Focusing on the global methane management

Action now by all and for all

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Key Point

- Coal and Human being
- ICE-CMM in China
- Practice in ShanXi Coking Coal
- Challenges and Considerations
Coal and Human being

1. The evolution in history

7200 years ago
Neolithic Age
Liaoning China
Goods

3500 years ago
Bronze Age
Xin Jiang
for burning

1800 years ago
<Notes on Book of Water>

By the end of
18th century
Industry revolution

By the end of 18th century
Industry revolution
2. Important role in the development of human society

- Proportion of Primary Energy Consumption 28.1% globe
  (source: 2017《Bp world energy statistic》)

- Proportion in China 61.8%, 2016
  (source: 2017《Bp world energy statistic》)

- 75blt coal produced in the past 60 years
  (source: 2017international energy expo. in china)

- 9blt coal production estimated globally in 2020
  (source: (IEA) 2014《coal market biannual report》)

- Proportion of PPEC 50%+ china in 2035
  (source: China development Summit 2014)
3. Energy consumption evolution from ancient ——more H and less C

Energy

- wood: 1H-10C
- coal: 1H-2C
- oil: 2H-1C
- natural gas: 4H-1C

"more H" — "less C" clean
4. Coal and gas formed and reserved together

- Adsorbed on the surface of coal particles, partly dispersed in coal pores or dissolved in coal seam water. It is a mineral resource of coal and belongs to unconventional natural gas.
- Coal and gas are associated with each other, and coal mining accompanied by large amount of gas emission.
- Note in Ming dynasty: realized the toxicity of gas.
- In 2015, 18bNm3 produced, 8.6bNm3 used.
  - China

Forecast: 90bNm3 CMM production in 2030.

(source:《Forecast and analysis of CBM market trends and future trends in China 2014-2019》)
5. Three stages for Human being knew gas

- **Initia**
- **Harmful gas**
- **No.1 killer for coal mines**

- **Development**
  - **Gas, A kind of Clean energy**
  - **Green house effect**
  - **21 times of CO₂**
  - **Coal and gas co-mining theory**
    (Academician Yuan Liang)
Gas produce CERs, an important asset for transactions, mortgages and financing.

The capitalization of gas utilization is another great progress from the industrial civilization characterized by fossil fuels to the ecological and economic civilization.
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1. Goals and Tasks

ICE-CMM in China, under the authorization of the UNECE, based on Shanxi Coking coal. The only global methane management hub for coal mines.

Committed to the global CBM(CMM) promotion of drainage, utilization and new technologies; committed to clean energy utilization, greenhouse gas emission reduction.
UNECE promotes the effective implementation of the guidelines for extraction and utilization of CMM(2011, 222 Act) to carry out methane management worldwide.

Cooperation between the two sides unprecedentedly open up a channel for policy makers to directly contact interested parties.
Full coverage of coal mine gas extraction and utilization project. Forecast: 11.3bNm³ CMM are to be drained, 6.5bNm³ to be used in 2017

2. Background

The state provides solid policy guarantee

- State basic policy: Resource saving and environment protection
- G20 summit 2016, Xi Jinping and UN former general-secretary Banki-moon

Subsidy by central gov. 0.3rmb/m³, by Shanxi province another 0.1rmb/m³
2. Background

China is the largest developing country in the world and one of the world's major carbon emitters. China's greenhouse gas emission reduction itself is a contribution to the world.

China's carbon emission reduction is a key contribution to the world.

Innovation, coordination, green, open and shared development.

China will move towards ecological civilization.

- Clean energy consumption proportion up to 20% in 2030 from 15% in 2015
- Unit GDP energy consumption drop 15% the 13th 5y-plan
- Unit GDP CO₂ emi drop 18% in 13th 5y plan

Commitment and confidence. China is a responsible developing country and a positive force in Global Climate Governance.

(source: 《"13th Five-Year" plan》)
2. Background

- Guarantee for Carbon finance market demand

- By 2020, the global total carbon emissions trading is expected to reach 3.5trillion$
- Carbon transaction is to replace oil be No.1
- China has taken the lead in global CDM Market Since 2009

Number of project, expected emission reductions and CERs issued by EB have being ranked first in the world

- Carbon emissions trading in 7 provinces and cities. China's carbon emissions trading (CCER) has entered the "fast lane " since 2013

- The world's carbon trading market is inseparable from China's extensive participation, and China's carbon trading also needs a prosperous world carbon market environment
3. Three major functions

1. Promoting new technologies on CMM extraction and utilization, project guidance, industry standards formulation (recognition), industrial policy advocacy.

2. Assisting enterprises, universities, research institutes to cooperate in technology, research and project.

3. Assisting and Guiding enterprises with “The Belt and Road” in mining, coal processing, coal chemical, equipment, gas utilization.
Based on the Support from governments at all levels in China

Under the guidance of UNECE

Constructing three service platforms

4. Three major platforms

platform1
Promote “the Best Practice”

platform2
Sharing resources for technology, talents, information

platform3
Utilization, carbon finance, new business model, joint development
5. Three major obligations

- Support the Chinese government's carbon emission reduction commitments
- Assist Carbon emission reduction for UN member countries
- Joint effort to protect the homeland of human being

So vulnerable the earth is as it is so valuable.

The climate has been and will continue to be the world's largest public product for all. ICE-CMM in China, we are coming today.
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1. The “3+1” model (TCF + CDM)

- 17 projects built, utilization 169MNM³/y,
- CO₂ reduction 2.5Mt.
- 4 power stations with high concentration gas. 4 with low concentration, total installed capacity 123.32Mw.
- CERs presale 250milion RMB
- 4 projects registered in UN under CDM
- 3 world class projects developed
- CERs been traded in world market
2. The “3and1” (3 products and 1 destruction)

Utilization in gradient way

Lower than 1.25%
Lower than 30%
30%-90%
Above 90%

oxidization
power generation, pressure adsorption, concentration increase
power generation; molecular sieve to increase concentration
CNG, LNG for sale

Compression station
Pipeline transportation

Oxidization for VAM
Generators
2. The “3and1” (3 products and 1 destruction)

★ Concentration is not a problem, but the drainage is

Du’erping demonstration project cooperate with Cindicatum, the introduction of international technical team and advanced technology, concentration increased from 15 to 33%, laid the foundation for the subsequent use of high quality gas. Form the virtuous cycle of utilization to promote drainage, drainage to ensure safety.

- Power generator for H-concentration
- For underground winter heating with H-temperature
- Waste heat from moderate-temperature for bathhouse
- VAM with extra-lower concentration, Destroyed directly

"SCCG Model" sharing
3. Dimensional drainage

3.1. Terms and spaces

To drainage in all terms and multi-dimensions

3.2. Application of comprehensive tech.

Before mining

On mining

After mining

technologies

surface

vertical well

Horizontal branch well

L shaped well (coal seam, rock seam)

The drilling 1km into the coal seam (fan shaped hole or parallel drilling) pre-pumping in a certain zone

Short drilling (fan shaped hole or parallel drilling)

Long distance drill along the roof

Drainage tunnel above(down) the roof(floor) the mining face

with pipeline in upper corner, pipeline in sealed gob

underground
3. Dimensional drainage

3.3. diversification in Management, equipment and training

*Management modularization*

- For mines with H-gas outburst risk
- Differentiated in production, preparation, layout
- Drainage in protective coal seam
- Pre-drainage, de-outburst progressing in alternative turn in Long distance drilling
- Horizontal multi-pipeline docking, vertical bore hole, rock tunnel under floor docking bore hole
- Comprehensive method use in case of gas flow above 25 m³/min in roof/floor drainage tunnel, on-mining coal seam, roof/floor fracture zone, gob side
- In floor drainage tunnel, on-mining coal seam, roof/floor fracture zone, gob side, in case of gas flow 10~25 m³/min
- In on-mining coal seam, roof/floor fracture zone, gob side in case of 5~10 m³/min
- Pipeline drainage in bog side in case of gas flow less than 5 m³/min

*Equipment serialization*

- Case on case for coalmines
- Case on case for working faces

*Systematic training*

- Pumper, driller
- Multi-level, means, subjects

*ZDY armored driller*

*2BEC pumper*
4. Taking "carbon" as the intermediary, connecting industries with finance agency

SCCG registered “Carbon Asset Management Company” at the end of 2015. The formation of “Carbon Asset” company is of helpful for “Carbon” to mortgage loans, bond issuance. The equity and investment platform creating a history for China’s coal enterprises to enter the field of carbon finance.

2 CCER projects in SCCG have been registered
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1. Utilization for VAM

A large amount of VAM concentration in China are around 0.1%, which is not matched with the existing equipment (0.4-1.25 required) for utilization.

2. Drainage in Goaf and abandoned zone

The drainage in goaf is prone to increase air leakage, cause spontaneous combustion. Gas drainage and utilization in abandoned mine need more policy support.
3. The gas capture and utilization in open mines

A large amount of VAM concentration in China are around 0.1%, which is not matched with the existing equipment (0.4-1.25 required) for utilization.

4. Drainage efficiency under special geological conditions

Low drainage efficiency due hole collapse under condition of Broken and Soft coal (rock) seam. The low drainage efficiency impacted by aquifer.

5. The incentive policy for emission reduction

Innovation needed in financing model for projects

Strong incentive policy for emission reduction and use needed under the principle of "extra " for each Government. Special support for high quality gas utilization(tax,price,etc.) expand carbon financing channels.
Challenges and Considerations

Utilization rate around 40% in China, means more space to improve, “The center” guides the best practice and is ready to work with you hand in hand to face the challenges in tech., finance, and equip.

Central government published “long term mechanism on resource capacity and monitoring early warning system”, environment cost will enter into energy pricing, indicate both opportunities and challenges.
Caring, supporting, focusing, sharing.

Well managed gas making the coal mines safer.

Well gas utilization making benefits maximization.

Less emission for better life.
THANK YOU FOR YOUR ATTENTION