The Nuclear Supply Chain
--What's the New Vision?

Roundtable / Dinner

Nuclear Energy Insider
Supply Chain *Conference*
--April 17, 2012

Linton Consulting

The Nuclear Supply Chain
--What's the New Vision?

CSM college of southern maryland
La Plata · Leonardtown · Prince Frederick · Waldorf

Tindall

Constellation Energy Group

Duke Energy®

CURTISS WRIGHT

FLUOR®

Progress Energy

TVA

U.S.NRC

ERNST & YOUNG
Quality In Everything We Do

GLOBAL
Quality Assurance Inc.

Day&Zimmermann NPS
We do what we say.

MNES
Mitsubishi Nuclear Energy Systems

CH2MHILL

Linton Consulting

Why Are We Here?

- Knowledge exchange
  - Status of nuclear revival
  - Challenges for the Supply Chain
- Share insights / perspectives
  - Utilities (demand side)
  - Vendors & suppliers (supply side)
  - Advisors, associations & advocacy groups
- Timely issues with a lot of associated questions
  - Growing electricity demand
  - Natural gas prices
  - Financing issues
  - Fukushima
  - Quality requirements

Key Questions

- What is the status of the nuclear renaissance and what should buyers and suppliers expect now?
- What are the key messages for suppliers who want to participate in nuclear markets?
- What are the frustrations of suppliers and buyers?
- What do suppliers need to know to improve their marketing and business development activities?
- What can suppliers reasonably expect from the new build, uprate and O&M market? Globally?
- What is the anticipated size and nature of the Fukushima-driven safety upgrade market?
- How can small business participate in nuclear markets?

Overview

- Demand - Global
  - O&M and Retrofit: 104 U.S. Plants; 320 Plants R.O.W.
  - New Build – China, Russia, UK, U.S., U.A.E., Saudi, France, Finland, Poland, Turkey, Vietnam, others
  - Government
- Supply
  - Products & Services to Existing Facilities (S-C is mature)
  - New Build (S-C Reviving/Growing)
    - Asia – Japan, Korea, China (growing)
    - Europe – France, Russia
    - North America - U.S., Canada
  - Fuel Supply Chain (global: Westinghouse, AREVA, GE)
  - Spent Fuel Transportation & Management
  - D&D

Buyers: Supply Chain Perspective

- Reliable supply of quality products and services
- Quality certainty
- Supply Chain efficiency, simplicity
- Long term warranty and dependability
- Financially stable
- Buy local, where possible
- Minimized cost
- Supplier diversity targets
  - Minority, veteran-owned, woman-owned
  - Economically disadvantaged, hub-zone

"We have a hard time taking a risk on unproven suppliers"

Suppliers: A Marketing Perspective

- Markets
  - Commercial nuclear industry (Utilities, Transport, Waste Mgm)
  - Government and Contractors (DOE, DOD, SRS, NRC)
- Long term, sustainable & profitable business
  - New build
  - O&M
- Fit with diversification strategy
- 4 P's of Marketing
  - Product
  - Place
  - Promotion
  - Price

Supplier Perspective

- Product
  - Thousands of components, assemblies, devices, services
  - High barriers to entry: Nuclear Quality Requirements
    - NQA-1
    - Commercial Grade Dedication
  - Teaming possible for some
- Place
  - Usually a preference for local, where possible
  - High quality requirements and specifications limit who can play; therefore local not always possible
  - Examples:
    - Forged reactor vessels from Japan Steel Works (JSW)
    - Software from Invensys (U.S.)
    - Pumps, valves, controls from Curtiss Wright (U.S.)

Supplier Perspective

- Promotion
  - How do new vendors break in?
  - How sell?
  - How stay positioned?
  - How maintain?
- Price
  - Be competitive, but not cheapest
  - Include long term warranty and liability

Industry Situation Analysis

- "Nuclear renaissance" in the news nearly a decade
  - Growing L.T. demand for baseload, low carbon electricity
  - Growing public support for nuclear
  - Maturing reactor technologies
  - Active construction in Japan, China, Korea, India, U.S.
- Policy / Regulatory trends more favorable
  - Yet financing problems in U.S.
- Globalization and change in Energy
  - Shifting global growth & demand: Asia
  - Energy dynamics & competition: oil, gas, coal, nuclear
- Energy economics creates major shift
  - Natural gas discoveries and price collapse
  - Oil to be impacted as well

Industry Situation Analysis

- Reactions to Fukushima Event:
  - Germany: Exit nuclear by 2022
  - Switzerland also
  - Italy also
  - Japan shutting down reactors: serious consequences
  - UK - Urgent need, but slower; Horizon cancels
  - Pause in Nuclear development : Malaysia, Thailand, …
  - Continue forward with additional safety controls: U.S., China, France, India, Russia, Finland, UAE …
  - Continue plans: Vietnam, Turkey, Indonesia, Poland …
  - Saudi's announce huge vision of 16 reactors (quiet recently)
  - **U.S. approves Vogtle and VC Summer**
- Energy demand growth worldwide continues

Industry Situation Analysis

- Japan
  - Electricity shortages
  - Decommissioning and clean up expense (Japan)
  - TEPCO financial crisis
  - Investment in gas generation, short term
  - Severe economic and social impact foreseen
- Regulators, peer review groups
  - Japanese regulator, US-NRC, European Commission and local regulators continue study and update regulations
  - IAEA, INPO, WANO, will grow stronger
  - Expect increased harmonization and stronger oversight
    - US-NRC highly respected

Areas of Need / Opportunity

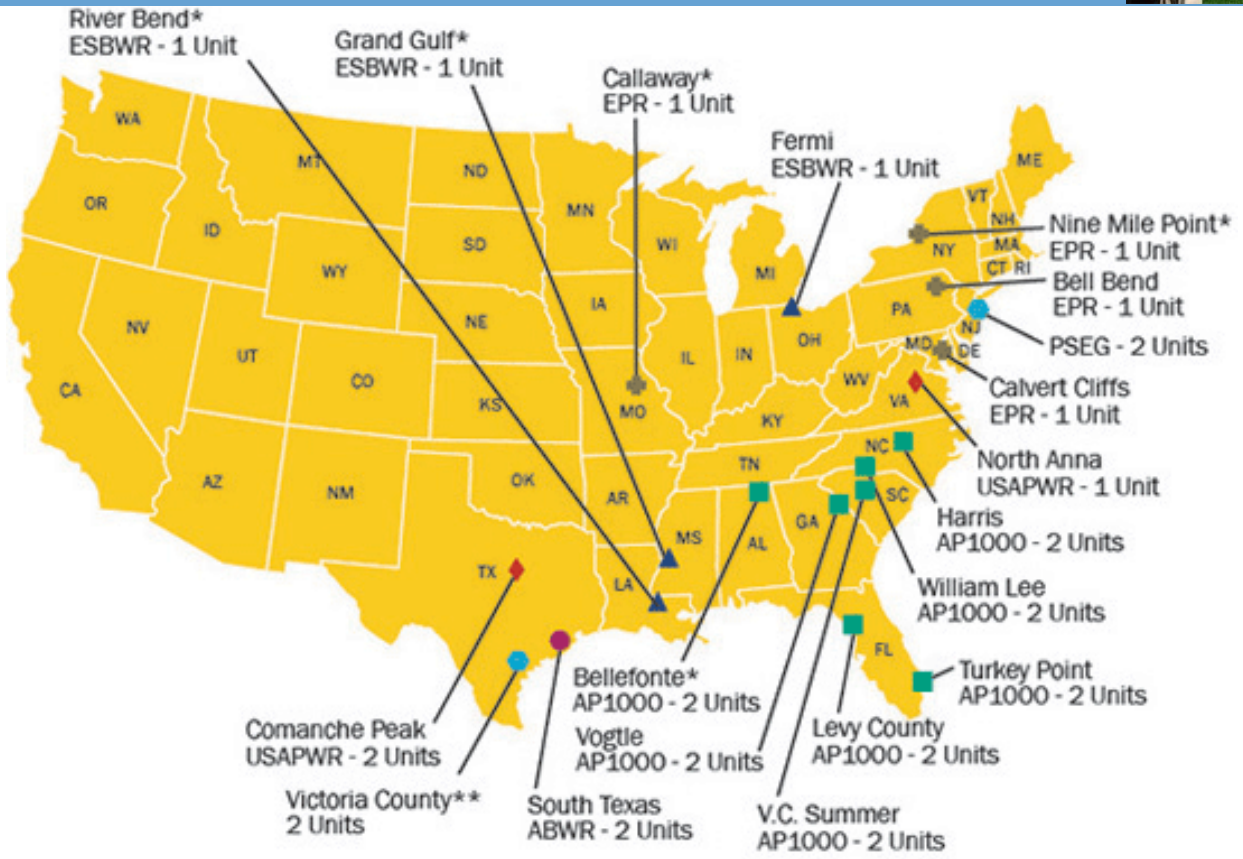
- Operating Reactors
  - Assessments, stress tests, safety and back up system evaluations
  - Possible shutdown of coastal reactors?
    - Build seawall or decommission?
    - Some temporarily shut down (Chubu Electric - Hamaoka)
    - What about San Onofre, Diablo Canyon, Brunswick?
  - Possible shutdown of reactors in seismically active areas?
  - Increased flood control in higher risk areas
  - Investment in additional equipment to assure back up power, emergency cooling water and fire protection systems

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

Linton Consulting

Scenarios for Nuclear Power

Proposed Reactors – How Many?



ABWR ■ AP1000 ✚ EPR ▲ ESBWR ♦ USAPWR ▽ Design/Units - TBA ● ESP

*Review Suspended by Applicant

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

Linton Consulting

Scenarios for Nuclear Power

Proposed Reactors – How Many Likely 5 Years?

X = Significant Postponement (Linton Assessment)

ABWR ■ AP1000 ✚ EPR ▲ ESBWR ♦ USAPWR ▽ Design/Units - TBA ● ESP

*Review Suspended by Applicant

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

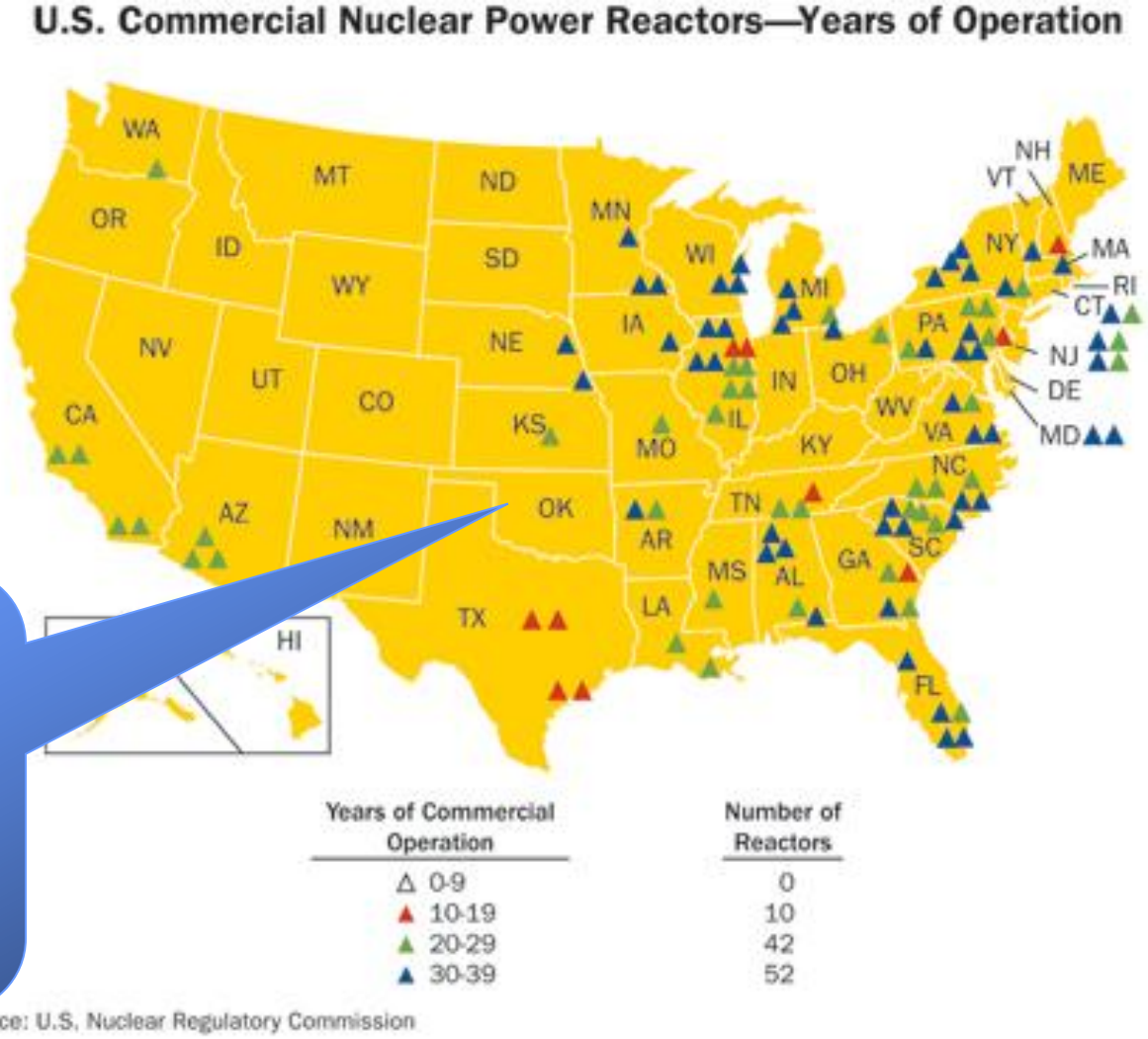
Linton Consulting

Scenarios for Nuclear Power

Operating Reactors - 104

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

"Recent events in Japan are likely to result in changes at existing U.S. nuclear plants…"
--NRC Commissioner Gregory Jaczko



Linton Consulting

Scenarios for Nuclear Power

Operating Reactors - 104

"Fukushima" upgrades to cost Billions?

"Operating plants spend $400 million for goods and services per year"

"It will cost Billions to fix Crystal River"

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

Years of Commercial Operation	Number of Reactors
△ 0-9	0
▲ 10-19	10
▲ 20-29	42
▲ 30-39	52

Source: U.S. Nuclear Regulatory Commission

Linton Consulting

Most Active U.S. Projects

- Tier 1 – "Happening: COL's Approved"
  - Southern & Partners' Plant Vogtle
  - SCANA and Partners
- Tier 2 – "Significant Ongoing E&C"
  - Watts Bar 2 – Completing
  - Crystal River?
  - Power Uprates: Entergy, Exelon, Others
- Tier 3 – "Actively Planning, but future"
  - Dominion's North Anna
  - Luminant's Comanche Peak
  - Duke's Lee Station, SC
  - Progress' Levy County, FL
  - TVA's Bellefont ?

"After these two, there is nothing else I have confidence in" --Financier

"We are anticipating a 1-2 year delay in the U.S. market due to Fukushima" -- Supplier

Linton Consulting

Expected Procurements

- Fukushima-response 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

"We are junk dealers – a lot of parts are obsolete and we have to scrounge parts from other plants"

Linton Consulting

Changing Demand Patterns

- Increasing demand, interest
  - Consulting, evaluations, assessments, stress tests
  - Peer reviews, monitoring
  - Rulemaking, harmonization/standardization, legal
  - Safety retrofits (& associated EPC); backup power systems, fuel storage ponds, flood control/seawalls, etc.
  - Power uprates
  - Dry cask storage systems
  - Small reactors?
- Slowing/reduced or postponed demand
  - New Build - Engineering & Construction (globally and selected countries)

Small Business – How Participate?

- Most utilities promote small & local businesses
  - High education/training requirements
- Most likely place to start: labor and services
  - Misc construction services
  - Facilities management, grounds maintenance
  - Fabricated, one-of-a-kind items
- Non-safety related equipment, materials
  - commodities: steel, fasteners, etc. commercial grade dedication
- Barriers to entry are high due to insurance, safety, people requirements
  - Procurement does the pre-qualification
  - Absolute perfection required

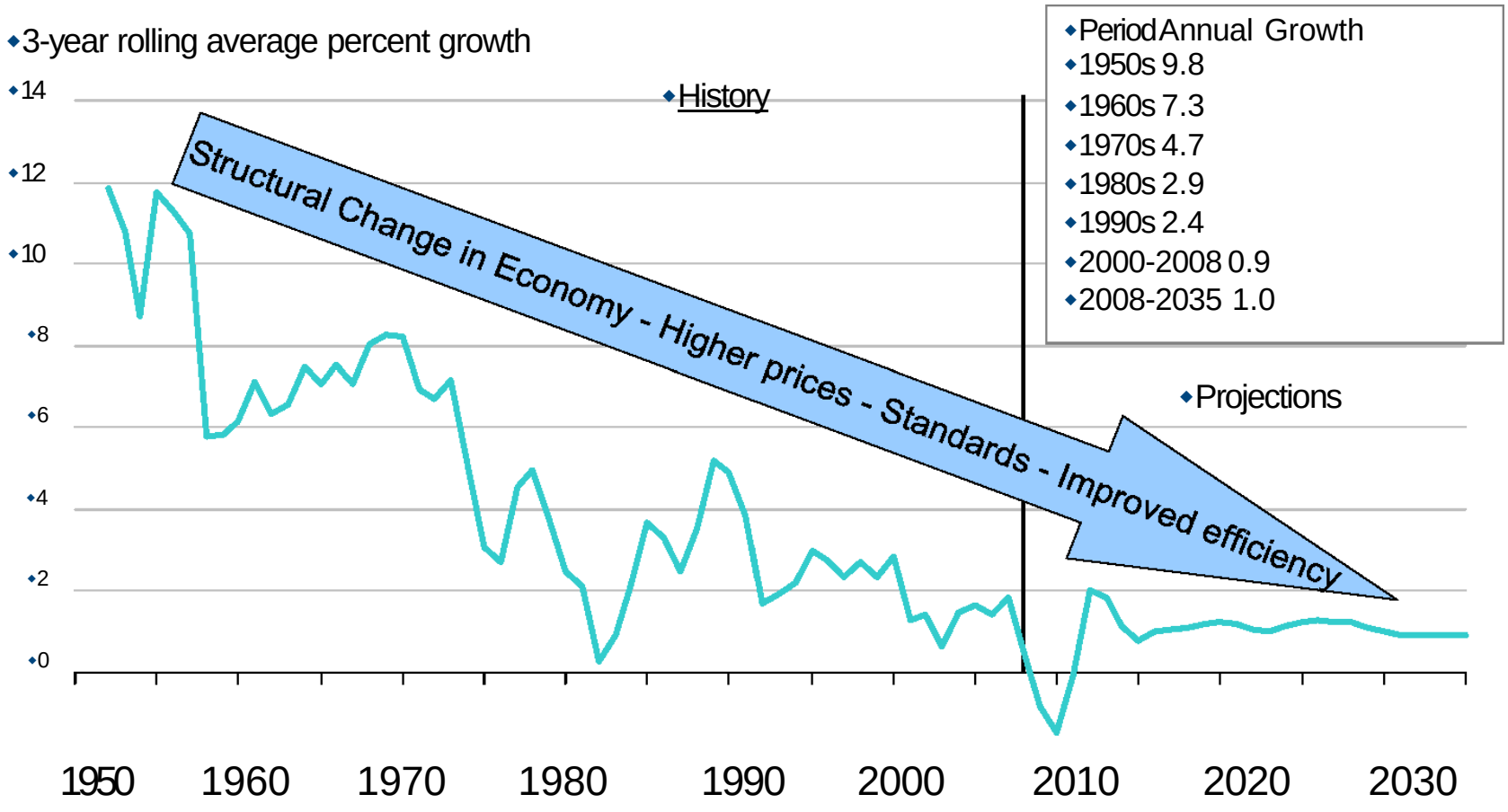
"Even an oil leak can shut you down."

Linton Consulting

Appendix

Linton Consulting

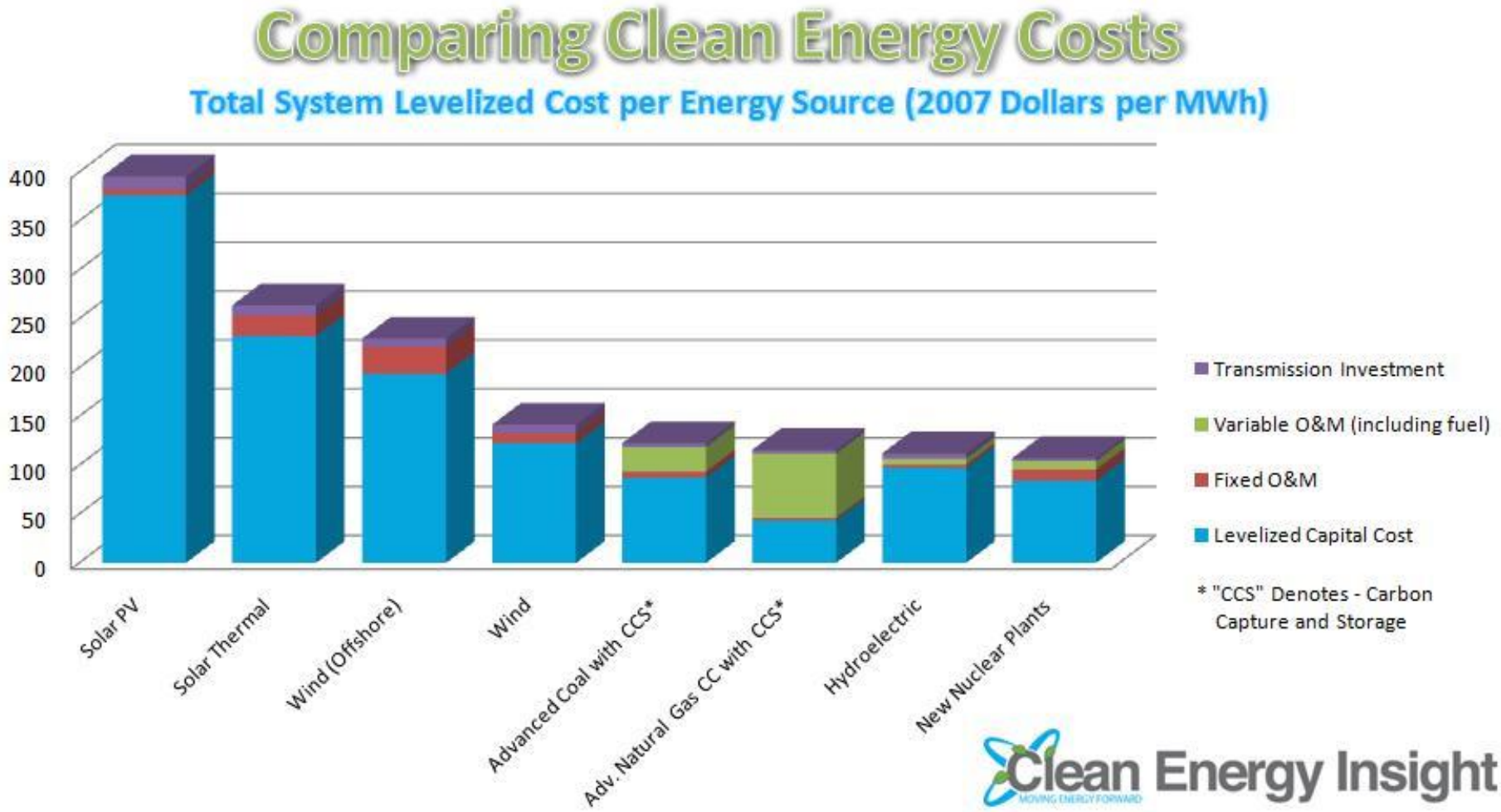
U.S. Electricity Use Growth – Slowing



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

Linton Consulting

Comparing Generation Costs

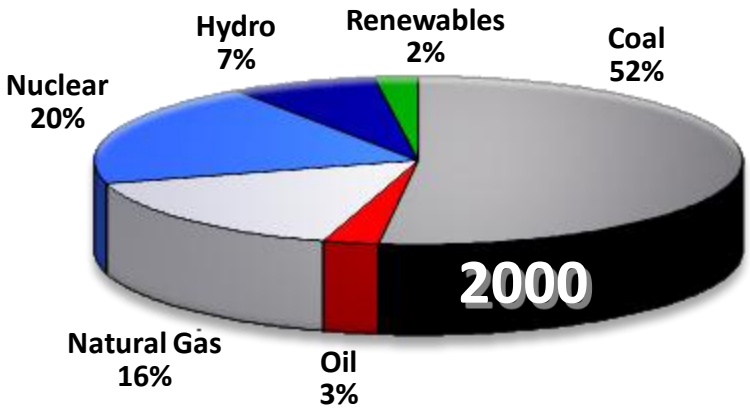


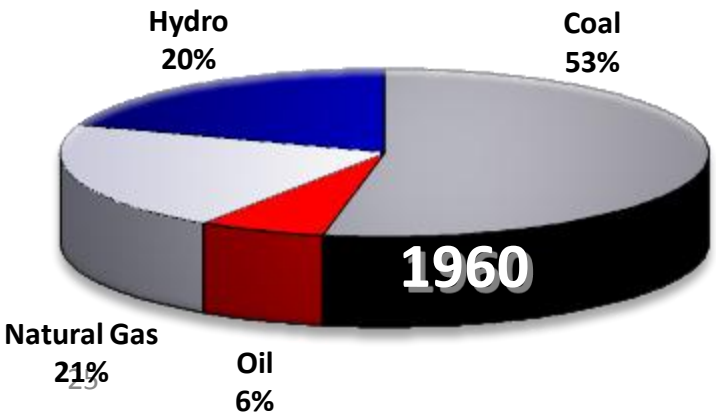
Clean Energy Insight

Linton Consulting

Energy Dynamics

- U.S. Generation mix changes over time
- Nuclear share from zero to 20%
- Global growth expected





Linton Consulting

Global Growth is Likely

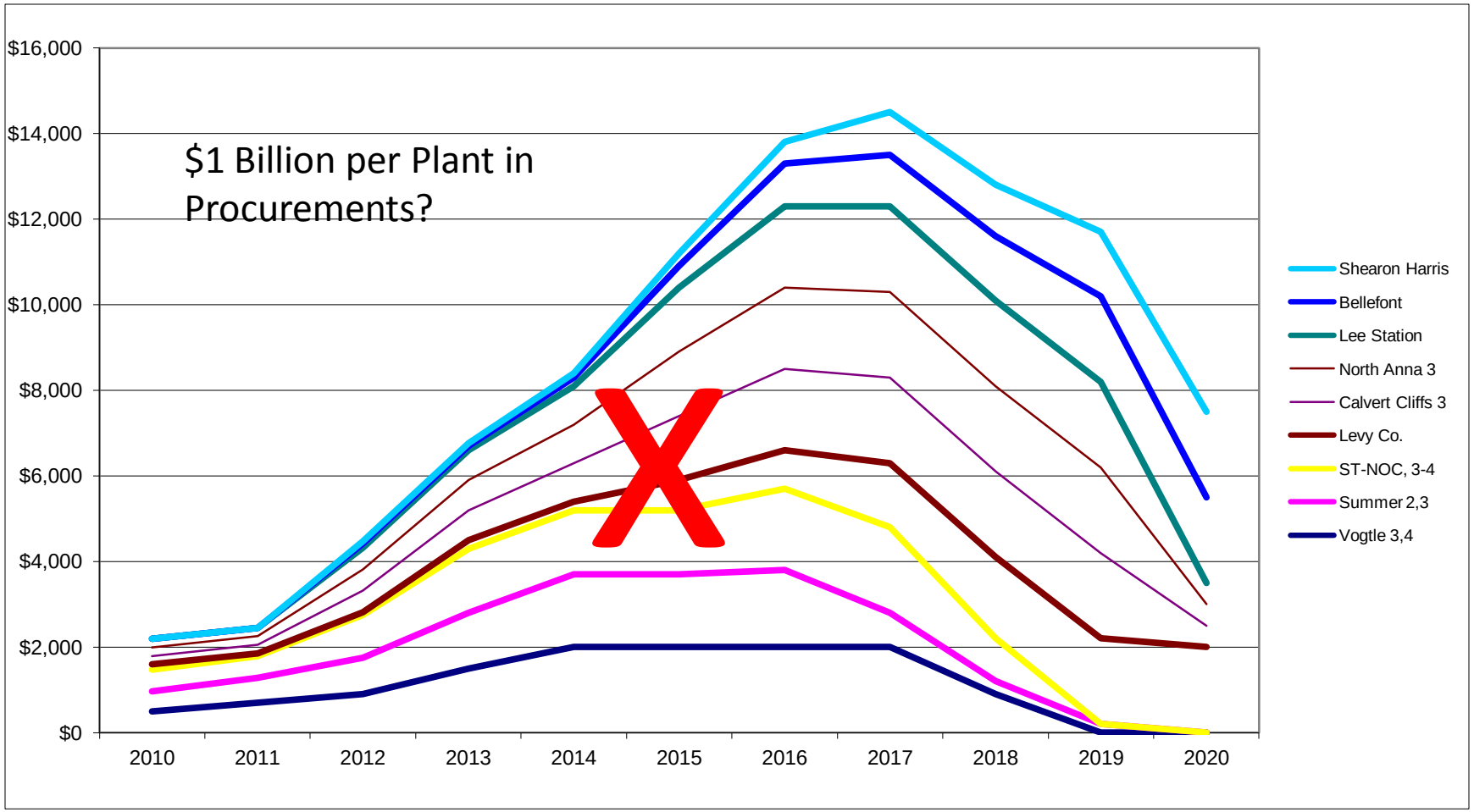
WNA NUCLEAR CENTURY OUTLOOK

MAJOR NUCLEAR PROGRAMMES*	2008	2030 Low	2030 High	2060 Low	2060 High	2100 Low	2100 High
Units - 1GWe							
Belarus	0	2	5	5	8	5	10
Belgium	6	6	8	8	10	8	22
Brazil	2	10	30	40	100	70	330
Bulgaria	2	4	7	5	7	5	7
Canada	13	20	30	25	40	30	85
China	9	35	100	150	750	500	2800
Czech Republic	3	5	7	5	12	5	15
Finland	3	5	7	8	10	8	11
France	63	65	75	80	110	80	130
Germany	20	20	50	40	80	80	175
Hungary	2	4	5	4	8	5	12
India	4	20	70	60	350	200	2750
Japan	48	55	70	80	140	80	200
Lithuania/ Latvia/ Estonia	1	4	6	5	8	5	8
Netherlands	1	1	5	7	20	10	35
Romania	1	4	10	5	20	10	25
Russia	22	30	70	75	180	100	200
Slovakia	2	3	4	4	5	5	7
Slovenia	1	1	1	1	2	1	2
South Korea (and North Korea)	18	25	50	45	80	70	145
Spain	7	8	20	20	50	25	60
Sweden	9	10	15	10	18	10	18
[illegible]itzerlan[illegible]					10	5	11

Source: World Nuclear Association Website

Linton Consulting

Nuclear Plant Capital Spending
$8 - 10B Supplier Market to 2020 ?



Linton Consulting

U.S. Electricity Markets

- Regulated (especially in Southeast)
  - Traditional utilities, regulated monopolies
    - Southern, SCANA, DTE, Dominion, Duke, Progress, FPL
    - Exelon, Entergy (have both)
  - PUCs closely monitor & control
  - Can get LGs and CWIP (in favorable states)
- Unregulated, competitive (NE, MW, Texas)
  - Merchant companies, no guaranteed returns
    - Constellation
    - NRG
    - Exelon, Entergy (Have both)
  - Can't get CWIP; must have LGs

"Are we seeing the merchant market leading to short term decisions that are not in the public's best interest?"
--Utility Financial Officer

Linton Consulting

Insights for Industry and Government

Linton Consulting

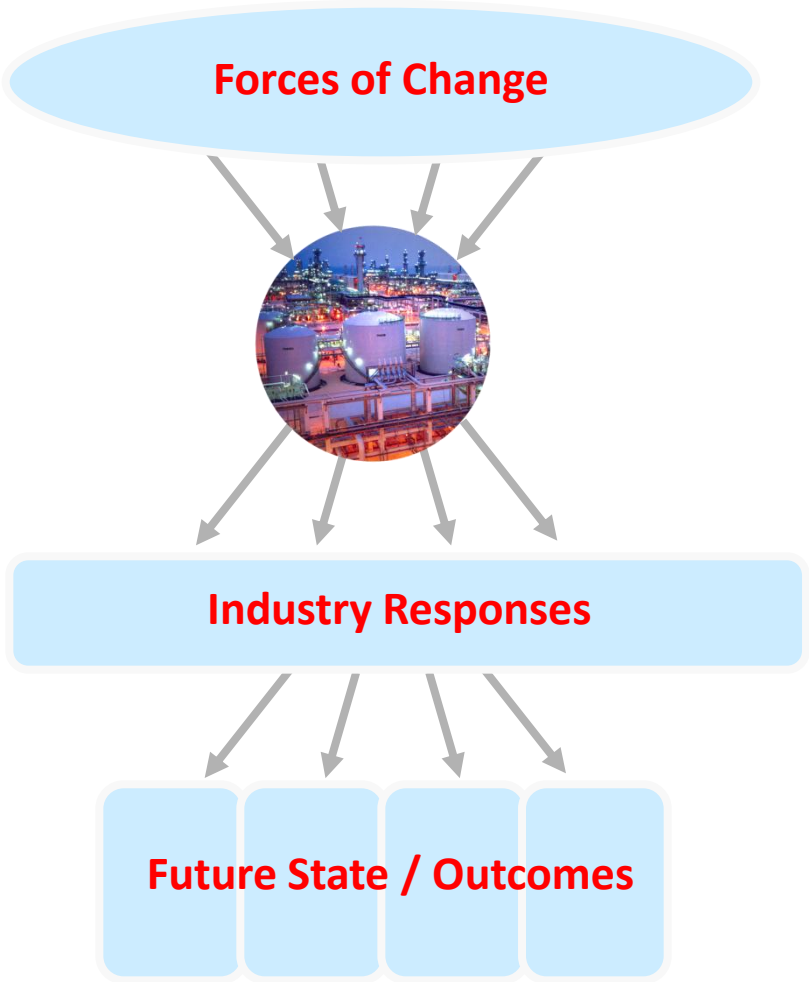
Who Is Linton Consulting?

- A professional practice providing independent insights and advisory services to industry and government
- Focus: Energy, Power, Nuclear
- Business strategy, market development, diversification, trend analyses, scenarios and visioning
- Executive relationships and introductions
- Strategic View
  - Process develops high level insights on the future state
  - Ongoing analyses and executive interviews
  - *Strategic View* Nuclear out Q3 / 2012
- Services leading to sound business strategies, decisions, plans and implementation

Linton Consulting

What is *Strategic View*?

- Research model
  - Used 15 years; 5 in energy
  - Forces affecting the future of the energy industry
  - Industry responses
  - Where it is leading – the future state/outcomes
- Process
  - Interviews with executives and thought leaders
  - Research & analysis
  - Executive Roundtable
  - Follow up & plan integration



Linton Consulting

Executive Roundtables

- Common purpose
  - Convene executives and thought leaders for knowledge exchange
  - Expand understanding
  - Share perspectives
  - Confirm/challenge paradigms
  - Advise leadership
  - Uncover ideas and opportunities for your organization
  - Explore Future – trends and challenges
  - Establish practical, realistic path forward

Linton Consulting