



Potential Markets for Alaskan LNG

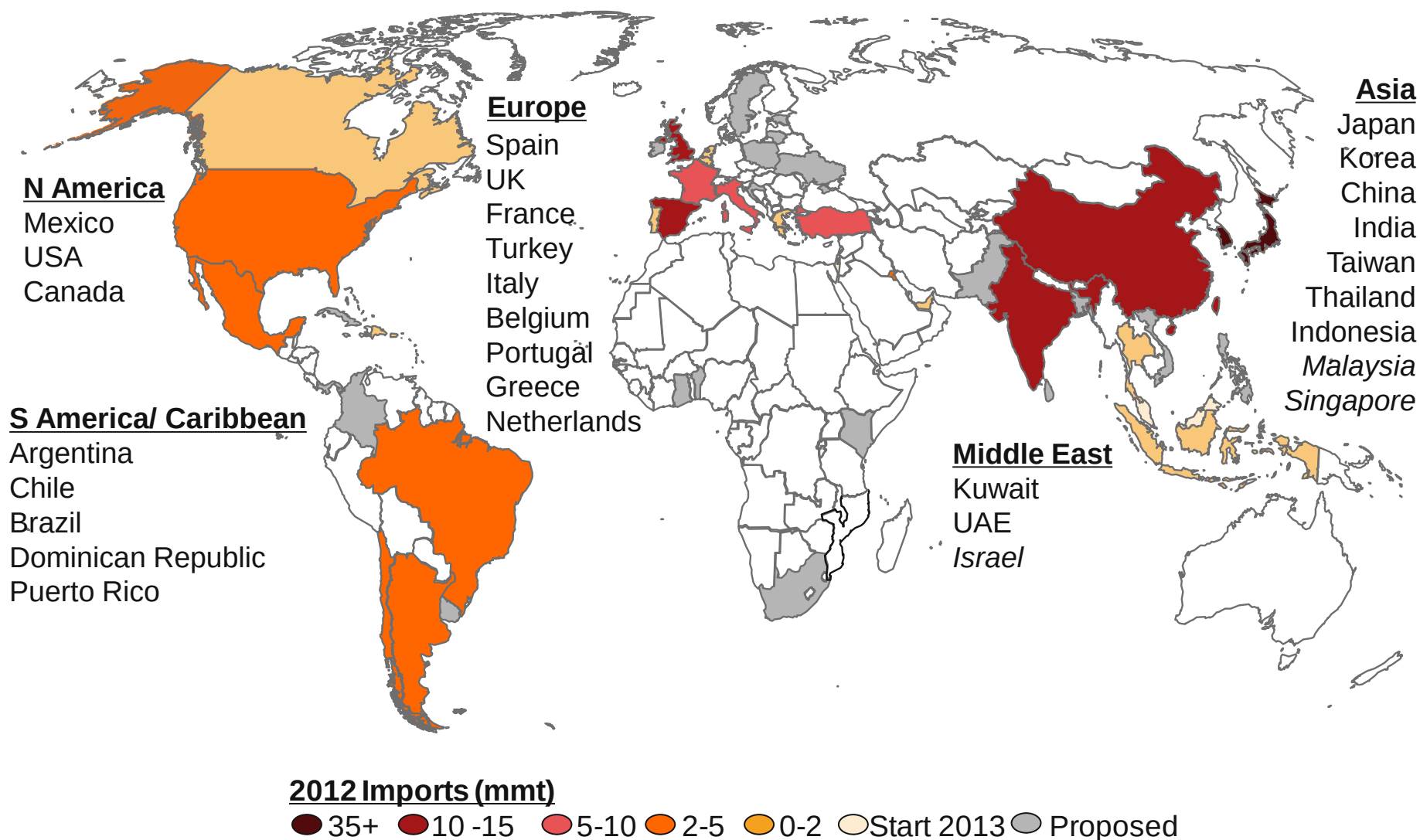
Anchorage, AK
August 5-9, 2013

North Slope Gas & LNG Symposium

Markets for Alaskan LNG

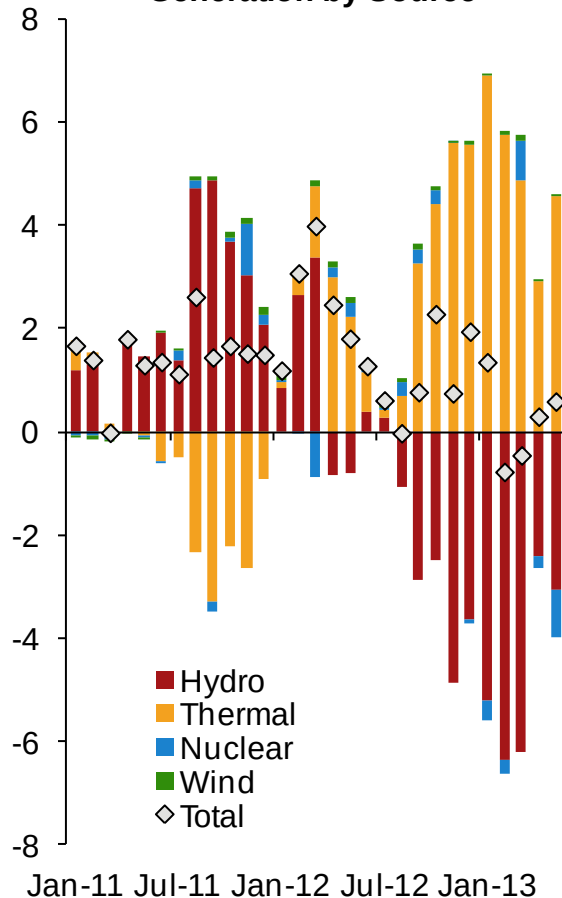
- Strong Growth From Most Regions
 - LNG driver different by market
- LNG Gaining in Popularity
 - Higher demand from existing markets
 - Numerous proposed markets
 - Floating Storage and Regasification Unit (FSRU) offers lower-cost solution
- Asia Will Be Target Market for Alaska
 - Geography
 - Market Size and Growth
- Opportunities Available Elsewhere, But More Limited
 - South America
 - Europe
 - Middle East and Africa

27 Importers (2012) and Counting



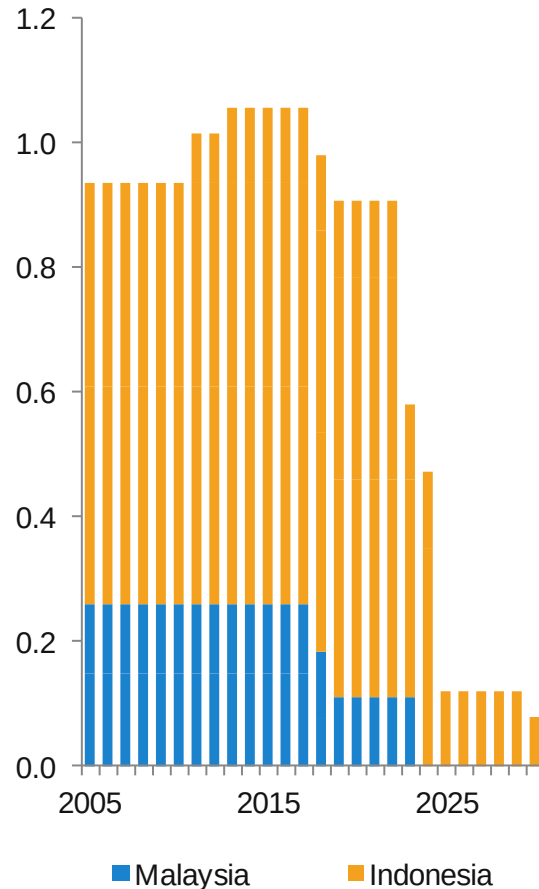
Why LNG? Three Examples

Brazil: Incremental Power Generation by Source



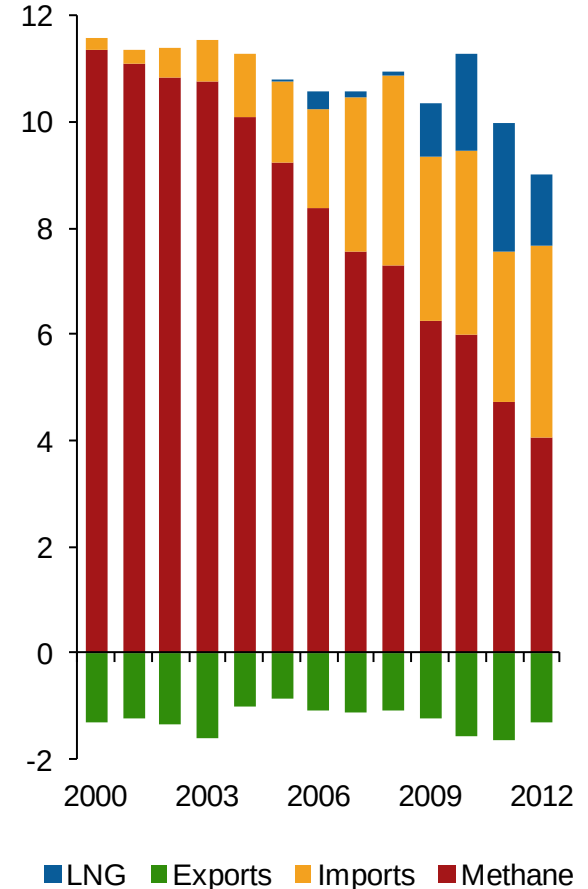
Brazil:
Offset Hydro

Singapore Gas Pipeline Contracts



Singapore:
Diversify Gas Supply

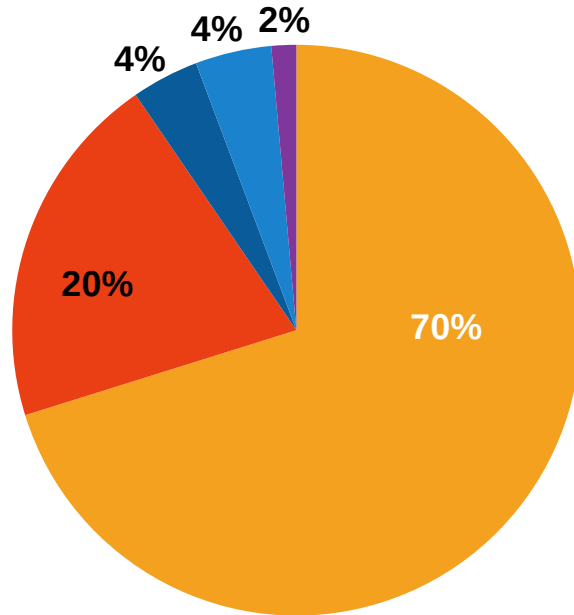
UK: Gas Supply



United Kingdom:
Declining Production

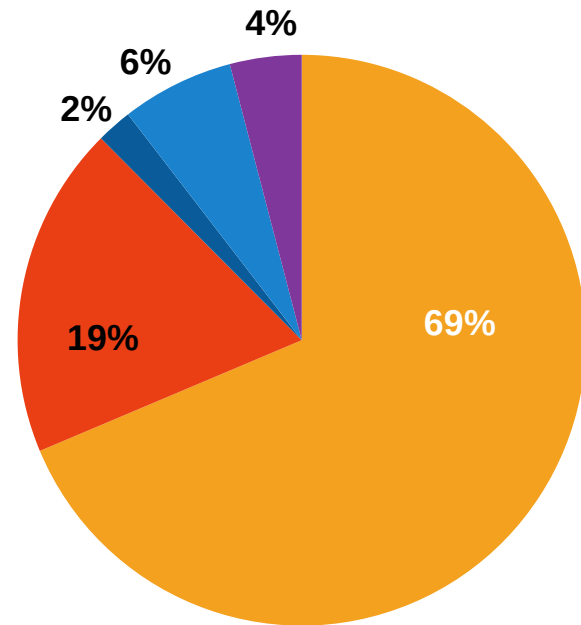
Demand Pull Greatest from Asia

LNG Demand by Region, 2012



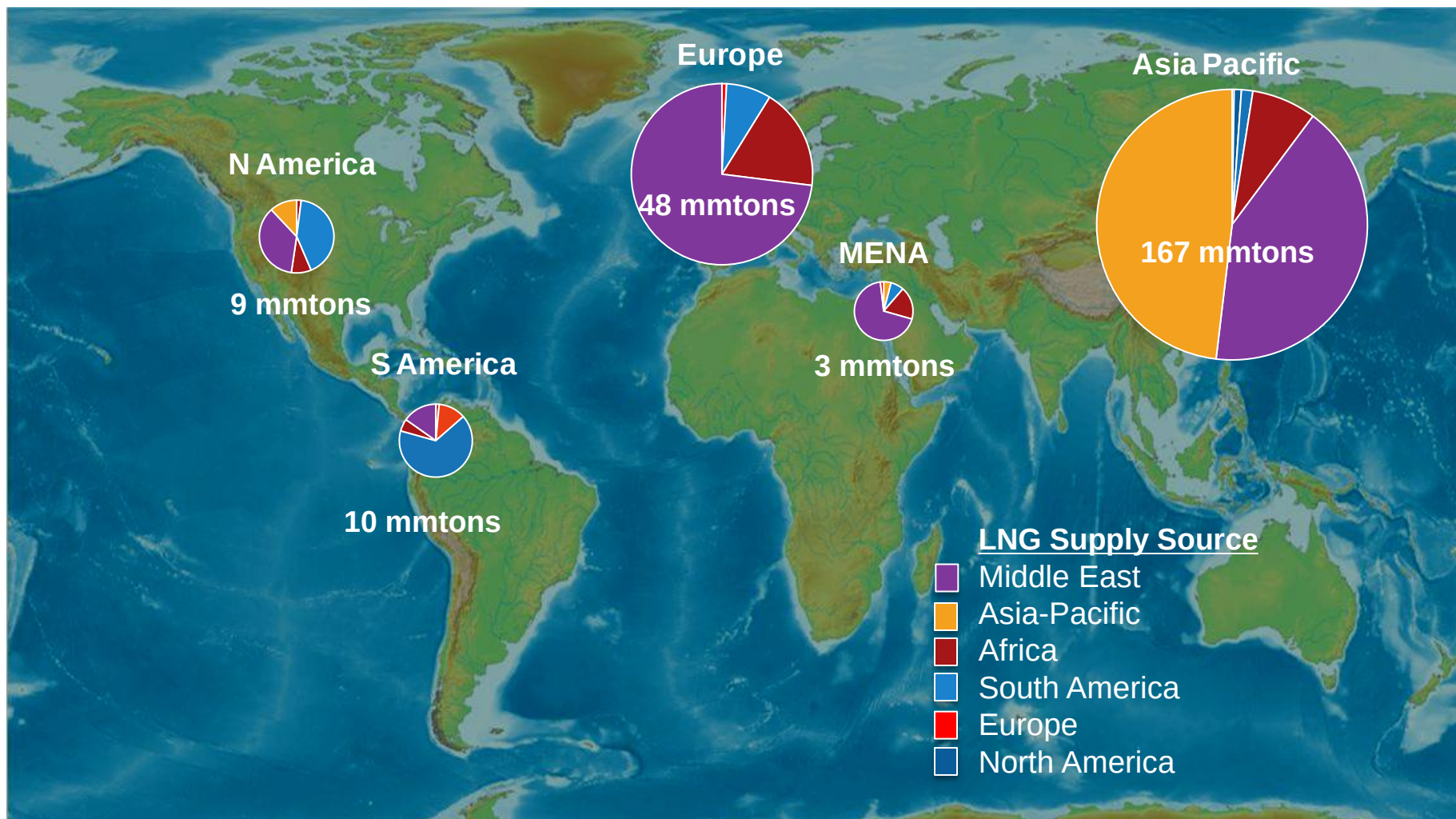
■ Asia
■ Europe
■ North America
■ South America
■ Middle East

LNG Demand by Region, 2030



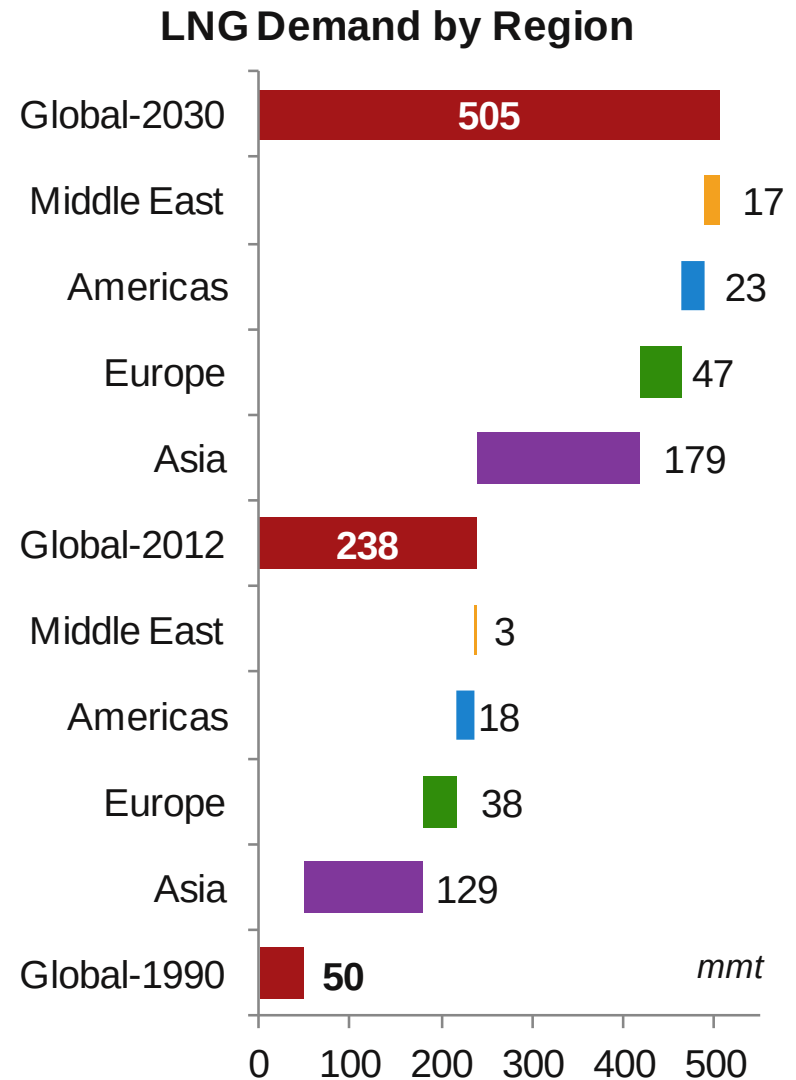
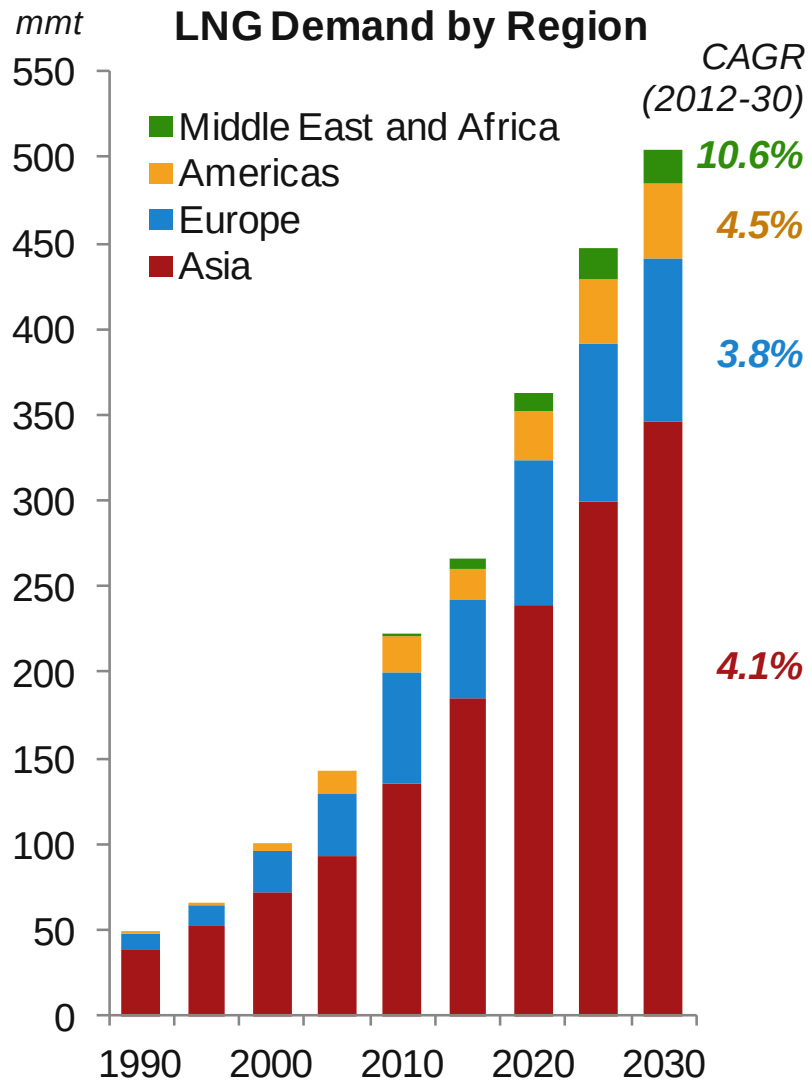
■ Asia
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Proximity Matters



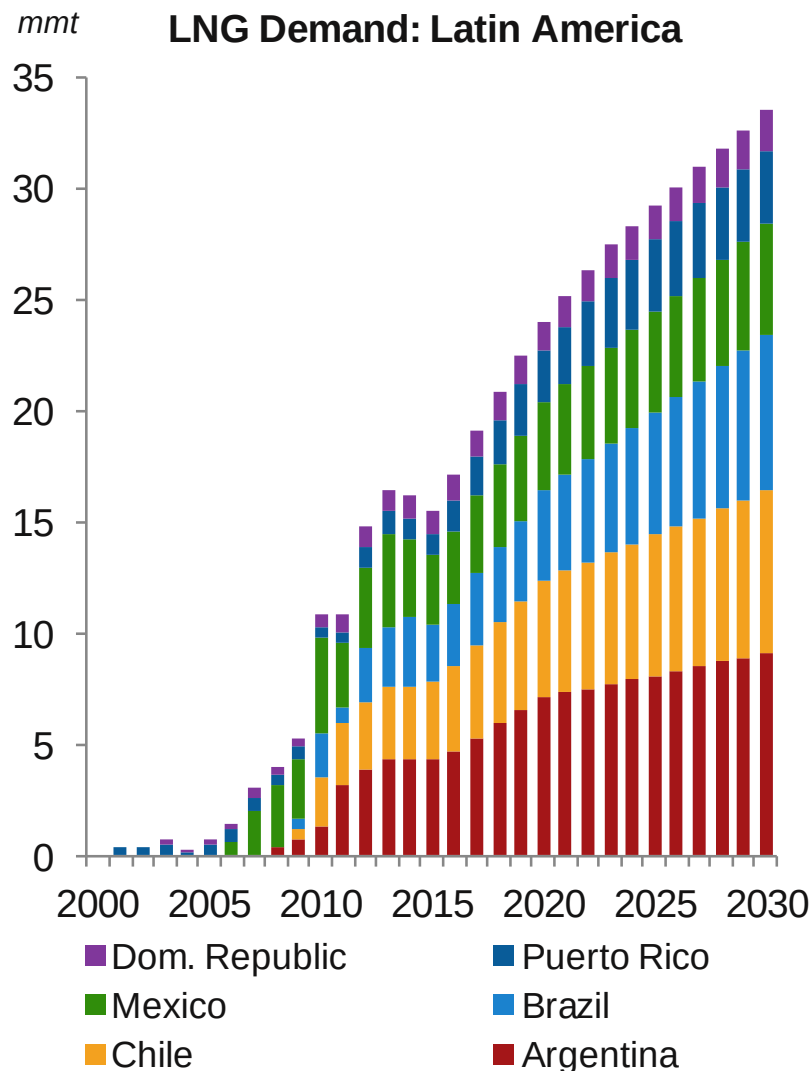
Asia main destination for Asia-Pacific supply

Asia Drives LNG Demand Growth



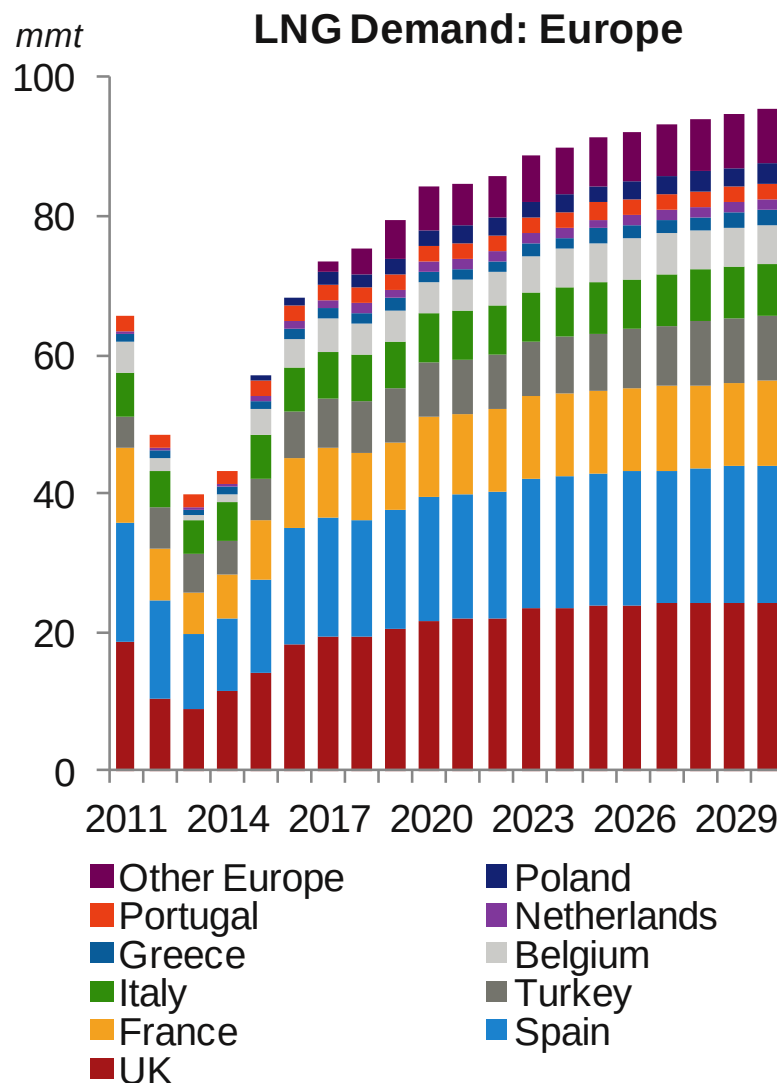
LNG Demand Outlook: South America

- Growth of 4.5% p.a. from 2012-2030
- Mexico
 - LNG offsets falling production
 - But competes with imports from US
- Brazil
 - Diversification from Bolivia
 - Important during droughts
- Argentina:
 - Declining production & reserves
 - Insufficient gas to meet seasonal peak
- Chile
 - Replace pipeline imports from Argentina
- Puerto Rico & Dominican Republic
 - Gas-fired power generation
- Proposed New Importers
 - Jamaica, Uruguay, and Colombia



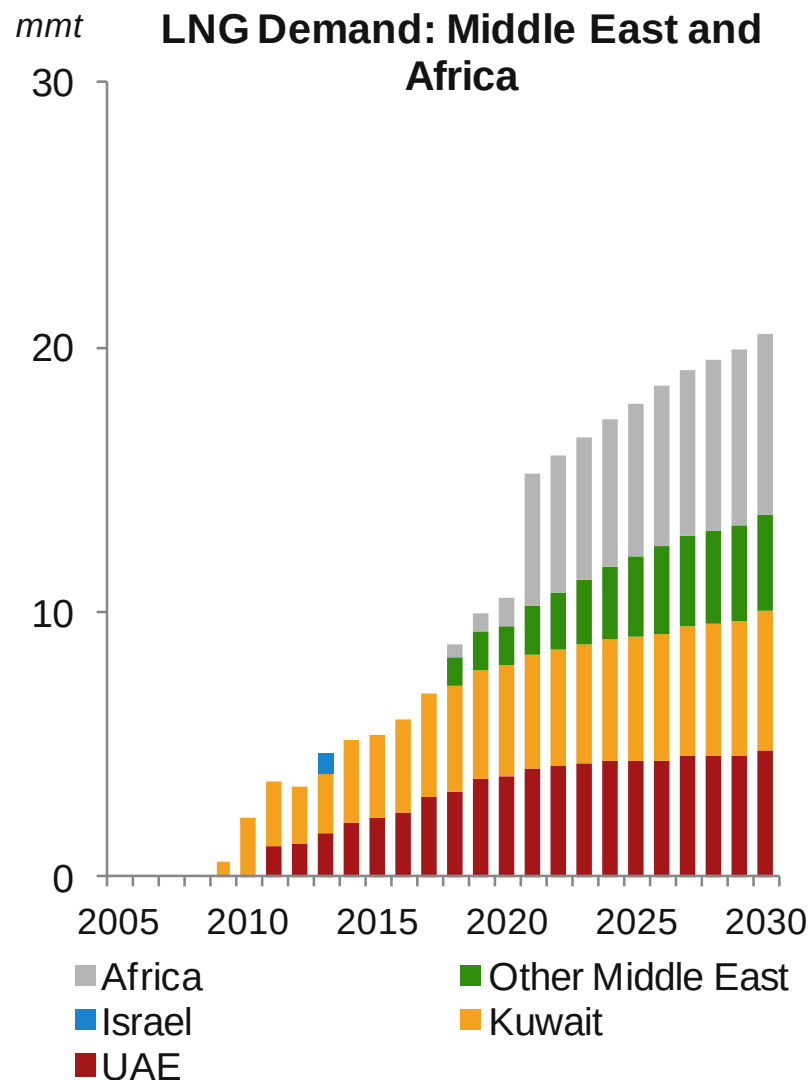
LNG Demand Outlook: Europe

- Lower growth region for LNG at 3.8% from 2012-2030
 - Large share of this is recovery: LNG peaked at ~66 mmtons in 2011
 - Moderating energy intensity per GDP (Energy efficiency and demographics)
- Sharp LNG decline from 2011-13
 - LNG diverted to higher-priced markets
 - Lower demand due to economy, coal, renewables, hydro
 - Pipeline gas replaced LNG
- LNG Growth Driven by
 - Declining production (UK, Netherlands)
 - Energy security (supply diversification)
 - New Importers: Poland, Lithuania
 - Proposed Importers: Sweden, Croatia, Estonia, Ukraine, Finland, and Ireland

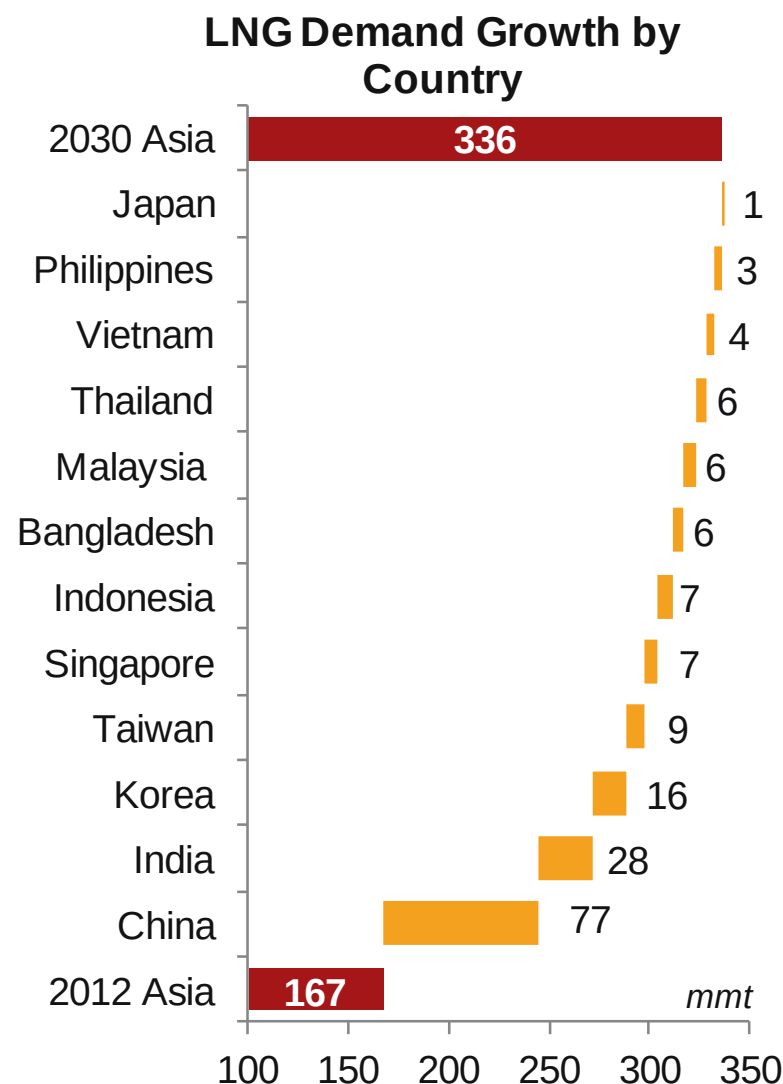
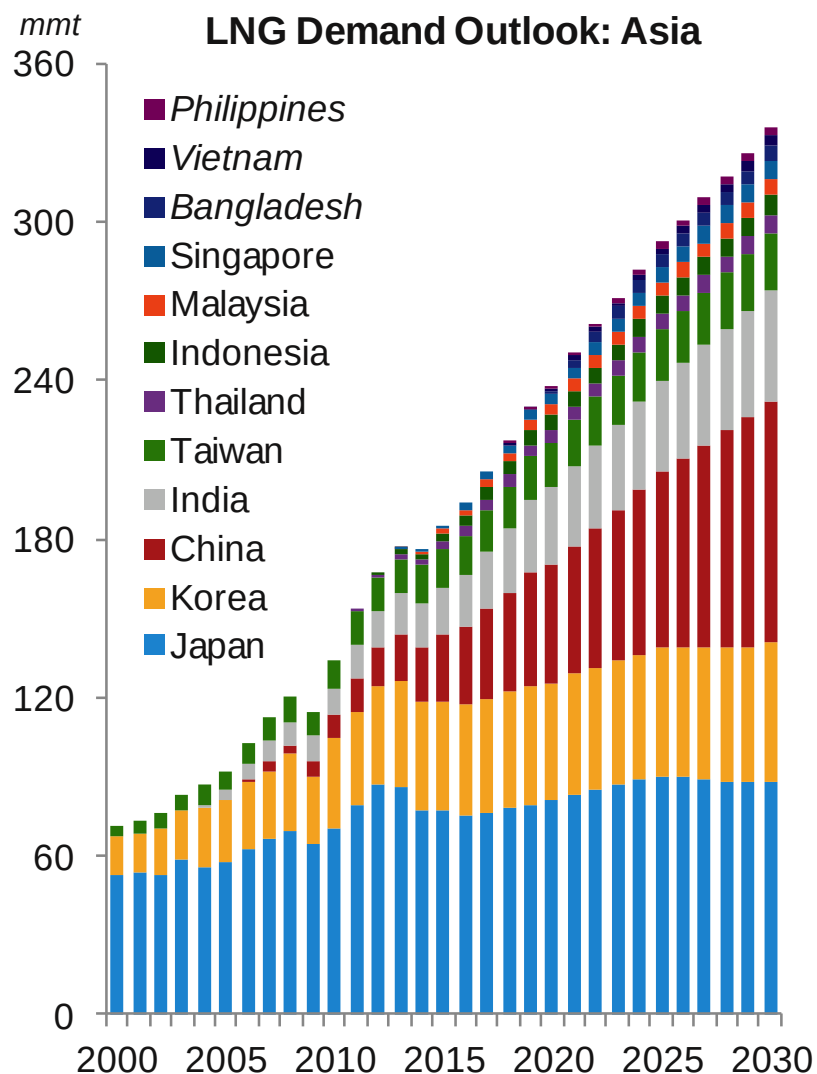


LNG Demand Outlook: Middle East & Africa

- Fastest growth region: 10.8% p.a. from 2012-2030, but smallest market
- Power Biggest Driver for Existing Markets: UAE, Kuwait
 - Fuel switching away from oil
 - Need to meet rising power demand during peak months (summer)
 - Both have proposed expansions to import capacity
- New Importer: South Africa
- Proposed New Importers:
 - Benin, Ghana, Kenya

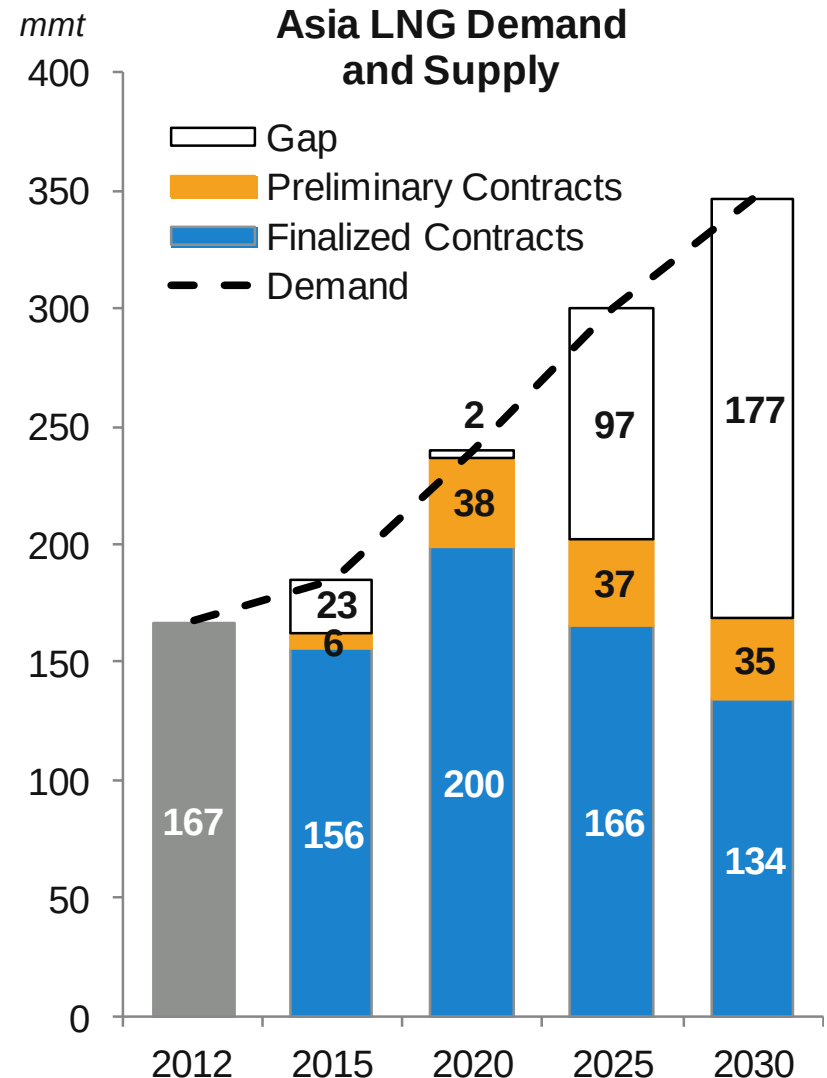


LNG Outlook: Asia



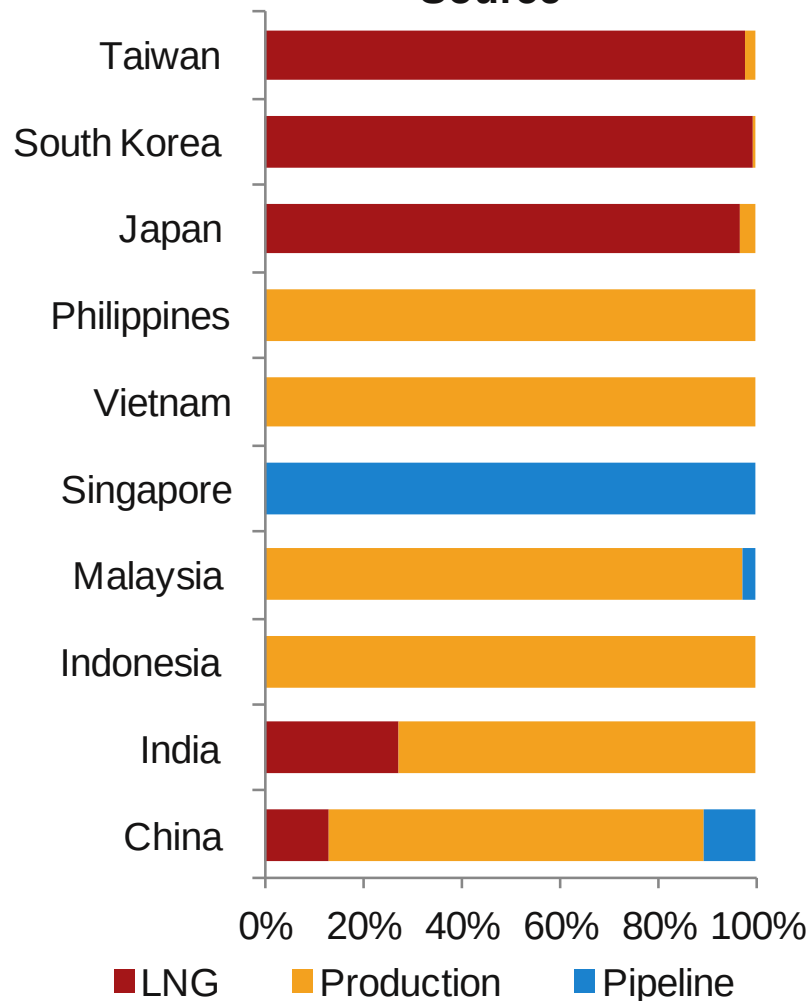
Growing Supply-Demand Imbalance in Asia

- How To Assess Markets for LNG Projects: Supply-Demand Gap
- Finalized Contracts (15-20 years)
 - SPA: Sales and Purchase Agreement
 - Equity Offtake (small portion of total)
- Preliminary Contracts
 - MOU: Memorandum of Understanding
 - HOA: Heads of Agreement
- Markets have different preferences for the share of demand not tied to long-term supply contracts
 - Short-term contracts
 - Spot volumes

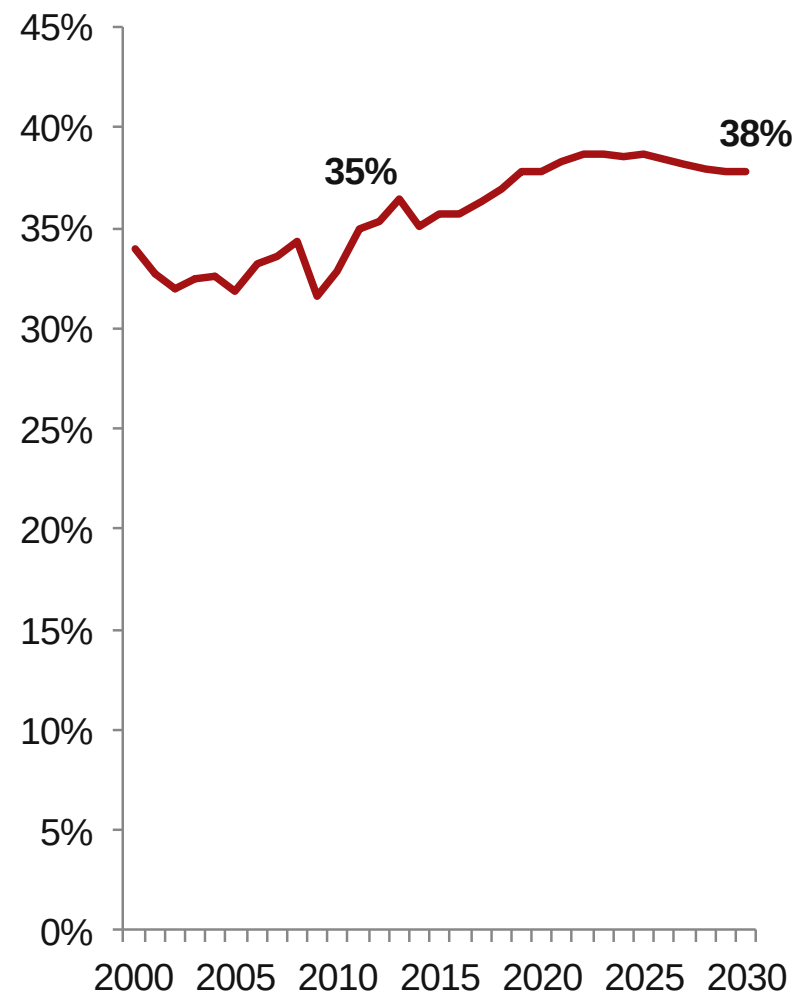


LNG Important Supply Source for Asia

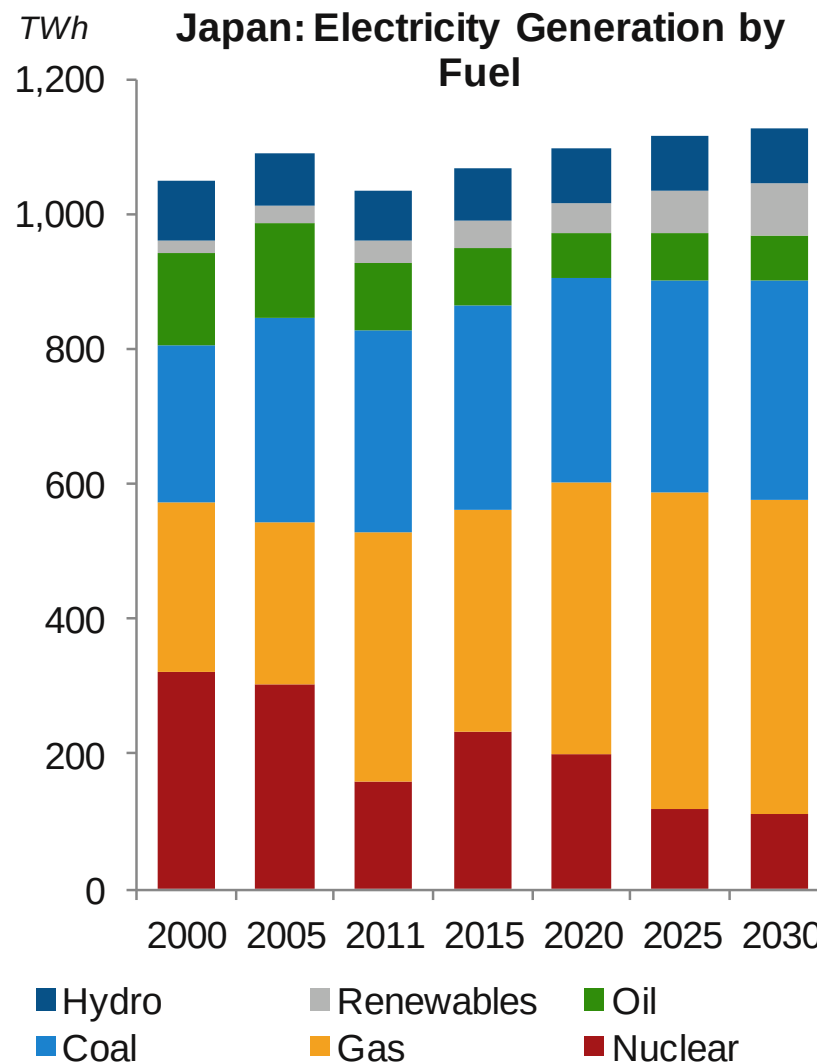
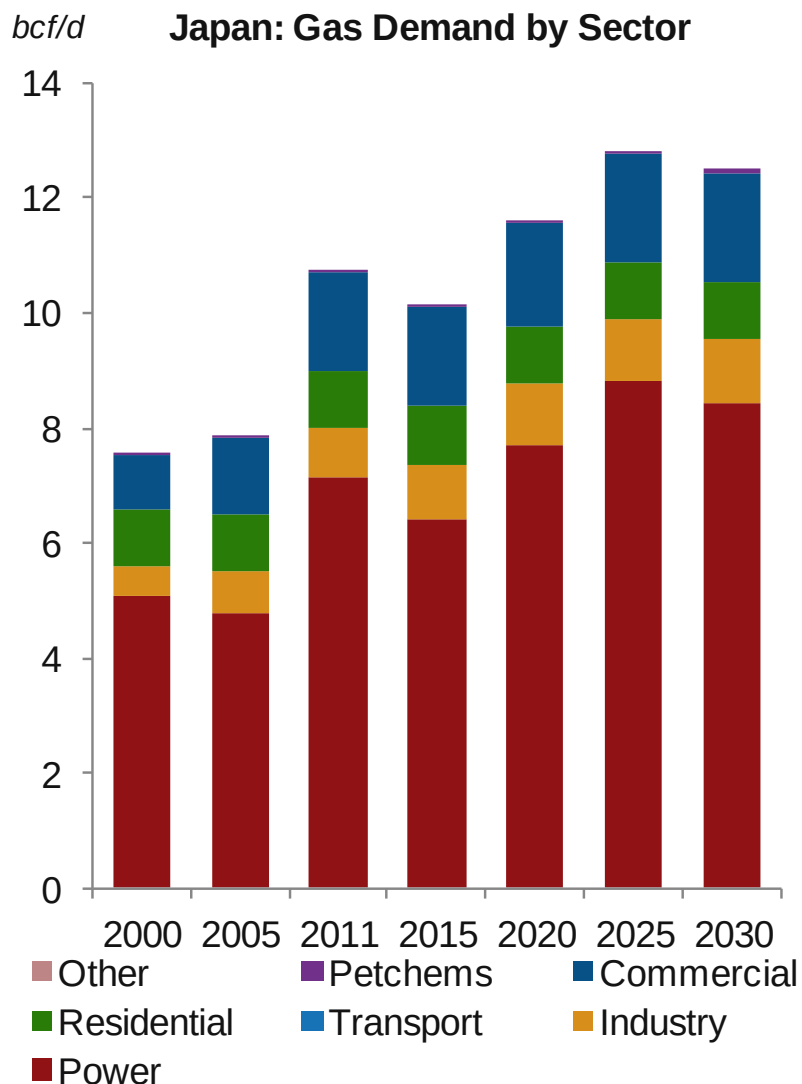
Asian Markets: Gas Supply by Source



LNG Share of Gas in Asia

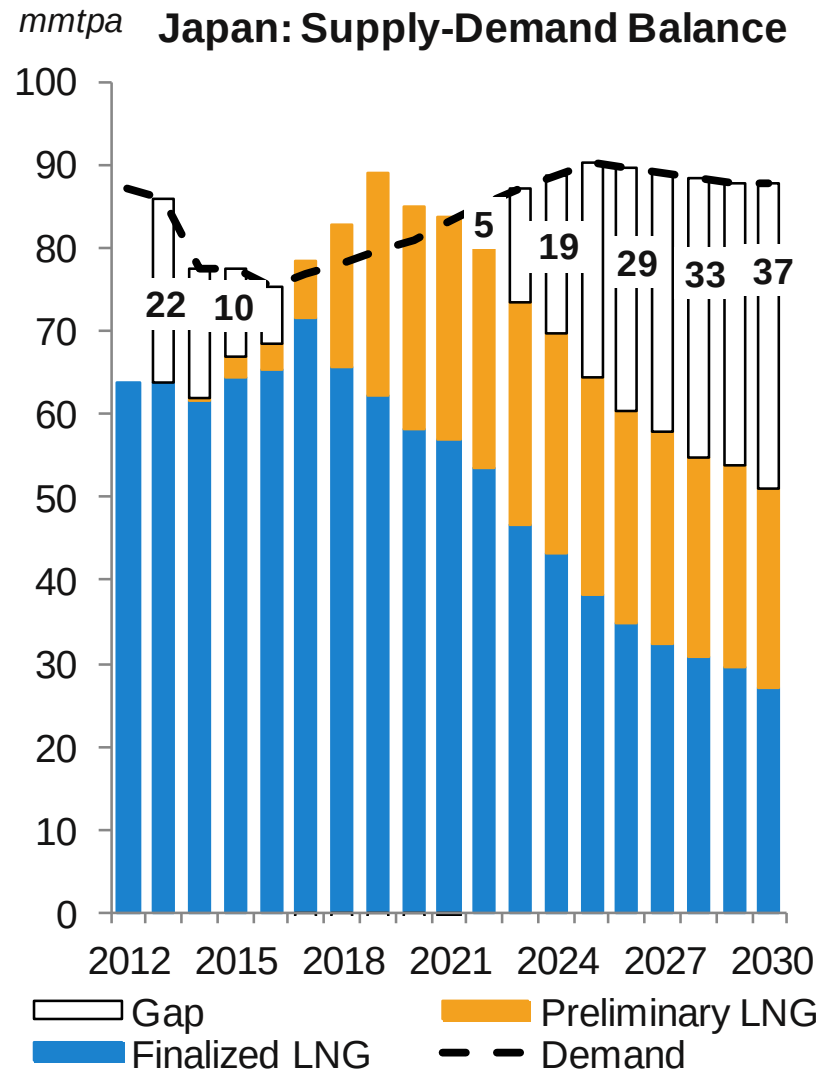


Japan: Gas Demand Drivers

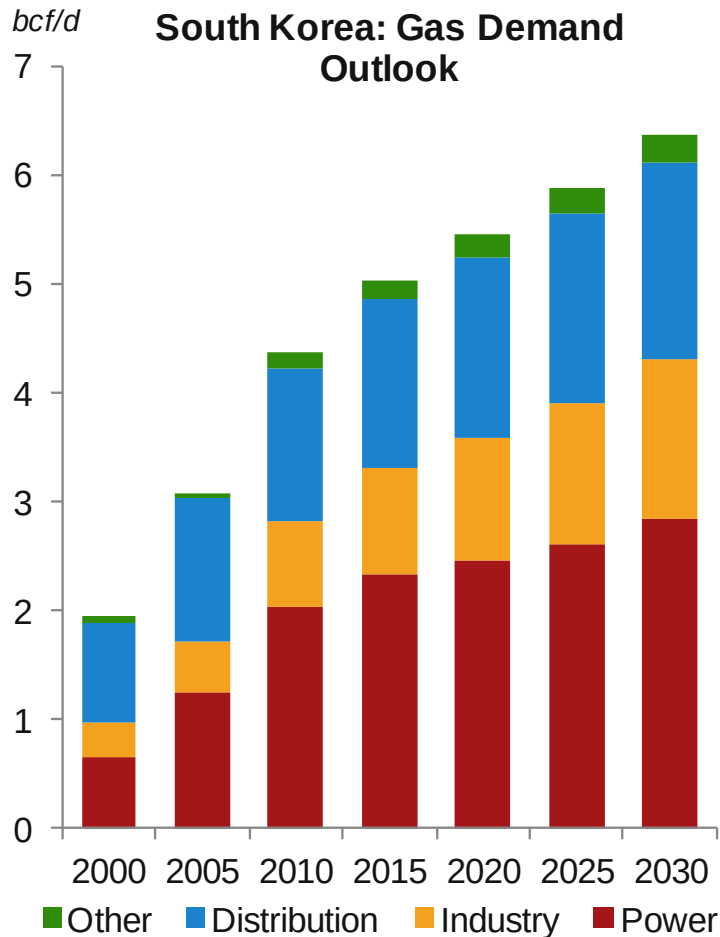


Japan: LNG SD Outlook

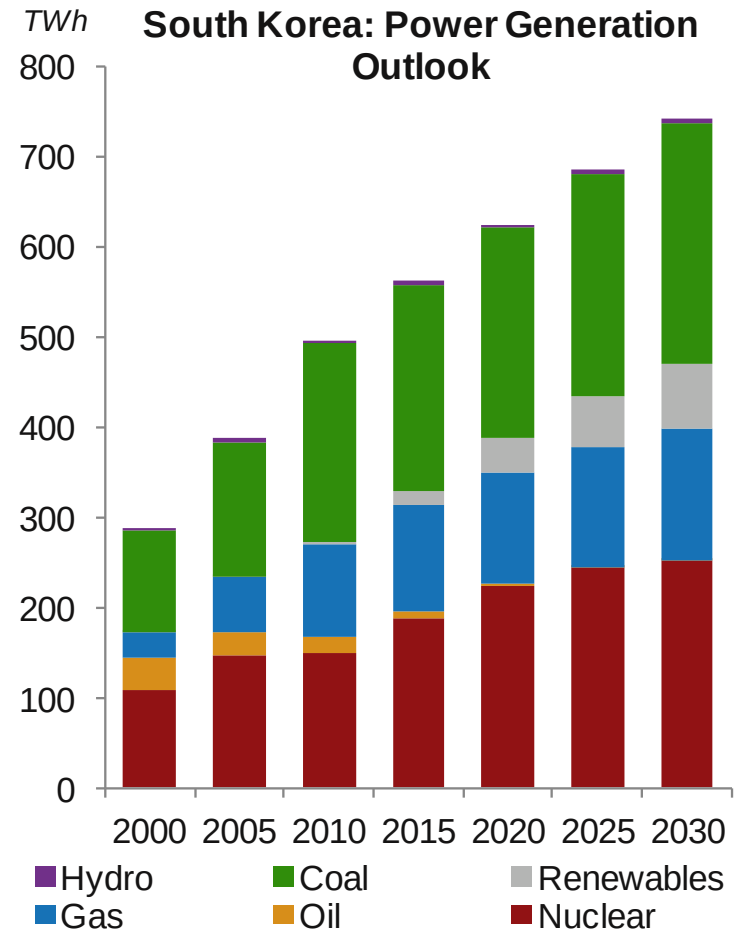
- Japan is the largest destination for LNG (88 mmtons in 2012)
- LNG Buyers:
 - Gas Utilities (e.g Tokyo Gas, Osaka Gas)
 - Electric Utilities (e.g. Tokyo Electric)
 - Other marketers/traders (Mitsubishi, Mitsui)
- Uncertainties in Outlook:
 - Choice of fuel in power generation:
 - Nuclear
 - Coal
 - Renewables



South Korea: Gas Demand Drivers



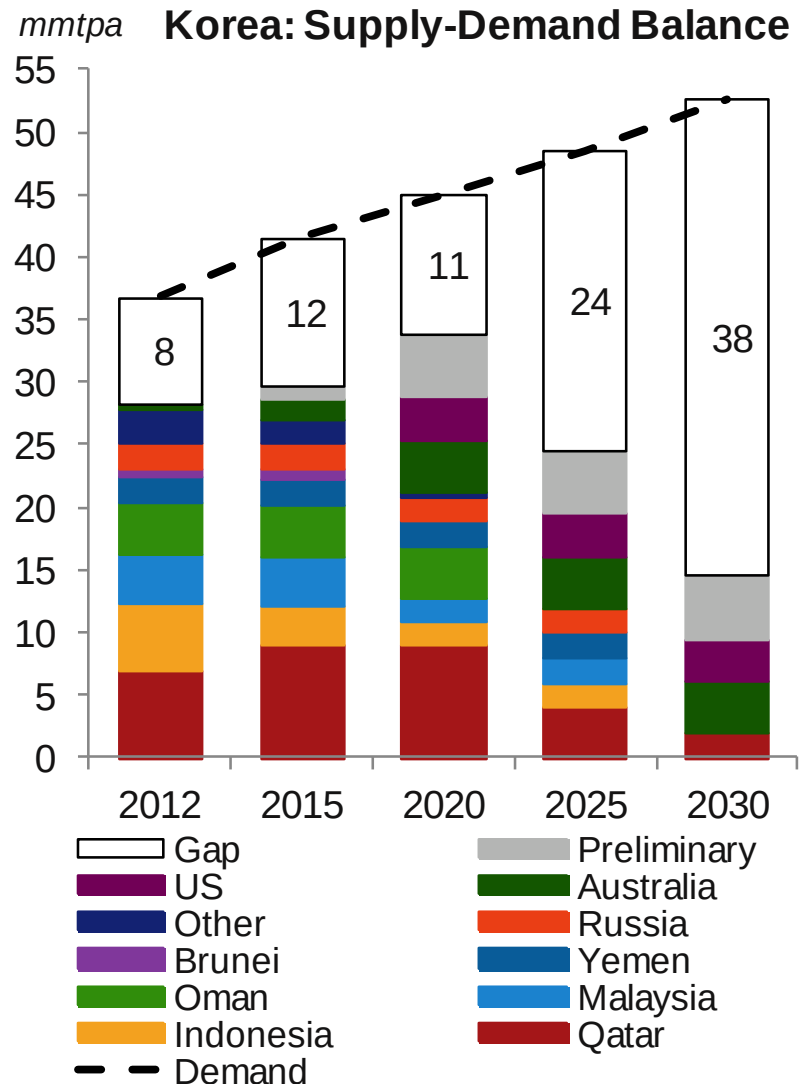
Power and industry largest drivers



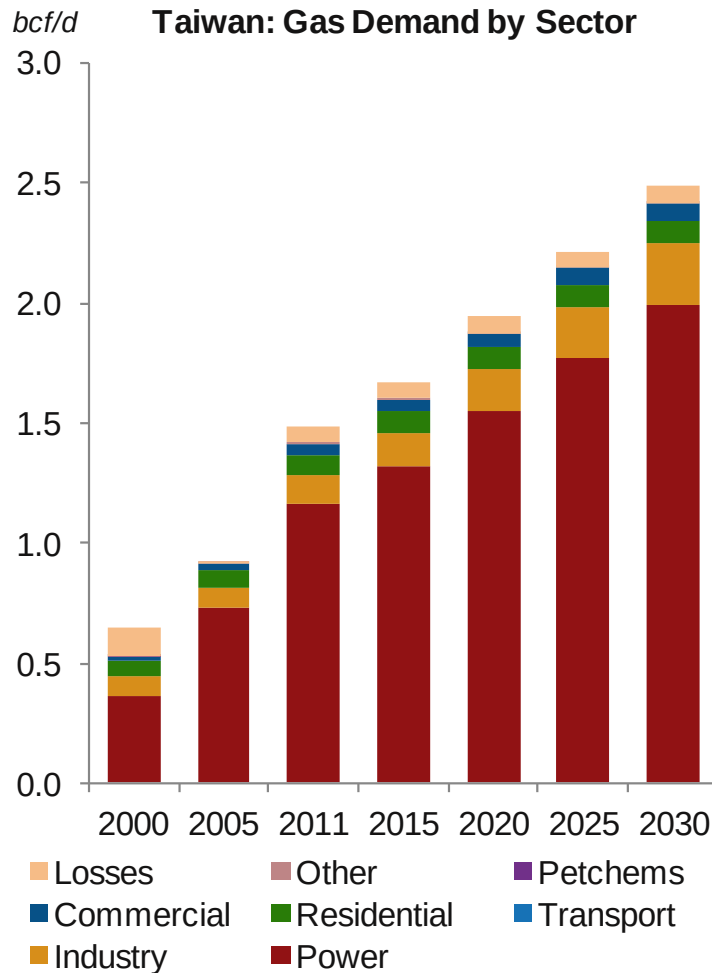
Steady role in fuel mix for gas

South Korea: LNG SD Outlook

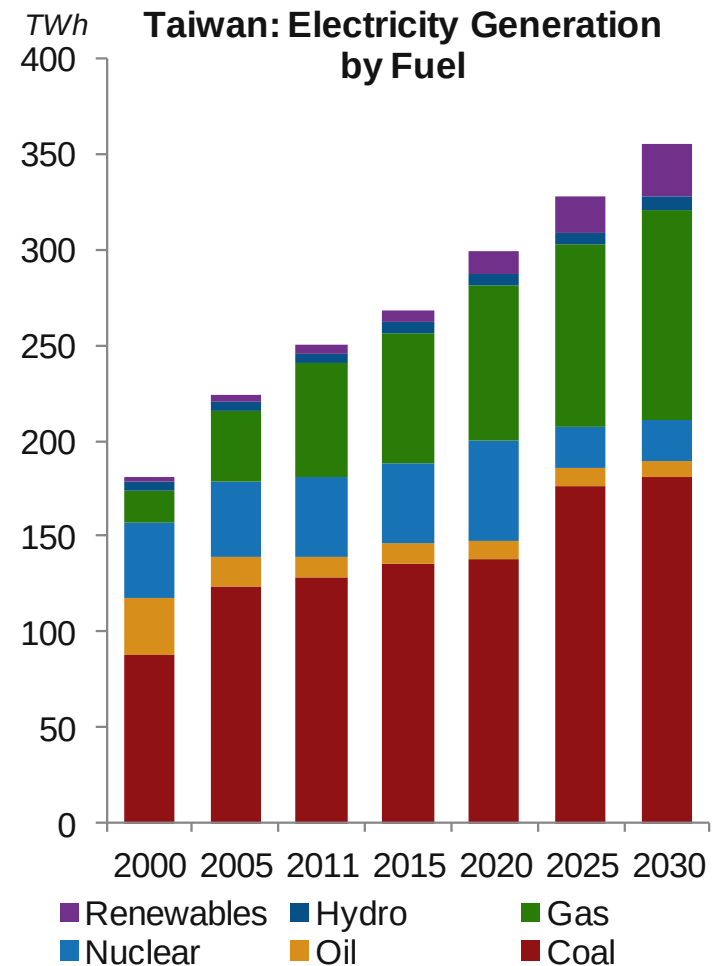
- Larger relative S-D gap than Japan
 - Korea heavily reliant on the spot market to meet demand
- Seasonal demand swings and storage
- LNG Buyers:
 - Korea Gas Corp (KOGAS)
 - Companies importing LNG for own-use:
 - Posco (Steel producer)
 - K-Power
 - KEPCO-owned Korea Midland Power Company (KOMIPO)
 - GS (proposed)
- Uncertainties in outlook:
 - Liberalization of gas market
 - Commitment to nuclear power targets



Taiwan: Gas Demand Drivers



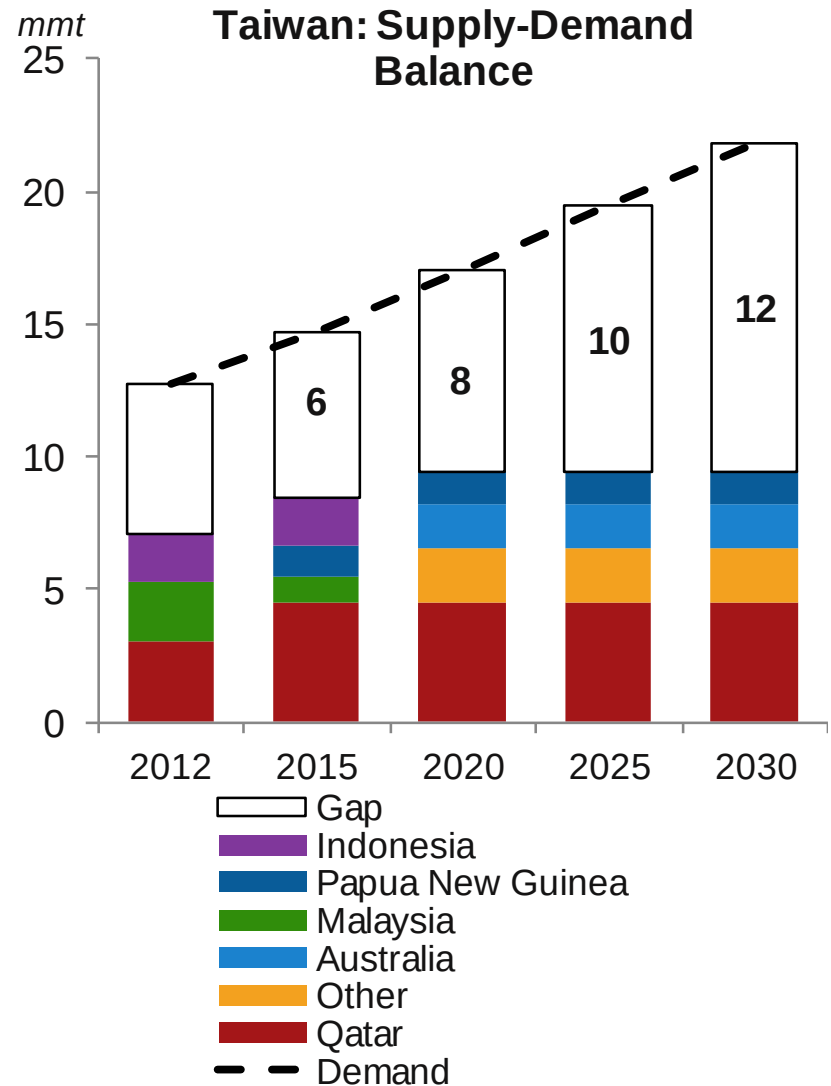
Gas prioritized for power generation



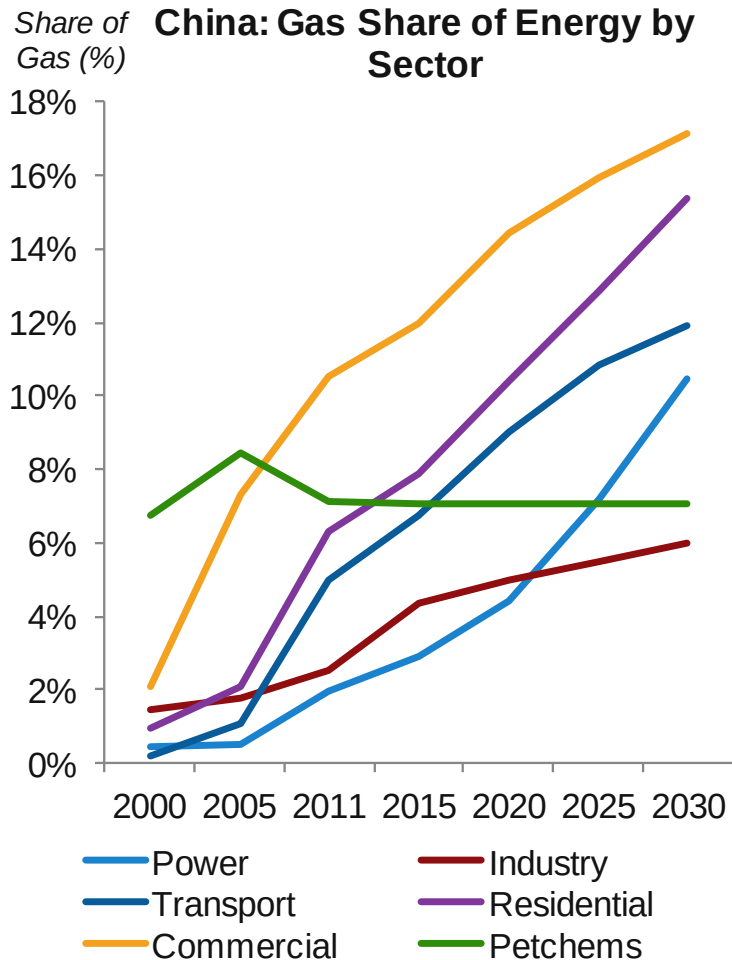
Growing role for gas in power

Taiwan: LNG SD Outlook

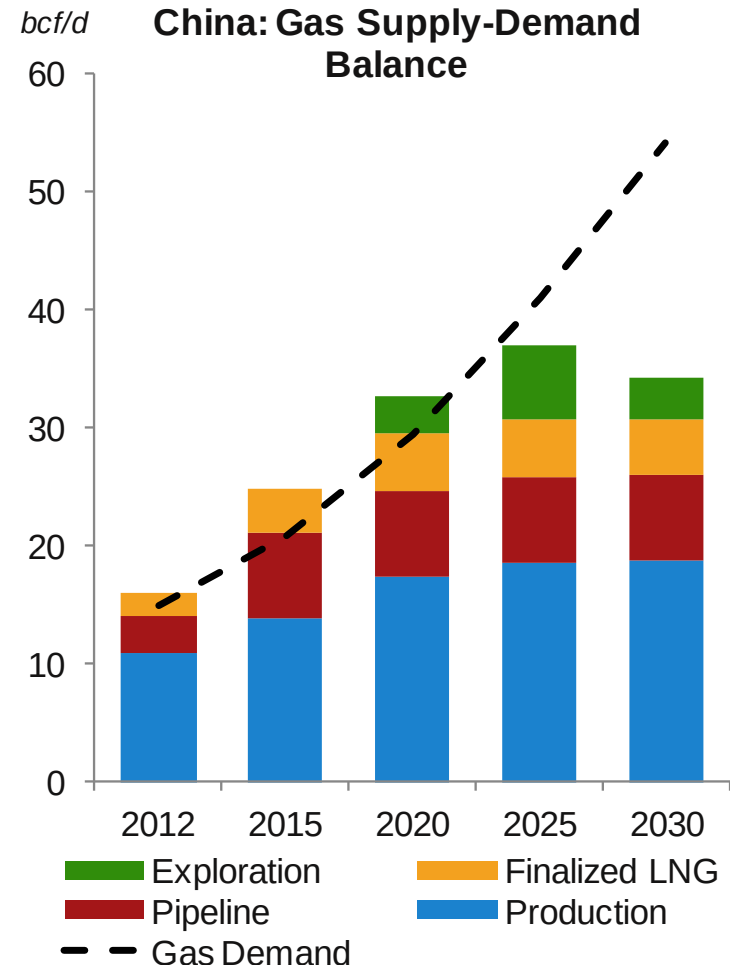
- Relatively large SD gap
- LNG Importers:
 - CPC
- Uncertainties in Outlook:
 - Power generation from gas
 - Development of new LNG import capacity



China: Gas Demand Drivers



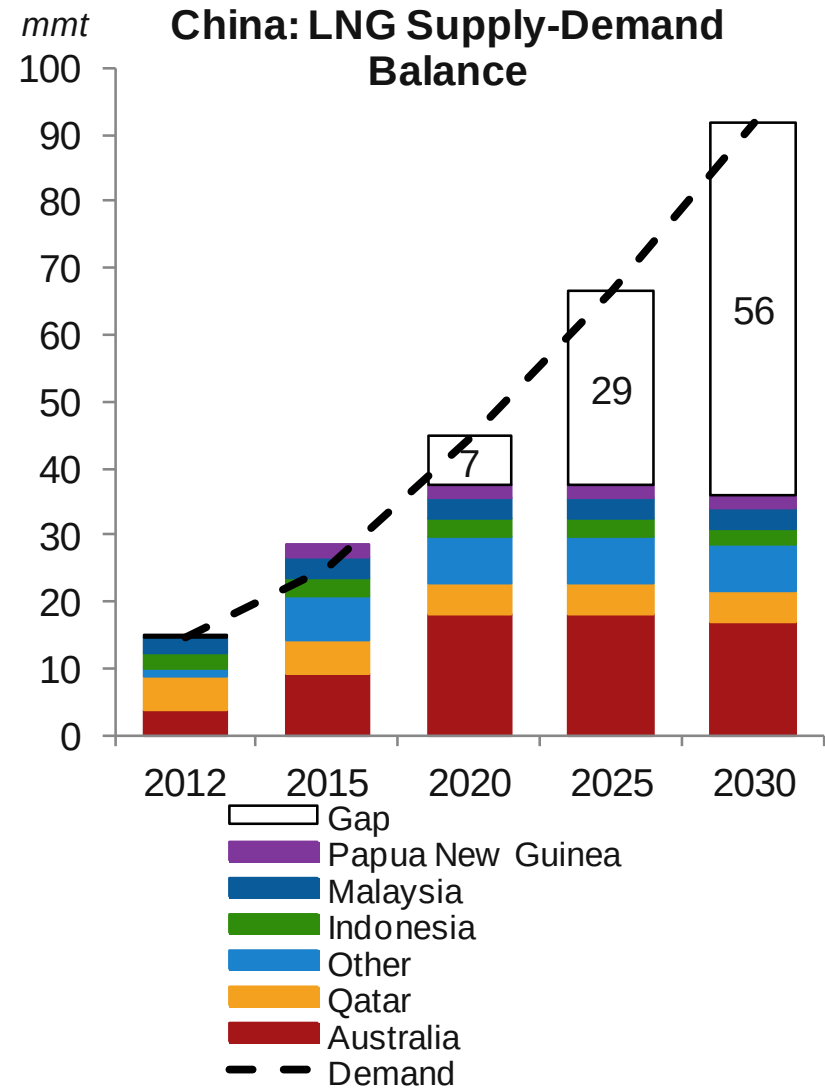
High demand upside from gas penetration potential



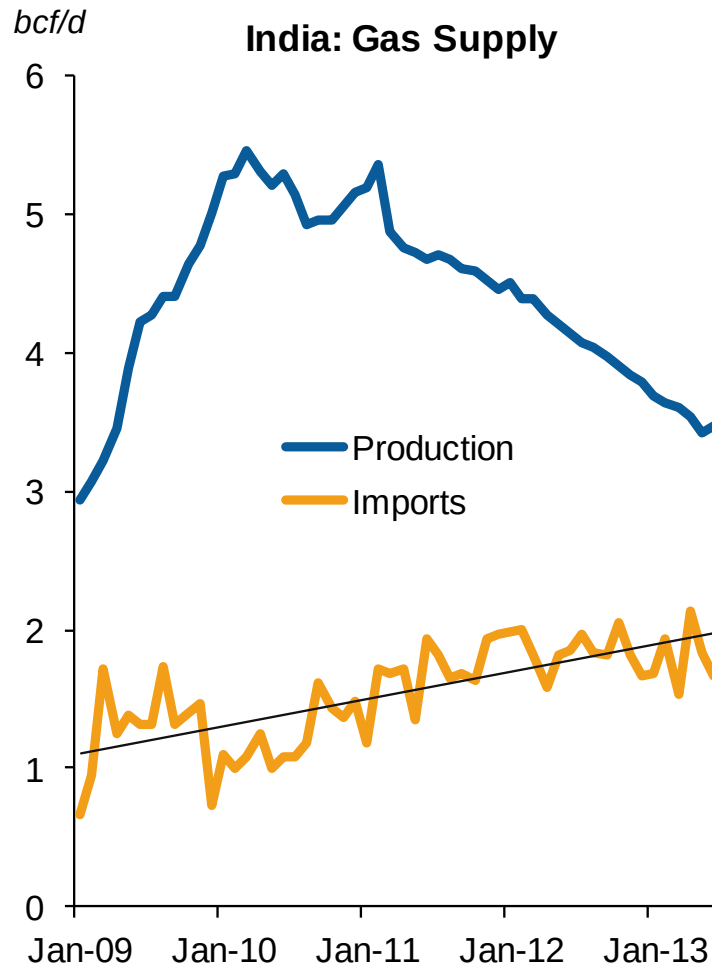
LNG competes with pipeline gas & production

China: LNG SD Outlook

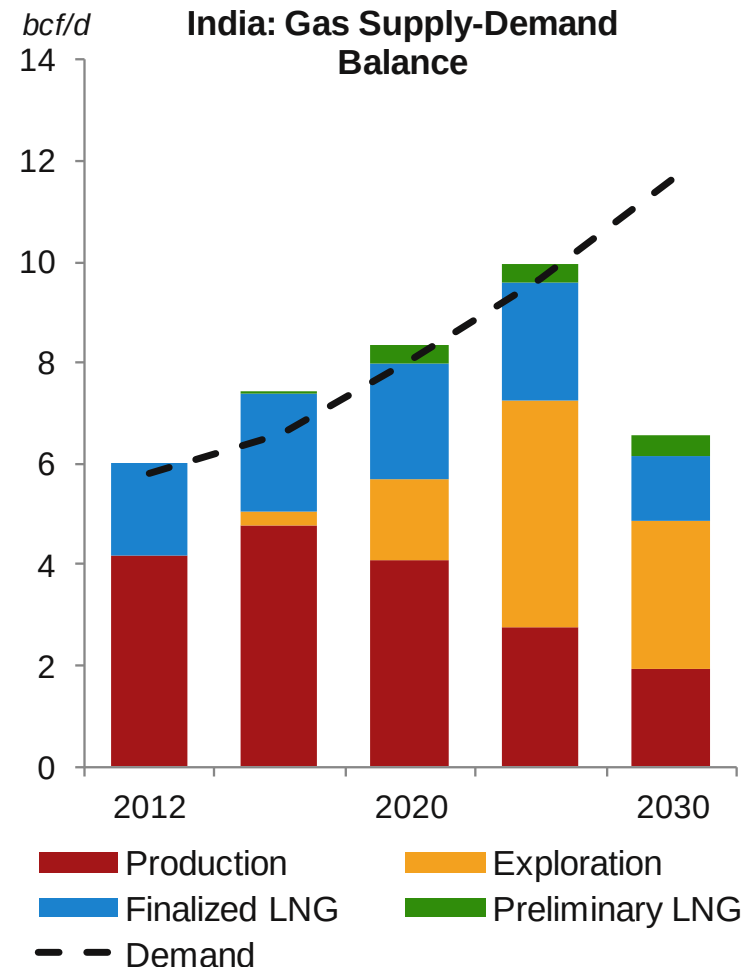
- Well-supplied through 2020
- Chinese NOCs moving up the LNG value chain
- LNG Importers:
 - CNOOC
 - PetroChina
 - Sinopec
 - Others
- Uncertainties in Outlook:
 - Availability of other supply sources
 - Gas pricing



India: LNG Demand Drivers



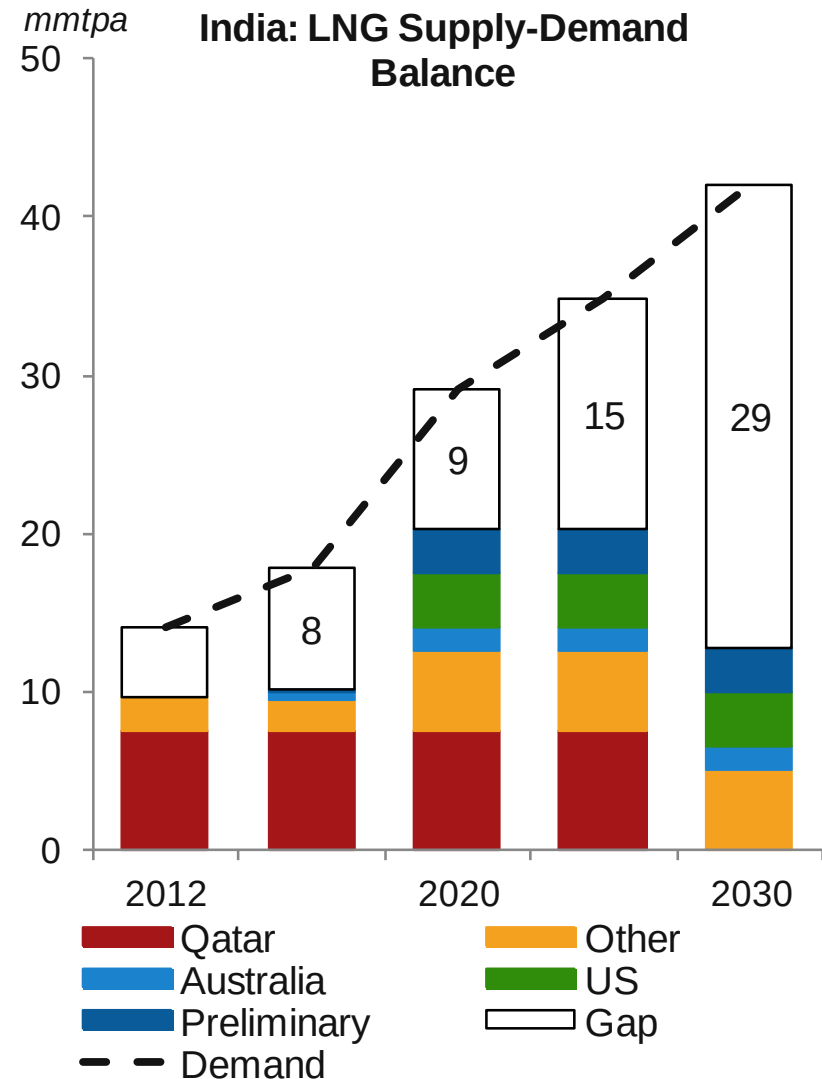
LNG offsetting declines in production



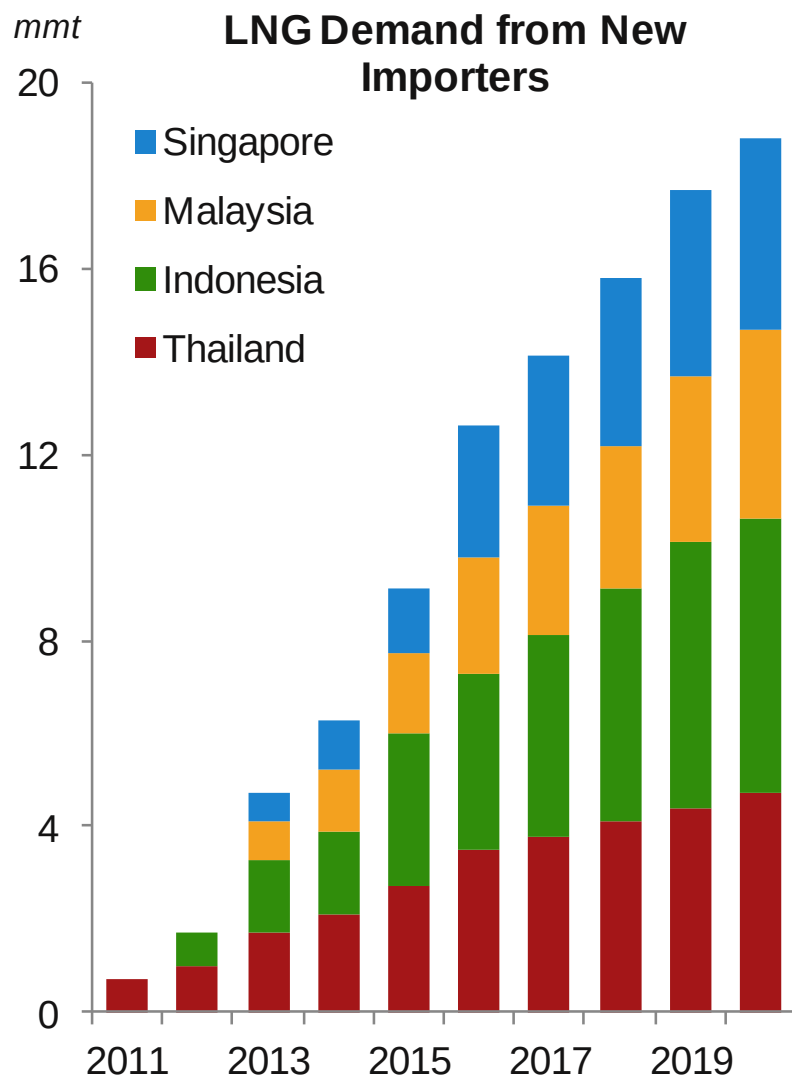
Can India deliver on its exploration potential?

India: LNG SD Outlook

- LNG Importers:
 - GAIL
 - Petronet LNG
 - Reliance
 - Gujarat State Petroleum Corporation (GSPC)
- Uncertainties in Outlook:
 - Availability of other sources of supply
 - Gas pricing



Demand From New LNG Importers in Asia



Source: PFC Energy Global LNG Service

Country	LNG Demand Drivers
Singapore	Pipeline gas supply Fuel substitution Government Incentives
Indonesia	Coal use in power Government promotion of domestic LNG Infrastructure development
Malaysia	Power sector Gas pricing reform Industrial development
Thailand	Ability to pay Domestic gas production Pipeline gas imports (Myanmar)

LNG Potential of Proposed Importers in Asia

Country	LNG Demand Drivers	Constraints
Philippines	Power/gas shortages	Gas pricing
Vietnam	Delays in domestic production Gas and power pricing Coal	Gas pricing Regulated Electricity Market Government Capacity
Pakistan	Gas Supply Shortages Power	Government Capacity Gas pricing LNG Financing
Bangladesh	Gas Supply Shortages Power, Transport, Industrial, Distribution	Government Capacity LNG Financing
Sri Lanka	Power	Market Size

Concluding Remarks

- Markets opportunities exist globally
- LNG becoming increasingly popular for existing and new markets
- Many uncertainties will shape outlook:
 - Nuclear
 - Coal
 - Oil Price
 - Domestic production
 - Gas Pricing