The Long and Winding Road Ahead

Shale Gas Development in China

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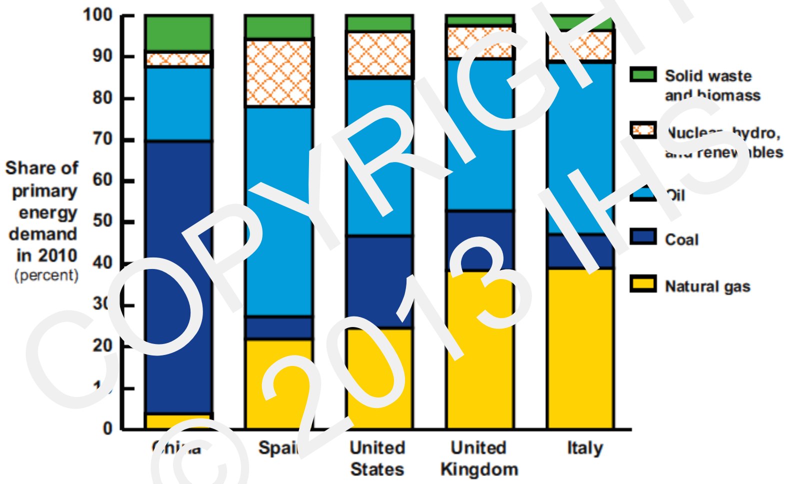
Key Implications

- China's natural gas market is supply constrained. Additional supply sources are required to meet the pent-up demand.
- With large resource potential, shale gas will become a key domestic gas source in the long run.
- Geological differences mean that cost in China will likely be higher than that of North America, but some play areas will see highly competitive shale gas being produced.
- A variety of subsurface and above-ground risks will likely push back the timing of China's "shale gale" until the 2020s.

China Needs More Natural Gas



Source: IHS CERA,

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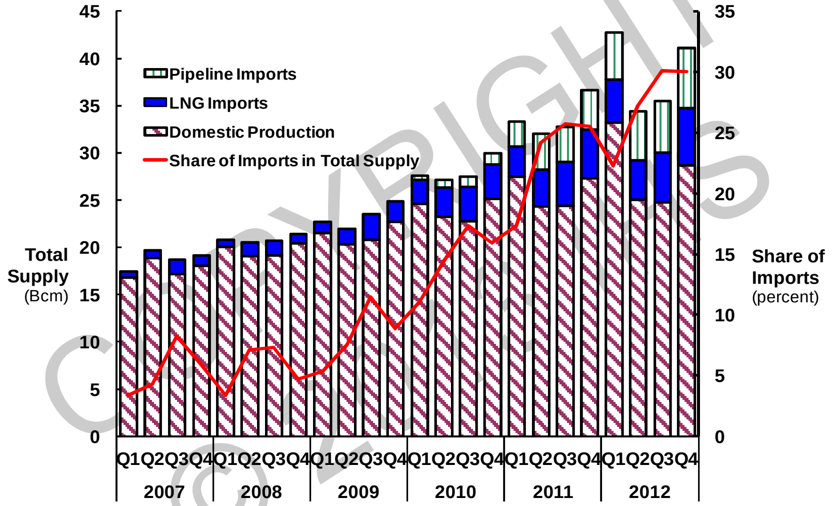
Strong Desire to Find Additional Gas Supply



Sources: IHS CERA, China Customs.
Note: Q3 2012 data are estimated.

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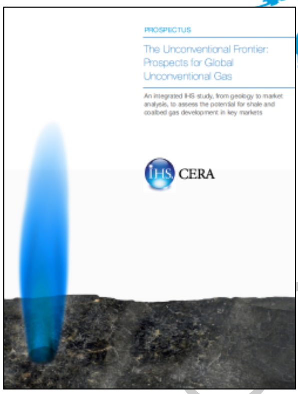
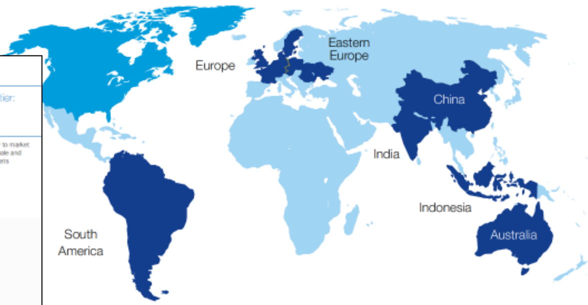
IHS CERA's Research on Unconventional Gas Resources outside North America

The *Unconventional Frontier* Study applies consistent database, analytical framework and research teams across the globe.





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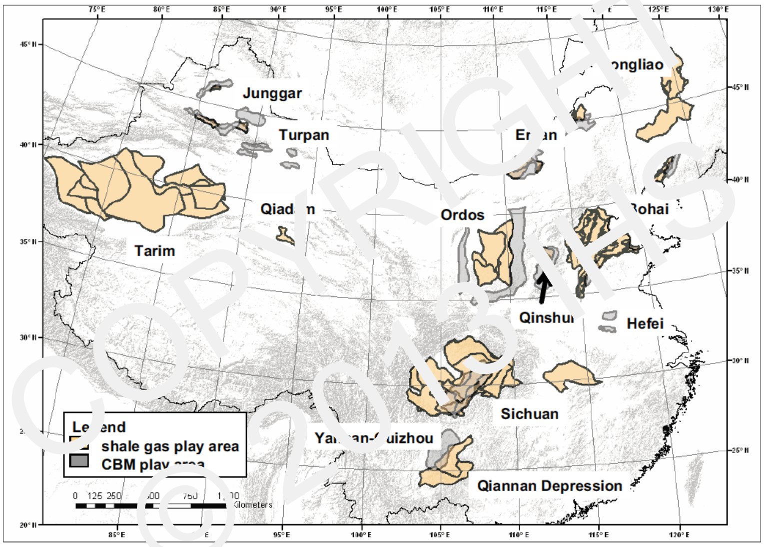
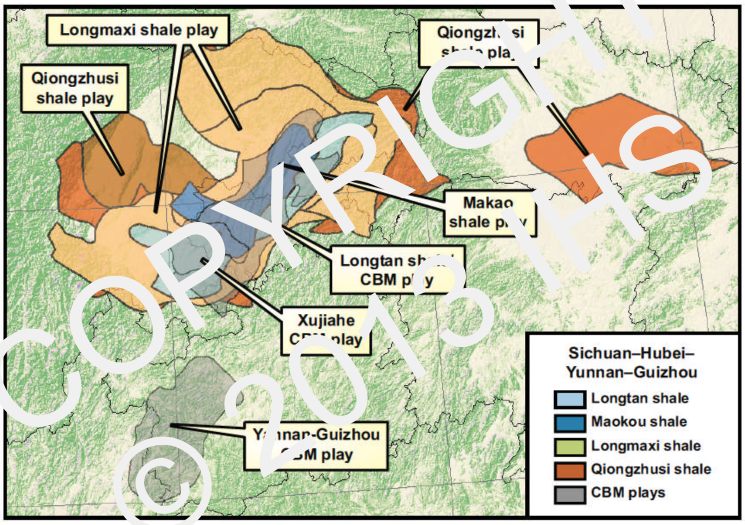
Geological Potential Assessment

Distribution of China's Unconventional Gas Resources



Source: IHS CERA.

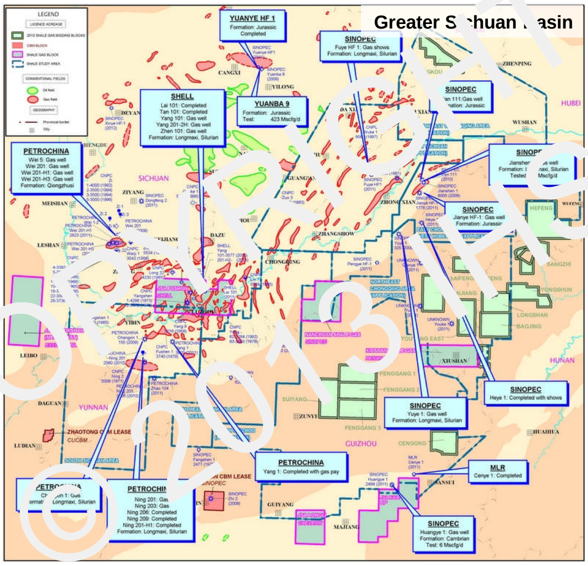
Example: Key Play Areas in the Sichuan Basin



Source: IHS CERA.

Challenges Facing Shale Gas Development in China

Exploration Activities Have Accelerated



Sources: IHS CERA, IHS IRIS21 database.
Data as of October 2012

Comparison of Select Aboveground Factors (US/China)

	United States	China
Mineral Rights	Linked to property ownership	Nationally owned
Upstream Pricing	Market-based	Regulated
Pipeline Access	Fair/open access with transparent tariff structure; integrated pipeline network	Fair/open access rule yet to be implemented; coverage area to be expanded.
Investors	Hundreds of companies investing, innovating, and competing with each other	Limited participation of non-NOC players (with some gradual liberalization)

Source: IHS CERA

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The Supply Constraint: Multiple Supply Sources Entering the Market but Pricing Mechanism Remains Unclear

Source: IHS CERA

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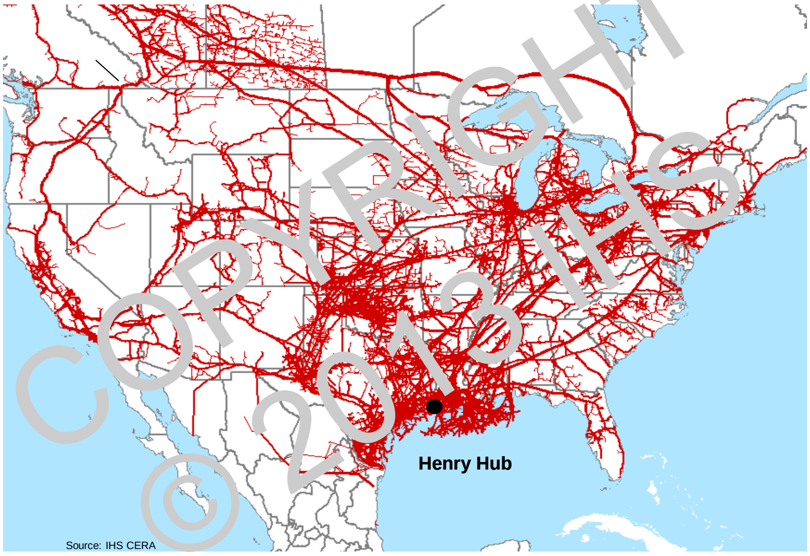
An Integrated Continental Pipeline Network in North America



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Significant Learning Time Required for New Entrants

Results from China's second shale gas lease tendering process

Power companies:
- China Huadian Corporation (SOE)
- Chongqing Energy Investment Co. (SOE, Local)
- Tongren Energy Investment Co. (SOE, Local)
- State Development & Investment Corporation (SOE)
- Anhui Energy Group (SOE, Local)
- State Development and Investment Co. (SOE)

Mining companies:
- China Coal Geology Engineering Corporation (SOE)
- Shanxi Huayin Energy (Private company)
- Henan Provincial Geo-exploration and Mineral Development (SOE, Local)
- Chongqing Mineral Resource Investment Co. (SOE, Local)
- Shenhua Geological Exploration Co. (SOE)

Energy trading company:
- Beijing Titan Tongyuan Natural Gas Resource (Private company)

City gas company:
- Jiangxi Natural Gas Co. (SOE, Local)

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