



## Power Sector Development – How to attract investment?

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# Overview

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## 1 **Industry structure in the power sector**

2 Alternative industry structures

3 Overview of development in SE Asia

4 Key determinants of successful development

5 Possible lessons for Myanmar

# There are a number of ways to categorize generation models in Asia

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<b>Ownership</b>	<b>Regulation</b>	<b>Structure</b>	<b>Competition</b>
<ul style="list-style-type: none"><li>• <b>Private</b></li><li>• <b>State-owned</b></li><li>• <b>Cooperative</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Government control</b></li><li>• <b>Independent regulator</b></li><li>• <b>By contract</b></li><li>• <b>Unregulated</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Integrated</b></li><li>• <b>Unbundled</b></li><li>• <b>Disaggregated</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Securing franchise</b></li><li>• <b>Development</b></li><li>• <b>Ownership</b></li><li>• <b>Dispatch</b></li></ul>

## Ownership has a strong influence on the type of regulation required

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- Who owns the generation activity?
  - Privately owned and operated?
  - State-owned?
  - Cooperatives?
- How is the industry regulated?
  - Directly by Government?
  - By a Regulator reviewing by a variety of different mechanisms?
  - By a contract?
  - Unregulated?

# Ownership influences regulation

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- In some countries, the state has always operated the power industry:
  - Much of Asia was state-owned 10 years ago although significant privatization has occurred since then
  - When the state owns the industry, regulation may be formally absent (but operates behind the scenes via ownership) or explicitly effected by Government (e.g., Indonesia)
  - Where regulators exist, they often defer to Government policy decisions (e.g., Korea)
- In other places the electricity industry is owned by private entities and often regulated by a regulator or by contract:
  - The cost-of-service regulatory model tended to be prevalent in the USA; thus places in Asia with a strong US influence use this model
  - Alternatively, regulation can be done by a contract that specifies what is allowed and how much return may be earned (e.g., Hong Kong)
  - Regulation may be by an independent Regulator, operating under a law, code or guidelines (e.g., Australia, Singapore, Philippines).

## Structure and competition often have implications for each other

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- How is power generation organized within the electricity supply industry (ESI)?
  - Integrated?
  - Unbundled?
  - Disaggregated?
- Where is the competition?
  - In securing the franchise to serve customers?
  - In developing a power station?
  - In owning the power station?
  - In dispatching a power station?

# Competition increases as generation is separated from other activities

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- The “traditional” ESI has one utility doing all the activities needed
  - Planning
  - Procuring and/or building new power stations and network infrastructure
  - Operating power stations and networks
  - Selling power to customers
- At the other end of the scale, a “market” style of ESI has every activity disaggregated
  - Planning is now done by everyone, coordinated by a market operator
  - Generating companies procure, build and operate power stations
  - Network companies procure, build and operate networks
  - Retail companies sell electricity to consumers
- In the middle there are various other structures, with the Single Buyer being a common form
  - A Single Buyer runs generation planning and power procurement – and may involve network and retailing operations
  - Private generators tender to supply power to the Single Buyer – either through long-term power purchase agreements (PPA’s) or an internal-short term dispatch market

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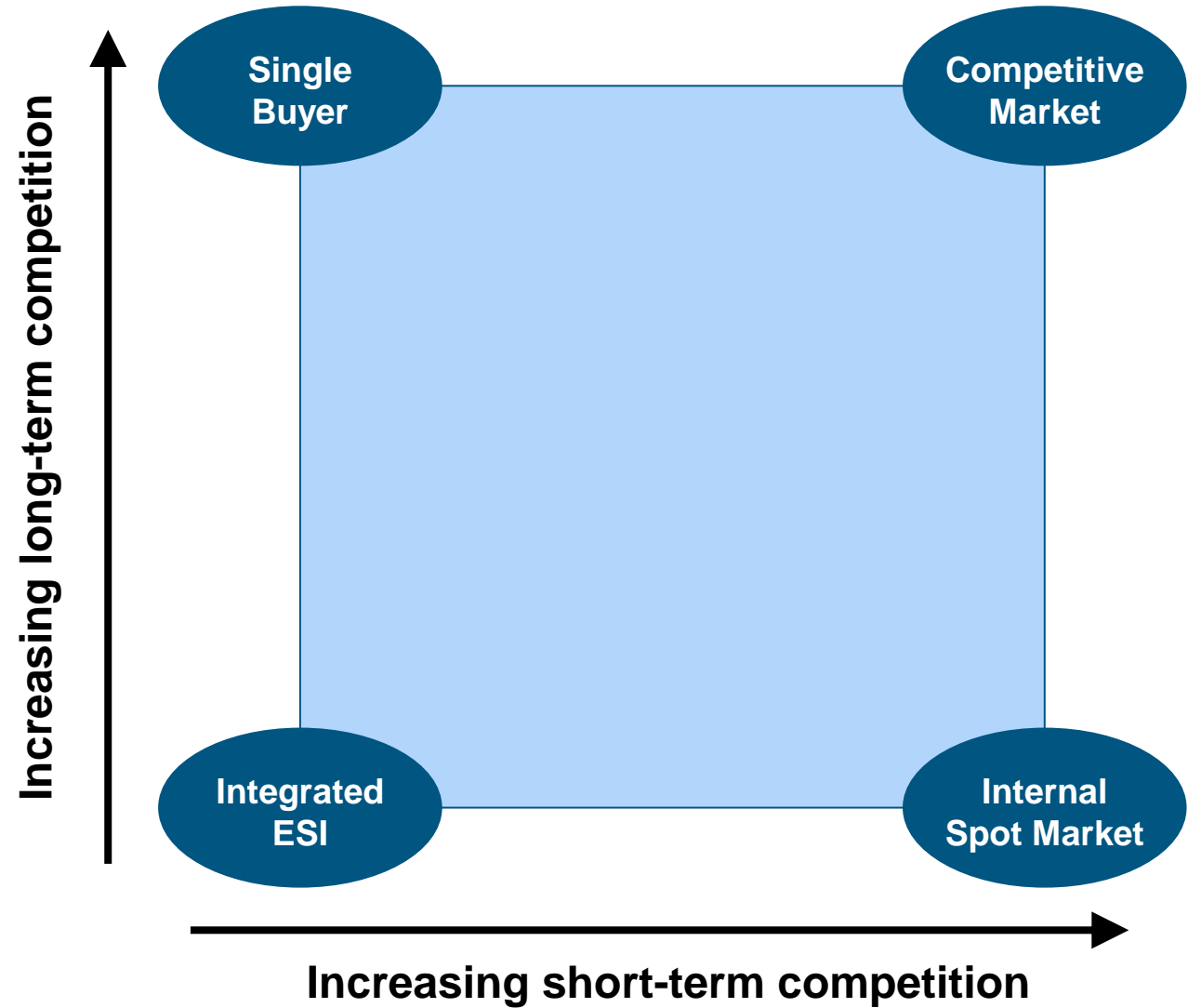
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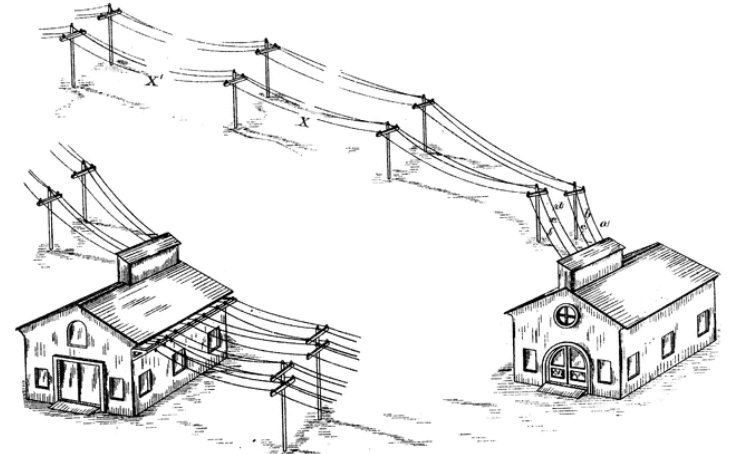
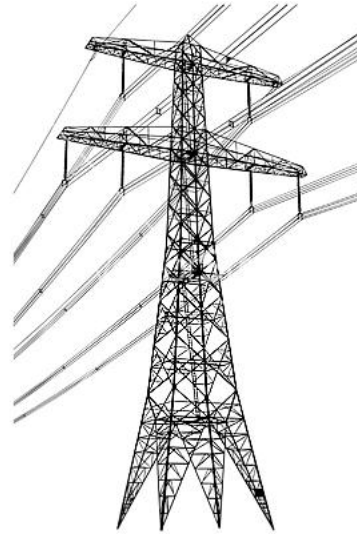
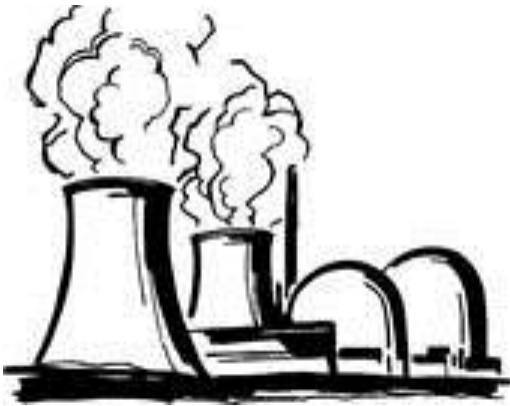
## Consider four alternative structures

- Integrated ESI
- Competitive market
- Single buyer
- Internal spot market



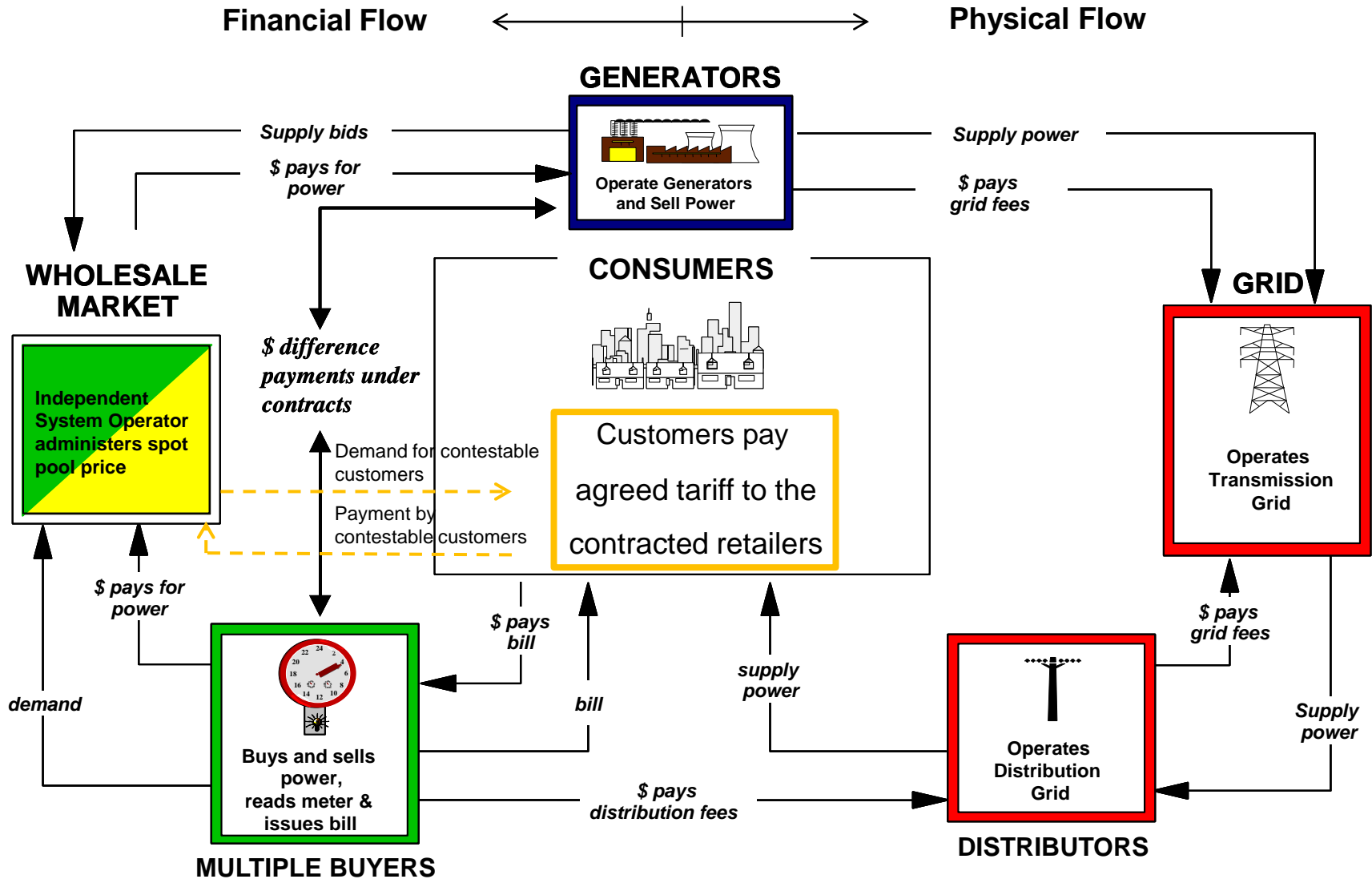
# Characteristics of an integrated ESI

- Planning, generation, transmission, distribution, and retailing are under the same umbrella



- Economies of scale and high employment – thus may be linked to the local economy and stability
- Competition may occur when new generators are procured from EPC contractors
- However, some integrated structures are characterized by inefficient operations and lack of innovation – sometimes little incentive for continuous improvement and relationships with EPC contractors may hinder high levels of competition in procurement.

# By contrast, a competitive market has far more entities and money flows



## In a market, competition exists at many levels

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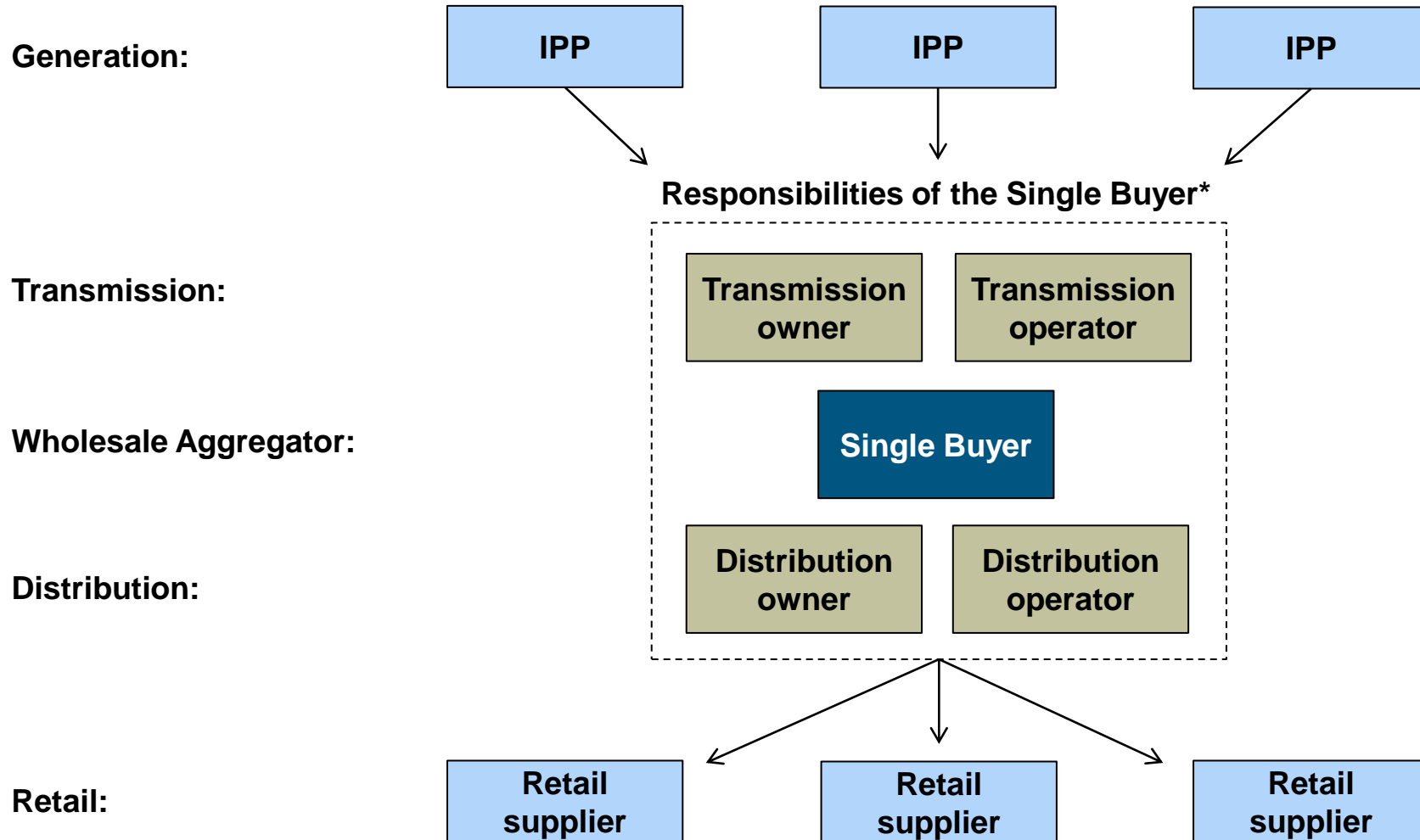
- A wholesale spot market is based on short-term dispatch competition
- Generators compete every hour to dispatch electricity into the grid
- Because of the hourly competition, other longer-term decisions are also driven by competitive forces – EPC and fuel procurement must also be subject to competitive tensions for any company to survive
- In mature markets, even retail customers may choose alternative suppliers – leading to even more competition but also more uncertainty
- The level of competition may have downsides – expensive, slow-to-build but ultimately least-cost technologies such as large baseload coal-fired power stations can struggle to gain financing in a world where long-term contracts do not exist.

## Overview of the single buyer structure

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- The Single Buyer is a stable form of disaggregated structure
- The Single Buyer (generally) runs the monopoly aspects of the ESI (networks) and procures power from private generation companies
- Competition exists in long-term power procurement via 10-20 year PPAs
- A Single Buyer may exist to gain some of the benefits of competition without the risks associated with a full market
- While it can be a transitional phase from a state-owned integrated monopoly to competition, it can also be an efficient model in its own right.

# The Single Buyer model is intermediate in its level of commercial complexity



Note: \* The Single Buyer does not necessarily need to function as the owner / operator of network assets in some market structures (e.g., EGAT of Thailand)

## Overview of the internal spot market

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- In an internal spot market, generating entities are unbundled, but exist within the integrated ESI
- The generating entities compete internally for dispatch
- Competition exists primarily via short-term dispatch
- Planning and investment typically continue to be controlled centrally
- The internal spot market captures the benefits of dispatch competition without the risks associated with a full market
- While it can be a transitional phase from a state-owned integrated monopoly to competition, it can be a relatively efficient model in its own right.

## How does investment occur in each industry structure?

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<b>Integrated ESI</b>	<ul style="list-style-type: none"><li>- Mainly driven by the utility, with limited external and foreign investment if state-owned</li><li>- Utility responsible for both generation and network facility investment</li><li>- Investment can proceed very quickly</li><li>- But sometimes investment does not occur on a timely basis due to lack of finance or inadequate planning (mostly state-owned)</li></ul>
<b>Single Buyer</b>	<ul style="list-style-type: none"><li>- Regulated grid operators responsible for the network facility investment, while SOEs and IPPs are responsible for the generation facility investment.</li><li>- Single Buyer will take the driving seat in determining how much and when new facilities are needed (through power development plan) – via either tendering or negotiation</li><li>- IPPs usually demand PPAs or some contract cover to safeguard their interest and obtain financing</li><li>- Well-established regulatory framework and creditable market counter-parties are important in attracting investment</li></ul>



## How does investment occur in each industry structure?

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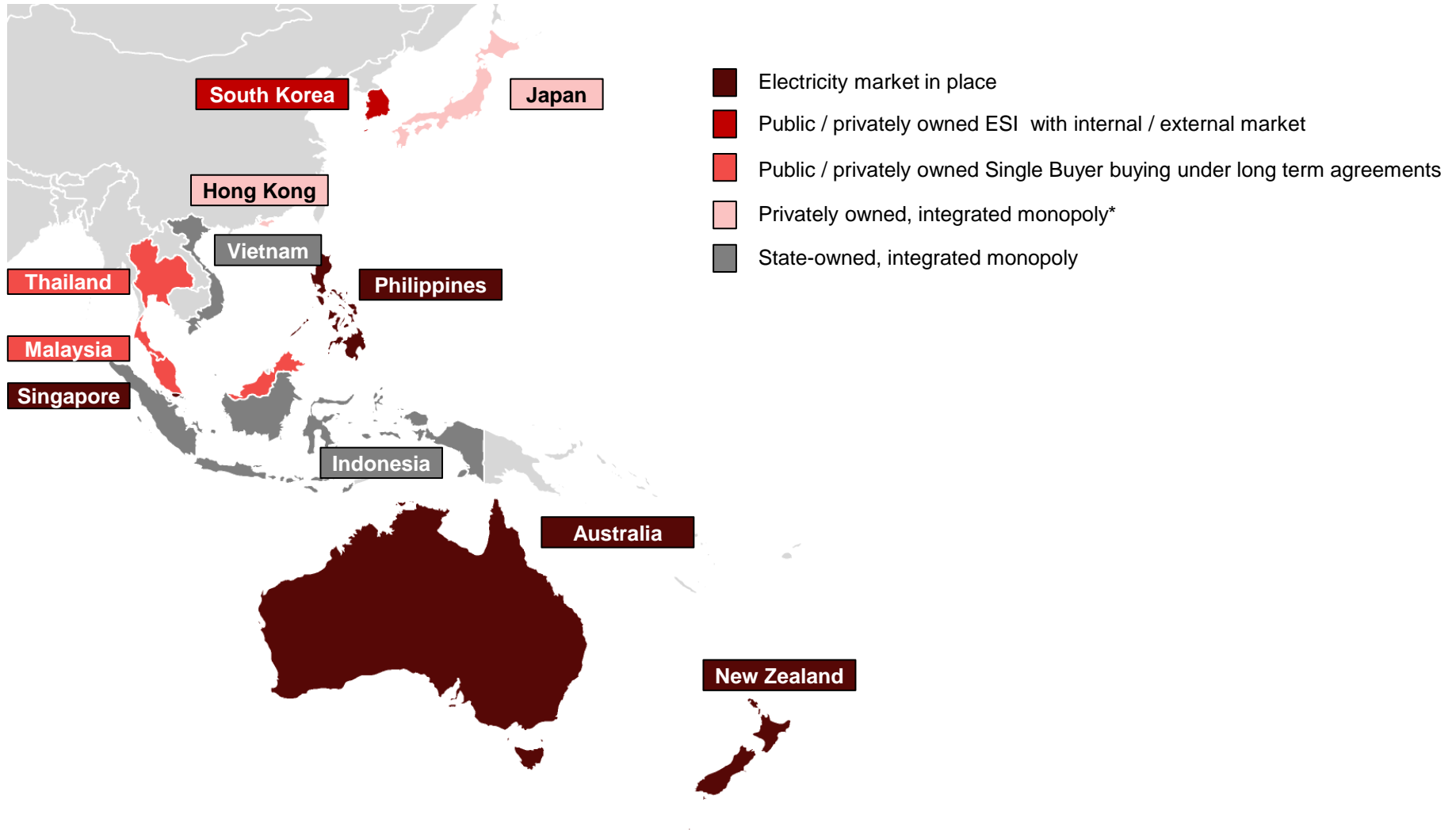
Internal Spot Market	<ul style="list-style-type: none"><li>- Utility responsible for network facility investment</li><li>- Generation investment may be controlled centrally (through power development plan) or partially delegated to unbundled generation entities</li><li>- As with integrated ESI, investment can proceed very quickly but lack of finance or inadequate planning may hinder development</li><li>- Unclear or inconsistent contractual relationships between parent and unbundled generation entities can also slow development</li></ul>
Competitive Market	<ul style="list-style-type: none"><li>- Regulated grid operators responsible for the network facility investment, while competing IPPs are responsible for the generation facility investment.</li><li>- System operator helps to assess the market supply-demand balance (through statement of opportunities), but investment in new facilities (other than the regulated network) is driven by market players opportunistically</li><li>- IPPs would deploy their own investment strategy (enter in bilateral contract or become merchant plant) and have to manage their own investment and business risk</li><li>- Well-established regulatory and market framework and creditable market counter-parties are highly important in attracting investment</li></ul>

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# Throughout Asia, there are various different kinds of power generation arrangements



Note: \* Often facilitated through a franchise arrangement

# Some countries in SE Asia have either adopted a market or are in the process of implementing a market



- Electricity market in place
- In process of market implementation
- Traditional IPP

Country	Electricity Market	Market Start
Philippines	Wholesale Electricity Market (WESM)	26 June 2006 (Luzon); October 2010 (Visayas)
Singapore	National Electricity Market of Singapore (NEMS)	1 January 2003
South Korea	Korea Power Exchange (KPX)	April 2001
Malaysia	No market	Discussions about a market have been ongoing
Vietnam	Planned market	Expected 2014 (Pilot Operation)

Source: Electricity Regulatory Authority of Vietnam

# But the environment in the power sector remains challenging



- Electricity market in place
- In process of market implementation
- Traditional IPP

## Key Challenges

### Singapore

- Fuel mix highly dependent on gas
- High cost of electricity
- Lack of indigenous fuel resources

### Philippines

- Increasing challenges to new build due to regulation & counterparty credit worthiness issues
- Open access introduces uncertainty
- High cost of electricity

### Malaysia

- End of gas subsidies changes gas vs coal economics
- Develop an efficient and effective single buyer mechanism

### Vietnam

- Mismatch between tariff and cost of electricity
- Lack of new build due to EVN's financial losses
- Severe reserve margin squeeze through to 2016

### Thailand

- Aggressive new build plans of 2010 PDP version 3
- Overcapacity and inefficiencies?
- Renewables targets

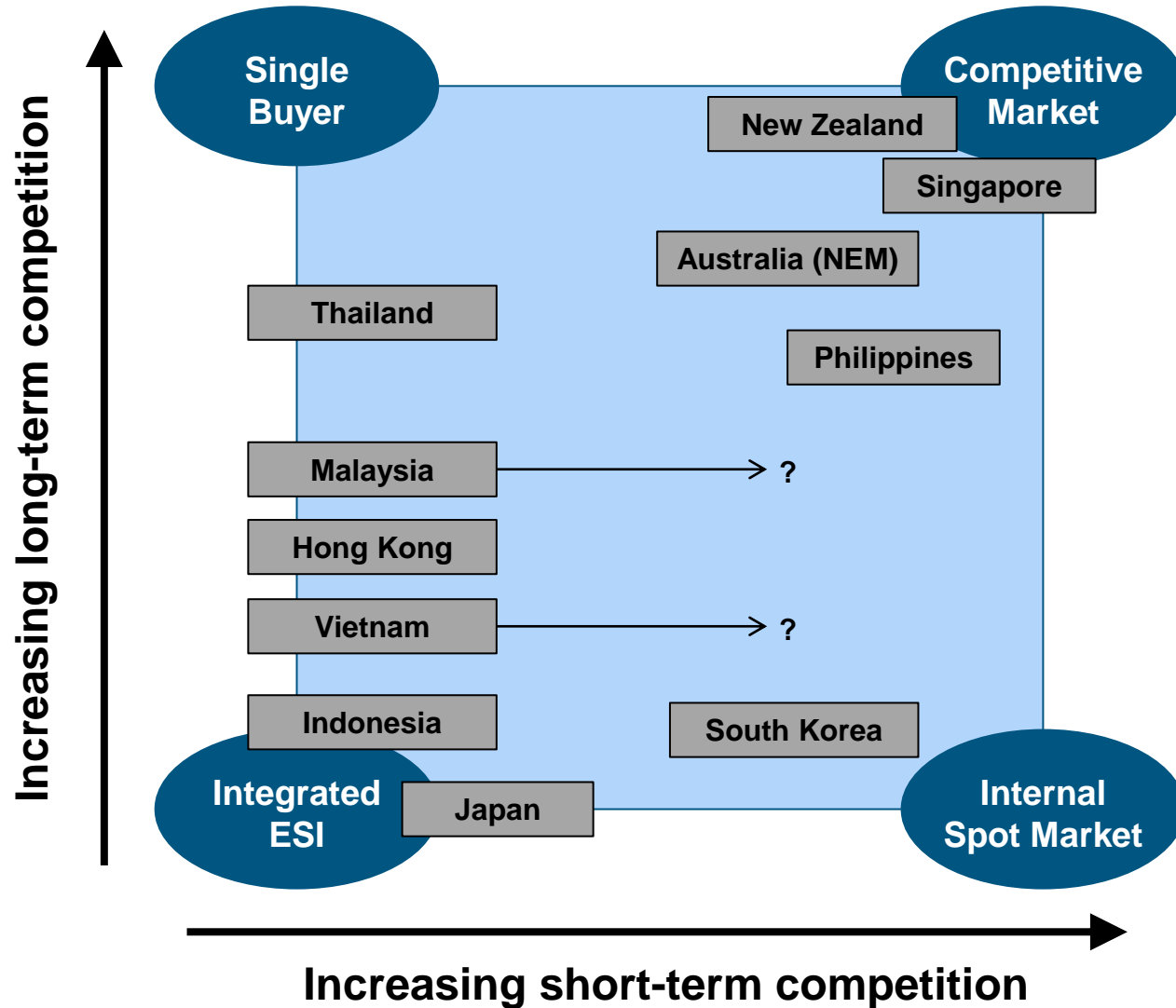
### Laos/ Cambodia

- Low Electrification
- Laos is highly dependent on hydro
- Cambodia is highly dependent on oil import and has the highest cost of electricity in the region

### Indonesia

- Low electrification
- Mismatch between tariff and cost of electricity
- Lack of new build due to PLN's financial losses
- Domestic gas/coal supply shortage induced by lower domestic prices for both fuels

# Summary of the competitive landscape in Asia/Pacific



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## The right path for any country depends on where it starts from .....

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- Electricity industries do not evolve gradually, they typically jump from one state to another, driven by internal or external forces
- The right development will depend on what the objective is – for example:
  - Inefficient integrated monopolies may be forced into disaggregation in order to fix a perceived lack of efficiency that drives up costs for consumers (e.g., Philippines, NSW)
  - State-owned companies may need to turn to the private sector for additional funds – via either a Single Buyer structure where private companies build generation and sell to the Single Buyer (e.g., Philippines in the 1990s) or a full scale privatization (Victoria)
  - Skills are also a vital component of ESI development. One of the drivers of the original IPP program in many countries back in the 80s was a perceived lack of skills in procuring power stations from international EPC contracts at appropriate costs. Large international firms had such expertise – and governments sought to harness these skills to try to increase the efficiency of procurement.



## ...and what constraints it faces

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- But the path also depends on the constraints – for example:
  - Malaysia has considered developing a full market – but while it continues to cross-subsidize tariffs and the Government intervenes in operations, a full market will struggle to attract investment
  - Vietnam needs new investment in generation. Although it has plans to develop a market, the uncertainties inherent in a market may deter the significant investment needed – and so the market plans remain in limbo
  - Singapore and Hong Kong both put a very high premium on the reliability of electricity supply given the nature of the industries in these small city-states. They have chosen different ways to achieve this objective – but both pay higher prices for electricity than one might expect, because of the trade-offs made between cost and reliability.

# A large barrier to investment in many Asian countries is the lack of a sustainable price for electricity to consumers due to Government subsidies

Country	Oil	Natural Gas	Coal	Electricity	Total	Average Subsidization (%)	Subsidy per person (\$/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

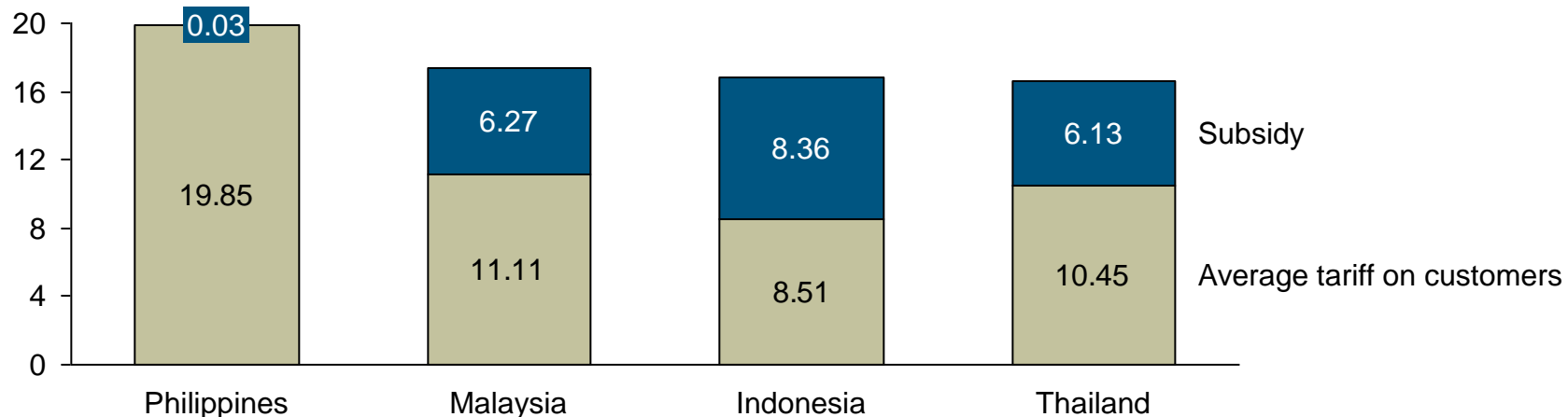
Source: IEA

Note: Units in \$ billions

**If the ESI does not recover its cost, how can it pay for new investment?**

## True cost of tariff if there is no subsidy (Jan 2012)

USc/kWh



Source: USAID

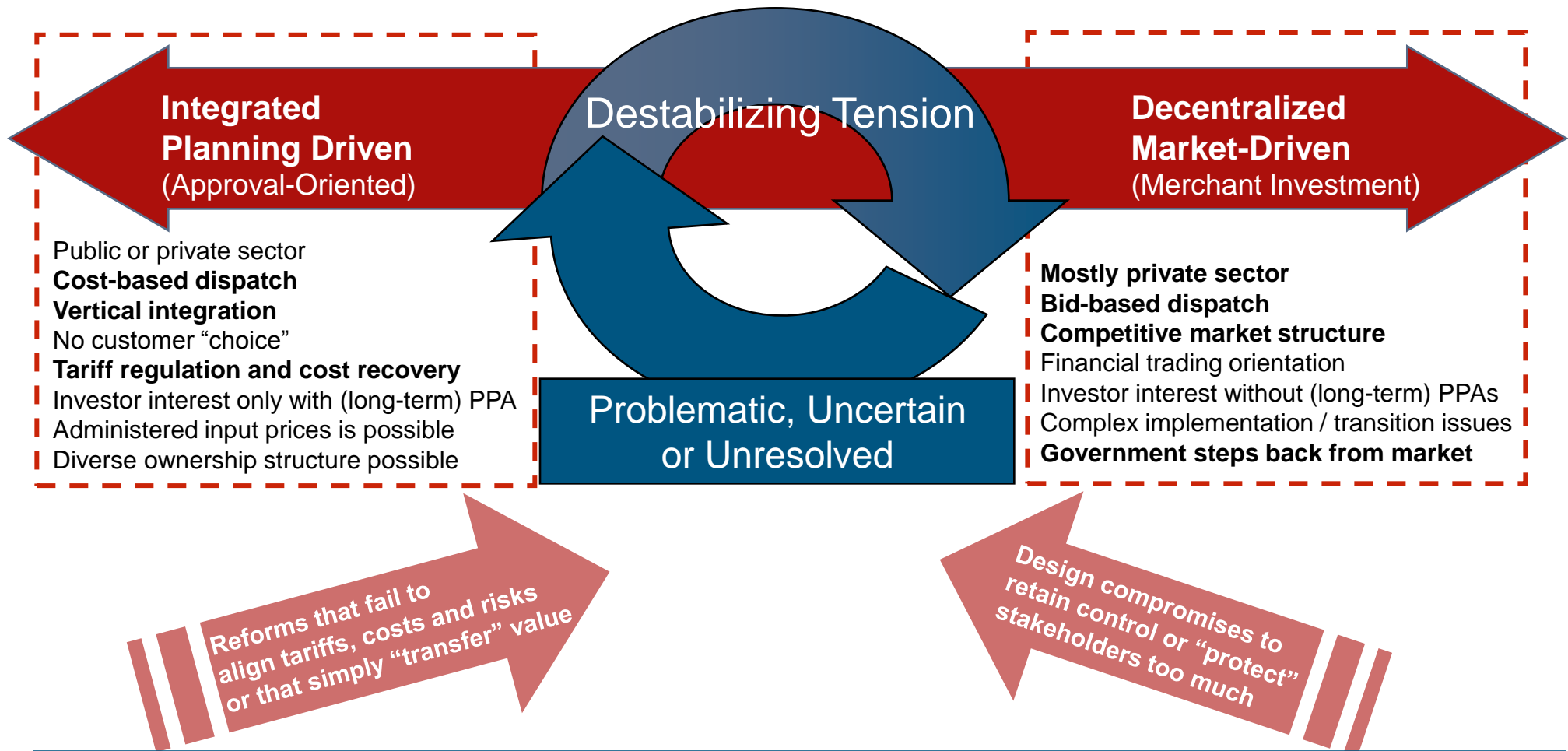
## Other barriers include leaving pieces of the old structure in place when you move to a new one

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- For example, in the Philippines, the regulator is operating in the same mode that it did when it regulated the Single Buyer, but the market has moved to a competitive model.
- The ERC must approve all new supply contracts that are signed and the regulation is focused strongly on “cost” rather than “economic efficiency” or sustainability
- The innovation that the market has introduced – which was the intent of the market – is ignored by the Regulator
- There can also be long delays (a few years) in obtaining provisional / final approval
- The implications of this approach is that new build sees regulatory certainty as a major hurdle to financial close and new projects are delayed.
- Such delays of themselves contribute to the very rising prices the Regulator is trying to avoid and undermine the objectives of the reform.

When markets move to a new equilibrium, the whole industry must fit together

There is a good reason why only a small number of discrete types of ESI exist – mixing and matching from different structures can result in bad outcomes



Either markets or single buyers can work, provided the frameworks fit together and the decisions, regulations and tariffs all match the chosen option

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## The first task of any ESI formation or reform is to determine the objectives

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- It's hard to drive in the right direction if you do not know the intended destination!
- For Myanmar it would be reasonable to expect that the objectives might include:
  - Widespread electrification
  - Least-cost development of the system to ensure the lowest cost of electricity to underpin social and economic development
  - A sustainable industry where new power is added as and when it is required

Clearly, making the industry attractive for power station investment will be key to achieving these objectives

## Then you have to identify where you are

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- How can you follow a map if you don't know where you are starting from?
- For Myanmar, this would mean taking stock of:
  - What is the current and latent electricity demand?
  - What resources are available to generate electricity? These might include conventional fuels such as coal, oil, gas or hydro, or it might include less conventional options such as wind or solar or smaller distributed-generation options
  - What sources of funding exist?
  - What laws and regulations already exist?
  - What expertise exists?
  - What are the barriers to investment and how can they be managed?

Understanding the resources that already exist helps to identify the gaps needed to bring in investment

## And finally, knowing where you are and where you want to go, develop a plan to get there

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- There is more than one way to get from A to B in most places, and the route chosen may depend on what you want to achieve along the way
- Malaysia is a good example of a country that is heading towards an objective, but has paused along the way
- Originally, the ESI was a state-owned integrated monopoly (TNB)
- In order to meet rapidly growing demand and decrease the draw on state-finances, however, it moved to a Single Buyer model in the 90s and signed new contracts with various IPPs to build power stations and deliver electricity to TNB
- Now it is considering further enhancements to competition, such as an internal pool or even a full market. However, constraints exist including cross-subsidies – meaning that the electricity revenues are not fully sustainable nor are fuel supplies market-priced. Over time, these issues need to be tackled before the market can be introduced.



# Regardless of the industry structure, some determinants are prerequisites to attracting timely investment

## Key Determinants

- Transparent information and data sharing (supply-demand balance is reported accurately and projected logically)
- Proper tariff setting mechanism (at least allow cost-recovery in a long run)
- Respect of rule and law (well-established market rules and dispute resolution mechanism)
- Enforce contract obligation (no easy change of terms unilaterally or default on duties)
- Fair field for market players (no discrimination or bias, or local protectionism)
- Consideration of stakeholders' interest (allow time for stakeholders to adapt to changes)



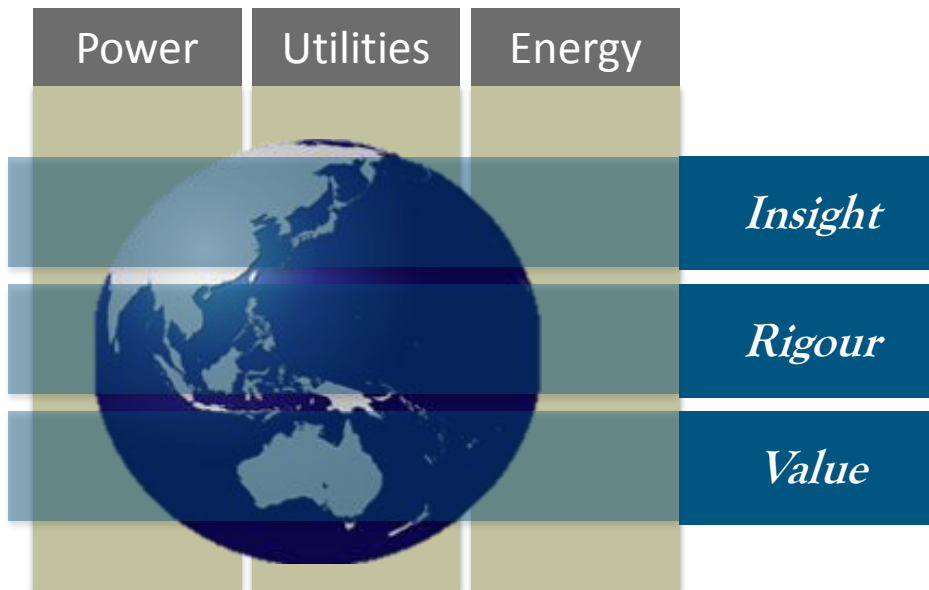
## Beware the stable transition points!

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- There is always a risk that the place you pause for a lunch-break becomes the destination!
- In the previous example of Malaysia, the time taken to tackle the pre-requisites of a market may yet stall the introduction further. So far it has been many years in the discussion phase
- Similarly, Korea introduced a “temporary” cost-based pool as an interim measure along the way to implementing a full market, involving disaggregation and privatization of the industry
- This has stalled at the cost-based pool, which operates more like an internal market of the Single Buyer KEPCO, which still supplies most consumers in Korea.

The moral of this is – the more stable the interim states are, the harder they are to leave!

Thank you!



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