Advanced Coal Combustion Technologies

Presentation To

U.S.-MONGOLIA BUSINESS ROUNDTABLE

by

Burns and Roe Enterprises, Inc

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June 15, 2011

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Agenda – Advanced Combustion Technologies

1. BREI Overview
2. PC and Fluidized-Bed Coal-Fired Plants
3. Integrated Gasification Combined Cycle (IGCC)
4. Latest technologies
5. Advantages and disadvantages

Burns and Roe

Corporate Overview

One of the World's Leading Engineering and Consulting Companies

- Leading designer of renewable, fossil and nuclear power generating facilities in the U.S.
- 175 Generating Units, totaling 75,000 MW
- Strong experience in all aspects of fossil, nuclear and renewable generation, transmission and distribution

Over 75 years of engineering many of the world's largest, innovative and most challenging projects in generation, transmission and distribution

Ranked as a Top ENR Engineering Firm

Providing cost effective and timely solutions to our clients

75 % of Business From Repeat Clients

Privately Owned and Managed for Three Generations

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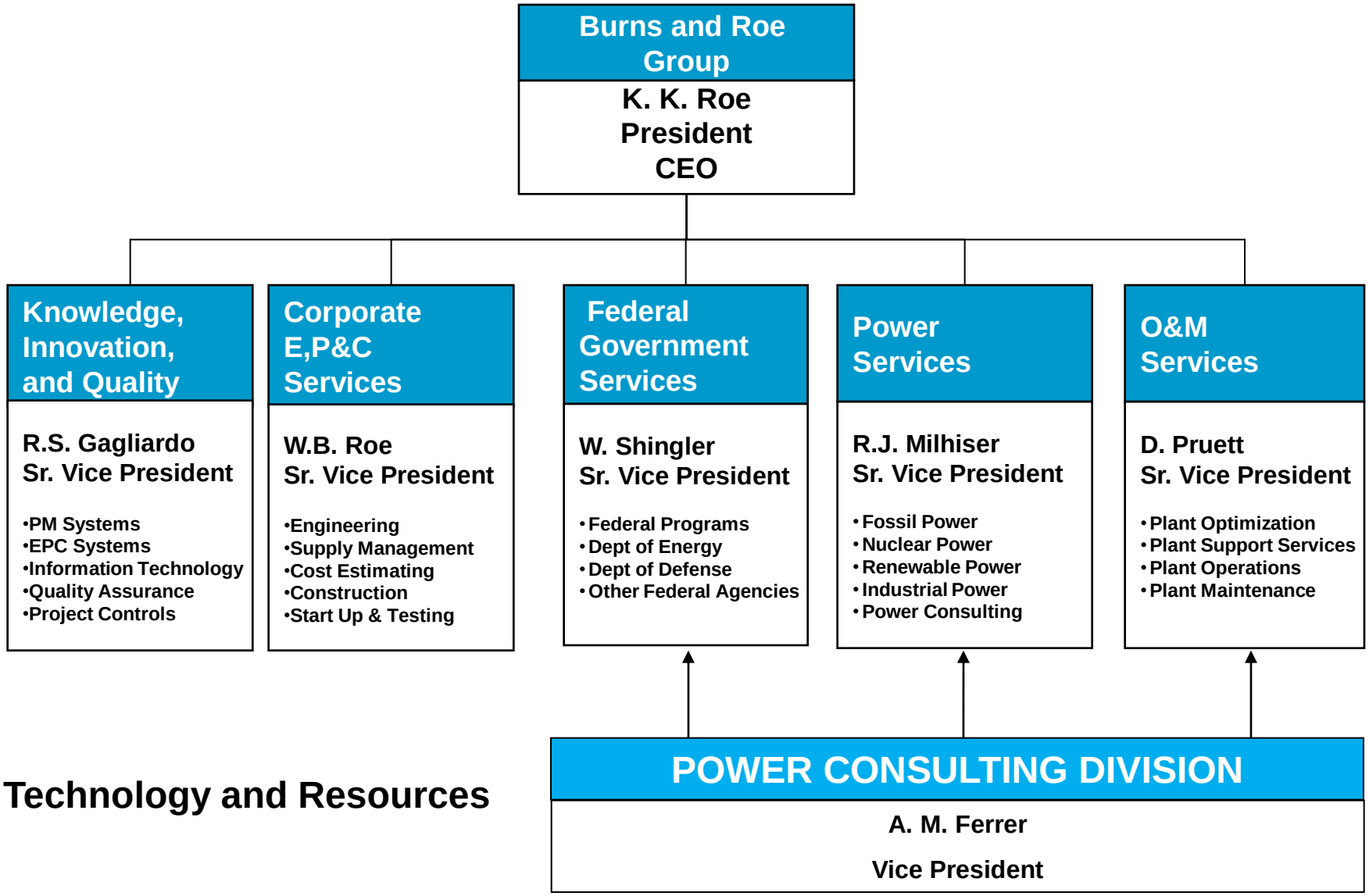
Corporate Organization



Technology and Resources

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PC and CFB are the Main Combustion Technology for Coal-Fired Power Plants

PC Power Plants

- Dominant in power industry
- Mature technology: up to ~1000 MW ultra supercritical units
- Least cost $/kW
- Typical sizes:
  - 300 MW – subcritical (~38% efficiency)
  - 660 MW – subcritical or supercritical
  - 800 MW – supercritical (~42%)
  - 1000 MW – ultra-supercritical (~45%)

Reference International PC Power Plants

- Paiton units 7&8: 2x660 MW subcritical
  - Commissioned in 1999
  - 1st private power project (BOO) in Indonesia and South East Asia
  - International financing, PPA agreement, Government guarantee
- Paiton unit 3: 1x815 MW supercritical
  - International financing, PPA agreement
  - To be commissioned in 2012
- Central Java 2x1000 MW ultra-supercritical
  - BOOT power project in Indonesia (25 year PPA)
  - International financing, PPA agreement
  - Government guarantee
  - By J-Power/Itochu Consortium, to be commissioned in 2016
- West Java 1 x 660 MW supercritical
  - BOOT power project in Indonesia (25 year PPA)
  - International financing, PPA agreement
  - Government guarantee ??
  - to be commissioned in 2017

Paiton Thermal Power Plant

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PC and CFB are the Main Combustion Technology for Coal-Fired Power Plants

CFB Power Plants

- ~ 500 units in operation world wide
- Mature technology: up to ~500 MW supercritical units
- More costly than PC and higher aux power
- Burn wide range of difficult fuel:
  - Waste coal: 70% ash
  - Petroleum coke: 7% sulfur
  - Tires, sludge, RDF
- Typical sizes:
  - 50MW, 100 MW, 150 MW, 300 MW - subcritical
  - 500 MW – supercritical

CFB Power Plants

- JEA 2x300 MW coal/coke CFB plants in Florida
  - Commissioned in 2002
  - 97% S capture (S in coke: 6.7%)
- Lagisza Project: 1x460 MW supercritical in Poland
  - 50% dried coal washery rejects (45% H2O, and 65% ash)
  - Commissioned in 2010
- Samcheok 4x550 MW supercritical in South Korea
  - Coal and biomass
  - To be commissioned in 2015
- ~ 50 units of 300 MW CFB's in China

JEA 2x300 MW

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PC and CFB Comparison & Project Development

- PC more efficient and more mature
- PC larger in size (1000 MW)
- PC less costly
- CFB for burning range of fuels, more difficult fuels.
- Typical schedule:
  - 1-2 years for project development, financing.
  - ~4 years for EPC construction
- Project development
  - Government guarantee expected for PPA or loans
  - LOC expected to be required

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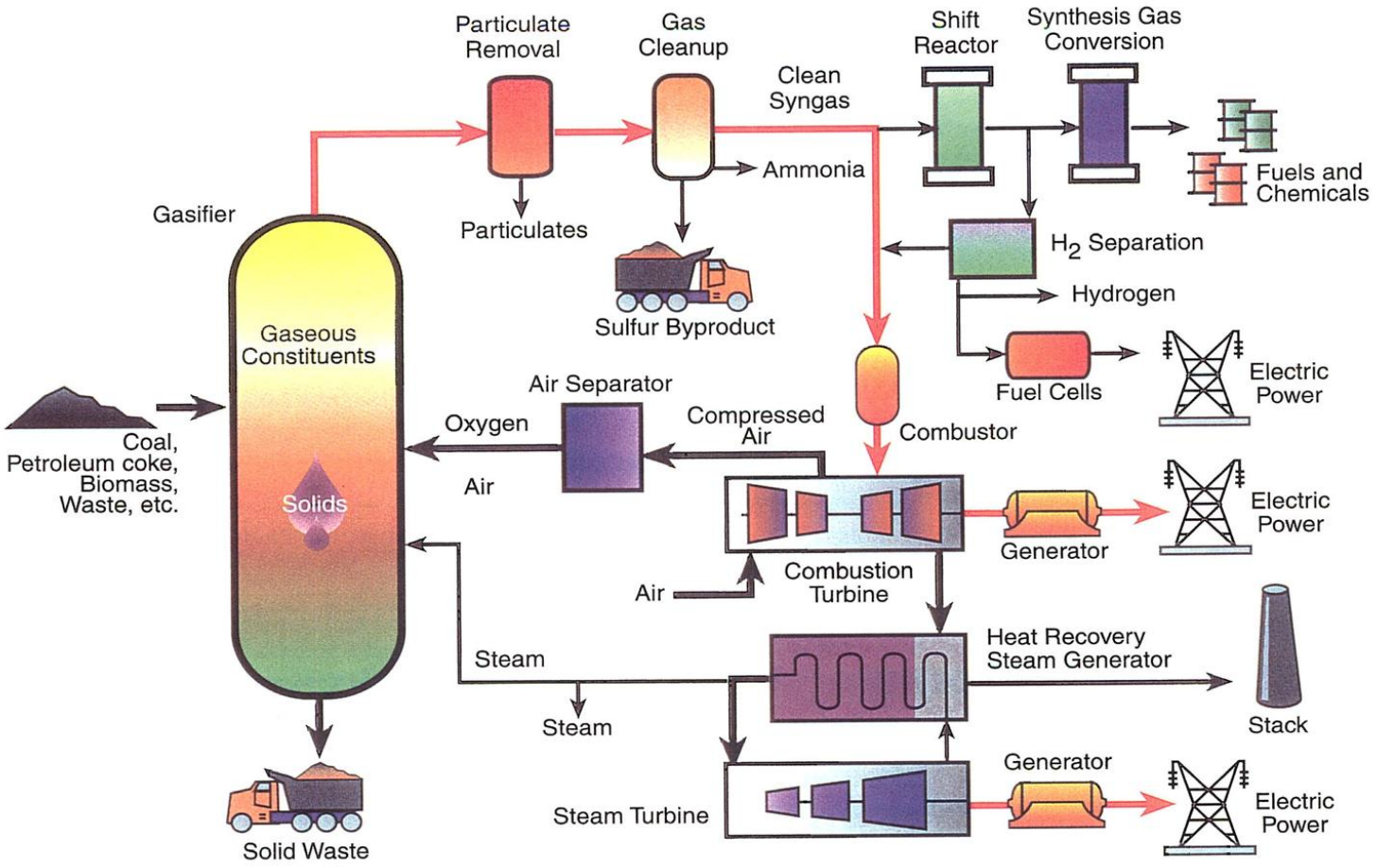
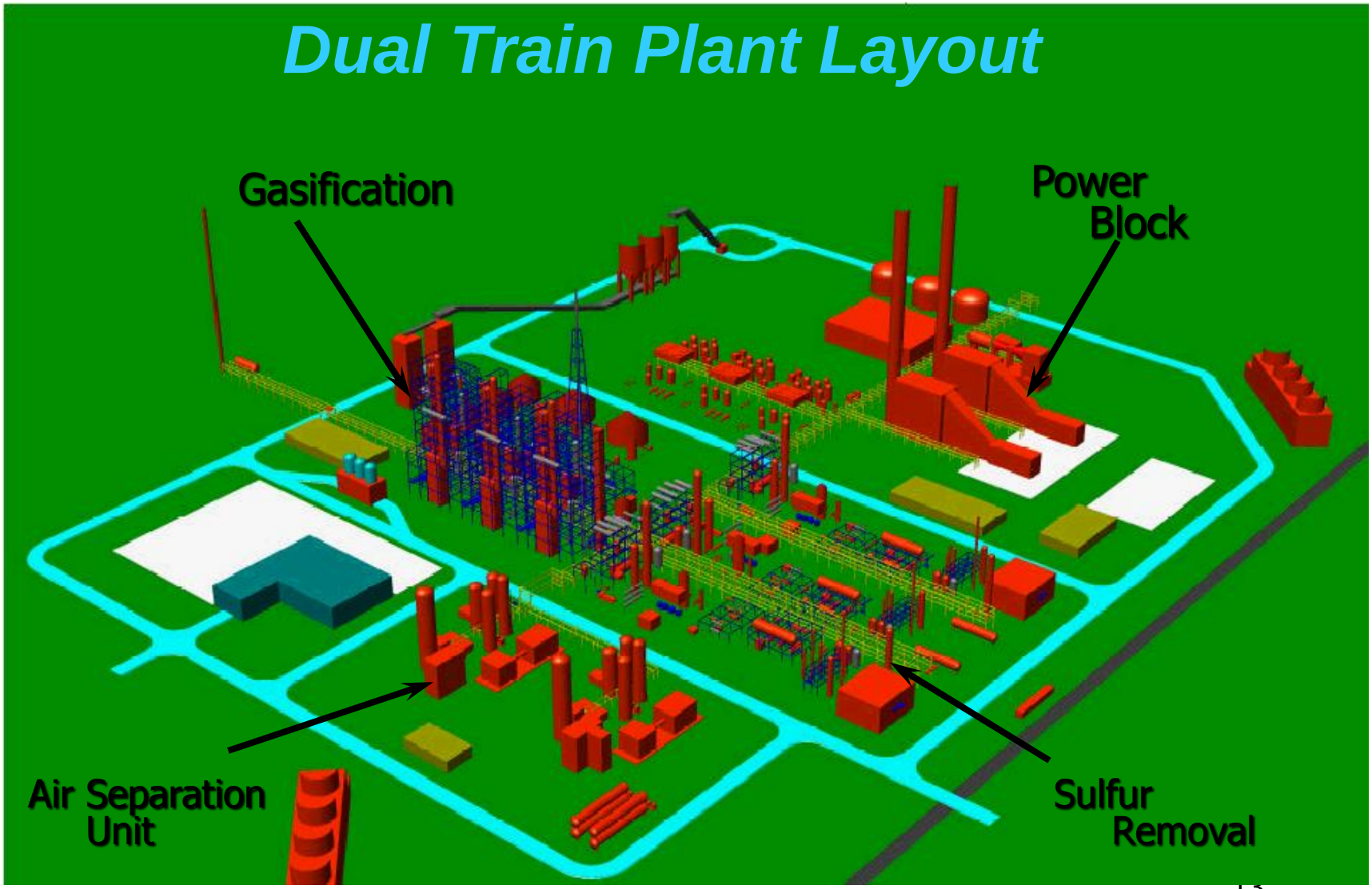
Burns and Roe Relationships

- Major International IPPs
  - GDF SUEZ
  - J-Power
  - Diamond Generating Asia
- Japanese Trading Companies
  - Project development
  - Equity Participation
- Chinese Companies
  - Project developers and EPC companies
  - Project financing
- US Ex-Im banks
- USTDA

IGCC Schematics



IGCC Plant Layout



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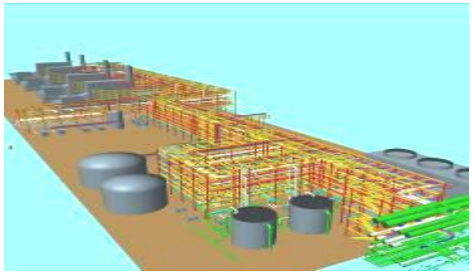
Why Burns and Roe?

- Independence
- Industry Leadership
- Creative and First of a Kind
- Funding contacts
- Corporate commitment – performance, reliability, and responsiveness to protect the Owner's interests
- Unique combination of single point of responsibility with single stop supply of services
- Standard Plants and Value Engineering
- Culture of Designing to the Price



To be the best, most responsive steward for our clients' capital projects

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