

# Procurement and Supply Chain Hurdles in a Global Upturn

Rice Global E&C Forum  
September 14, 2010

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Senior Vice President & Chief Procurement Officer  
Fluor Corporation

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# Agenda



- ◆ **Fluor Overview**
- ◆ **Material Market Overview**
- ◆ **The Capital Project Supply Chain Process**
- ◆ **State of the Procurement Profession**
- ◆ **Supply Chain Education**

# Fluor Overview



- ◆ One of the world's leading publicly traded engineering, procurement, construction, maintenance, and project management companies
- ◆ **#114** in the FORTUNE 500
- ◆ Over **1,000** projects annually, serving more than **600** clients in **85** different countries
- ◆ More than **42,000** employees worldwide
- ◆ Offices in more than **30** countries on **6** continents
- ◆ Nearly **100** years of experience



**Fluor Corporate Headquarters**  
*Dallas, Texas*

# Fluor Differentiators



- ◆ Executing work in challenging locations
- ◆ Mobilizing diverse workforces
- ◆ Linking global engineering resources
- ◆ Sourcing material globally
- ◆ Meeting compressed schedules
- ◆ Developing innovative and cost-effective project financing
- ◆ Optimizing assets over a facility's life cycle
- ◆ Managing joint ventures and alliances globally

# Fluor's Diversified Industries



## Energy & Chemicals

- ◆ Chemicals
- ◆ Downstream
- ◆ Upstream
- ◆ LNG
- ◆ ICA Fluor

## Industrial & Infrastructure

- ◆ Alternative Power
- ◆ Commercial & Institutional
- ◆ Healthcare
- ◆ Life Sciences
- ◆ Manufacturing
- ◆ Mining & Metals
- ◆ Telecommunications
- ◆ Transportation
- ◆ Water

## Government

- ◆ Department of Defense
- ◆ Department of Energy
- ◆ Department of Homeland Security
- ◆ Department of Labor
- ◆ NASA
- ◆ UK Nuclear Decommissioning Authority

## Power

- ◆ Gas Fueled
- ◆ Nuclear
- ◆ Plant Betterment
- ◆ Power Services
- ◆ Solid Fueled

## Global Services

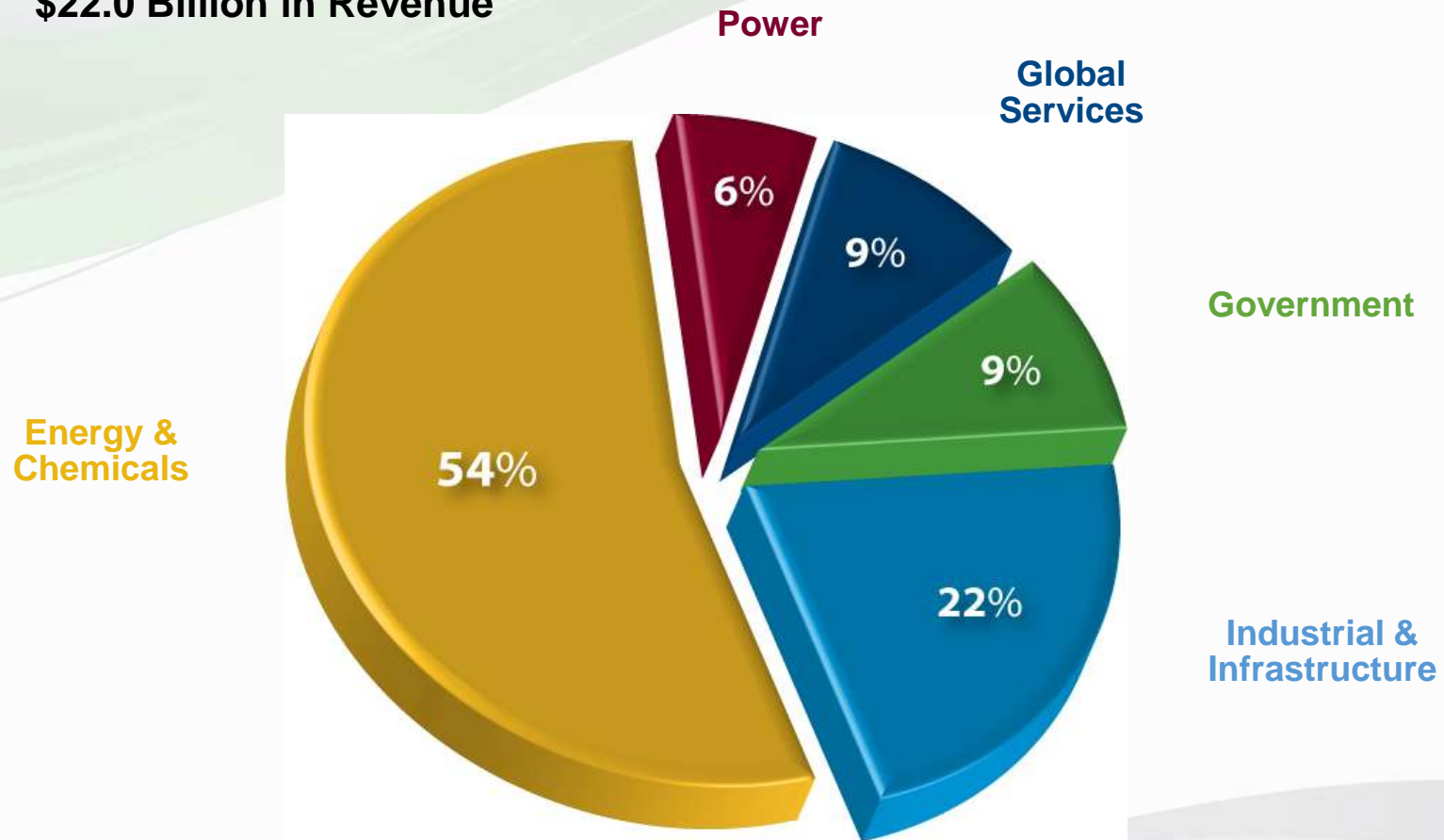
- ◆ Operations & Maintenance
- ◆ Construction Equipment & Tools
- ◆ Staffing



# 2009 Fluor Performance Revenue by Business Group



**\$22.0 Billion in Revenue**



# Center-Led Global Procurement Organization



# Center-Led Procurement Organization Worldwide Network

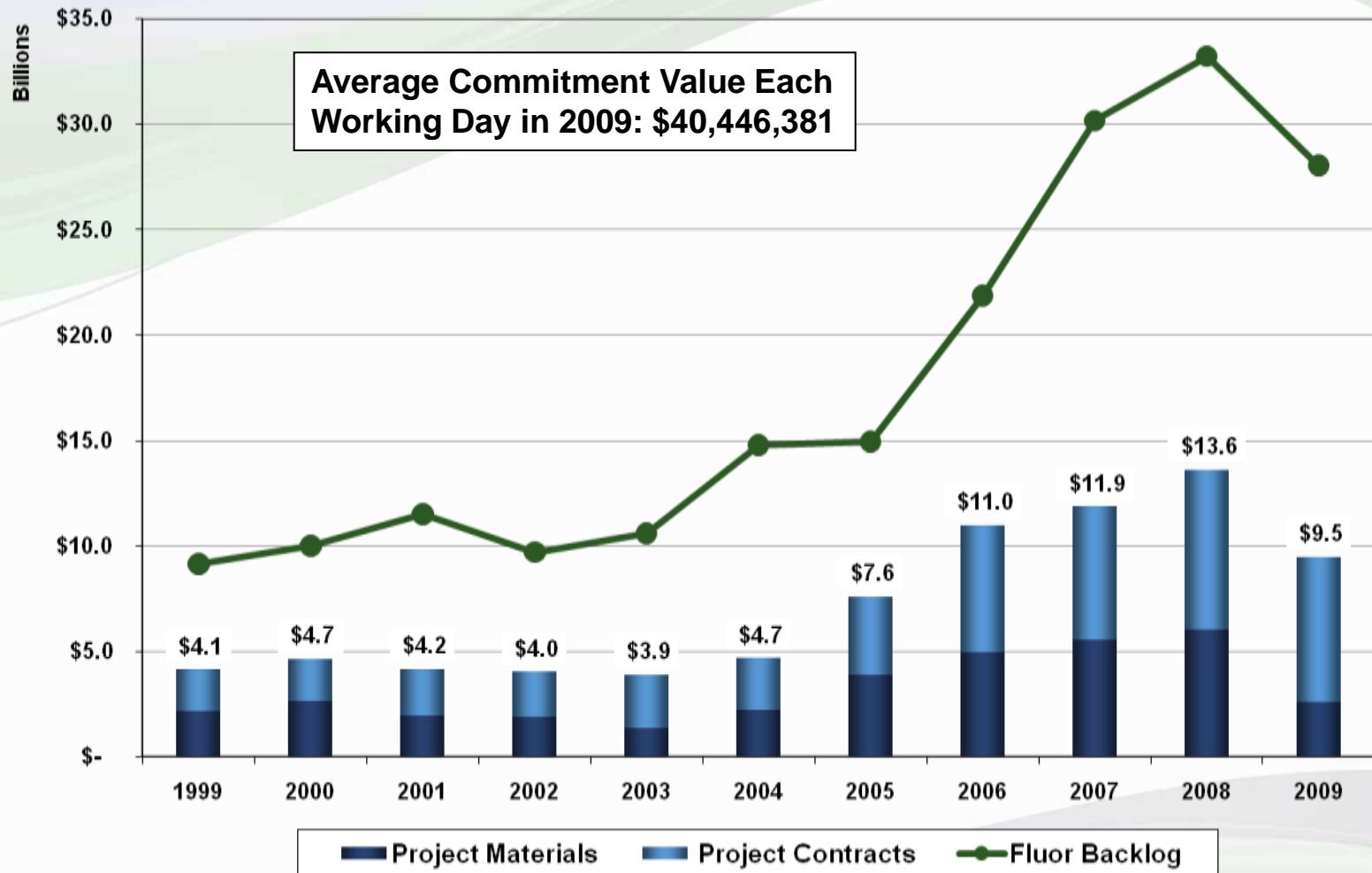


**Over 1,800 Procurement Professionals Worldwide**

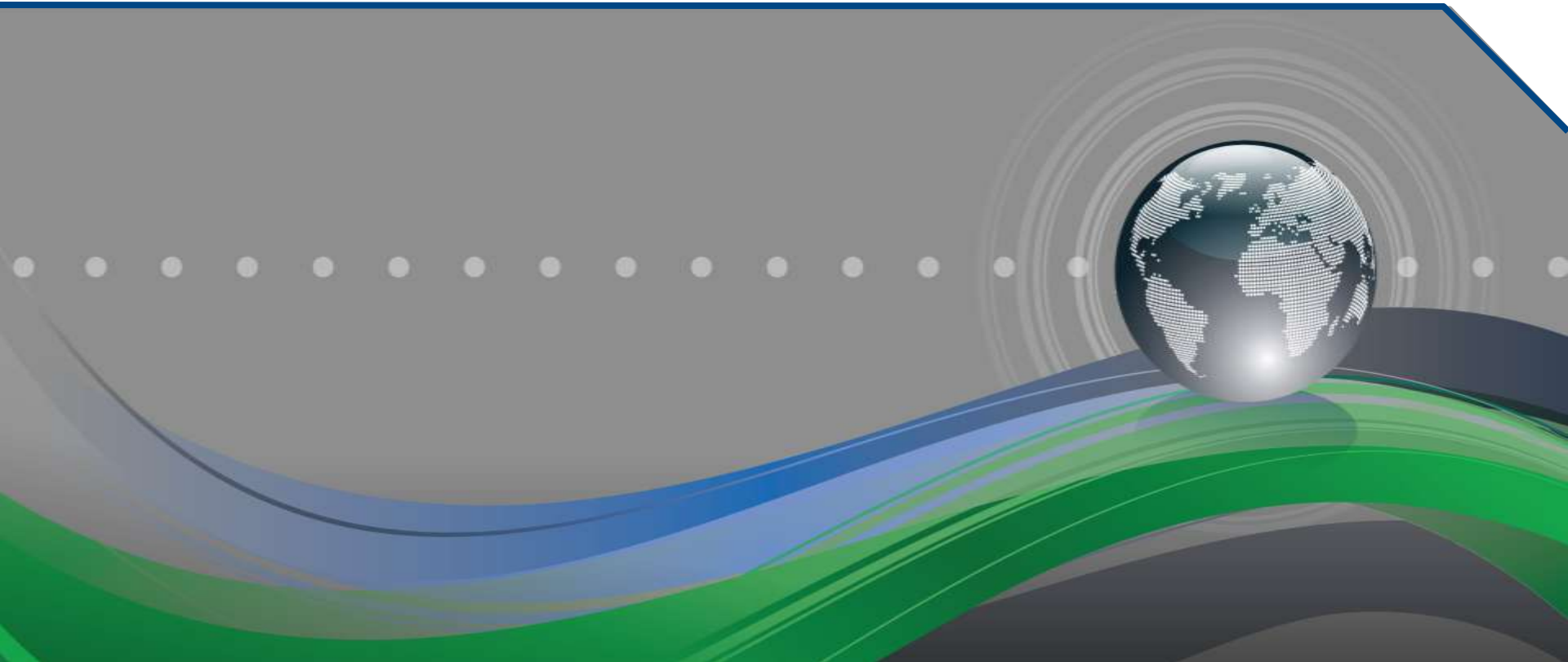




# Fluor 10-Year Worldwide Spend Volume



# Material Market Overview



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# Material Market Mid 2010 Update



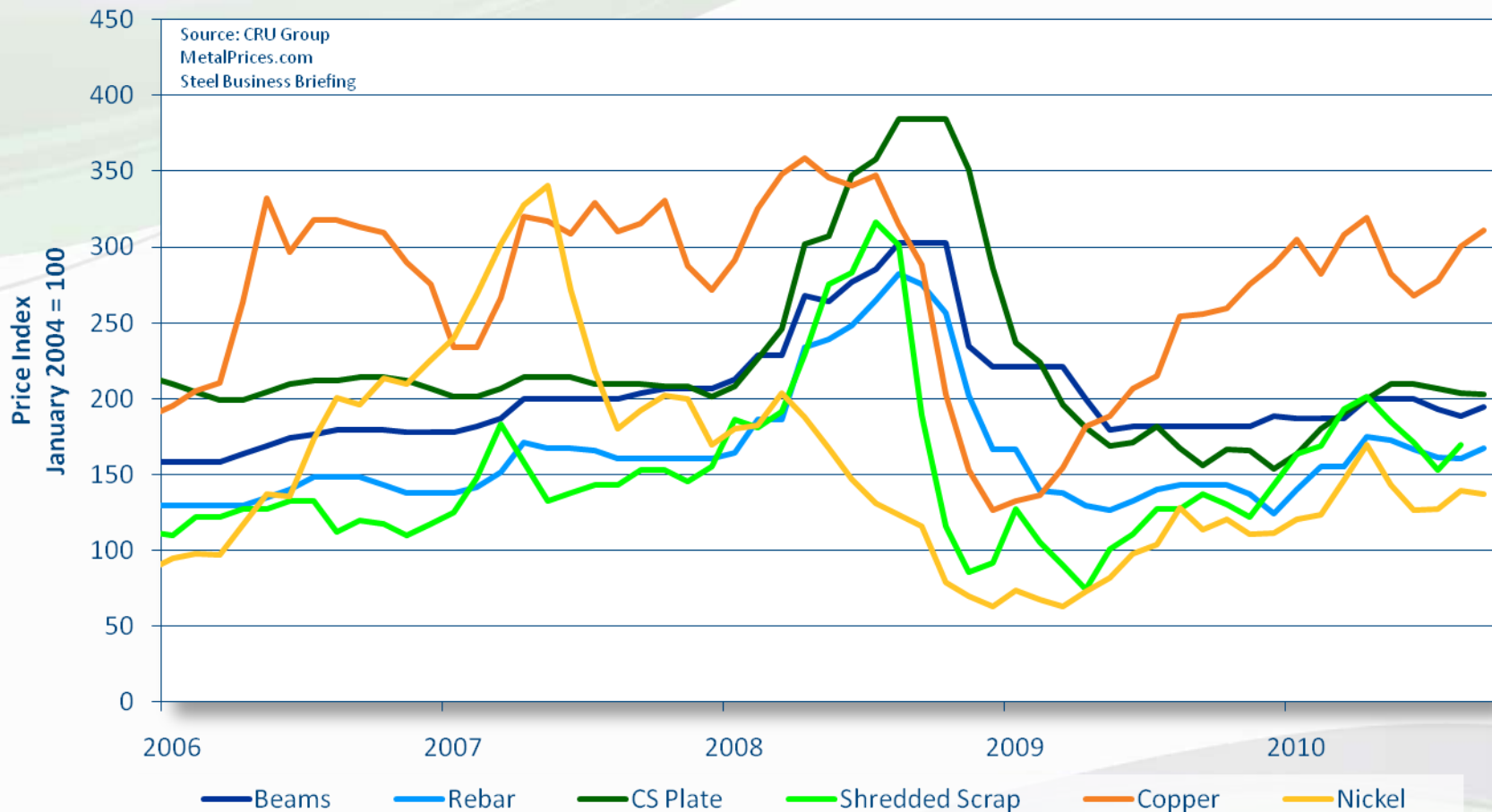
- ◆ **Raw material prices are leveling off**
- ◆ **Engineered equipment and steel fabrication prices dropped drastically in 2009 but we are beginning to see an uptick**
- ◆ **Supplier shop space is well below capacity**
- ◆ **Low cost country sources of supply continue to be very aggressive on price**
- ◆ **Opportunity for both Owner's and Contractors to secure lower prices for goods and services...but the window of opportunity will start to close soon**

# Economic Indicators

## Raw Material Prices Are Leveling Off



**U.S. Raw Material Price Escalation**  
January 2004 – September 2010



# Market Recovery Estimated Timing/Commodity Escalation



Supply & Demand Forecast	2009				2010				2011			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
% GDP World *	-3.3	-3.0	-1.9	0.8	3.7	3.9	3.8	3.6	3.4	3.4	3.5	3.7
Oil Price \$/Barrel *	43	60	68	76	79	78	72	75	80	81	84	86
<b>Commodity Escalation</b>												
Fabricated Structural Steel	(10)-(5)				(5)-10				3-8			
Pressure Vessels and Heat Exchangers	(10)-(2)				(10)-(2)				1-5			
Compressors	(10)-0				0-3				1			
Pumps	(10)-0				0				0			
Pipe Material	(40)-0				0-5				3-8			
Valve Material	(15)-0				(2)-5				3-10			
Electrical	(10)-0				0-10				2-10			
Control Systems	(2)-4				(2)-4				3-6			
Logistics – Domestic	(5)-0				3-5				3-6			
Logistics – International	(15)-0				(5)-7				0-6			

**Legend**  Good  Med.  Bad

\* Source of Oil Price and % GDP Growth Forecast: IHS Global Insight July 15, 2010



# Hurdles in a Global Upturn



## ◆ Challenges

- Rising material and equipment costs
- Longer lead times
- Limited shop space
- Quality issues

## ◆ Mitigation Strategies

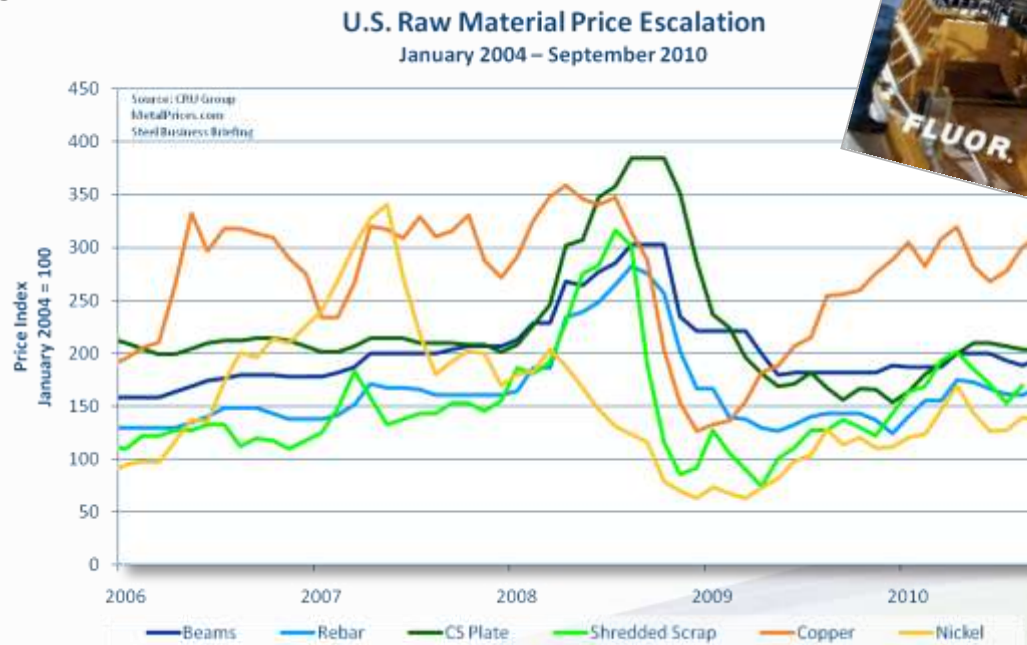
- Manage material market better
- Constantly collect and leverage market intelligence
- Pre-qualify Low-Cost Country Suppliers (LCCS)
- Develop additional global supplier alliances
- Maintain focus on supplier collaboration
  - Downturn could lead to regression toward previous methods
- Strengthen shop inspection organizations

# Managing Market Intelligence



- ◆ Quarterly Material Market Bulletins for our projects, estimating groups, and clients that contain market specific information and trend analyses for select material and equipment categories

- Supply
- Demand
- Pricing



# Low Cost Country Sourcing



- ◆ **LCCS provides 15-40% total cost savings versus non-LCCS region competitive bidding**

- Lower labor costs
- Reduced costs of manufacturing equipment
- Reduced cost of raw materials

- ◆ **Fluor rates and monitors LCCS suppliers**

- Price differentials against US baseline
- Delivery times
- Schedule risk
- Quality / Pre-Qualification

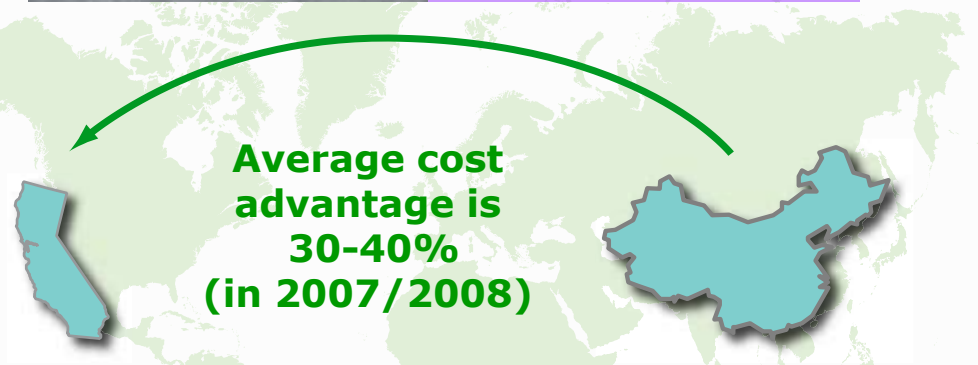
- ◆ **Strategic supplier agreements developed with suppliers in low cost and emerging markets**

- ◆ **LCCS infrastructure investment required**

- ◆ **CII Product Integrity efforts (counterfeit avoidance)**

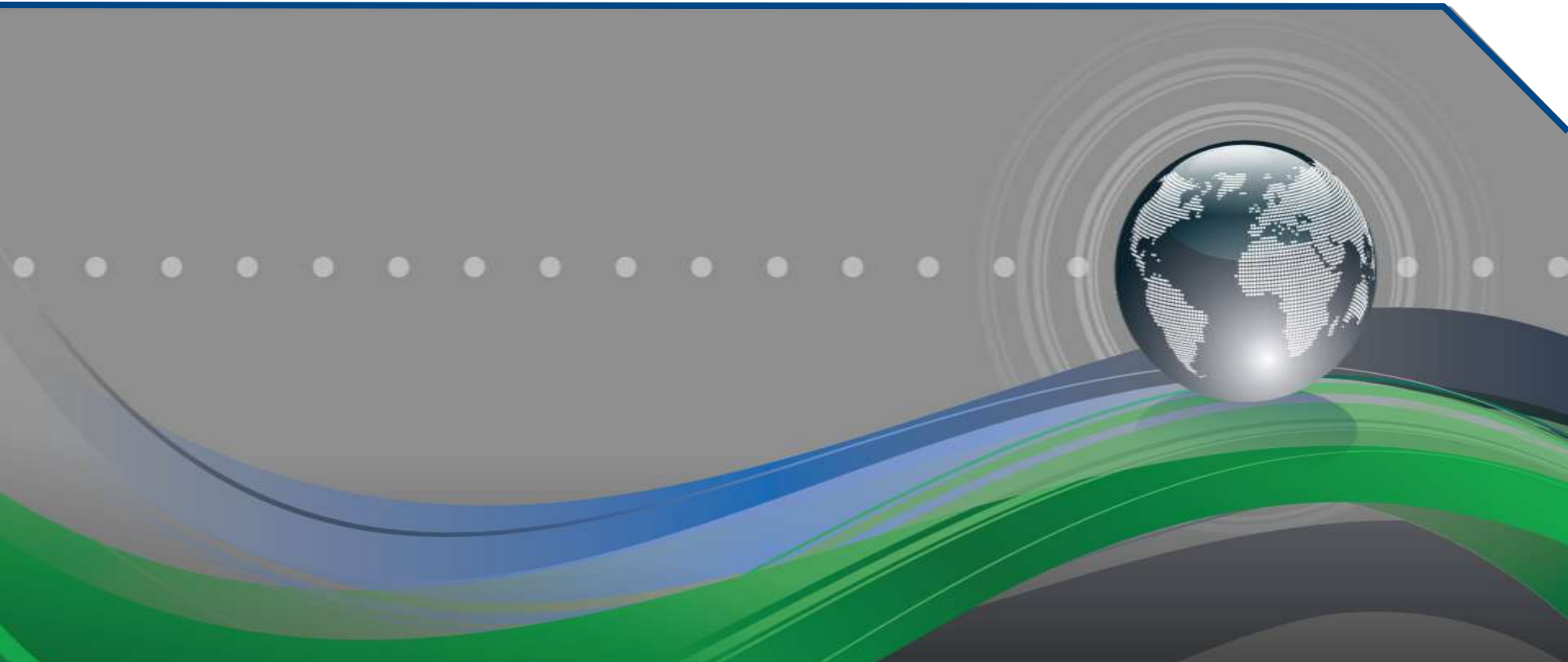


**Product:** Structural Steel  
**Advantage:** Lowest Cost (33% advantage opposed to US suppliers), Short Delivery  
**Project Location:** California



**San Francisco-Oakland Bay Bridge**

# The Capital Project Supply Chain Process

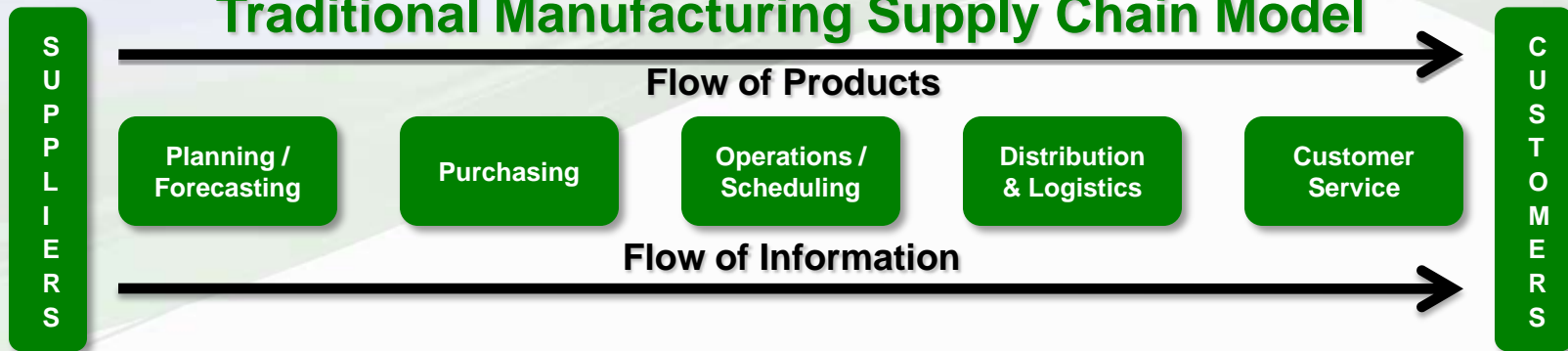


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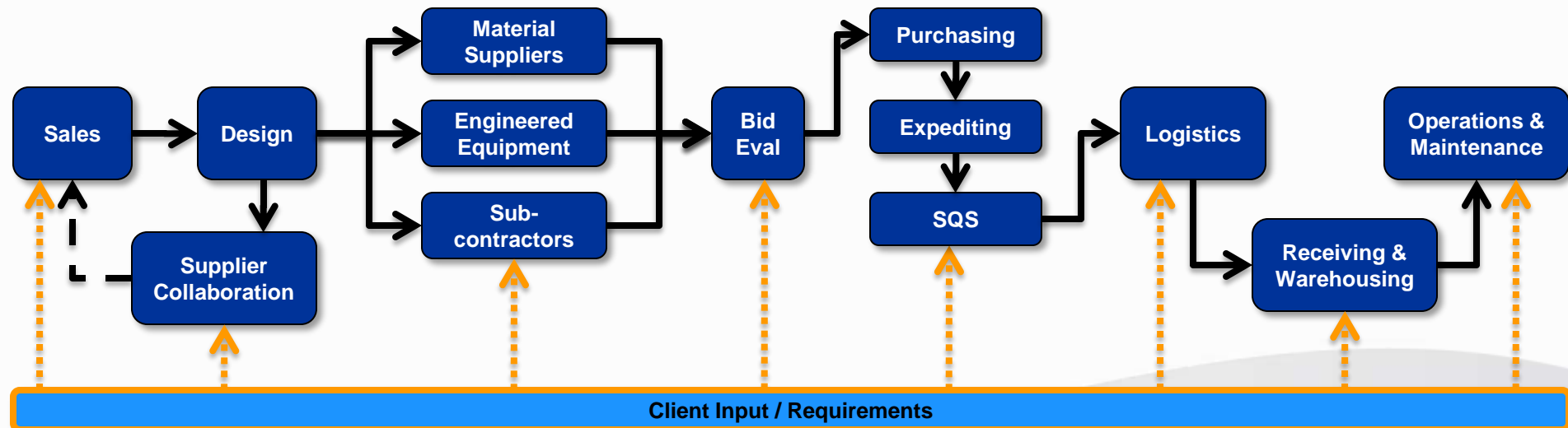
# Manufacturing versus Capital Project Supply Chain



## Traditional Manufacturing Supply Chain Model



## Capital Project Supply Chain Model

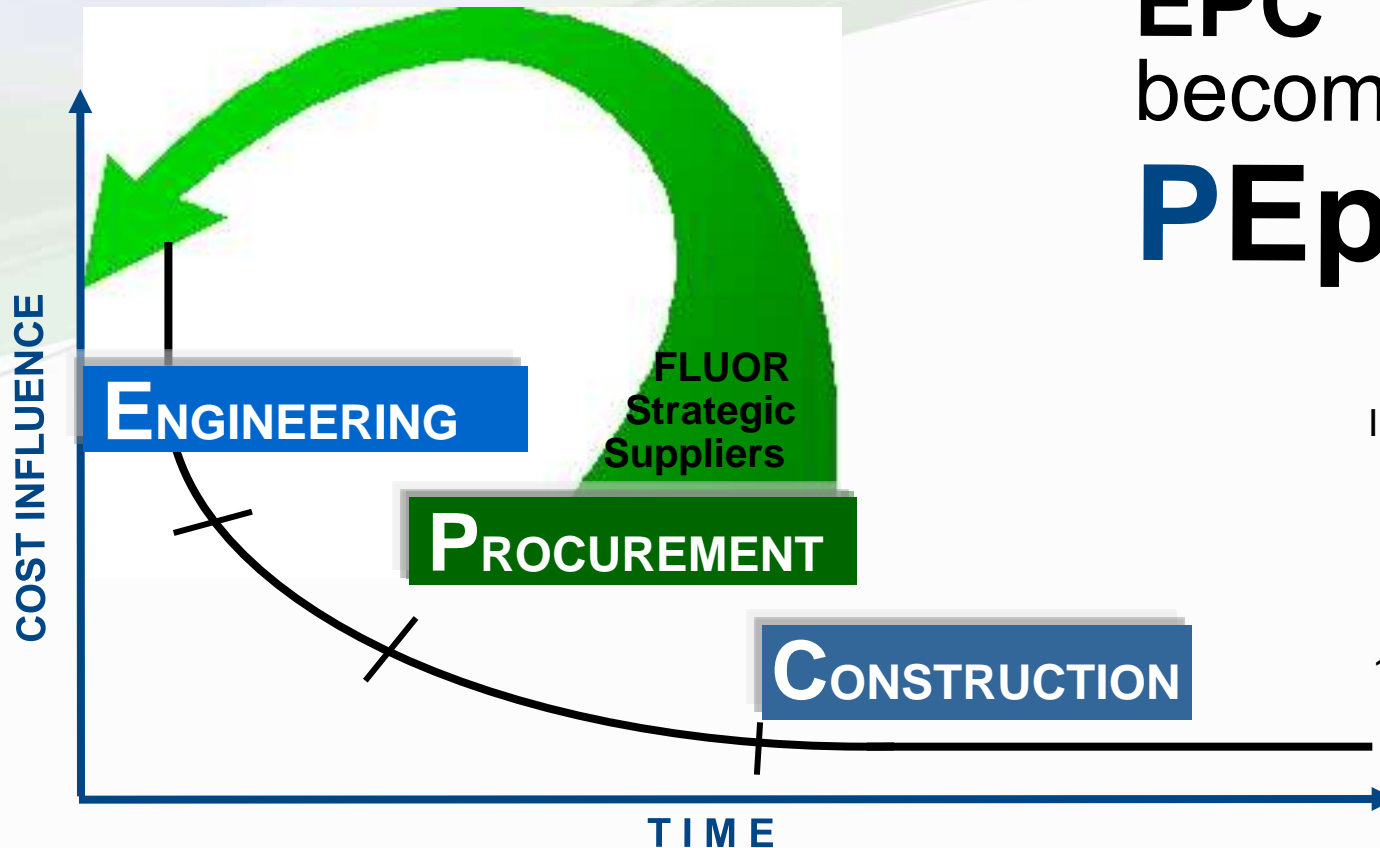




# EPC Industry Innovation The PEpC Process



EPC  
becomes  
**PEpC**



Construction Industry Institute (CII) indicates:

4-8% cost savings

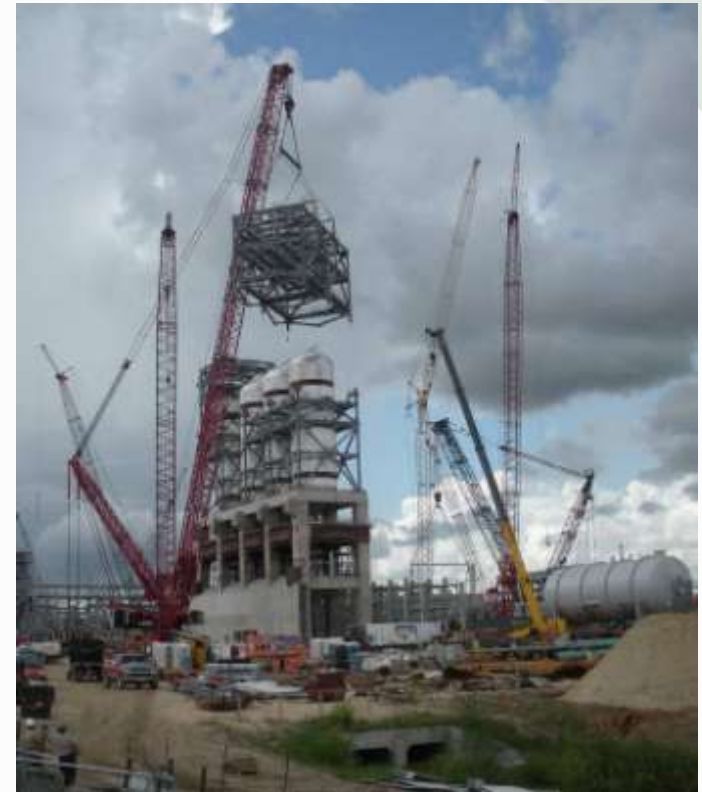
10-15% savings in time

The ability to influence the cost of a project is greatest at the beginning of a project - bringing key suppliers in early is essential to success.

# Case Study: Coke Drum Initiative Project Scenario & Outlook in 2006



- ◆ A number of refinery expansion projects were planned for 2006-2009 in North America
- ◆ Delayed Coking Units (DCU) were included as a part of these expansions
  - Capable of handling heavier crude oil; expected to be the feedstock
- ◆ In anticipation of an upsurge in these DCU Projects, Fluor began an investigation to assess project risks and opportunities



# Case Study: Coke Drum Initiative Project Risk Assessment



## ◆ Supply Chain risk was paramount

- Materials were required at site to support construction schedule
- Coke Drums were identified as the bottleneck for achieving Fluor client project schedule objectives
- Approximately 20-30 Coke Drums were needed to support Fluor targeted projects



## Case Study: Coke Drum Initiative Supply Chain Impact



- ◆ **Traditional coke drum fabricators had been over extended or had a large backlog**
  - Japanese fabricators had nearly 100% of the market share over the previous 10 years, but could not keep up with the anticipated demand
- ◆ **Globally, the clad plate mills were also at peak capacity and clad plate deliveries had been in the one year range and in some instances even longer**
- ◆ **Coke drum deliveries had been in the range of 28 – 33 months and these longer deliveries extend construction commensurately**



# Case Study: Coke Drum Initiative Success Partners & Stakeholders





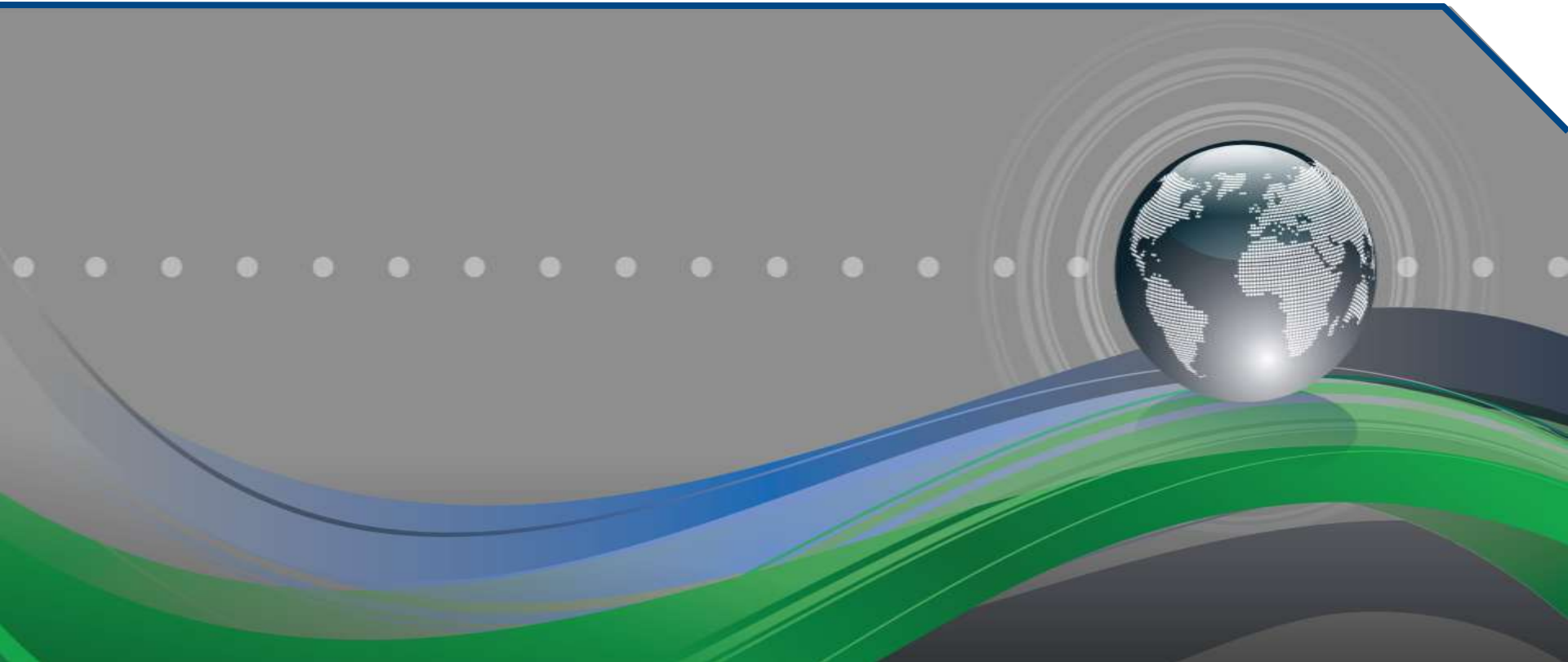


# Case Study: United Kingdom Wind Farm Success Criteria



- ◆ **Early engagement with suppliers**
  - Unique expertise and product knowledge
  - Drives efficiencies in design
  - Reduce engineering effort and rework
  - Improve quality
  - Optimises life cycle costs
- ◆ **Understand supplier investment plans**
- ◆ **Seek long term commitments / frameworks**
- ◆ **Consider strategic investments to address gaps in supply chain as applicable**
- ◆ **Develop relationships with development and government agencies to take advantage of investment funding**
- ◆ **Lessons Learned**
- ◆ **Win – Win for all parties**
- ◆ **Flexible, collaborative approach and long term strategic vision throughout the supply chain**

# State of the Procurement Profession



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# EPC Procurement Profession Timeline



## 1970's

- Material Systems
- MRP
- Subcontractor administration
- Business Roundtable  
CICE study

Big Chief  
Tablets

Bid Tabs /  
Telex

Spreadsheets  
Fax's

## 1960's

- Purchasing  
(Purchasing Agents)
- Traffic
- Expediting
- Inspection



## 1980's

- Procurement
- Just-In-Time
- Material Management
- Logistics



# History of Purchasing and Supply Management 1980's



- ◆ **The advent of just-in-time purchasing techniques in the 1980's made purchasing a cornerstone of competitive strategy**
- ◆ **Purchasing had become responsible for acquiring the right materials, services, and technology from the right source, at the right time, in the right quantity**
  - The term Procurement began to replace Purchasing
  - The role of Materials Management became a core-competency in Procurement
  - Logistics also emerged as a core-competency of Procurement
- ◆ **Organizations**
  - AIChE founded Engineering and Construction Contracting Association in 1969
    - Fully autonomous organization beginning in 2002
  - Construction Industry Institute founded in 1983
  - CAPS Research organization founded in 1986



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## 1990's

- Supplier partnerships
- Supply Chain
- Chief Procurement Officer
- Supplier consolidation
- SAP, etc.



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# History of Purchasing and Supply Management 1990's



- ◆ **Procurement assumed a position in organizational development and management**
- ◆ **Procurement became more integrated into the overall corporate strategy**
- ◆ **Terminology**
  - “Supply chain management” began to replace the terms “purchasing”, “transportation”, and “operations”
  - The title Chief Procurement Officer began to emerge
- ◆ **The introduction of the CII PEpC model further elevated the role of Procurement in the EPC industry.**
- ◆ **Organizations**
  - Procurement Executives Group founded



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## Big Chief Tablets

## Bid Tabs / Telex

## Spreadsheets Fax's

## Email

## EDI & eProcurement

## 1960's

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## 1980's

- Procurement
- Just-In-Time
- Material Management
- Logistics



## 2000's

- "Seat at the table"
- Supplier collaboration
- PEpC
- Market intelligence
- LCCS
- Strategic sourcing
- Supply chain degree programs

# History of Purchasing and Supply Management 2000 – Present



- ◆ Procurement's role and recognition in the Capital Projects industry continues to grow
- ◆ Most E&C firms established executive-level procurement positions
- ◆ Owner Chief Procurement Officers are more engaged in Capital Projects
- ◆ Procurement executives are commonly requested to make presentations at major industry events
- ◆ Creation of the first graduate-level Supply Chain Management degree focused on Capital Projects

**1915**



**1969**



**1983**



**1986**



**1994**



# EPC Procurement Profession Timeline



## 1970's

- Material Systems
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- Supplier partnerships
- Supply Chain
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## 2010

- Market intelligence
- International competition
- Dispersed execution
- EPC Supply Chain Education (Clemson)

## Big Chief Tablets

## 1960's

- Purchasing (Purchasing Agents)
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- Inspection



engineering and construction contracting association

## Bid Tabs / Telex

## Spreadsheets Fax's

## 1980's

- Procurement
- Just-In-Time
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- Logistics



Construction Industry Institute®



## Email

## EDI & eProcurement

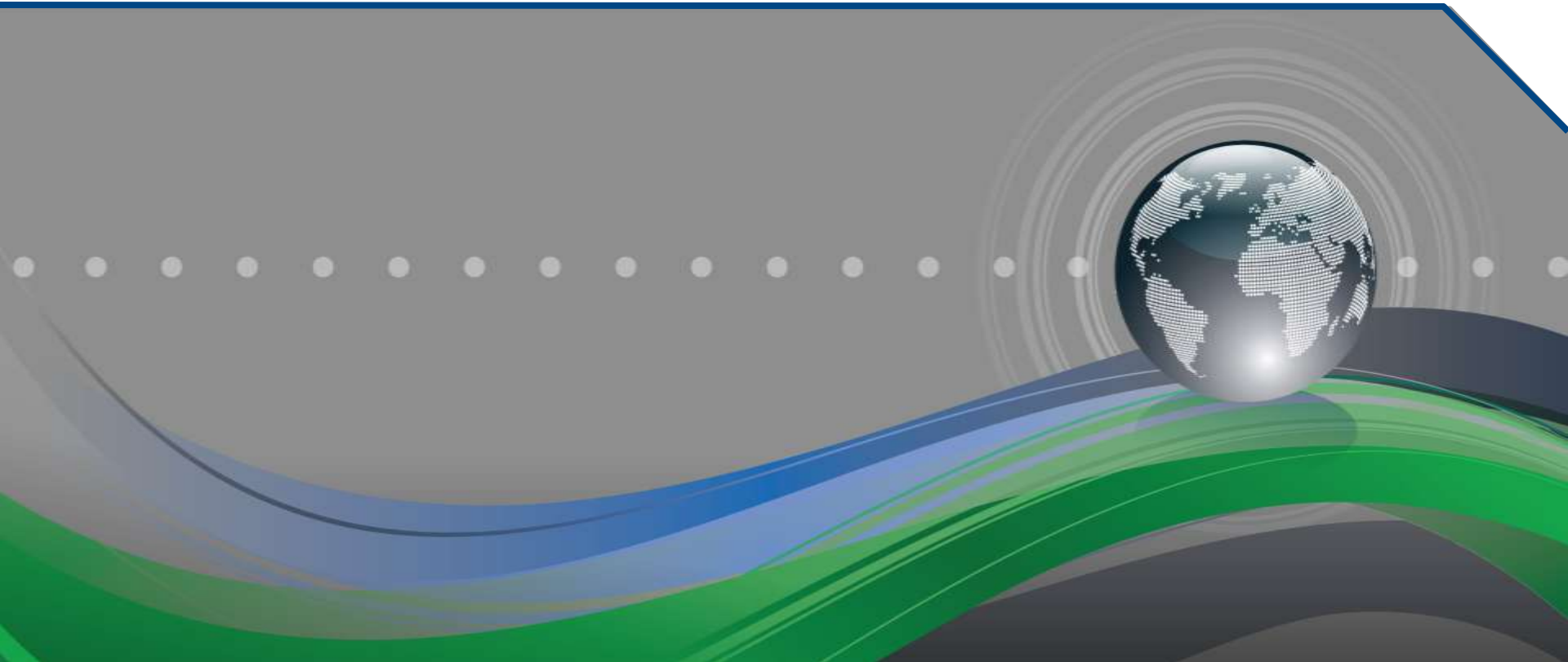
## 2000's

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- PEpC
- Market intelligence
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- Strategic sourcing
- Supply chain degree programs

## Total Collaboration Environment



# Clemson Supply Chain Master's Program



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# Procurement Innovation

## Fluor Endowment to Clemson University



### Fluor Endowed Chair of Supply Chain and Logistics for Capital Projects

- ◆ \$2 million investment matched with \$2 million from State of South Carolina
- ◆ Announced September 11, 2007
- ◆ Unique focus on capital projects
- ◆ Fully accredited Master of Engineering
- ◆ Distance learning – no on-campus requirements
- ◆ Enrollment of 80+ students across three cohorts from Fluor and other companies in the industry
- ◆ Continued support and input from owners, contractors, and suppliers



# Employers of Current Students



- ◆ Abbott
- ◆ Alstom
- ◆ BMW Group
- ◆ Boeing
- ◆ Bosch
- ◆ Capsugel (Pfizer)
- ◆ CH2M Hill
- ◆ ExxonMobil
- ◆ Fluor
- ◆ Foster Wheeler
- ◆ GE Gas Turbine
- ◆ Hatch
- ◆ Jacobs
- ◆ Kiewit
- ◆ Panalpina
- ◆ S&B
- ◆ Sandvik
- ◆ UPS





# Curriculum





## Masters Degree in Capital Projects Supply Chain

### ONLINE!

10 total courses

3 courses per year  
August-December  
January-April  
May-July

Program accepts new students each May

*"Fujair Corporation recognizes the immense value supply chain management brings to capital projects. We are pleased to be able to partner with the State of South Carolina to establish what is a truly unique master's degree program for working engineers and supply chain professionals."*

- Jim Scott  
Senior Vice President and Chief Procurement Officer  
Fujair Corporation

#### About the Program

Clemson University is proud to offer a Master of Engineering in Industrial Engineering with a concentration in Capital Projects Supply Chain and Logistics designed specifically for working professionals. To achieve the objective of improving and optimizing the supply chain with specific applications in capital projects, a multidisciplinary approach has been developed that integrates coursework and appropriate fundamental tools from Industrial Engineering, Civil Engineering, and Management. This structure will provide both a diversified knowledge base for improving supply chain processes today, and durable tools and concepts that will continue to serve the graduate in facing the challenges of tomorrow. The program represents and explores the various roles and interests in the execution of capital projects, including owners, contractors, suppliers and subcontractors.

To accommodate the demanding schedules of full-time professionals, all classes are offered online through asynchronous, web-based delivery with no residency requirement. Lectures can be downloaded to a desktop, iPod, or mobile device for convenient viewing. Since these courses are self-paced and accessible on the web, students can continue their education regardless of their location worldwide.

#### Time to Completion

Students take one course at a time, three per year, so the program requires 40 months to complete. The reason for this design is simple. Courses have been constructed to require between 60 and 90 minutes every day so that students can balance pursuing a master's degree, remain effective at work, and maintain a quality home-life, as well. Students report that this balance results in an enjoyable learning experience, better retention, and a positive impact on their current jobs.

#### Program Costs

All courses cost \$750 per credit hour plus an estimated \$50 in fees, or approximately \$2,300 per course. Textbooks are an additional cost, but faculty have selected books that will be used in more than one course, creating a "library" of references for the future.

#### Program Prerequisites

Prerequisites for enrollment in this program are: 1) an undergraduate degree from an accredited university, 2) college mathematics consistent with a degree in engineering, business or management, and 3) relevant industry experience. Students do not need an undergraduate engineering degree to be considered for admission.

#### Information and Application

For more information, see our website at [www.clemson.edu/ces/departments/ie/graduate\\_programs/M.Eng](http://www.clemson.edu/ces/departments/ie/graduate_programs/M.Eng), Dr. W.G. Ferrell at [Wferrell@clemson.edu](mailto:Wferrell@clemson.edu) or at 864-656-2724.



# CLASSES

## Core Industrial Engineering Fundamentals

### IE 851 Data Collection, Analysis and Interpretation

Methods for effectively working with data to extract and communicate meaningful information. Excel is the software tool used.

### IE 852 Modeling and Decision Making

Techniques for modeling real-world problems and solving them to facilitate better decision making. Excel is the software tool used.

### IE 853 Foundations of Quality

Discussions of selected topics from quality control, total quality management, and Six Sigma, especially those relating to supply chain analysis and improvement.

### IE 854 Fundamentals of Supply Chain and Logistics

Application of model building and analytical techniques in the design, optimization, and control of the supply chain and logistics systems.

### IE 857 Health, Safety and the Environment

A comprehensive look at the basics of environmental impacts and remediation programs and at the issues related to health and safety in construction, including reducing workplace injuries and implementing an effective safety management program.

## Capital Projects Supply Chain Concentration Classes

### IE 850 Introduction to Capital Projects Supply Chain

Introduction to the phases of capital projects and the design and control of the capital projects supply chain including the challenges associated with each of the primary roles - owners, contractors, suppliers.

### IE 855 Capital Projects Supply Chain

Application of quantitative and qualitative tools and techniques in the design, control, management, and optimization of the capital projects supply chain.

### MGT 856 Business Fundamentals for Supply Chain Management

Principles and techniques of leadership, human resources management, financial management, marketing and economic analysis, particularly as they relate to the capital projects supply chain.

### IE 858 Case Studies in Capital Projects Supply Chain

Integration of topics covered throughout the curriculum using a series of real-world case studies in capital projects.

### IE 859 Capstone Design Project

A capstone experience in industry requiring application of curriculum content to a real-world opportunity.



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