



THE LANTAU GROUP  
strategy & economic consulting

# The cost of an overly constrained decision process: three real world challenges

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## What is an overly constrained decision process?

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A overly constrained decision process leads to bad decision:

- ***the problem has been over-simplified***
- ***the range of possible solutions is too limited***
- ***potential flexibility is ignored***

Leading to higher cost outcomes

**Market mechanisms and more sophisticated regulation can be a help**

## Three examples where we have seen overly constrained decisions...

Challenge	Environmental	Power Procurement	Fast Flexible Power
	<b>Integrating LNG into the fuel mix</b>	<b>Optimizing the economic life of a power station</b>	<b>New technologies that have complex benefits and costs</b>
Obstacles	<ul style="list-style-type: none"><li>Setting specific fuel mix targets / constraints</li><li>Averaging lower priced domestic natural gas and new LNG (hiding the real cost)</li><li>Dealing with price volatility</li></ul>	<ul style="list-style-type: none"><li>Regulatory incentives that inadvertently reward replacement of depreciated plant</li><li>Failing to incorporate a full range of alternatives when evaluating PPA extension</li><li>Setting participation rules that unduly limit the field in competitive tenders</li></ul>	<ul style="list-style-type: none"><li>Omitting new technologies in generation expansion planning processes</li><li>Omitting generation or demand-side options when evaluating network support applications</li><li>Using valuation methodologies that under-value optionality and flexibility</li></ul>

**The impact of getting these decisions wrong can run in the USD hundreds of millions for larger projects, or can cumulate over time from missed opportunities**

# Three examples where we have seen overly constrained decisions...

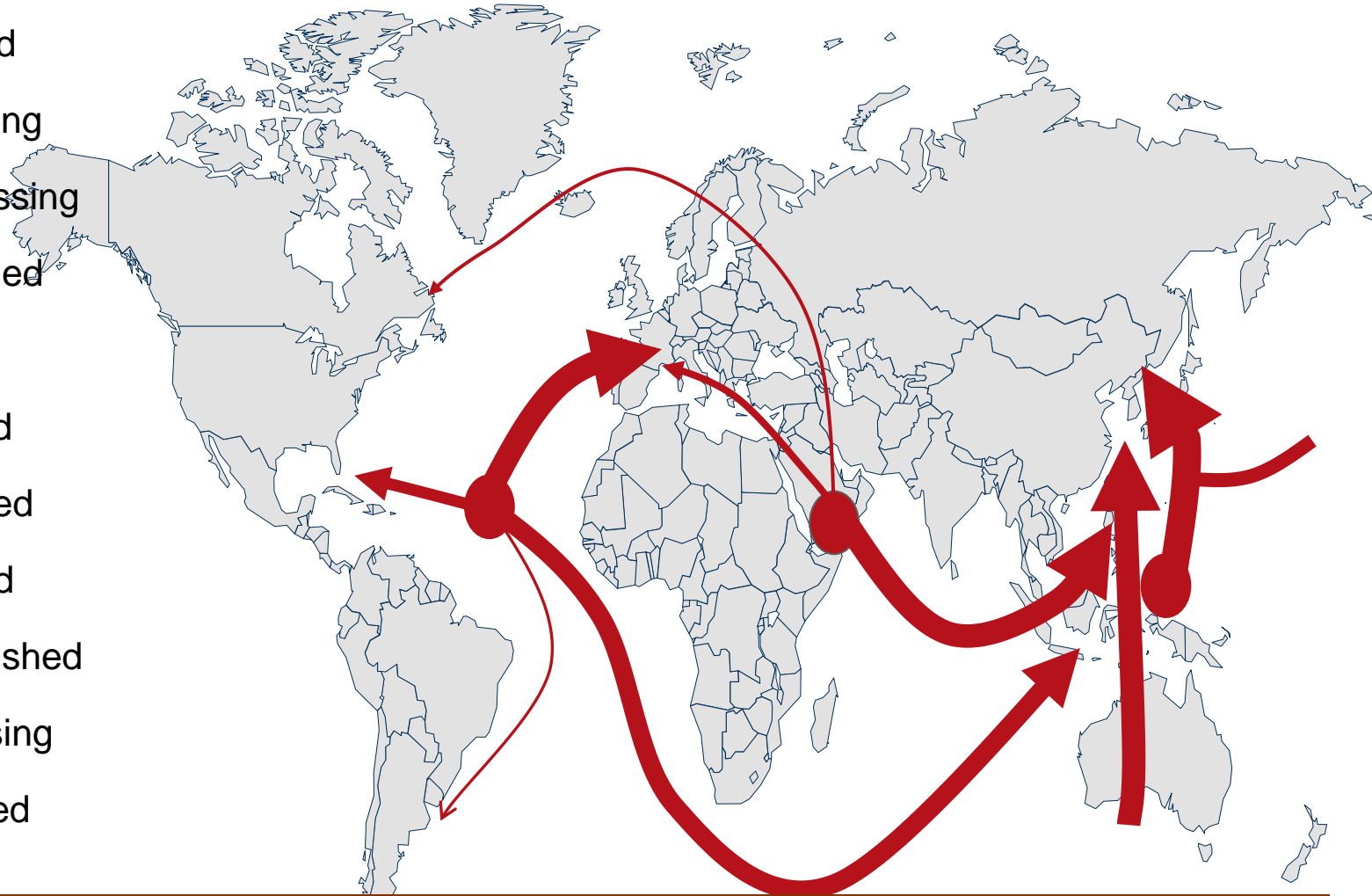
Challenge	Environmental
	<b>Integrating LNG into the fuel mix</b>
Obstacles	Setting specific fuel mix targets / constraints
	Averaging lower priced domestic natural gas and new LNG (hiding the real cost)
	Dealing with price volatility

Power Procurement
Regulatory incentives that inadvertently reward replacement of depreciated plant
Failing to incorporate a full range of alternatives when evaluating PPA extension
Setting participation rules that unduly limit the field in competitive tenders

Fast Flexible Power
Omitting new technologies in generation expansion planning processes
Omitting generation or demand-side options when evaluating network support applications
Using valuation methodologies that under-value optionality and flexibility

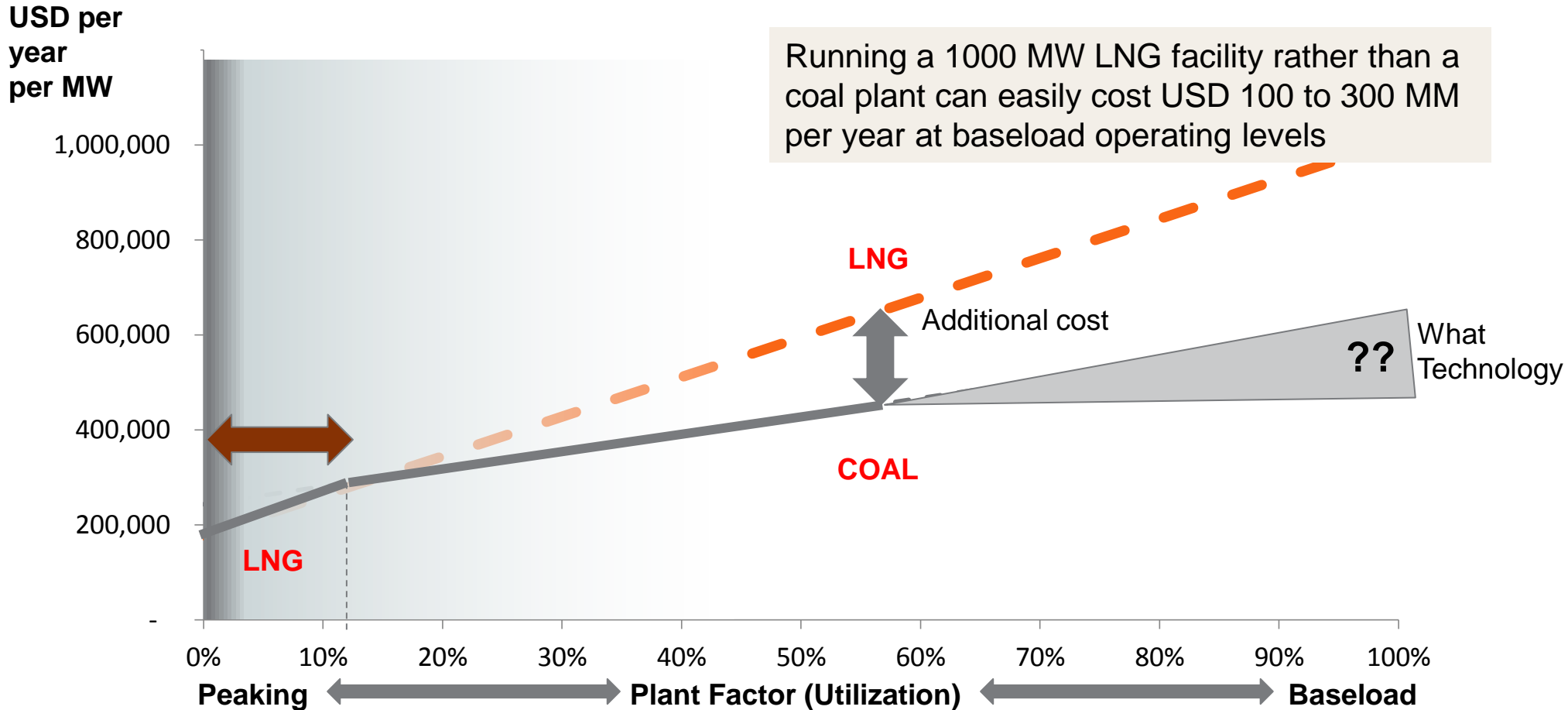
## LNG has received significant attention throughout the Asian power sector

- Malaysia—planned
- Thailand--discussing
- Philippines--discussing
- Hong Kong--planned
- China--expanding
- Korea--established
- Taiwan--established
- Japan--established
- Singapore--established
- Viet Nam--discussing
- Indonesia—planned



**Unfortunately, despite widespread interest, LNG is not a magical silver bullet**

# In Asia, LNG is mainly a “peaking” fuel due to regional supply and demand fundamentals and resulting oil-linked pricing



**Recent “lower” LNG pricing is due more to global demand than long-term fundamentals. Only very significant supply enhancement will change this.**

## New short-term LNG market dynamics are (still) evolving...(in Asia)

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### **OLD MODEL: SIMPLE / POINT-TO-POINT**

- Full investment and financial planning for the whole value chain
- Long-term off-take agreements with stable pricing clauses
- Limited rights on diversions
- Limited recourse project financing

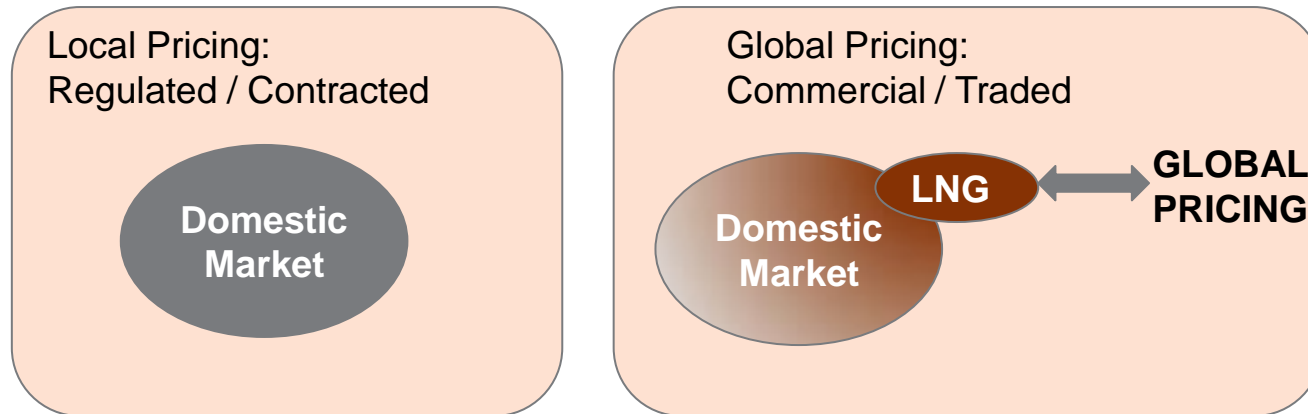


### **NEW MODEL: COMPLEX / DYNAMIC**

- Diversion and arbitrage as a value stream – “flexible network model”
- Greater flexibility in pricing
- Spot LNG sales, option quantities
- Sellers taking more market risk
- Equity stakes by buyers

**As LNG buying becomes more sophisticated, how can regulators / governments determine whether fuel is purchased efficiently (spot vs contract?)**

## Introducing “global” LNG to previously “local” markets creates new challenges



### CHALLENGES

- Reconciling “old” gas and “new” gas pricing
- Avoiding or minimizing otherwise expensive subsidies (hidden or explicit) to manage tariffs
- Avoiding the use of “average” rather than “incremental” pricing when evaluating investment decisions and large scale usage
- Avoiding mandatory fuel use or fuel mix constraints that limit ability to “flex” when things change

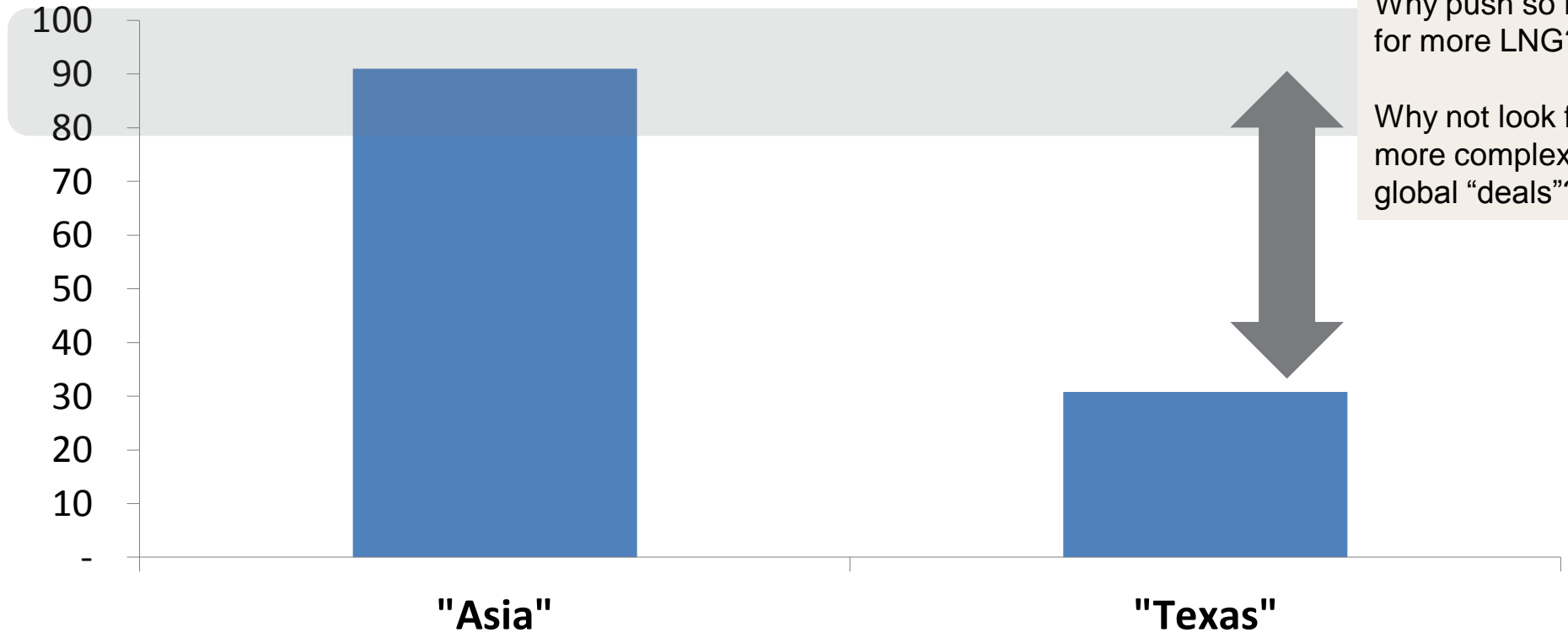
**Without markets or rigorous economic regulation the cost of meeting these challenges is often hidden (and seldom small)**



More flexible combined gas and environmental strategies would be cheaper....

**Cost to Switch to LNG from Coal in Asia Compared to Texas  
(measured in terms of *Cost per Tonne of CO<sub>2</sub> Removed*)**

USD/Tonne CO<sub>2</sub>

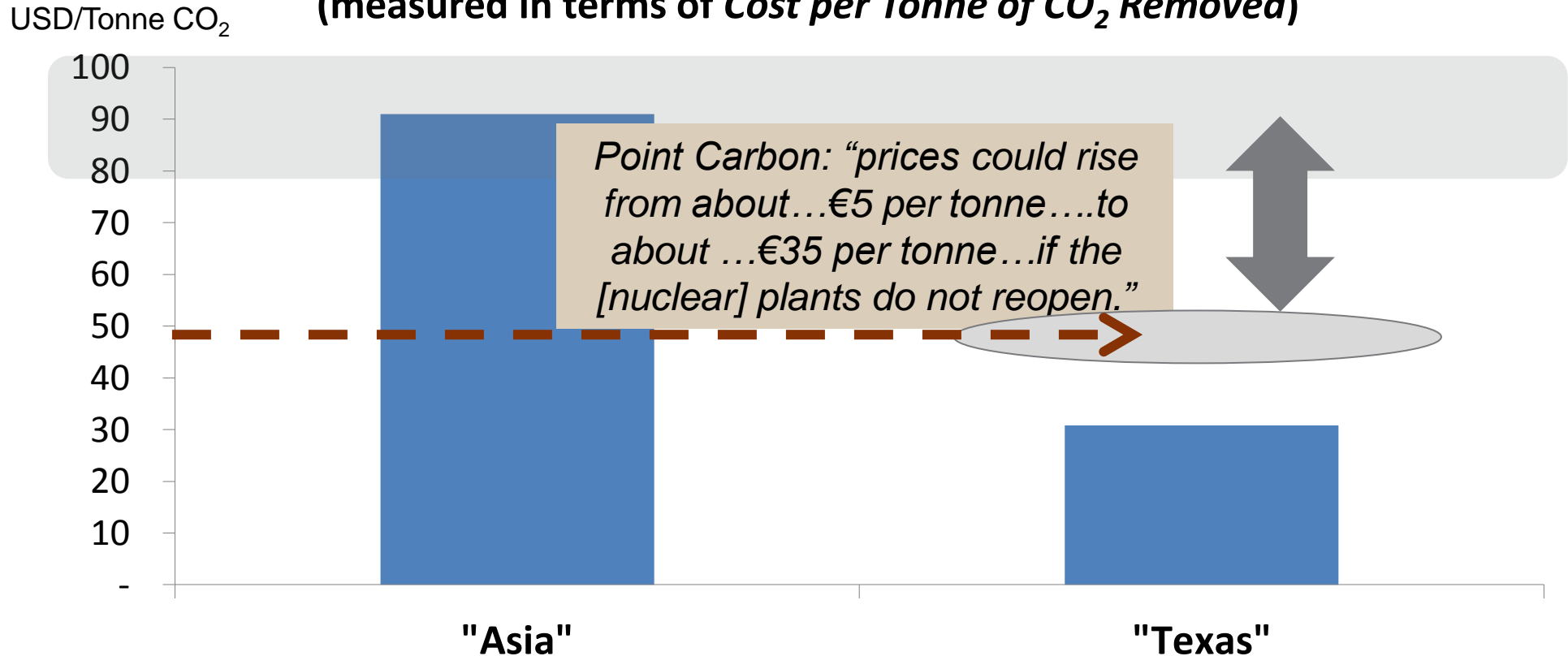


Why push so hard for more LNG?  
Why not look for more complex global "deals"?

**The absence of effective CO<sub>2</sub> trading markets (or innovative equivalents) raises the cost in Asia of achieving desirable environmental objectives**

More flexible combined gas and environmental strategies would be cheaper....

### Cost to Switch to LNG from Coal in Asia Compared to Texas (measured in terms of *Cost per Tonne of CO<sub>2</sub> Removed*)



**You do not need "global CO<sub>2</sub>" markets to implement more efficient local investment why not soft-link to readily identifiable benchmarks—and save a lot of money?**

# Power procurement

Challenge	Environmental	Power Procurement	Fast Flexible Power
Obstacles	<p>Setting specific fuel mix targets / constraints</p> <p>Averaging lower priced domestic natural gas and new LNG (hiding the real cost)</p> <p>Dealing with price volatility</p>	<p><b>Optimizing the economic life of a power station</b></p> <p>Regulatory incentives that inadvertently reward replacement of depreciated plant</p> <p>Failing to incorporate a full range of alternatives when evaluating PPA extension</p> <p>Setting participation rules that unduly limit the field in competitive tenders</p>	<p>Omitting new technologies in generation expansion planning processes</p> <p>Omitting generation or demand-side options when evaluating network support applications</p> <p>Using valuation methodologies that under-value optionality and flexibility</p>

# As older plant retire / expire, how to judge their continued *economic* life?

- **Ignore them**

- Focus on new build only. Retire when depreciated

- **Extend them (bilateral negotiations)**

- Develop a “reasonable” deal

- **Compare them to alternatives**

- Estimate an “economic” deal

- **Subject them to competitive pressures**

- Cost-based pools
- Managed market arrangements
- Capacity and energy markets

**SIMPLER  
BUT COSTLY**



**MORE DYNAMIC  
FLEXIBLE**

## **Numerous, dynamic alternatives**

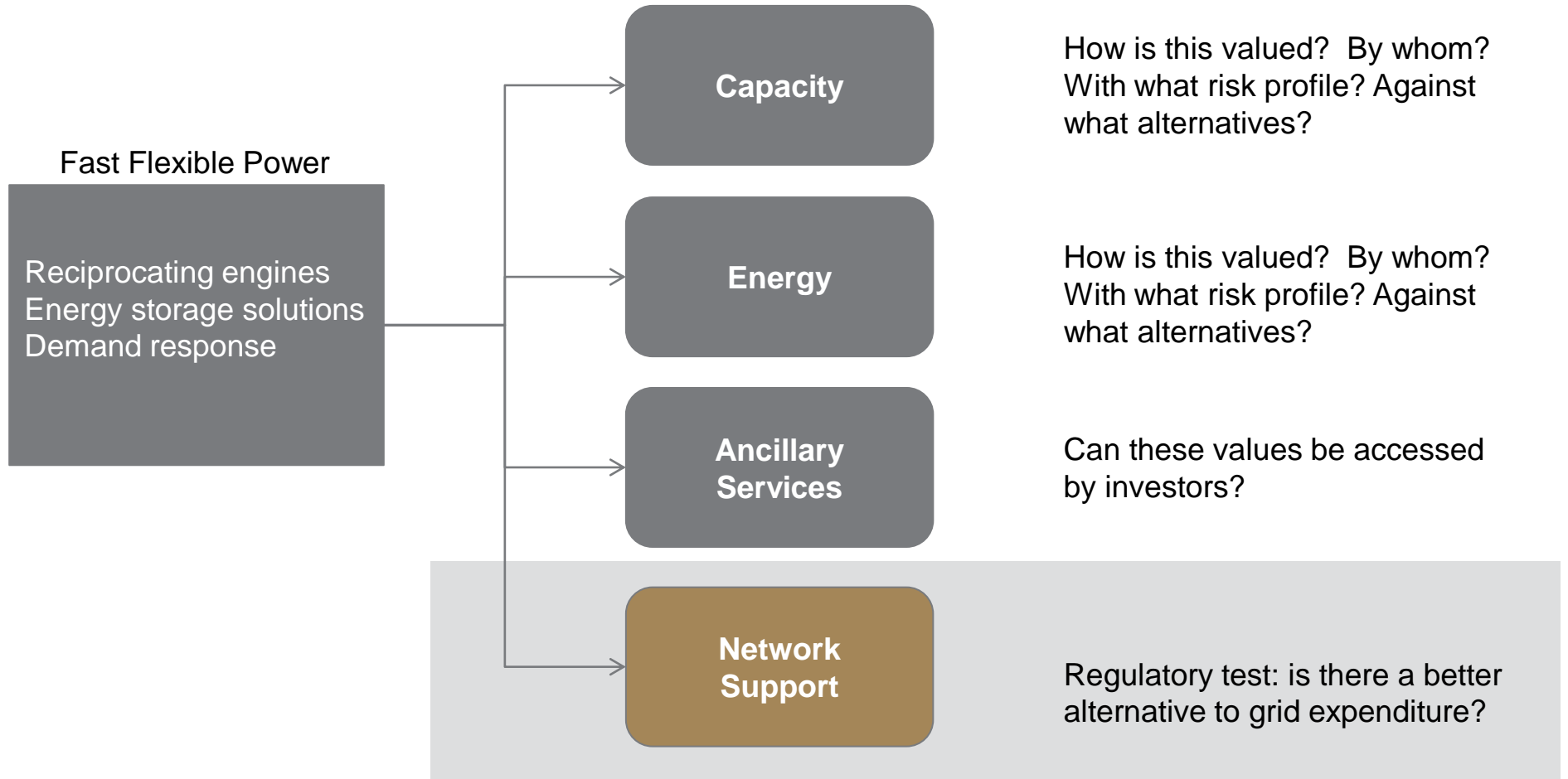
Redispatch of existing capacity  
Refurbishment / life extension  
OCGT / CCGT  
Coal (various configurations)  
Renewables  
New technologies  
Reciprocating engines  
Energy storage  
Nuclear  
Demand management  
Power import agreements  
Review of system security practices  
and equipment ratings

**The growing complexity of options and scenario drivers can severely tax non-specialist policy makers and under-resourced regulatory bodies**

# Fast Flexible Power

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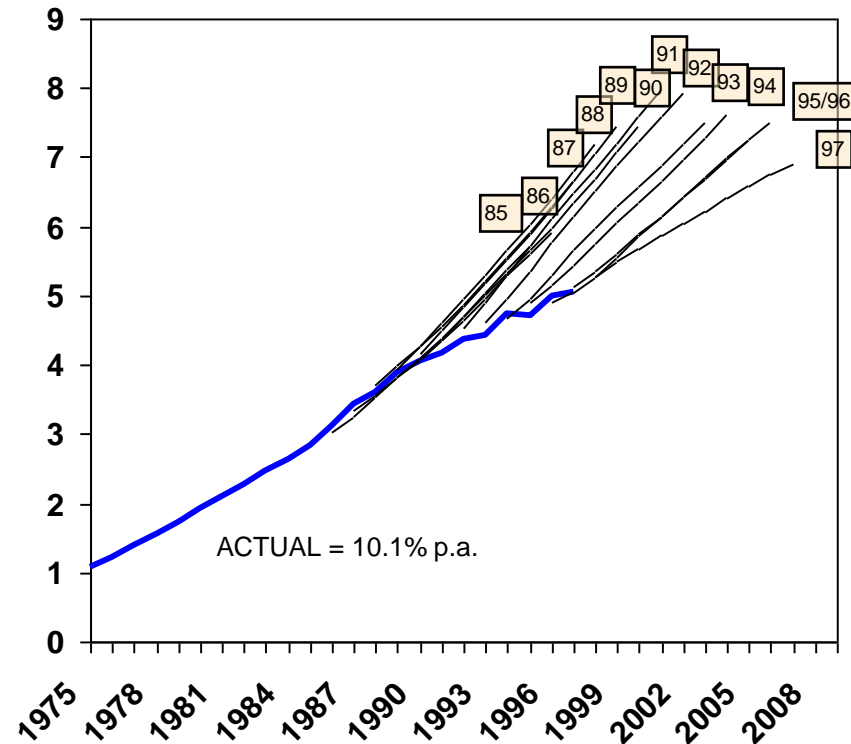
# Fast flexible power is a complex value play – requiring innovative thinking to capture value in both traditional utility and merchant markets



**Fast flexible power-related challenges extend across both market and regulated models**  
*The level of effort expended by leading global regulators in these areas is instructive*

# Flexibility has more value when uncertainty is recognized explicitly

DEMAND FORECAST VS ACTUAL



**Remarkably, a single demand forecast scenario may be all that supports some investment decisions**

To reduce the risk of expensive, overly constrained decisions in this increasingly complicated world, you ***have to make a choice***

## Economic Regulation (Approval-Oriented)

Disciplined interrogation of proposals by informed, capable and well resourced independent economic regulator

Mandated consideration of a wide range of alternatives

Continuous review of methodologies to capture all relevant sources of value

Suitable performance incentives

## Robust Markets (Merchant Based)

Access to price signals

Effective competition in the competitive segments

Access to fuel markets

Non-discriminatory access to essential infrastructure

Competition not undue market power

Overly  
Constrained  
Decisions  
Higher Costs  
Hidden Subsidies

And you have to do it well



Thank you

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