



THE LANTAU GROUP

strategy & economic consulting

PowerGen Middle East: Managing the Squeeze

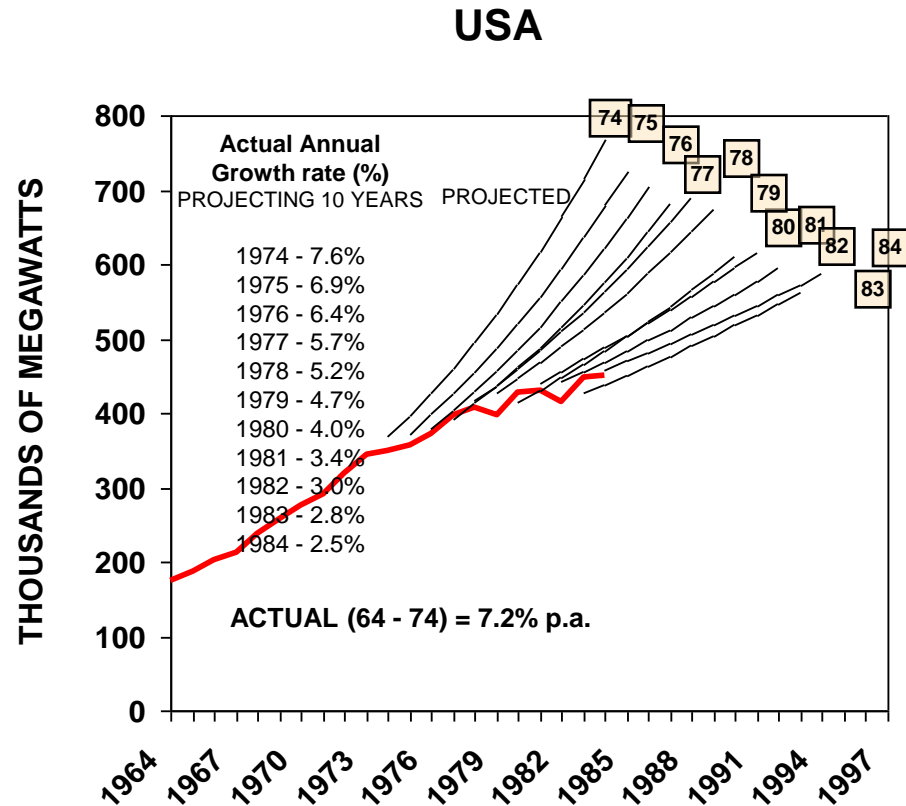
The Power Sector

Dramatic, Resurgent and...Exposed

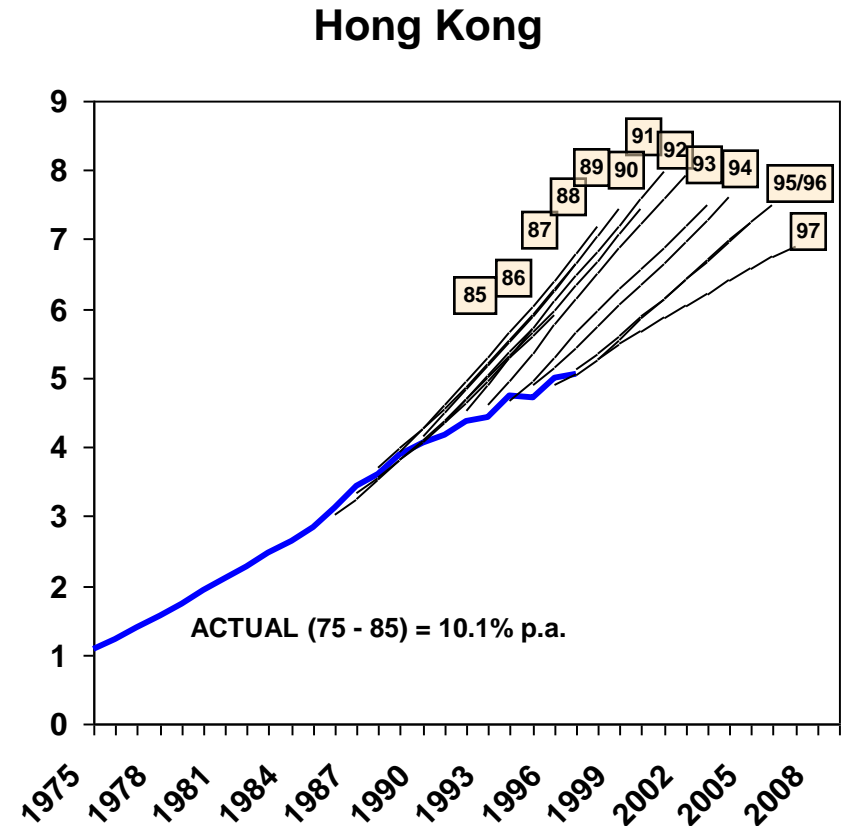
- **Throughout the world, many stakeholders face an uncomfortable squeeze**
 - The future is very uncertain
 - Regulation is often inconsistent, with tariffs not reflecting costs or risks
 - Input costs have increased significantly
 - Governments remain very closely involved in the sector, creating uncertainty for commercial investors and for longer-term policy and regulation
 - Emerging carbon and environmental risks pose new and even greater challenges
- **The Middle East can learn from some of the challenges Asia has, and is, facing in this regard**

The challenges for most stakeholders are significant and new

How can you plan when forecasts are invariably wrong?

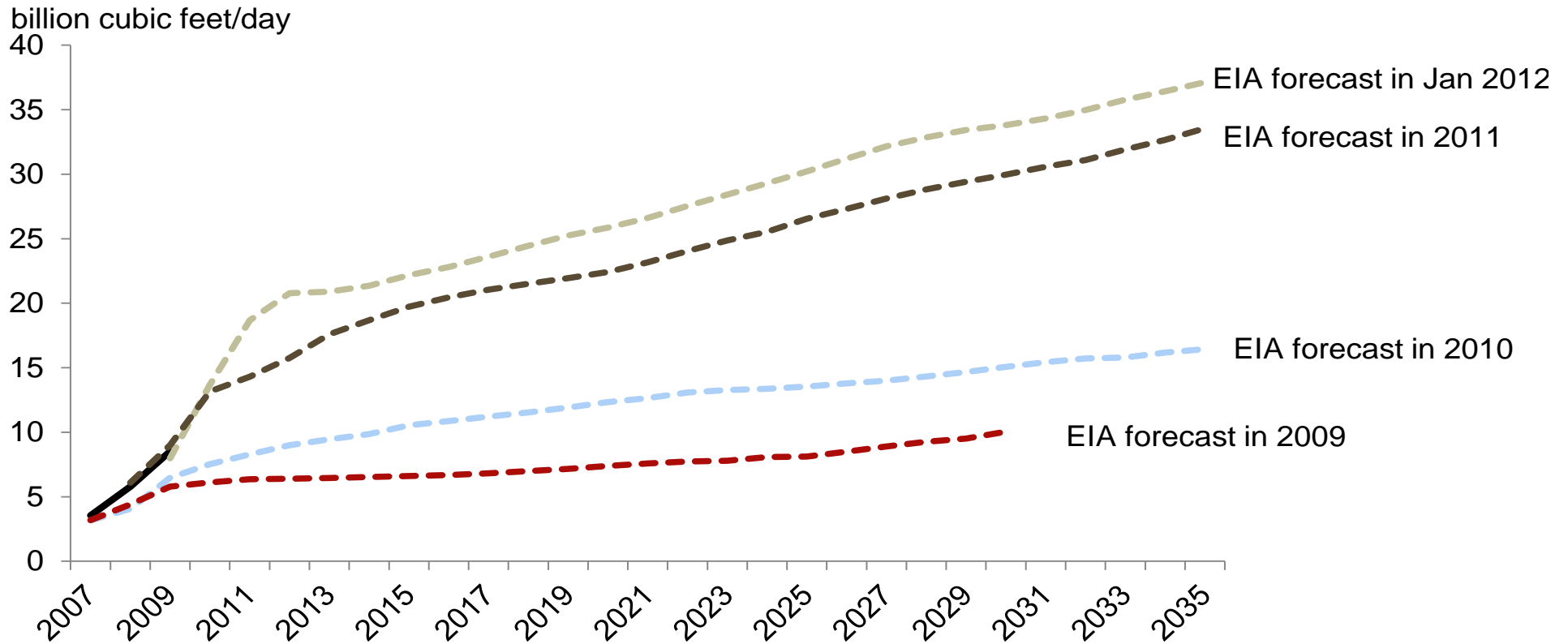


Source: North American Electric Reliability Council
Electric Power Supply & Demand 1984, p.5



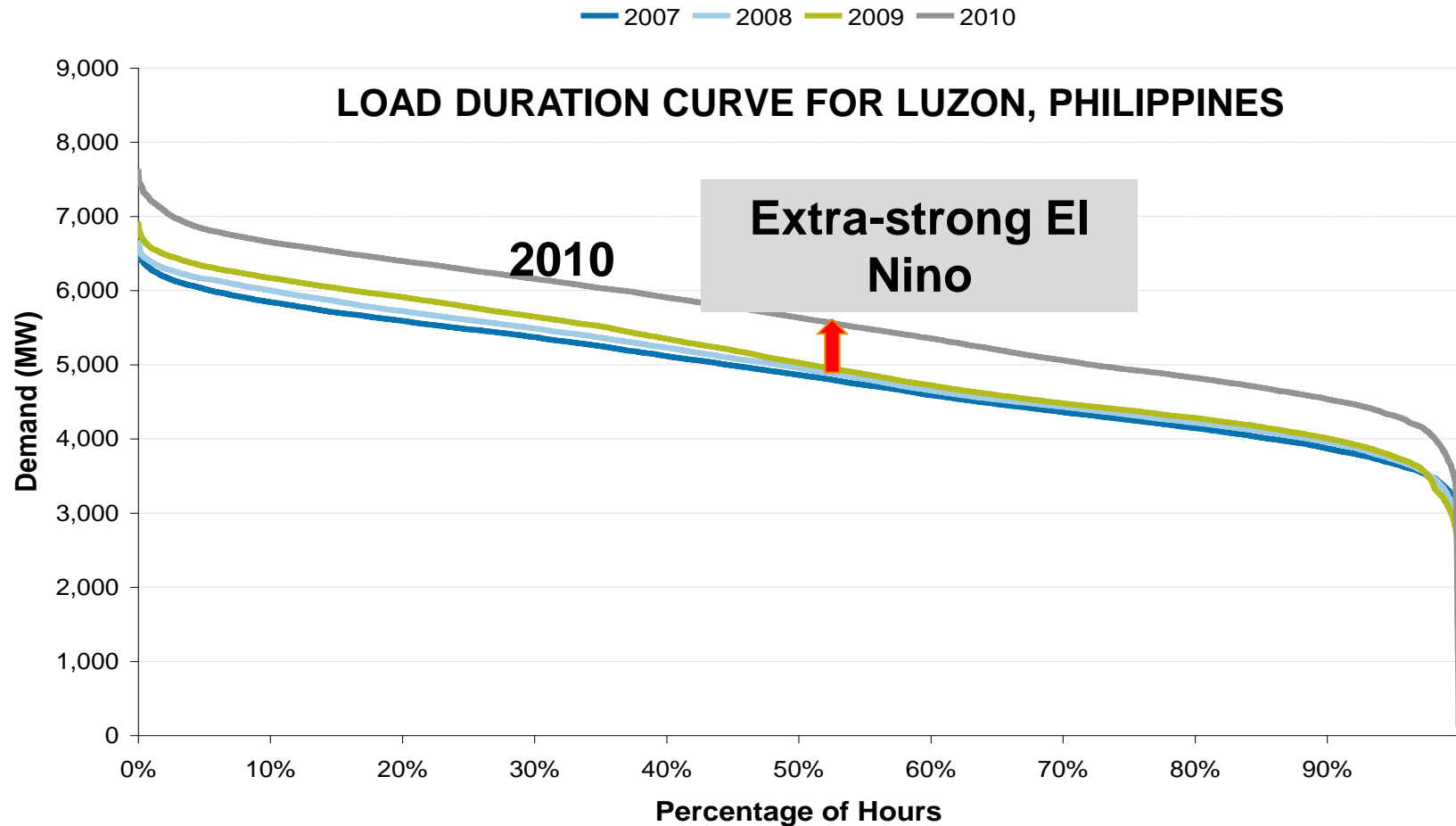
Even the best forecasts are imperfect when new trends or disruptions arise unexpectedly

The USA completely underestimated its gas resources



This is not a case of bad forecasting – but illustrates that forecasting is difficult and imperfect

Even in the short term, surprises can have dramatic impacts

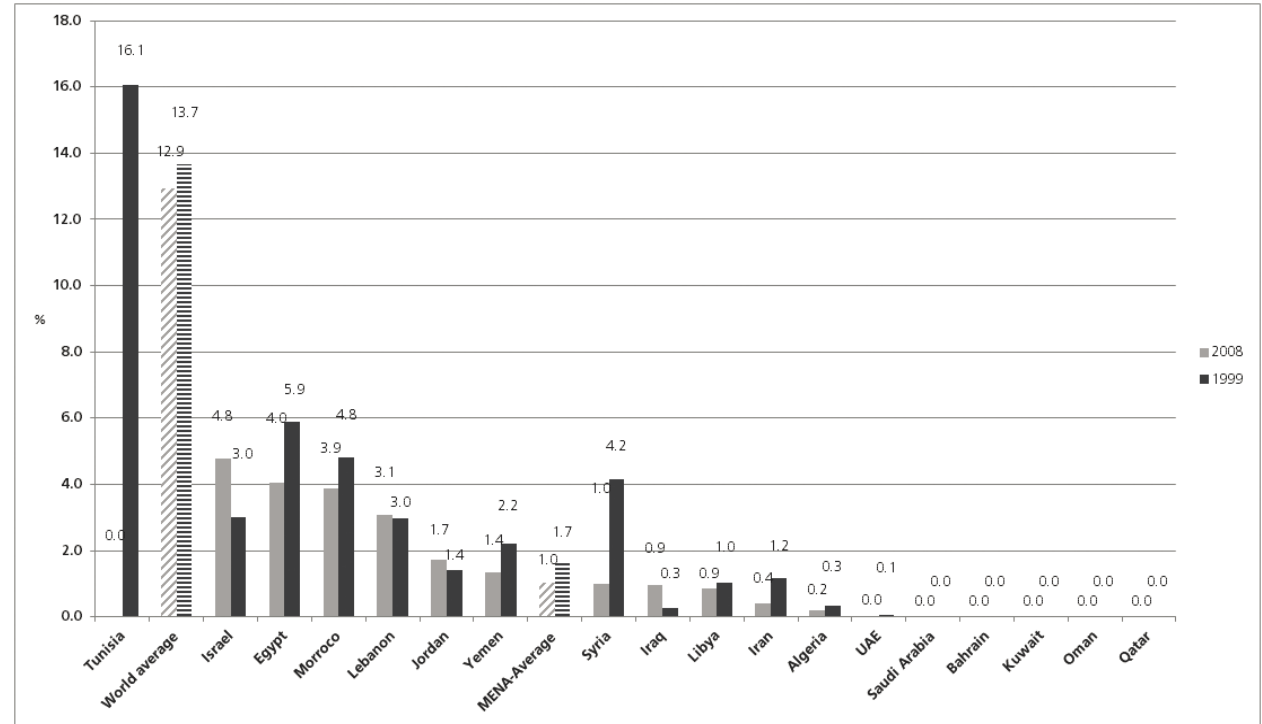


Energy security requires preparation, capacity and flexibility

Some surprises are man-made, such as the rising environmental concern globally

Renewables Share in 1999 and 2008 Middle East and North Africa Primary Energy Consumption

- Europe has a target of 20% for renewables by 2020
- Australia also has a 20% target
- Even China has ambitious targets for solar and wind installations

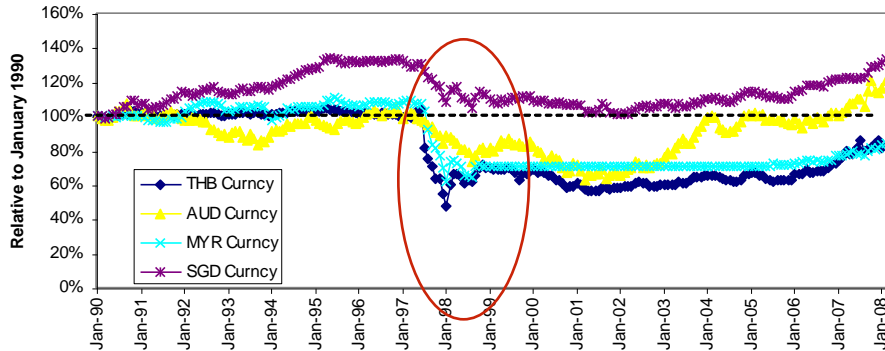


Source: Jalilvand 2012

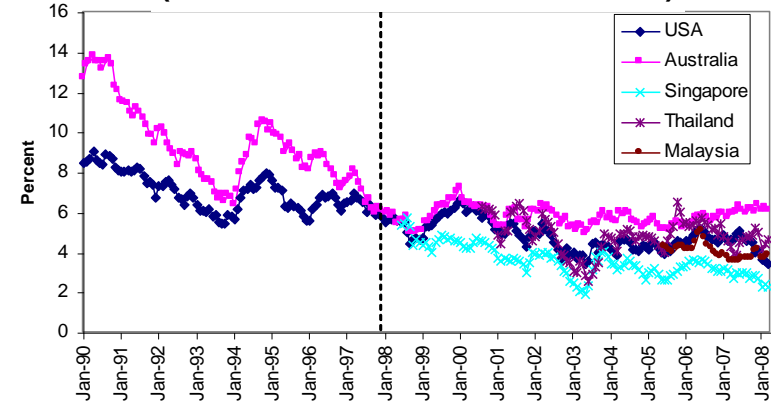
Environmental pressures are also growing around the world, and the Middle East is no exception

The Asian Financial Crisis in 1998 created a highly focused problem at a time when many other factors were relatively calm

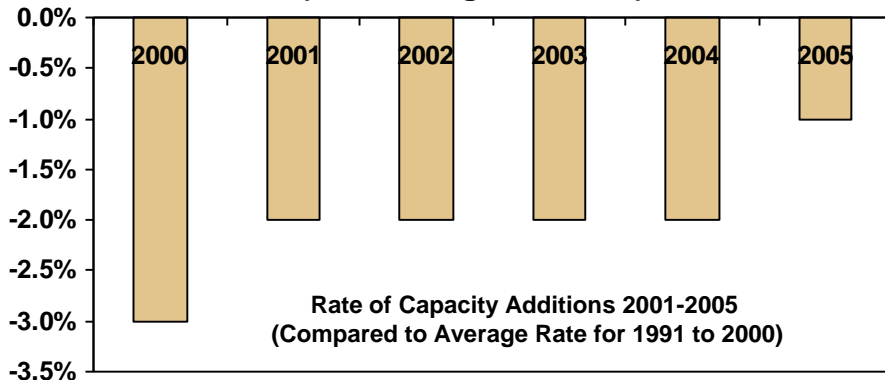
**Currencies Dramatically Weakened
(Value Relative to USD)**



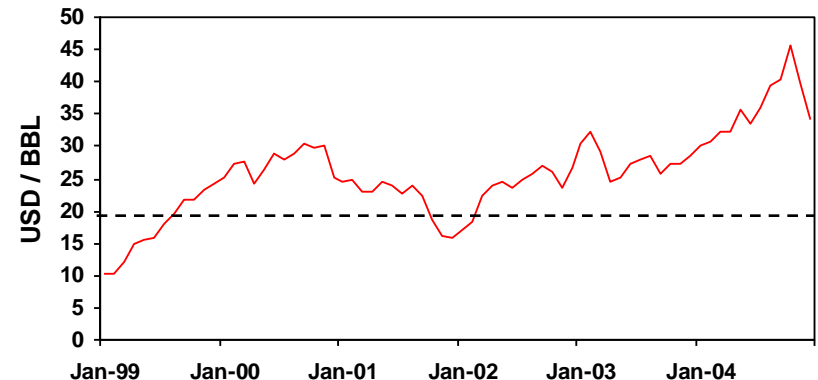
**Eventually falling financing costs
(10 Year Government Bond Rates)**



**Offset partly by reduced investment
(conserving cash flow)**



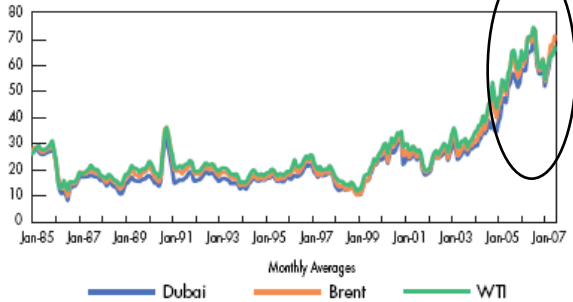
US \$20 to 25 / BBL Oil



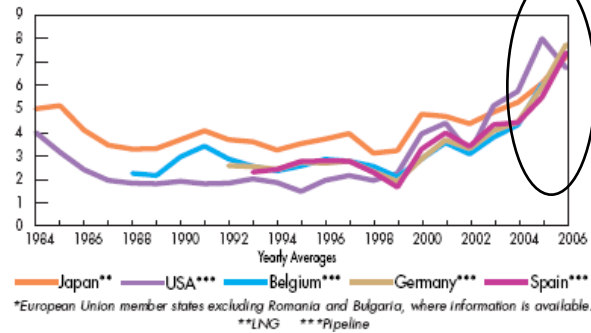
Steady growth and manageable costs – over time – could resolve many problems

Ten years later, rising prices placed new demands on industry stakeholders

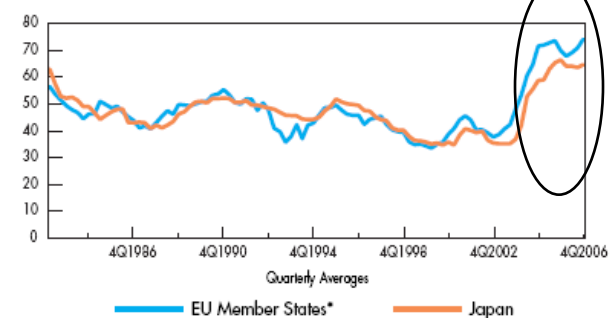
Key Crude Oil Spot Prices in US Dollars/barrel



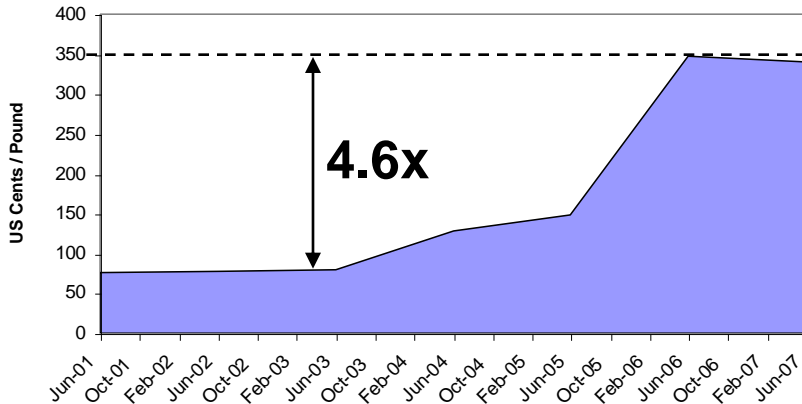
Natural Gas Import Prices in US Dollars/MBtu



Steam Coal Import Costs in US Dollars/tonne



Dramatically Rising Copper Prices



Significantly Increased New Construction Cost Estimates

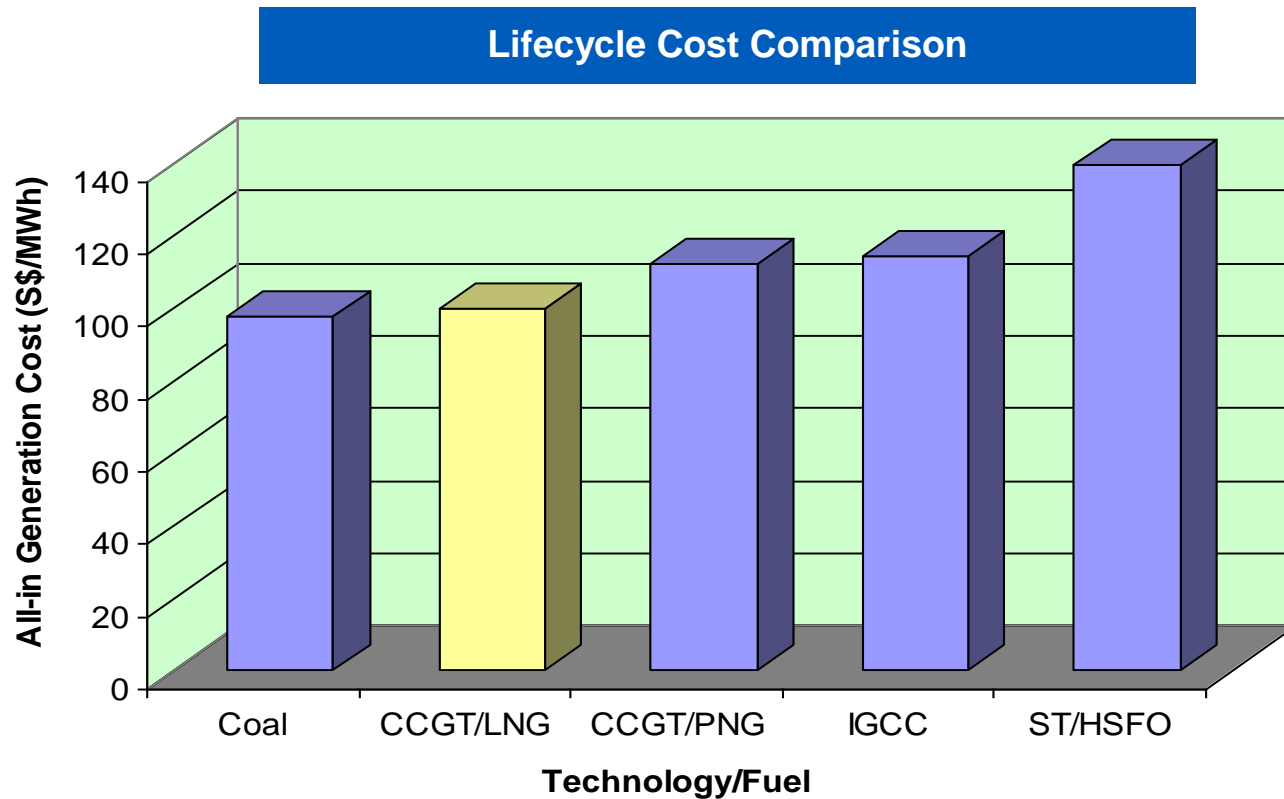
Overnight Cost (US\$/kW)	2003	2007	% Change/Year
CCGT	608	798	7%

Source: California Energy Commission, reporting on IEPR estimates

Sources: World Energy Outlook, NYMEX, California Energy Commission

Surging growth and volatile input costs have create new challenges

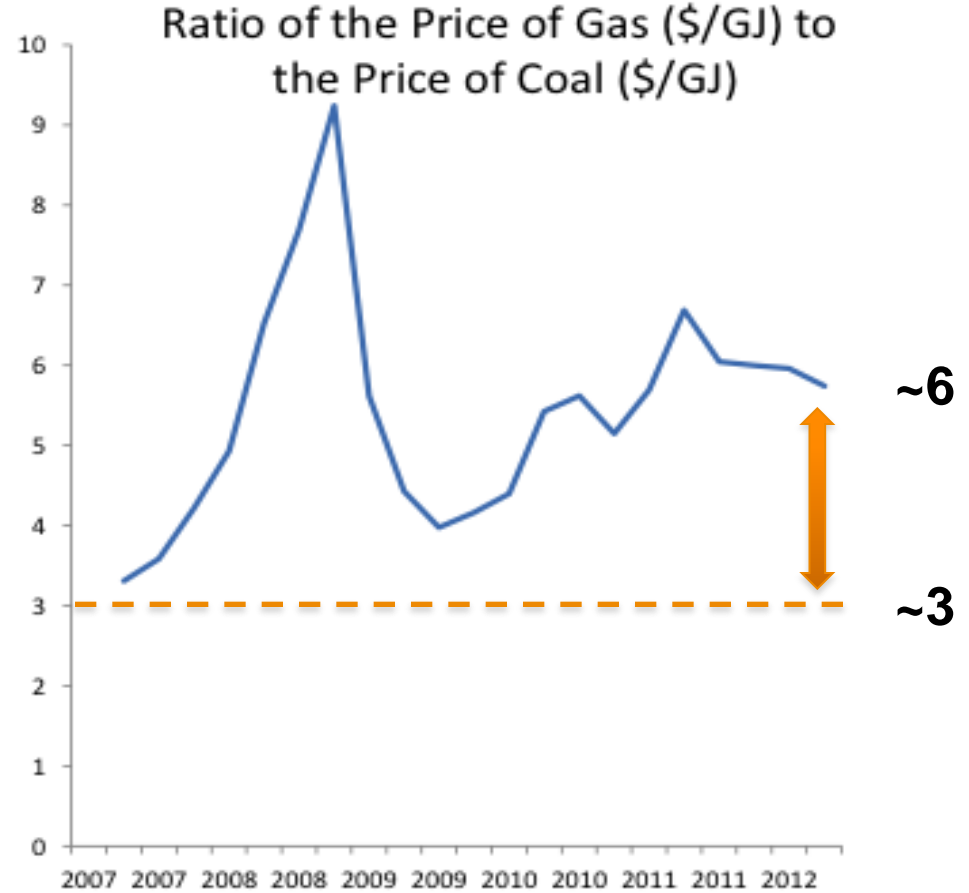
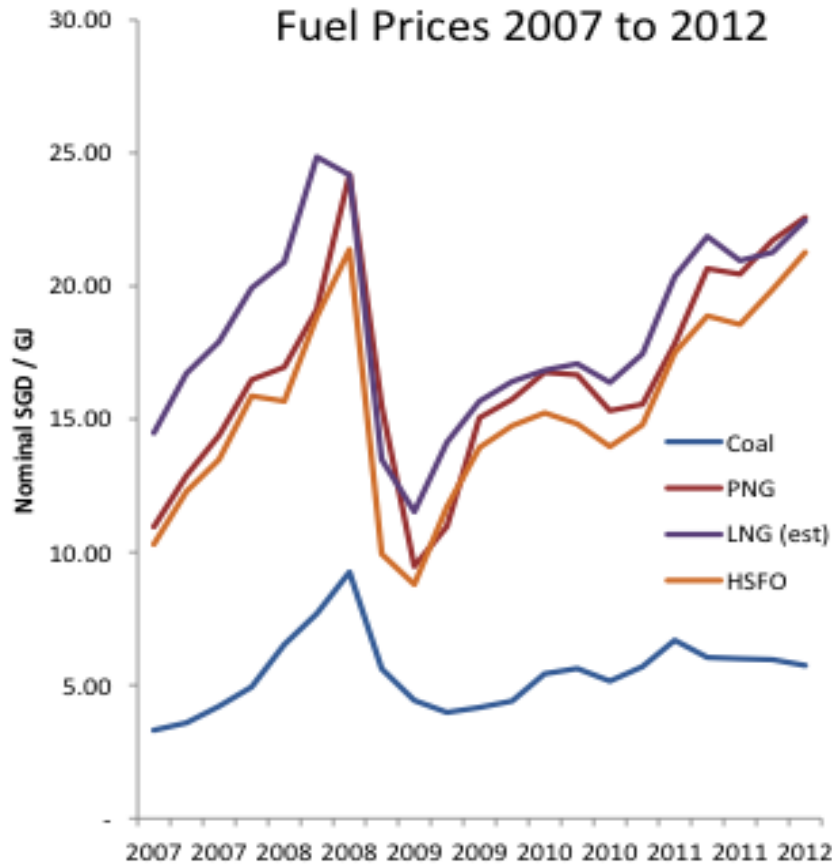
In 2006, Singapore conducted a study that showed LNG to be relatively economic



Source: TGE, *Integrated Summary Report for Proposed LNG Terminal*, 7 August 2006

The consultant concluded that CCGT/LNG plants would be roughly competitive with conventional coal plants and much more environmentally friendly

But after 2006, the underlying critical cost assumptions changed dramatically



The price of LNG nearly doubled relative to the price of coal.....undermining much of the analysis

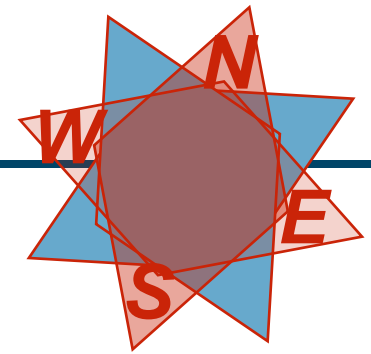
Most likely, its going to get a lot more difficult...

The Story of Sindbad

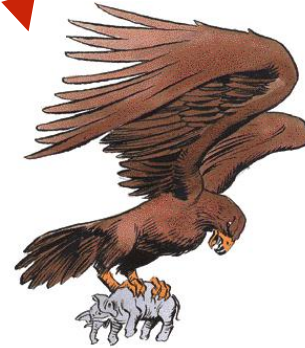
- Cyclops and The Roc are two legendary creatures from Arabian mythology
- Throughout the course of Seven voyages, Sindbad overcame countless obstacles and defeated many monsters
- Although Sindbad conquered his foes, it was a difficult journey during which both his skills and focus were pushed to their limits



The Squeeze
Cost Competitiveness
Energy Security
Environmental Sustainability



The Core Challenge
Retaining Valuable Flexibility
Avoiding Hubris



An increasing role for rigorous analysis, international perspective and clear focus



Battling the Roc: The Squeeze

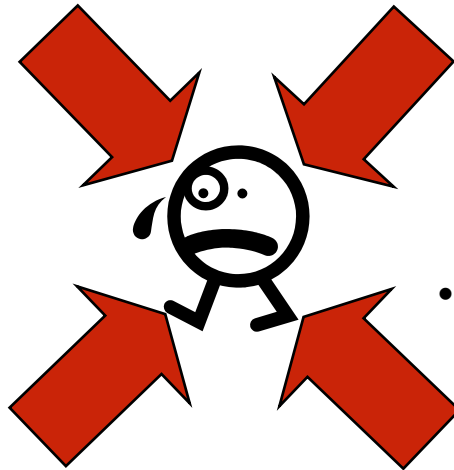
The industry faces pressure from all sides

- **Substantially increasing costs**

- Fuel markets
- Commodity prices
- EPC contracts
- Financial market uncertainty

- **Regulatory and policy risks**

- New regulatory bodies with uncertain or unproven directions
- Rising costs not readily passed through
- Regulatory capacity takes time to develop



- **New investment**

- Demand uncertainty
- Falling reserve margins
- Build versus buy?

- **Environmental pressures**

- Changing fuel mix changes the dynamics of fuel prices globally
- Temptation to solve new problems using old approaches
- Lack of a clear roadmap in many cases

Regulatory management, astute planning and investment and a bit of luck are going to be required

Addressing the Squeeze

Ensure tariffs reflect costs and (clearly) agreed risk allocations

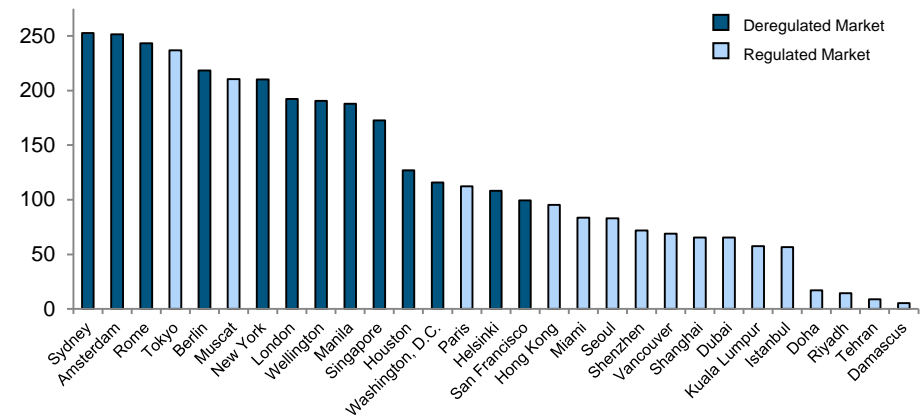
- **Costs, risks and prices should be aligned**

- Recent fuel price increases will make it more difficult to align prices with costs
- Political management of electricity tariffs limits effectiveness of other reform efforts

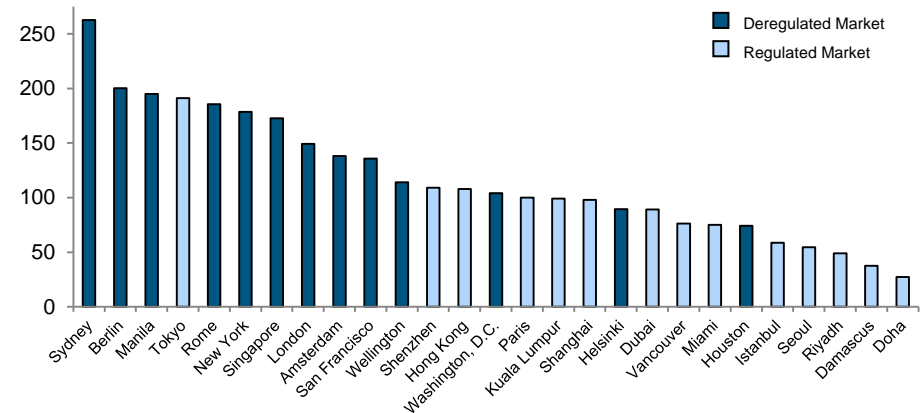
- **Observations**

- Moving to “market-based systems” reduces scope and durability of cross subsidies
- Transition arrangements may be needed to accommodate all stakeholder needs when adjusting tariffs over time

Residential Tariff HK cents/kWh (as of Nov 2012)



Commercial Tariff HK cents/kWh (as of Nov 2012)



Source: TLG Research

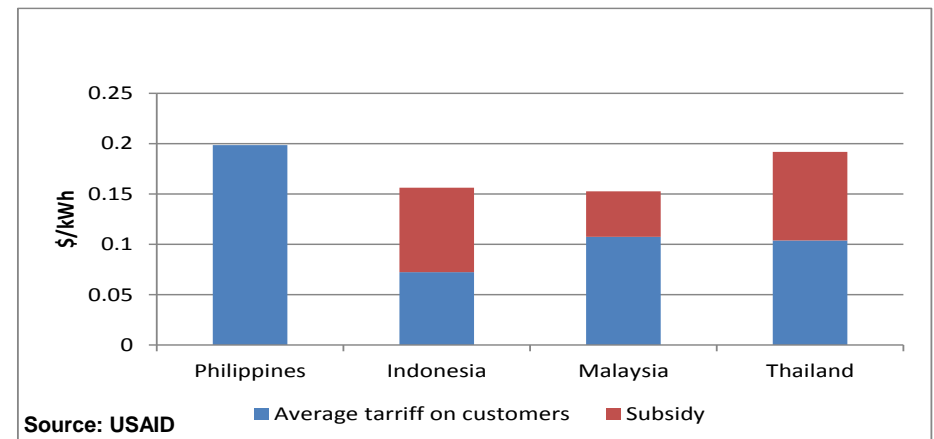
The factors driving up electricity industry costs are affecting all players in all countries worldwide

Some governments use subsidies to mitigate true energy costs, but this creates market distortions and results in wasteful consumption

Country	Oil	Natural Gas	Coal	Electricity	Total	Average Subsidization	Subsidy per person	Share of GDP
Malaysia	3.89	0.97		0.81	5.67	20	199.6	2.4
Thailand	2.11	0.48	0.44	5.44	8.47	20.7	122.7	2.7
Philippines	1.1				1.1	7.3	11.8	0.6

The IEA's study finds that fossil fuel consumption subsidies are often used to artificially lower the end-use price of the fuel and alleviate energy poverty, but are an inefficient means for doing so, creating market distortions that result in wasteful energy consumption.

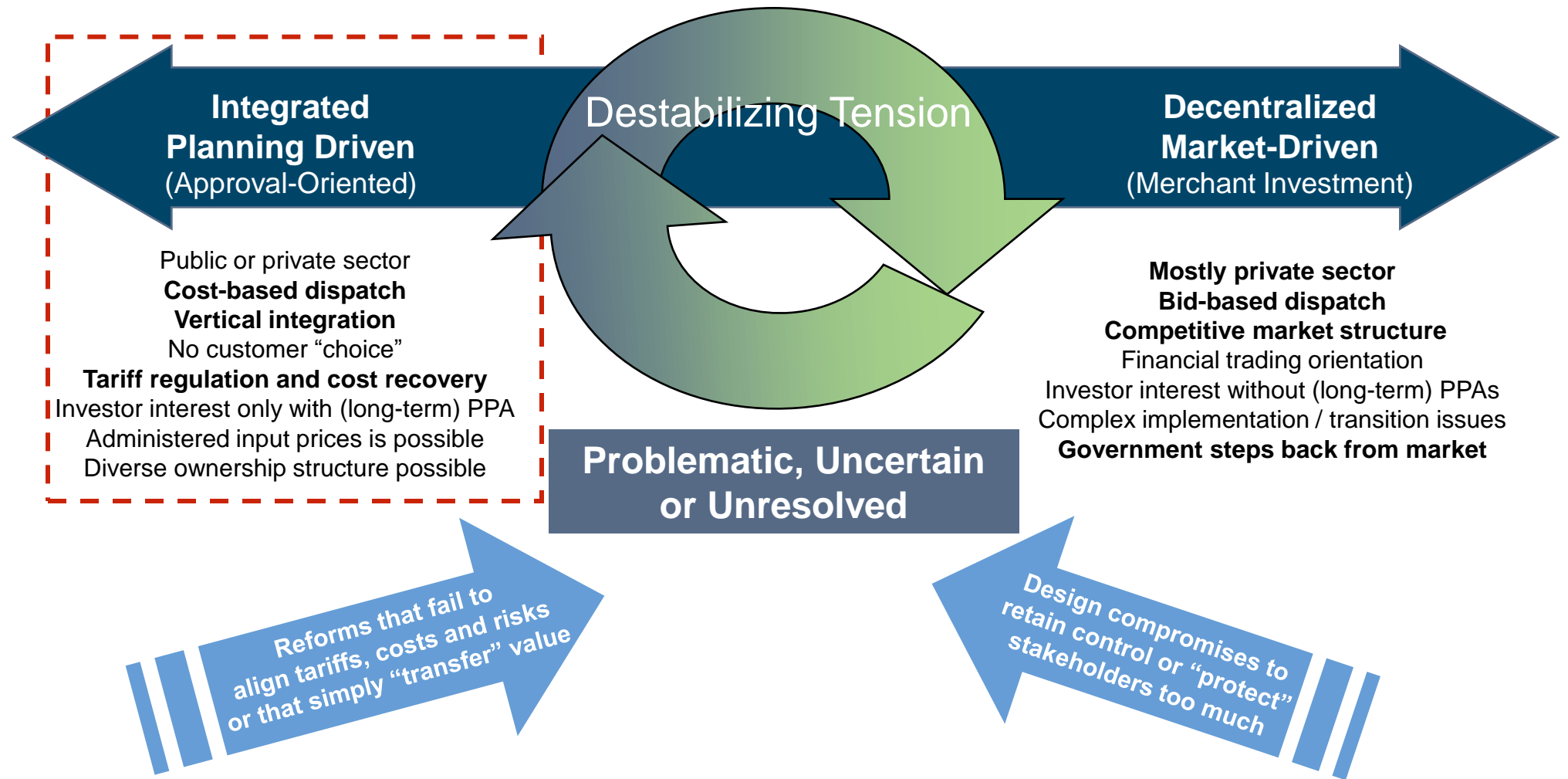
In 2010, only 8 percent of the \$409 billion spent was distributed to the 20 percent of the poorest population, demonstrating inefficiencies in assisting the poor.



Somebody has to pay subsidies and while they are in place consumers demand more power because they see no feedback within the price

Addressing the Squeeze

Do not expect market reforms to work without robust regulation first



Mixing “desirable” elements from each “side” is a recipe for disaster

Addressing the Squeeze

Use explicit transition arrangements to address stakeholder concerns

- **Tariff transition to long-term sustainable levels**
 - Establish what the long-term sustainable level is
 - Market-price fuel – at least for incremental and decremental amounts
 - Run efficient procurement processes and pay competitive prices for new generation
- **Time frame required**
 - An effective transition can be done over 5 to 10 years
 - Dramatic changes can be highly disruptive with little near-term benefits
- **Support energy efficiency through better pricing at the margin**
 - Appropriate price signals pertaining to increased or decreased usage relative to benchmarks
 - Manage “average” prices using carefully designed transition instruments

**Piecemeal approaches and simplistic “market” reforms are not the solution:
A comprehensive transition plan and roadmap is needed in many markets**

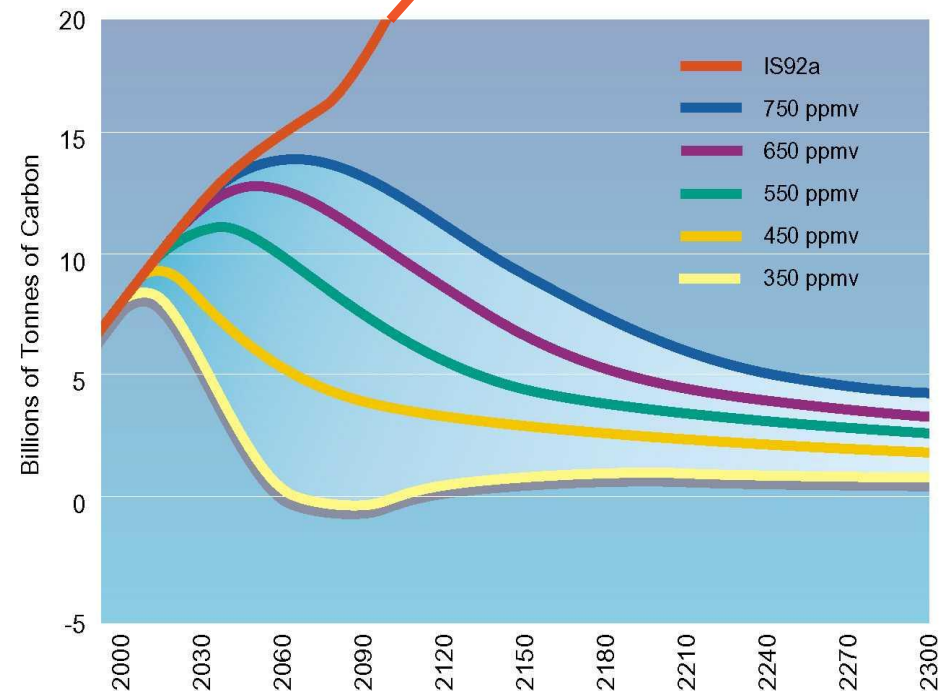


Facing the Cyclops: The Core Challenge

Environmental policy is evolving rapidly both outside and within the Middle East

- **Standards vary widely**
 - Who will bear the higher costs in exchange for the benefits created?
 - What should be the form and scope of regulation?
 - What happens when impacts cross borders (ambient air quality impacts)?
- **To what extent will flexibility – which has proven value elsewhere – be embraced?**
 - “markets” and “trading”
 - Seasonality and locational considerations
- **And then there is carbon.**

Emissions Trajectories Consistent With Various Atmospheric CO₂ Concentration Ceilings



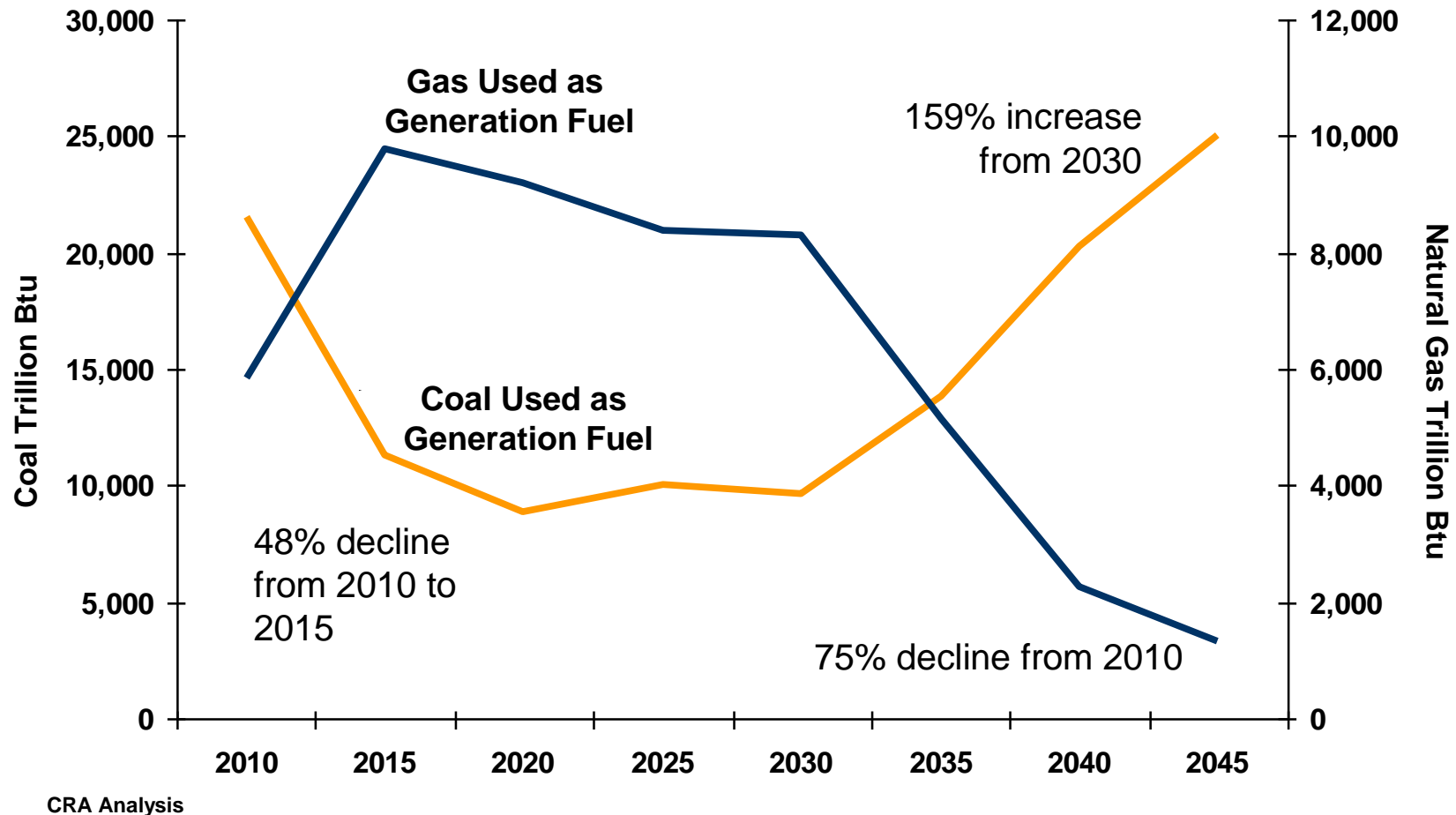
Balancing growth needs and carbon mitigation is a huge challenge

Elsewhere, a wide array of policy proposals exist to deal with greenhouse emissions...

- **The best utility response to these is not necessarily obvious or clear-cut**
 - What to build or acquire – natural gas, coal, take a chance on nuclear or carbon capture and sequestration?
 - Are renewables or nuclear the answer? They are certainly not cheap!
 - What to invest in existing units – retrofit environmental controls, perform unexpected maintenance?
 - What businesses to be in or out of – will utility regulation protect against cost risks or magnify them?
- **Investments that look good under one carbon policy outlook can look terrible under another**

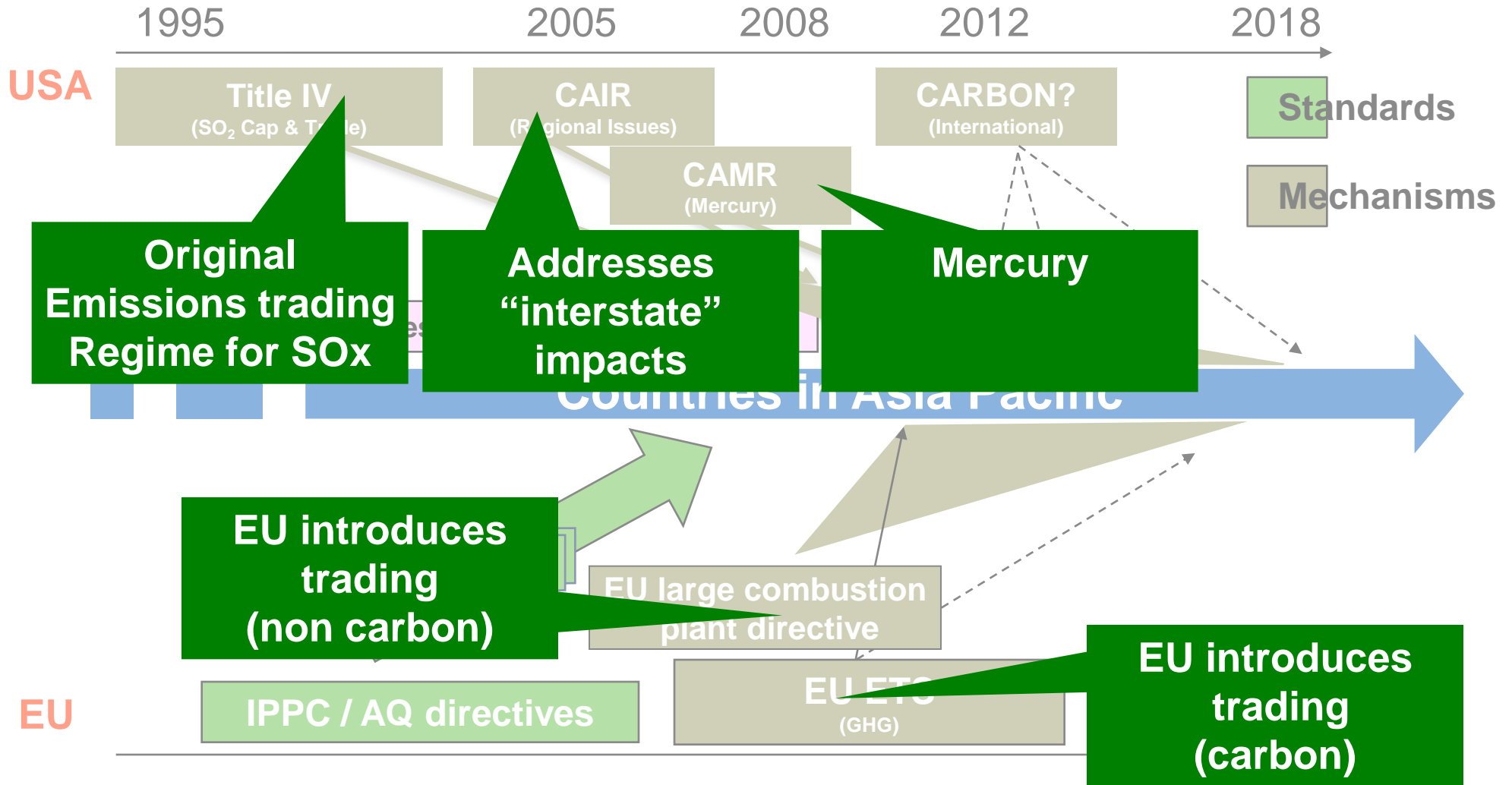
A more difficult decision process than the power industry has faced in years

Carbon policy extent and timing remains a wild card whose potential impacts are likely to be enormous (USA example)



In our experience with clients, developing a response to carbon policies depends on the details and the transition: no single strategy is best under all scenarios

Carbon is not the only pressure for change in the environmental policy arena



What to expect in the future?

- **Expect pressure to further tighten NO_x and particulate limits**
 - Asia Pacific SO₂ emissions are often relatively low given coals commonly burned
 - Probable focus to PM2.5 (smaller RSPs), as these are seen as a greater risk than PM10
 - Potential trading arrangements or at least fleet-wide optimisation
- **Eventual pressure for some form of “trading”**
 - Trading is “fashionable” but the prerequisites of an effective trading programme are crucial
 - May lead to rethink of interconnection utilisation and reliance
- **Ultimately trading and other flexible approaches depend on level of diversity**

Role of interconnection and the scope for within-system redispatch is unclear



Implications For Sindbad

Not so simple questions → fairly important answers

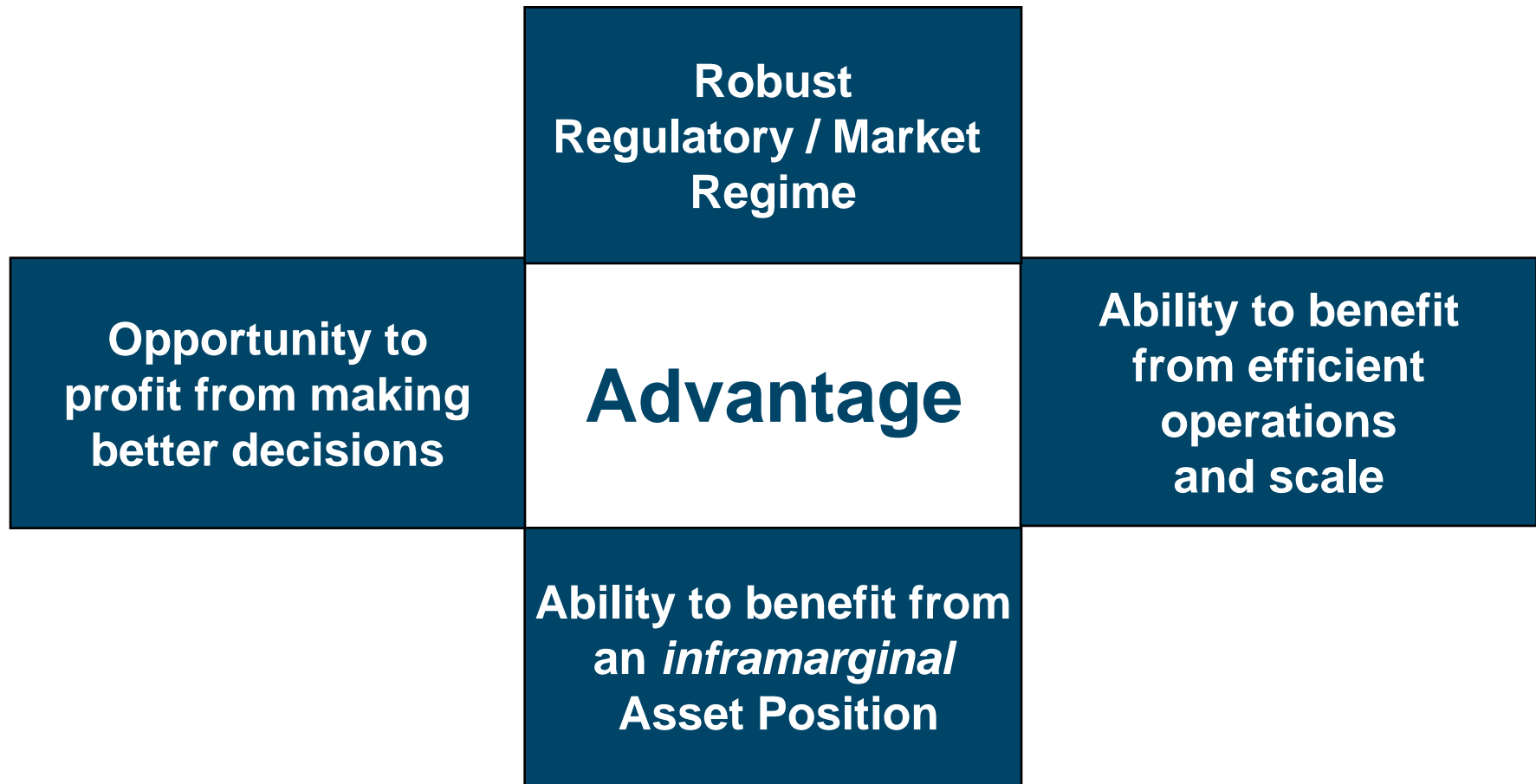
- **How to interpret and deal with fuel and commodity market risks and uncertainty?**
- **How to design a procurement process to facilitate an eventual transition to a market-based structure?**
- **What is the value impact on an acquisition target of environmental policy scenario X, Y or Z ?**
- **What should the price of gas be?**
- **How do we ensure a “level playing field” if we open up our market?**
- **Would you want to participate in an emissions trading regime that does not define the “thing” being traded?**
- **How to evaluate the merits of “green” projects that depend on uncertain CDM revenues?**
- **Can a system of complex tariff subsidies be sustained? Are the resulting investment decisions desirable?**
- **Is the meaning clear when the word “reasonable” is used to describe the setting of tariffs to customers?**

Questions we hear from real clients facing real risks

Challenges ahead

- **Incumbents should become leaders in the key areas driving industry change**
 - Pro-actively manage regulatory risk / build regulatory management capability
 - Begin to assess new areas, including environmental regulation, as these require time
 - Learn from changes that have happened elsewhere
- **Regulators need independence and robust economic regulatory expertise**
 - Need more economists (of course...)
 - Need scope to act in a consistent, repeatable and defensible (fact-based) manner
 - Need capacity to deal with information “asymmetry”
- **Governments need to provide clear policy direction and focus on the transition requirements, not micro-management**
 - Get out of the business, but not out of the sector
 - Develop long-term roadmap to end subsidies and support a commercial footing for business activity
- **IPPs can support consistent industry regulation, transparent, well-run tender processes and robust risk allocations**
 - Industry restructuring after regulatory reforms, not before

Sustainable advantage



All four of these are supported in only a few Asia Pacific markets. In the other markets, significant work remains. The Middle East is well placed to leapfrog Asia and restructure more effectively.