

# Industry Perspective on the Changing Global Gas Market



Rachmat Abdoellah  
VP Planning & Technology  
IndoAsia Business Unit  
Chevron Asia Pacific E&P



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## Indonesia

- Largest producer (~40% of the country's crude oil)
- Duri Field, world's largest thermal EOR operation
- Largest geothermal producer (636 MW of installed capacity)
- Gendalo-Gehem deepwater gas development

## Philippines

- 45% non-operated interest in Malampaya natural gas field
- 40% non-operated interest in Geothermal operations: 637 MW capacity

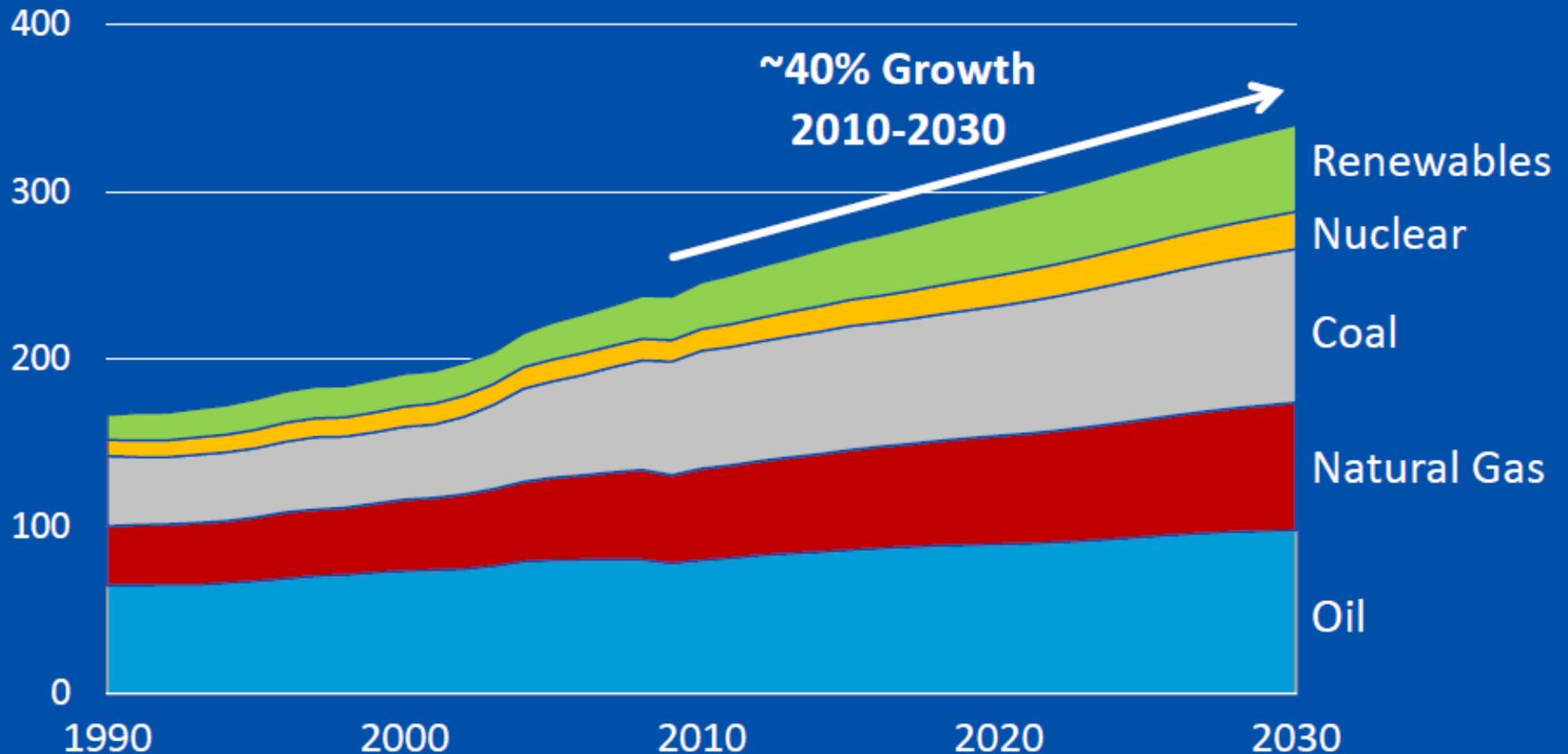


# All Energy Sources Are Required to Meet Increasing Demand

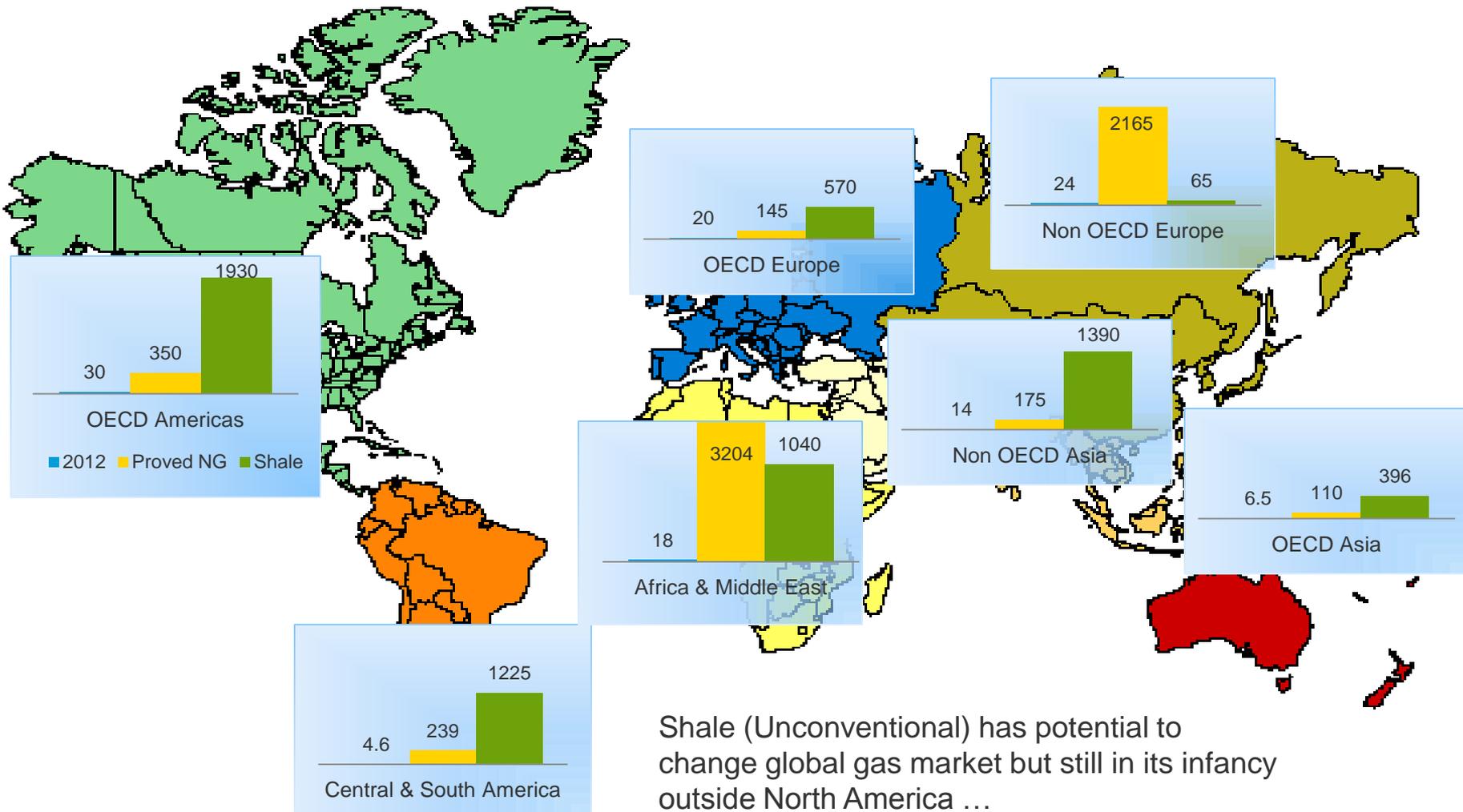


## Global Energy Demand

Million Barrels of Oil-Equivalent per Day



# Global Gas Consumption and Resources (TCF)



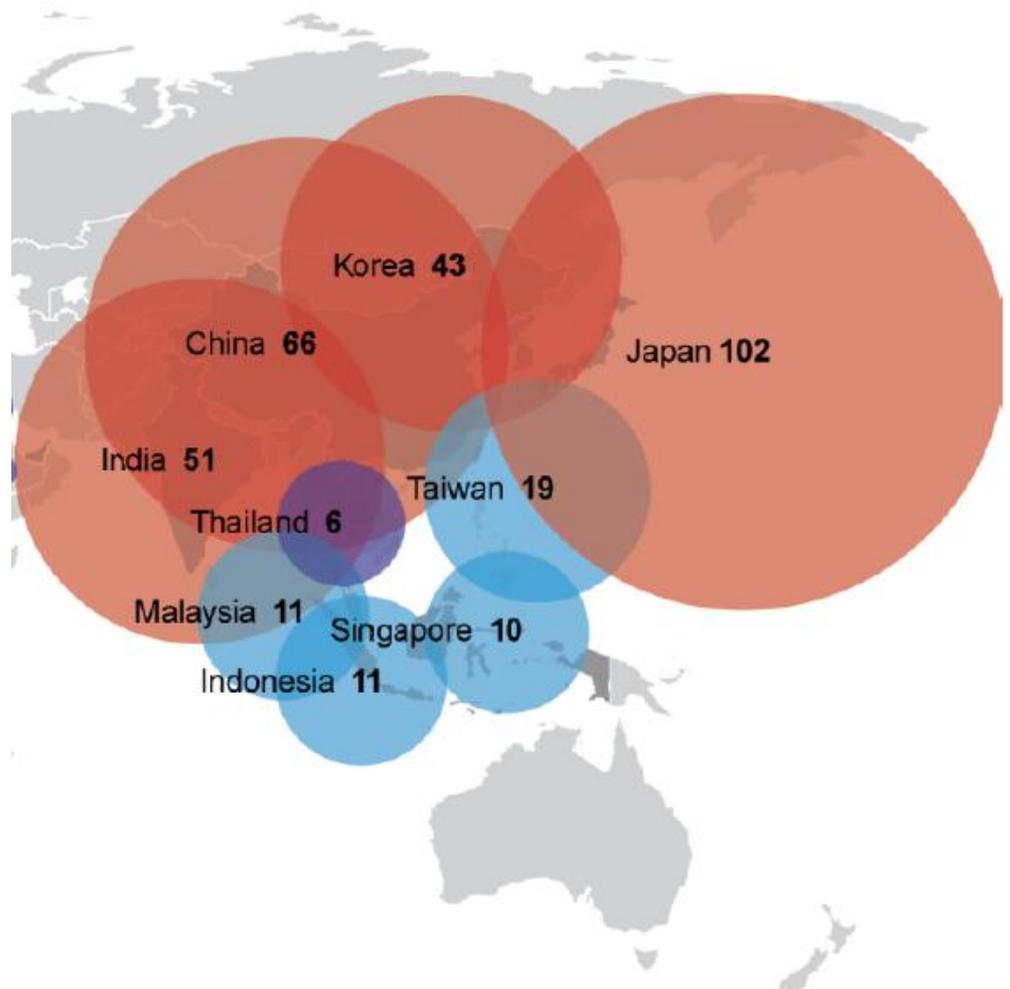
Shale (Unconventional) has potential to change global gas market but still in its infancy outside North America ...

# Forecast Asia LNG Demand – 2025

## Million Tons Per Annum (MTPA)



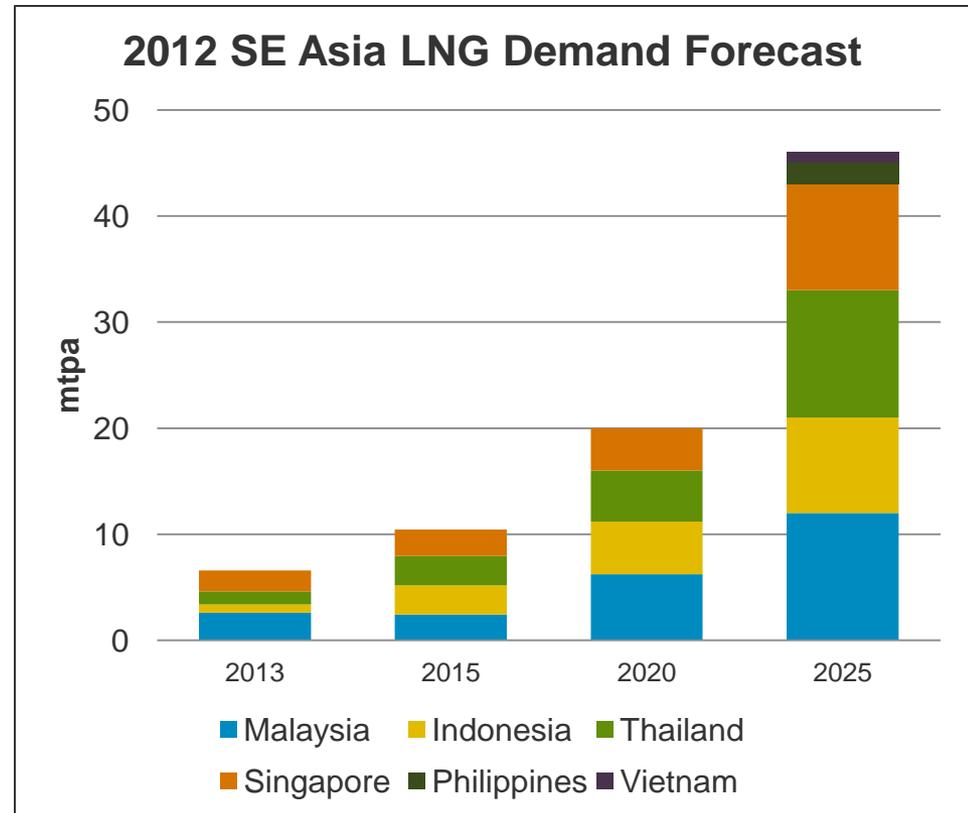
- Asia will continue to lead global LNG demand growth
- Growth driven by emerging economies and environmental issues influencing decisions around energy mix
- Traditional LNG buying economies of Japan, Korea and Taiwan will continue to place a strong emphasis on security of supply
- Combining shale development with LNG is progressing and mainly targeting Asia market



# Southeast Asia LNG Demand is Growing Rapidly



- Singapore and Thailand have both developed LNG import terminals to meet expected rapid growth in gas demand
- Even traditional gas and LNG exporters like Indonesia and Malaysia now have LNG import terminals to cope with growing domestic gas demand
- Until more gas supplies are found, new international pipelines will face development challenges
- Lacustrine shale resource plays (common in SE Asia) have more risks/uncertainties than their popularly known marine shale counterparts



Source: Wood Mackenzie

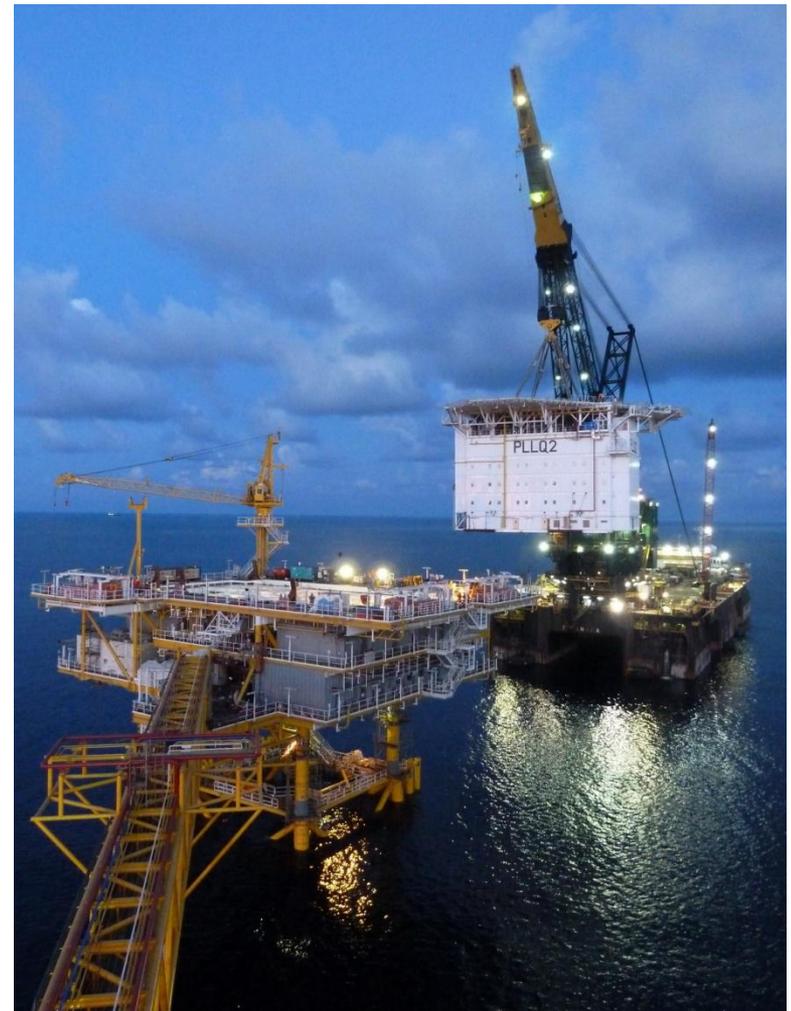
# Trans ASEAN Gas Pipeline (TAGP): Evolving Organically



# TAGP Concept: Development Challenges



- Capital costs, especially for subsea interconnecting pipelines and platforms
- Transit protocols (fees, prices, etc.) through “third” countries en-route from supply to market
- Transit rights through disputed waters with overlapping claims
- Conflicting regulatory regimes among ASEAN countries
- Growing domestic gas demand in producing countries
- Emerging role of LNG imports in ASEAN region
- Resource nationalism/political reluctance to export gas
- Gas quality specifications



# Asia LNG Trading Hubs: Development Facing Challenges



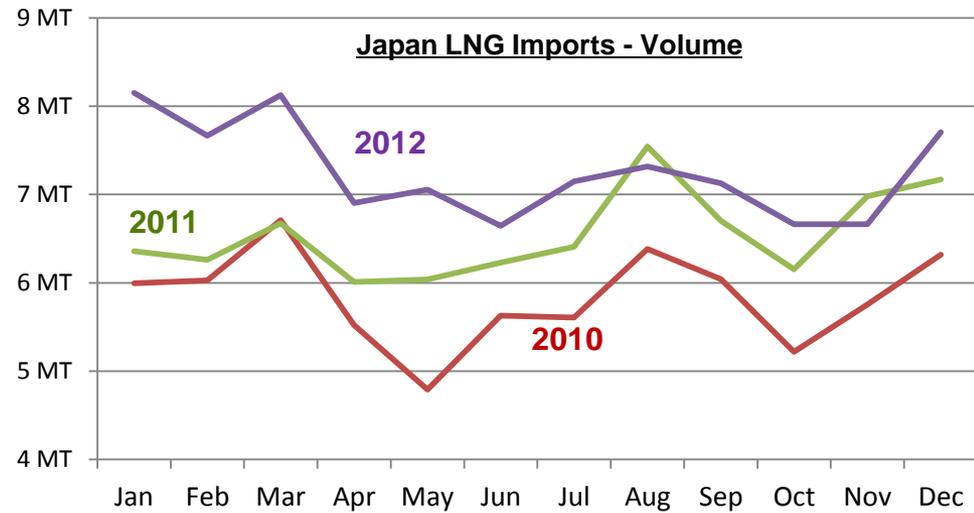
- Small immature markets
- Physical infrastructure (tanks, pipelines) alone does not ensure liquidity
- Liquidity limited by small number of market participants
- Concerns of excessive influence by single supplier or government gas pricing policies
- Uncertainty about physical location
- Asia hub pricing unlikely to be used/accepted as basis for long-term LNG contracts



# LNG Trade: Japan Case Study



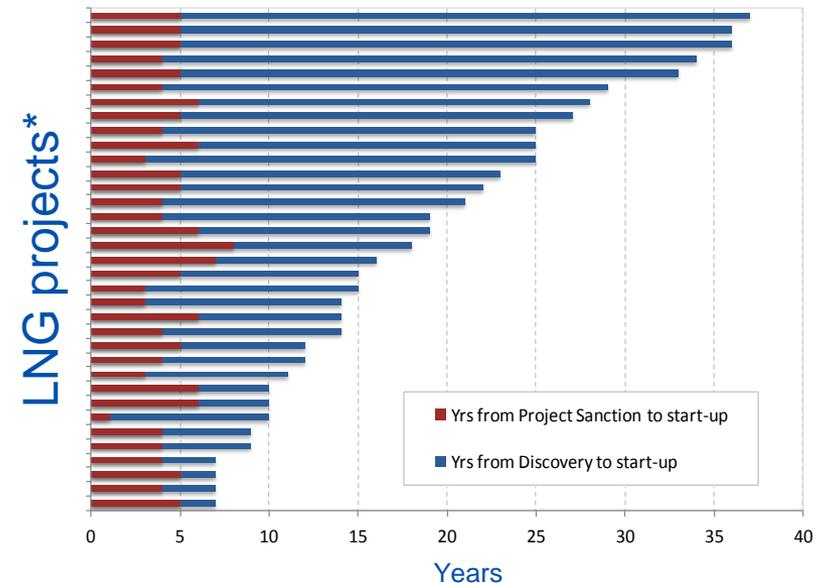
- Even after the Great East Japan earthquake shut down Japan's nuclear industry, the flexibility of LNG allowed demand to be met
  - Nuclear power had provided ~30% of Japan's electricity
  - In 2011 and 2012, as Japan's nuclear utilization fell to zero, LNG kept the lights on
- Japan's imports increased by 8.5 MT (+12%) from 2010 to 2011 and 8.7MT (+11%) from 2011 to 2012
  - With 17 countries exporting LNG in 2012, LNG supply is dependable and robust



# The Supply Challenge for LNG from Discovery to Delivery



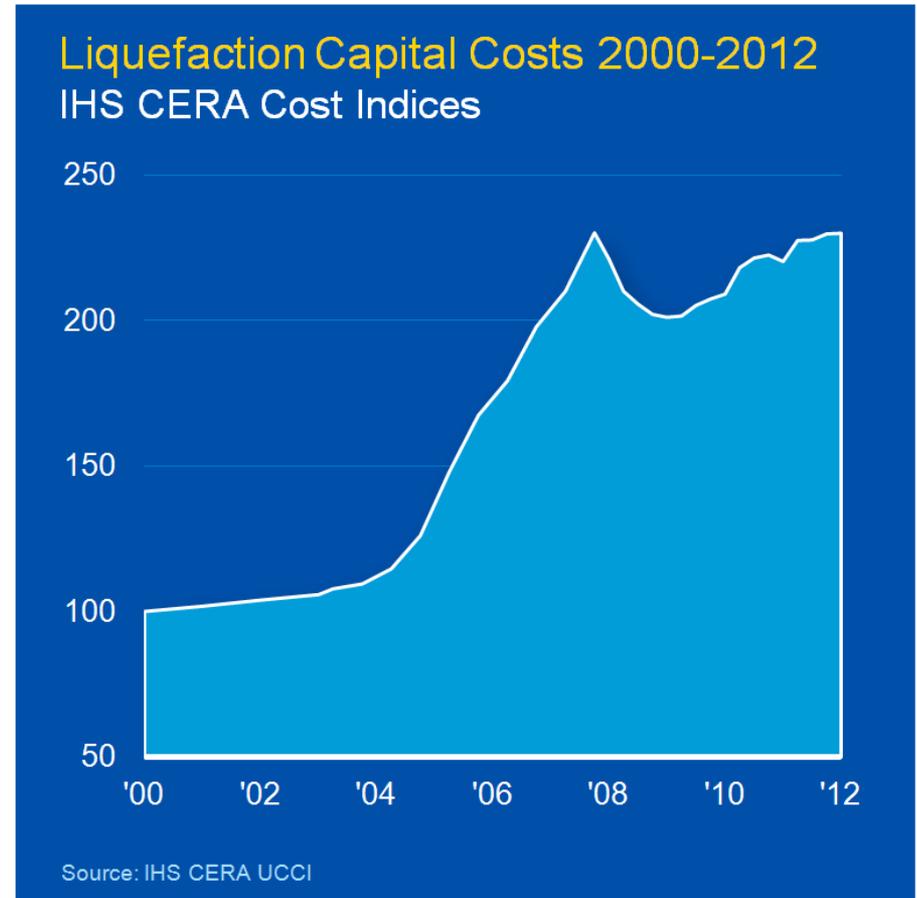
- Complex and time-consuming process to bring new LNG supply to market
- For last 35 projects developed globally – average of more than 18 years from discovery to start up
- On average ~5 years from project sanction to start-up
- Mega-projects often require unanimous agreement by multiple partners in each development phase
- Multiple work fronts required
  - Technical
  - Stakeholders
  - Commercial & Marketing
- Unconventional as supply source will add to the complexity and execution time



# The LNG Supply Challenge - Capital Cost Environment



- Project developers are facing high capital cost environments
- Costs are linked to upstream oil developments
- Few developers have capital resources and expertise to develop LNG projects



# Chevron Long Term Growth Areas include both Shale/Tight and LNG



# A Roadmap Forward



- Asian demand for gas and LNG is growing rapidly
- A number of challenges continue to limit cross-border pipeline gas trade in Asia
- Asia pricing hub faces challenges and will develop slowly
- LNG supply is becoming more flexible while providing security of supply
- LNG projects are complex, long-term developments requiring well-understood pricing based on deep, liquid markets.
- Unconventional in SE Asia has potential to add to the gas source supply but has more inherent risks / uncertainties.



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Rachmat Abdoellah, VP Planning & Technology,  
IndoAsia Business Unit  
Chevron Asia Pacific Exploration & Production Co.

