

# Energy Challenge, Clean Coal Utilization , The UCG Progress in China

**Rick Wan, Ph.D**

**XinAo Group ([www.xinaogroup.com](http://www.xinaogroup.com))**

P. R. China



Indo-US Energy Dialogue Working Group on Coal & Asian Pacific Partnership Coal  
Mining Task Force Workshop on

UCG

14 Nov. 2006, Hotel Taj Bengal, Kolkata, India

## 1. Energy Challenge in China, the Role Coal Plays

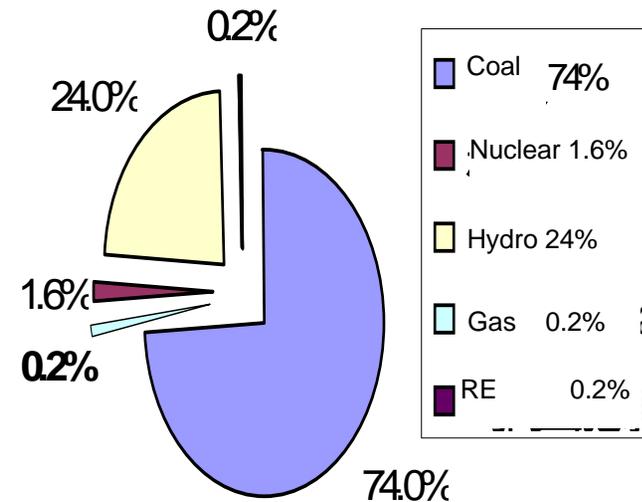
## 2. UCG Status in China

## 3. XinAo's Perspective on UCG

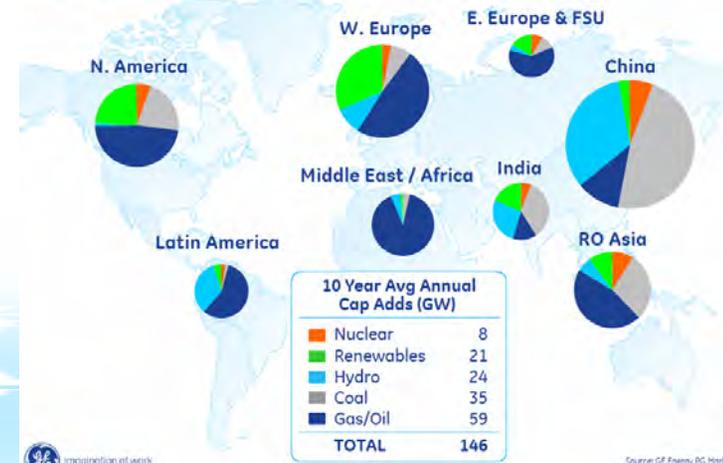


## High lines:

- ✚ Oil and gas resources are limited;
- ✚ China Energy consumption highly depends on coal >70%;
- ✚ Mining costs increasing due to the higher safety requirement and new government regulations;
- ✚ Government is looking to diversify energy supply for economic, environmental and security reasons;



**Power Gen Landscape ... Next 10 Years**  
Total Capacity Additions - GW (2006 - 2015)

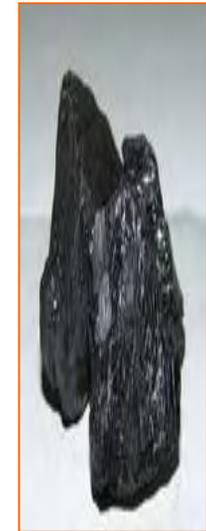
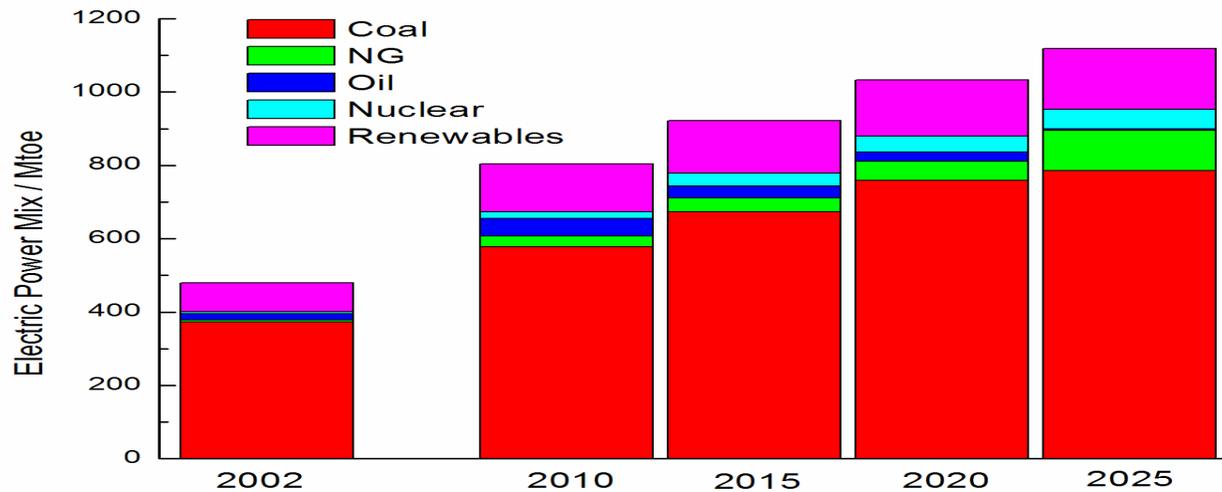


## High lines:

- ✚ **Environmental degradation is becoming a national priority**
  - 📊 **China has 9 out of the 10 top most polluted cities in the world**
  - 📊 **International commitments – China 2nd largest GHG emitter.**
  - 📊 **UNEP Director: “China’s economic goals ‘environmentally unachievable’” due to resource constraints;**

**Big Problem!**

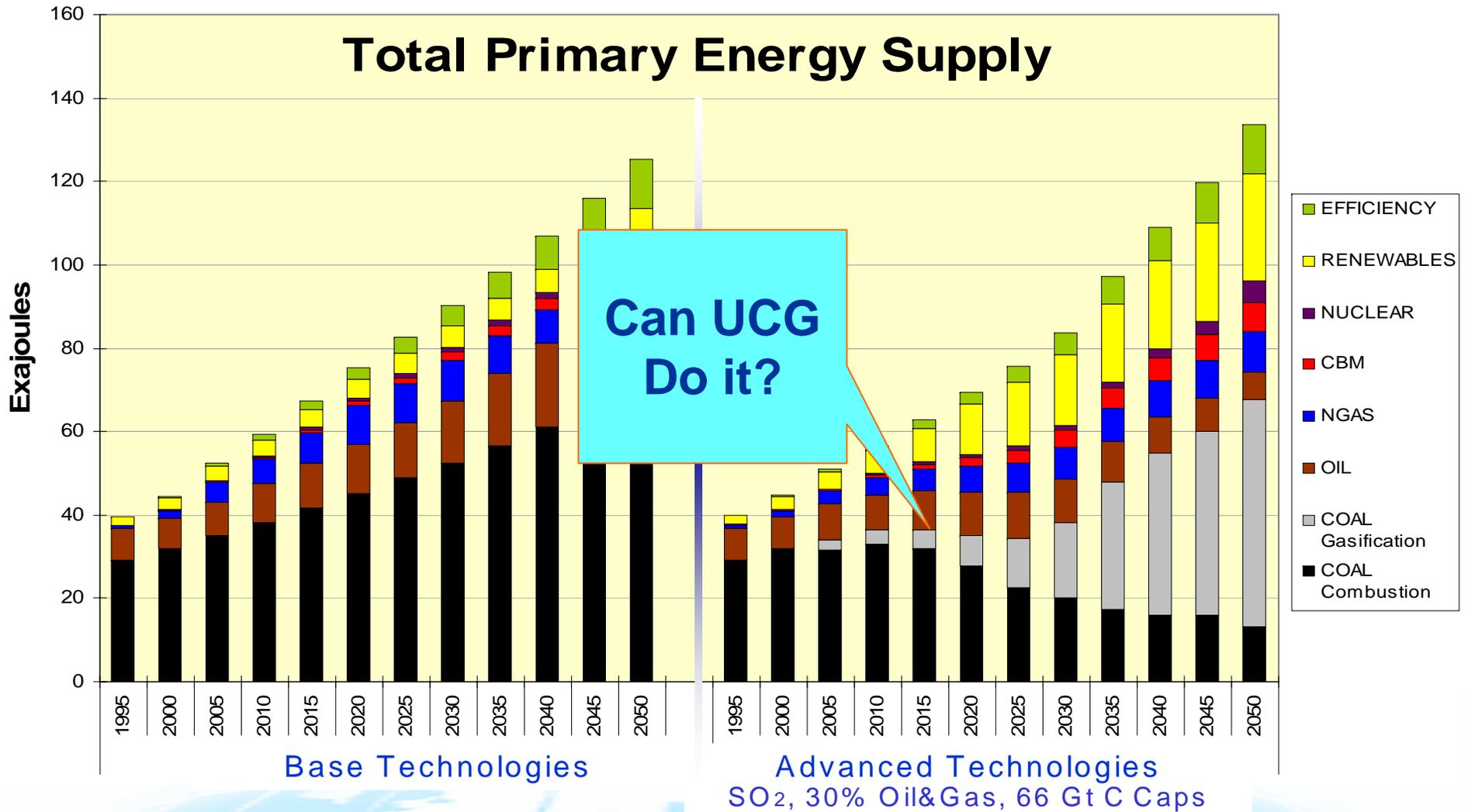




## Configuration of Electrical source in China

### High lines:

- ✚ **The Coal-Dependence status will continue for a long time;**
- ✚ **We have to find a clean way to utilize coal, no other choice**

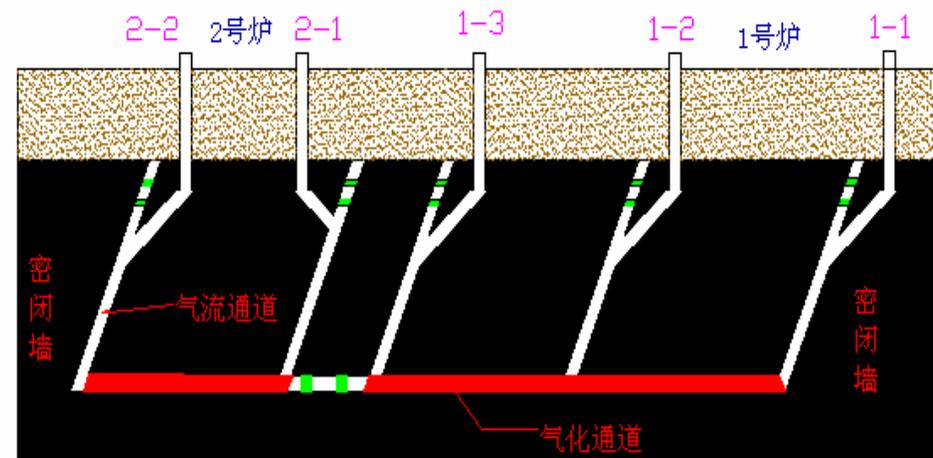


✚ **1958---1965 (Skochinsky Institute of Mining)**

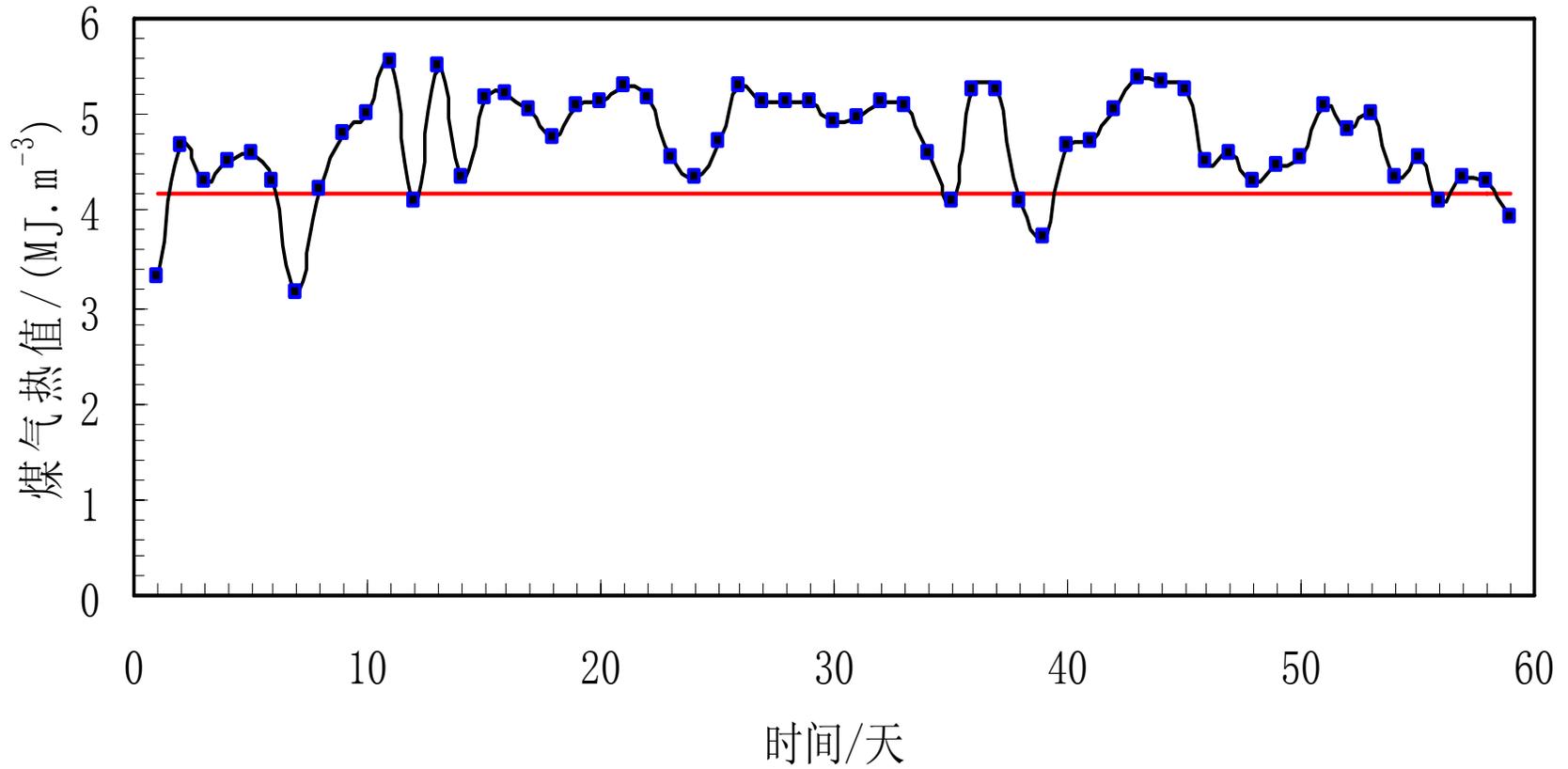
XinWen, ZhiaoZhuang, HeGang, Tatong, WanNan Total of **16** Mines experienced the Underground Coal Nature Burning Experiment. made substantial achievement.

✚ **1985---Present**

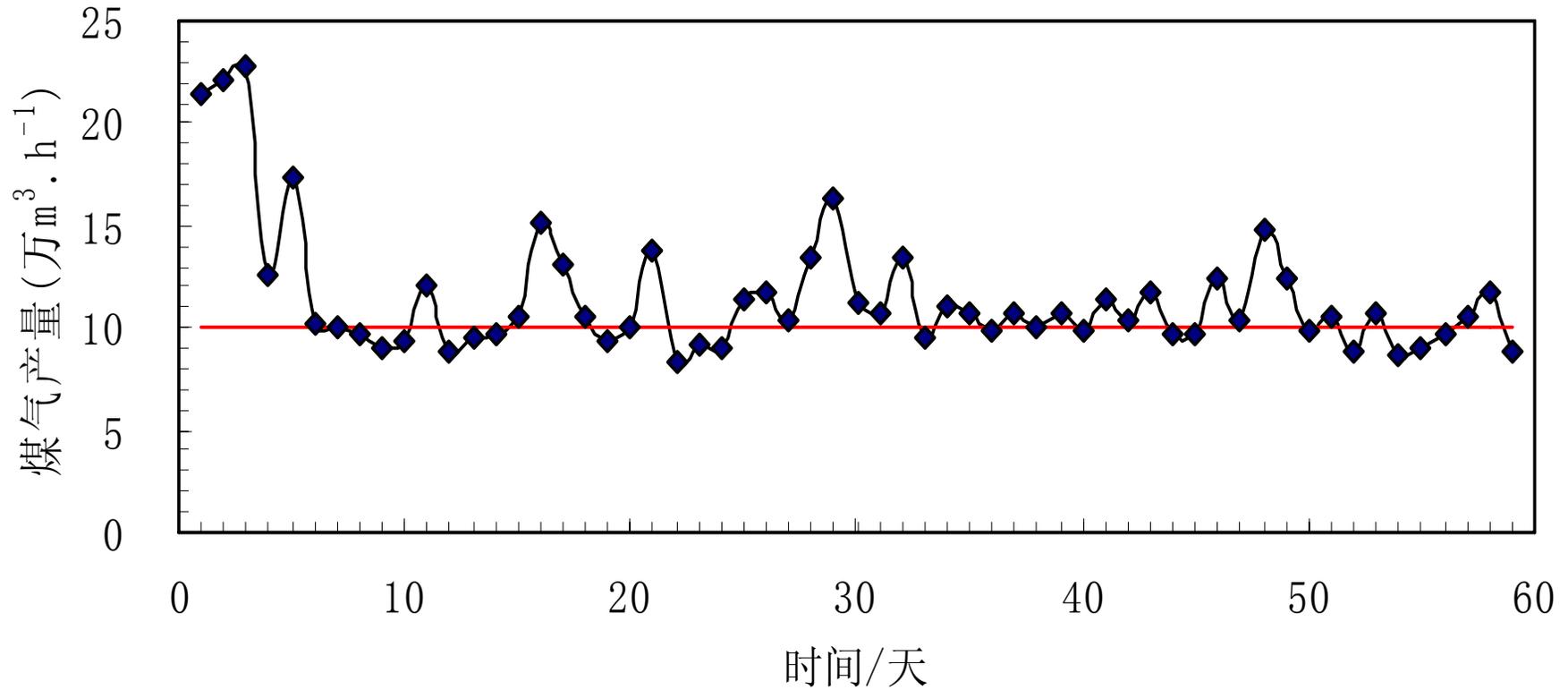
Xu Zhou, TangShan, XinWen, Feicheng, XieYang, FuXin, Yilang, Yima, HeBi, XinMin, total of **17** abundant mines, new mines performed UCG.



XieYang

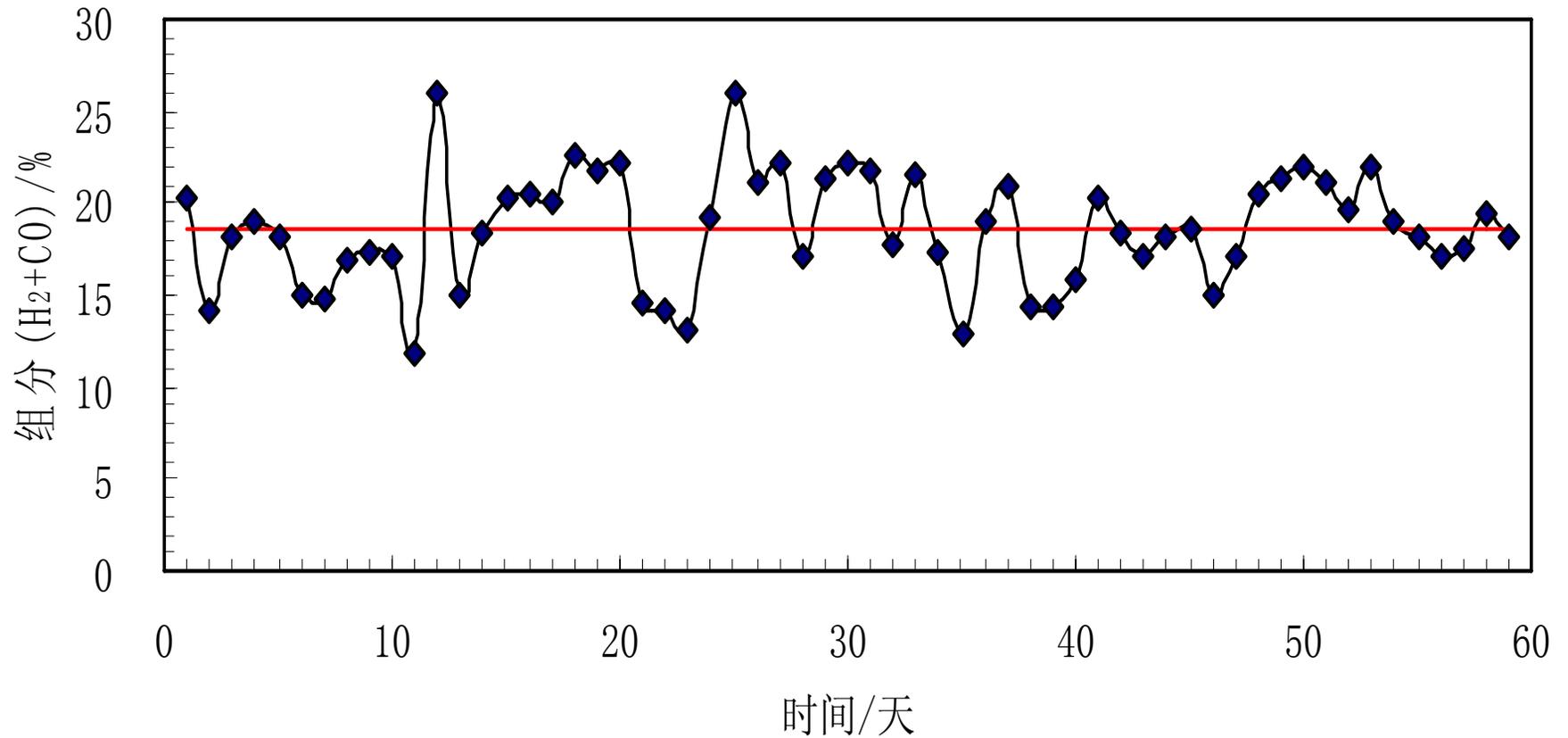


**Syngas (59days) analysis**



## Production (59days) Sustainable analysis





## H<sub>2</sub>+CO Sustainable (59days) Analysis

## Some of the UCG Sites

Place	Number of Burner	Coal Type	X10k M3/D	Year Started	Status
Yima	1	Long Flame Coal		1998	Pilot, stopped
Xinwen	3	Gas Coal	6	2000	Steam, Cooking gas,
Xinwen XieZhong	2	Gas Coal	2	2001	Steam, Cooking gas
Feicheng ChaoZhuang	2	Fat Gas Coal	3.5	2001	Steam, Cooking gas
Panzhuhua	1	Meager Lean Coal	8	2001	
He Bi #3	1	Meager Lean Coal	15	2001	Air, Stopped
Fuxin	1	Gas Coal		2001	Air/O2, Stopped
Xin Mi	1	Long Flame Coal		2000	O2, Stopped
XinWen	4	Gas Coal	10	2002	Steam, Cooking Gas, power station.
XinWen	1	Gas Fat Coal	2	2003	Steam, Cooking Gas

**Reason**  
?

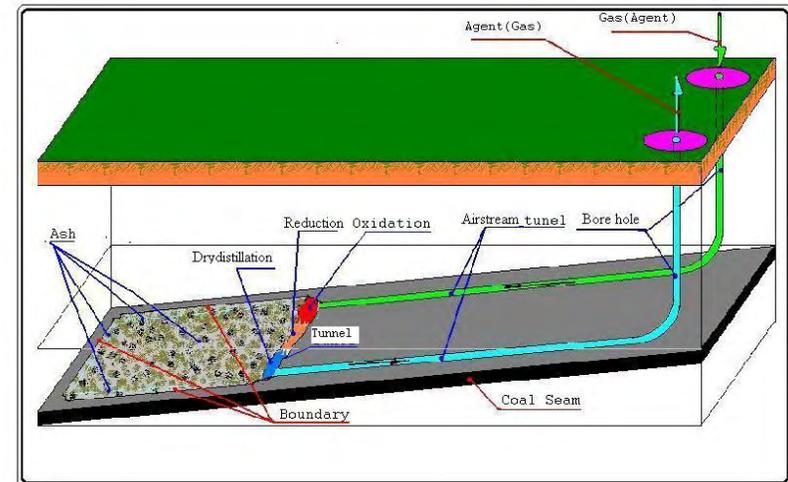


## Chinese Characteristics:

- ✚ Recover the abandoned resources in previous mining process,
- ✚ Extract as much as possible
- ✚ Environmental Safety !
- ✚ Government Code For Clean Coal Technology?

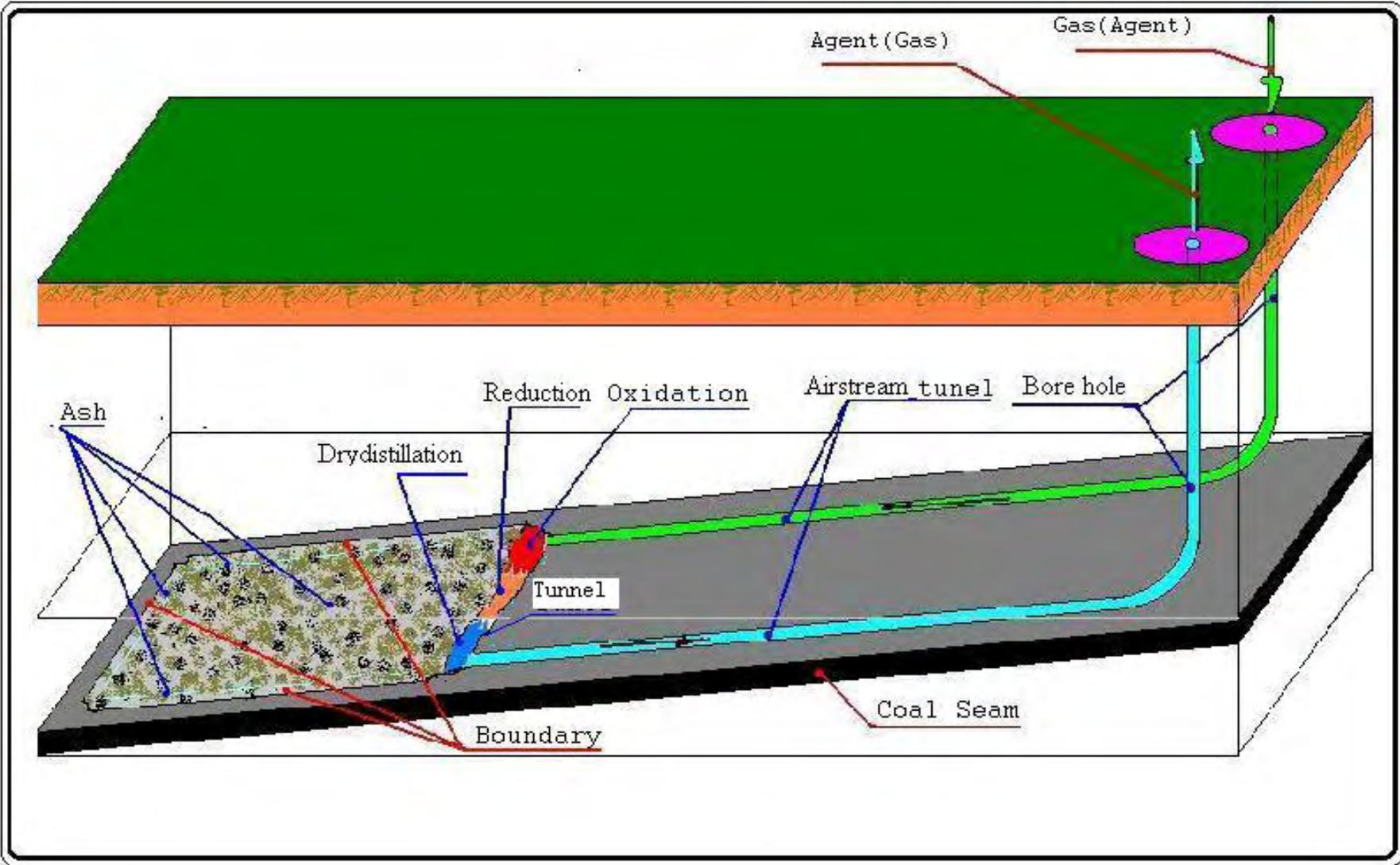
### Chinese UCG Community “goal”

- Full Usage of Coal (80%);
- No Explosion ( $O_2 + CH_4$ );
- No Leakage;
- No Ground Deformation;
- No Water contamination;

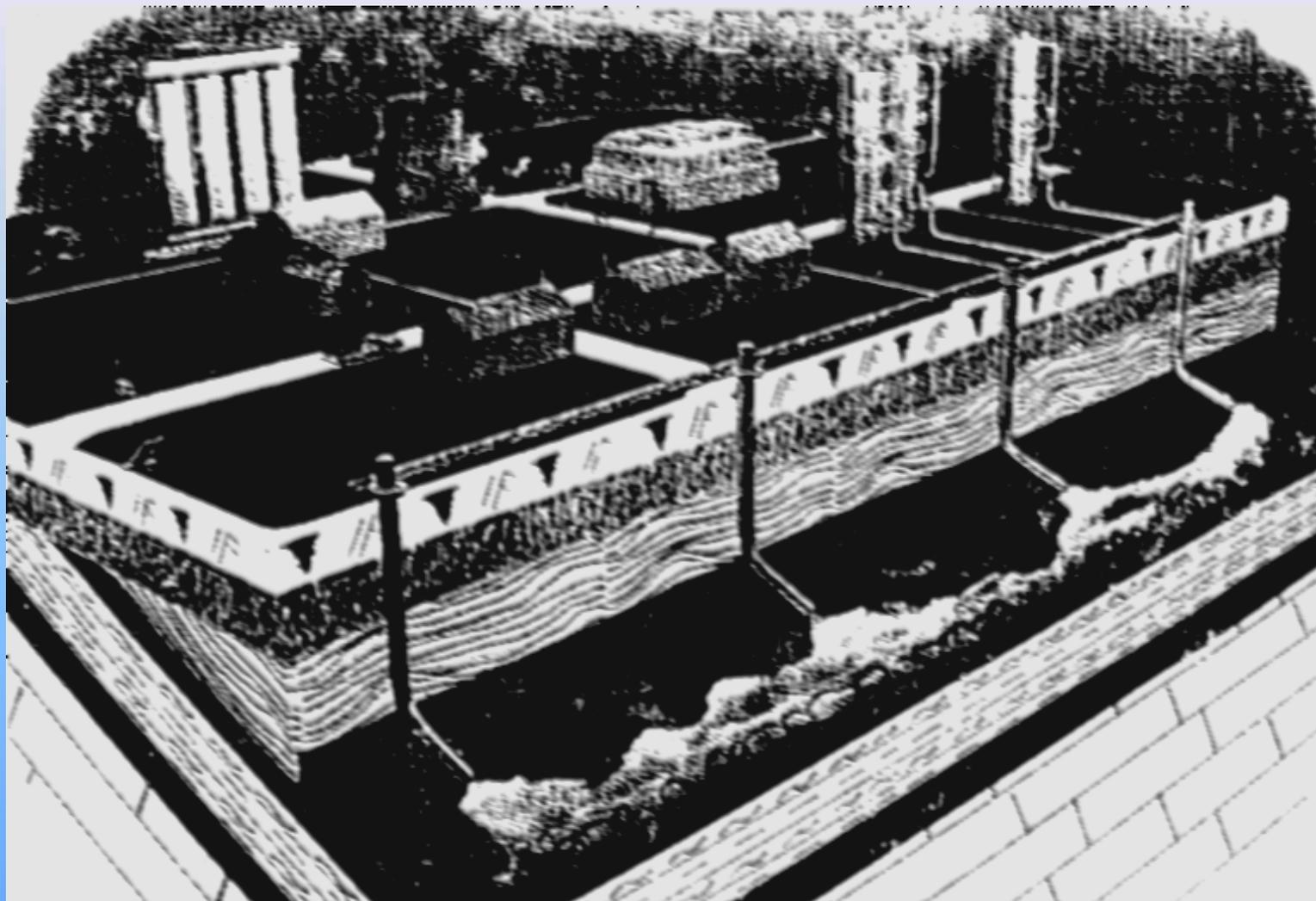


“Long Tunnel、Large section、  
two Stages”

"Long Tunnel, Large Cross-section, two Stages"



# 新工艺地下气化炉



**LLT Underground Gasifier at Liuzhuang mine**

## Ma Zhuang Pilot Site: The Only bore hole drilling

### Tunneling for the Vertical boreholes

- ★ Hydraulic Tracking
- ★ Explosion
- ★ Directional drilling

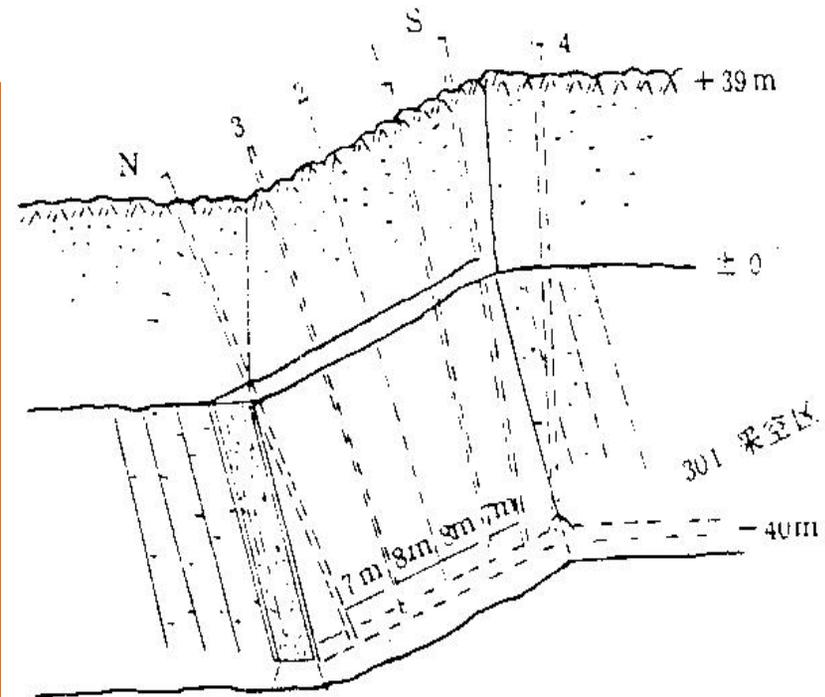


图1 气化炉结构

1,2,3—测温孔;4—注浆密封孔 S、N—进排气孔

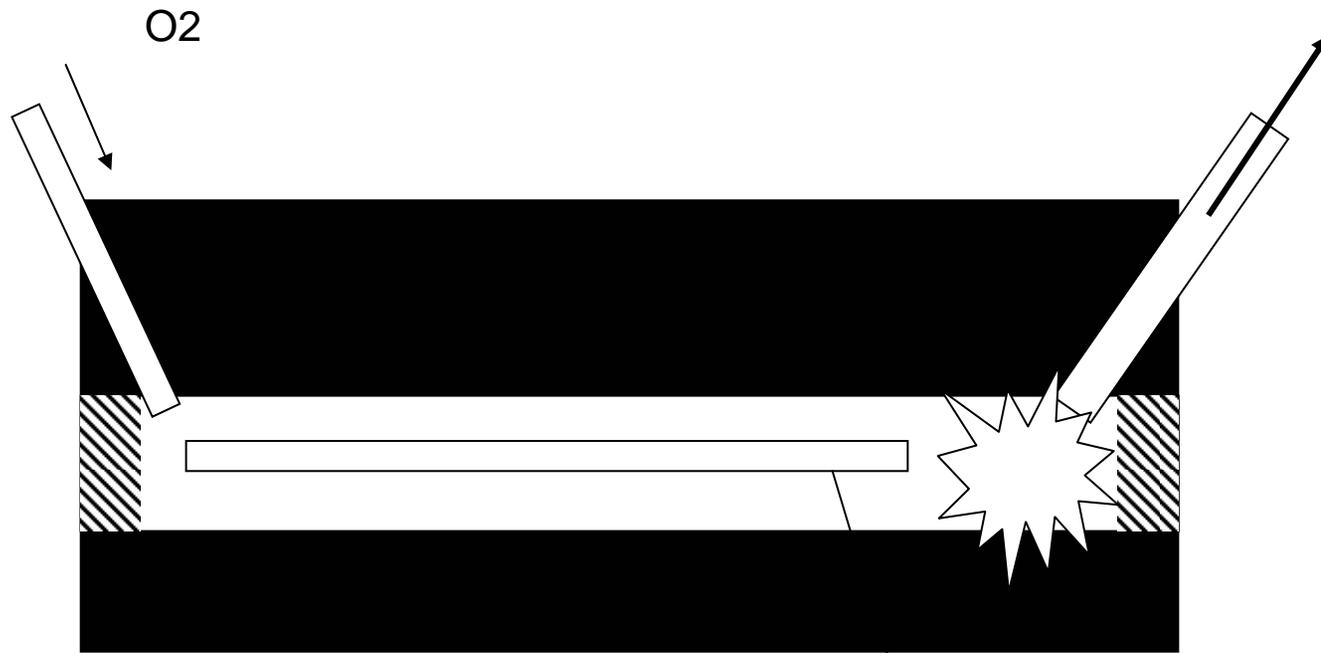
In Chinese 27 Year of the UCG History, they deserve the recognition.

## What we have learned:

1. China is the only Country pursued UCG work continuously
2. **Bad Results:**
  - Still no commercialized yet.
  - Making the same mistake again and again. (lack of site characteristic study)
3. **Good impact:**
  - Hand-on experience; (One example: Chinese CRIP)
  - 106 page of the Text book;
  - 6 Ph.Ds; over 100 Graduate Student on UCG

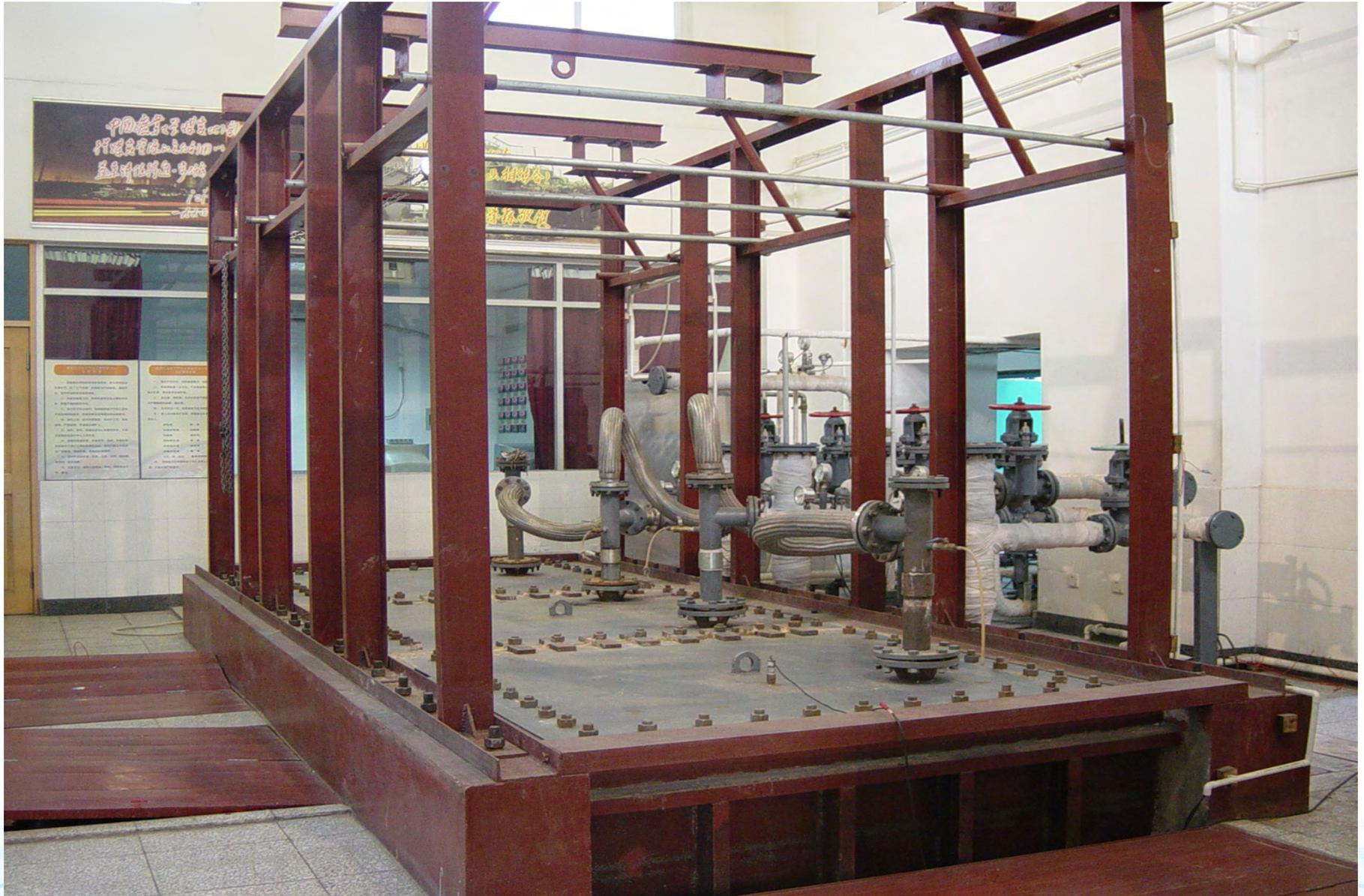
Chinese Way:



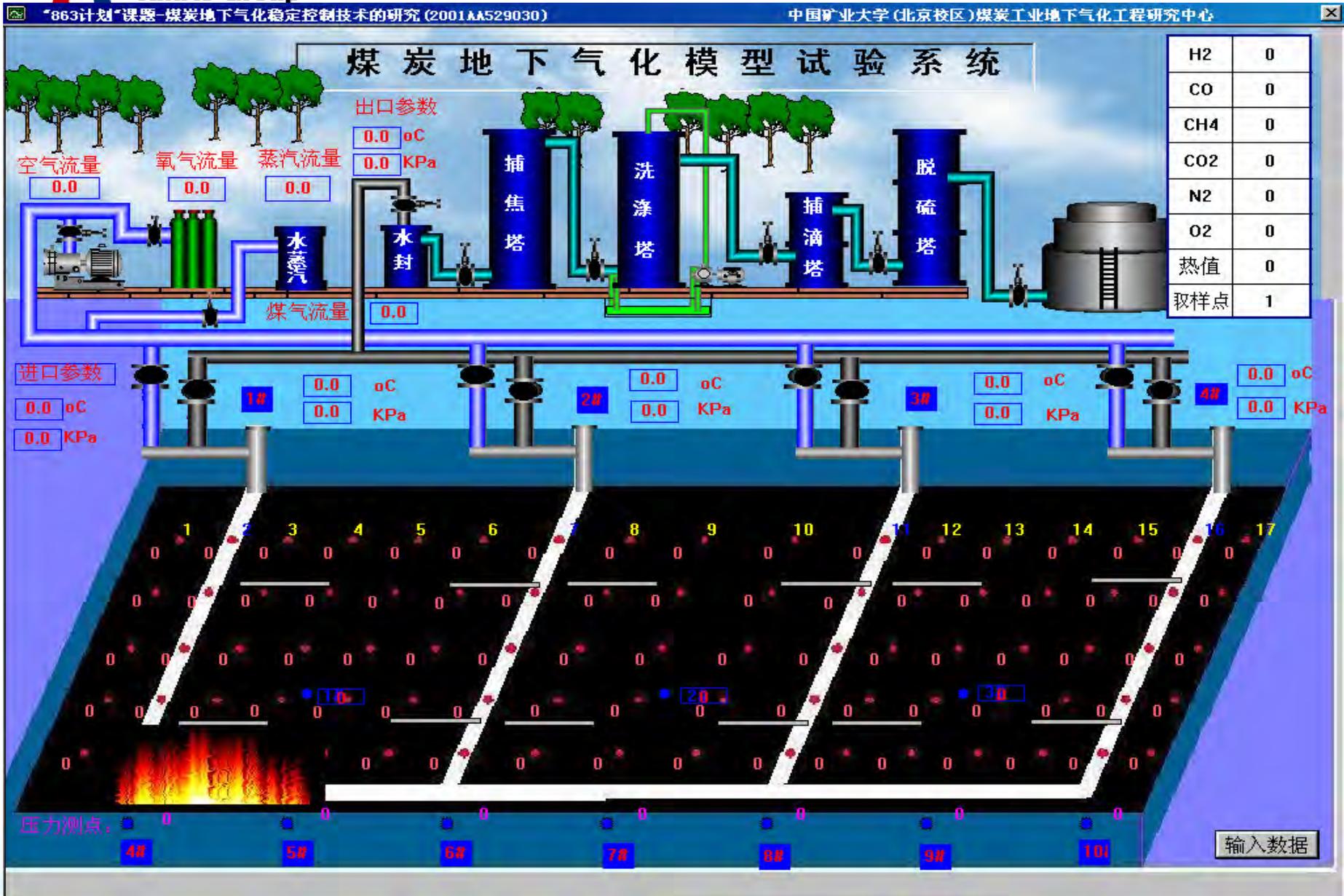


Oxygen injection Pipe:









### Facts:

- ✚ **Found: 1989**
- ✚ **Employee: over 20,000**
- ✚ **Over 100 Subsidiaries**
- ✚ **Over 63 Cities**
- ✚ **3 IPO companies**
  - **Energy Distribution**
  - **Energy Equipment (LNG..)**
  - **Energy Related Chemicals (SCG)**
  - **Energy Production (UCG)**

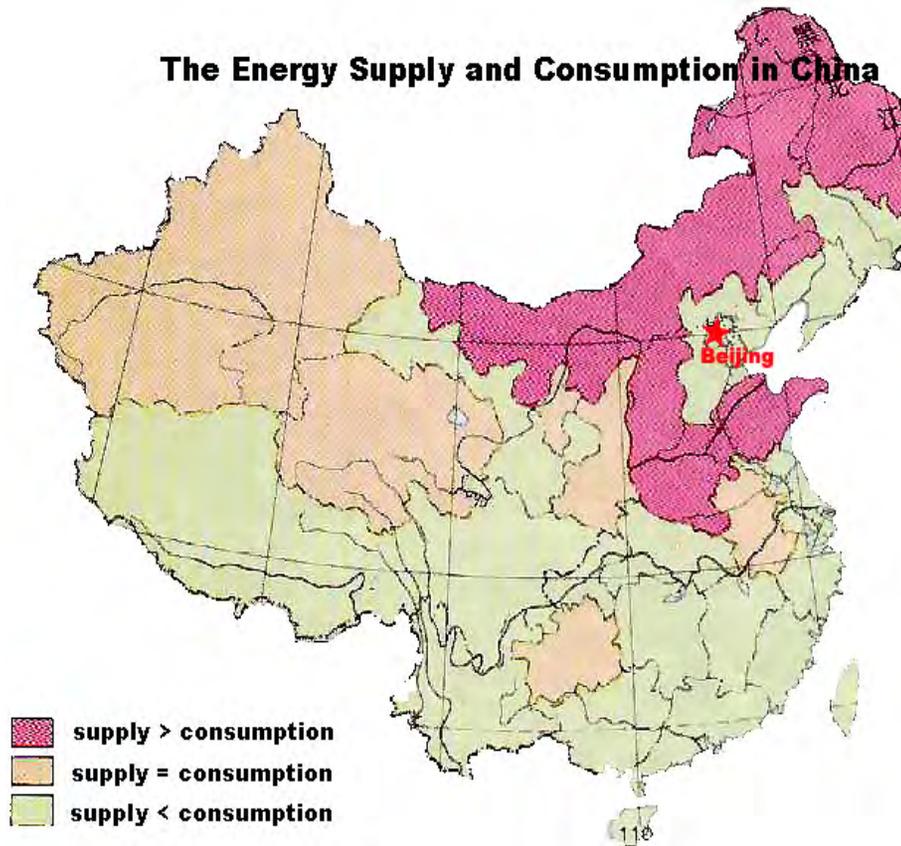


**19 years Growing Rate: 42%**  
**Largest Private Energy Distribution Company**

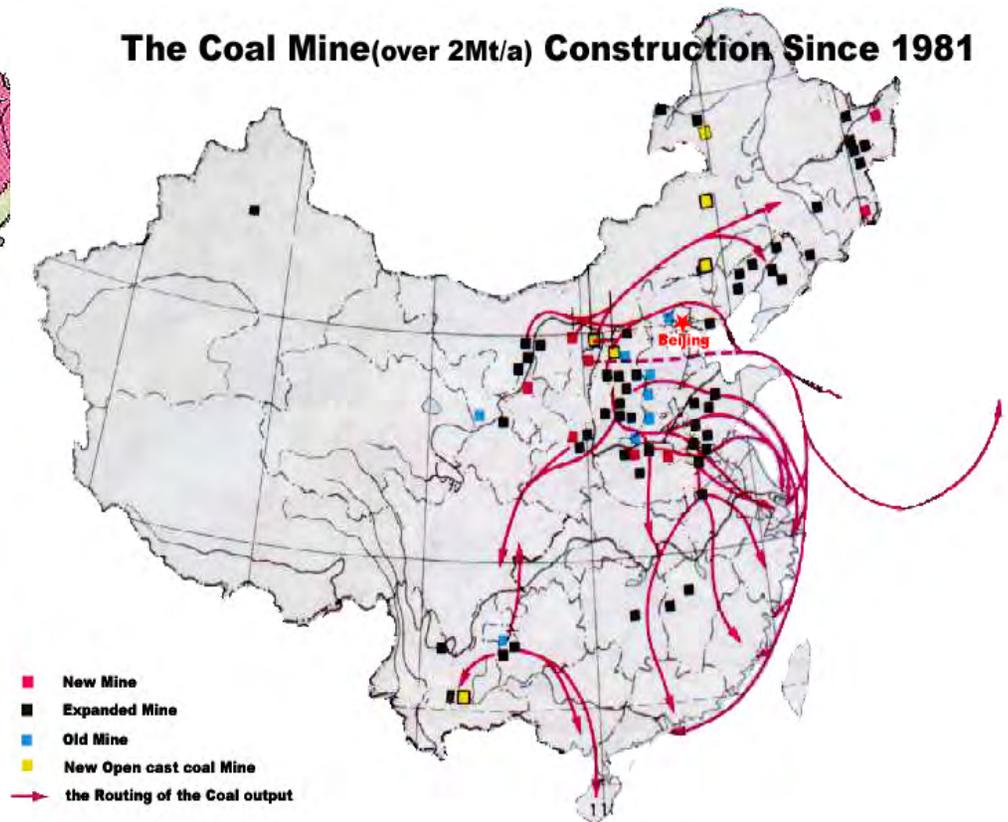
**XinAo's UCG Strategy is driven by the market.**

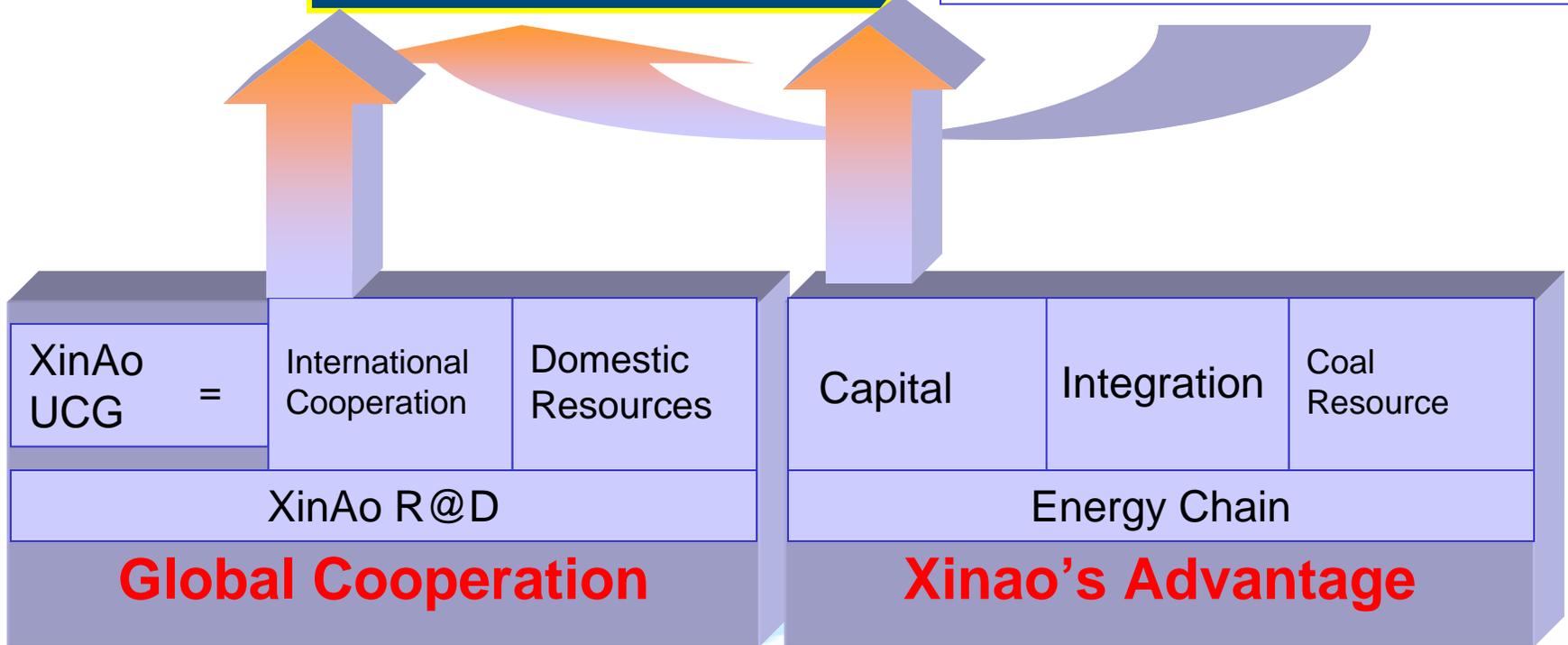
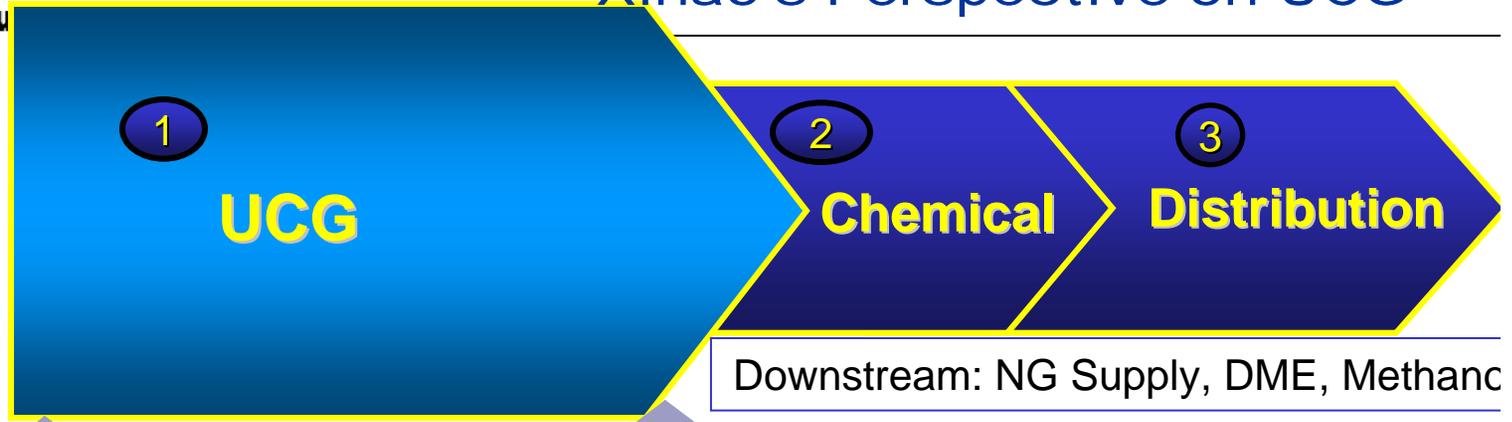
**Coal producing area & transportation trend in China**

**The Energy Supply and Consumption in China**



**The Coal Mine(over 2Mt/a) Construction Since 1981**





Key components

Resource

Technology

Market

XinAo's responsibilities

Resource

XinAo's innovation

**International Cooperation needed?**

**Ergo, LLNL, Carbon energy, Uzbekistan, Europe, India...**

**UCG Commercialization**

**Tech.**

Market

Integration

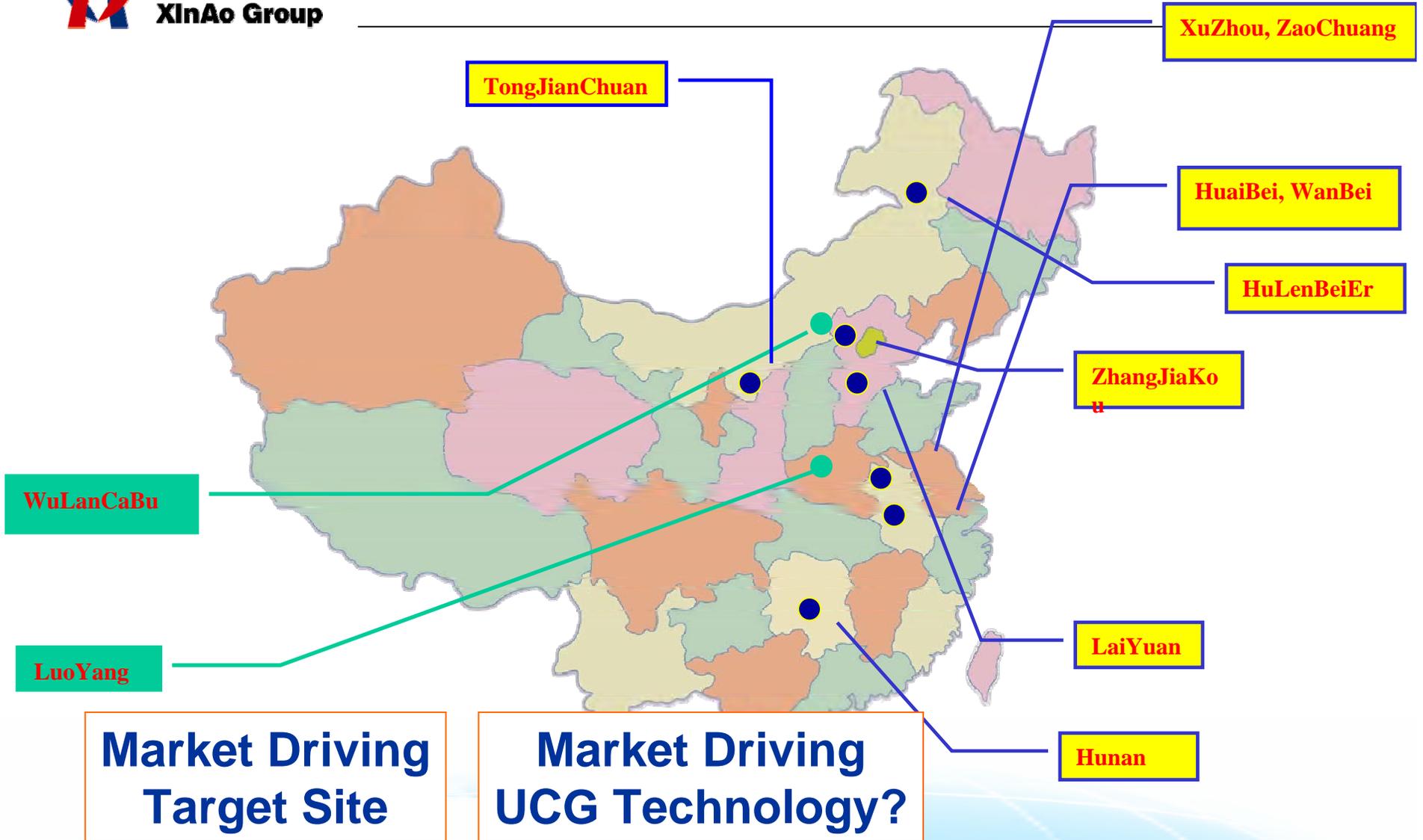


Long-Term Goal (2020)

UCG Coal : 36.10 million Tons  
Annual Revenue : 19.98 Billion RMB  
UCG Investment : 34.351 Billion RMB  
**Coal Chemical Revenue : 32.68 Billion RMB**  
**Coal Chemical Investment : 24.33 Billion RMB**

Total Investment : 58.68 Billion RMB  
Total Sales : 52.66 Billion RMB , \$6.6 Billion





“Available Technologies to be adapted  
need for chosen deposition”  
“...for market-Chosen Sites”

**Mr. Prem Sawhney**  
**XinAo's view**

**Thanks !**

