EXHIBIT 60
Coal Mine Methane Recovery & Utilization in the United States: *Emerging Trends*

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US EPA
Coalbed Methane Outreach Program

• Voluntary program since 1994
  – We don’t have any sticks, just carrots!

• Our mission
  – To promote the profitable recovery and use of coal mine methane by working cooperatively with coal companies and related industries

• Our focus
  – Greenhouse gas emission reduction opportunities: coal mine methane rather than coalbed methane
CMOP Focus: Mitigation of CMM

Recovery of CMM from diverse sources

- Ventilation Air Methane
- Pre-Mine Drainage
- Gob/Goaf Gas
- Abandoned (closed) Mine Methane
- In-Mine

Ventilation shafts produce large volumes of very dilute methane (~1% or less) that is challenging to recover.

"Drainage" of CMM from active or closed mines yield gas streams quality ranging from low to high concentrations of methane.

Photos Courtesy Various Sources
US Gassy Coal Basins

- Only about 50 US coal mines are considered “gassy”
- 20 underground coal mines conduct drainage / degasification
US Coal Production

• World’s 2nd largest coal producer
  – 2005 production: 1.1 billion short tons
  – 50% bituminous, 42% subbituminous

• Trends in coal production
  – Shift towards surface mining
    • 2005: Underground coal = 33%, surface 67%
  – Shift towards Western US
    • 2005: 44% US coal production east of the Mississippi River

- United States ranks 2nd globally in CMM emissions
- 2005 total emissions: 141.8 Bcf
Trends in US CMM drainage, recovery, and utilization
CMM Utilization

• ~10 projects operating at active mines
  – Most projects inject natural gas into pipeline network

• Projects use drained gas from underground mines
  – Gas from advance degas wells and gob wells
  – Nearly 80% of all drained gas is recovered & used

• 41 Bcf CMM recovered and used (2005)
  – The most emissions avoided globally!
  – 37.8 Bcf from active mines, 3.4 Bcf from abandoned mines

Photo courtesy of Resource Enterprises, Inc.
Innovative US CMM Projects at Active Mines

- **CONSOL VP and Buchanan Mines**
  Integrated CMM projects: pipeline, 88 MW power plant, coal drying

- **CONSOL Bailey Mine**
  Microturbine (70 kW)

- **Pinnacle Mine**
  Pipeline injection project uses surface directional drilling to maximize gas production

- **Shoal Creek and Oak Grove**
  Natural gas pipeline injection

- **JWR Blue Creek Mines**
  BCCK Cryogenic plant converts gob gas into pipeline quality gas
Primary CMM Use:
Eastern US Pipeline Injection

- Well-capitalized and extensive natural gas infrastructure in Appalachian Basins
- Large portion of CMM is high-quality gas requiring minimal treatment
- Gob (goaf) gas in the Eastern US can be upgraded
  - Economically co-mingled with high-quality gas
  - Processed to meet pipeline standards

Photos courtesy of Resource Enterprises and BCCK
Other Uses of CMM at Active Mines

- Power generation
  - ~90 MW capacity total
- Coal drying
- Heating mine ventilation air

Photos courtesy of Resource Enterprises, Inc.
Drained Gas Recovery & Use: 
Comparison of US Coal Basins

Future Opportunities:
Increasing US CMM Recovery and Use

• Drained gas
• Ventilation air methane
• Closed (abandoned) mines
• Surface mines
Increasing Drained Gas Recovery and Use

• **Market barriers**
  – Pipeline access and system constraints in Western US
  – Low power prices

• **Legal barriers**
  – Ownership of CBM and coal mine methane is often unclear
  – State legislation defining ownership rights has had key impact on US CBM production
  – Key distinction between fee lands and public lands

• **Technological barriers**
  – Achieving additional drained gas recovery
Future Opportunities:
Ventilation Air Methane (VAM)

- Largest source of coal mine methane
- Low methane concentrations (typically < 1%)
- Technologies now available to harness ventilation air methane
- EPA and DOE are co-sponsoring technology demonstration project at abandoned coal mine in West Virginia
Future Opportunities: Abandoned Mine Methane

- About 20 projects use gas from 30 abandoned mines
- EPA developed methodology for estimating emissions from abandoned coal mines
- Opportunities abound!
  - Free from constraints of active mining
  - Emissions avoided
- Challenges remain
  - Finding surface owner
  - Obtaining gas rights
  - Predicting gas flows
Future Opportunities: Surface Mine Methane

- Surface mines account for ~ 67% of US coal production but only ~16% of US CMM emissions
  - Mines in 13 states account for 90% of total
- Emissions not well characterized
  - Currently: coal basin-specific emission factors
- EPA is investigating potential to mitigate methane emissions from surface mines
Why has CMM Recovery and Use Been Successful in the US?

- Strong institutional knowledge
  - Degasification operations began in the early 1970’s to enhance mine safety

- Financial incentives
  - Section 29 Credits (now expired) provided incentives to drill CBM/CMM wells

- Forward-thinking industry
  - Some coal companies consider themselves to be “energy companies”
  - Many coal companies see methane as a commodity rather than a nuisance
Remaining challenges to CMM development

- Low electricity prices in many regions
- Lack of clarity regarding methane ownership regulations, status
- Sparse natural gas pipeline infrastructure (western US)

Source: US Dept of Energy
Conclusions

- US CMM emissions are projected to decline
  - Reducing emissions will become more challenging
- Markets for drained gas are well established
  - Opportunities for additional recovery still remain
- Future opportunities
  - Ventilation air methane, largest source of CMM emissions
  - Recovery of abandoned mine methane
  - Surface mines are virtually untapped
Thank you!

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