

The background of the slide is a complex, semi-transparent overlay of financial data. It includes a grid of numbers in various colors (white, yellow, green, red) on a dark blue background. Overlaid on this grid are several line charts with different colored lines (white, yellow, green, red) and a candlestick chart on the right side. The overall aesthetic is that of a high-tech financial or data visualization.

Do existing markets support clean energy?

Jan Stempien

24th May 2018

About The Lantau Group

Consultants to the Energy Sector

Competition, Markets, Regulation, Policy

Decisions Support Analysis

Disputes

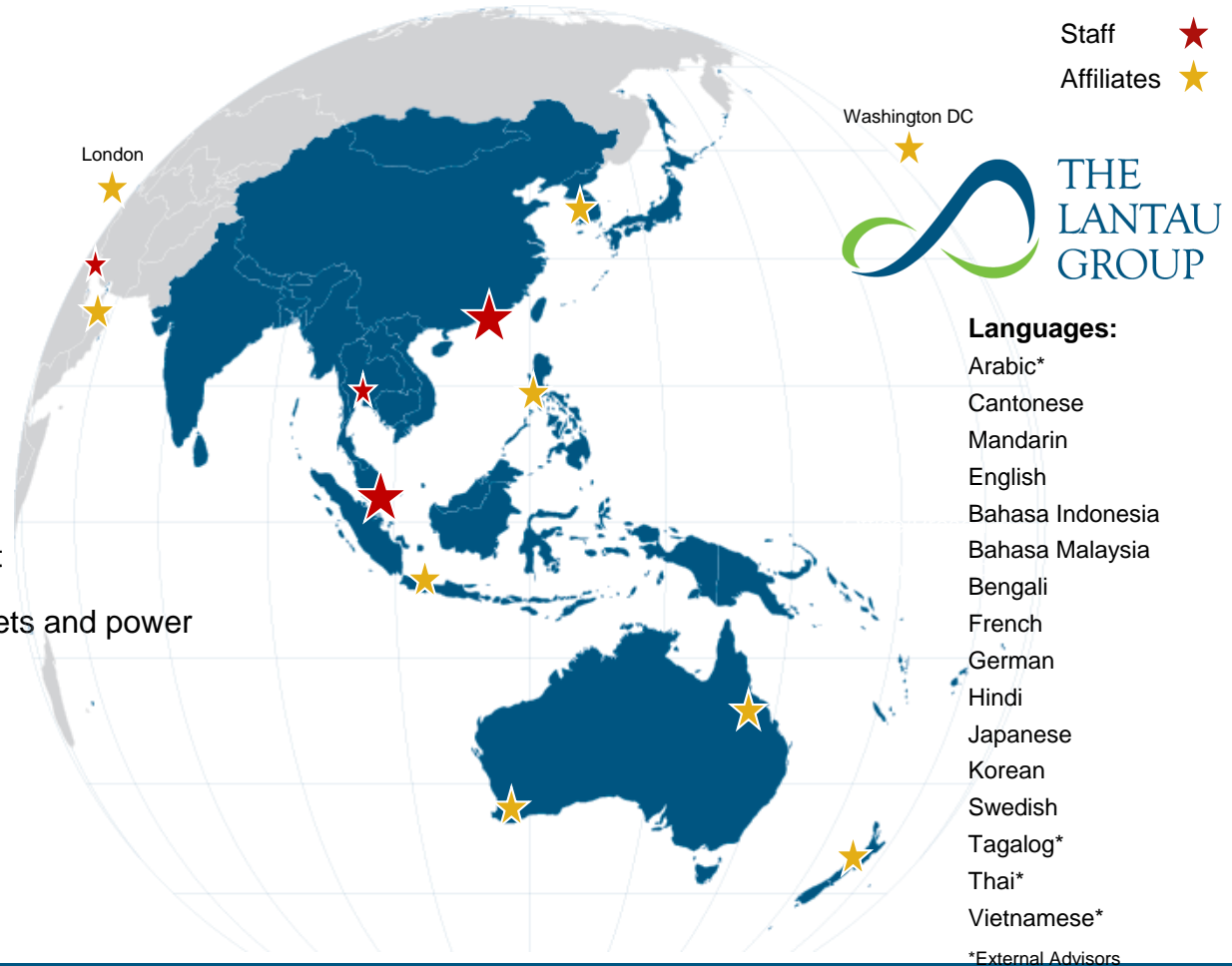
Market Analysis

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



We work with clients who are shaping the future of energy

Leading advisor around the region on energy economic and commercial issues

Vietnam

- Gas and LNG demand supply
- Analysis of coal versus gas competition
- Gas master plan assistance (NOC)

Malaysia

- Single Buyer market design
- PPA disputes
- Post PPA expiry valuation
- Incentive-based regulation (IBR)
- Cost of service / Tariff Design
- Load forecasting enhancement

Singapore

- Market design / Structure
- Regulation
- Market Power / Vesting Contracts
- Fuel Mix
- Tariff Comparison / Cost Recovery
- Price forecasting

Philippines

- IPPA Design/Execution
- Ancillary services opportunities and regulation
- LNG entry strategy and economics
- Natural Gas Masterplan
- Distribution Cooperatives
- Most of the major renewable, gas, coal, geothermal, and hydro project market transactions

India

- Wholesale market modelling for IPP developer
- Fuel switching study
- End user pricing / invoice tracking

Mongolia

- Alternative fuel use

Uzbekistan

- CNG Vehicle Market

Indonesia

- Gas to power (small scale)
- Gas to power and non-power (large scale)
- Strategic opportunity review

Japan

- Solar Entry Strategy
- End user pricing of gas and electricity

New Zealand

- Transmission cost recovery and evaluation
- Market design and regulation
- Hydro development cost-benefit analysis
- Gas market development

China

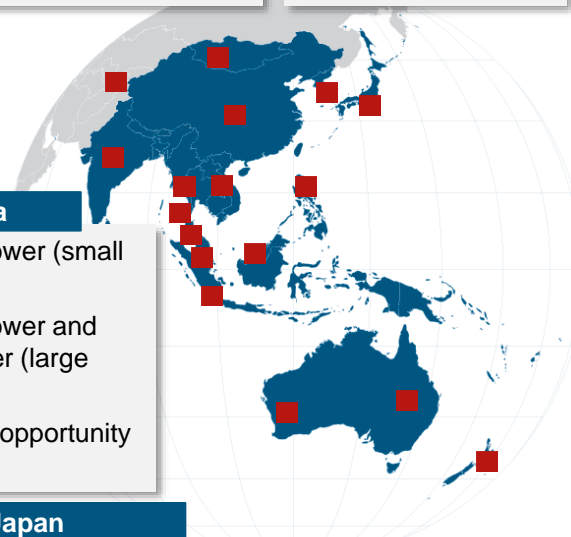
- Curtailment study in Gansu, Jilin and West Inner Mongolia
- Transmission system analysis
- Multiple studies on small-hydro power investment opportunity
- Coal-fired power generation and carbon policy in Zhejiang
- Coal-fired power investment opportunity in Chongqing
- Assessment of gas-fired CHP opportunities in Guangdong
- Strategic assessment of opportunities in Guangxi Province

Korea

- Korean "CBP" market review (KEPCO)
- Korean Nuclear Sector Review (KEEI)
- Vesting Contract Design (KEPCO)
- Gas and coal IPP opportunities

Australia

- Capacity market design
- Contract dispute
- Market design and policy
- Energy Market Review
- Demand response economics
- Renewable energy opportunities and regulation/policy
- Market analysis / modelling
- Market design and regulation
- Network regulation and cost recovery
- Gas market development



Extensive experience serving Asia's energy leaders since 1997



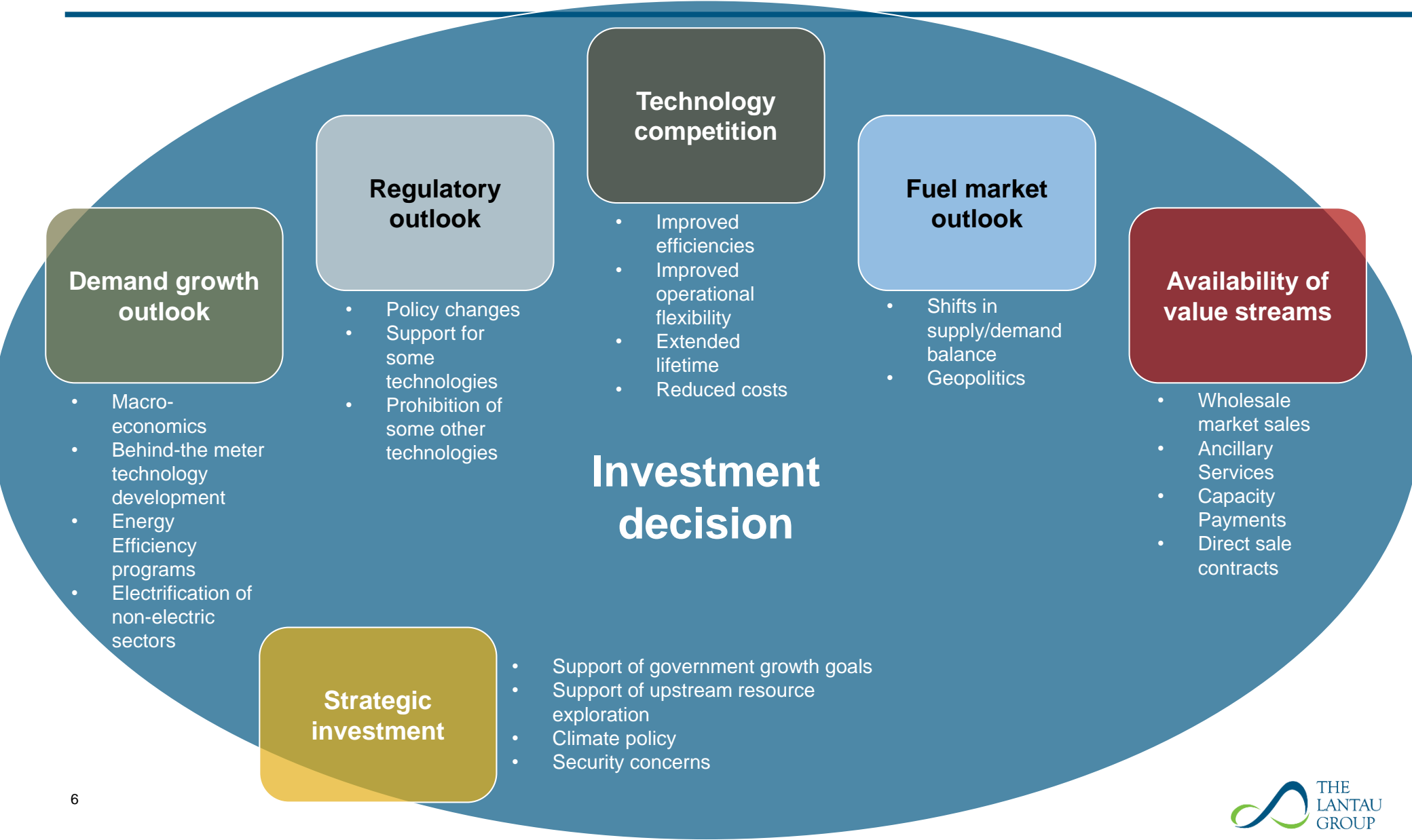
Agenda

- Investing in power market – the need for out-of-market revenue to support clean energy investment
- Is market or out-of-market instrument/intervention better?
- The impact of behind-the-meter interventions
- Summary

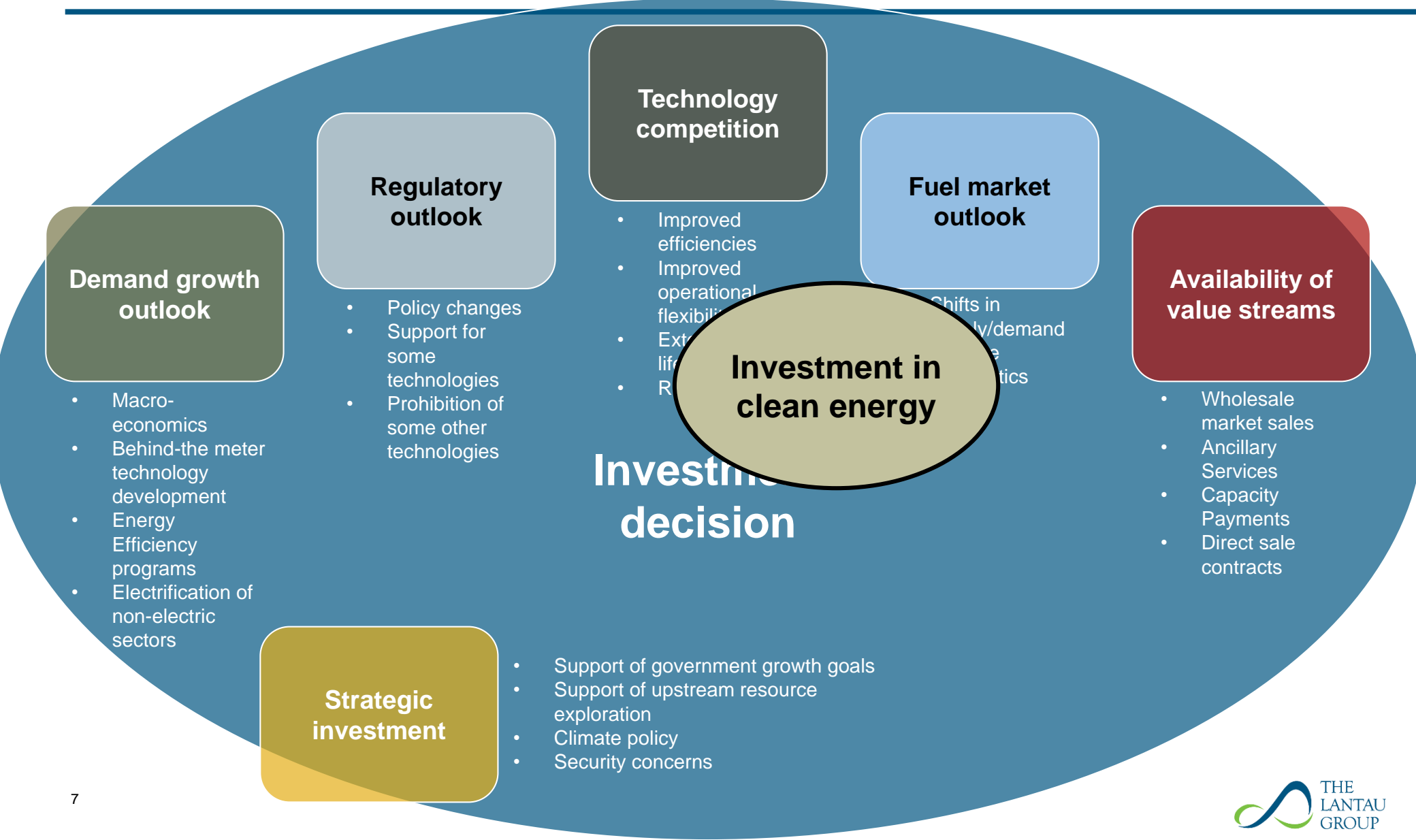
How do you make an investment decision?

**Investment
decision**

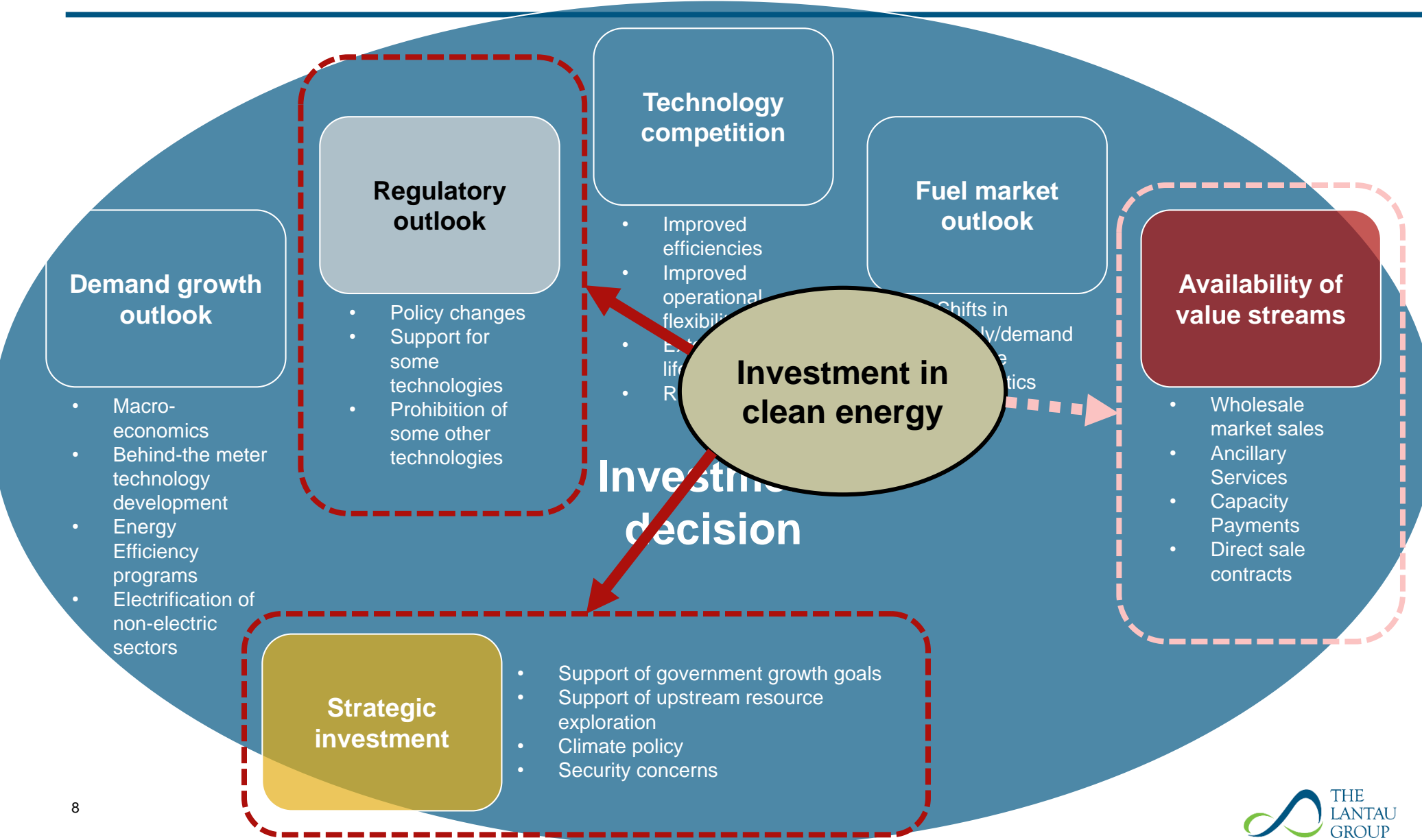
Traditionally, there are many factors that need to be considered



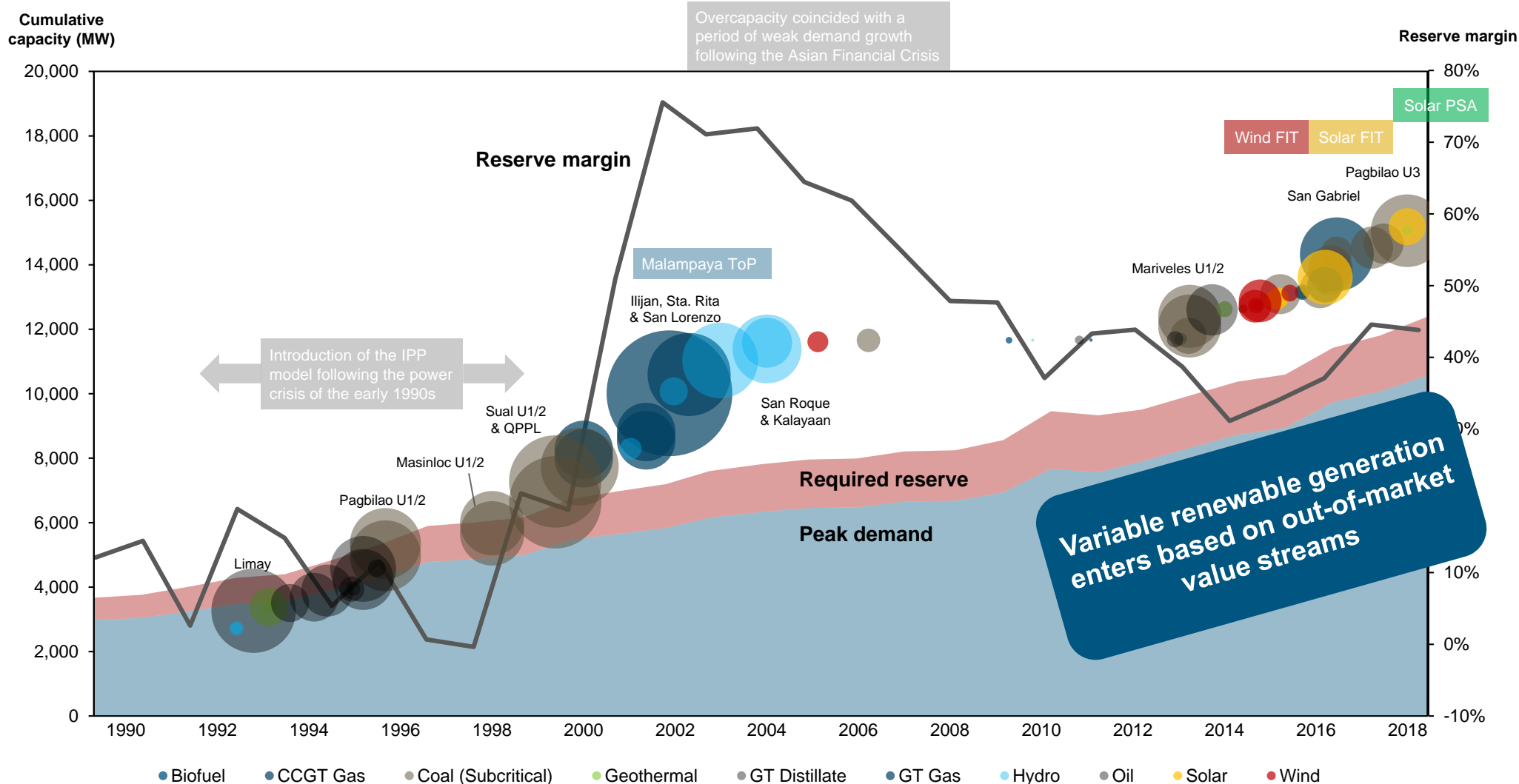
But when it comes to the clean energy investment...



... availability of special revenue streams reduces the importance of some factors










Indeed, historically addition of wind and solar capacity was driven by the out-of-market payments



Note: Bubble equates to one genset and size of bubble corresponds to its size (MW dependable)
Source: TLG analysis

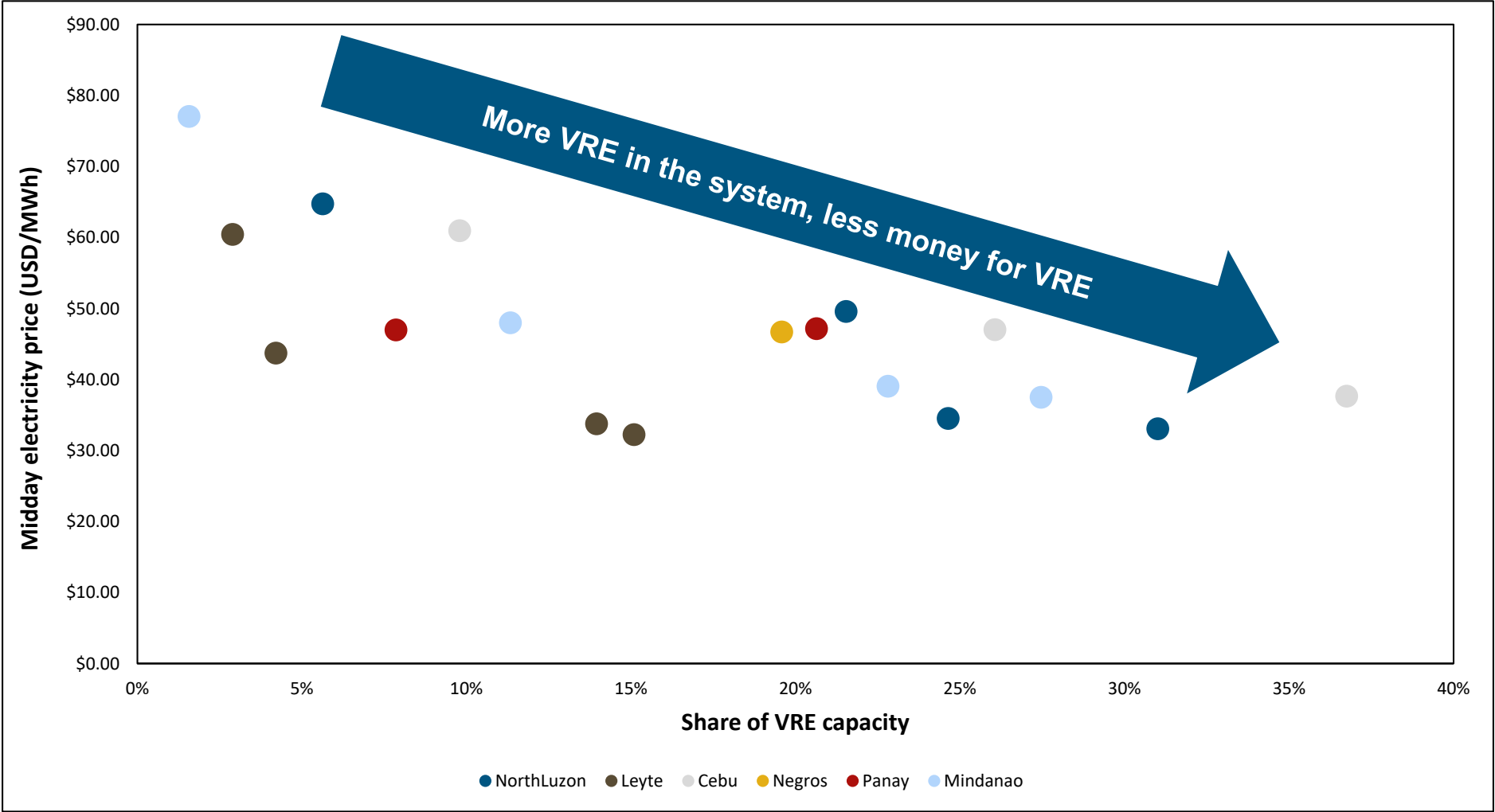
After expiry of FiT programs securing out-of-market PSA with the offtakers is crucial for clean energy projects to get off the ground

Original Suppliers		Powersource First Bulacan Solar Inc. (PFBS)		Pilipinas Newton Energy	Island Wind Energy Corp.
Result of Negotiations	50 MW 5.39 PhP/kWh	50 MW 5.39 PhP/kWh	75 MW – 85 MW 3.50 PhP/kWh	50 MW 2.9887 PhP/kWh	150 MW 3.5 PhP/kWh
Counterparty (off-taker)	 MERALCO	 MERALCO	 MERALCO	 MERALCO	 MERALCO
Qualified Price Challenges	None	Soleq Solar Co. 4.69 PhP/kWh	Solar Philippines 2.9999 PhP/kWh	TBD	TBD
Option to Match	N/A	Matched by PFBS	Not Matched	TBD	TBD
Current Status of CSP	PSA signed Regulatory Approval Pending ERC Case No. 2017-014-RC Price: 5.39 PhP / kWh* Term: 20 Years	PSA signed Regulatory Approval Pending ERC Case No. 2017-012-RC Price: 4.69 PhP / kWh* Term: 20 Years	PSA signed Regulatory Approval Pending ERC Case No. 2017-094-RC Price: 2.9999 PhP/kWh Term: 20 Years	PSA TBC Undergoing price challenge Yet to be submitted to ERC Price: 2.9887 (TBD) Term: TBA	PSA TBC Undergoing price challenge Yet to be submitted to ERC Price: 3.5 (TBD) Term: TBA

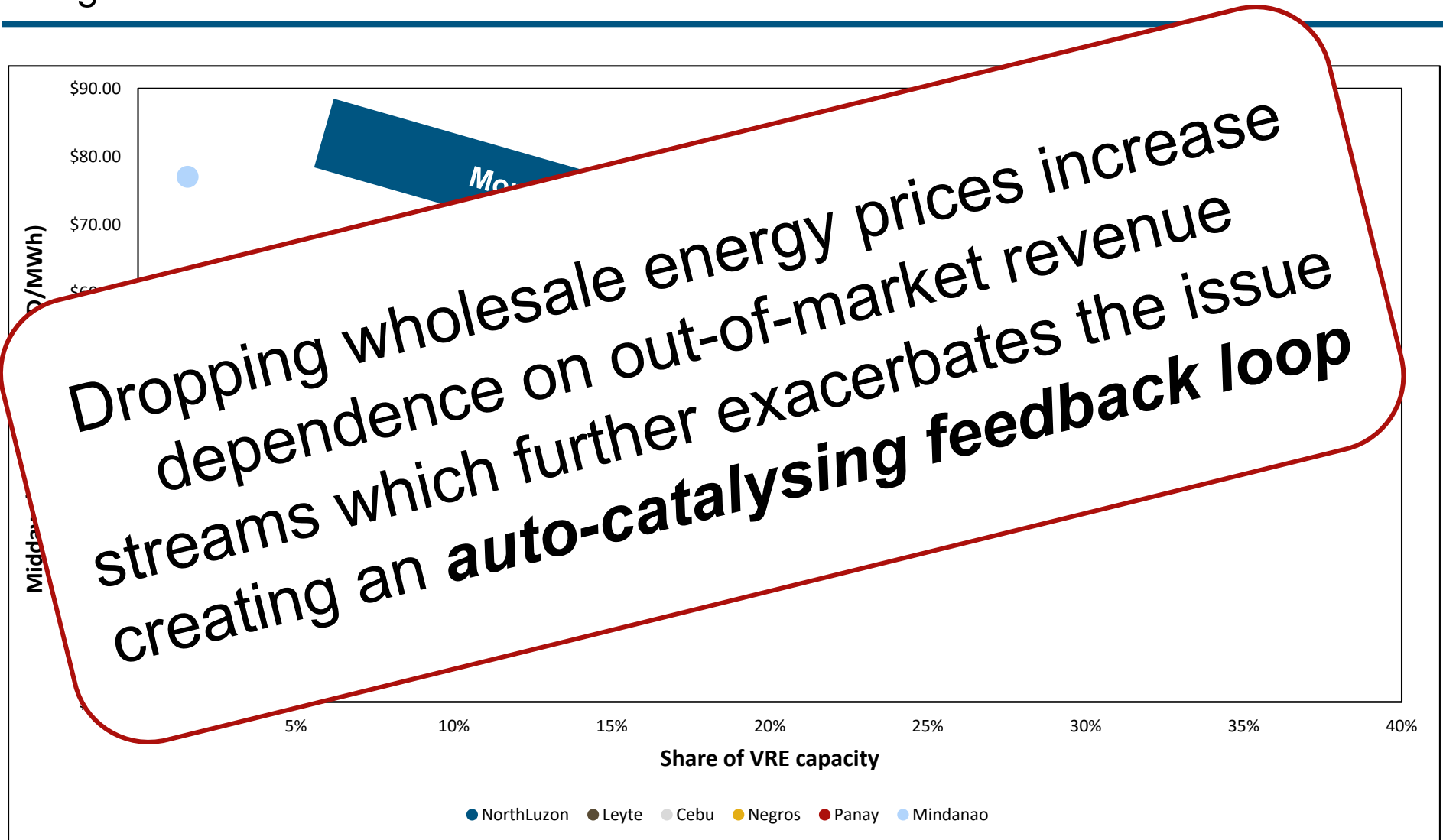
Solar PV Projects

Wind Project

Unfortunately, increasing penetration of clean energy dampens the prices for the generators



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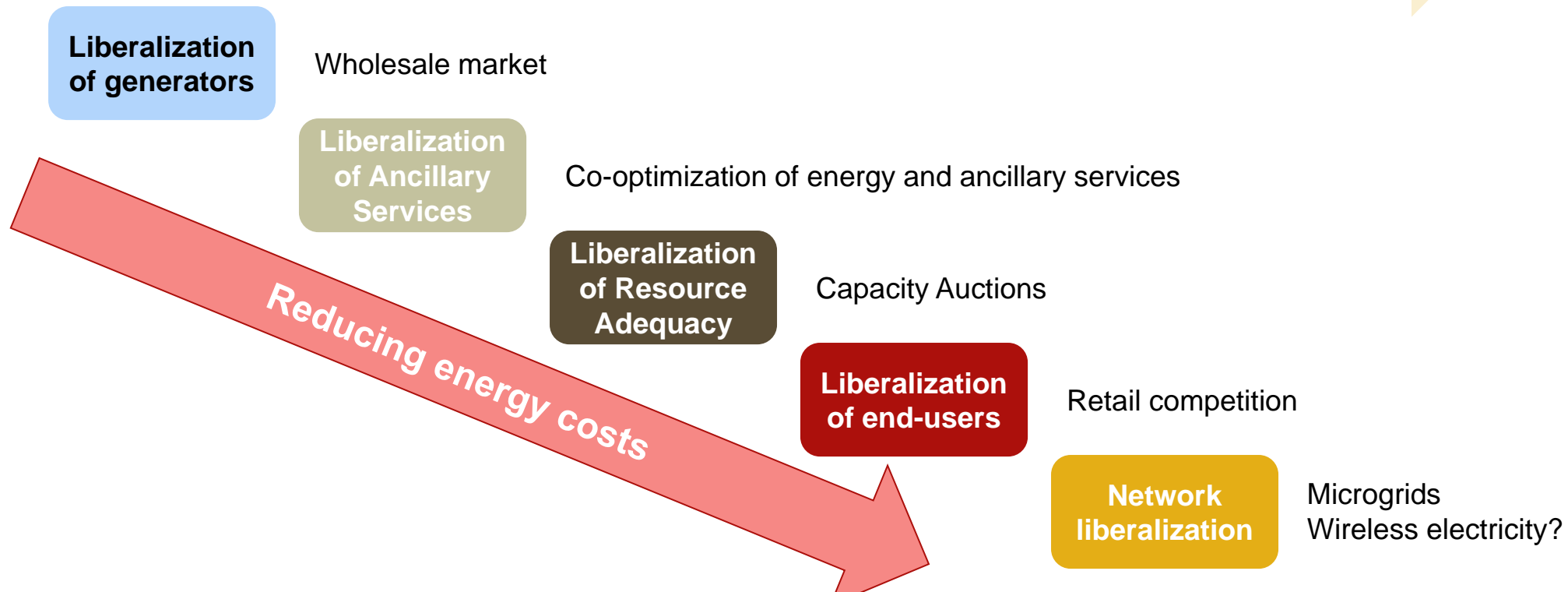


There is no going backwards
(but which way is forward?)



We deregulated the markets in hope of lowered costs and more efficient investment

Market liberalization thrust



Liberalized (deregulated) markets promise competition, efficient investment signals and ultimately lowered costs, but they are blind to externalities and in need of submarkets.

But markets are blind to externalities and ended up being subject to out-of-market interventions

Market liberalization thrust

Liberalization

- Fuel mix policies
- Feed-in tariffs
- Capacity payments
- Renewable energy targets
- Premature asset retirement
- Special arrangements for some assets to enter the market (national interest based)

Liberalized (deregulated) markets promise competition, efficient investment signals and ultimately lowered costs, but they are blind to externalities and in need of submarkets.

Robust design, incorporation of externalities and assurance of certainty is possible and needed to monetize on the promise of market deregulation

Earning revenue out-of-market distorts the deregulation efforts and leads to long term inefficiencies and reversal to the regulated market.

- sets to enter the market (national interest based)
-

Liberalized (deregulated) markets promise competition, efficient investment signals and ultimately lowered costs, but they are blind to externalities and in need of submarkets.

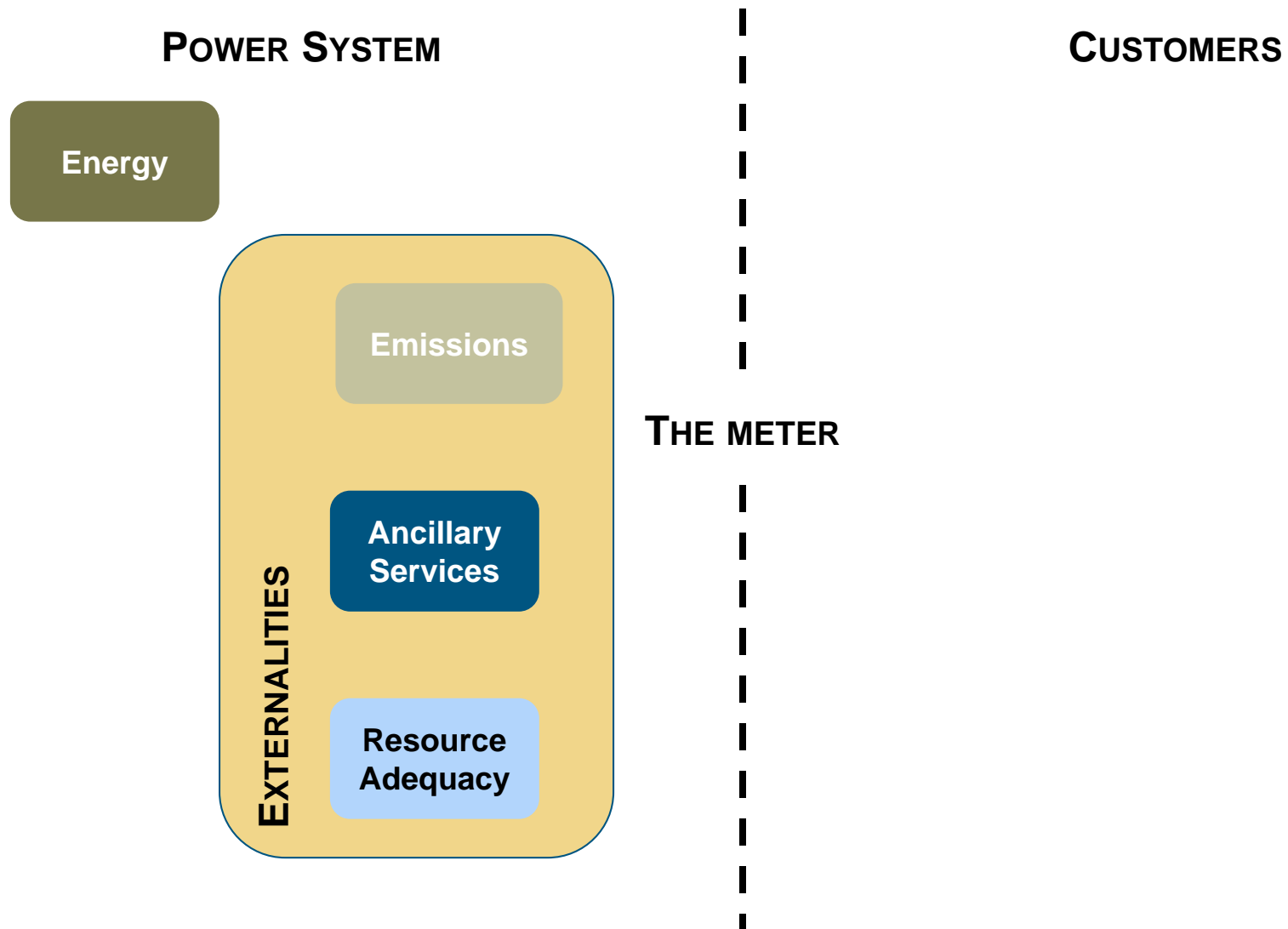
Do value stream need to come from out-of-the-market?

VALUE STREAM	ELIGIBILITY	VALUE
Energy sales	Every generator producing energy when there is demand for it	Market or cost based
Ancillary services	Generators having specific technical capabilities, e.g. ramp-rate or ability to sustain firm output for specified period of time	Market or cost based
Special payments	Externality payments, e.g. capacity payment, green energy payment	Market or cost based
Direct Sale Agreements	Power Purchase Agreements, Power Supply Agreements, etc	Market or cost based

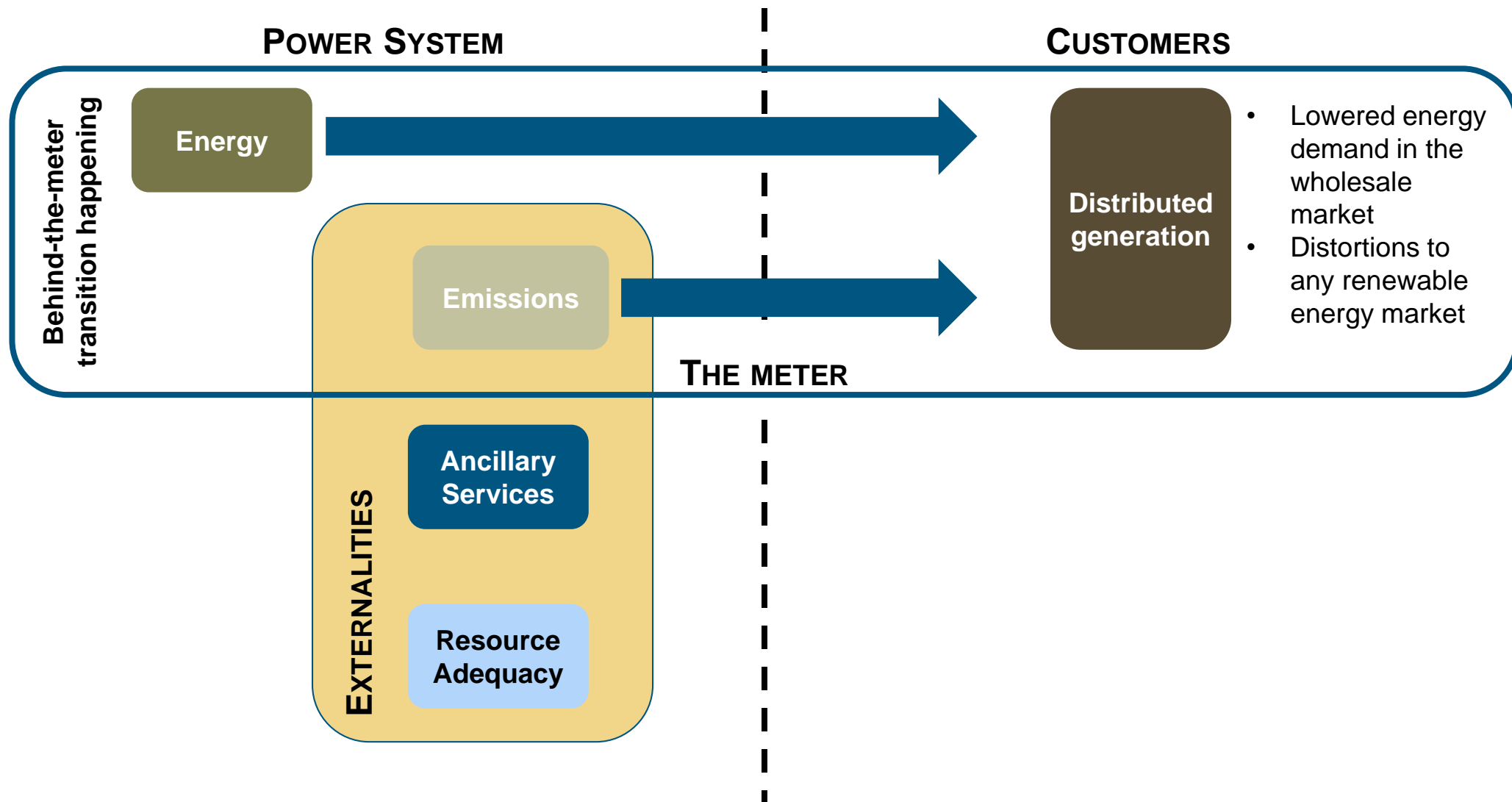
So the market can be sorted, but what about the consumers?

Impact of the behind-the-meter developments

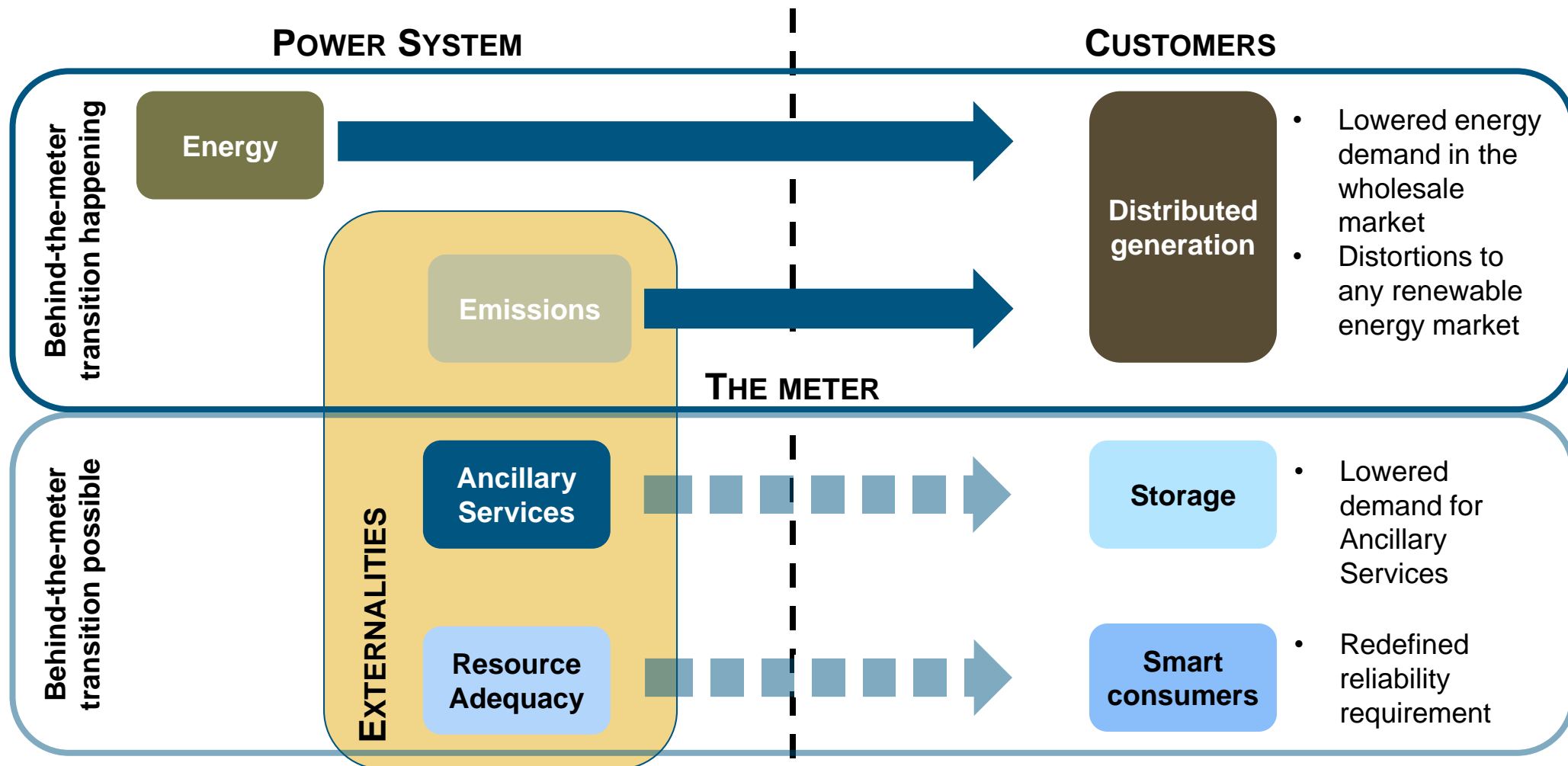
What role will behind-the-meter play?



Revenge of the statistician – currently, behind-the-meter dampens the demand for energy at times when clean energy generators produce the most

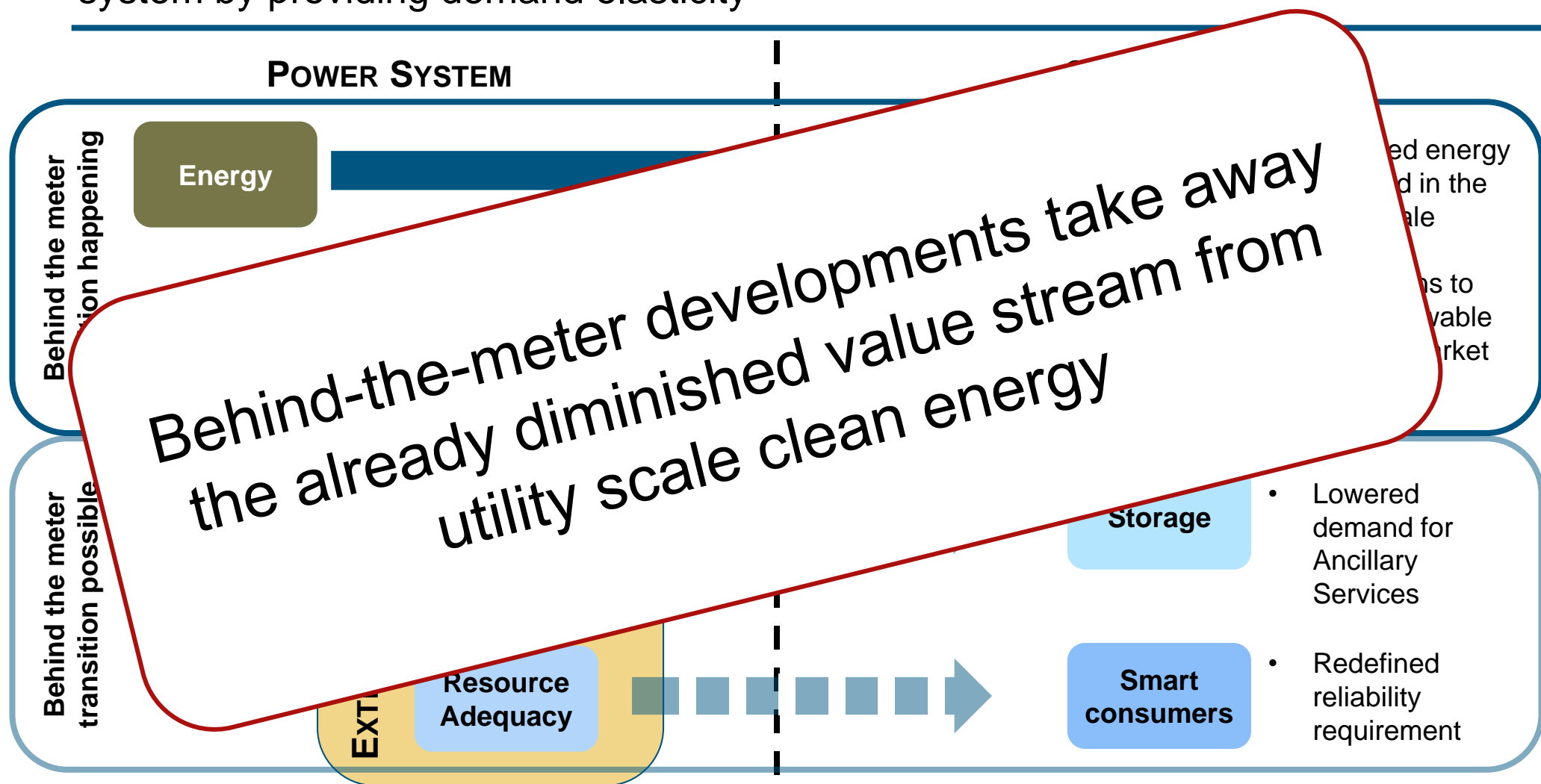


Entry of smart devices and storage can stir even more issues with the current market design in majority of the jurisdictions



Essentially the same technologies supply clean energy on both sides of the meter reducing any benefits of the scale and taking away benefits of centralized power market. This is further exacerbated by lack of economy of scale in the network business.

Careful incorporation of the behind-the-meter resource could benefit the power system by providing demand elasticity



Essentially the same technologies supply clean energy on both sides of the meter reducing any benefits of the scale and taking away benefits of centralized power market. This is further exacerbated by lack of economy of scale in the network business.

Conclusions?

So what is the future of power market?



**Investment in
clean energy**

Two long term trends can render investment in clean energy unsustainable...

Existing market design

**Downward pressure
on wholesale
energy prices**

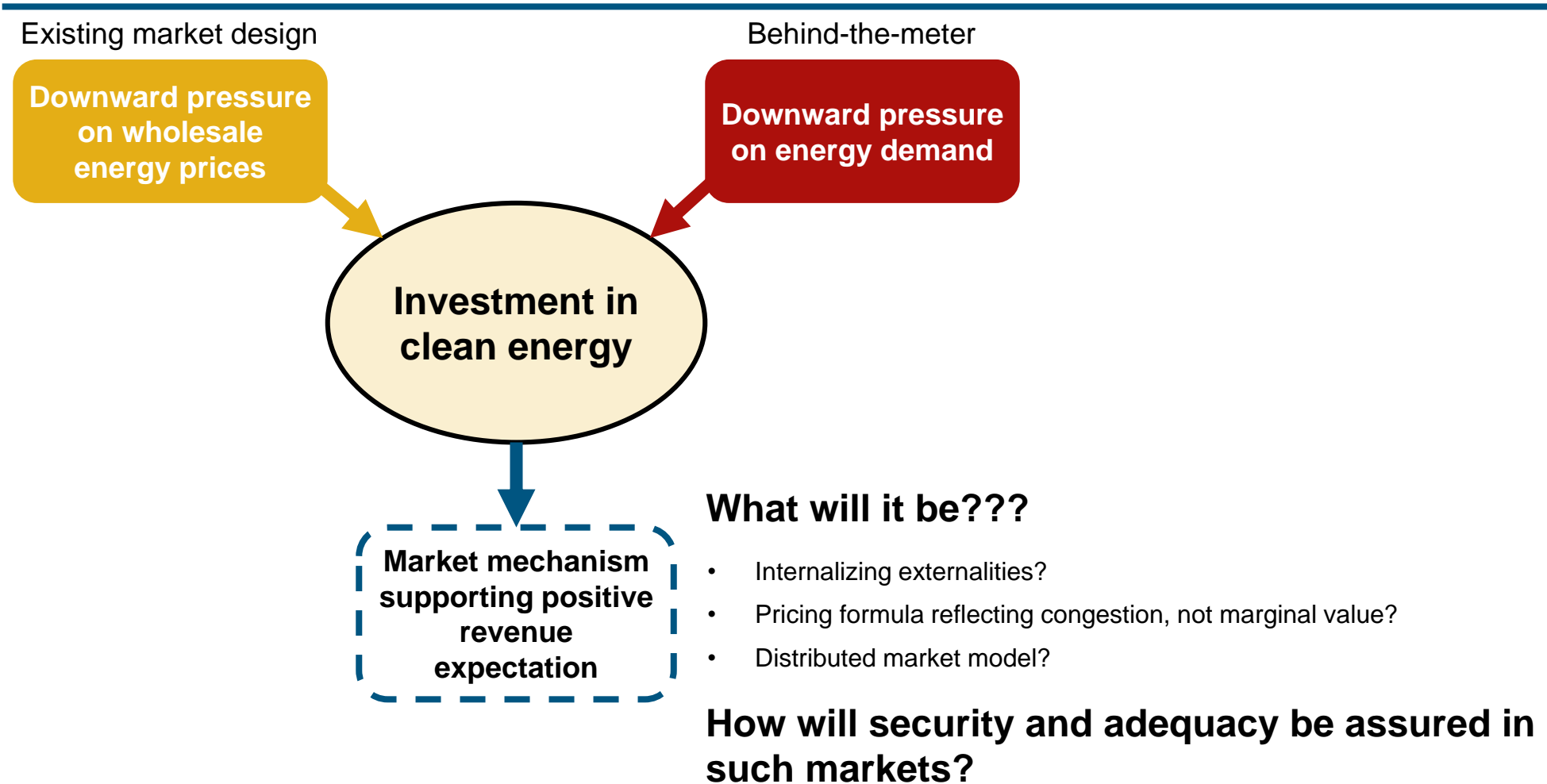
Behind-the-meter

**Downward pressure
on energy demand**

**Investment in
clean energy**

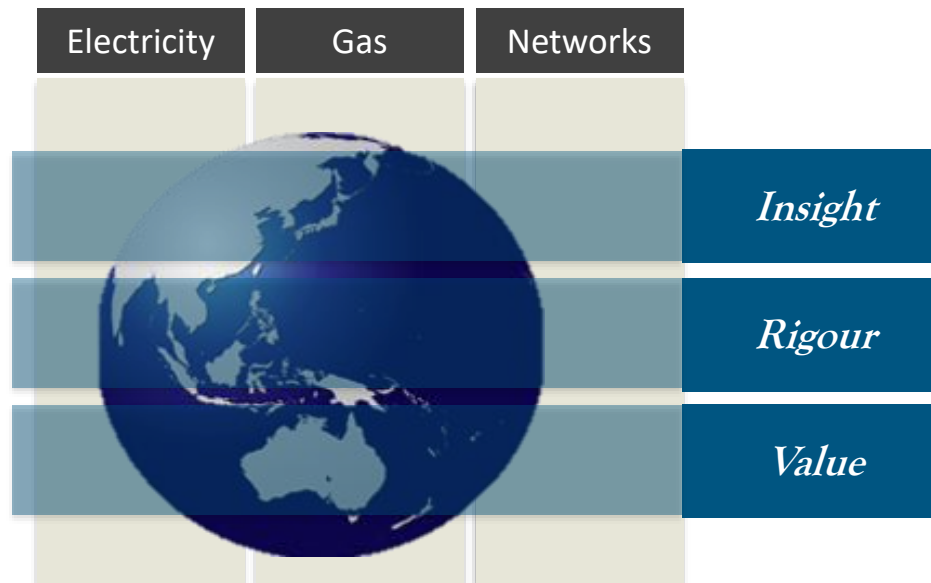
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graph TD; A[Existing market design] --> D((Investment in clean energy)); B[Behind-the-meter] --> D;
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... unless a mechanism is instituted that provide long term positive revenue expectation



How to assure sustainable investment environment without out-of-market interventions?

Contact Us



Contact

Jan STEMPIEN – Consultant
jstempien@lantaugroup.com

By phone

+852 2521 5501 (office)

By mail

4602-4606 Tower 1, Metroplaza
223 Hing Fong Road,
Kwai Fong, Hong Kong

Online

www.lantaugroup.com