

Session MS II – Keeping Up With Demand:

Building the Nuclear Supply Chain

Strategic View – Nuclear Perspectives on The Commercial Nuclear Industry

Owned & Produced By:



Presented By:



Supported By:



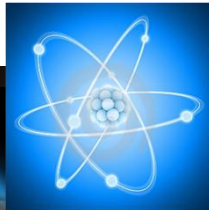
Co-located With:



Strategic View – Nuclear



Perspectives on the Commercial Nuclear Industry Supply Chain View



Presentation to:

Nuclear Power International
Conference
December 12, 2012

Linton Consulting

Who Is Linton Consulting?



- ◆ A professional practice providing independent insights, advice and facilitation to industry and government
- ◆ We enable: business strategy, diversification, market development, trend analyses, scenarios and visioning
- ◆ Focus: Energy, Power, Nuclear
- ◆ Buyer-Seller / Partner introductions & relationship development
- ◆ Strategic View process
 - High level interactions and interviews
 - Ongoing analyses and insights
- ◆ Industry Partners provide depth: UxC, *Nuclear Energy Insider*, *InnovaNet*

What is Strategic View?



◆ Research model

- Used 15 years; 7 in energy
- Forces affecting the future of the energy industry
- Industry responses
- Leading to Future State/ Outcomes

◆ Process

- Interviews with executives and thought leaders
- Research & analysis
- Executive Roundtables
- Building Knowledge-base
- Reports & Sharing



9 Nuclear Industry Roundtables

Strategic Issues, Participants in 2012



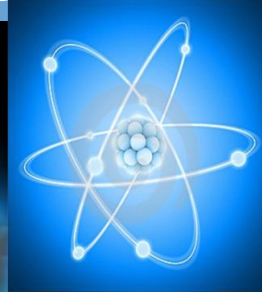
Presentation Purpose



- ◆ Overview of Commercial Nuclear – Today and Tomorrow
 - Fuel Cycle / Nuclear Value Chain
 - Size and Growth
 - Forces of Change
- ◆ Carolinas Nuclear Cluster
 - Purpose and Objectives
 - Recent Activities, Successes
- ◆ Supply Chain Opportunities & Challenges
 - Becoming a Supplier
 - Planning for Success

Nuclear Power Today

A Huge and Growing Global Market



104 Reactors - U.S.

435 Reactors
Worldwide

Growing/Changing
Supply Chain

68 Reactors Under
Construction

Many More in
Planning

Nuclear Power Reactor Statistics



Operating Reactors

USA	104
France	58
Japan	50
Russia	33
South Korea	21
India	20
UK	18
Canada	18
China	16
Ukraine	15
Sweden	10
Others < 10	72
Global Total	435

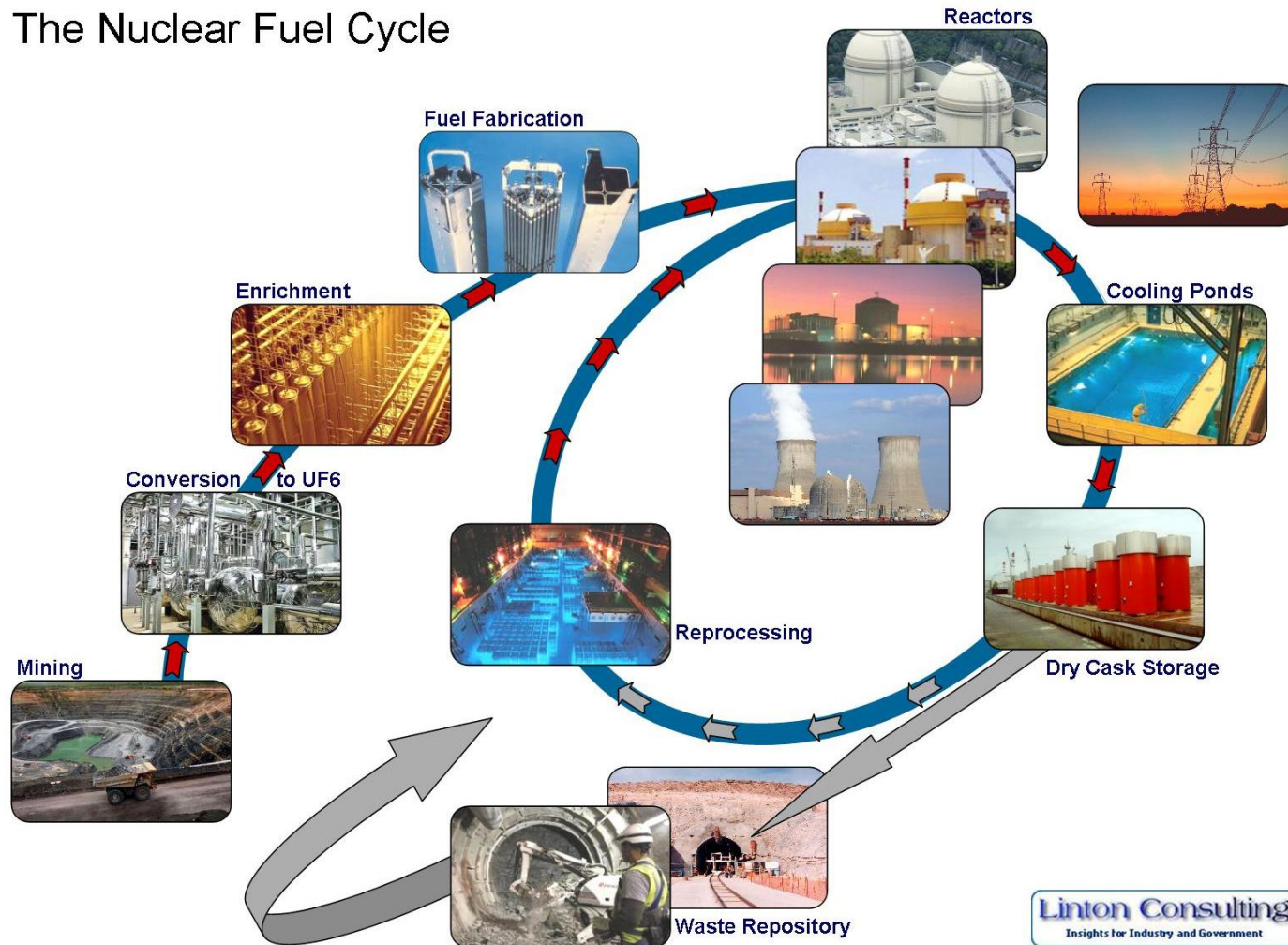
Under Construction

China	26
Russia	10
India	7
USA	5
Bulgaria	2
Japan	2
Pakistan	2
Slovakia	2
Ukraine	2
Taiwan	2
Others	8
Global Total	68

Nuclear Industry Today



The Nuclear Fuel Cycle



Source: Linton Consulting Strategic View - Nuclear

Linton Consulting
Insights for Industry and Government

Linton Consulting

Forces of Change »»» Future



◆ Electricity Demand

- Growing strongly in Asia, Mid-East, Latin America
- Slow or no growth in North America, Europe

◆ Energy Dynamics

- Natural Gas price low in North America
- Coal out of favor

◆ Public Opinion (Fukushima & Fear)

- Strong opposition Europe, Japan, others
- U.S., UK, others still favorable

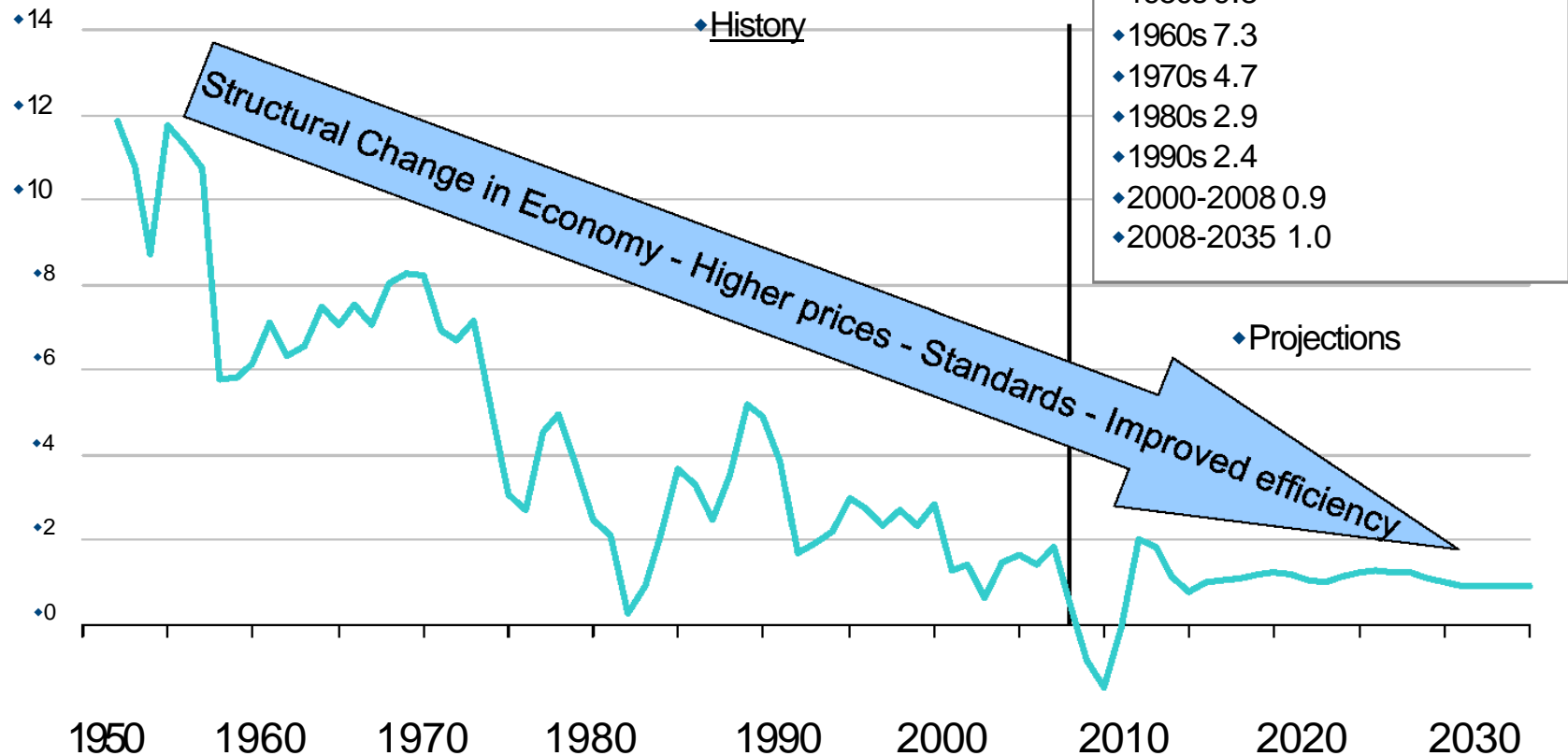
◆ Government Policy & Regulation

- Germany, Italy, Switzerland to exit; Japan unsure
- U.S., UK, China, France, India, UAE, favorable
- ...but growing safety requirements adding to costs

U.S. Electricity Use Growth – Slowing



◆ 3-year rolling average percent growth



John Conti, USDOE, April 6th, 2010 Source: Annual Energy Outlook 2010

Linton Consulting

Scenarios for Nuclear Power

Proposed Reactors – How Many Likely 5 Years?



X = Significant
Postponement



*Review Suspended by Applicant

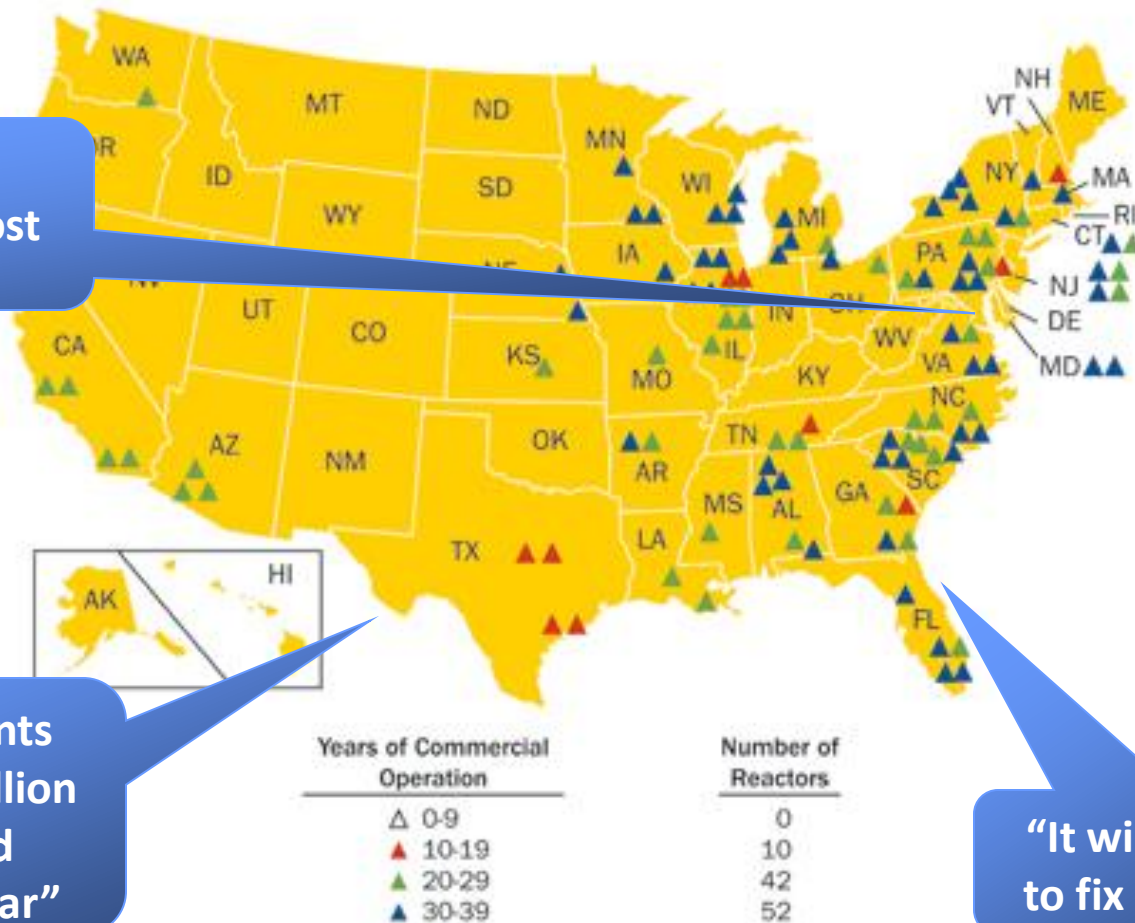
** COL Application Amended by Applicant to ESP on 03/25/2010

Scenarios for Nuclear Power

Operating Reactors - 104



U.S. Commercial Nuclear Power Reactors—Years of Operation



“Fukushima”
upgrades – will cost
Billions

“The future
of nuclear
will be driven
more by
existing
plants than
new builds”

“Operating plants
spend \$200+ million
for goods and
services per year”

“It will cost Billions
to fix Crystal River”

Source: U.S. Nuclear Regulatory Commission

Future



◆ New Build to 2030

- High: China, India, Russia, So. Korea to add major capacity – 2030
- Medium: UAE, Saudi and others in MENA
- Low: UK, France, Finland, Canada, So Africa, Ukraine, Slovakia, Poland, Turkey, Vietnam, Brazil, U.S., others
- Small Modular Reactors (after 2020) – new paradigm?

◆ Existing Unit Spending

- Capital improvements, capacity additions/uprates, life extensions
- Steam Generator, turbine-generator replacements
- Safety enhancements: Fukushima & other

◆ Fuel Cycle: front-end, back-end

- Conversion, enrichment, fuel assembly manufacturing
- Decommissioning, Used Fuel Storage, Waste Repositories

Supply Chain



◆ Global Demand and Supply Chain to Grow, but...

- Each country prefers to develop its own suppliers and many are developing indigenous capabilities where possible
- France, So. Korea, Russia, China, India, developing technologies, suppliers and are committed to export; Japan, also
- International suppliers face high barriers to entry
- IP: short term advantage, in a long term industry
- Still many opportunities for export

◆ U.S. Supply Chain Recovering

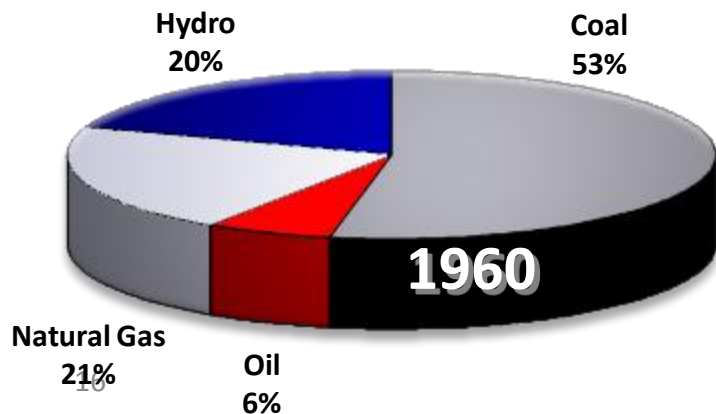
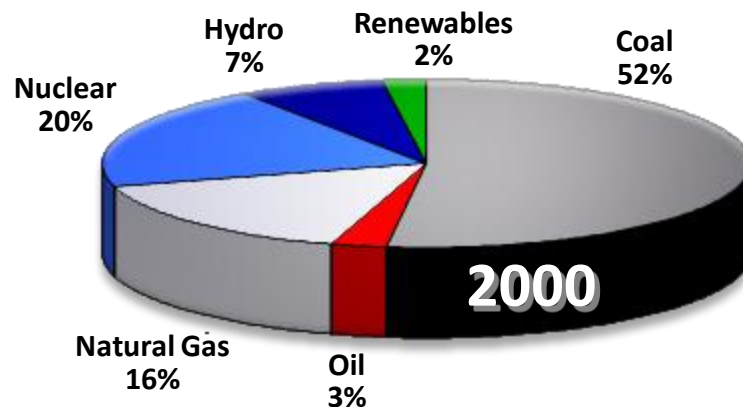
- New build not robust enough, though
- Current projects 50% procured
- Significant repair, safety upgrade opportunities will be primary market for major U.S. contractors and suppliers

“We have procured about 50% of our requirements on existing projects ” – Shaw Procurement Officer

Energy Dynamics



- ◆ U.S. Generation mix changes over time
- ◆ Nuclear share from zero to 20%
- ◆ Decline expected 2030 – due to NG



Expected Procurements



◆ Fukushima-response & similar safety work

- Flood control retrofits (Example: Oconee)
- Buying equipment for disaster mitigation
 - Backup diesel generators
 - Batteries
 - Dry cast storage

◆ Normal O&M

- Finding replacement parts
- Outage work

◆ Digital Upgrades

- New digital equipment
- Software and programming
- Expect smaller projects; not complete replacements



“We are antique dealers – a lot of parts are obsolete and we have to scrounge parts from other plants”

Industry Situation Analysis

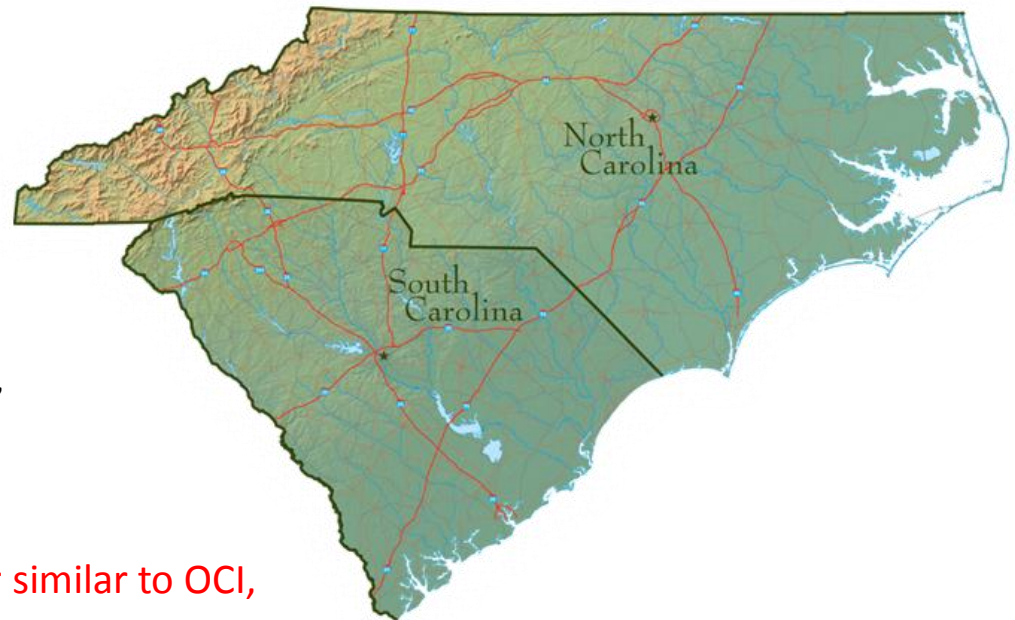


- ◆ Existing Reactor Work
 - Life extension, Upgrades, Efficiency improvements, Safety
 - \$15-20 billion per year; growing
- ◆ Fukushima-driven Safety Enhancements
 - U.S. \$5 – 10 Billion
 - (Worldwide: \$30 – 50 Billion)
- ◆ Fuel Cycle: Front-end; Back-end
 - Mining, conversion, enrichment, deconversion, fuel
 - \$20 billion?
- ◆ D&D
 - In private sector, \$500 million per plant
 - Government sector (DOE, etc.) \$billions over 15 years
 - Waste repositories – \$billions 10-15 years

CNC- Carolinas' Nuclear Cluster



- ◆ Economic Cluster – A grouping of related supply chain companies achieving economic and skill-based advantages
- ◆ CNC Mission: Collaboratively strengthen workforce, services, products, and policies to capture and extend our global leadership in nuclear energy capabilities
- ◆ Current Chair- Jim Little, URS Corp.
- ◆ 50+ Members
- ◆ Cited by Michael Porter for its progress as an industry cluster
- ◆ Industry-driven, collaborative
- ◆ Areas of work: Economic Development, Workforce, Policy, Tech Development, Communications

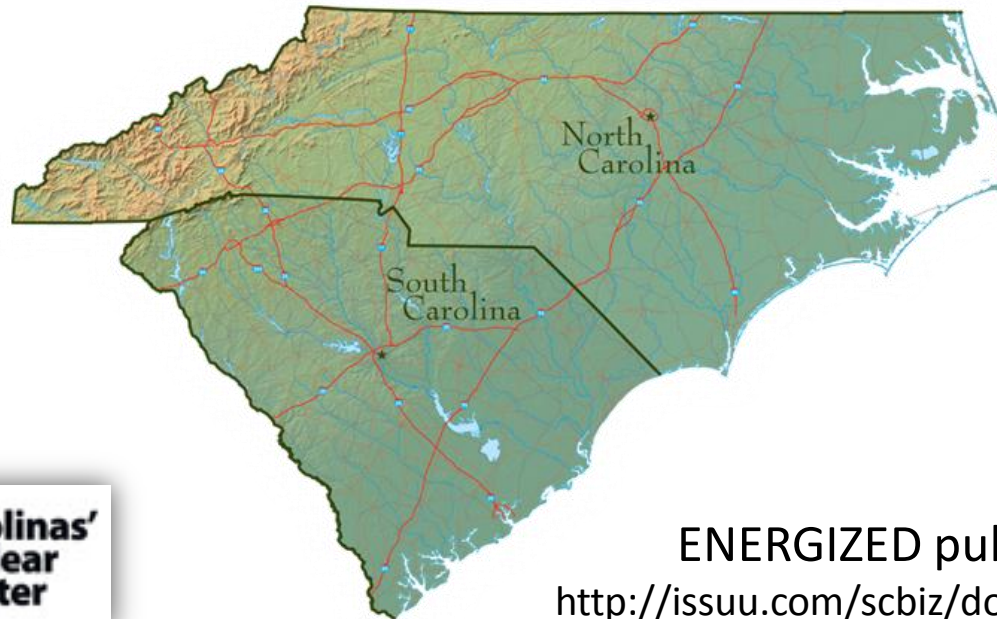


(Promotes Nuclear as an economic cluster similar to OCI, Burgundy Nuclear Partnership, China Nuclear City, KA CARE)

CNC- Carolinas' Nuclear Cluster



- Numerous companies have relocated to the Carolinas
- Recognized industry hub for conferences, activities and tours
- Growing employment and nuclear competencies



ENERGIZED publication:
<http://issuu.com/scbiz/docs/2012energized>

nuclearcluster@newcarolina.org

Linton Consulting

CNC – Carolinas Nuclear Cluster

55 Members



- | | | |
|---|--|------------------------------|
| ♦ Aiken Technical College | Global Quality Assurance | SCRA |
| ♦ AREVA | Hendrick Construction | SCUREF – SUNRISE |
| ♦ ASCO Valve/Emerson | Jacobs Engineering | Shaw Power Group |
| ♦ Babcock and Wilcox | J-E-T-S Nuclear Consultants | Siemens Energy I&C |
| ♦ Carotek | K&L Gates | Spartanburg Tech |
| ♦ Central Piedmont Com. Col. | Kontek | SRS – Community Re-Use Org |
| ♦ Citizens For Nuclear Technology Awareness | Midlands Technical College | Tetra Tech |
| ♦ Columbiana High Tech | NC Dept. of Commerce | Tindall Corporation |
| ♦ Clemson University | NC State University | Toshiba (TANE) |
| ♦ Duke Energy | Orangeburg Tech | UNC Charlotte |
| ♦ Economic Development Partnership – Aiken/Edgefield Counties | Pegasus Nuclear | University of South Carolina |
| ♦ Electric Power Research Institute | Progress Energy | URS Corporation |
| ♦ EnergySolutions | RCS Corporation | WACHS Services |
| ♦ EngenuitySC | Qualitech Solutions | WEC Welding & Machining |
| ♦ Fluor | Savannah River Nuclear Solutions / SRS | Weirich Engineering |
| ♦ Francis Marion University | SC Dept. of Commerce | Westinghouse |
| ♦ Gaston College | SC State University | York Technical College |
| ♦ Generation mPower | SCANA / SCE&G | Zachry Nuclear Engineering |

CNC 2011-12 Supply Chain Initiative



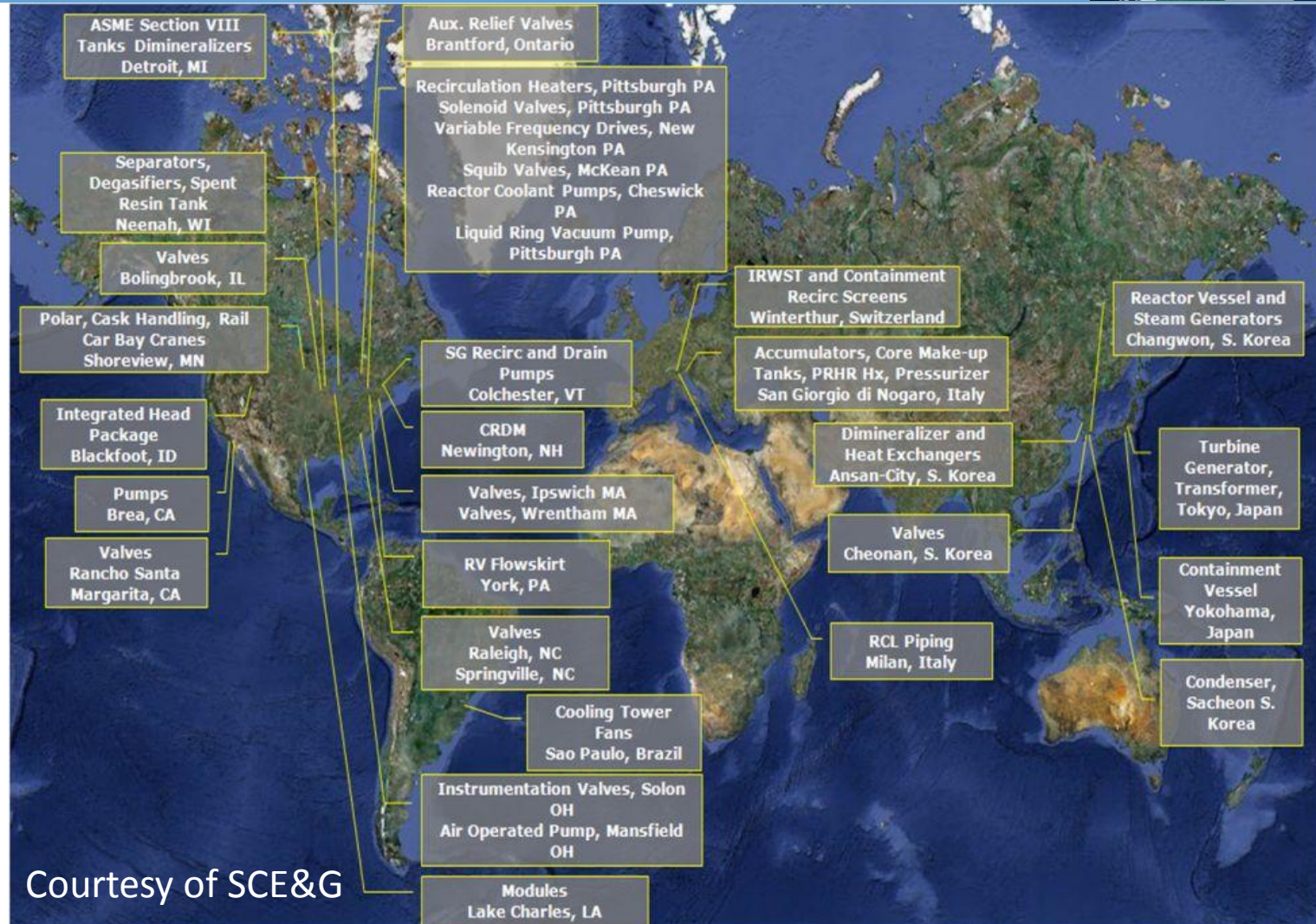
- ◆ CNC Work for SBA
 - Enhance & expand nuclear supply chain in Carolinas
- ◆ Conducted research to identify existing players
- ◆ Identified areas of need, companies to expand or enter
- ◆ Linton 1 of 2 in matchmaker role
 - Interviews
 - Advising & counseling
- ◆ Convened CNC “Supply Chain Summit”
 - Over 50 participants total
 - 12 Senior Procurement leaders from Utilities & EPCs
 - 40 supply chain companies
 - Introductions, matchmaking, speed dating

How Participate? Long Term View



- ◆ Identify potential uses of your products / services
 - New plants
 - Retrofit and repair work
 - Electric transmission grid
 - Value chain and support manufacturers
- ◆ Most likely U.S. customers
 - Identify utility fleets: Exelon, Entergy, Duke, Southern, Scana
 - Identify prime contractors such as Shaw, Bechtel, Fluor, Others
 - Identify large manufacturers such as Westinghouse, GE Hitachi, AREVA, Mitsubishi
 - Fabricators such as Shaw Modular Solutions, Shaw piping
 - Component manufacturers Curtiss Wright, Shaw piping: pipe, pumps, valves, vessels, fasteners, shielding, etc.

Where Are Components Sourced?



Courtesy of SCE&G

Reactor Unit Content



- ◆ Each AP1000™ nuclear power plant requires approximately:
 - 130,000 cubic yards of concrete
 - 22,500 tons of rebar
 - 15,000 metric tons of steel
 - 300 modules and assemblies
- ◆ Each plant will create 1,400 to 1,800 on-site construction jobs and hundreds of support jobs during the construction period
- ◆ Each plant offers billions in economic impact to its region

Some slide content courtesy of Westinghouse



Linton Consulting

Challenges



- ◆ Barriers to entry are high due to insurance, safety, people requirements
- ◆ Nuclear quality programs represent stringent standards and significant additional cost
 - NQA-1
 - Commercial grade dedication
 - Procurement does the pre-qualification
 - Absolute perfection required in quality systems
- ◆ Significant oversight and therefore, significantly higher costs
- ◆ Nuclear grade products cost more and should offer higher margins
 - Many companies set up a separate organization to serve nuclear

Your Strategic Plan - Considerations



- ◆ Market Potential
 - Domestic
 - International
- ◆ Your Company Situation – Manufacturing and Operations
 - Current quality program and organizational fit
 - Gap analysis?
 - Manufacturing strategy for nuclear
 - Investment Required
- ◆ Timing of Market – Timing of Investment
 - Risk Vs. reward
 - When is ROI likely?
 - Can you take a long term view?

**The Nuclear Industry
must plan far in advance...**

**“My job is to be sure that
when you flip the light
switch 10 years from now,
the lights come on.” –Jim
Rogers – CEO Duke Energy**



Bill Linton, Principal Linton Consulting

Telephone: 864 901 5398

Email: Bill@LintonConsulting.com