

2003 Conference On Unburned Carbon On Utility Fly Ash

**Coal's Role In International Energy
Security And Sustainable Development**

**Pittsburgh, PA
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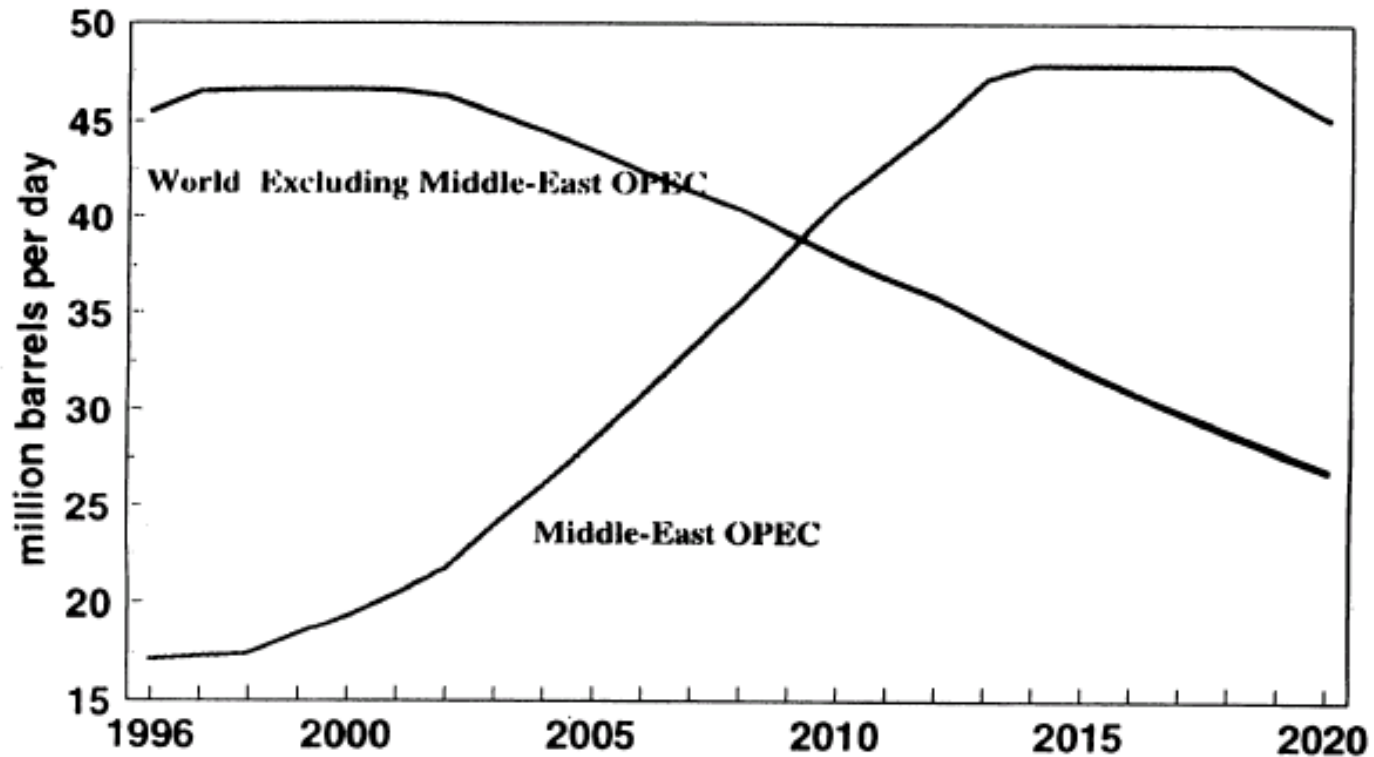
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Increasing Role of Middle-East OPEC



INTERNATIONAL ENERGY AGENCY

AGENCE INTERNATIONALE DE L'ENERGIE

The Three Goals Of Energy Policy

- Energy Security
- Economic Growth
- Environmental Protection

Source: International Energy Agency

Vision Statement For The World Summit On Sustainable Development

The United States Will Work Effectively To:

- Open Our Economies And Societies To Growth
- Provide Freedom, Security And Hope For Present And Future Generations
- Provide All Our People With The Opportunities For Healthy And Productive Lives, and
- Serve As Good Stewards To Our Natural Resources And Our Environment

Source: Paula J. Dobriansky
Under Secretary, Global Affairs / U.S. Dept. of State
May 23, 2002

The Role Of Coal In Global Energy Consumption

- Accounts For 25% Of World Primary Energy Consumption
- Fuels 36% Of World Electricity Generation
- World Consumption: 5 Billion Tons/Year
- International Coal Trade: 600 Million Tons/Year
- Reserves Will Last More Than 200 Years
- Diversity Of Reserves And Production

Natural Gas – Complements Coal

- Power Generation Will Account For Half Of Future Demand Growth For Natural Gas
- Lower CO₂ Emissions
- Lower Criteria Pollutants
- Higher Price Per Unit Of Energy

Sustainable Development

“... development that meets the needs of the present without compromising the ability of future generations to meet their own needs”

Definition from the Brudtland Commission

IEA Statement On Sustainable Development - Johannesburg

- “... [T]here can be no sustainable economic development without a secure, affordable supply of energy in a form which avoids unacceptable environmental damage.”
- “Fossil fuels, although environmentally challenged, can meet the criteria of security and affordability.”

*Source: Robert Priddle, Executive Director
International Energy Agency
August 30, 2002*

Strategic Value And Role Of Coal

	Local	National, International
Economic Growth & Development	<p>Jobs — Infrastructure Development — Electrification</p>	<p>Productivity — National Income — Balance of Payments</p>
Energy System Security	<p>Infrastructure Reliability</p>	<p>Resistance to Energy Shocks</p>

Strategic Value And Role Of Coal

— First Dimension —

Local

**Economic Growth
& Development**

Jobs

**Infrastructure
Development**

Electrification

Infrastructure Development



Examples Of Contributions From Coal Production To Local Economies

Australia, New South Wales, Hunter Valley

Coal & Allied Ltd (a Rio Tinto Company) in 2000 employed over 700 local people and purchased \$91 million in goods and services from 575 regional businesses to support its mining operations. -- *Rio Tinto*

Germany, North Rhine – Westphalia

Lignite-based mining and power generation contributes 13,000 direct and 28,000 total jobs in North Rhine - Westphalia. -- *RWE Rheinbraun*

United States, Western Pennsylvania

CONSOL Energy over a two-year period (2000 and 2001) in western Pennsylvania:

- Paid \$422 million in wages to 3,200 employees.
- Purchased \$320 million in local goods and services from 580 businesses and services. -- *CONSOL Energy*

Strategic Value And Role Of Coal

— Second Dimension —

**Economic Growth &
Development**

**National,
International**

Productivity
—
National Income
—
**Balance of
Payments**

Contributions Of Coal And Coal-Fired Generation To National Economies

- Supports Economic Growth And Electrification
- Encourages Productivity Growth Through Electric Technologies, Including Computer-Based Technologies
- Stabilizes Power Prices

Importance Of Production And Use Of Coal To U.S. Economy

\$133 Billion Of Household Income And 3.6 Million Jobs In The United States In 2010 Will Be Attributable To The Production And Use Of Coal.

Source: The Economic Impact Of Coal Utilization In The Continental United States

*Adam Rose & Bo Yang
The Pennsylvania State University
January 2002*

Coal's Role In The Digital Economy

- Electricity Is, And Will Remain, The Primary Energy For The Digital Economy
- The Economy Will Need More (not less) Abundant, Low-Cost Electricity
- The Economy Will Become Even More Reliant On Electricity - Thereby, Making Reliability A Critical Criterion

*Source: Energy Policy In The Electron Age
Mark Mills, Mills McCarthy & Associates Inc. / 2000*

Strategic Value And Role Of Coal

— Third Dimension —

Local

**Energy System
Security**

**Infrastructure
Reliability**

Energy System Security

Electricity Is Different From Other Goods Or Services:

- Critical To The Economy
- Technically Exacting – Supply Needs To Equal Demand At All Times
- Interrelated – Network Stability

*Source: Alternating Currents – Electricity Markets and Public Policy
Brennan T. J., Palmer K.L. and Martinez S.A.
Resources For The Future – May 2002*

Energy System Security – Infrastructure Reliability

Coal-Fired Power Plants Prevent Sudden Disruptions

Coal Supply

- Many Diverse Sources of Coal (less vulnerable to supply disruption)
- Better Storage Capability Near Power Plant (less vulnerable to transportation disruption)
- More Certain Commodity Availability During Peak Demand (peak demand for natural gas coincides with peak demand for electricity)

Coal-Fired Power Plants

- Less Vulnerable to Outages (mature, reliable technology)
- Less Vulnerable to Terrorism (versus nuclear power plants, natural gas pipelines or LNG facilities)

Strategic Value And Role Of Coal

— Fourth Dimension —

**National,
International**

**Energy System
Security**

**Resistance To
Energy Shocks**

Coal's Attributes For International Energy Security

- Large Reserves
- Geographically Diverse
- “Conflict Free” Energy Source
- Low-Cost Energy
- Extensive Infrastructure In Place
- Burns Cleanly With Technology

Source: “The Certainty of Coal”

Coal Industry Advisory Board (1999)

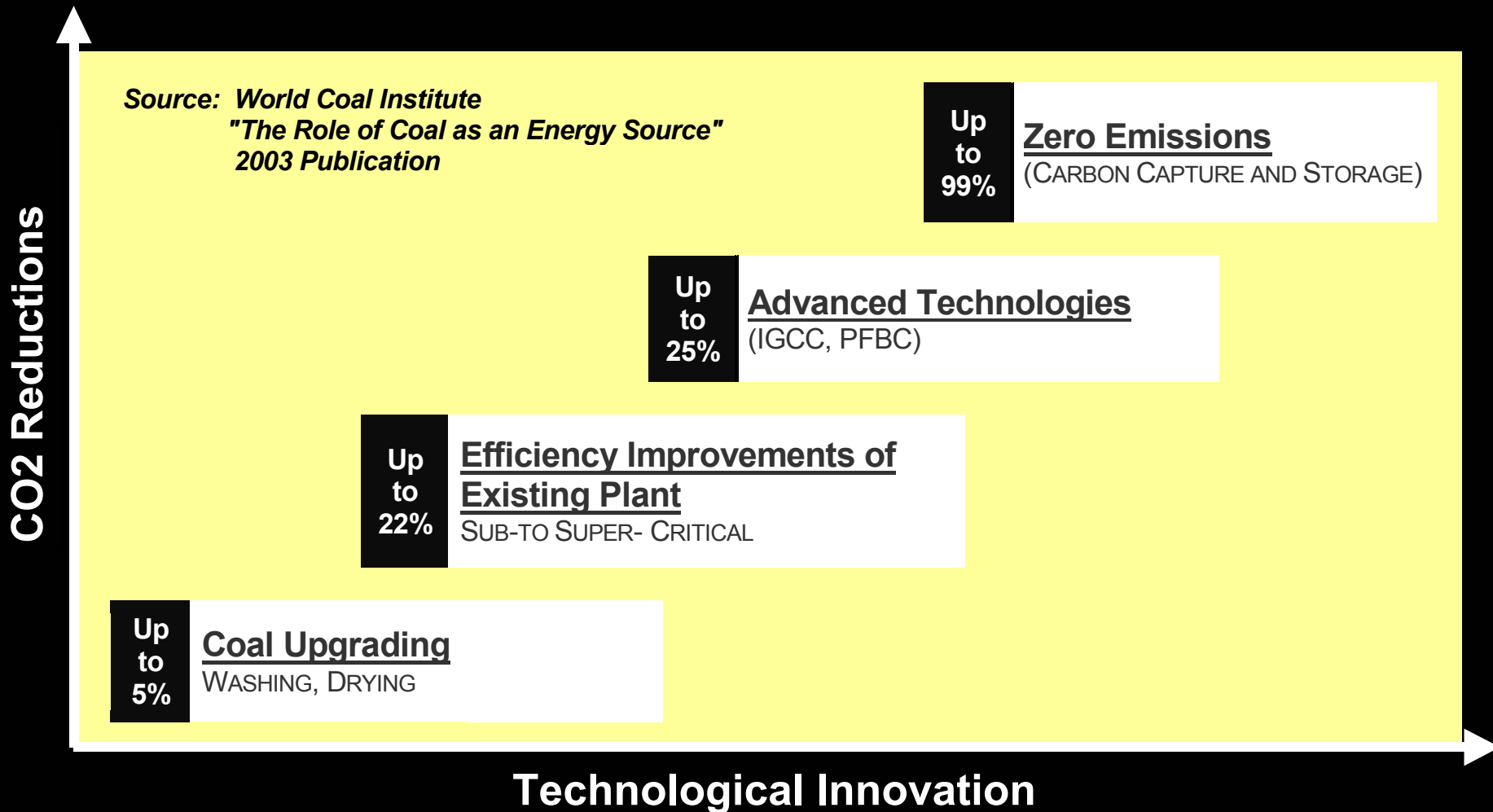
Strategic Value And Role Of Coal

	Local	National, International
Economic Growth & Development	<p>Jobs</p> <p>—</p> <p>Infrastructure Development</p> <p>—</p> <p>Electrification</p>	<p>Productivity</p> <p>—</p> <p>National Income</p> <p>—</p> <p>Balance of Payments</p>
Energy System Security	<p>Infrastructure Reliability</p>	<p>Resistance to Energy Shocks</p>

How To Achieve Goals Of A Sustainable Energy Policy

- Encourage Electrification
- Establish Sound Environmental Regulations
- Safeguard Energy Supplies Through Diversification
- Support Advanced Coal Technologies

The Coal-Fired Route To CO₂ Reduction The Technology Pathway



National Energy Policy

“U.S. National Energy Security Depends On
Sufficient Energy Supplies To Support U.S.
And Global Economic Growth”

*Source: Report of the National Energy Policy Group
May 2001*

Sustainable Energy Policy Taking The Long View:

- Economic Growth
 - Coal-Fired Generation Will Enable and Stimulate Economic Growth and Social Welfare
- Energy Security
 - Diversified Energy Production Reduces Vulnerability
- Environmental Protection
 - Economic Growth and Energy Security Will Enable Cost-Effective Environmental Controls

The World Needs Coal

Advanced Coal Technologies
Will Meet The Challenges
Of The 21st Century

*Source: World Coal Institute
“The Role of Coal as an Energy Source”
2003 Publication*