The Value of Coal Combustion Products: An Economic Assessment of CCP Utilization for the U.S. Economy

Summary Prepared for:

Office of Management and Budget

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American Coal Council

ACC Objectives

Business-to-Business

Support the business, marketing and management capabilities of American coal suppliers, coal consumers, coal transporters, coal traders and coal support service companies.

Advocacy

Advocate for coal as an economic, abundant/secure and environmentally sound fuel source.

Liaison

Support the activities and objectives of associations involved in advancing coal industry interests

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ACC Membership

The ACC represents the collective interests of 160 companies spanning the entire coal chain.

From the hole in the ground to the plug in the wall.

- Coal Suppliers
- Coal Consumers (utility & industrial)
- Transportation (rail/barge/truck/ports)
- Energy Traders
- Coal Support Services
- Contributing Supporters (universities & associations)

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Economic Assessment History

- Environmental benefits of coal ash utilization well-known, but economic benefits less defined
- 2005: ACC published first detailed analysis of coal ash utilization economic impact
  - Prepared by Power Products Engineering
  - Addressed fly ash, bottom ash, boiler slag and synthetic FGD gypsum
  - Based largely on 2003 data and interviews with industry participants

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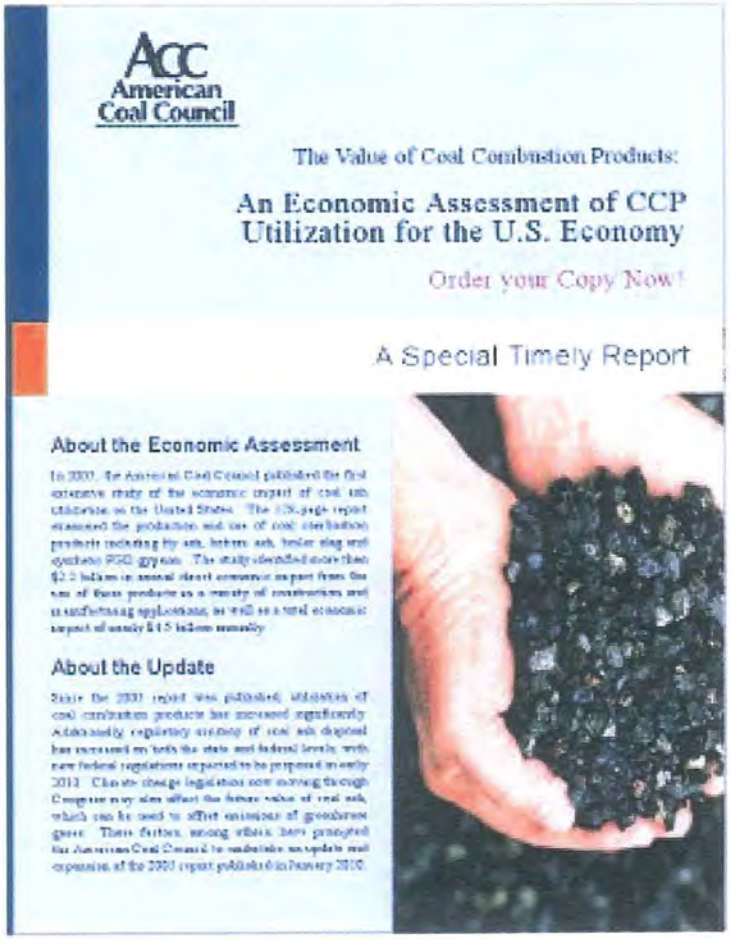
2010 Edition Just Published

- Second edition enhancements:
  - Revised baseline economic metrics with most up-to-date information available
  - Expanded analysis of historic utilization trends and the impacts of market, technology and regulatory factors
  - Added descriptions of technology and regulatory factors expected to affect future utilization



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About the Author

- John N. Ward is President of John Ward Inc. -- a marketing and public affairs consultancy focusing on energy issues. He was formerly Vice President, Marketing and Government Affairs, for Headwaters Incorporated -- a leading provider of pre-combustion and post-combustion clean coal technologies and services. John is a former board member and past president of the American Coal Council. He served on the National Coal Council as appointed by the U.S. Secretary of Energy. John is formerly chairman of the Government Relations Committee of the American Coal Ash Association and participates in numerous industry groups related to the manufacturing and use of construction materials.

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Study Conclusions

- The study identifies the following annual economic benefits from the utilization of Coal Combustion Products as an alternative to disposing of them as waste:

Economic Benefit Type	Amount
Revenues from Sale of CCPs for Utilization	$ 1,028,761,000
Avoided Costs of Disposal	$ 412,800,000
Savings from Use as Sustainable Materials	$ 5,000,000,000 to $10,000,000,000
Total Economic Impact	**$6.4 billion to $11.4 billion**

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Revenues from CCP Sales

- Sale of CCPs produces direct revenues to producers, marketers and transporters of materials
- Indirect economic beneficiaries of these revenues include federal state and local taxing entities; ash storage and material handing equipment suppliers; truck and rail transportation equipment suppliers; and local businesses

Revenue Segment	2007 Revenues
Producers (Utilities)	$ 223,822,000
Marketers	$ 608,782,000
Transporters	$ 196,157,000
Total	**$1,028,761,000**

Complete report includes comparative data to 2001 and break-outs of estimated revenue by product type and average price per ton.

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Avoided Disposal Costs

- 2009 Recycled Materials Resource Center study:
  - Sponsored by the Electric Power Research Institute
  - Applied life cycle analysis to determine economic savings from avoiding landfill disposal
  - Findings:
    - Total life cycle cost to dispose one year's currently recycled materials would be $412.8 million if disposed on utility plant sites
    - Cost would increase to $1.4 billion if disposed in commercial facilities

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Sustainable Material Use Impacts

- Same 2009 Recycled Materials Resource Center study:
  - Calculated economic benefits associated with using CCPs to replace conventional materials in sustainable construction activities
  - Comparisons were made between energy consumption, water use, and greenhouse gas emissions associated with conventional materials and procedures and those employing CCPs
  - Life cycle analysis showed savings of between $5 billion and $10 billion annually from using CCP-based materials

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How Did Industry Get There?

- Roots of modern CCP beneficial use industry:
  - Early adoption by key government agencies:
    - 1940s – U.S. Bureau of Reclamation dam construction activities
    - 1950s – U.S. Army Corps of Engineers and Tennessee Valley Authority utilization activities
  - Increasing environmental regulations:
    - Clean Air Act of 1970
    - Utilities begin collecting substantially all coal ash produced in steam electric power plants

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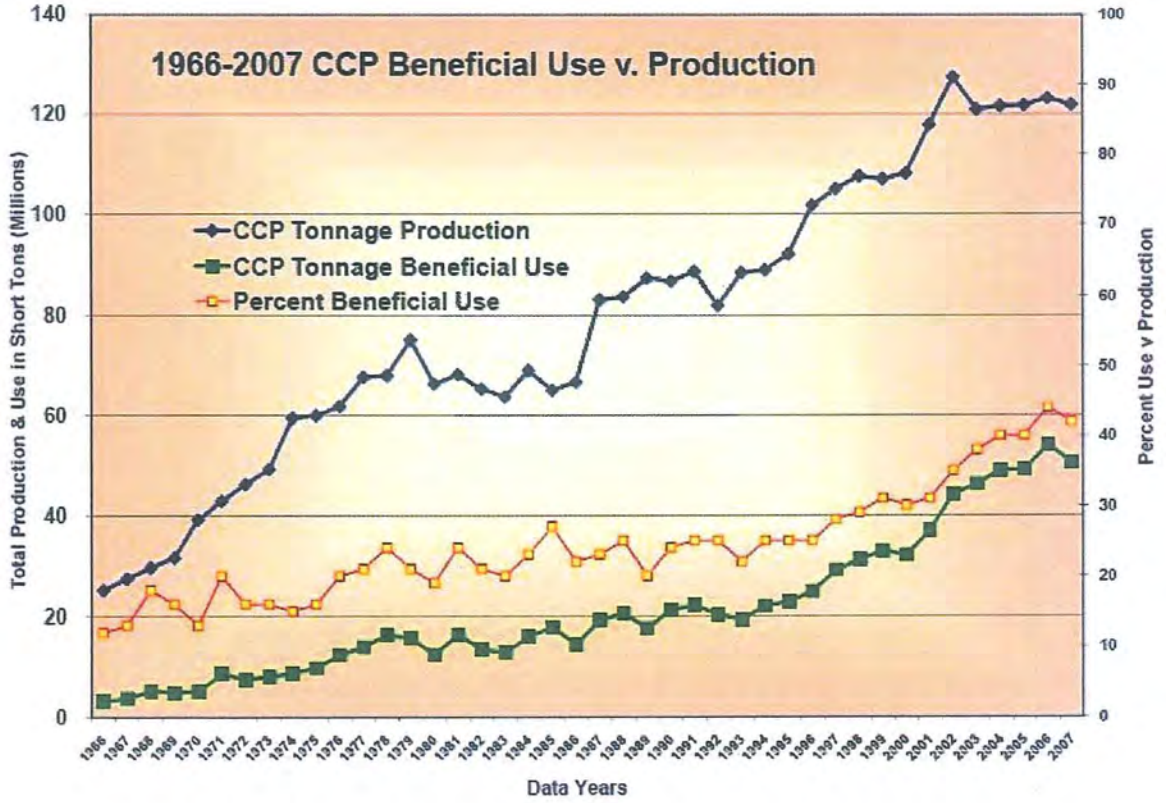
Market Responses Follow

- National Ash Association – forerunner to American Coal Ash Association – formed in 1968
- Steady increases in CCP utilization follow for four decades



Source: American Coal Ash Association

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Major Influences on Utilization Rates

- Industry standards setting organizations
  - Advances in technological knowhow, education of users and specifiers of construction materials, and development of formal specifications
  - ACI, ASTM, AASHTO
- Evolution of environmental regulations
  - U.S. Environmental Protection Agency actions:
    - Final Regulatory Determination on CCPs in 2000
    - Creation of Coal Combustion Products Partnership (C2P2 program) in 2003
    - Beneficial use rates increased from 30% to 44% since 2000
  - Regulatory certainty incentivized investment in logistics and new ash technologies

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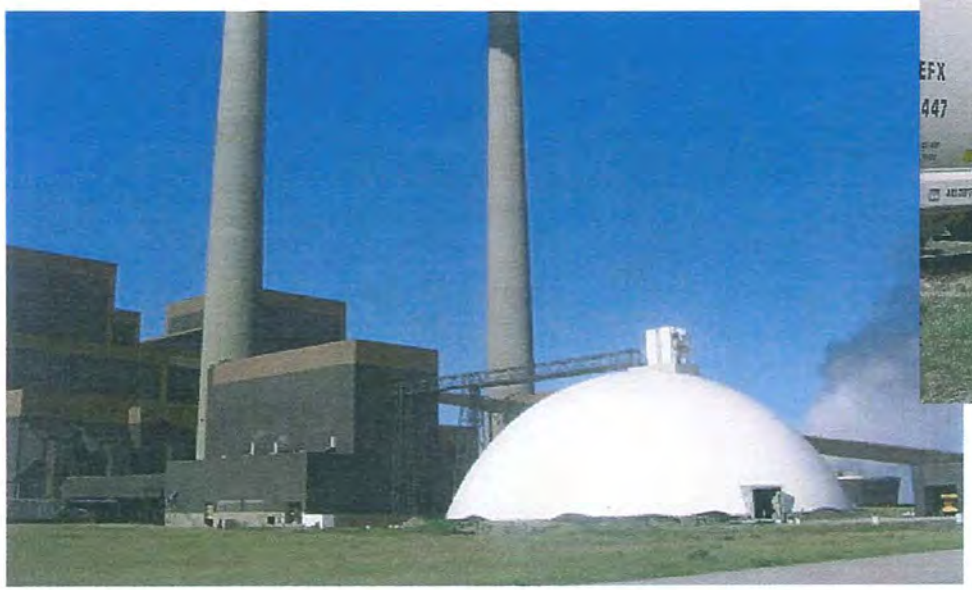
Logistics Role in Utilization

- Significant investment required to overcome:
  - Geographic market disparities
  - Seasonal market disparities



Great River Energy ash storage and distribution

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Technology Role in Utilization

- Technology used to enable:
  - Higher utilization rates of CCPs in existing applications
  - Utilization of CCPs in new applications
  - Improving the quality or marketability of CCPs.

Khalifa Tower, in Dubai

Calstar fly ash bricks

PMI Carbon Burn-Out unit

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Regulatory Developments on Horizon

- EPA Standards for the Management of Coal Combustion Residuals Generated by Commercial Electric Power Producers
- EPA CERCLA Financial Assurance Requirements
- EPA Steam Electric Generating Effluent Guidelines
- Climate Change Regulation
- Mercury Regulation

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Conclusions

- Utilization of Coal Combustion Products constitutes a multi-billion dollar per year industry in the United States, creating significant product performance, environmental, and social benefits
- Government utilization and regulatory activities have played major roles in the establishment and growth of the industry
- Regulatory actions that encourage recycling as a preferred alternative to disposal contribute to increased utilization rates
- Regulatory actions that stigmatize the resource – such as a "hazardous" designation in any setting – threaten to reverse decades of utilization growth

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