



APERC Workshop at EWG53
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2-1. Natural Gas Utilization in APEC

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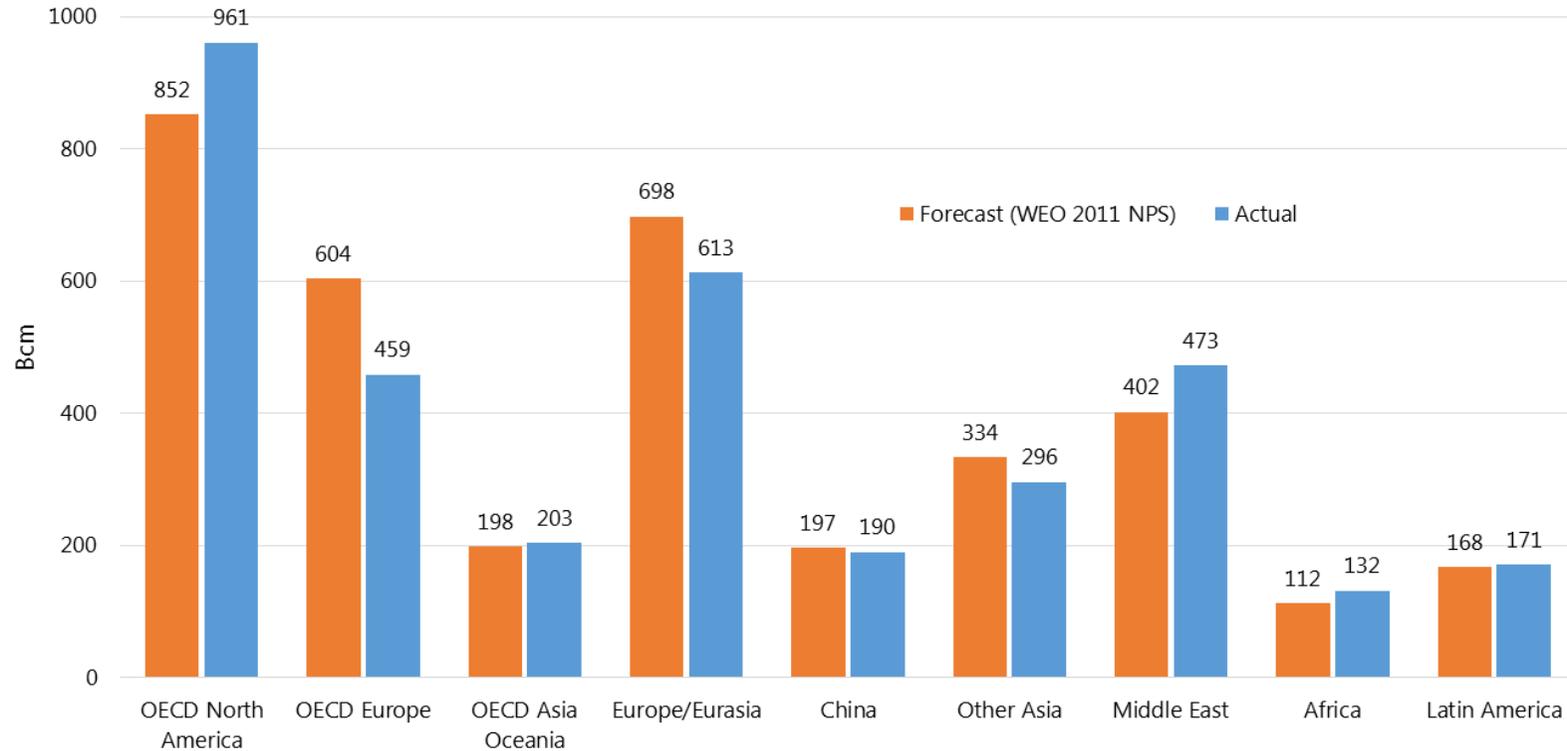
Research overview

- **Background**
 - Objective of the study
 - Why hasn't "Golden Age of Gas" been realized.. yet?
- **Challenges in expanding gas utilization**
- **Gas utilization in major consuming economies: What has been done and what should be done?**
 - Case study -1: China
 - Case study -2: United Kingdom
 - Case study -3: Japan
 - Case study -4: Indonesia
 - Case study -5: Vietnam
 - Case study -6: Chile
- **Conclusions and policy implications**

Objective of the study

Defining "Golden Age of Gas":

Forecast and actual demand in the "Golden Age of Gas" scenario in 2015



Source: IEA (2011) and Cedigaz (2016)

"Golden Age of Gas" happened in OECD North America and Middle East, but lags in other regions

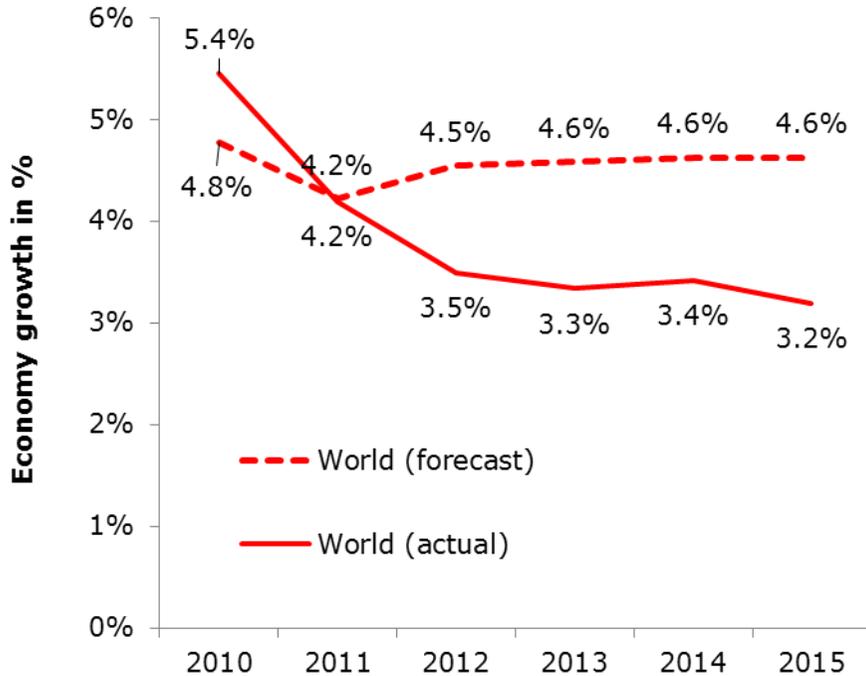
Why hasn't "Golden Age of Gas" been realized...Yet?

Six factors have worked against the gas utilization:

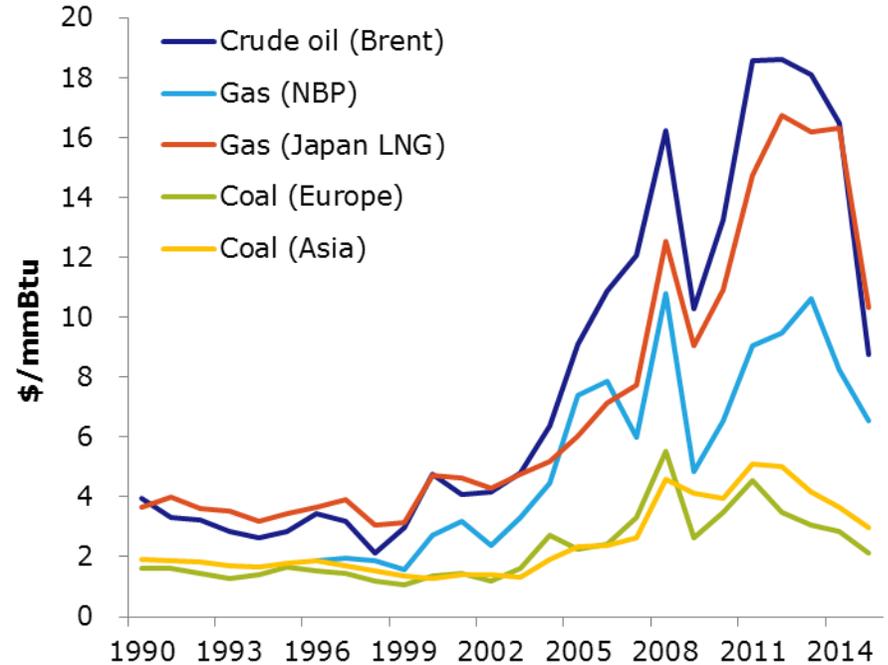
- **Slower than expected economic growth**
- **Relative gas/coal economics**
- **Policy support for renewable energy sources**
- **Traditional LNG trading practices, including oil price-linked pricing formulas**
- **Lack of infrastructure and limited efforts by government**
- **Decline of domestic gas production**

Why hasn't "Golden Age of Gas" been realized...Yet?

Slower than expected economic growth and relative economics against coal



Source: IMF (2011) and (2015)



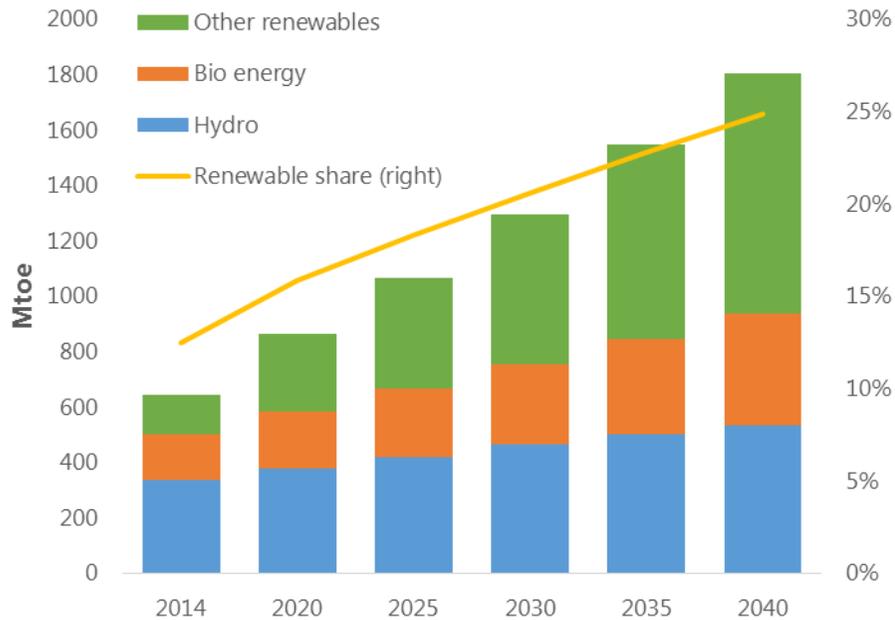
Source: IMF (2017)

Actual economic growth rates were not as high as initial expectations, while coal continues to be the preferred fuel because of resource abundances and cost

Why hasn't "Golden Age of Gas" been realized...Yet?

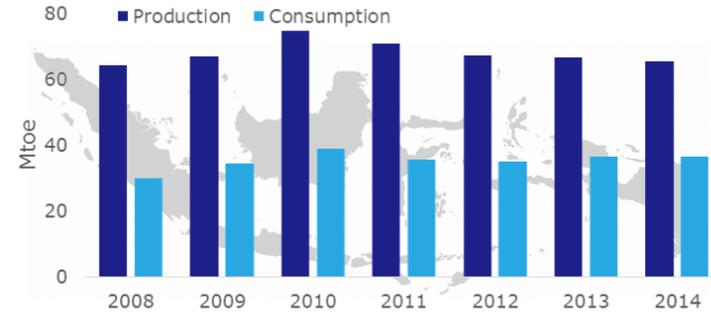
Renewable energy become top priority for many economies and reduced gas production

Projected share of renewable energy in global power generation

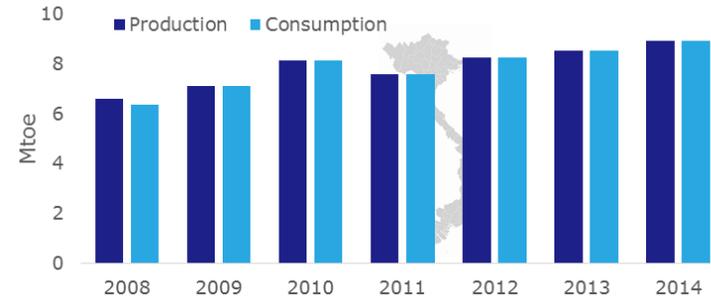


Source: IEA (2016)

Indonesia gas production and consumption



Viet Nam gas production and consumption

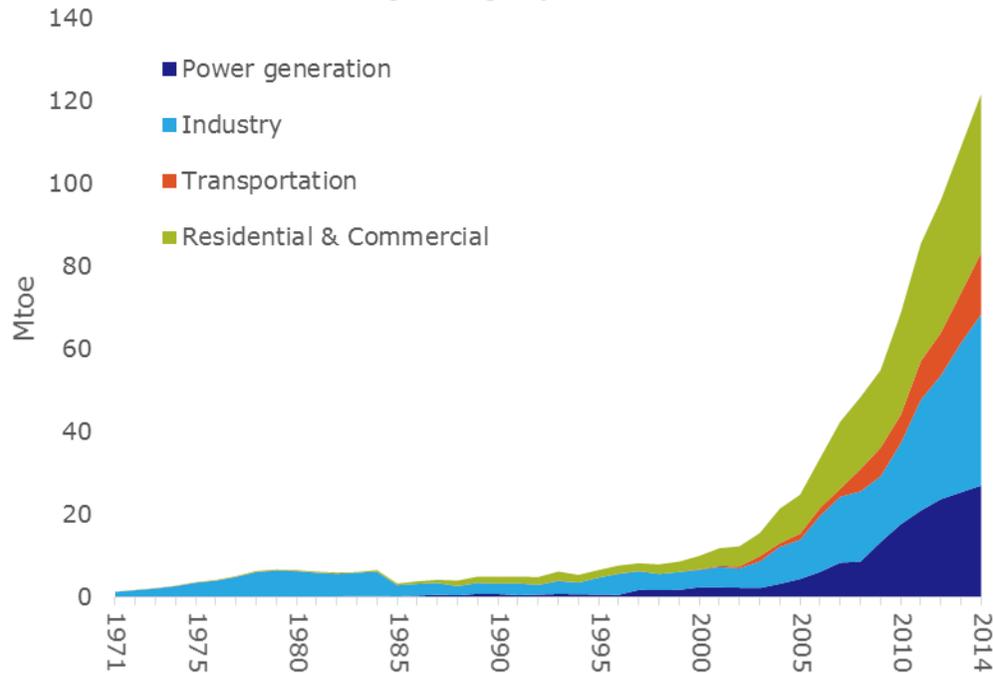


Competition from renewable energy, which is expected to fuel 25% of the world's power generation by 2040, and decline in gas production in some economies hampered gas growth

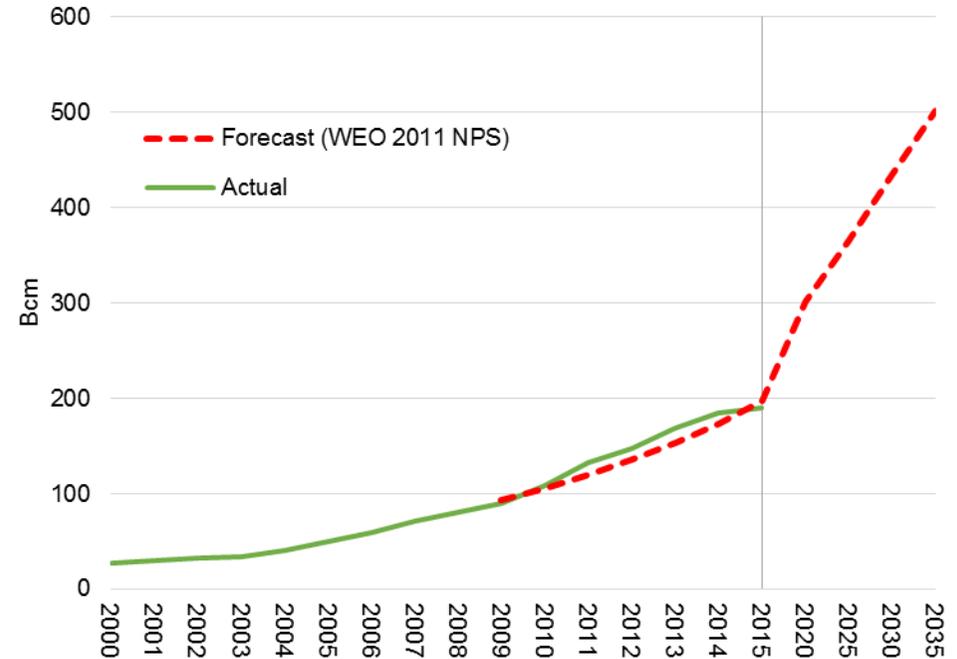
Case study 1: China

China has been directly and indirectly promoting gas usage

Natural gas usage by sector in China



Gas demand forecast as of FY 2010 and actual demand



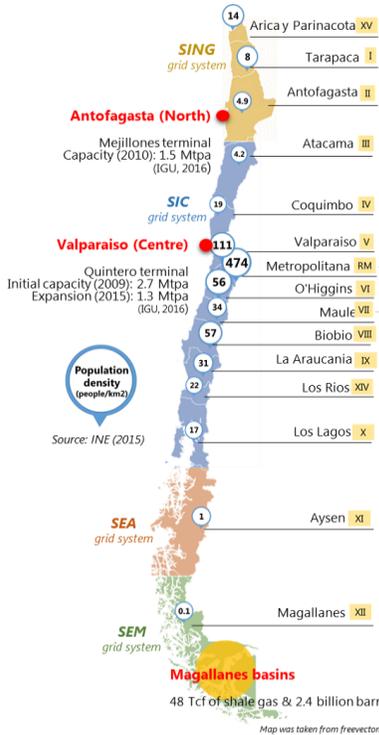
Source: IEA (2011 and 2016)

Gas market reform, domestic gas production (shale gas), and environmental policies will be crucial in improving gas demand growth in China

Case study 2: Chile

More potential for gas demand to support Chile's renewable energy target

Natural gas and firewood usage in residential sector

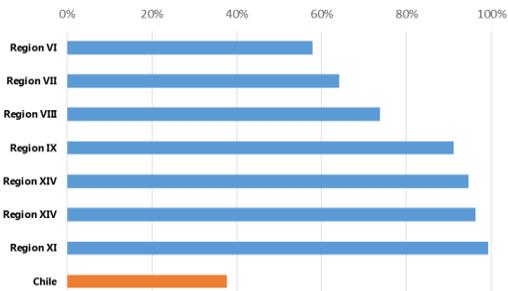


Natural Gas Residential Market, 2015

RM Region	
Natural gas potential users:	1,709,490
Gas grid capacity (residential)	767,568 65%
Actual users	498,978 29%
VIII region	
Natural gas potential users:	108,163
Gas grid capacity (residential)	66,115 47%
Actual users	30,922 29%

Source: Galetovic and Sanhueza (2015)

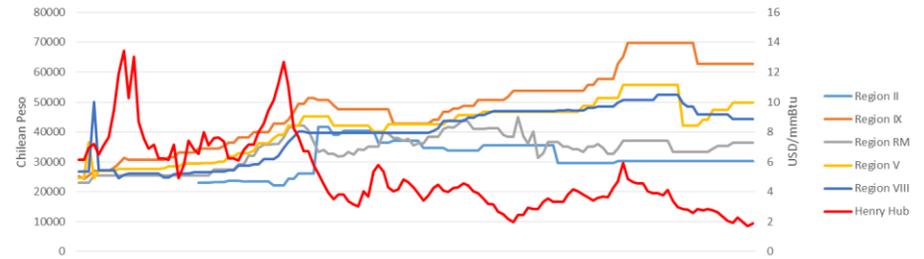
Firewood penetration in centre-south regions, 2015



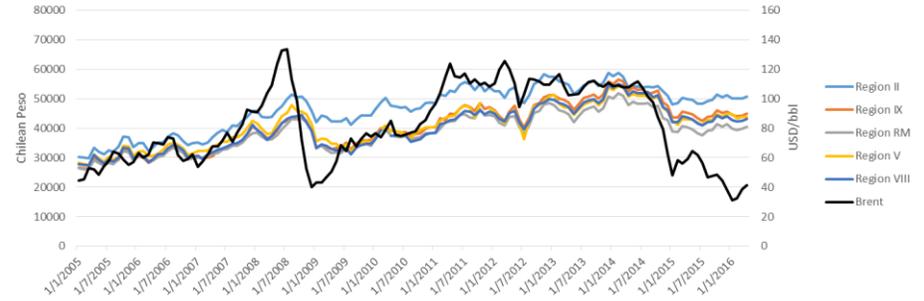
Source: MEC (2016), APERC Analysis

Price of natural gas and LPG in Chile

Natural gas price: residential vs benchmark



LPG price: residential vs benchmark

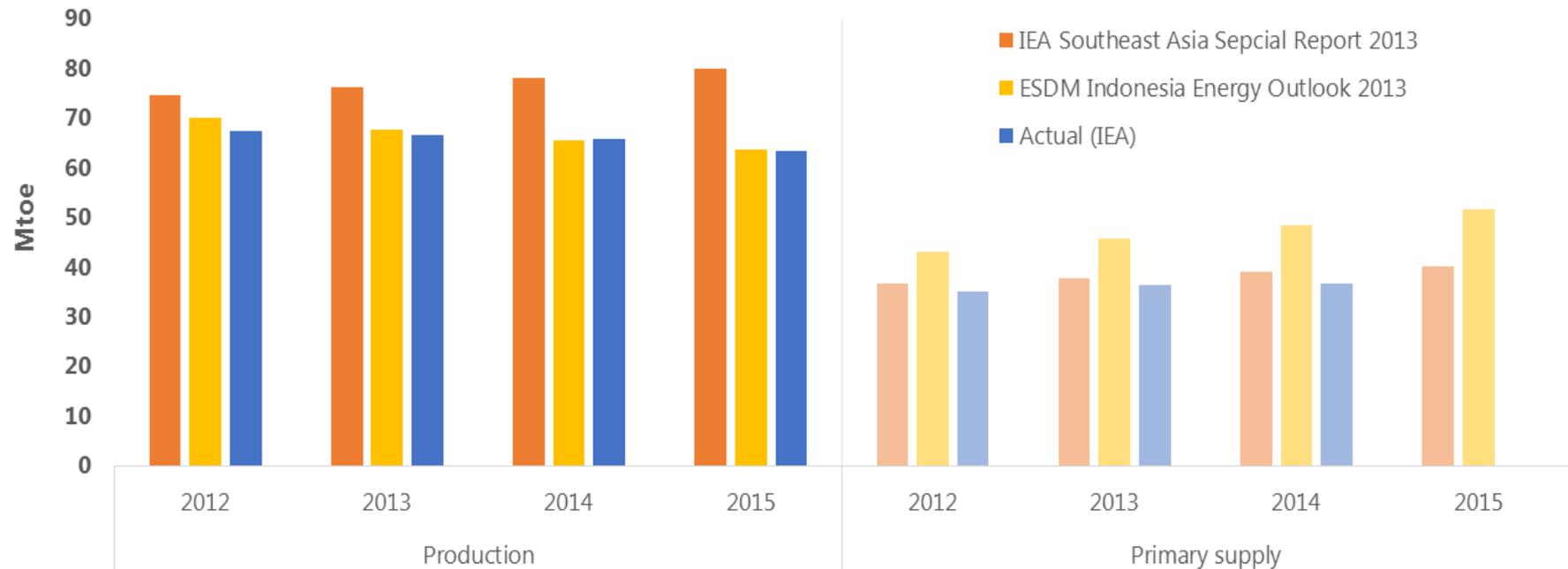


Source: CNE (2015) and APERC Analysis

Improving market oversight, building new infrastructure, and potential shale gas production may improve gas demand in the future

Case study 3: Indonesia

Indonesia has a huge potential to increase its own gas consumption



Source: IEA (2016), IEA (2013) and ESDM (2015)

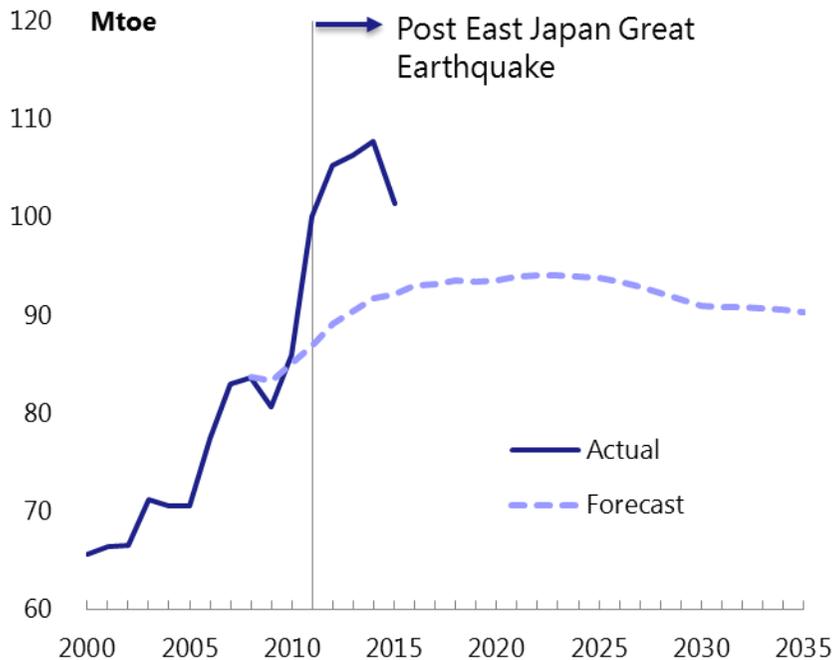
Economy uncertainties, cheap coal, high renewable targets, insufficient infrastructure, and depleting production contribute to lower gas demand

Note: Since IEA and ESDM reports do not provide yearly data in their publication, APERC used simple AAGR derived from the forecast to determine 2013-2015 data.

Case study 4: Japan

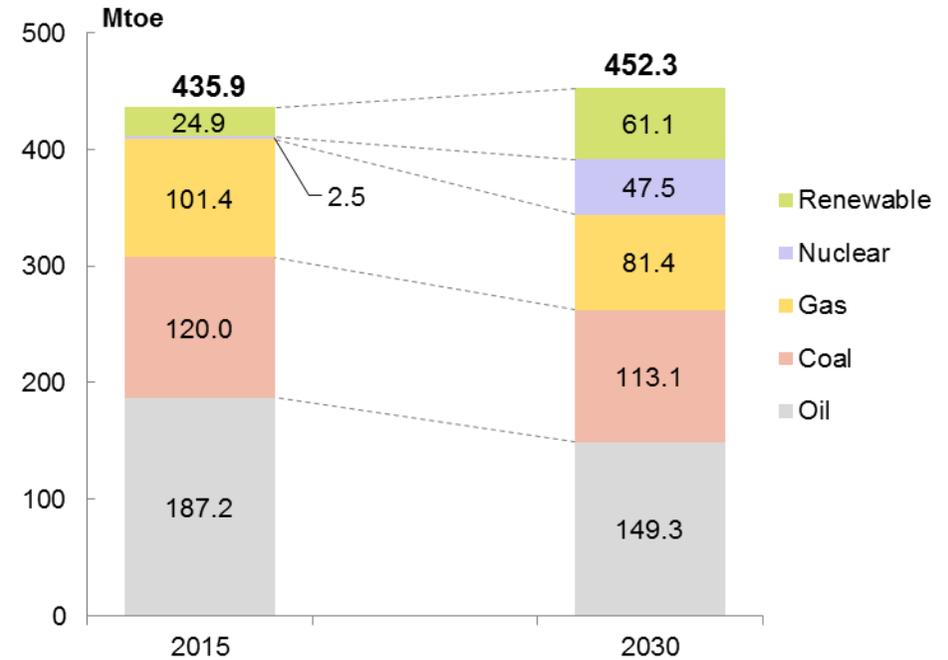
Gas usage in Japan is highly influenced by past events

Actual and forecast gas demand



Source: IEA (2016) and IEEJ (2010)

Long-Term Energy Supply and Demand Outlook

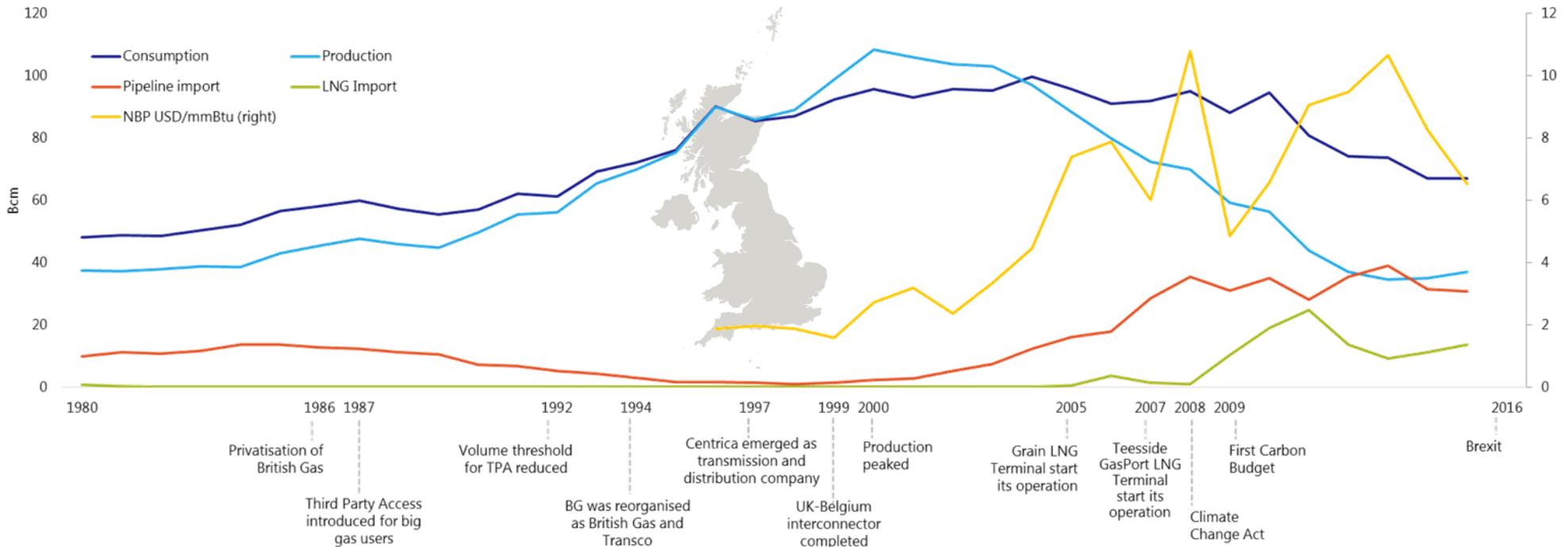


Source: IEA (2016), Ministry of Economy, Trade, and Industry (2015)

Lack of gas resources does not stop the government from providing a clear direction for future gas usage—transportation, power and residential

Case study 5: United Kingdom

Although gas demand declined in the UK, gas trade managed to sustain consumption

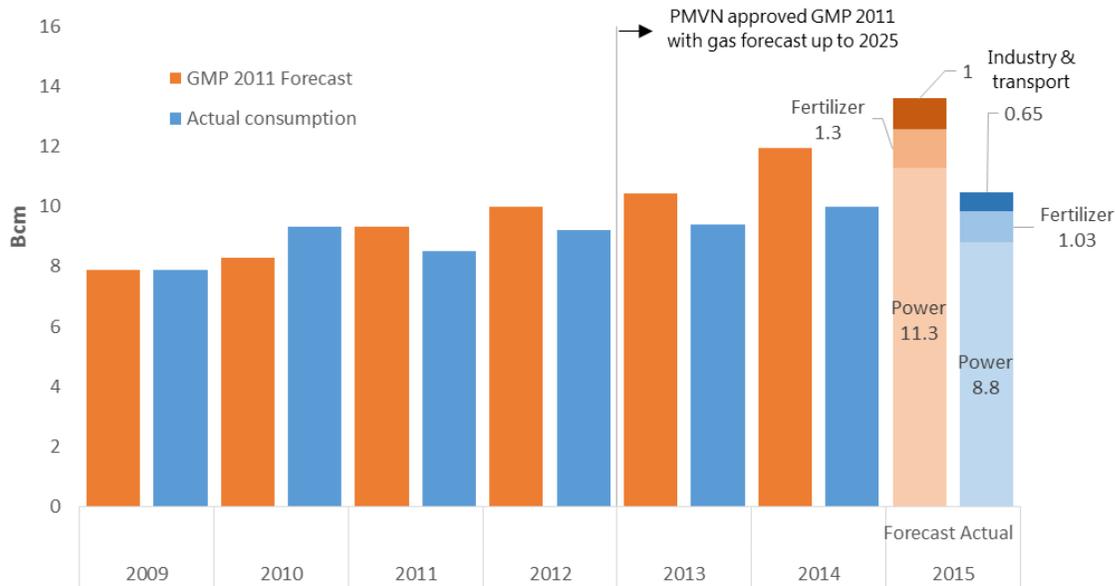


Source: Cedigaz (2016), BP (2016) and IEA (2008)

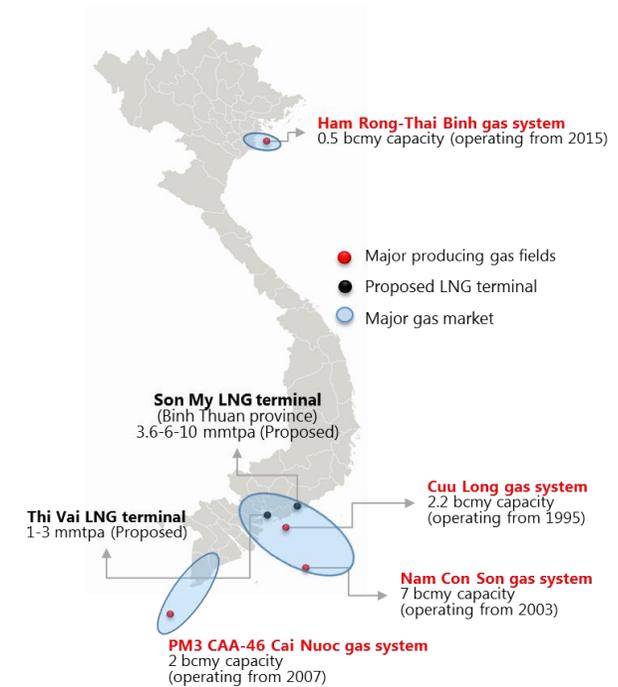
Although UK has a robust electricity market, high renewable shares in power generation and declining domestic gas production pushed gas demand lower

Case study 6: Viet Nam

Gas demand in Viet Nam is highly dependent to domestic production



Source: PMVN (2011) and PVGas (2012 & 2016)



Source: PVGas (2016b) and LNG World Shipping (2016)

Viet Nam, as one of the economies with the largest untapped gas reserves in the APEC region, has a huge potential to increase its own gas production and consumption

PMVN – Prime Minister of Viet Nam. GMP – Gas Master Plan

1. Clear commitments by the government

- Gasification cannot be realized without government commitments.
- Desired share of natural gas needs to be determined or a market needs to be developed where the benefits of natural gas can be properly recognized.
- Expected role for natural gas has to be specified.
- Government's commitment will facilitate financing investments by lowering investment risks.

2. Infrastructure development

- Gasification can be achieved by "supply-push."
- Government has a large role in facilitating development.
- Establishing a supply network is necessary to promote gasification for transportation use.

3. Reasonable pricing

- Oil price linked formula hurt development of demand in Asian emerging economies.
- Price benchmark based on gas vs. gas competition in Asia.
- Carbon pricing may be an option, but the policy should be carefully designed to realize the desired outcome.

4. Expansion of wellhead production

- Demand can be supply driven.
- Domestic upstream investments can be promoted through regulatory arrangements and introduction of foreign capital and expertise.



Thank you for your kind attention

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