

26th World Gas Conference

1 – 5 June 2015 – Paris, France



TS. PGC C 2

CHINA'S SHALE GAS INDUSTRY-CURRENT POLICY

Zhao Qun
China National Petroleum Corporation (CNPC)



OUTLINE

1

Shale gas policies in China

2

Case study of typical shale gas well

3

Prospect of shale gas subsidies

1. Shale gas resources of China

Recoverable resources



Production per annul

U.S. 20.7 Tcm (7299Tcf) (EIA, 2014)

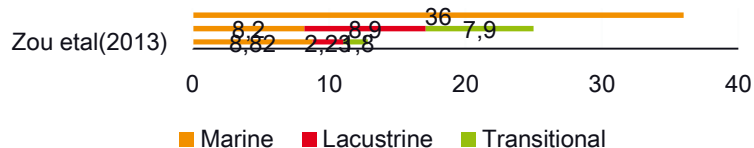
370 Bcm (13100Bcf) (EIA, 2015)

China 8.82Tcm (311Tcf)

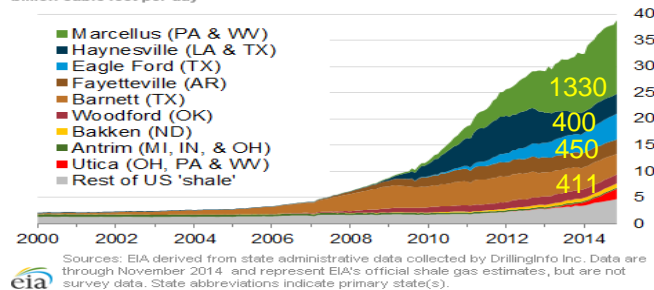
160 Bcm (5650Bcf)?

$$160 \times 50\% = 80 \text{Bcm (2825Bcf)}$$

China shale gas recoverable
resources(Tcm)



Monthly dry shale gas production
billion cubic feet per day



2. Shale gas industrial policy

Key policys for shale gas industry

| Policies and Regulations | Policy Giver | Issue Date |
|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|----------------|
| Notice about the work of strengthening shale gas resources prospecting & exploitation and supervision | Ministry of Land and Resources (MLR) | December, 2011 |
| Notice about shale gas development and utilization of subsidy policy | Ministry of Finance (MF) and National Energy Administration (NEA) | November, 2012 |
| Shale gas industrial policy | National Energy Administration (NEA) | October, 2013 |

● Exploration and extraction rights

- ◆ An individual mineral
- ◆ One of the 172 minerals
- ◆ Ministry of Land and Resources
- ◆ December 2011

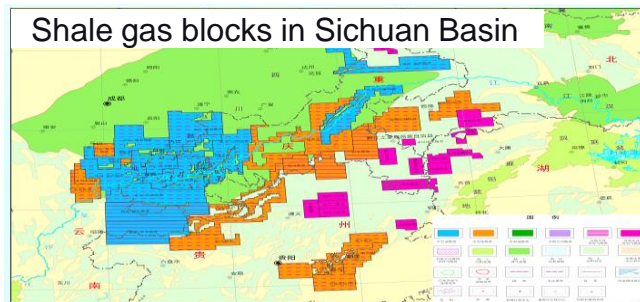
Exploration or extraction rights

- ◆ Can be gotten by bidding in no mining right area
- ◆ Additional right should be applied for in oil & gas blocks



Notice about the work of strengthening shale gas resources prospecting & exploitation and supervision

- ◆ Two rounds of shale gas exploration right bidding
- ◆ 21 shale gas bidding blocks
- ◆ 33 additional shale gas right blocks

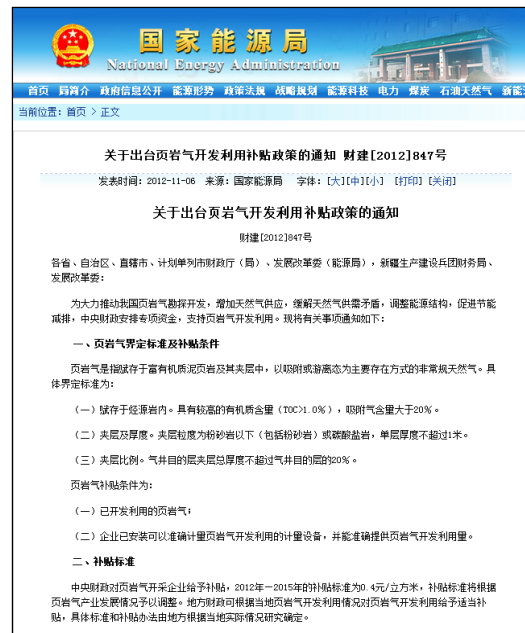


Shale gas exploration blocks, China

| Shale gas mining right | No. | Area (km ²) | Location |
|---------------------------------------------|-----|-------------------------|----------------------------------------------------------------------|
| Apply for additional shale gas mining right | 33 | 146258.38 | The sichuan basin and its peripheral ordos basin |
| The first round of bidding | 2 | 4236.81 | Chongqing, Guizhou, Hunan |
| The second round of bidding | 19 | 19504.81 | Chongqing, Guizhou, Hunan, Hubei, Jiangxi, Zhejiang |
| Total | 54 | 170000 | Chongqing, Hunan, Hubei, Guizhou, Jiangxi, Zhejiang, Shanxi, Sichuan |

Financial subsidies

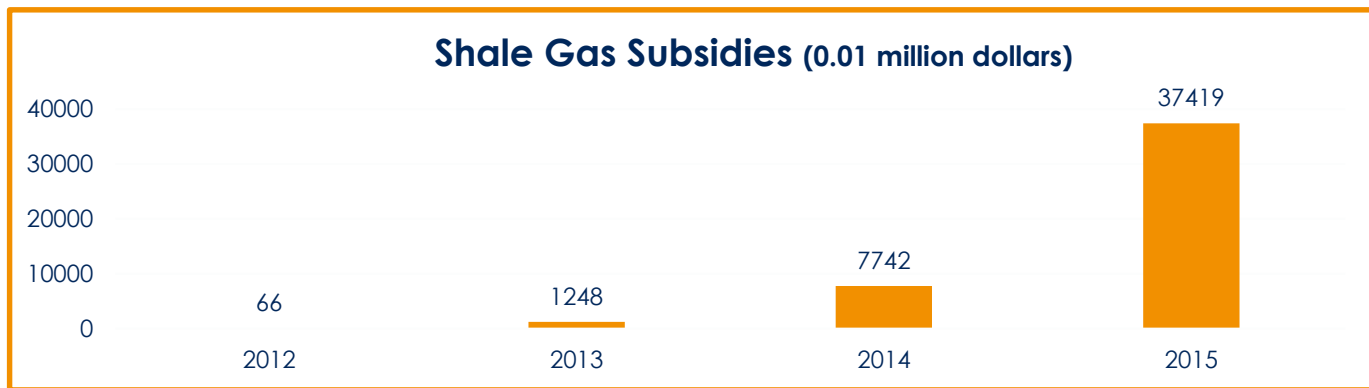
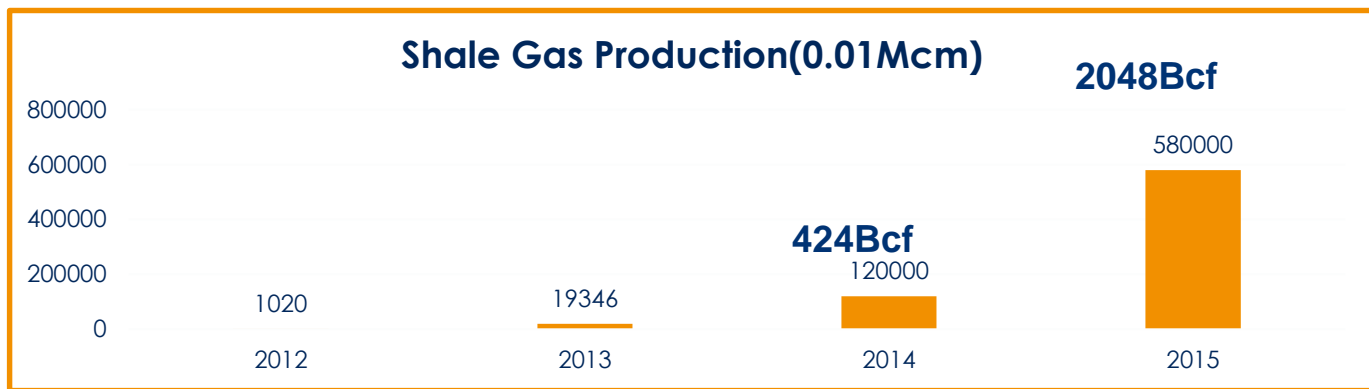
- ◆ 0.4 RMB/m³ (1.83 dollar/Mbtu) financial subsidies
- ◆ Gas produced in 2012-2015
- ◆ Ministry of Finance and National Energy Administration
- ◆ November, 2012.



Notice about shale gas development
and utilization of subsidy policy

Conditions for financial subsidies:

- ◆ Gas Produced from shale reservoir with TOC > 1.0 %
- ◆ Interbedded formation ratio < 20 %
- ◆ Single interbedded formation (such as sandstone or limestone) < 1 m
- ◆ The shale gas should have been produced and utilized
- ◆ The shale gas should have been metered accurately



3. Technology research projects

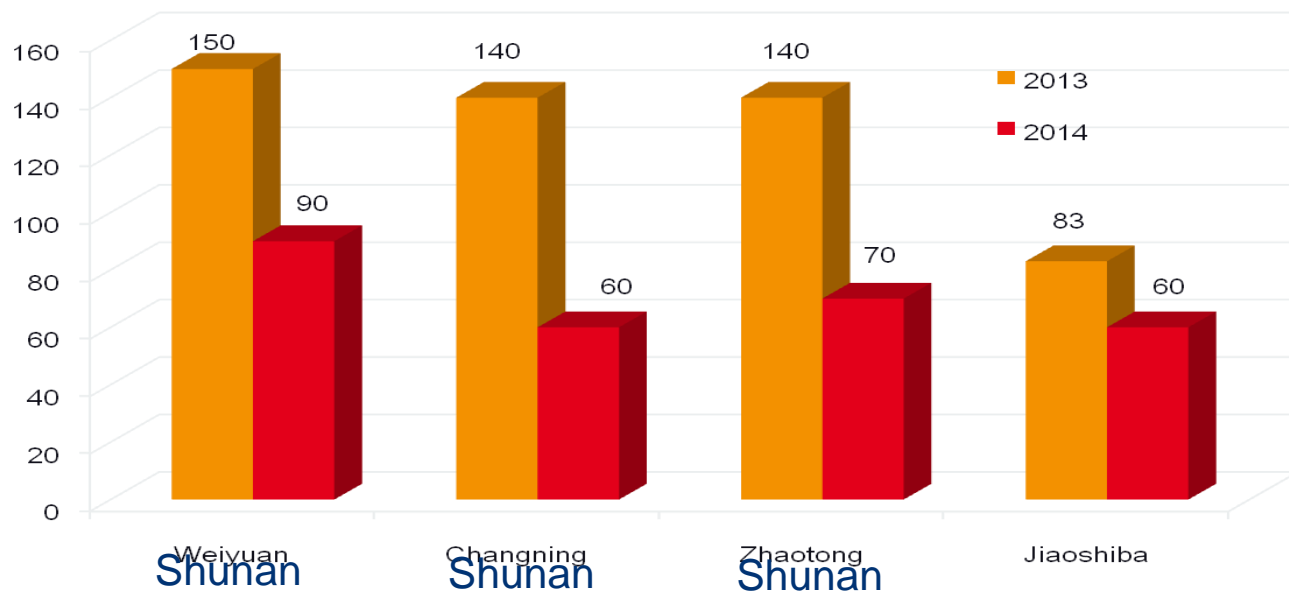
- ◆ National key project: “Critical techniques for shale gas exploration and development (2010)”
- ◆ National basic research plan (973): “Southern Paleozoic shale gas resource potential accumulation mechanism and evaluation (2012)” and “Basic research on Southern marine shale gas development (2013)”

H2 shale gas pad



◆ Drilling cycle

2013-2014 Shale gas well drilling cycle



OUTLINE

1

Shale gas policies in China

2

Case study of typical shale gas well

3

Prospect of shale gas subsidies

1. Typical well without subsidies

Economic analysis of typical well with well cost 700 million RMB

| Parameters | Economic analysis | | |
|------------------------------------------------|-------------------|-------------|-------------|
| Initial gas producing rate (Mcm/d) (MMcf/d) | 20 (7.1) | 15 (5.3) | 10 (3.5) |
| EUR (Bcm) (Bcf) | 0.139 (4.9) | 0.11 (3.9) | 0.089 (3.1) |
| horizontal segment (m) | 1500 | 1500 | 1500 |
| Well cost (million RMB) (million dollars) | 700 (112.9) | 700 (112.9) | 700 (112.9) |
| Price (RMB/m ³) (dollars/Btu) | 1.6 (7.3) | 1.6 (7.3) | 1.6 (7.3) |
| NPV (million RMB) | 24.87 | 1.01 | -7.89 |
| IRR (%) | 22.75 | 12.13 | 4.42 |

Economic analysis of typical well with well cost 600 million RMB (96.8 million dollars)

| Parameters | Economic analysis | | |
|------------------------------------------------|-------------------|------------|-------------|
| Initial gas producing rate (Mcm/d) (MMcf/d) | 20 (7.1) | 15 (5.3) | 10 (3.5) |
| EUR (Bcm) (Bcf) | 0.139 (4.9) | 0.11 (3.9) | 0.089 (3.1) |
| Horizontal segment (m) | 1500 | 1500 | 1500 |
| Well cost (million RMB) (Million dollars) | 600 (96.8) | 600 (96.8) | 600 (96.8) |
| Price (RMB/m ³) (Dollars/Btu) | 1.6 (7.3) | 1.6 (7.3) | 1.6 (7.3) |
| NPV (Million RMB) | 24.87 | 16.68 | 1.71 |
| IRR (%) | 34.51 | 19.57 | 9.28 |

2. Typical well with 0.4RMB/m³ subsidies in 2014-2015

Economic analysis of typical well with 0.4RMB/m³ subsidies in 2014-2015

| Parameters | Economic analysis | | |
|------------------------------------------------|-------------------|------------|------------|
| Initial gas producing rate (Mcm/d) (MMcf/d) | 20(7.1) | 15(5.3) | 10(3.5) |
| EUR (Bcm) (Bcf) | 0.139(4.9) | 0.11(3.9) | 0.089(3.1) |
| horizontal segment (m) | 1500 | 1500 | 1500 |
| Well cost (Million RMB) (Million dollars) | 700(112.9) | 700(112.9) | 700(112.9) |
| Price (RMB/m ³) (Dollars/Btu) | 1.6(7.3) | 1.6(7.3) | 1.6(7.3) |
| NPV (Million RMB) | 39.46 | 19.22 | 1.24 |
| IRR (%) | 41.62 | 21.61 | 8.93 |

OUTLINE

1

Shale gas policies in China

2

Case study of typical shale gas well

3

Prospect of shale gas subsidies

China government is full of confidence with shale gas development

“Action Plan for Accelerating exploration & Development of Shale Gas (NEA,2014) ” : 30-50 Bcm (1059-1765Bcf) shale gas will be produced in 2020 and 80-100 Bcm (2825-3531Bcf) in 2030.

Shale gas subsidy policy will last at least till 2020





Thanks for your attention!



Acknowledgement

- ◆ Thanks to our company CNPC for supporting us on this paper.
- ◆ Thanks to my working team for their great job.

Contact Information

- ◆ Name: Qun Zhao
- ◆ Tel: (+86)13784814420
- ◆ E-mail: zhaoqun69@petrochina.com.cn