

Technology for Sustainable Development

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Jordan
25 April 2007

World Coal Institute

WCI provides *a voice for coal*

- > **Associação Brasileira do Carvão Mineral**
- > **Australian Coal Association**
- > **British Equipment Manufacturers Association**
- > **Camara Asomineros**
- > **Coal Association of Canada**
- > **Coal Association of New Zealand**
- > **Confederation of UK Coal Producers**
- > **Indonesian Coal Mining Association**
- > **National Mining Association USA**
- > **Philippine Chamber of Coal Mines**
- > **Shaanxi Coalfields Geological Bureau**
- > **Svenska Kolinstitutet**
- > **UGC Partnership Limited**

- > **PT Adaro Indonesia**
- > **Anglo Coal**
- > **Arch Coal**
- > **BHP Billiton Energy Coal**
- > **BHP Billiton Mitsubishi Alliance**
- > **Carbonnes del Cerrejon Colombia**
- > **Carbonnes del Zulia Venezuela**
- > **Coal India Limited**
- > **Consol Energy**
- > **Glencore International**
- > **Joy Global**
- > **Mitsubishi Development**
- > **Peabody Energy**
- > **Rio Tinto Ltd**
- > **Solid Energy NZ**
- > **Store Norske Spitsbergen Grupekompannt Norway**
- > **TOTAL SA**
- > **XSTRATA Coal**

Coal provides:

25% of world primary energy

40% of world electricity

66% of world steel



Beilungang Power Station, China

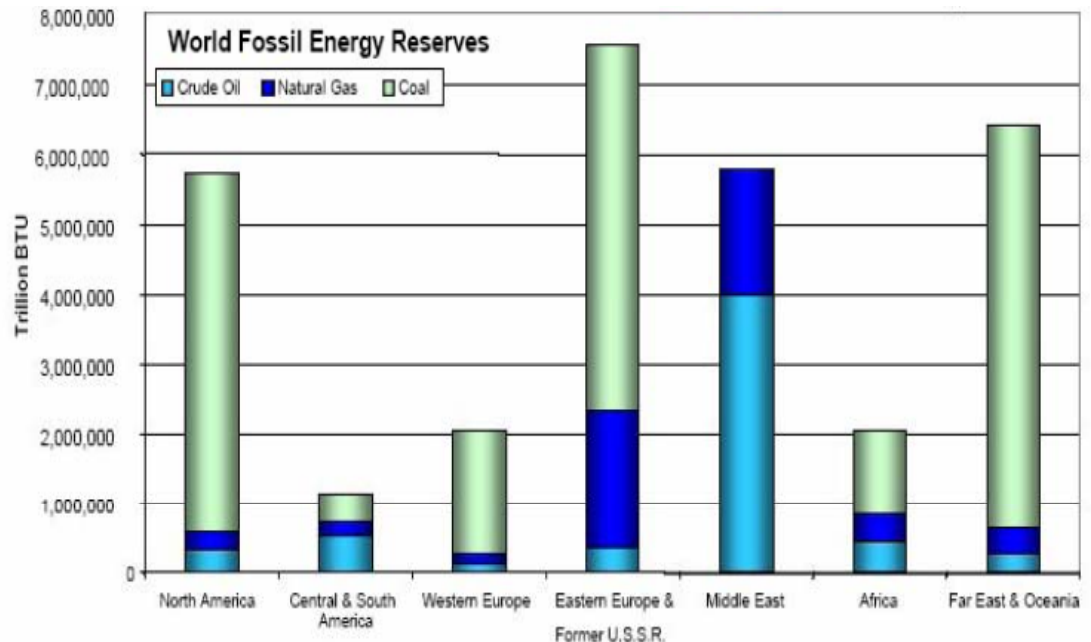
Coal: a fuel with a future

- ❑ OIL 45 years
- ❑ GAS 65 years
- ❑ COAL 155 years

- ✓ Abundant
- ✓ Globally distributed
- ✓ Affordable & stable in price
- ✓ Safe & reliable

More than three times as long as oil
More than twice as long as gas

(BP Statistical Review of World Energy 2006)



Coal's role in poverty alleviation

CHINA

- 700 million people over 20 years
- Electrification rate of 99%
- Generation industry 77% fuelled by coal

INDIA

since 1947

Electricity generation 4b to 400b KWh

30,000 kms transmission lines to more than 4 million kms

85% villages connected

Industry 68% fuelled by coal

SOUTH AFRICA

- Electrification rate doubled in a decade (35% to 66%)
- Generation industry 90% fuelled by coal

REST OF SUB-SAHARAN AFRICA

- Electrification rate of only **10%**
 - 575 million people rely on biomass for energy

Carbon capture & storage (CCS)

CO₂ Storage Demonstration Projects

Source: IEA Greenhouse Gas R&D Programme

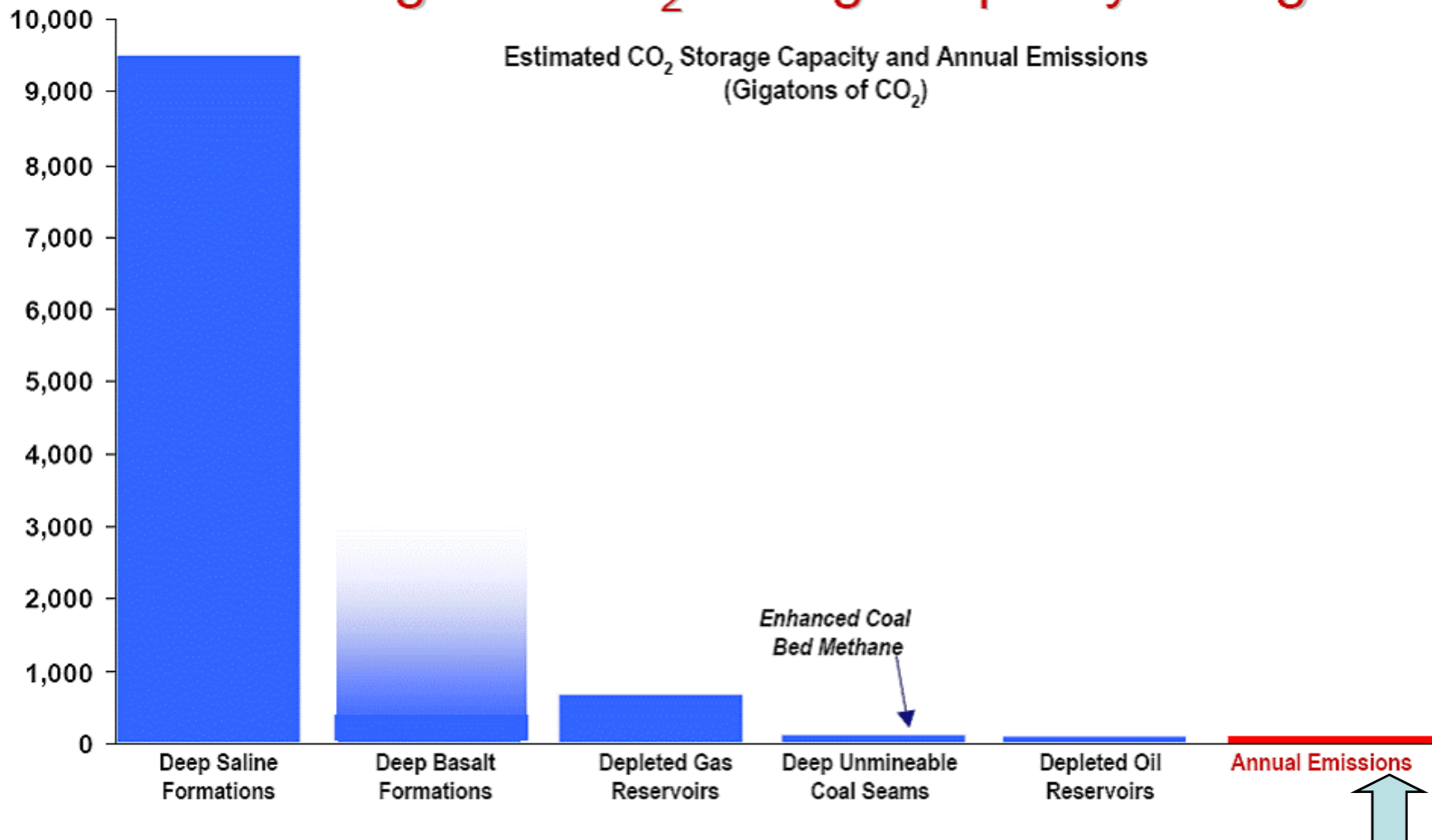


UN Intergovernmental Panel on Climate Change - Special Report on CSS -

- **Costs** of stabilising CO₂ emissions can be reduced by 30% or more by including CCS in mitigation portfolios
- **Power plants** with CCS could emit 80-90% less CO₂ net
- Majority of **CCS technologies** either *economically feasible under specific conditions* or part of a *mature market* now
- **Potential leakage** very likely < 1% over 100 years likely < 1% over 1,000 years
- Huge **storage capacity** for CO₂ in geological formations

CCS: geological storage potential

Potential global CO₂ storage capacity is huge.



Source: Battelle Memorial Institute, "Carbon Dioxide Capture and Geologic Storage: A Core Element of a Global Energy Technology Strategy to Address Climate Change," April 2006

Government views – political acceptability?

> **EUROPE**

- Integrated environment/energy plan - efficiency & clean technologies
- 12 coal CCS by 2015
- All new plant CCS after 2020
- CCS in EU ETS

> **USA / AUSTRALIA / OTHERS**

- USA - Energy security / FutureGen
- Asia-Pacific Partnership on Clean Development & Climate
- Australian COAL 21 Fund

> **G8 / IEA PROCESSES**

> **UNFCCC / KYOTO PROTOCOL ON CLIMATE CHANGE**

- Clean Development Mechanism

Other views

The immediate and widespread implementation of CCS is vital if we are to avoid the devastating and irreversible consequences of climate change
(President, Bellona Foundation)

WWF believes that CCS has the potential to be an important part of the solution to stay below 2°C global warming & cut CO₂ emissions by more than 50% globally (Director General, WWF International)

The only possible overarching solution to a long-term sustainable future is to develop a global mix that uses all options simultaneously – to combine greater energy efficiency improvements with more renewables, more nuclear energy and more fossil fuels with CCS
(Executive Director IEA)

If only we had developed and installed the equipment for removing CO₂ from power stations and industry 50 years ago ... (James Lovelock)

Substantial remaining obstacles

> **Regulatory environment**

- Verification
- Monitoring

> **Public acceptance**

- Public awareness

> **Financing**

- Public Private Partnerships
- Technology transfer to developing countries

Thank you

www.worldcoal.org

