

The Future Role of Gas in China

Dr. Alec Waterworth
Prof. Mike Bradshaw

Introduction

- What will happen to China's gas consumption?
 - The level of demand required by national energy policy
 - The level of domestic production (conventional & unconventional)
 - The level of pipeline imports secured
 - The level of LNG imports required to balance supply and demand

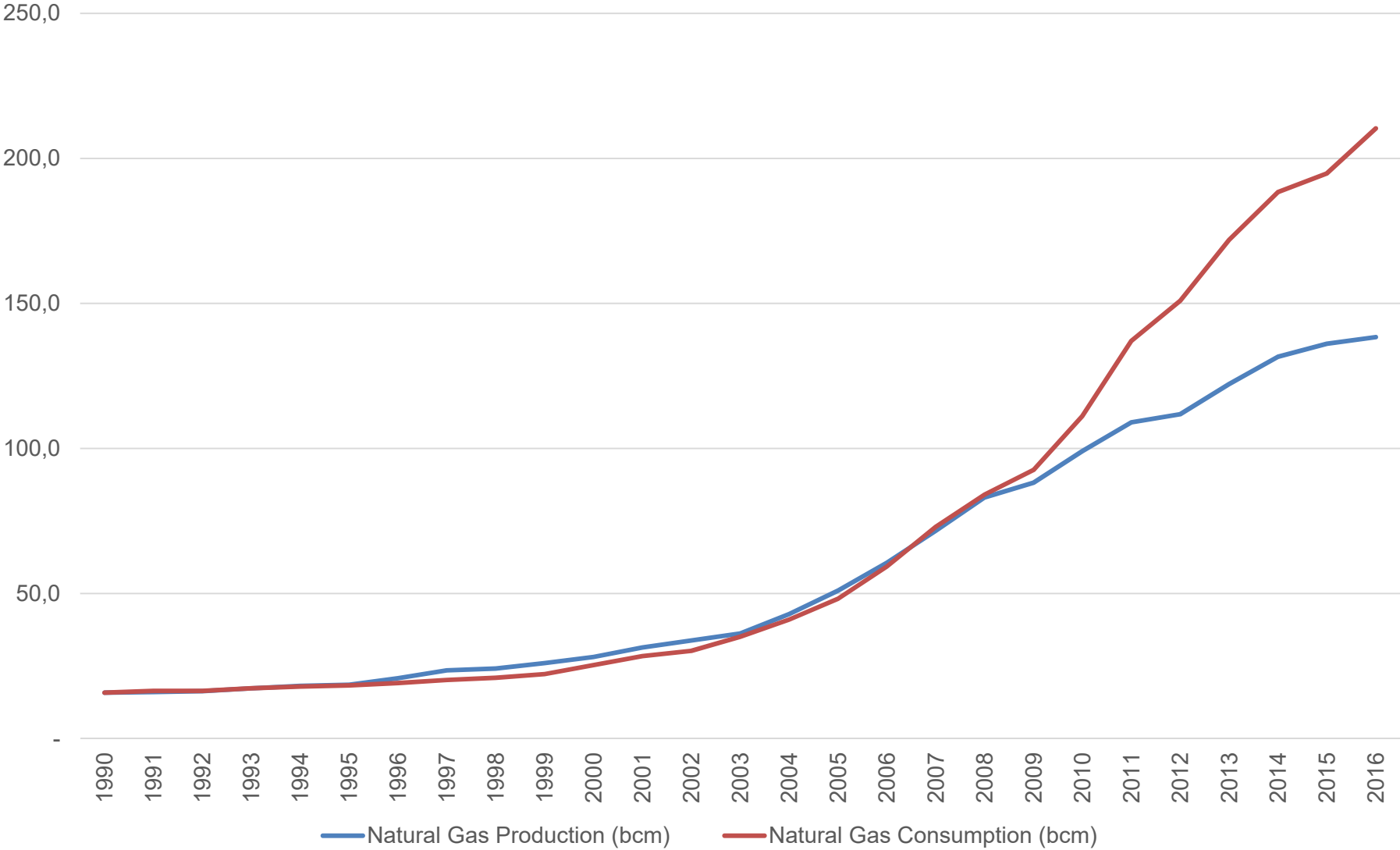
Domestic demand growth

- Gas growth and coal decline over last decade
 - In 2015: 64% from coal (down from 72.4% in 2005); natural gas was 5.9% (2.4% in 2011)
- Rapid growth in gas consumption 2003-2014 ('golden age of gas')
- China remains largest consumer and producer of coal
- Ambitious targets for the future:
 - EDSAP (2014-2020) outlines gas in energy mix will increase to 10% by 2020, coal's share to under 62%
 - Further supported in 13th FYP
 - Experts predict gas consumption will double from 2015 levels by 2020; China will contribute 38% of global gas demand growth to 2022

Domestic demand growth

- Driven (in part) by government mandate to improve air quality and lower CO₂ emissions
 - Record levels of pollution in cities
 - 1m deaths in 2015; 1.5m in 2040
 - Increasing environmental awareness of population (particularly in coastal regions)
 - Paris agreement: peak CO₂ emissions by 2030
 - Air quality is driving change; CO₂ abatement is co-benefit
- Key sectors:
 - Industry: primary contributor to gas growth; small-scale industries; broader substitution remains cost and supply prohibitive
 - Residential/Commercial: price sensitivity; growth from urbanisation
 - Power: 65% coal, 3% gas; some new gas plants in coastal regions; cost prohibitive and perception of gas as 'transitional'
 - Transport: strongest sector for growth (EIA), NGVs (policy support, retrofitting vs. access, cost and challenge of NEVs)

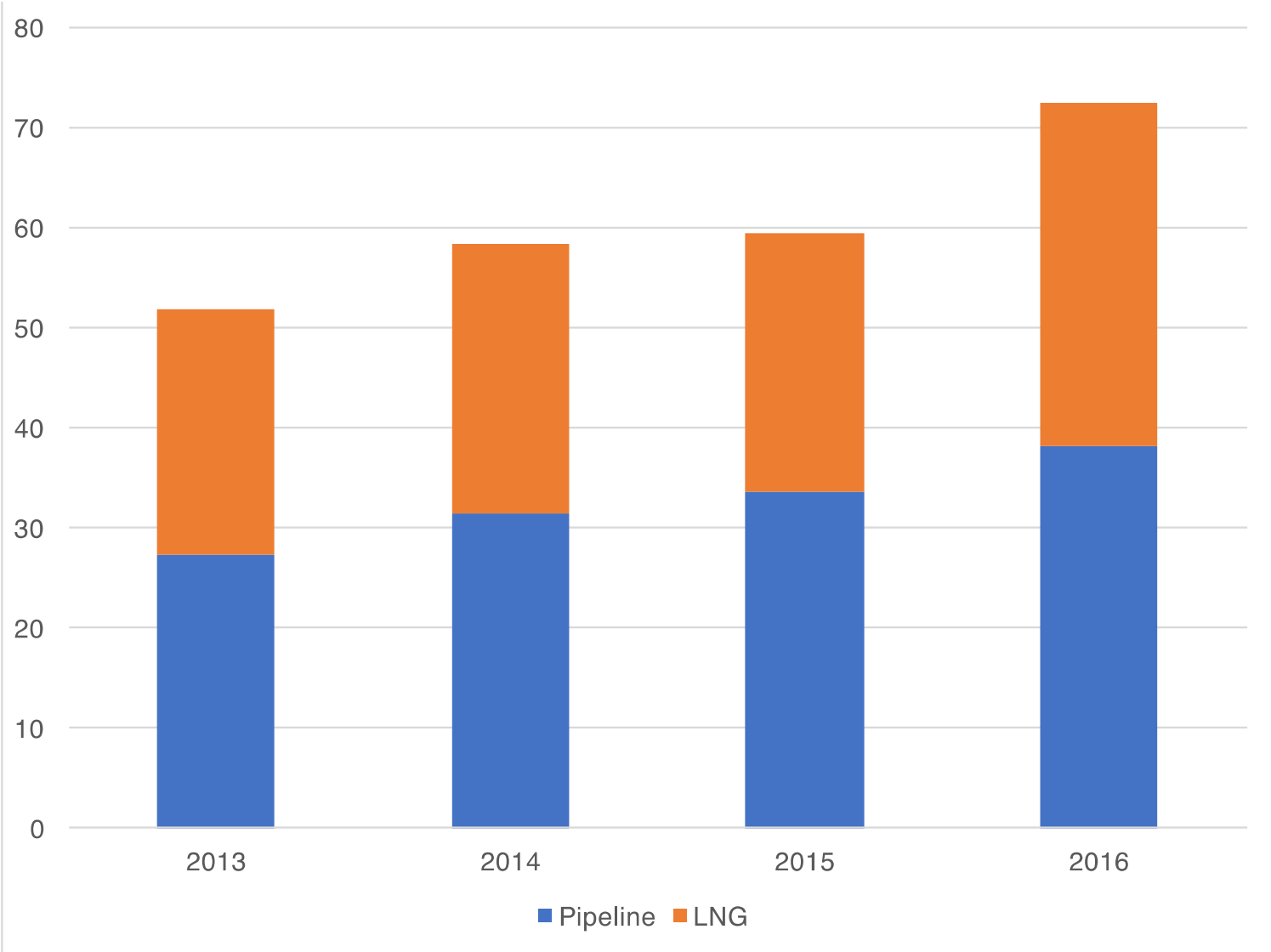
China's Domestic Production and Consumption



China's domestic production

- Primarily tight gas, with some coal-bed methane and shale; offshore is modest, accounting for less than 10% of domestic production
- 13th FYP identifies need to increase domestic production
 - 60% of gas needs to be met by domestic production by 2020
 - 2nd largest shale producer by 2040 (EIA)
- Private investment to increase with market liberalisation
 - BP partnership with CNPC
- Challenges: low production rates, unfavourable geology, technology level in the field, operations inefficiencies, cost inflation

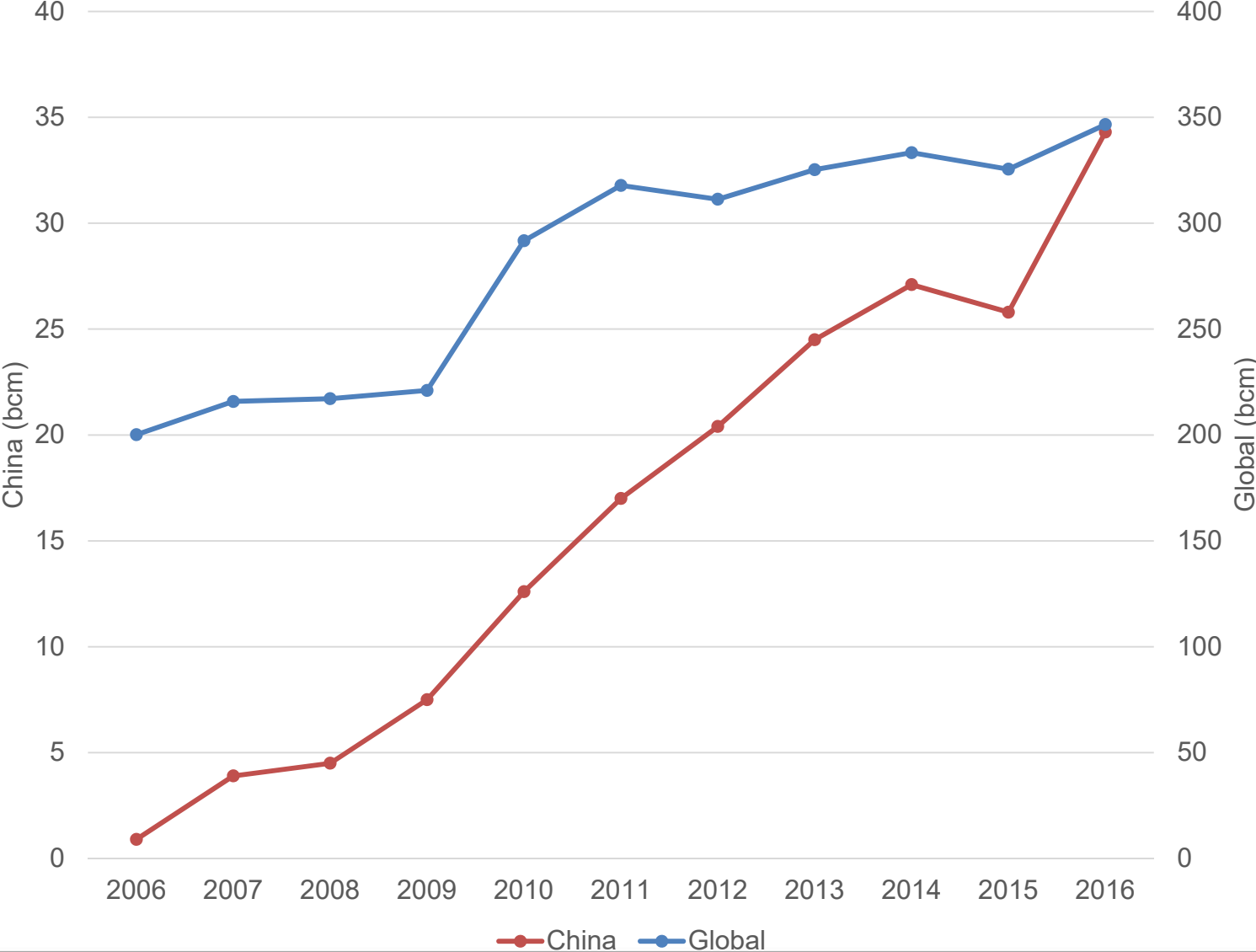
China's Gas Imports



China's pipeline imports

- Central Asia-China pipeline: primarily Turkmenistan, also Uzbekistan and Kazakhstan
 - 3 lines - 55bcm/year, operating at 60% capacity
 - Construction of Line D (additional 30 bcm/year) indefinitely suspended
- Geopolitical aversion to LNG
- 'Power of Siberia' w/ Russia
 - US\$70bn pipeline between Russia's far east and Northern China – 38bcm/year; first volumes expected in 2020
 - Power of Siberia-2 (or Altai) pipeline (30 bcm/year) discussed but stalled
 - Further options with Russia (inc. Vladivostok from Sakhalin)
 - Russia is hopeful of long-term strategic gas trade relationship; for China, deal is more geopolitical than economic

LNG Imports



China's LNG imports

- LNG import growth of 33% in 2016
 - To continue: 34 bcm/year in 2016; 77 bcm/year in 2022 (IEA)
- Over-contracted: may mitigate by further postponing 2nd Russia pipeline and/or reducing C. Asia pipeline imports
- Spot trading increased 20% in 2016
 - Will continue as long-term contracts expire and new players join the marketplace
 - Part of global trend of increased flexibility
- Heavy investment in LNG capacity (regasification 68 bcm in 2016; potential to increase to 145 bcm in 2023)
 - 13 terminals, 6 under construction
- Private investment increasing (liberalisation)
 - Private imports, private terminals and infrastructure, open-access

Conclusions

- The future is uncertain...
 - Possibility of 2nd golden age of gas
 - Several important opportunities to grow gas in key sectors
- Gas faces significant challenges, greatest of which is cost vs. coal and oil alternatives
 - Will require governmental intervention to incentivise switch on consumption side
- On the commercial side, liberalisation is key to attaining much-needed private investment to enhance domestic production and transmission
- Spot/short-term traded LNG will balance the market – global implications