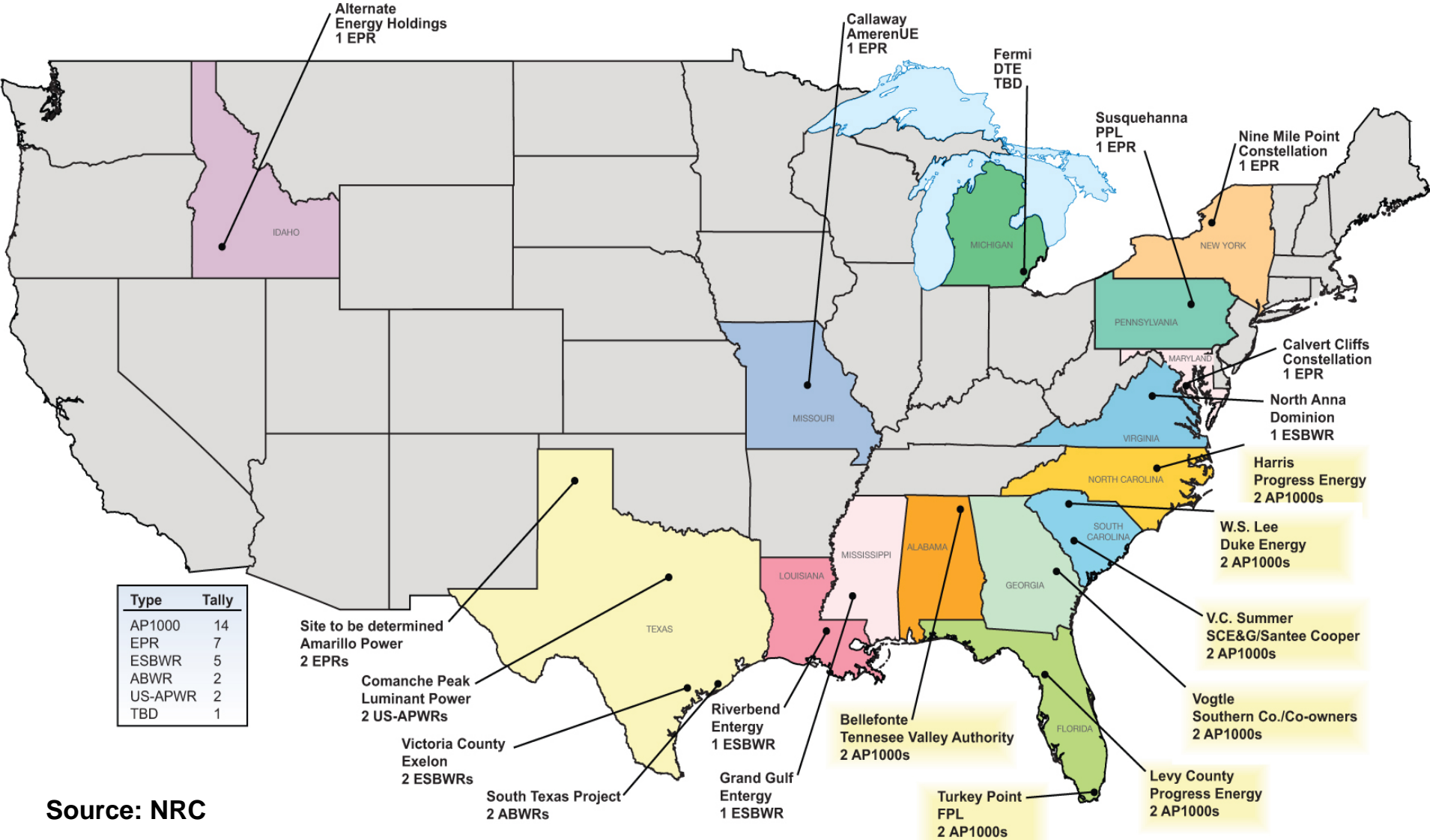
# New Reactor License Applications in US 34 units as of August 2008

Expected New Nuclear Power Plant Applications Updated August 18, 2008						
Company*	Date of Application	Design	Date Accepted	Site Under Consideration	State	Existing Operating Plant
<b>Calendar Year (CY) 2007 Applications</b>						
NRG Energy (52-012/013)	09/20/2007	ABWR	11/29/2007	South Texas Project (2 units)	TX	Y
NuStart Energy (52-014/015)	10/30/2007	AP1000	01/18/2008	Bellefonte (2 units)	AL	N
UNISTAR (52-016)	07/13/2007 (Envir.) 03/13/2008 (Safety)	EPR	01/25/2008	Calvert Cliffs (1 unit)	MD	Y
Dominion (52-017)	11/27/2007	ESBWR	01/28/2008	North Anna (1 unit)	VA	Y
Duke (52-018/019)	12/13/2007	AP1000	02/25/2008	William Lee Nuclear Station (2 units)	SC	N
2007 TOTAL NUMBER OF APPLICATIONS = 5 TOTAL NUMBER OF UNITS = 8						
<b>Calendar Year (CY) 2008 Applications</b>						
Progress Energy (52-022/023)	02/19/2008	AP1000	04/17/2008	Harris (2 units)	NC	Y
NuStart Energy (52-024)	02/27/2008	ESBWR	04/17/2008	Grand Gulf (1 units)	MS	Y
Southern Nuclear Operating Co. (52-025/026)	03/31/2008	AP1000	05/30/2008	Vogtle (2 units)	GA	Y
South Carolina Electric & Gas (52-027/028)	03/31/2008	AP1000	07/31/2008	Summer (2 units)	SC	Y
AmerenUE (750)	07/24/2008	EPR		Callaway (1 unit)	MO	Y
Progress Energy (756)	07/30/2008	AP1000		Levy County (2 units)	FL	N
Entergy (745)		ESBWR		River Bend (1 unit)	LA	Y
Exelon (761)		ESWBR		Victoria County (2 units)	TX	N
PPL Generation (762)		EPR		Bell Bend (1 unit)	PA	Y
UNISTAR (759)		EPR		Nine Mile Point (1 unit)	NY	Y
Luminant Power (754)		USAPWR		Comanche Peak (2 units)	TX	Y
Detroit Edison (757)		ESBWR		Fermi (1 unit)	MI	Y
Alternate Energy Holdings (765)		EPR		Bruneau (1 unit)	ID	N
2008 TOTAL NUMBER OF APPLICATIONS = 13 TOTAL NUMBER OF UNITS = 19						
<b>Calendar Year (CY) 2009 Applications</b>						
Florida Power and Light (763)		AP1000		Turkey Point (2 units)	FL	Y
Amarillo Power (752)		EPR		Vicinity of Amarillo (2 units)	TX	UNK
2009 TOTAL NUMBER OF APPLICATIONS = 2 TOTAL NUMBER OF UNITS = 4						
<b>Calendar Year (CY) 2010 Applications</b>						
Blue Castle Project		TBD		Utah	UT	N
Unannounced		TBD		TBD	TBD	UNK
Unannounced		TBD		TBD	TBD	UNK
2010 TOTAL NUMBER OF APPLICATIONS = 2 TOTAL NUMBER OF UNITS = 4						
2007 – 2010 Total Number of Applications = 23 Total Number of Units = 34						

\*Project Numbers/Docket Numbers  
 Yellow – Acceptance Review Ongoing  
 Blue – Accepted/Docketed

Source: US Nuclear Regulatory Commission (NRC) August 2008

# New Reactor License Applications in US

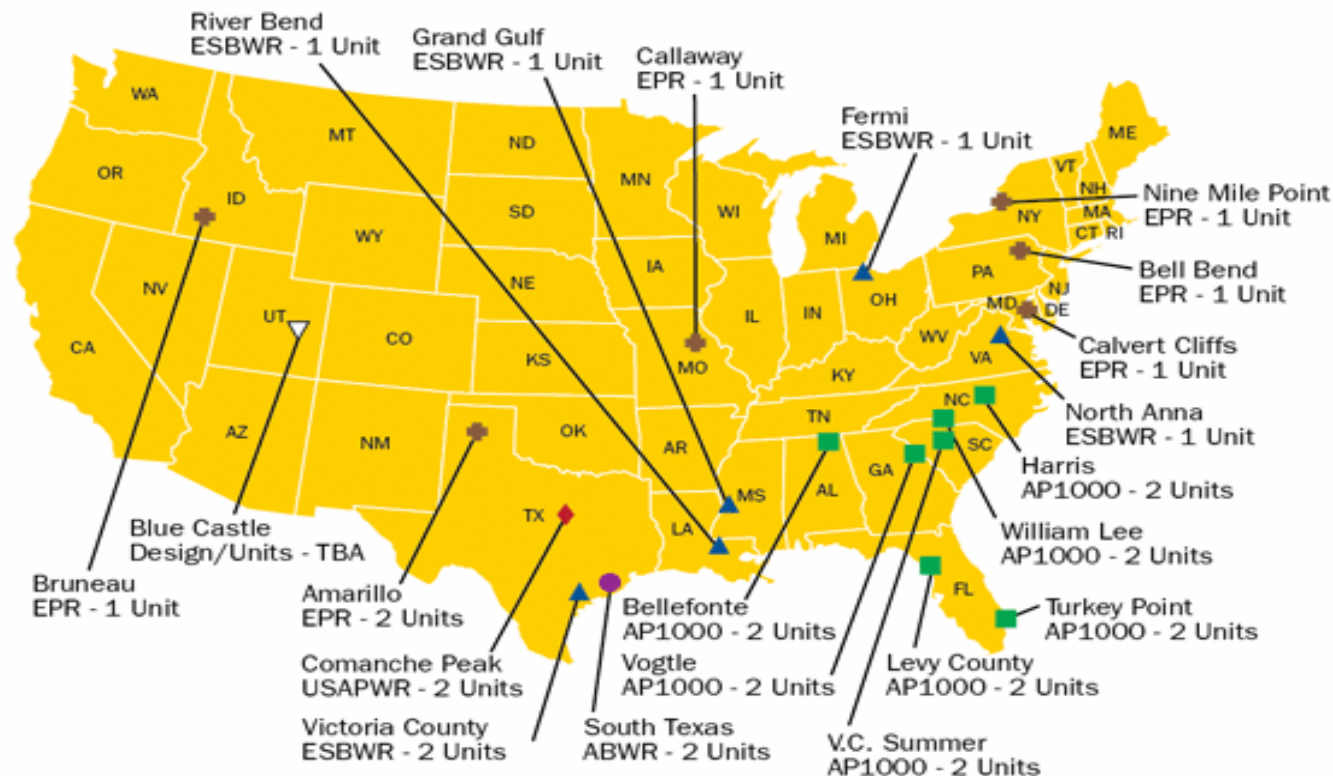


Source: NRC

# Current and Future Construction

## Location of Projected New Nuclear Power Reactors

You may click on a site name to view the NRC's website for the specific COL application



You may click on a design name to view the NRC's Web site for the specific design.

● ABWR   ■ AP1000   ⚙ EPR   ▲ ESBWR   ◆ USAPWR   ▽ Design/Units - TBA

Source: NRC

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# Westinghouse Supply Chain Vision



# Supply Chain Vision

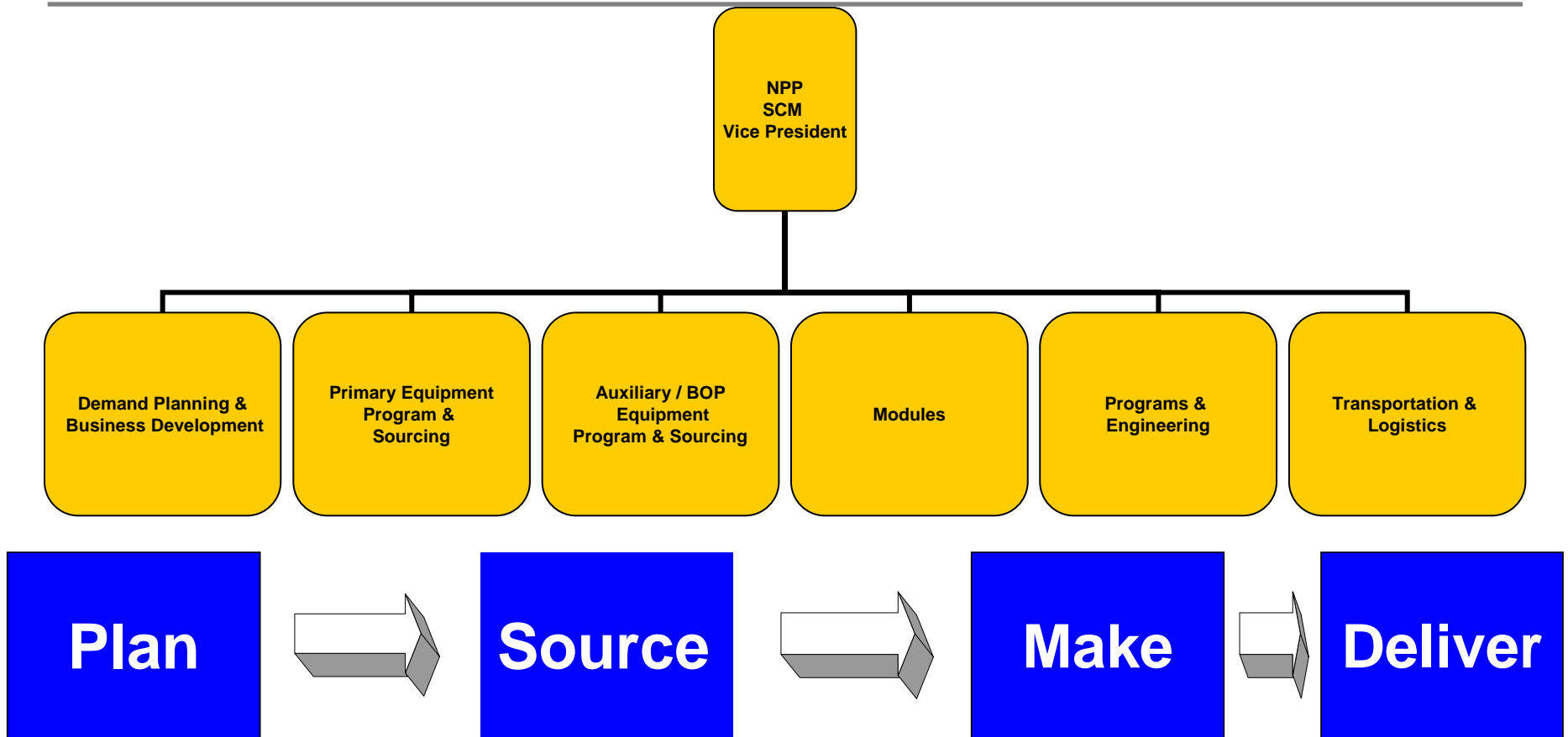
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***Localized Supply Base as a partner with Westinghouse in the AP1000™ Integrated Global Supply Chain network.***

1. **Localization & horizontal integration – We Buy Where We Build™**
2. **Progression of Localization**
  - **Minimum Development/ Investment:** Construction labor and construction commodities
  - **Medium:** Localization of equipment by qualified local industries. Mainly Commercial off the shelf, build-to-spec, non-safety, but need to be commercially competitive
  - **Maximum:** Qualified safety-related, Tech Transfer. TT develops local industries, licensed technology. Usually viable only for national fleet program aspirations

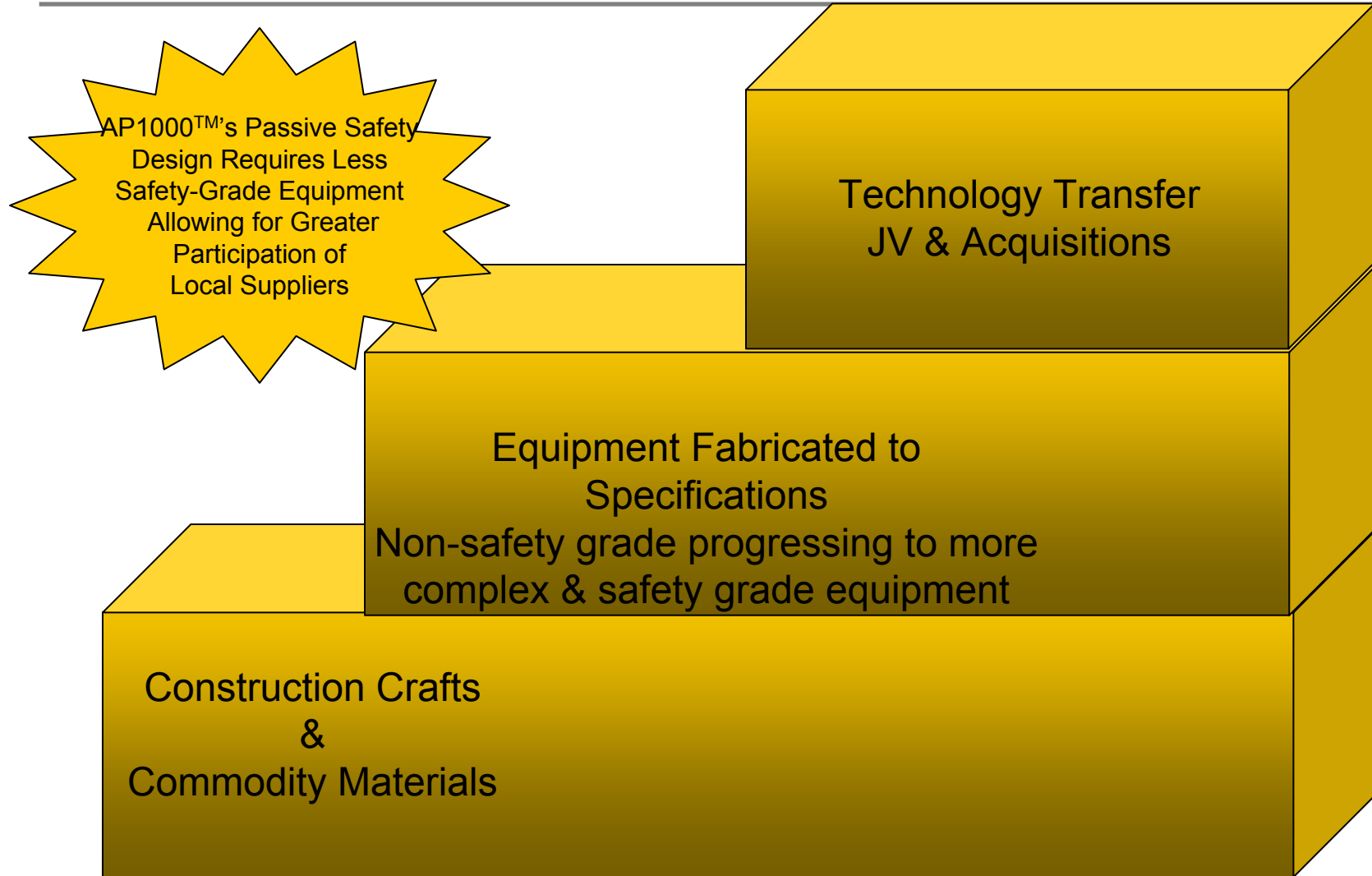


# SCM Organization Integrated Supply Chain



# Progression of Localization

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# Localization Opportunities

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## Most Equipment and Commodities are non-safety class

- Concrete
- Rebar
- Formwork
- Structural Steel
- NSSS Piping
- BOP Piping
- Cable
- Cable Tray
- Metallic Conduit
- HVAC Duct
- NSSS & BOP Valves:
- Pumps & Compressors
- Heat Exchangers & Condensers
- Tanks & Accumulators
- Air Handling Units, HVAC Fans
- Switchgear, MCCs, Panels
- Batteries
- Instruments
- Forgings
- Modules



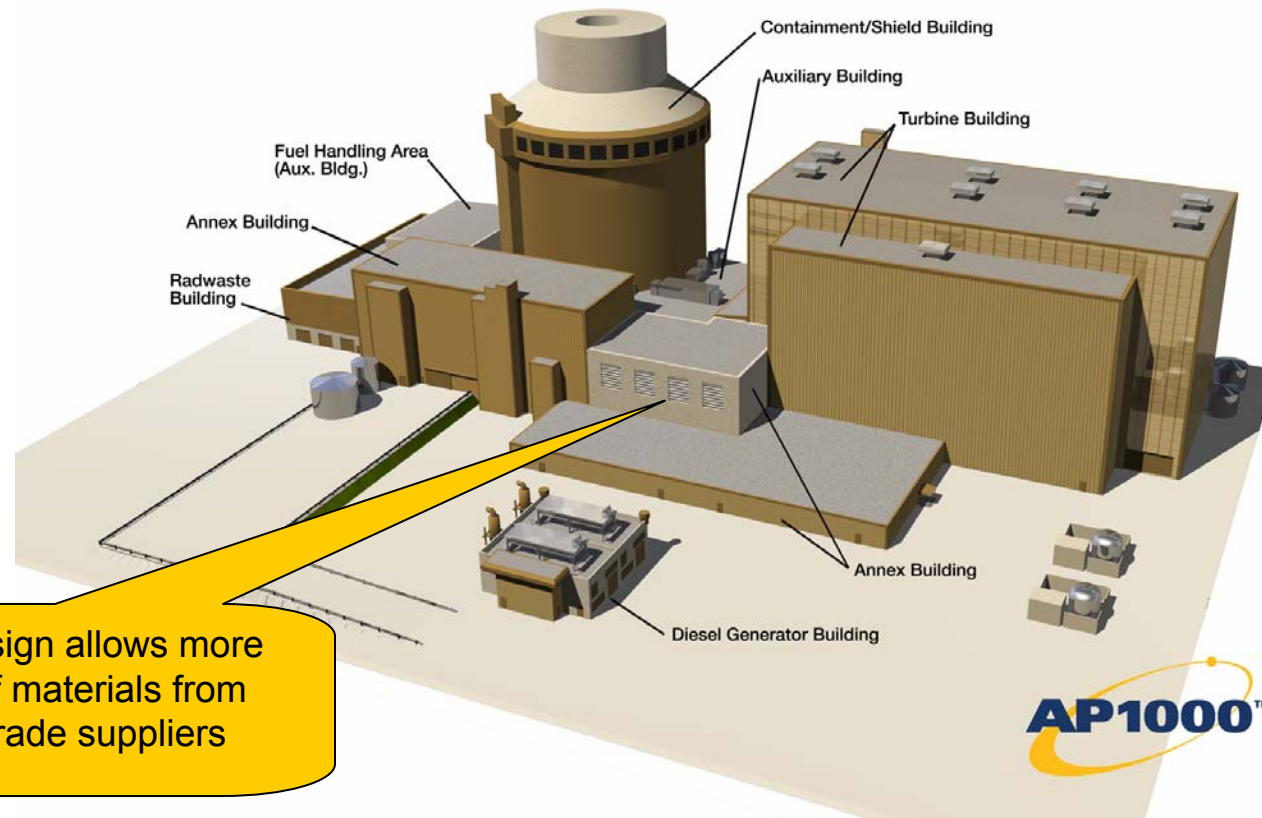
# Target list for Capacity Expansion

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- Forgings – UL
- Tubing – In 600TT
- Major equipment – Primary (RV, SG, PSZR)
- RCPs
- Reactor Internals
- CRDM
- IHP
- Containment Vessel
- Modules – CA01, CA20
- RCS Coolant Loop Piping
- Polar Crane
- Valves – Safety class
- MSIV
- Squib valves
- TG
- I&C



# The Westinghouse AP1000™

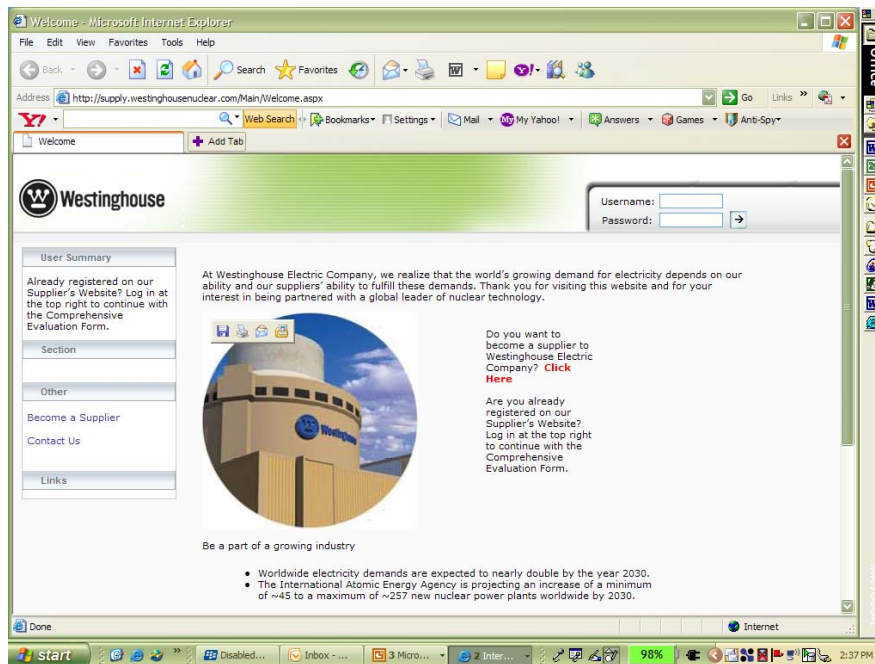


The passive design allows more procurement of materials from commercial grade suppliers



# SCM Portal –

<http://supply.westinghousenuclear.com>



- One focal point of access for suppliers to do business with Westinghouse
- Provide Westinghouse information to suppliers inquiring to do business with Westinghouse (Quality, Regulatory, Generic Term and Conditions, etc.)
- Central collection point for supplier's information, capabilities and capacity
- Provides broader, updated and consistent communication with supply base
- **Allows timely and consistent evaluations of suppliers to add to our ASL/QSL for targeted commodities / services**
- Long term transition to E-commerce



# Supplier Development Activities

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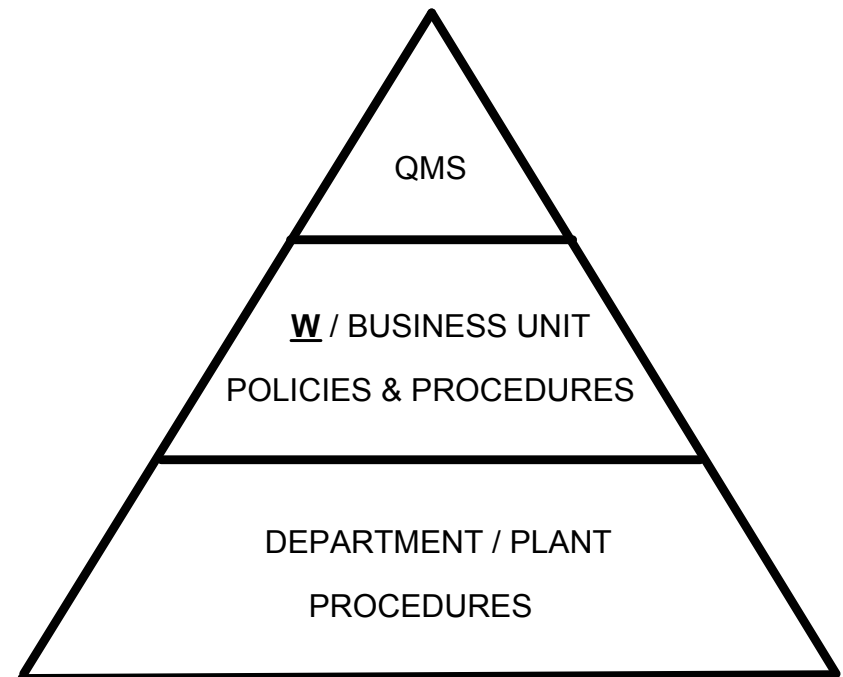
- Supplier Survey Inputs (Forms, SCM Portal, ..)
- Sourcing commodity leads to review (Go/No Go)
- NDA Execution
- ITB/Feasibility Evaluation package to Supplier
- Supplier – SCM meetings/visits
- Preliminary QA Evaluation
- Preliminary RFQ
- QA Audit and Corrective actions
- ASL
- Formal RFQ



# AP1000™ Quality Assurance Program

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- Westinghouse QMS meets:
  - 10CFR50 App. B (USNRC)
  - NQA-1, 1994 Edition
  - IAEA-50
  - ISO-9001:2001 Edition
- Referenced in AP1000™ Design Certification
- Basis for current Westinghouse supply globally (and in Canada)



# Equipment and System Classifications

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- “Safety Related”
  - Maintain integrity of the reactor pressure boundary
  - Required for safe shutdown of the plant.
  - Prevent release of radiation to the public.
- “Safety Significant”
  - Non-safety related systems that contribute to plant safety.
  - Important for protection of investment.
- “Non-safety Related”



# Westinghouse Supplier Quality Requirements

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- Safety Related components
  - 10CFR50 Appendix B (regulatory requirement)
  - NRC Regulatory Guide 1.28 (endorses NQA-1)
  - ASME NQA-1 1994
  - 10CFR21 (Reporting of significant safety issues)
  - Westinghouse PQR-1 (oversight, right of access)
  - ASME Code (where applicable)



# Westinghouse Supplier Quality Requirements

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- Safety Significant systems and components
  - Based on USNRC NUREG-0800 Section 17.5 II V (Westinghouse Spec APP-GW-GAM-200)
  - Review of suppliers quality program with proposal
  - Audit performance of suppliers QA program
  - Westinghouse PQR-1 (oversight, right of access)  
Sometimes referred to NQA-1 “lite”
  - Aligned with 18 Criteria of 10CFR50 Appendix B and ASME NQA-1



# Westinghouse Supplier Quality Requirements

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- Non-safety related components
  - Review of suppliers quality controls with proposal
  - Good commercial practice
  - Past performance
  - Westinghouse PQR-1 (witness, hold point, right of access)



# Time-Phased Approach to Global Participation

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- Not a “One size fits all” approach
- Initial level is determined by supply capacities and capabilities.
- Phased-in over time based on development of skills and investment.
- Driven by supplier readiness and compliance to regulatory and Westinghouse QA requirements.
- Can include technology transfer where appropriate.



# Opportunities for RSA Suppliers

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- Opportunities enhanced by AP1000™ Design & Delivery Plan
  - Design Simplification, Standardization and Passive Safety
  - Extensive Localization Scope
- Our Supply Chain strategy is predominantly horizontal
- We Buy Where We Build TM -Localization and Technology Transfer
- Global Sourcing - Participate in our global projects

## Challenges

- Need to be competitive for global participation
- Additional investments to expand capacities & strengthen capabilities.



# Perfect Partnership

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- Westinghouse is world-wide supplier
- Horizontal Integration – Global supplier base
- Cost and Schedule Control – Simplification and Standardization
- Localization – We Buy Where We Build™
  - Opportunities enhanced by AP1000™ design and delivery plan
  - Committed to Technology Transfer with successful track record



# Questions

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