



The **energy sector** is being **disrupted**, but the **drivers** form a complex mix of **innovation, market-dynamics**, and legacy regulatory and policy factors. The result can be a mix of **desirable** and **undesirable** impacts that introduce **change** but not *necessarily progress*.

Creating a Competitive Electricity Market in Vietnam

October 2017

Sarah Fairhurst



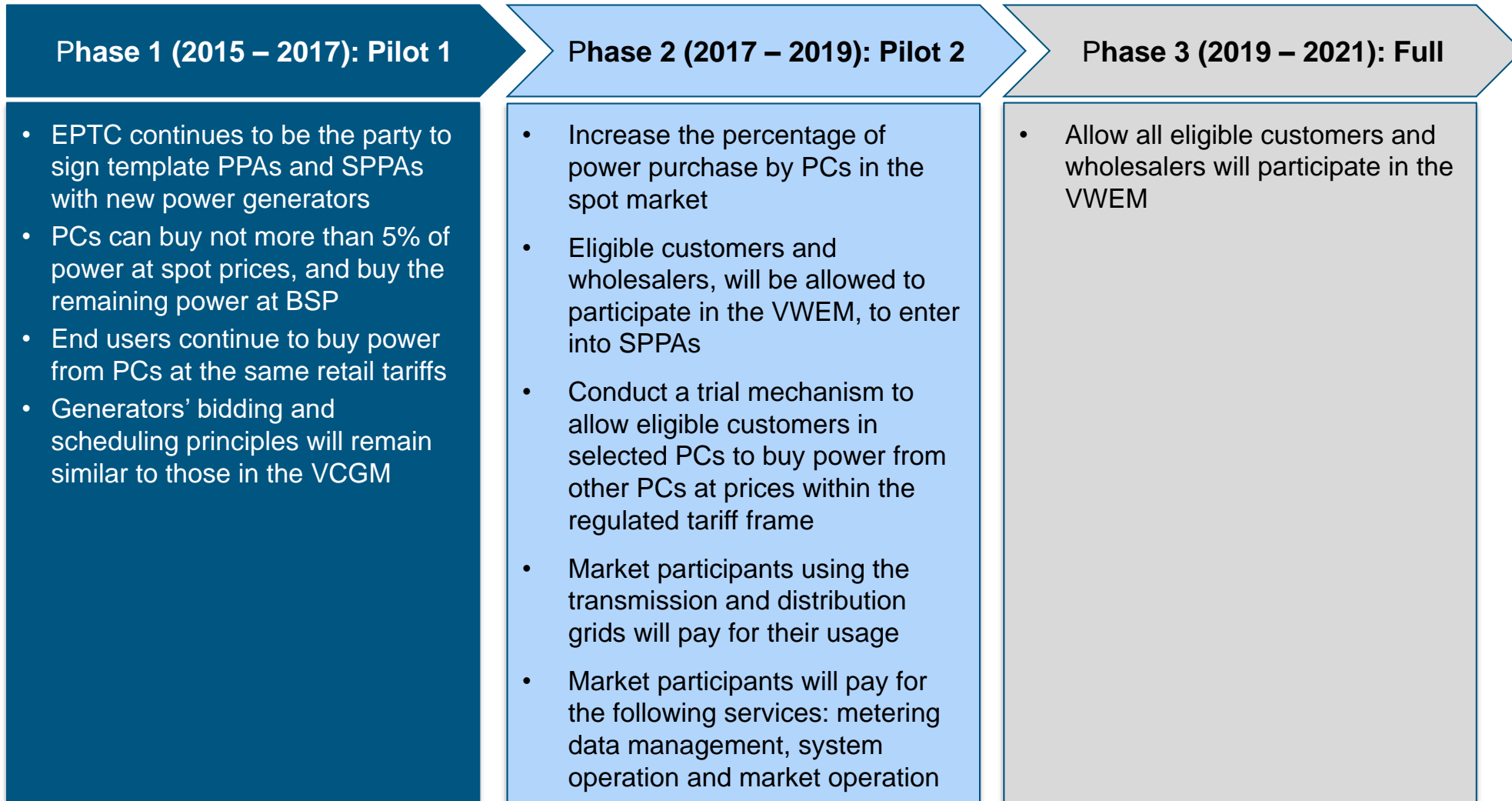
THE LANTAU GROUP
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Across the globe, markets are being exposed to more competition, using a range of market designs and other mechanisms

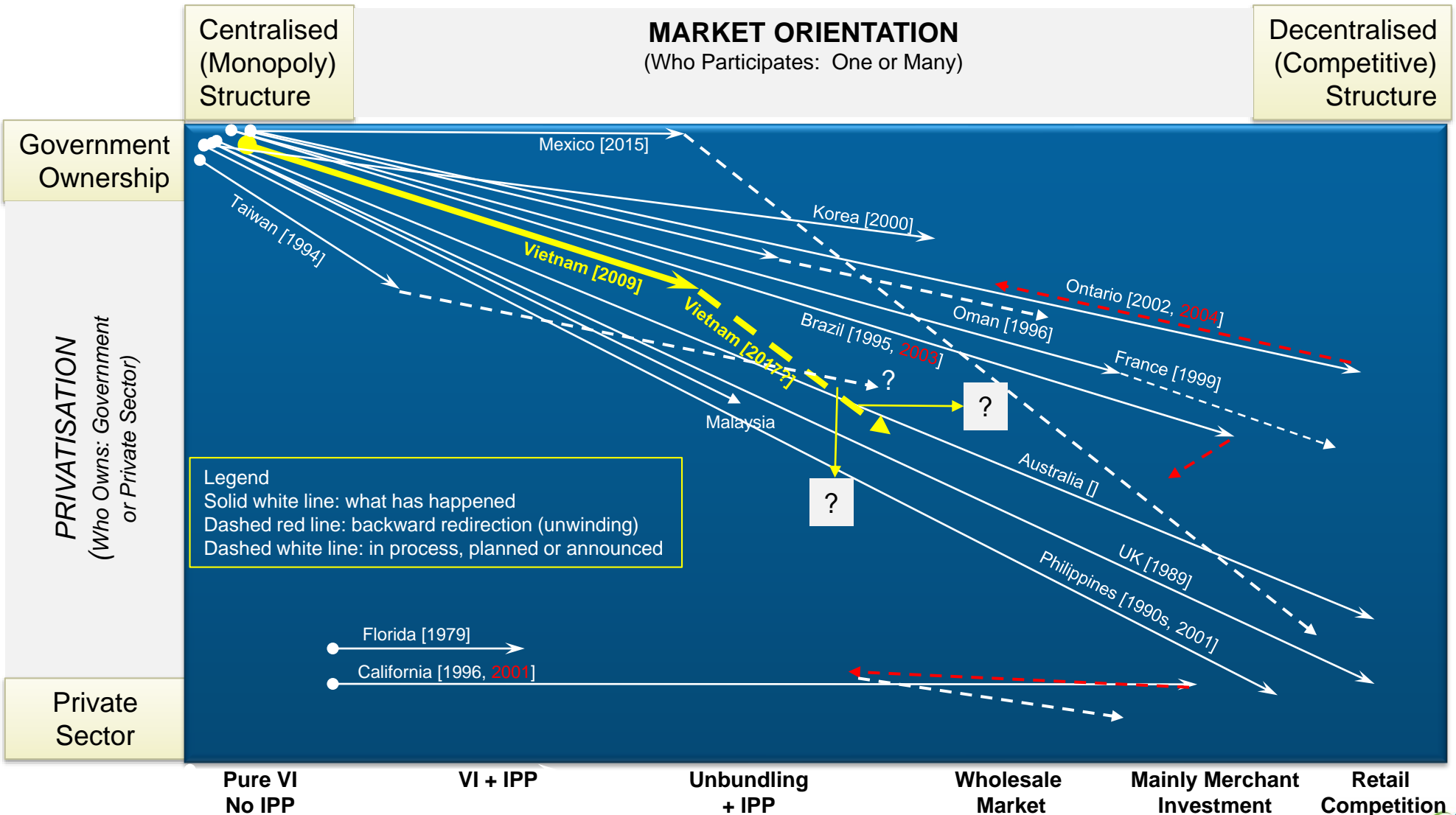


1 In November 2016 Alberta recently approved AESO's recommendation to develop a capacity market
 2 Colombia has a Reliability Charge scheme that replaced the capacity market in 2006

Vietnam is no different. Ongoing market reforms nudge the system along towards liberalisation, though progress has been slow



Thirty years of global progress in one direction: To where the risk is!



BUT

Just when you thought you knew what this presentation was about....

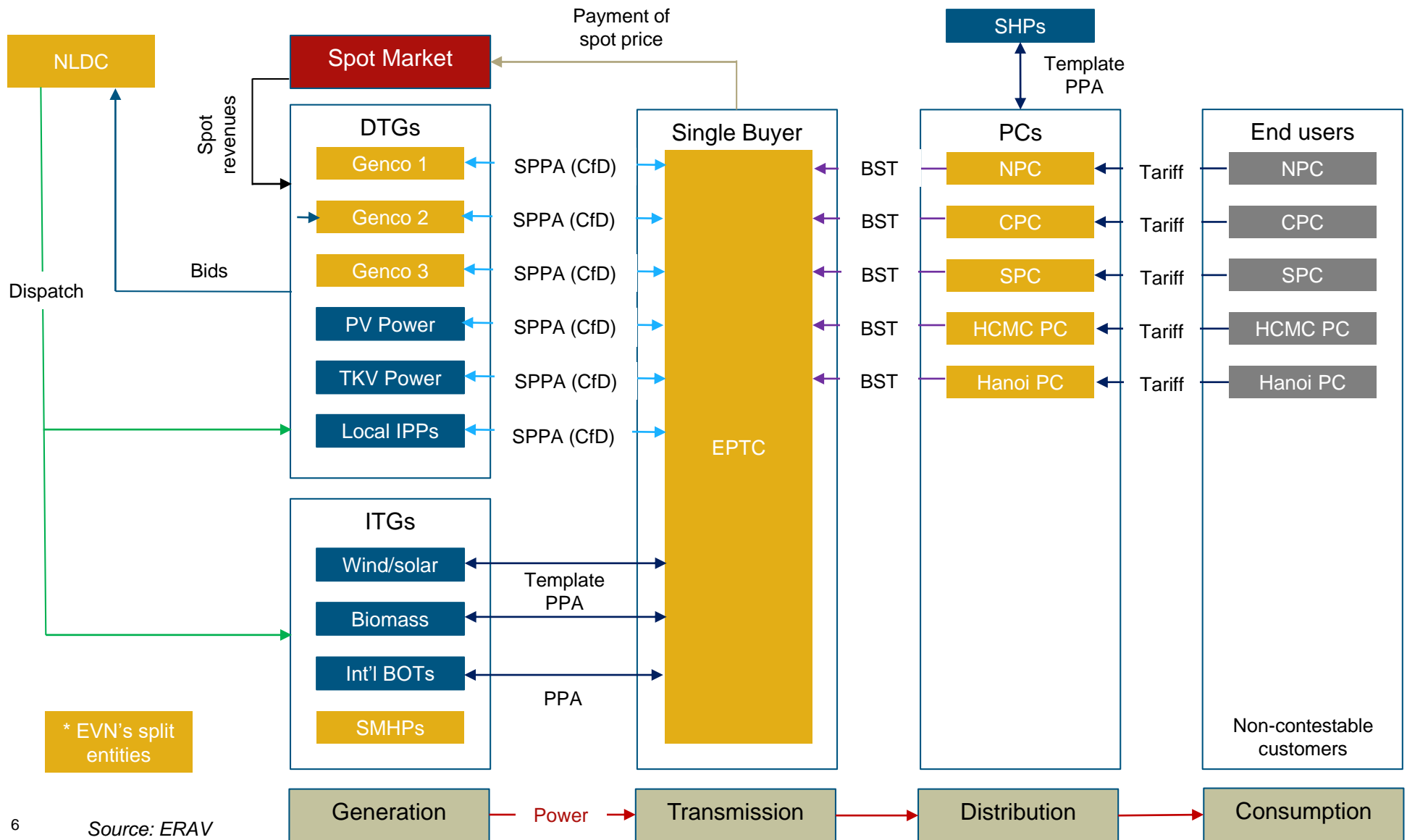
(NEW)

The world has changed and so advice on the subject also needs to evolve

Holes and Ladders; Winners and Losers



VCGM has done the things that other markets have done – separation of competitive and monopoly functions; separation of generators to allow competition



Onward now to a wholesale spot and retail market?

Original market reforms were based on the classic description of a power market – generated thirty+ years ago (Just as I entered the workforce in the UK!)

Supply Side

- Coal or nuclear plants run baseload
- Gas plants run mid-merit
- Hydro or diesel are peaking units

(Technology is well understood, stable, with incremental improvements)

Demand Side

- Large customers should be able to choose supplier
- Households can choose their retailer eventually
- No options for self generation

(Demand is “passive”, their only choice is what price to pay)

The economics “rules”

- Bigger is better – economies of scale
- The merit order defines dispatch – coal then gas then diesel
- The intersection of supply and demand is the right price
- Power flows in one direction – from generator to transmission to distribution to customer

But how the world has changed and our ideas of markets need to evolve too

More Stakeholders

- Renewable energy developers
- Demand response providers
- New business models (Fin-Tech: blockchain, peer to peer)
- Customers as generators

More Technologies

- Smaller scale technologies
- More technology stakeholders
- More differentiating factors
- Rapidly falling costs and improving performance

More Policies

- Generous Feed-in-Tariffs
- Aggressive Renewable Portfolio Standards

More “Choices”

- Ability to use competition to get lower prices from exposed suppliers
- Options for “behind the meter” generation or cogeneration
- Households with options for rooftop solar or (say) Tesla batteries
- Industrials with preferences to contract for renewable energy

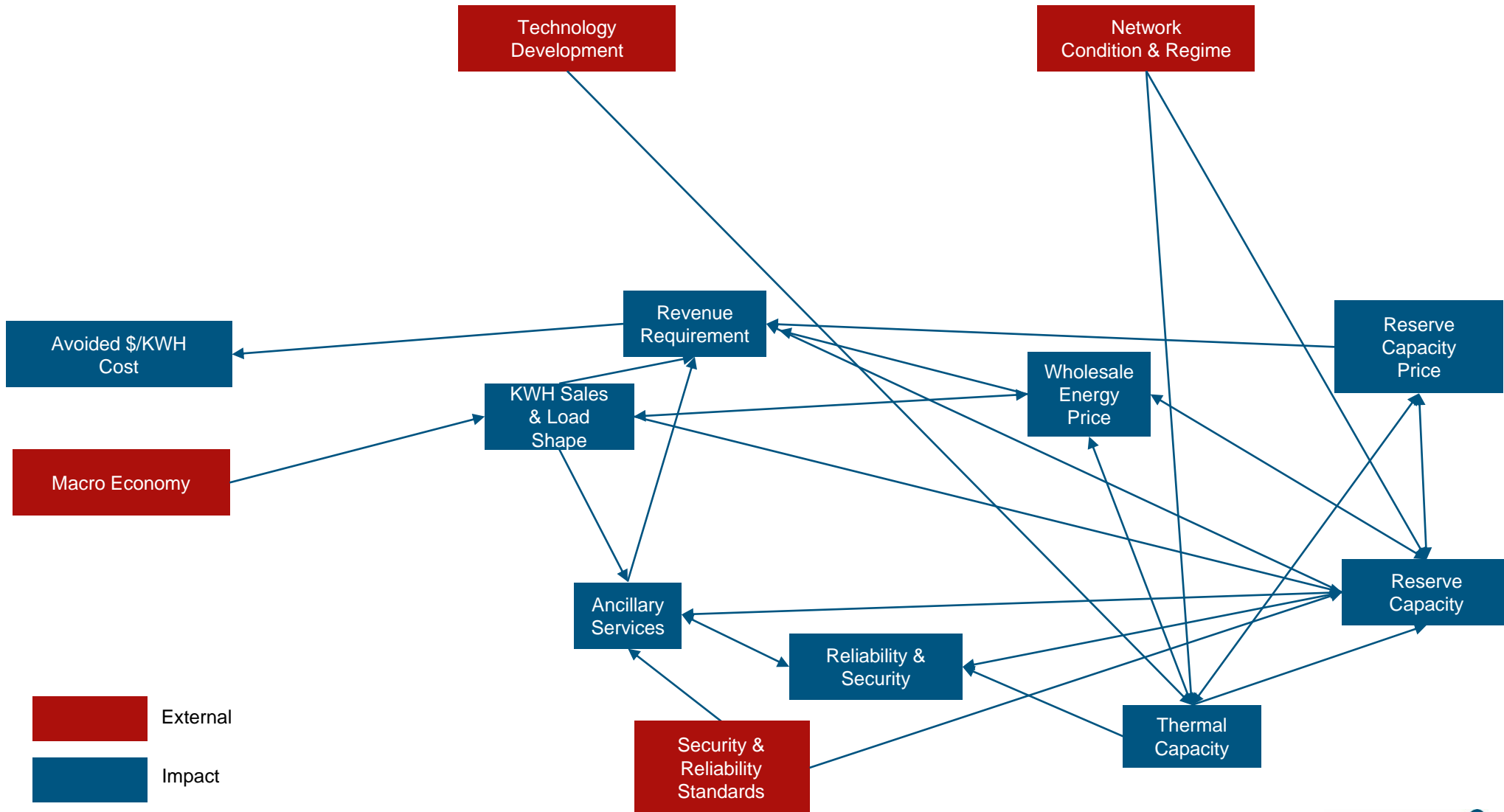
Easier “Exploits”

- Use distributed energy resources (DERs) to avoid paying for their share of the grid
- Cherry picking of profitable customers
- Exploiting market mechanisms
- Value shifting

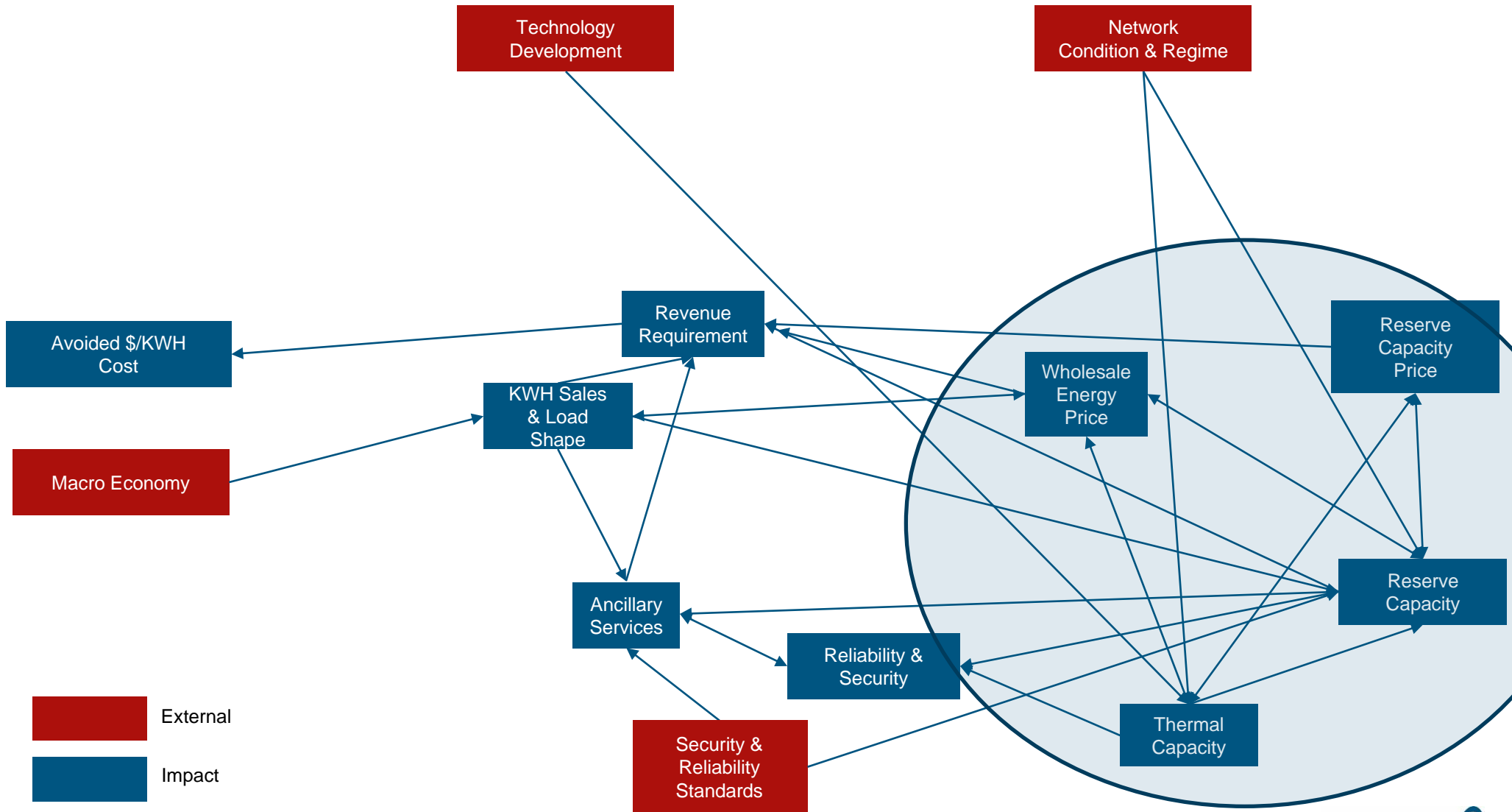
...the future looks (even more)
different to the past



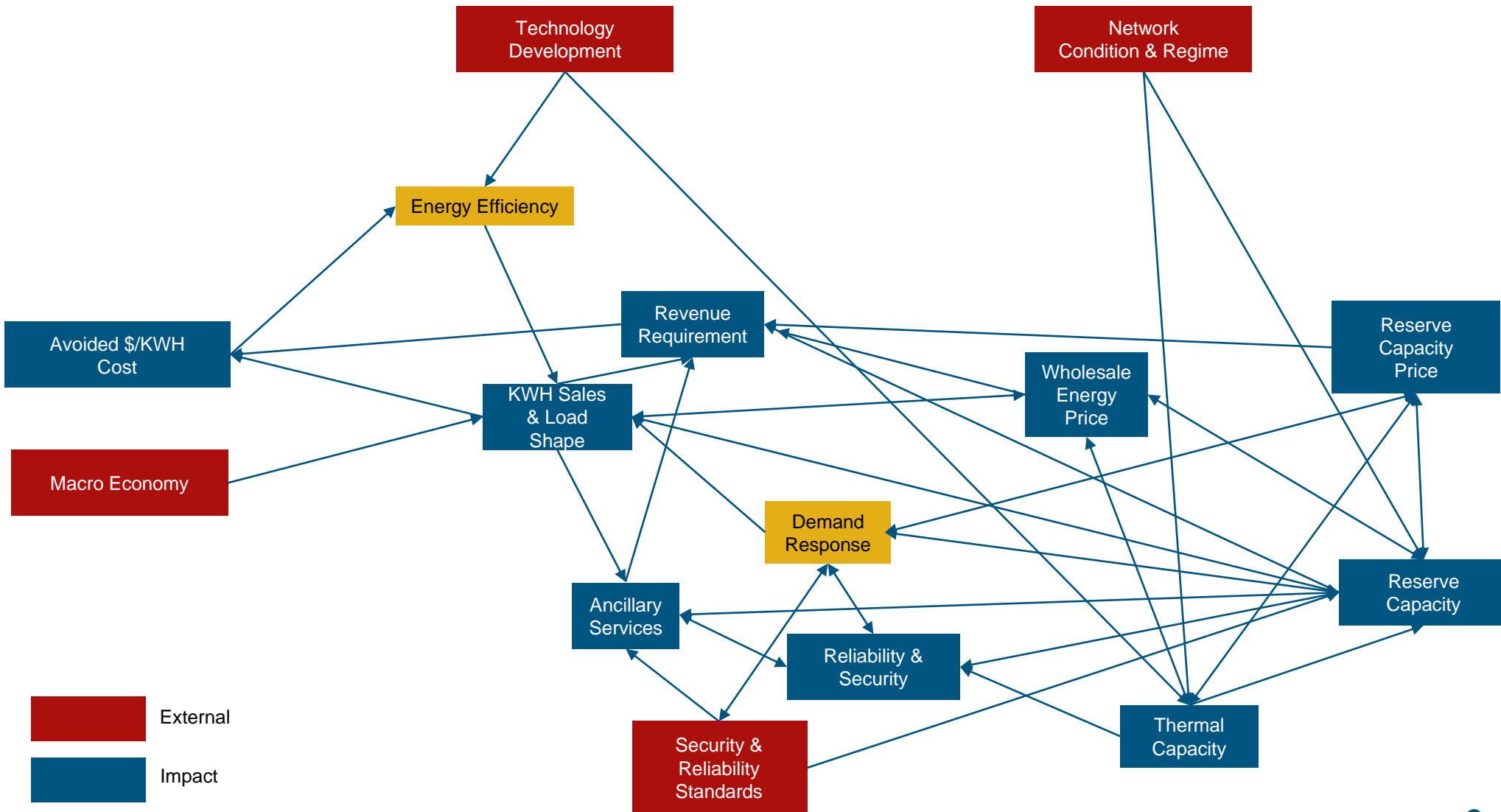
We used to live in a simpler time (that seemed complex enough then...)



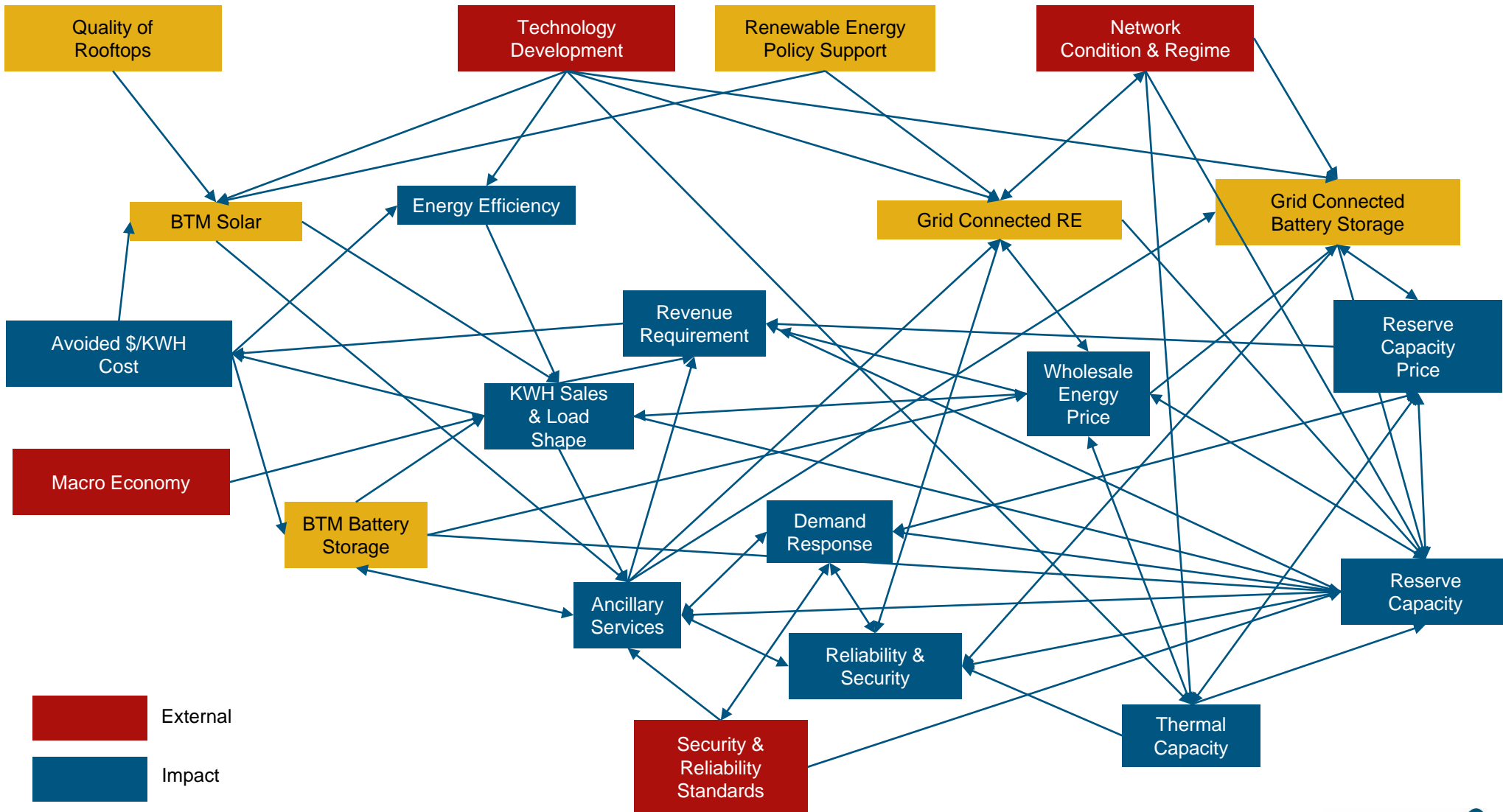
The focus was just on how to generate electricity at least cost...



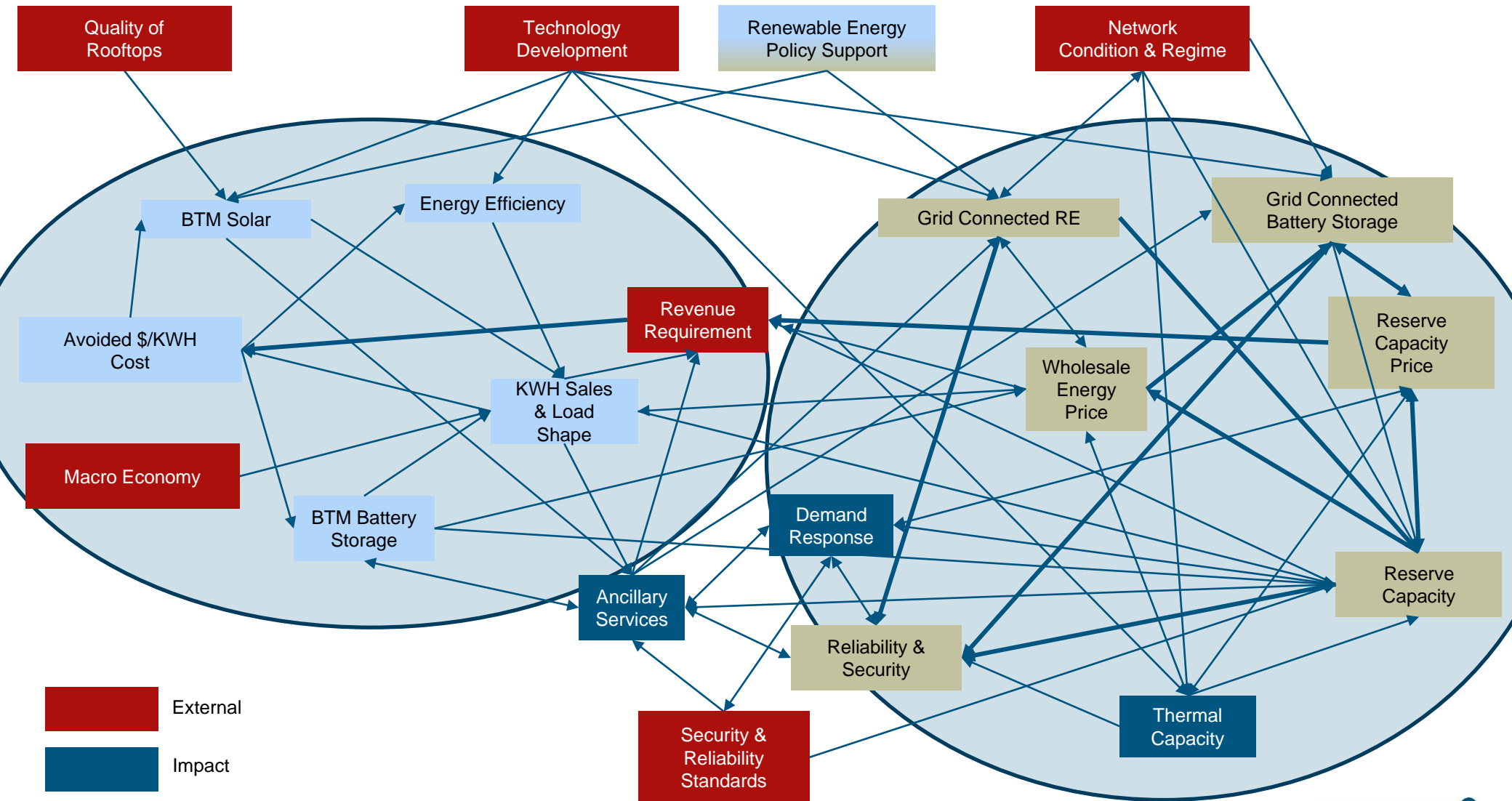
We then started seeing some “customer-side” responses (or tried to encourage them)



And then new technologies emerged on both sides of the “meter”



Does something become magically better or different just because it is on one side of a meter or another?



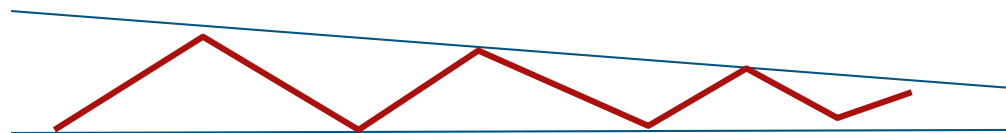
New stakeholders every day – few look like energy companies – everyone wants a slice of the pie (or two slices) or a whole new pie



These forces create winners and losers when players seek to exploit pricing anomalies or cross subsidies

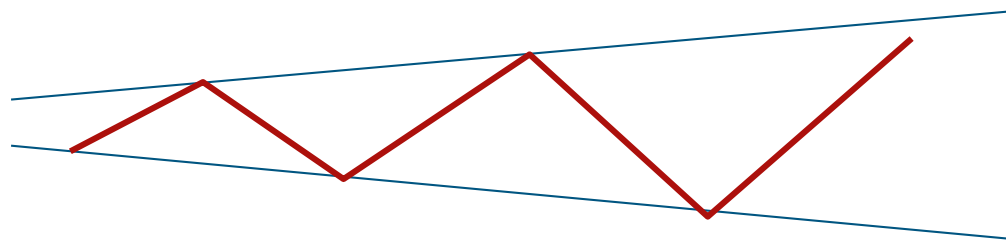
- The introduction of new technology (or the maintenance of existing technology) into the electricity sector is likely to be problematic if:
 - It is adopted (or not adopted) due to a pricing anomaly (i.e., a distorted or incomplete, or missing price signal)
 - Its adoption (or non-adoption) creates or worsens a pricing anomaly
 - Its inappropriate presence (or absence) reduces reliability or security of the system
 - It results in a material shift of costs to other stakeholders
- Usually there is some triggering of additional forces, which can either be:

Self regulating



Benign

Auto-catalysing

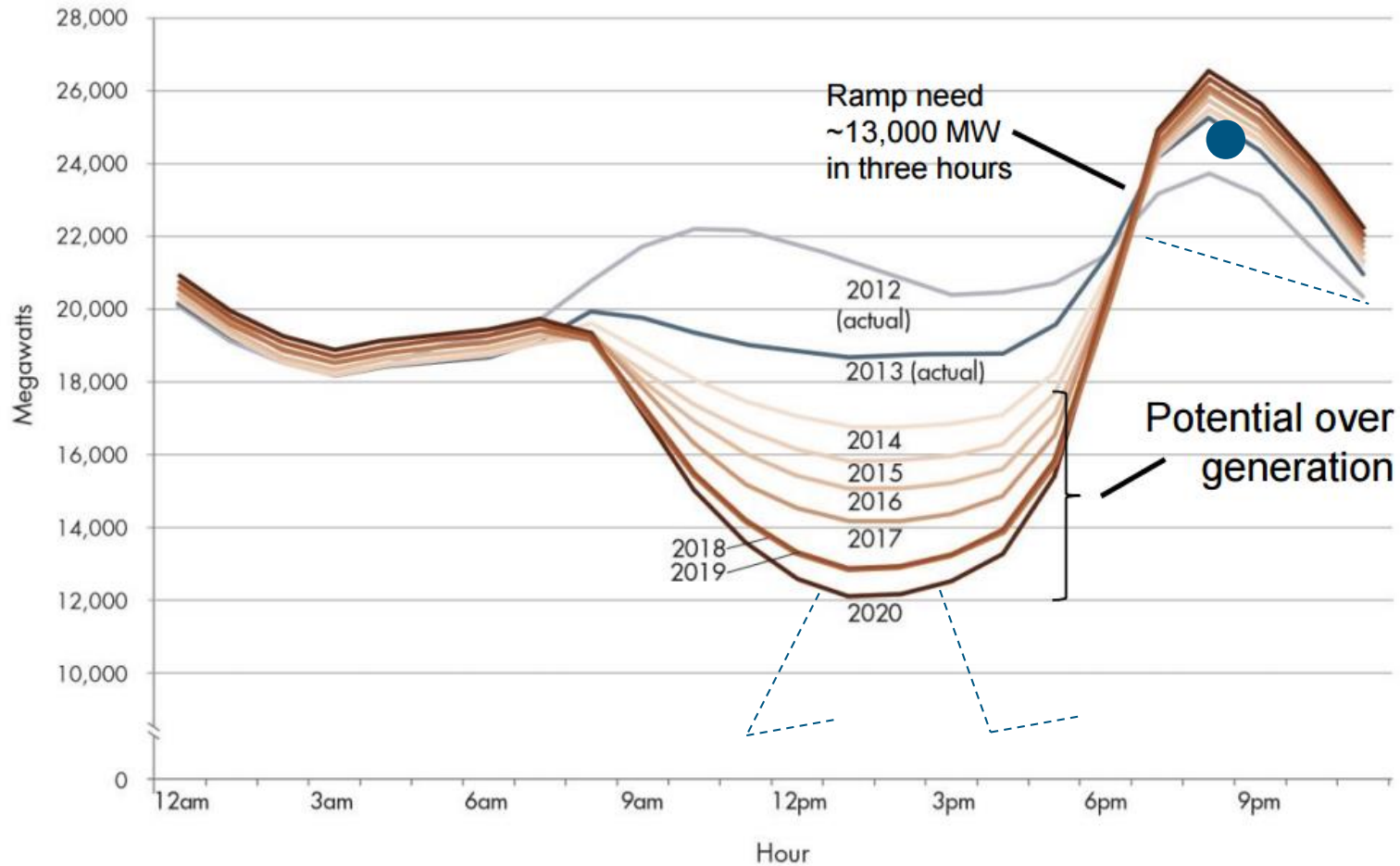


Disruptive

For Example....

System load profiles are changing dramatically due to renewable energy

California's "Duck Curve": Impact of Solar Output on Net Generation Requirement

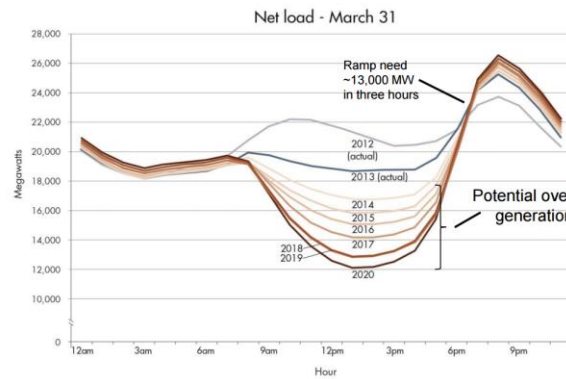


In response....

If you find yourself in a big enough hole, someone will sell you a ladder !



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Excess renewable energy creates a market for energy storage solutions

Battery storage

A presentation slide for Advancion Energy Storage. The slide features the Advancion logo at the top. Below the logo, it reads "ADVANCION CASE STUDY" and "AES Alamos Energy Storage". The main text states: "Energy Storage is the most cost-effective solution for peaking applications, based over gas peaking plants, considering long-term economics and the full range of benefits gained from-grid balancing capabilities delivered by Advancion." The slide is divided into three columns: "THE CHALLENGE" (Long-term, California), "THE NEED" (Environmentally responsible and highly flexible resource that can be located), and "THE SOLUTION" (AES Advancion's energy storage). Below the text, there is a map of California, a diagram of a battery storage system, and a photograph of the AES Alamos Energy Storage facility. The AES logo is in the bottom right corner.

Disruption (for some) is an opportunity to sell a new solution

Technologies (and stakeholders) force new thinking about tariffs and incentives

Does Nevada's Controversial Net Metering Decision Set a Precedent for the Nation?



What Nevada's decision could mean for other states

by Julia Pyper

February 04, 2014

Regulators said the order was designed to make solar customers pay their fair share for use of NV Energy's grid. Solar companies warned that the changes make rooftop solar economics unworkable.

What is so problematic about net metering (other than that it can be auto-catalysing)

So what does this mean for competitive electricity markets in Asia?

- European, UK and Australian markets are already changing because of disruptions
 - Demand is falling rather than growing because of efficiency and behind the meter technologies
 - The concept of a “merit order” struggles when so much of the new plant has no variable cost!
 - Tariff structures are under review, because where price \neq cost, anomalies exist and customers are cherry-picking where they install solar and batteries to “save most money”
 - New retailers are entering the market with ever increasing innovations – using smart grids, fin-tech and consumer smartphones to change the way people view and purchase their power

But is this relevant to Asia? And Vietnam in particular?

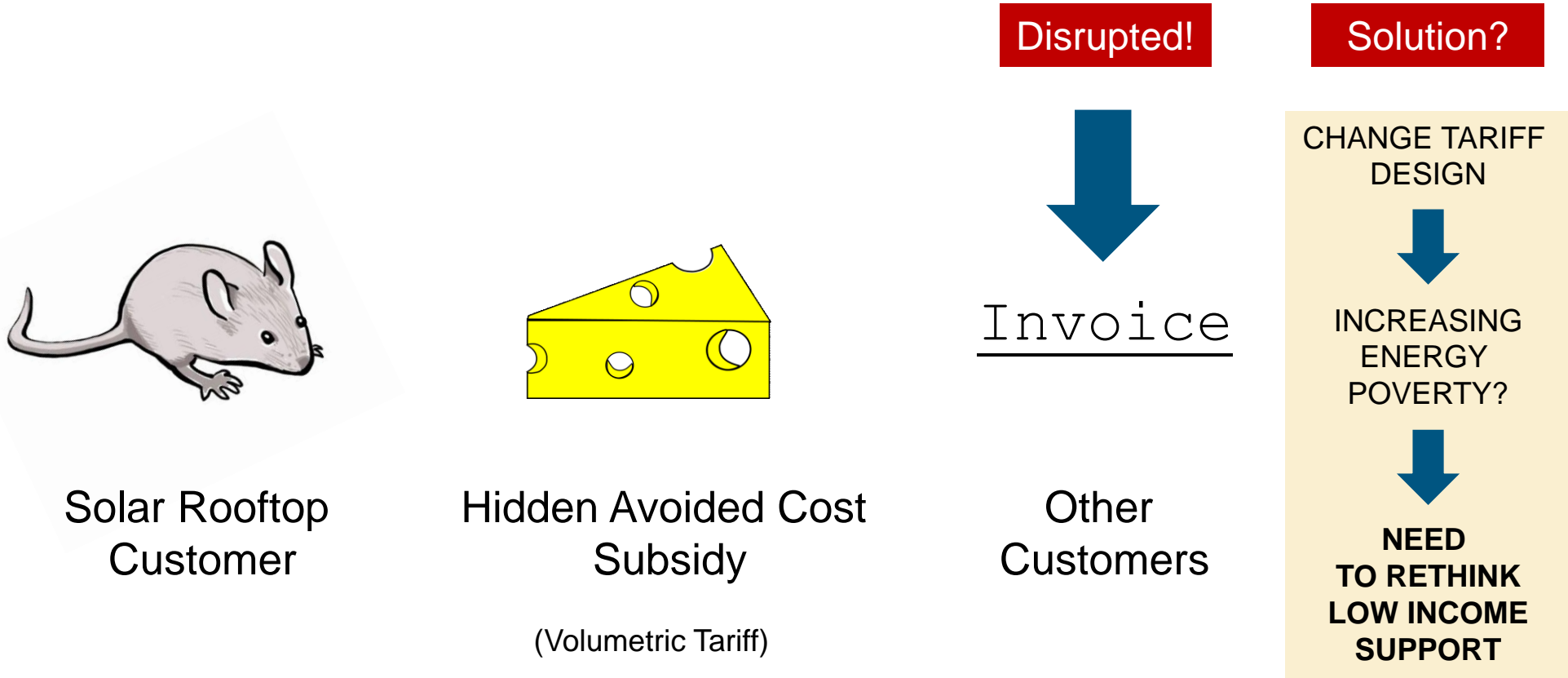
But Asia also has some fundamental differences to the developed world

- Demand is still growing
- New generation is still needed
- Excessive renewable penetration pushed by policies is rare....(for now)...
- ...and economic renewables less common due to cross subsidies and low tariffs that mean renewables need to be cheaper than in the West to compete

But for how much longer?

Vietnam may think its subsidies are a good idea... but

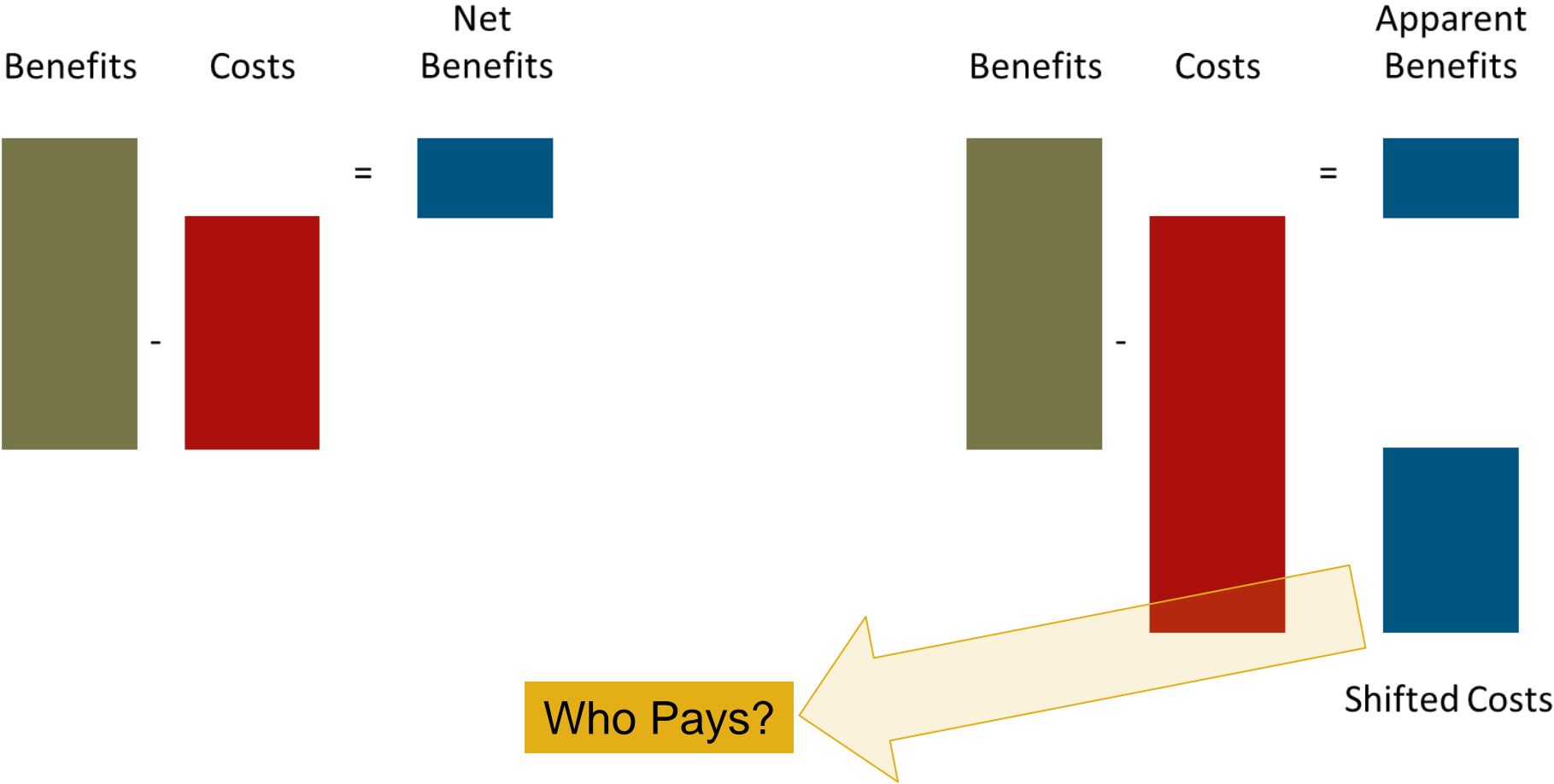
As other markets have found, subsidies do not survive disruptive technologies



Disruption (for others) is a threat to their future

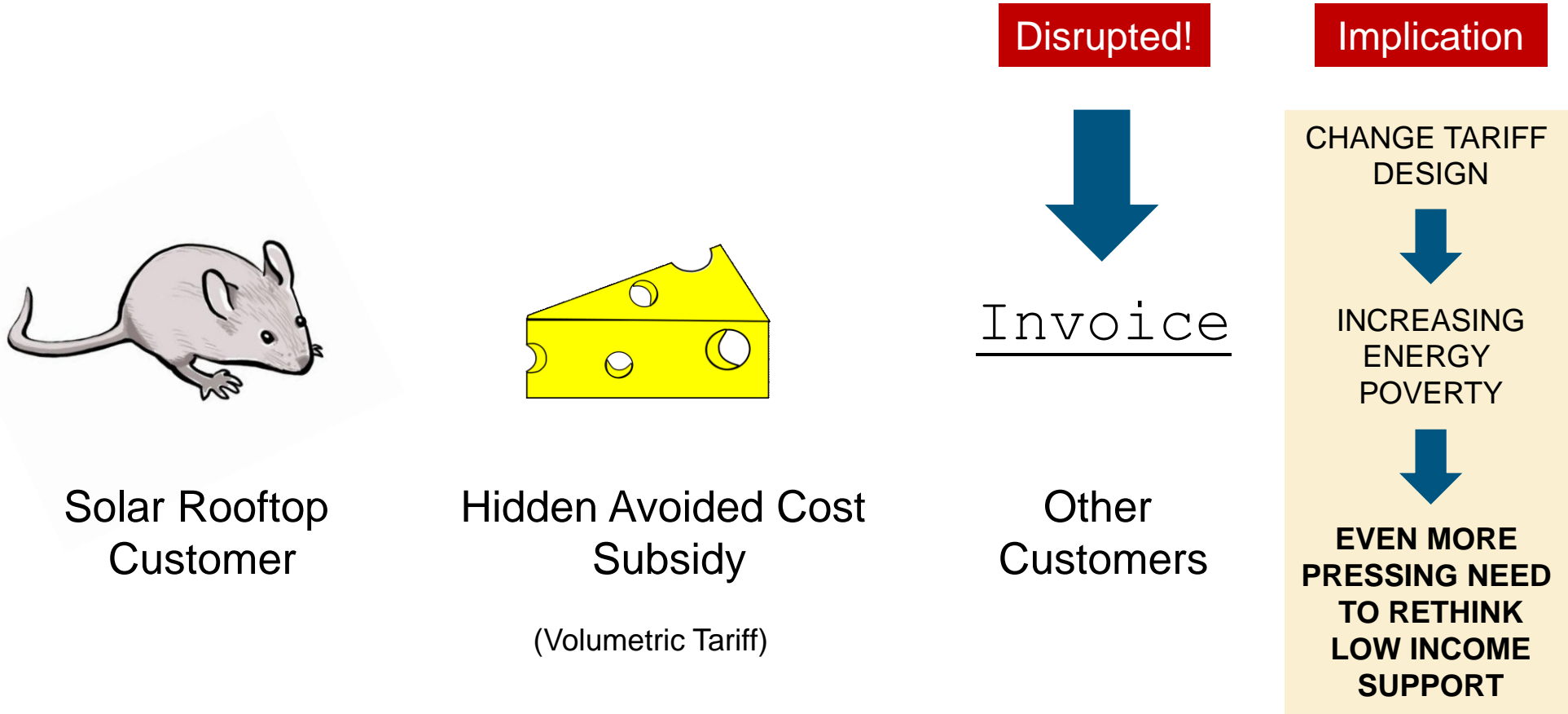
Need to look below the surface...things are not always as they seem.

Cost shifting is a real problem for customers and investors and taxpayers



Subsidies are supposed to ensure power is affordable. No matter what, though, someone has to pay....

Example: California has an increasing energy poverty problem



Tariff structure matters, but changing tariff structures is difficult and slow, but new technologies and new stakeholders move much faster....

New policies can cause incredible value shifting....

In the worst cases, market changes have been extremely bad for investors

Investor exposure to renewable energy in Germany

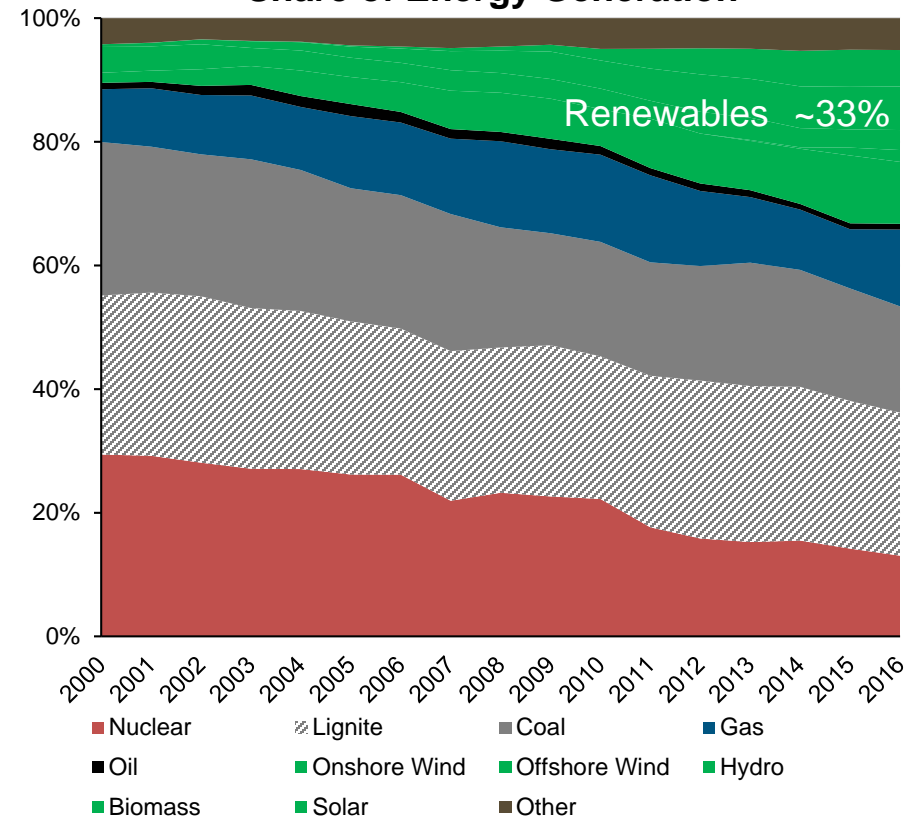
E.ON Market Capitalization



RWE Market Capitalization



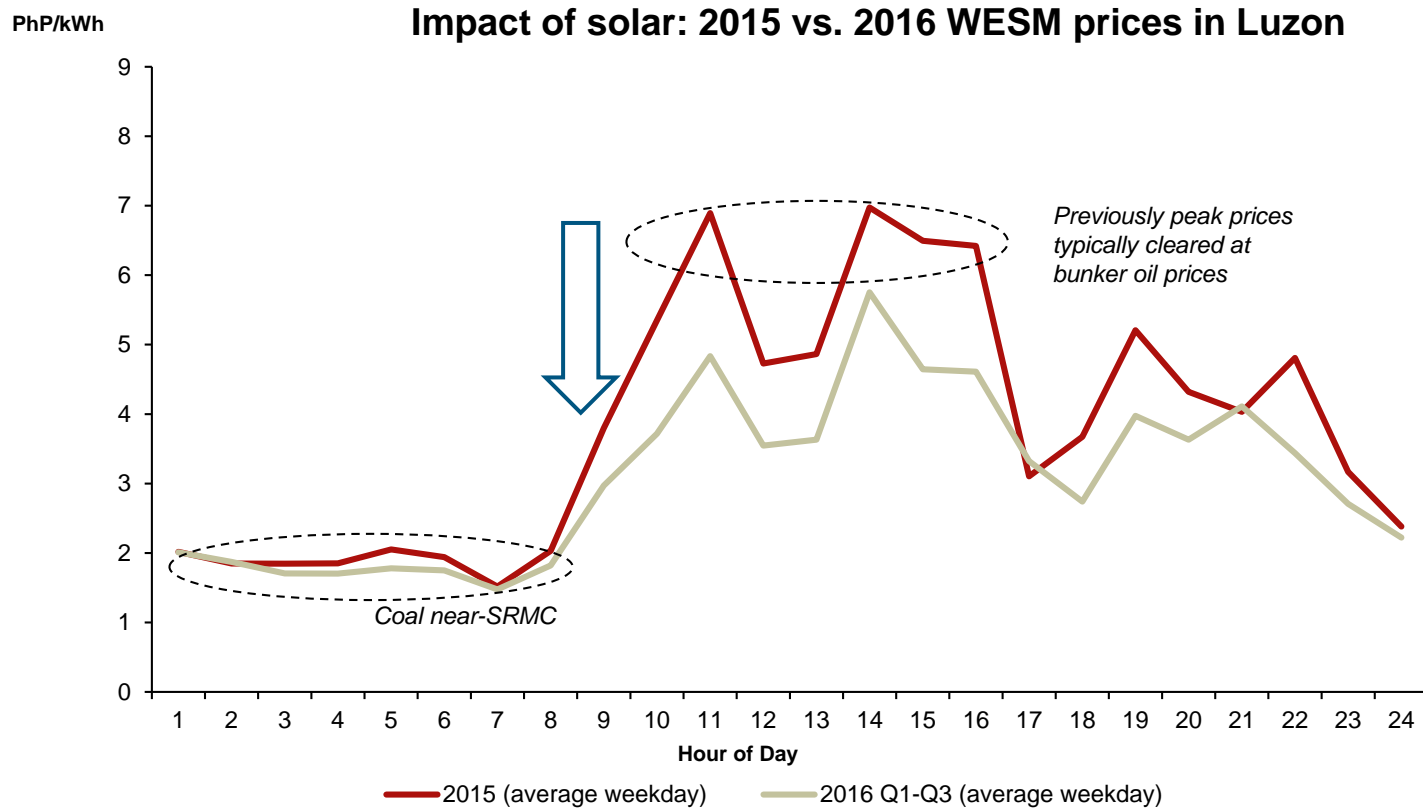
Share of Energy Generation



Fear of change is always a factor, because the value implications are enormous!

And these forces are not unknown in Asia.

Example from Philippines: The increase in solar and wind under the Philippine Feed In Tariff has placed significant downward pressure on WESM prices....



1

During the first quarter of 2016, 346 MW of solar commenced operations in the WESM, all of which came under the Solar FIT2 quota

2

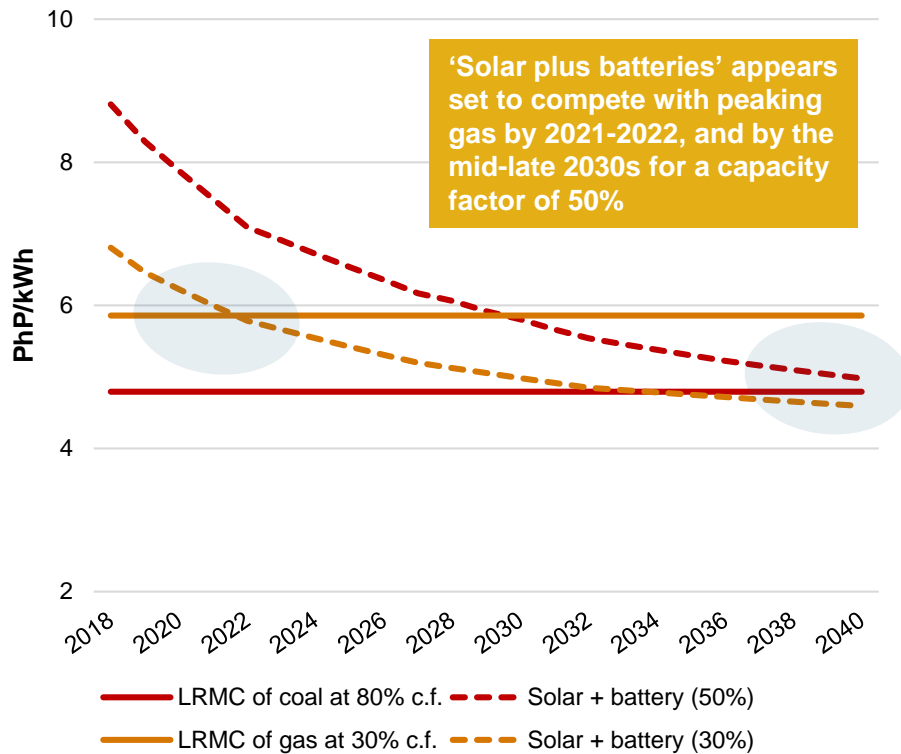
This additional solar has reduced reliance on expensive oil-fired plant over the diurnal peak, where solar generation occurs¹

3

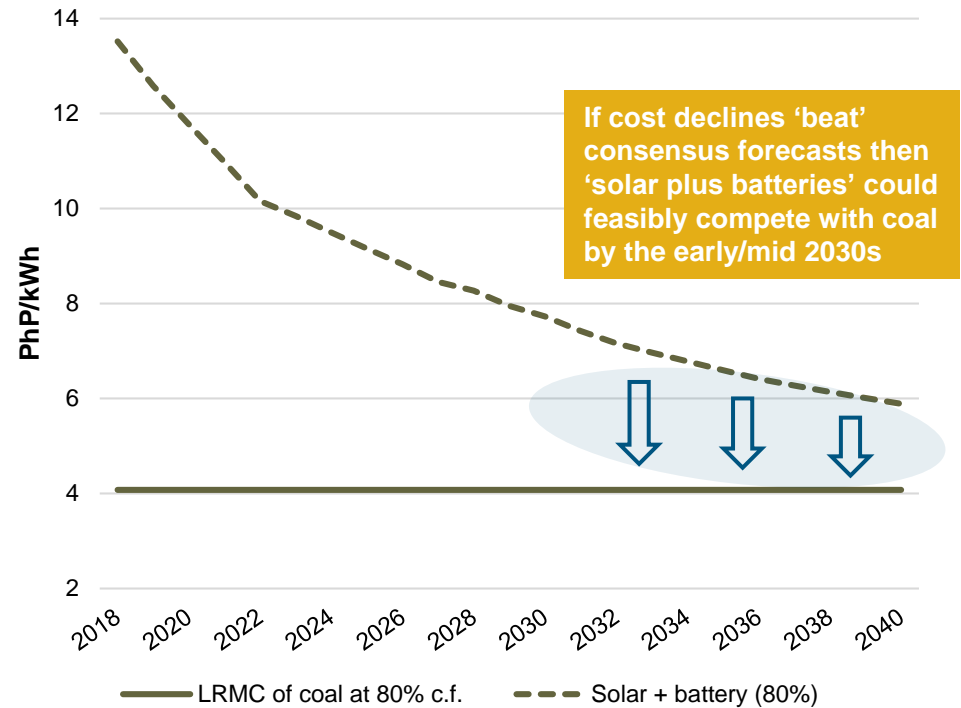
Between 2015 and 2016, prices have fallen by an average of PhP 0.89/kWh

And it is likely that solar (and, later, solar+batteries) will be able to compete with coal well within the economic life of any coal under planning today

Comparison of LRM C for 'solar plus batteries' vs. gas



Comparison of LRM C for 'solar plus batteries' vs. baseload coal

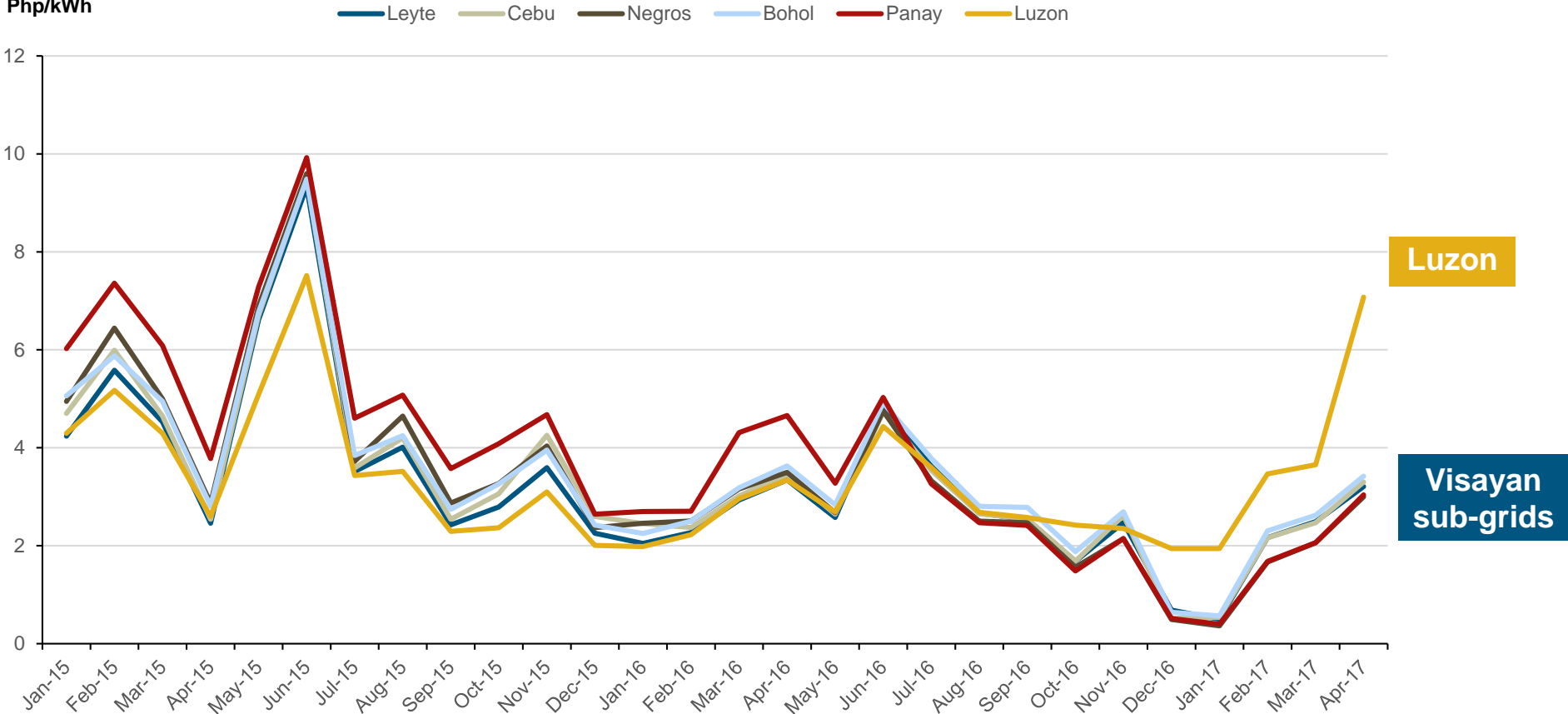


^ For 30% and 50% cases, solar+battery generation aligns around the diurnal irradiance peak
 * Assumes long-run 1.8% pa. fall in solar costs, and 7% pa. for batteries
 Source: California EPA Air Resources Board; TLG analysis

....However the addition of too much plant in one region has also seen a large rise in transmission constraints, system instability and price separation

Monthly LWAP for Luzon and Visayan sub-grids

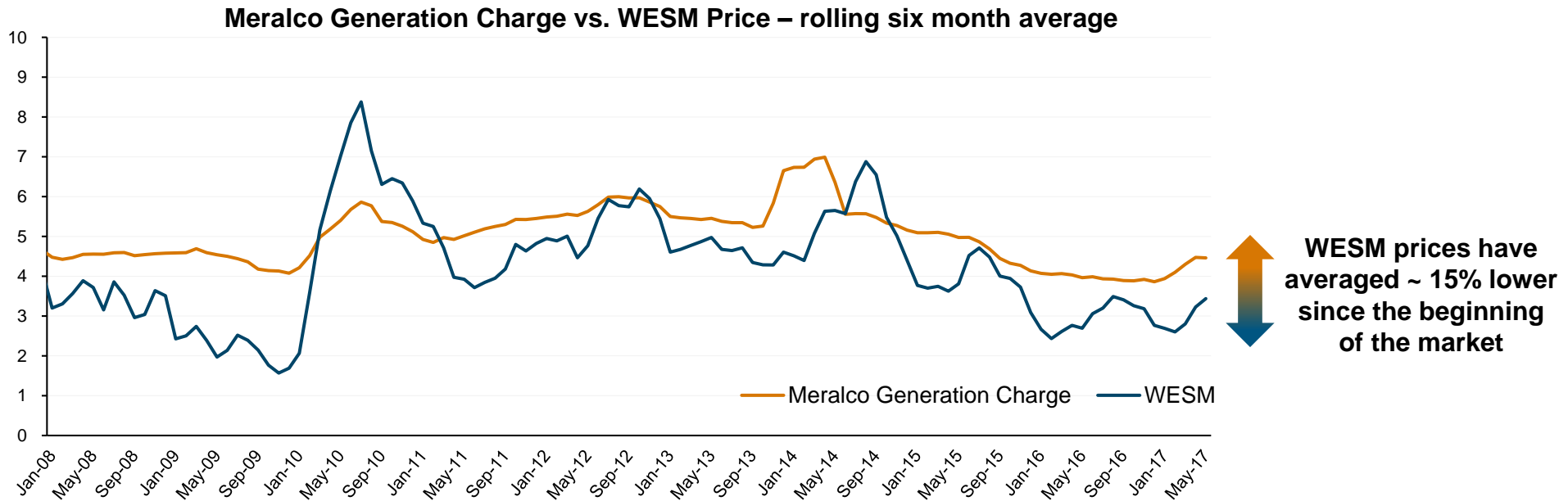
Ex-ante LWAP
Php/kWh



29 Note: +/- 32,000 Php/MWh price cap applied to the ex-ante data.
Source: PEMC; TLG analysis

The whole market needs to operate consistently to get good outcomes: Examples from the Philippines

Spot markets bring competition and make markets more efficient – but the spot market is only one part of the overall “electricity market”.



When the rules for customer pricing are not aligned with the spot market design, customers do not see the benefit of the reforms

Observations

- The energy market and the environmental and technology agenda have long been out of sync
 - Higher financial risk to shareholders
 - Greater risk of blackouts

- Few fully understand these trends and their implications
 - Too many conflicting messages from competing stakeholders
 - Tariffs are too political and do not respond to changing conditions or risks
 - Policies may be developed without a realistic view as to what they will cost or what impact they will have

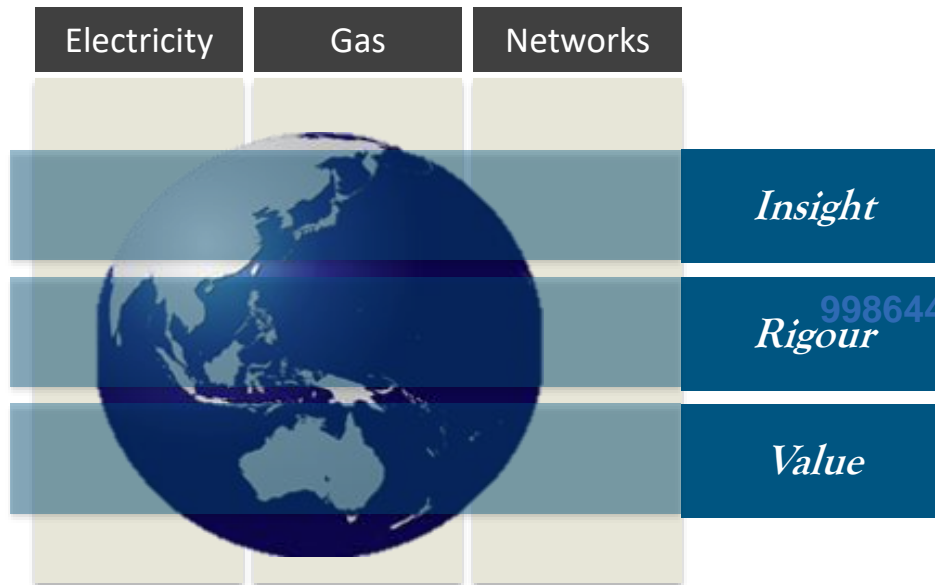
Which way is (really) forward?

So what should Vietnam take from these examples?

The homework we need to do to prepare for the future....

- Getting signals right for ancillary services (and promoting them from being merely “ancillary”!)
- Tariff design / regulation
 - What is the right charging and cost recovery structure, especially for networks?
- Ensuring a regime that gets price and performance signals right for storage (not just batteries)
 - Ensure appropriate access to ancillary service value as well as energy arbitrage
 - Recognise that storage can accelerate / amplify feedback between BTM and Grid Connected Options
 - Cost-shifting can worsen, more quickly → tariff design and responsiveness
- Signaling for the right type of capacity in the right locations will get harder
 - Integrating transmission and generation and demand planning
 - Avoiding wasteful curtailment due to poor location decisions for renewable energy
- Recognise that socialised energy pricing can trigger challenging feed-back loops that ultimately make it even harder to address energy poverty – need mechanisms outside the energy sector

Thank you



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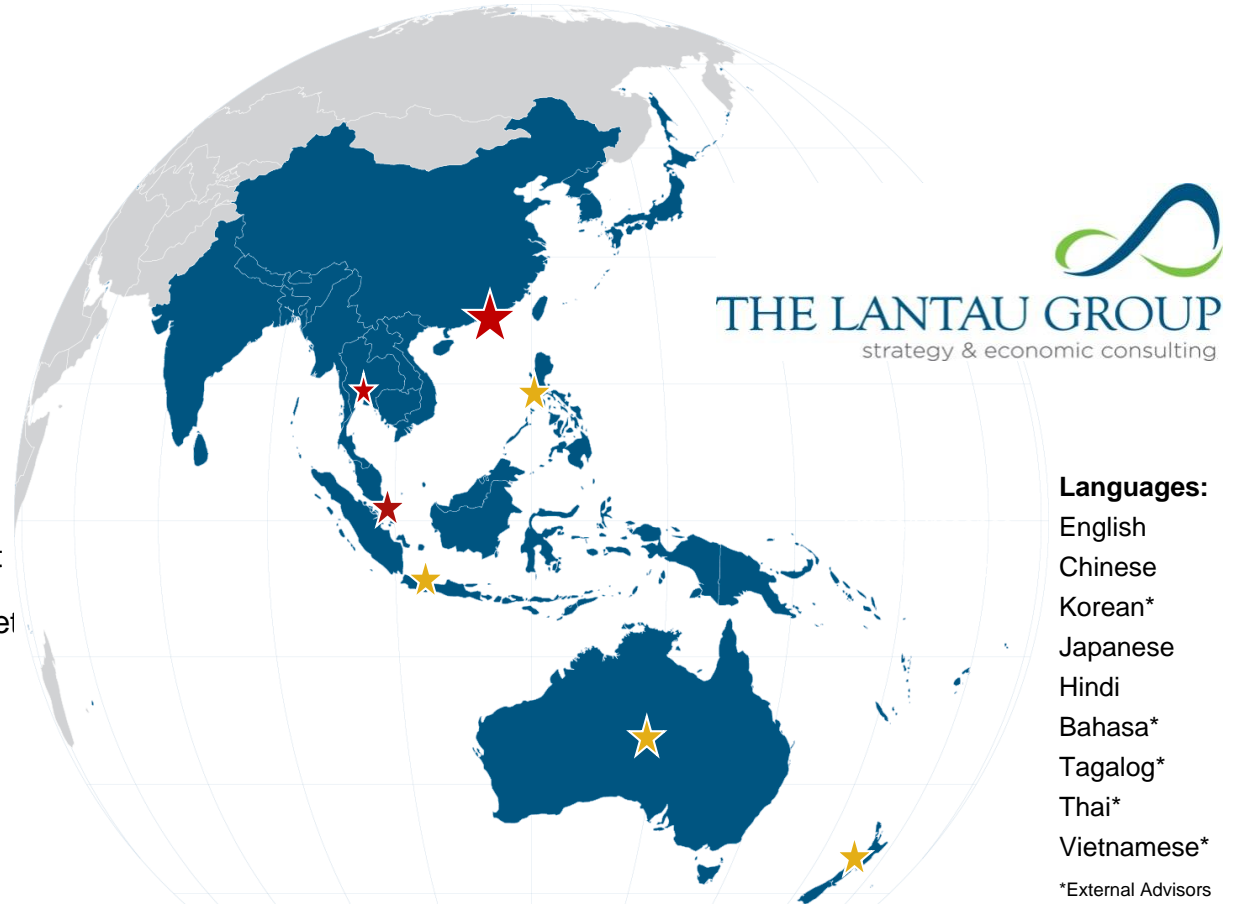
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