COAL SECTOR UPDATES IN CHINA

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Outline

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China Coal Sector Update
China Coal Sector Update

- **Coal production and consumption in China**
  - Coal production was 3.75 billion tons in 2015, decreased 3.1% compared with that in 2014.
  - Coal consumption: 3.97 billion tons in 2015, decreased 3.8% compared with that in 2014.

![Output and Consumption of Coal from 2000 to 2015 in China](chart.png)
China Coal Sector Update

CMM drainage

- CMM drainage volume increased from 2.2 Bm³ in 2005 to 13.56 Bm³ in 2015, increased by more than 5 times compared with that in 2005.
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**CBM Recovery from surface wells**

- CBM Production Volume is 4.37 billion m³ in 2015.
- Jincheng Anthracite Mining Group (JAMC) is the largest CBM producing company in China. It produced 1.45 Bm³ in 2015, accounting for 33.2% of the total in China.

![Bar chart showing CBM production volume from 2005 to 2015 in China](chart.png)

*Unit: Bm³*
CMM underground drainage

- The top 10 provinces with CMM drainage are Shanxi, Guizhou, Anhui, Henan and others in 2015, see following graph.
- Drainage volume of CMM in Shanxi Province was 6.03 Bm³ in 2015, accounting for 44.43% of total CMM in China.

Top 10 Provinces with drainage volume of CMM in the year of 2015
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Utilization of CMM

- The volume of CMM utilization was 4.8 $\text{Bm}^3$ in 2015 with the utilization rate of 35.3%.

![CMM utilization from 2000 to 2015 (10^9 m^3)]
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Key Areas of CMM Utilization

- Utilization volume of CMM was 2.23 Bm\(^3\) in Shanxi Province in 2015, accounting for 46.85% of total utilization volume in China.
- The recovered CMM was mainly used as fuels for power plants, households, industries, etc.

Top 10 Provinces with utilization volume of CMM in the 2015(Bm3)
China Coal Sector Update

■ Regulatory Updates
  ➢ Guideline on Further Accelerating the CBM/CMM Exploitation and Utilization issued by the State Council of P.R. China in Sep. 22, 2013.
    ■ Increase Government Funds Support
    ■ Increase Indirect Financial Incentives
    ■ Encourage Private Investment in CBM/CMM
    ■ Market Pricing Mechanism
    ■ Encourage Power plants to use CBM/CMM as fuel

  ➢ Regulations and Actions for Coal Mine Safety
    ■ Revising coal mine safety regulations, calling for comments.
    ■ Recovery CBM from virgin coal seams before construction of a mine.
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CBM Exploitation and Development Action and Plan 2020 had been published on February 3, 2015

- Building 3-4 bases of CBM development,
- Proven CBM reserves reaches 1 trillion m$^3$.
- The CBM(CMM) production Volume will reach 40 Bm$^3$ per year, CBM surface production volume is 20 Bm$^3$ and should be used 100%. CMM drainage volume is 20 Bm$^3$, utilization rate of CMM is more than 60%.
- Integrating CBM recovery and coal mining in the key coal mining areas.
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- Governmental Subsidies for CMM Exploitation and Development during 13th Five Year Plan (2016-2020) issued on February 14, 2016
  - Central government provides subsidies for CMM, increased the subsidies from 0.2 RMB to 0.3 RMB per cubic meter.
  - Shanxi Province and Shaanxi Province provides the provincial additional funding 0.1 RMB/m3.
  - Hunan Province provides the provincial additional funding 0.15 RMB/m3 for CMM recovery, 0.2 RMB/m3 for CMM use.
■ CMM Project Outlook
CMM Project Outlook

- **Emission reduction projects in China:**
  - 89 CDM projects have been approved, therein, 58 projects were registered and 33 projects with CERs issuance in use of CMM up to May 22, 2015.
  - GMI provides the total grants of USD$ 2.17 million for 11 CMM projects in China from 2006 to 2015.
CMM Project Outlook

- Policy barriers
  - Coal companies suffered from economic losses as coal price reduced since 2013, hence reduced financial support for CMM projects.
  - CMM projects could not produce profits without CDM funds.

- Approaches to overcoming challenges
  - NDRC is reviewing the suggestions on increased subsidies for CMM recovery and utilization.
  - By the end of August 31, 2015, 26 projects of CMM utilization projects had been approved as voluntary emission reduction projects in NDRC, 5 had been registered.
CMM Project Outlook

- Anticipated or planned projects
  - Low Quality CMM Utilization (Concentration < 30%):
    Enrichment and purification with PSA for civil use or power.
  - Comprehensive Utilization Project of Low Quality CMM and VAM.
CMM Project Outlook

- Anticipated or planned projects
  - Recovery and Utilization of Abandoned Coal Mines
    - Supported by Prosperity Fund of UK, Policy Framework for AMM Recovery and Utilization in China had been accomplished, which effectively promote the AMM development in China
  - Feasibility study of AMM recovery and utilization pilot project and policy recommendation for AMM recovery and utilization in China had been approved by the UK Embassy.
CMM Project Outlook

- Using AMM as fuels for power generation
  - In consideration of the situations that coal supplies are much over demands and gassy coal mines are accident-prone, Chinese Central Government planned to close down about 4000 small coal mines and 300 large coal reserve-exhausted mines with total annual output capacity of 500 million tones of coal in coming 3 to 5 years, for which the Central Government will provide financial support of RMB 60 billion.
  - Using AMM as fuels for power generation will make great contributions to energy supply and emission reduction.
Case studies 1:
Main CBM recovery technologies in China
Main CBM recovery technologies in China

- Surface vertical wells in virgin coal basins
- Multi-lateral horizontal well
- Gob wells in active mining area with increased permeability
- Surface vertical Butted well
- CBM drainage by combination of surface well and underground drilling
- Stimulation Technology of CBM Well, including fracturing, Nitrogen and CO₂ Injection
Combination drainage of underground boreholes and surface wells

- At Jincheng coal mines: gas was drained from single seam in gob area.
- At Huainan coal mines: Gas was drained from released pressure zone of the working seam and adjacent seams.
Case studies 2:
Utilization of CBM/CMM in China
Utilization of CBM/CMM

- Power generation
- Compressed gas for vehicles fuel
- Liquefied gas
- Civil use by pipeline transportation
Power generation

- The CMM power plant with capacity 120 MW in Jincheng coal mine is in operation very well. It is the largest CMM power plant in the world, consuming 180 million m$^3$ CMM and generating the electricity of 720 million kWh per year.
- Until June, 2013, total installed capacity was 1340 Mw in China.
Liquefied CBM

- The liquefied CBM has been applied in many fields, and it is also advantageous to the remote CBM recovery, reduce CBM storage cost, and application for CBM in peak shaving.
Case studies 3:
The feasibility study project of coalbed methane extraction in Guanzhai exploration area for Guizhou Hengyuan Mining Development Co, Ltd.
In 2015, CCSR undertook the feasibility study project of coalbed methane extraction in Guanzhai exploration area for Guizhou Hengyuan Mining Development Co., Ltd.
Overview of GuanZhai coal mine

- Located in GuanZhai exploration area, southwest of Qianxi County, Guizhou province.
- New mine, coal and gas outburst coal mine.
- Total production capacity: 1.8 million tons/a.

Location of Guanzhai exploration area
Feasibility analysis

- Feasibility analysis from two aspects of technology and economy
  - Technical feasibility analysis

- Technical feasibility analysis:
  - stratum condition
  - coal quality
  - geologic structures
  - hydrogeologic condition
  - coal seam
  - lithology of coal seam roof and bottom
Feasibility analysis

- Economic feasibility analysis

investment budget  feasibility  financial evaluation
Case studies 4: VAM Utilization Development in China
VAM Utilization Development in China

China research institutes and universities had done lots of fundamental application research on the VAM abatement technology. Some application and mature VAM abatement technology had been developed and applied in the demonstration projects.
VAM Utilization Development in China

- At present, the mitigation and utilization of VAM in China and internationally is mainly carried out in three ways of thermal oxidation, catalytic oxidation and auxiliary use as combustion air.

- Companies that adopt first method include Shengli Power Machinery Group Co., Ltd., MEGTEC (with its Voc sidizer technology), Dürrand Eisenmann, and Zibo Zichai New Energy company. A number of VAM abatement projects with commercial scale units have been demonstrated at coal mine sites in several provinces of China.
VAM Utilization Development in China

The VAM utilization project in Datong coal mine

The VAM utilization project in Gaohe coal mine in Shanxi Province
CBM/CMM Near Zero Emission
CBM/CMM Near Zero Emission

- CMM Zero Emission In Shaanxi Coal and Chemical Industry Group
  - Combination of CBM and CMM recovery from surface wells and underground horizontal boreholes.
  - CBM with high concentration is supplied to other cities by pipeline. CMM of low concentration and VAM are utilized for power generation.
CBM/CMM Near Zero Emission

- Comprehensive Utilization of LCMM and VAM
  - A demonstration project at Dafosi Coal Mine of Binchang Mining Group

Comprehensive Utilization Project in Dafosi Coal mine of Binchang Mining Group
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