IMPACTS OF COAL MINING AND TRANSPORT

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FOCUS OF THE PRESENTATION

• Why is mining so evocative?

• How do mining practices and related challenges vary globally?

• How are mining activities controlled?

• How can mining companies leave a positive legacy?
MINING BASICS
MINING IS A CHAIN

- Transport from mine to coal-fired plant
- Co-ordination along chain and at transfer points
- Many different stakeholders
- Many potential issues: dust, noise, nuisance
• closing old mines and consolidating remaining mines into remote “coal bases”

• remediation of damage from previous activities

• Chinese government showing a “transformation towards ecologically sustainable development since the 1990s”

https://worldview.stratfor.com/article/china-imposes-new-coal-production-tax
• Still contention over the balance of economic growth versus environmental concerns in some regions

• Most focus is on the new Adani Carmichael Mine

• Some excellent best practice case studies

• Many small companies rather than large conglomerates

• Sector has government backing

• Abandonment of closed sites is a significant safety issue

Untreated lake in a former coal mine pit (Apriando, 2017)
Germany

- Concerted move away from coal – only two deep mines still in operation
- Significant public opposition to coal-based power

Poland

- Heavily reliant on coal for power, energy security and employment
COMPLIANCE
LEGAL FIELDS ASSOCIATED WITH MINING

- Forest laws
- Water rights
- Regional planning laws
- Waste laws
- Mining laws based approval of recultivation
- Soil protection laws
- Construction laws
- Emission control laws
- Nature conservation laws

(Milojcic, 2011)
ENVIRONMENTAL EFFECTS OF COAL MINING

- There is a complex matrix (ICMM) of mining activities and the potential impacts they can have on the environment.

- Everything from exploration of the land through to construction and transport can cause effects such as a reduction in biodiversity or an impact on migratory species.
A mine project must include a complete plan for how the mine will be closed and rehabilitated.

A guarantee or bond is required to ensure the cost of rehabilitation is covered, regardless of what happens to the mine.

The plan covers the entire time period from before ground is broken and well after mine closure.

(Skuta and others, 2017)
EMISSIONS FROM MINING
Upstream emissions account for 5–37% of fossil fuels’ overall emissions. To date, analyses of potential emissions have not taken this into account.

Upstream emissions are expected to increase as the world’s conventional fields become depleted and companies turn to more energy-intensive fields. 

Source: http://oci.carnegieendowment.org/
● Emissions come from the mine but also from machinery on the mine site

Energy inputs and GHG emissions per tonne of coal mined from surface coal mining in Australia (Goswami, 2016)
GHG EMISSIONS FROM INDONESIAN COAL MINING

- Heavy machinery is the main source of emissions
- Moving overburden causes most releases
- Improving fleet efficiency and scale can be effective

Contribution to GHG emissions and fossil fuel depletion (DFF) from mining activities and processes (Aguirre-Villegas and Benson, 2017)
STREAMLINING THE DELIVERY CHAIN

- This is the coal chain in New South Wales, Australia, from the mine to the port, via the railway.

- Particulate emissions can arise from the surface of loaded wagons, from residual coal in empty wagons, from the diesel locomotives and from the roads and tracks being travelled, including re-entrainment of previously spilled or deposited coal and other dust.

- Dust will also be generated at every point that coal is lifted and moved along the entire coal chain.
COAL STORAGE DOMES

- Small footprint
- Reduces risk of spontaneous combustion
- No surfaces for dust to settle (reduces spontaneous combustion risk)
- Can be sealed to exclude oxygen and introduce nitrogen
- No run off or leaching
- Dust released can be extracted and recycled or disposed of

Coal storage dome in Tunisia (Geometrica, 2017)
WORKING TOWARDS BEST PRACTICE
WORLD’S LARGEST MINE
NORTH ANTELOPE ROCHELLE

92.9 Mt of coal sold from NARM in 2016
35% improvement in Peabody’s global safety rate since 2012
US$2.3 billion direct and indirect economic benefits from the mine in 2016

1145 employees working at NARM in 2016
2610 ha coal mined lands restored by Peabody globally in 2016

Mine facts from Peabody, 2017
Between 2014 and 2015:

- Construction of 100 charitable specialist hospital diagnostic centres
- Funding for training in plumbing and dress making
- Installation of 11 deep bore wells for free drinking water
- Installation of solar street lights and hand pumps
- Scholarships and housing for students.
MINE REHABILITATION
HAWKS NEST SURFACE MINE, VA, USA

Photos from Schmidt, 2016
Reclaimed coal mine site in Newcastle, England.

Created in 2010 at a cost of £2.5 m.

Controversial at first but now an important legacy for the region and a local tourist attraction.
LESSONS TO BE LEARNED
- Prepare environmental impact assessment before the project commences, based on expert guidance & early community interaction
- Review case studies of best practice projects
- Learn from these and create site-specific mode of operation reflecting this
- Publish performance and emissions data

Openness and honesty foster trust
LEARN FROM THE MISTAKES OF THE PAST
MINING CAN IMPROVE RATHER THAN DAMAGE

Image from coalwoodwestvirginia.com

Photo credit: Steve Brockett
THANK YOU FOR LISTENING
ANY QUESTIONS?

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