



**Our name signals our business focus in the Asia Pacific region**

Lantau Peak, on Lantau Island in Hong Kong, is also known as Chinese Phoenix Mountain, aptly reflecting the importance of renewal and reinvention to meet new challenges

Introduction to our Capabilities in Natural Gas

# About The Lantau Group

## Consultants to the Energy Sector

Competition, Markets, Regulation, Policy

Decisions Support Analysis

Disputes

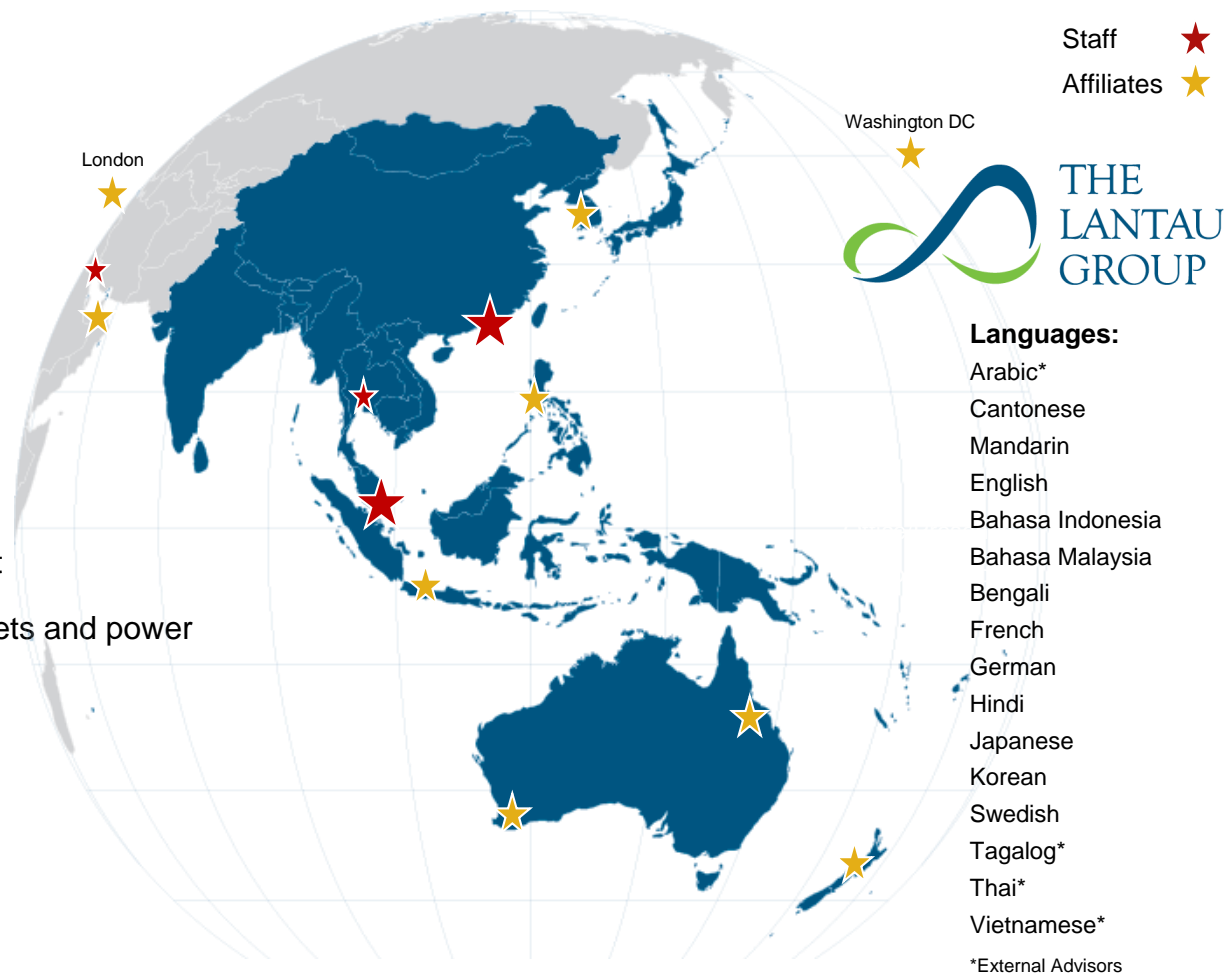
Market Analysis

Asset Valuation

Strategy and Advanced Analytics

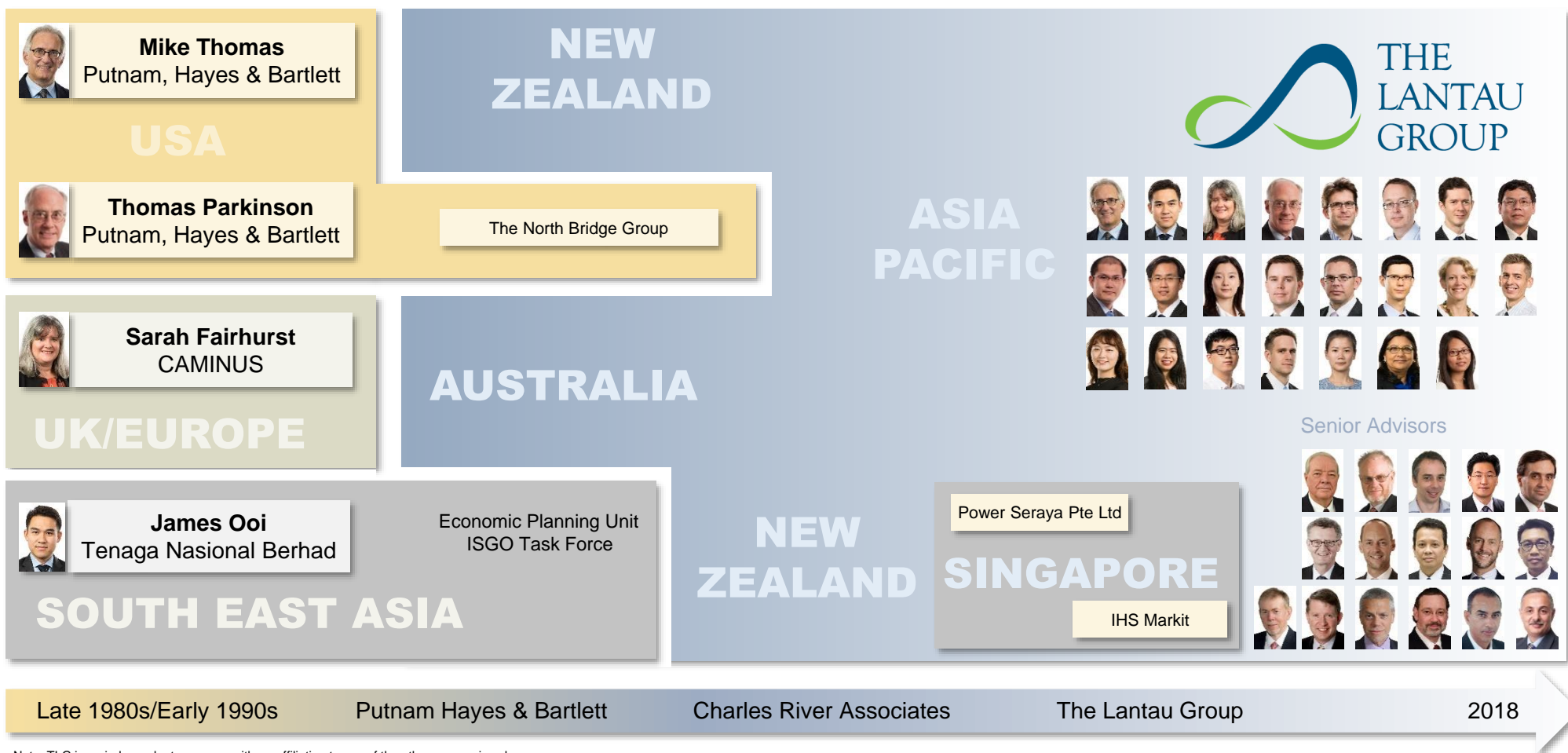
### Offerings:

- Strategic, commercial, and regulatory support
- Ability to connect the dots between fuel markets and power
- Analysis-based recommendations
- Highly relevant international experience
- Accessible experts focussed on the region
- Pricing, trends, drivers, risks



All of our work is related to the profound commercial, regulatory, and policy factors shaping the energy sector

# Decades of experience in commercial and regulatory matters across the globe



Deep and Experienced Team

# Working with some of the region's leaders on energy matters since 1997



Oil & Gas companies



Large Users



THE Brattle GROUP



Morgan Stanley



International Aid Agencies



Leading Utilities



Financial Institutions



Market and System Operators



Government Ministries



Regulatory Agencies



Independent Power Producers



# TLG's experts embody a diverse range of experience

## Myanmar

Energy market analysis as part of regional screening studies (Asia energy company)

Small-mid scale LNG to power study (Japanese multinational)

## China

Advise on gas sector liberalisation (government agency)

Gas demand and fuel switching study (IOC)

City gate gas pricing study in China (IOC)

## Vietnam

Gas and LNG demand supply, and cost and pricing outlook (Japanese LNG company)

Analysis of coal versus gas competition (Investor)

Gas master plan assistance (NOC)

## Thailand

Gas tariff reviews (Regulator)

Gas monetization strategy (Independent)

## Malaysia

Gas distribution tariff review (Utility)

Gas retail margin study (utility)

## Singapore

LNG demand for repowering program for genco (Generation company)

Energy mix policy (Regulator)

## Australia

Review of gas access code for (government advisor)

New pipeline from Victoria to South Australia (government advisor)

## Philippines

Philippine Natural Gas Masterplan (NOC)

LNG demand in WESM and other islands (IOCs)

LNG terminal studies (Lenders, Investors)

## Indonesia

Small-mid scale LNG to power study (Japanese multinational)

ADB sponsored assistance to PLN on the central Indonesia LNG for distributed power plants tender (Utility)

Marketing study on monetising remote gas as LNG (Independent)



# We combine deep energy sector expertise, analytical rigour and strategic insight

## The Lantau Group

### Analytical Rigour

We focus on what can be measured and substantiated. Qualitative assessments are typically reality checked using a variety of techniques. We provide independent, objective, well-grounded advice for decision-makers facing high stakes choices.

### Core Industry Expertise

We are dedicated to energy issues and electricity / gas markets in the Asia Pacific region.

This is what we do.

### Deep Experience

We gained our experience first-hand, working on seminal projects and on key assignments throughout the Asia and the rest of the world. We understand how regional energy and electricity markets have evolved over time because we have influenced that evolution through our work. We complement our commercial and strategy work with extensive experience advising regulatory agencies and policy makers.

### Multi-Disciplinary/ Perspective

We understand the fundamentals while recognising practical limits, political sensitivities, and commercial realities of each market. We see opportunities and risks from all angles – for the benefit of our clients

### Focus and Dedication

We own our company, so when we say we are dedicated to our clients we mean it. Our reputation matters. We are directly incentivized to assist our clients in ways that generates value over the long term. Furthermore, our senior team members are actively involved in the execution of mandates and assignments, interacting directly with our clients on a regular basis.

The analysis of power meets the power of analysis.



# TLG specialises in gas and power

## Commercial Advisory

- New market entry strategies
- Commercial opportunity for gas use for the power and non-power sector.
- Value of off-shore gas resources
- Power sector fuel contracting
- Power sales agreements
- Transaction structuring
- Timing and value of gas-fired power stations
- Value and volumes for LNG terminals

## Gas Market Analysis

- Addressable market for small-scale LNG
- Business strategy for market entry
- CNG transport and cylinder manufacturing
- Market for uncontracted gas
- Gas pricing by inter-fuel competition

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- Timing and value of gas-fired power stations
- Value and volumes for LNG terminals

Our power-side capabilities give us unique insights into the drivers of gas demand throughout Asia

# The TLG gas team

## Mike Thomas

Partner  
mthomas@lantaugroup.com



Mike has advised energy sector stakeholders on sensitive regulatory, commercial, and strategic matters for nearly 30 years. He is an expert in the rigorous analysis of energy sector decisions including: how or whether to regulate; how and when to rely on market forces; and the evaluation of opportunities and risks.

Prior to co-founding The Lantau Group he headed the Asia Pacific Energy & Environment practice of a global consulting firm. He has been based in the Asia Pacific region since early 1997.

Mike has an MPP from Harvard Kennedy School and a BA in economics from Carleton College.

## Sarah Fairhurst

Partner  
sfairhurst@lantaugroup.com



Sarah specialises in the space where commercial transactions and public policy collide – assisting both public and private sector clients to manage transitions. Prior to co-founding The Lantau Group, Sarah worked with CRA in Australia, New Zealand and Hong Kong for over 10 years.

Previously she led influential work streams in the Australian electricity and gas markets, privatising assets and designing and administering bespoke power procurement tenders. She has worked in the power sector within industry (PowerGen) and as a consultant since the start of the UK market liberalisation. She has lived and worked in Asia, Australia/NZ and Europe, and has extensive experience of these markets.

Sarah holds an MA from the University of Cambridge.

## James Ooi

Partner  
jooi@lantaugroup.com



James Ooi has 20 years of experience in the energy industry. He is an expert in areas related to energy market design, asset valuation, commercial contracting for gas and power (SPA, GSA and PPAs), corporate strategy, planning and operations, with experience across Asia Pacific, the Middle East and North Africa.

Prior to joining TLG, James headed the Gas & Power practice for a global consulting firm in Asia. In addition to consulting, James brings deep operational experience and has held management leadership positions at major generators and power utilities in the region. James is based in Singapore.

James holds an MSc and BEng in Electrical Engineering from the UK and is fluent in English, Mandarin, Cantonese and Bahasa (Malaysia and Indonesia).



# The TLG gas team

## Dr Thomas Parkinson

Partner Emeritus  
tparkinson@lantaugroup.com



With 30 years of consulting experience in energy, natural resource and other commodity-based industries, Tom helps clients rigorously evaluate high stakes choices, develop better strategies and design effective commercial and regulatory arrangements.

Prior to co-founding The Lantau Group, he worked with Charles River Associates in Asia. With experience spanning projects in 15 countries across four continents, he brings deep insight to his work in markets and utility regulation, as well as in the effective application of quantitative techniques to improve value capture.

Tom holds a PhD from Stanford University.

## Liutong Zhang

Senior Manager  
lzhang@lantaugroup.com



Liutong has worked extensively on projects involving detailed analyses of many Asian energy markets for a range of clients including power producers and retailers, financial investors, regulatory bodies, financial stakeholders, and policy makers. In China, he provides detailed province-level analyses of China's energy sector, including advice to clients on renewable curtailment, opportunities for hydro-power, and the economics coal-fired power plants. He has presented in energy briefings and conferences and is called on by Reuters, Platts, Dow Jones and other recognized media.

Liutong holds a Bachelor of Chemical Engineering from the National University of Singapore (NUS). He is fluent in English and Mandarin.

## Céline Paton

Manager  
cpaton@lantaugroup.com



Céline Paton is an economic expert in energy infrastructure projects. Prior to joining TLG Céline was a freelance Energy Infrastructure Consultant specialising in on-grid renewable energy auctions, liquid fuel storage terminals and gas-to-power infrastructure initiatives. She has completed many projects with development finance institutions and power utilities, mainly focusing on Africa. She also worked for 5 years in export and project finance at BNP Paribas Fortis.

Céline holds a Master in International Business Economics from Leuven School of Business and Economics, a Master of Business Economics from Louvain School of Management and a Bachelor of Business Science in Management from Facultés Universitaires Saint-Louis, Belgium. She speaks fluent English and French.

# The TLG gas team

## Wendy Yong

Consultant  
wyong@lantaugroup.com



Wendy Yong has worked extensively in Asia's oil and gas markets. Prior to joining TLG, she held the position as the Subject Matter Expert (SME) on Greater China and East Asian markets for a global energy research firm in Asia based in Singapore. Wendy has strong background in quantitative commercial and regulatory analysis.

Wendy holds an MBA from the University of Cambridge and a BBA (Honours) in Management and Operations & Supply Chain Management from the National University of Singapore. She is fluent in English and Mandarin.

## Dr Jan Stempien

Consultant  
jstempien@lantaugroup.com



Jan Stempien is an expert in new energy technologies and associated policies. Dr Stempien has worked as an energy systems researcher in Singapore, Germany, and Hong Kong. He has published widely in top tier journals on energy storage technology and energy policy design and has also worked on projects related to mobility, buildings, and microgrids. While in Singapore, Dr Stempien was a registered power sector expert for Singapore's National Climate Change Secretariat.

Jan holds a BSc degree in Power Engineering from Warsaw University of Technology and PhD in Electrochemical Energy Systems from Nanyang Technological University.

## Dave Carlson

Senior Advisor  
dcarlson@lantaugroup.com



Dave is an experienced energy market operator, designer and change manager with a track record spanning Asia, Africa, Australia and New Zealand. Most recently he was a Senior Business Development Director at SGX, responsible for new initiatives in the gas and power sectors. Prior to that he served for 10 years as the COO and CEO of the Energy Market Company, EMC, the national electricity market operator for Singapore. Dave has served on and chaired many industry and governance panels to further liberalise energy markets including market rules covering such topics as market rules evolution, the implementation of retail contestability, developing gas trading and introducing electricity derivative products.

# The TLG gas team

## Robert S Linden

Senior Advisor  
rlinden@lantaugroup.com



Bob Linden has devoted his professional career to the study of the intersection of energy markets and policy, from the perspective of a business executive, industry consultant, and independent market analyst. He has advised clients ranging from energy cooperatives to oil majors, and from local citizen groups to multi-national lending institutions, for the past 20 years. His work is based on a profound understanding of gas market strategy across the world. His independent research has focused on technological change, resource economics, market fundamentals, and industry regulation.

Mr Linden holds a BA, summa cum laude, in analytic philosophy from Lawrence University, and a BS, magna cum laude, in chemical engineering from the University of Maryland.

## Professor Wook Kim

Senior Advisor  
wkim@lantaugroup.com



Professor Kim has more than 25 years' experience in investment and financial analysis in energy and power industries; electric power economics and electricity market simulation; renewable energy and carbon market; smart grid and microgrid design and investment analysis, and optimization of power system operation and planning.

Currently a professor at Pusan National University, Wook previously worked as manager of the Overseas Business and Power Trading Departments at Korea Southern Power Corporation and as an equity analyst of the utility sector at Samsung Securities, and has been involved in market developments for many years.

Wook holds a PhD from Seoul National University.

## Peter Littlewood

Senior Advisor  
plittlewood@lantaugroup.com

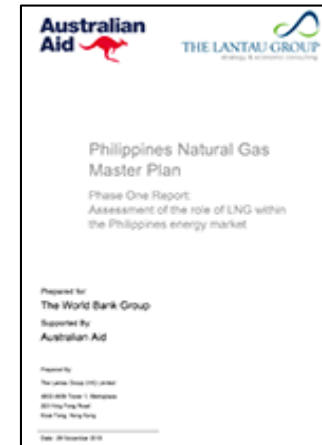


Peter Littlewood is the former Group Director – Operations for the CLP Group in Hong Kong. He was responsible for developing power projects in Hong Kong, China, India, Australia and other Asia Pacific countries over a 40-year career in the power industry that has seen the start of a transition from fossil fuels to renewable technology. He implemented projects using conventional, nuclear, hydro, wind, solar and biomass technologies during the period when CLP became the largest international investor in the Asia Pacific power market and the largest external investor in the China power market.

Peter Littlewood holds an MA Degree in Engineering (First Class Honours) from the University of Cambridge and completed the Harvard Business School Advanced Management Programme.

# We are known for innovative solutions to new challenges

- Our robust understanding of power generation economics throughout Asia give us unique insights into the value of all aspects of the gas supply chain
  - Gas versus coal
  - Gas for mid-merit and peaking
  - Gas-fired generation technologies
  - Value of flexibility versus traditional take-or-pay arrangements
  - Value of breakbulk and small scale LNG
  - Diesel displacement
  - Environmental benefits
- We develop innovative regulatory and commercial structures to capture value and enable successful projects



## Credentials and experience

What is the opportunity for **gas** in Asia?

Can you help us understand **power and gas pricing** in China?

Can you help us develop and privatise **IPPA** arrangements in the Philippine WESM?

What are the elements of a **prudent regional investment** strategy?

How is **nuclear power** contracted and how is it developed in new markets?

How much is a stake in a **global power** portfolio worth?

What is the optimal **fuel mix**?

Is my small scale **LNG** proposal viable?

What is the addressable market for an **energy storage** solution?

How much to pay for a Singapore **genco**?

How should **transmission** investment decisions be made?

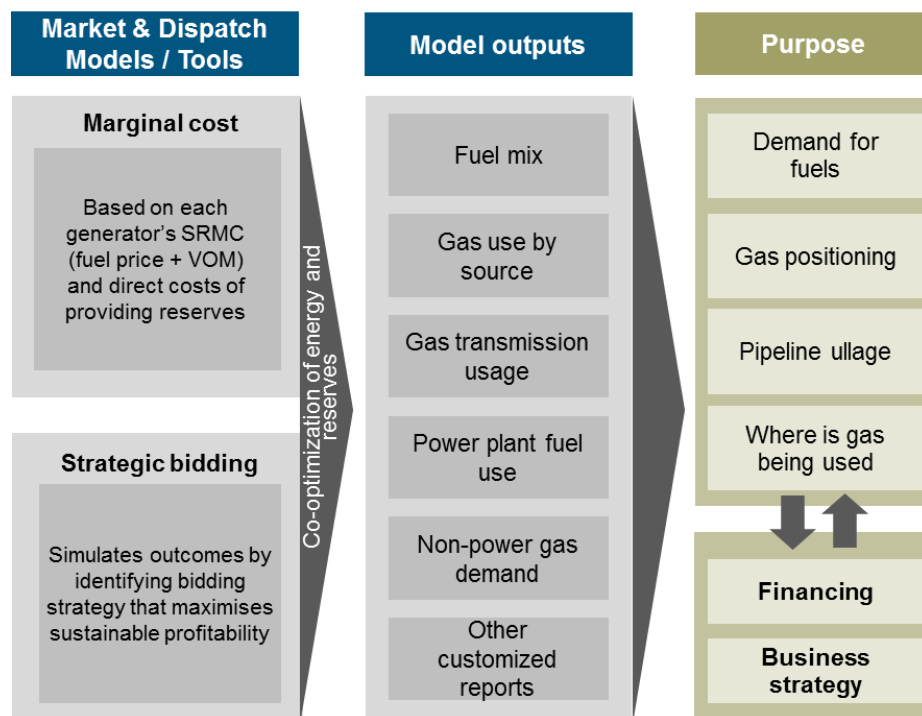
How should “**capacity**” be remunerated in the Korean Cost-Based Pool?

What is optimal **value** of undeveloped offshore gas?

How to manage **stakeholder** expectations during periods of cost uncertainty?

The next few slides highlight some of our experience – focussing on natural gas

# Fuel to power optimisation model: how does gas find value?



- Central to some of our analysis is our fuel-to-power model that will simulate the demand for fuel by the power sector, and also the demand for gas by the non-power sector.
- Numerous insights can be gained from the outputs of a simulation run, such as the demand for all types of fuel, the demand for gas/LNG, the demand for a particular source of gas, what gas is stranded, infrastructure utilisation, where on the power system gas is being used and where it is not needed.
- As it is a fuel-to-power model it also captures constraints on the gas transmission system. This will of course be very useful in determining the ullage over time in the transmission pipelines for potentially available backfilling by new supplies of gas.
- With this very powerful tool the study can run various sensitivities.



## Our In-House Market Model

According to Chinese legend, in a year of drought, the giant Kua Fu chased the sun, seeking to capture and tame it to better serve mankind. For us, this is the inspiration to keep chasing our goals.

Our fuel to power model is very useful for running sensitivities



## Japanese LNG company

### Scope

- Commentary on energy policy
- Gas market structure
- Price of gas and competitive fuels
- Current and future outlook of supply/ demand of gas and competitive fuels

### Work

- The key features of the latest gas master plan were outlined. Some cautionary notes signalled on parts that looked over ambitious.
- The gas market structure was analysed from several angles. The key players in upstream, midstream and downstream were highlighted. The routes and capacity of current and future gas pipeline infrastructure were described.
- The cost of gas along the value chain from upstream to different end users was analysed and cross subsidies explained.
- Based broadly on power plant new build in the official power development plan, different sensitivities were run to gain insight into the need for LNG imports.

### Benefits

- Improved understanding of key features of the Vietnamese gas market.
- Provided demand curve and pricing of gas by sector.
- Analysed domestic gas and imported LNG in supply curves.
- Insights into drivers and hurdles that could affect timing and size of LNG demand.

Provided analysis into the domestic gas market and the need for imported LNG

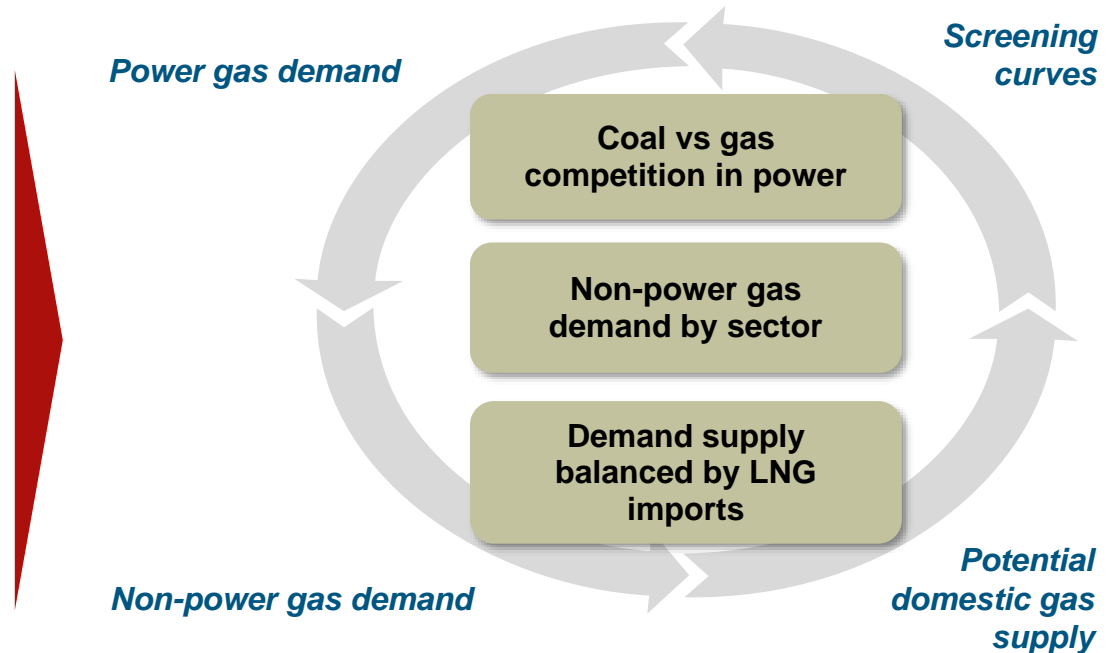
# Case study

## Indonesia – potential demand for imported LNG

### Context

- An international LNG company wished to understand the key drivers, hurdles, costs and pricing that would influence the need for imported LNG.
- Demand for gas/LNG analysed by sector and price
- Supply of gas stacked up by region by wellhead cost plus transmission cost.
- Demand supply balance revealed the need and likely price range for imported LNG.

### Approach and value added



We provided client with the insights for its LNG strategy

UK listed E&P  
company

### Scope

- An E&P company had uncontracted natural gas reserves and wanted to evaluate options to monetize the gas by supplying this as LNG to domestic markets.

### Work

Due to the remote location of the gas field, the delivery of the LNG by truck on roads and via river on barges were evaluated.

A high level investigation was made on features of the river, with several potential navigational issues identified.

Maritime transport solutions to take LNG down river to markets in Kalimantan were costed and described.

The LNG was in the competition with other fuels in the power and non-power sectors so its competitiveness against these other fuels was analysed and the potential attainable market size was quantified.

### Benefits

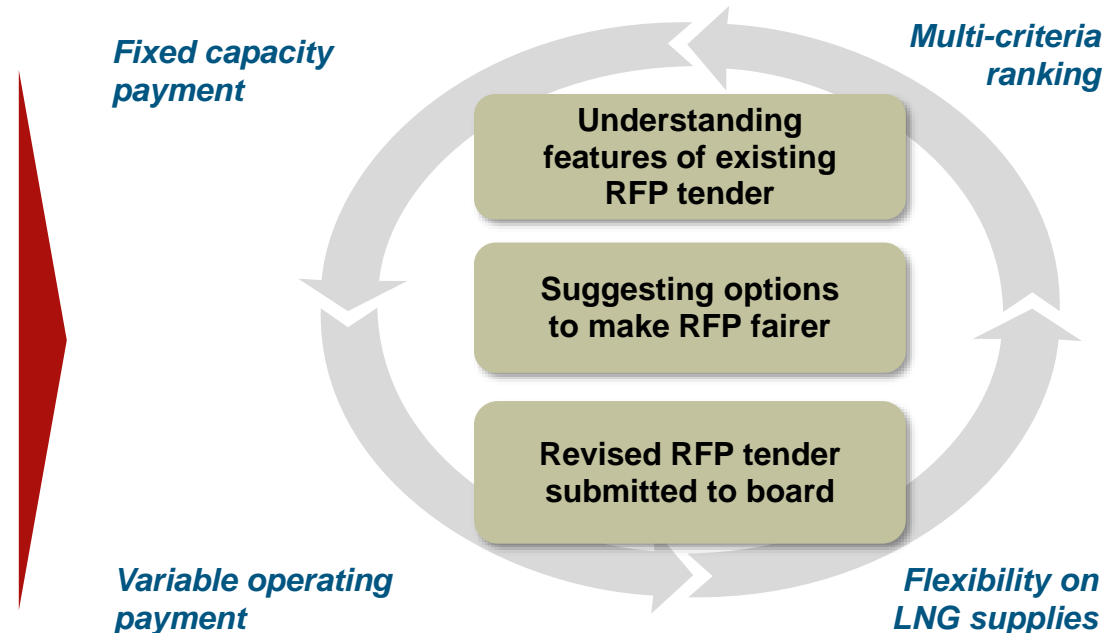
- Improved understanding of interaction between the features of the river and maritime LNG solutions.
- The relative competitiveness of LNG against other fuels analysed.
- Potential demand in different sectors in power and non-power quantified.

Initial market analysis indicated enough potential demand to use all LNG production

### Context

- The state power company wished to achieve the supply of LNG to power stations located on the islands in the central area of the Indonesia archipelago.
- A multilateral engaged TLG to assist with the drafting of a large turnkey tender for the provision by bidders of terminals, jetties, vessels, on a build operate transfer basis, and, also the supply of the LNG commodity to new-build PLN power plants.
- Recommendations were made to make the commercial structure more workable for both the bidders and PLN, subject to local legal and regulatory constraints.

### Approach and value added



We provided the client with advise on how to structure payments so that risks were shared more evenly thus making the project more attractive to potential bidders

# Thailand gas tariff guideline review and recommendations

## Reviewing guidelines and making recommendations on next steps towards best international practice

Review current status of tariff setting guidelines as set by regulations, government policy and other laws.

Determine which are subject to amendment by the regulator and which are fixed by a higher government body.

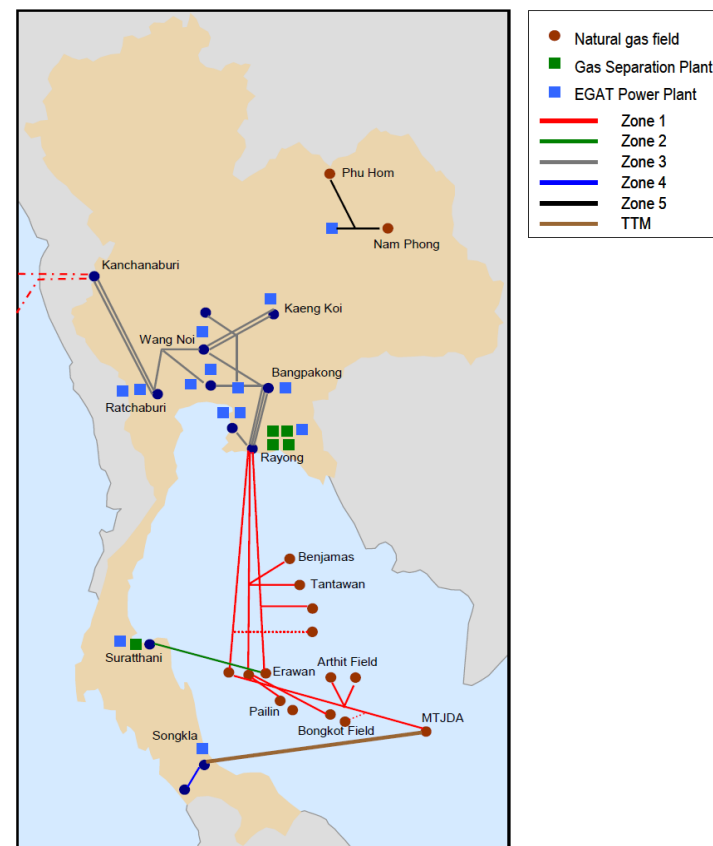
Describe method behind those that are fixed and assess robustness of approach.

Interview license holders and review documentation to discover details of methodology of current tariff setting compared to guidelines.

On those that are amendable by the regulator make recommendations to make gas tariff guidelines reflective of appropriate risks and cost recovery.

Assist with implementation of building block approach to infrastructure pricing.

## Thailand gas infrastructure – how to set correct prices?



Steps taken towards fairer prices for customers and better compensation for risks to suppliers

# Benchmarking study for bundled Southeast Asia gas distributor and retailer

## Core analytical components

WACC for pipeline part of the business

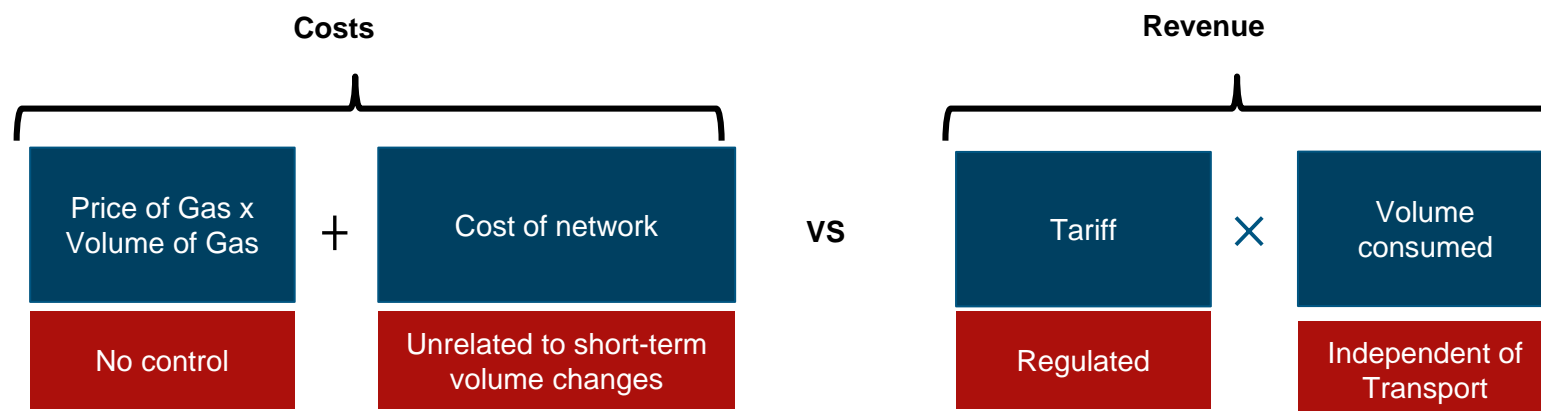
WACC for receivables and working capital part of operations

Operating margin for retailing part of the business

Appraise cost-pass through for retailing and comparison with regime in other jurisdictions

Advise on interaction with regulator on transitioning to a more liberalised regime

## Addressing possible misalignments between costs and revenues

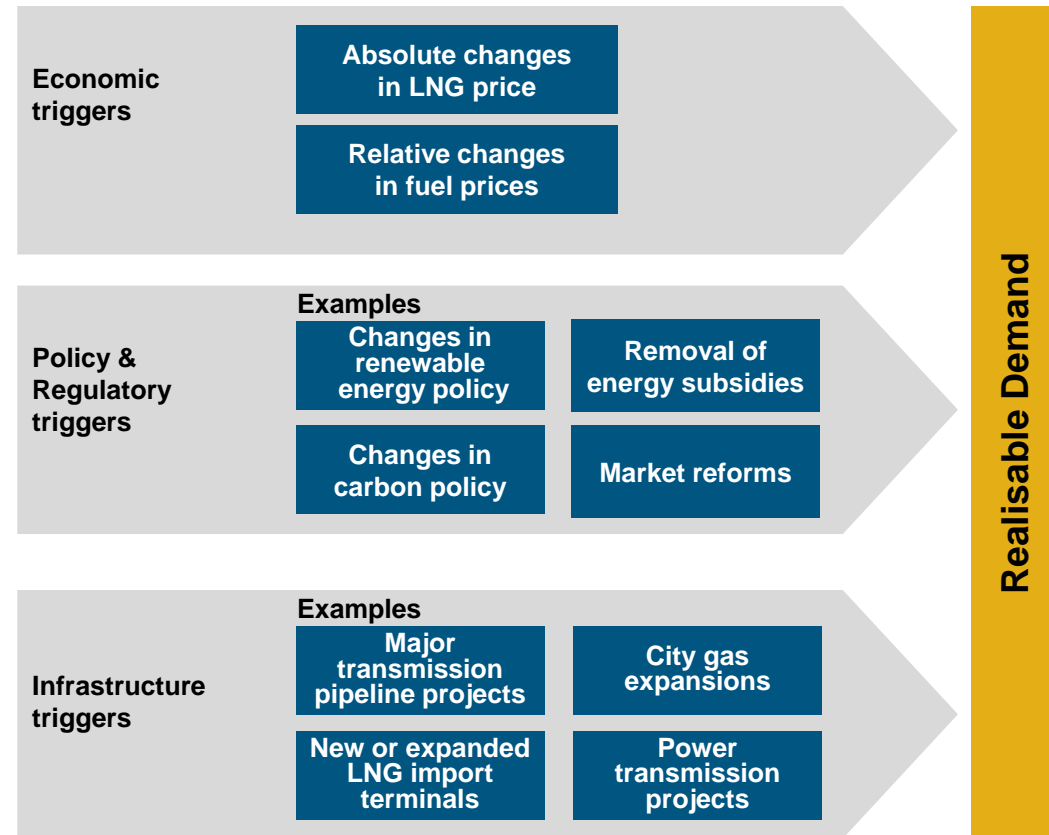


Asset light businesses still need a return to cover risk,  
and asset heavy businesses need certainty on recovery of investments



# Switching potential for LNG in power and non-power

- Analysed key drivers working for and against switching opportunities for LNG in power and non-power sectors in a wide range of countries across Asia and the Middle East and Turkey.
- Assessed demand for LNG driven by short run and long run relative power sector economics but also local factors such as policy, regulatory and social considerations, and infrastructure.
- Developed monthly forecasts by country and sector to capture any seasonality.



Ten key drivers of opportunity for LNG identified in multiple markets

# Case study

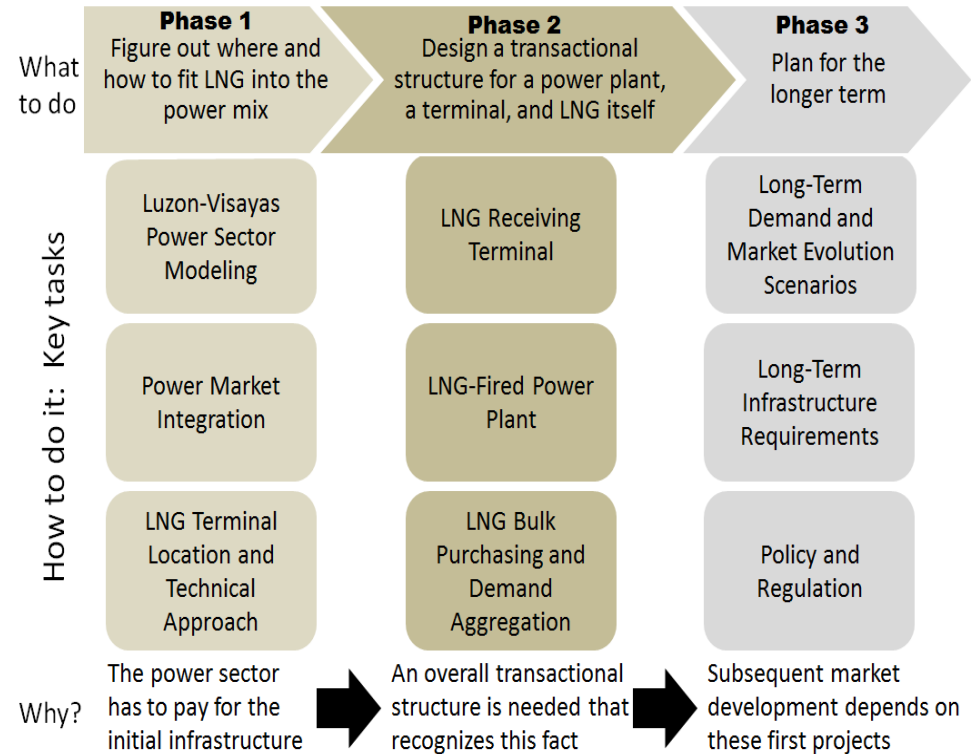
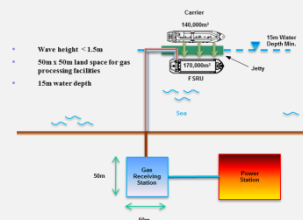
## Development of Philippine Gas Master Plan (1)

Philippine  
Department of  
Energy  
(supported by  
World Bank  
and AusAid)



### Scope

- Assist with the development of a Masterplan for natural gas (LNG) imports into the Philippines



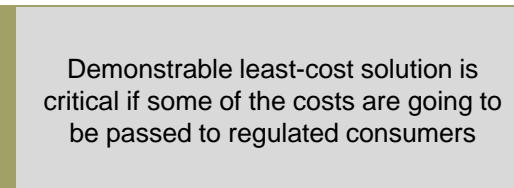
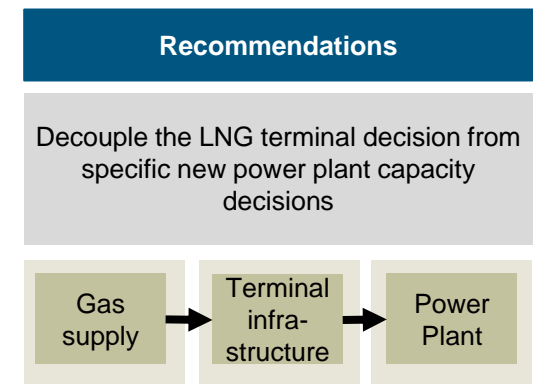
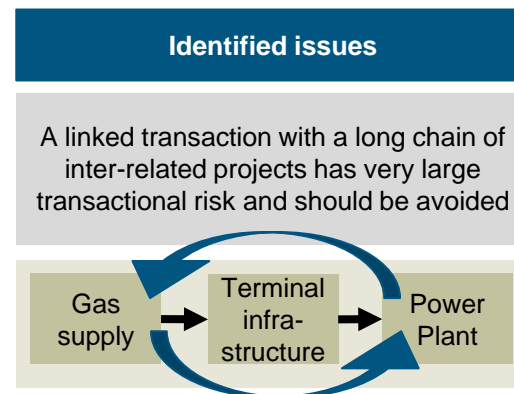
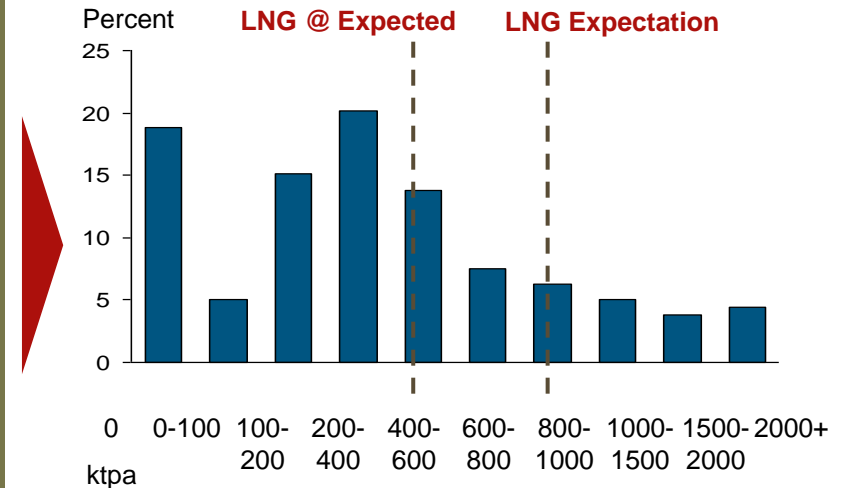
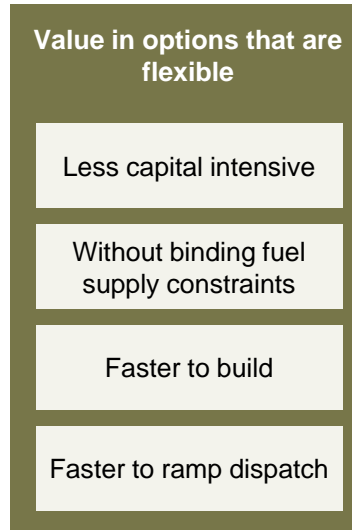
# Case study

## Development of Philippine Gas Master Plan (2)

We modelled the electricity market to identify both the amount and the variability of potential gas demand. Then we analysed barriers to development of an LNG terminal and developed a options to overcome those barriers.

Key takeaways from this project included the exceptionally high value of supply flexibility, which requires innovative approaches.

Flexibility requires significant decoupling of infrastructure investment from gas purchasing, which require more innovative commercial models for financing terminals and purchasing gas in Asia.

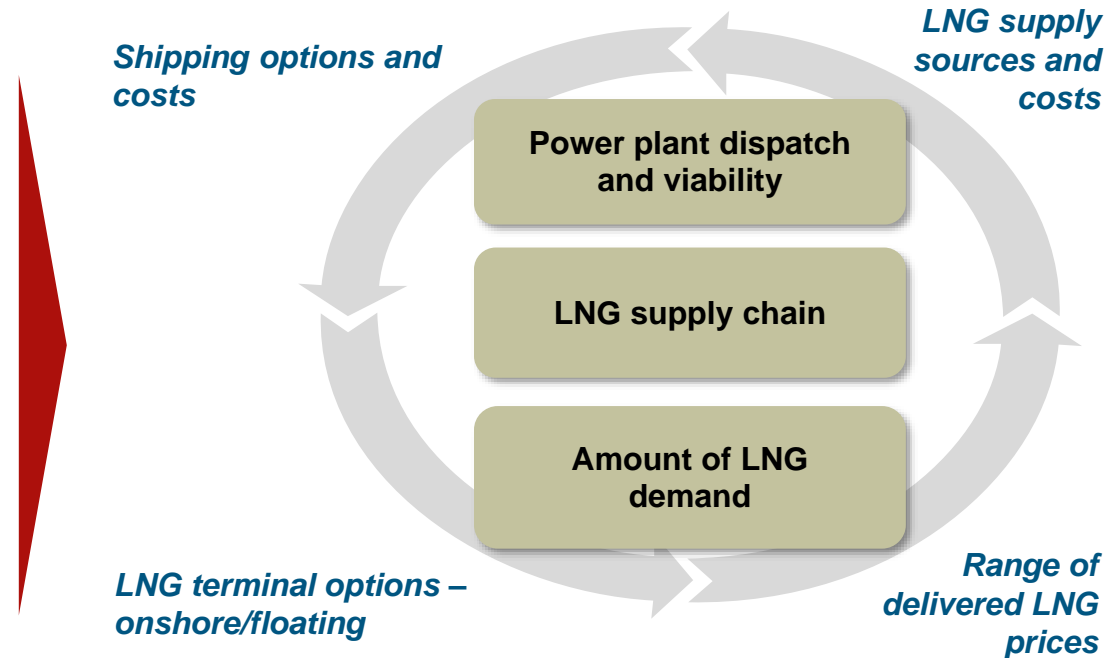


- Market-test the opportunity through an open season for capacity
- Competitive selection process to find infrastructure supplier

## Context

- New build is dominated by coal plant and solar which provide competition for gas fired plants using regasified LNG.
- The decline in domestic piped gas and an end to high take-or-pays should see new gas/LNG supply fit into a mid-merit role.
- Examine the viability for small CCGTs in the Philippines using LNG as fuel.

## Approach and value added



Viability of CCGT plant determined across a range of demand and supply side variables

## Case study

# Philippines – LNG terminal assessment

### Investor into LNG terminal in the Philippines

#### Scope

- Assess the long term demand for gas/LNG in the Philippines and especially Luzon.
- Determine likely range of through-put at LNG terminal.

#### Work

- Demand by the power sector was appraised based on type of new build power plant, gas pricing relative to other fuel costs, regas costs, new pipeline buildout and access.
- In the non-power sector the initial displaceable demand was estimated from data on use of other fuels such as diesel, PLG and fuel oil. Inter-fuel economic analysis revealed the extent to which RLNG did or did not under cut existing fuels. Delivery methods analysed and costed were by truck and by pipeline.
- In addition, the potential to displace traditional fuels on other islands in the Philippines with transhipments of LNG from Luzon using small scale LNG technology was analysed.

#### Benefits

- The potential investor got a much better understanding of the likely range of throughput volumes at the terminal allowing for a more informed financial analysis.

Range of through-put volumes for the LNG terminal supported financial modelling

# Global benchmarking study for Southeast Asia gas shipper

## Key steps in approach

Established very extensive database on global peer group

Collated data on international gas transmission and distribution tariffs

Normalised key performance indicators

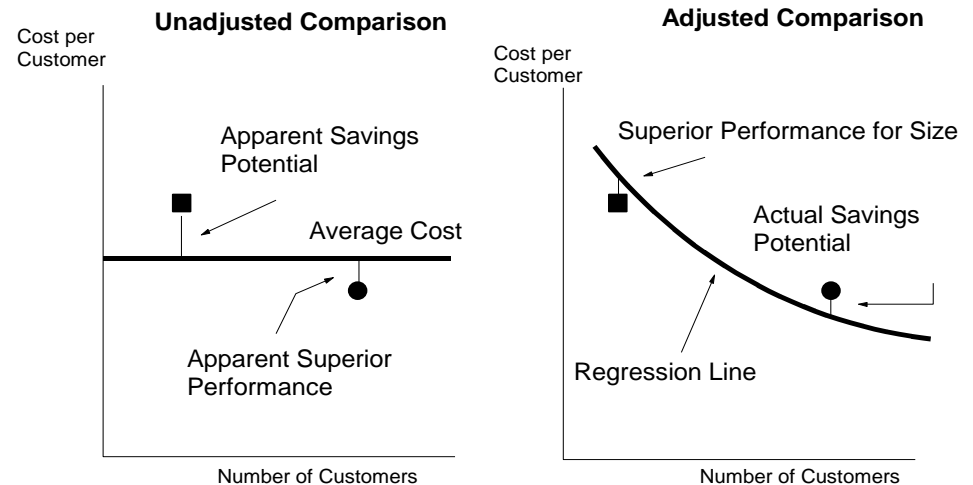
Narrowed peer group down using similarity factors to client based on relevant operational metrics

Developed comparable customer profiles

Assessed client performance against benchmarks

Offered guidance on future interaction with the regulator on incentive based regulation

Normalisation is key to benchmarking as each utility has unique characteristics



Finding deeper insight into performance against its peers



## Case study

# High level summary of LNG demand in Asia

National Oil  
Company

### Scope

- Forecast LNG demand for all countries within Asia and also in India.
- Comment on usage of existing LNG terminals and timing of new ones.

### Work

- Updated country by country demand for fuel for power and non-power.
- Derived what part of that fuel would be met by domestic gas and what part by LNG,
- Considered each countries' main alternative for fuel for power other than gas.
- Analysed the effect of environmental policy on gas demand.
- Investigated current usage and future build out of LNG terminals,
- Assessed which LNG projects were at greatest risk of cancellation.

### Benefits

- Client got a better understanding of the timing and scale of future LNG demand for each target country.

Opportunities for LNG marketing identified

# Case study

## How to price gas/LNG?

### Regional National Oil Company



#### Scope

- With a huge divergence gas prices in different part of the world the NOC wished to review gas pricing methods and understand the pros and cons of each

#### Work

- Examined current gas pricing levels and mechanisms for transmission and gas pricing in China and Southeast Asia
- Addressed recent and proposed changes in these mechanisms
- Review differences in supply and demand across various countries
- Develop a hands-on workshop to evaluate how gas might be priced relative to alternative sources of power sector supply (such as new coal build)

#### Benefits

- A deeper understand of the pros and cons of different price setting mechanisms
- Ability to provide more effective input into future gas policy decisions



Client used insights to enhance interactions with policy makers

## US Major

### Scope

- The company had discoveries of offshore associated gas
- Was there sufficient demand of natural gas to support monetisation efforts given a push by the government for coal build power plant in south Vietnam?



### Work

- We developed and analysed key inputs such as prices for oil, fuel oil and coal, and also power demand
- Evaluated regulatory and policy risks, including how comparable gas resources had been priced and regulated
- Developed sensitivities related to competition between gas and coal for power generation which showed strong economics for more coal and less gas
- Identified pipeline constraints as a further complicating issue

### Benefits

- The demand outlook for what could be low priced associated gas was clearly positive
- But the status and size of the gas reserves impacted on when the gas would get to market
- A large proven resource might justify a new pipeline enabling early entry, smaller proven reserves would mean joining the queue to get into the existing pipeline

Client determined to exit market, choosing to devote money and resources towards more valuable endeavours elsewhere

# What is the commercial opportunity for trucked LNG in Thailand?

UK-based  
independent  
exploration  
and production  
company

### Scope

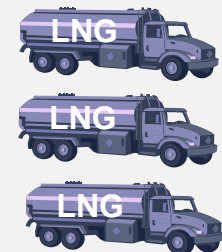
- An exploration and production company wished to assess marketing options for its on shore gas resources

### Work

- There is no pipeline network in the northeast of Thailand that reaches industry, so other deliver methods for gas were considered
- Small scale LNG was selected
- We established the delivered price that industry was paying for fuel and LPG
- From this we subtracted the breakeven cost of the entire value chain from liquefaction, trucking, storage and vapourisation
- The difference between the two indicated that there was sufficient economic rent or wellhead price to justify the build out of small scale LNG delivery by truck to industry to displace fuel oil and diesel

### Benefits

- Client better understood one option for monetising onshore gas.
- This helped with investor presentations



Trucked small scale LNG is gathering momentum

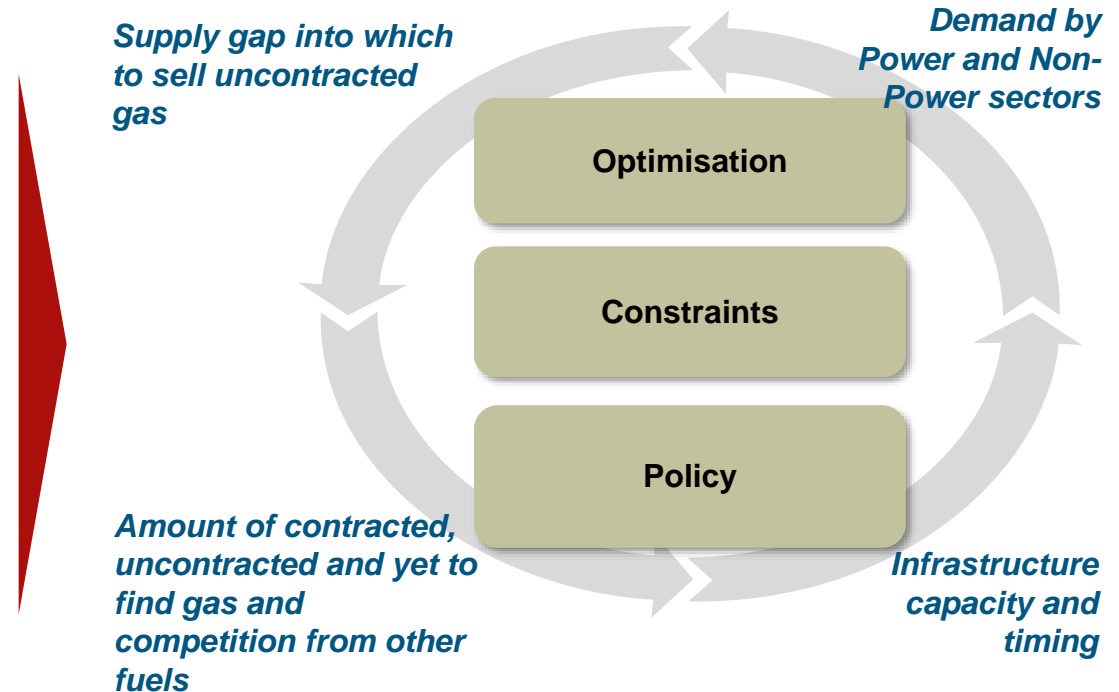
## Assessing the market for uncontracted gas in Southeast Asia

### Gas Demand Supply Balance

- Detailed fundamentals driven analysis that forecasts the demand supply balance for gas into power and industry
- Key insights were: the demand supply gap into which upstream probable and possible gas reserves could be marketed, infrastructure utilization, power station dispatch, pricing and economics of piped gas, LNG, NGL, NGV and electricity

Indonesia  
Malaysia  
Singapore  
Thailand  
Vietnam

### Approach and value added



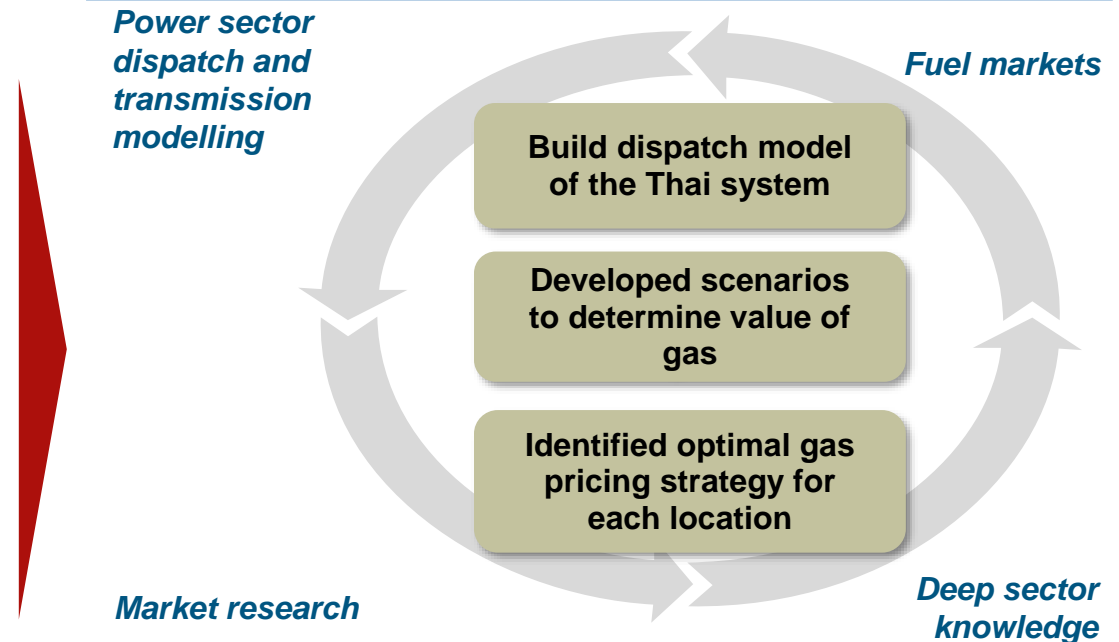
The opportunity for development of uncontracted gas in Southeast Asia remains significant

## What is optimal value of undeveloped offshore gas?

### Context

- Client had substantial offshore gas resources
- By optimising the timing of development, the client could capture greater value
- Alternative to gas was coal and energy imports from neighbouring countries
- Client wanted a detailed analyses of the Thai and Malaysian electricity sectors to assess the relative economics of gas versus coal in different regions

### Approach and value added



We provided client with the insight and analytical backup necessary to gain approval from its global headquarters for its negotiating and expansion strategy



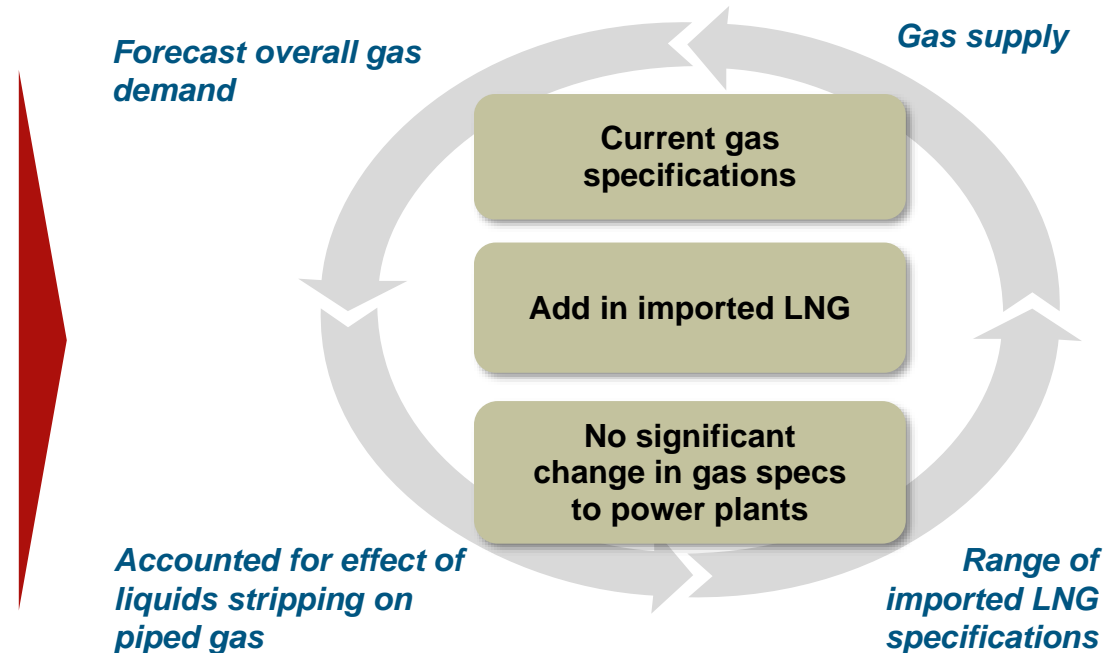
# Case study

## Effect of LNG on gas mix in Thailand

### Context

- The company wished to understand what import gas options existed for Thailand. We addressed Overlapping Claims area with Cambodia, smaller regional gas resources that might be suitable for CNG, global LNG availability and LNG gas composition.

### Approach and value added



Imported LNG would not change gas specifications for power plants within a medium term time horizon

# Many of our projects delve into the implications of gas use in merchant electricity markets



<b>1998-2001</b> Creation of gas vesting contracts in South Australia <i>New gas trading company</i>	<b>2008</b> Assessed demand in Singapore for LNG by the power sector <i>IOC</i>	<b>2010</b> LNG demand for power plant repowering <i>Singapore genco</i>	<b>2010</b> Privatisation of gas fired power plant <i>PSALM</i>
<b>2008-2009</b> Valuation of various power companies <i>Various international investors</i>	<b>2013</b> Innovative natural gas master plan <i>World Bank Group</i>	<b>2013</b> WESM advisor for LNG to power project <i>Confidential</i>	<b>2012</b> Strategy advisor for an LNG to power sector <i>Oil Major</i>
<b>2012</b> Feasibility of LNG-fired power station <i>Power plant investor</i>	<b>2013</b> Impact of fuel constraints on the Singapore electricity market <i>Internal</i>	<b>2014</b> Gas-based fuel mix policy <i>Regulator</i>	<b>2016</b> Assessed viability for new LNG fired CCGT <i>Power company</i>

Key issues include the implications of gas flexibility, how gas competes with coal in different market segments and how merchant strategies impact on gas use

# We also study gas tariffs, regulation and pipeline issues



2001-2002



Development of a new gas pipeline from Victoria to South Australia  
*Australian government*

2002



Review of national gas access code  
*Victorian Government*

2008



Fuel price forecasting for IPP round  
*Ministry of Energy*

2012 and ongoing

China, Japan, Taiwan gas & power price forecasting  
*Multinational manufacturing co.*

2010



Arbitration on piped gas pricing dispute in Singapore  
*Confidential*

2010



Analysis of the impact of alternative LNG pricing arrangements  
*Confidential*

2012



Workshop on regional gas price methodologies  
*NOC*

2010-2012



Changes to tariffs for gas transmission after the introduction of LNG  
*Regulator*

2011 - 2012



Gas pipeline tariff review  
*Energy Regulatory Commission*

2014



Benchmarking network performance  
*Gas Transmission and Distribution Company*

2015



Reviewing WACC and retailing margins  
*Gas Distribution and Retailing Company*

2015-2016












Gas tariff guideline review  
*Energy Regulatory Commission*

Our work spans infrastructure and gas opportunities across the Asia Pacific region

# And understand fundamental supply-demand analysis and its implications



<div>2004</div> <div></div> <div>Korea city gas demand study <i>NOC</i></div>	<div>2006</div> <div></div> <div>Gas demand supply study <i>IOC</i></div>	<div>2007</div> <div></div> <div>Aceh and North Sumatra gas market overview <i>E&amp;P company</i></div>	<div>2006</div> <div></div> <div>Gas demand supply study <i>E&amp;P company</i></div>
<div>2009</div> <div></div> <div>Gas demand study on Northeast Thailand <i>E&amp;P company</i></div>	<div>2008</div> <div></div> <div>Gas master plan assistance <i>NOC</i></div>	<div>2006 to 2010</div> <div></div> <div>Southeast Asia fundamentals gas demand supply balances <i>Various E&amp;P Companies</i></div>	<div>2013</div> <div></div> <div>Asia LNG price forecast <i>US investor in liquefaction plant</i></div>
<div>2014</div> <div></div> <div>Switching demand for in power and non-power in Asia and Middle East <i>IOC</i></div>	<div>2016</div> <div></div> <div>Demand for gas in power and non-power, and, need for imported LNG <i>LNG Company</i></div>	<div>2016</div> <div></div> <div>Indonesia gas market study and need for imported LNG <i>LNG company</i></div>	<div>2017</div> <div></div> <div>Vietnam gas demand-supply balance and need for LNG <i>LNG company</i></div>

Our work spans infrastructure and gas opportunities across the Asia Pacific region

# We have a strong record in market entry and transaction support



2004 


SEA market study for uncontracted Sumatra gas  
*US major*

2005 

Sale of a gas pipeline inter-connector in Europe  
*Gas companies*

2005 

China - assessed the market for LNG in Guangdong  
*LNG seller*

2003 

Comparing new build options of gas versus coal fired plants  
*E&P company*

2006 

Sale of gas retail business  
*Australian state*

2003 

Divestiture of assets and country exit in Norway  
*US Energy company*

2008 

Gas storage farm out in the UK  
*Gas company*

2010 

Marketing support to sell gas to small power producer  
*E&P company*

2013 


LNG business development in Southeast Asia  
*Australian E&P company*

2013 

Market entry support to sell LNG to industry by truck  
*Overseas company*

2016 

Advisor for investor in LNG terminal  
*Confidential*

2017 

Using small scale LNG technology to displace existing fuels  
*E&P company*

Our work spans infrastructure and gas opportunities across the Asia Pacific region

## As well as a wide range of other issues



2004



Effect on gas specification  
and on power sector of  
LNG to gas mix.  
*IOC*

2005



Roadmap for development  
of Malaysian ESI  
including gas issues  
*Tenaga Nasional*

2006



Study of benefits of  
Kimanis LNG terminal vs  
pipeline to Bintulu  
*IOC*

2008



Overview of the  
economics of CNG in  
transport  
*E&P companies*

2009



CNG study for gas  
supplier in Uzbekistan  
*North Asia Gas Company*

2014



Small scale LNG  
*LNG equipment suppliers*

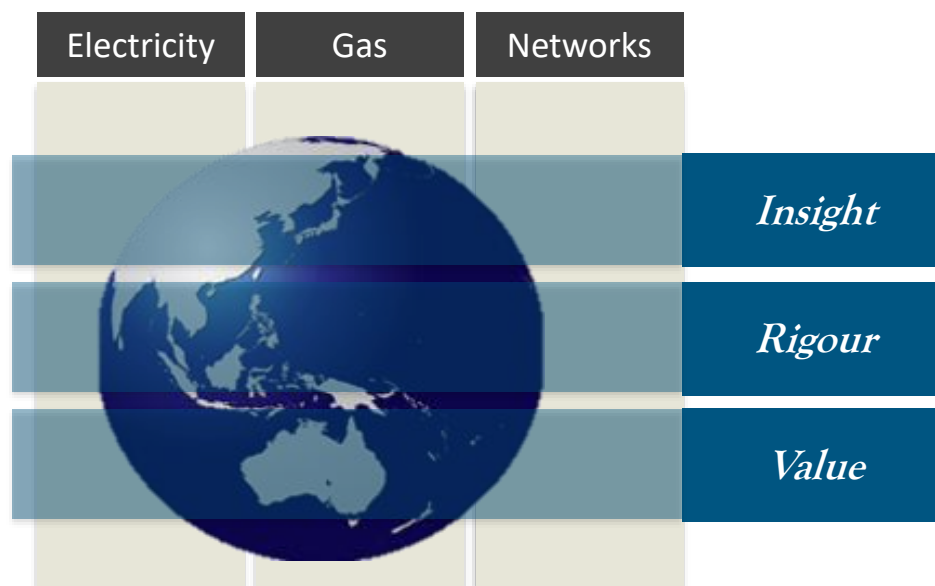
2016



Small scale LNG tender to  
supply central archipelago  
*Multi-lateral & state power  
company*

Our work spans infrastructure and gas opportunities across the Asia Pacific region

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