Can Asia lead the way in efficient renewable network integration?

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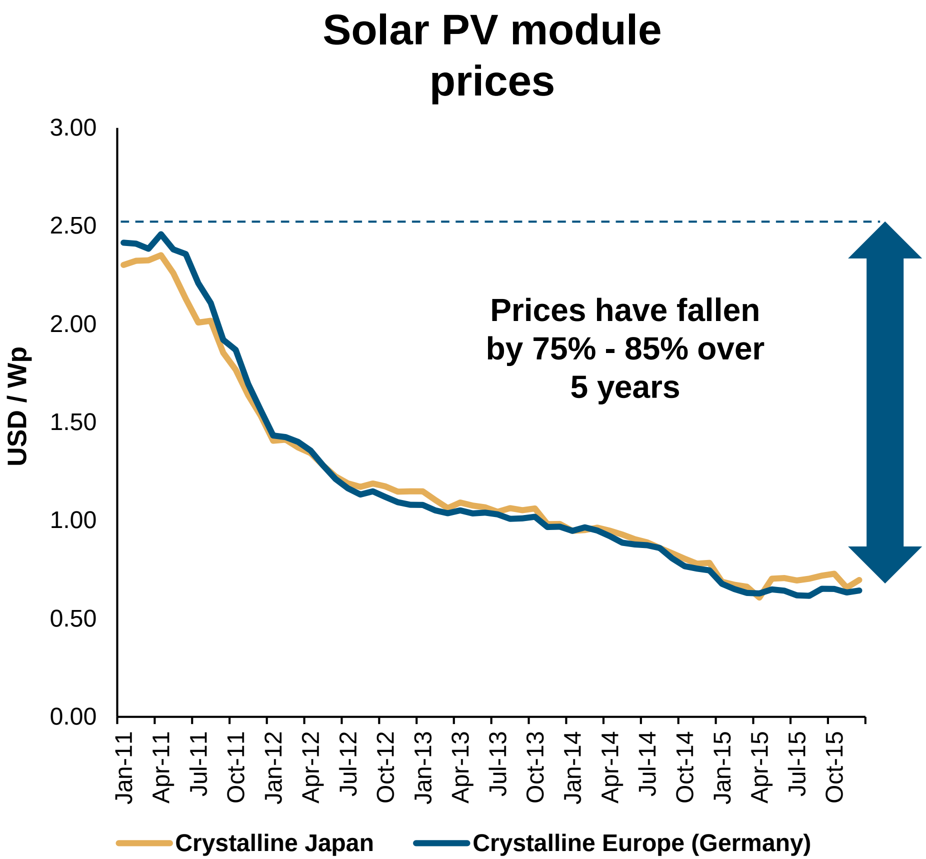
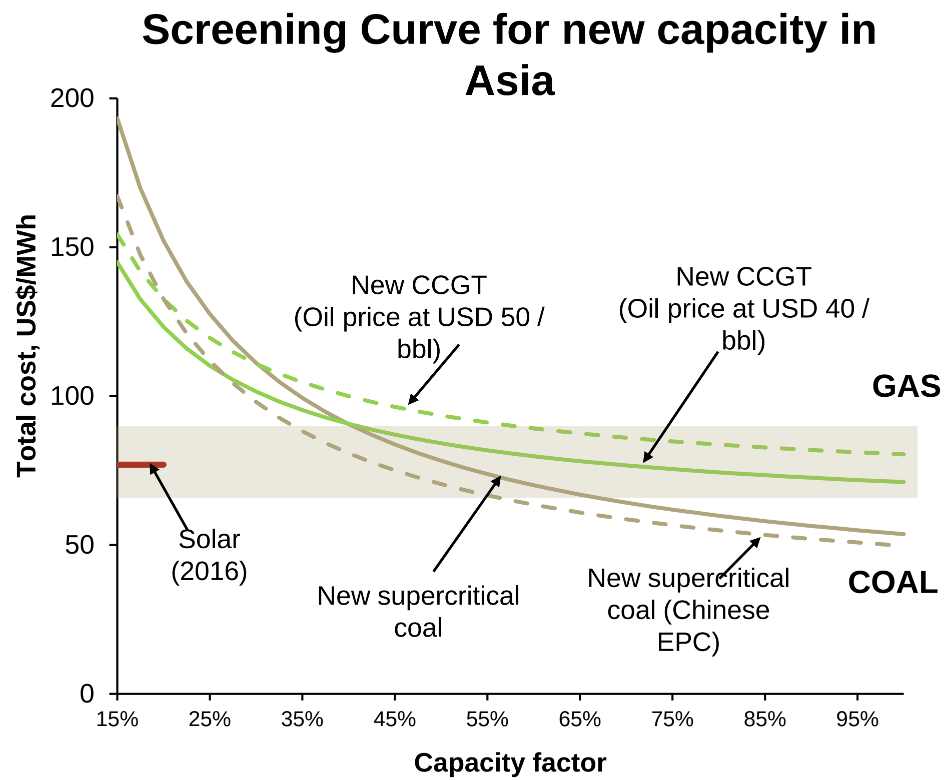
THE LANTAU GROUP
strategy & economic consulting

The world has changed … but by how much?



Source: IRENA



Source: TLG analysis

Today, solar at the right locations is cost competitive vis-à-vis conventional generation. Solar is no longer a "special case" requiring preferential treatment for it to enter the system.

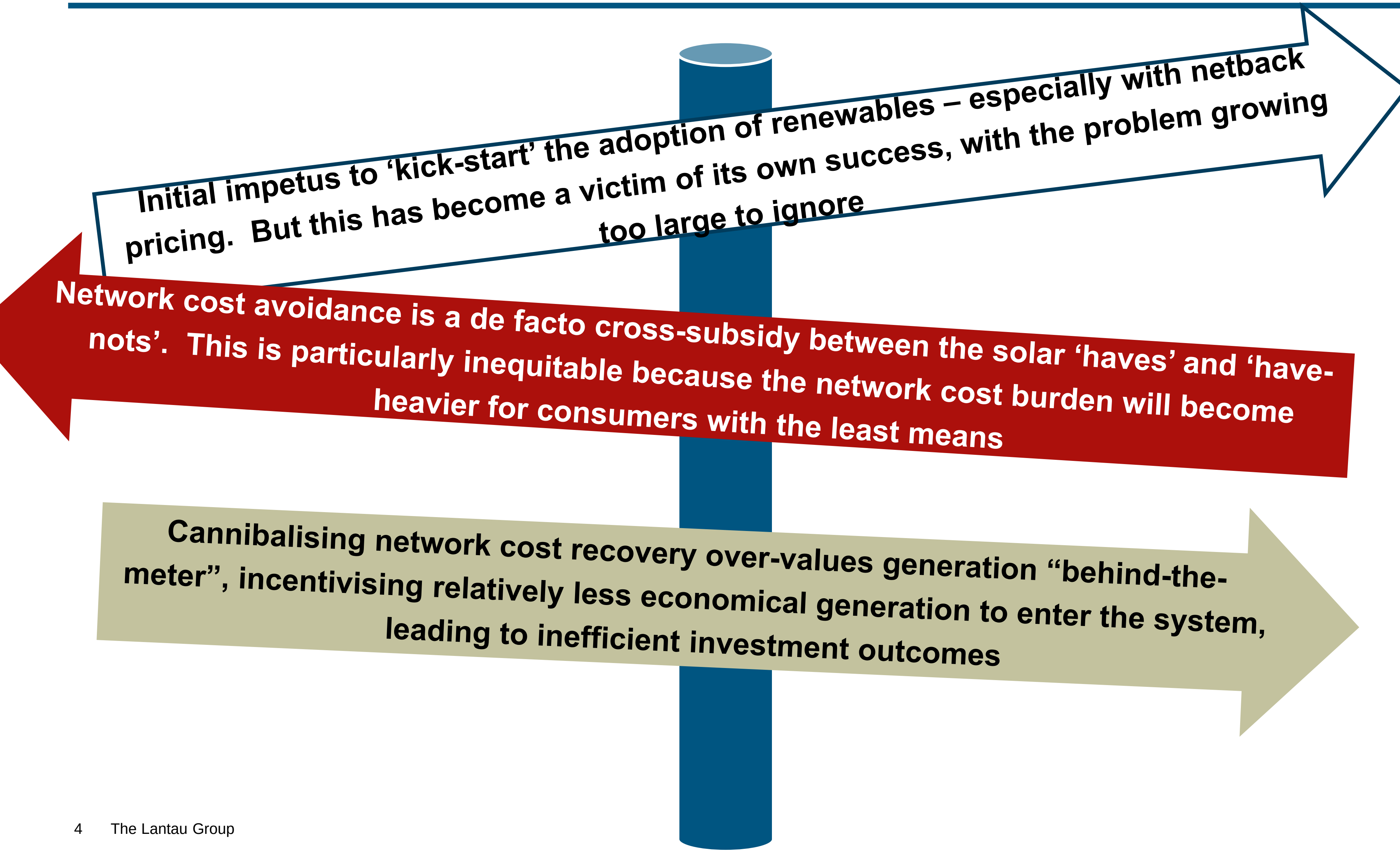
But … network policies have not nearly caught up as quickly …

- The economics of solar receive a boost by avoiding network charges – a value transfer from the grid to the consumer
- Yet, the reality is that network infrastructure is a heavy fixed upfront investment, with long cost recovery periods
- To be astute, consumers should be paying for network costs as fixed costs, rather than as variable costs
- However, fixed charges are often politically unpalatable, especially as they will be high relative to the consumption for the smallest of consumers
- It became expedient to charge network costs on a volumetric basis (or at least partially so), with some implicit cross-subsidy between large and small consumers
- But are they obsolete?

Beware the distortions

- While solar (especially rooftop solar) can avoid volumetric network charges, particularly because of on-site generation and consumption…
- There is no such luck for “brick-and-mortar” generation transmitting through the grid
- Things get worse in regime where injection of excess solar into the grid is paid at the full retail tariff rate
- There is not only inequitable cost avoidance, but solar is being actually “paid” network charges
- So is cannabalising network revenue necessary or appropriate?
- Getting the economics righter (or right-er) is usually pretty sensible

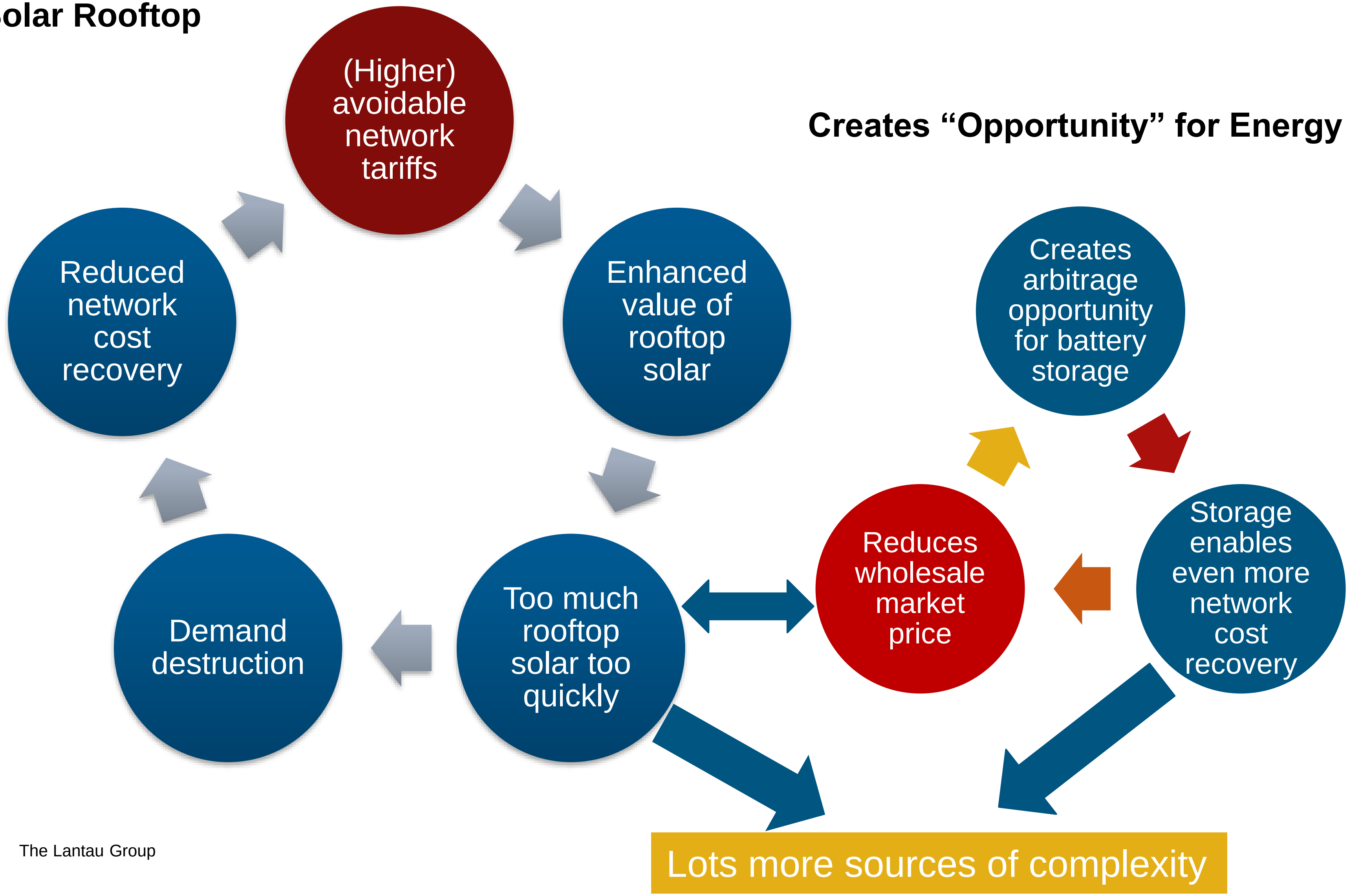
Where does this all lead?



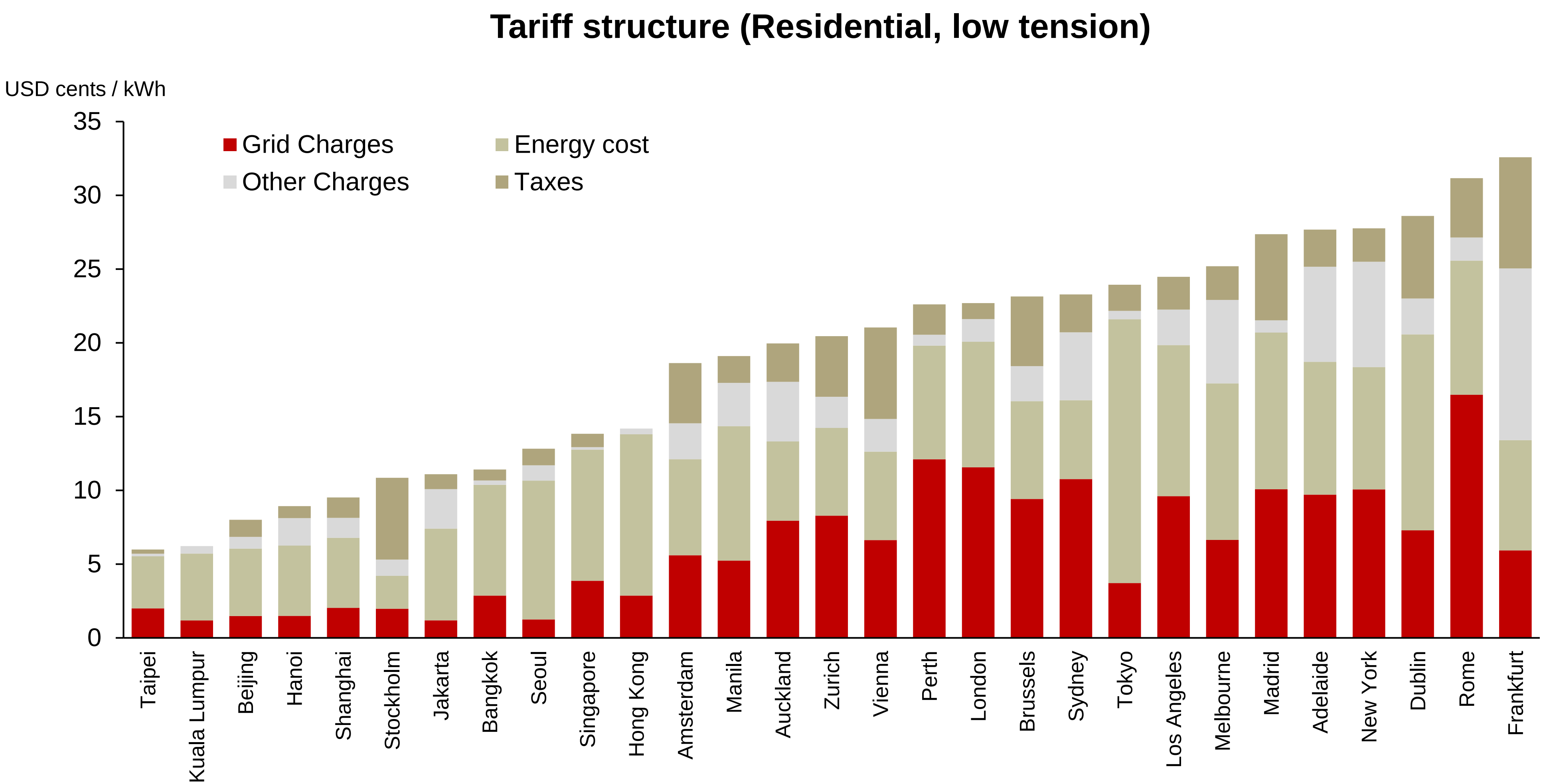
Commercial responses make the problem even more complex and disruptive

Solar Rooftop

Creates “Opportunity” for Energy Storage



Distortions are the greatest in cities / countries with high avoidable grid charges (charged on volumetric basis)

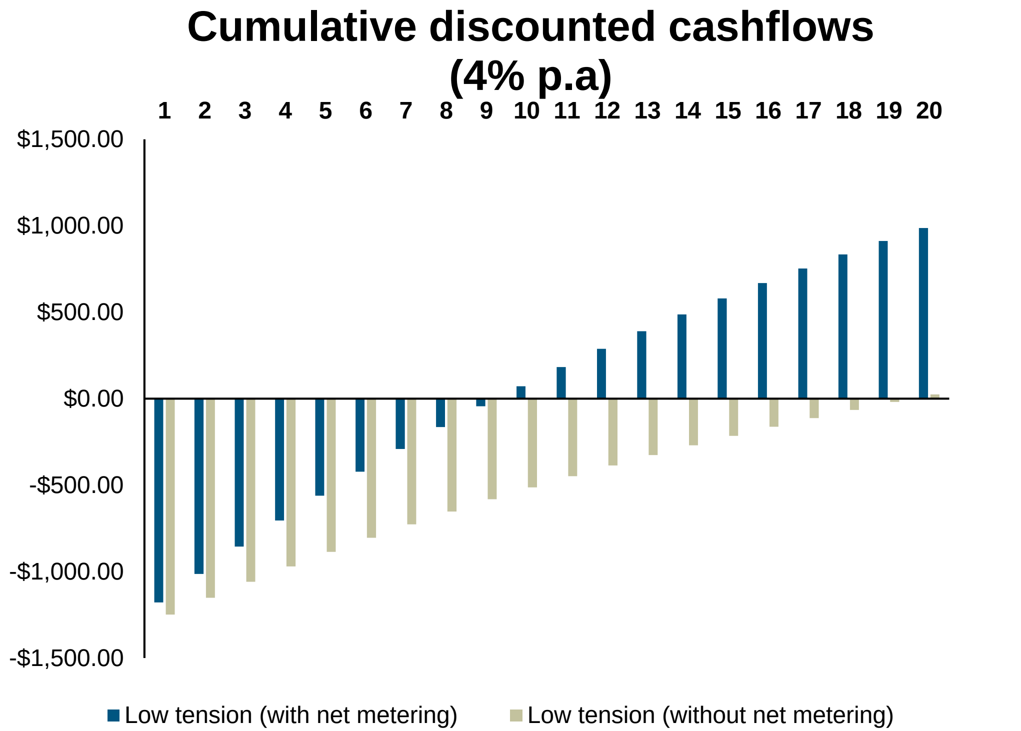


Source: TLG analysis, EIA, Eurostat, and various statistics depts

How large are the distortions?

- We developed a DCF model for rooftop solar in Singapore, which serves to illustrate the effects of network cost avoidance on solar investments

Parameter	Assumption applied
Assumed turnkey cost of solar generation in 2017 **(i.e. inclusive panel and balance-of-system costs)**	SGD 1,350 / kWp
Assumed asset life	20 years
Solar yield	1300 kWh / kWp / year
Annual degradation in solar yield	0.5% / year
O & M costs	2% of annualised turnkey costs / year
Discount rate	4% p.a.
Grid costs	As per tariff schedule in Table 7
Energy costs	Forward USEP price projection in 2017



Network cost avoidance (from net metering) improves the investment's NPV by SGD 900 – over an initial investment amount of SGD 1,350 !

Poor network pricing leads to poor incentives and has knock-on implications

- Technology incentivisation is all messed up
  - Network tariff avoidance – is that really the prudent way to support (solar) technology development?
  - Efficiency benefits of really large new advanced power stations (elsewhere) that impose ancillary services costs on the system which are paid for by other stakeholders; but solar pays practically nothing today.
- Reliability of supply
  - Is it worth it to networks to continue providing equivalent reliability to all customers even when the customers are not paying for it?
- Environmental regulation (particularly fuel mix targets in Asia)
  - Fuel supply constraints or fuel diversification policies to shift to renewables at prices that are much higher than the underlying emissions related opportunity costs.
- Generation / Network boundary
  - What options are available to deal with network constraints and are these efficient?

Benefits to suppliers of smart stuff (e.g. solar) paid for by stakeholders who do not get the benefits – these are not smart benefits

Integrating renewables requires a holistic approach to maximise the benefits

Network operations

- Optimising generation resources in operation (energy and ancillary services)
- Fault anticipation and recovery

Ancillary services cost reduction

- Strengthen ability to act on closer-to-real-time information (especially with forecast enhancement)

Dispatch Engine Capabilities

- Network and system constraint automation for optimal dispatch
- Reduced dispatch intervals for better real-time decision-making

Forecast enhancement

- Real-time solar (and wind) forecasts
- More accurate picture of renewables dispatch, in turn facilitating market decisions on unit commitment

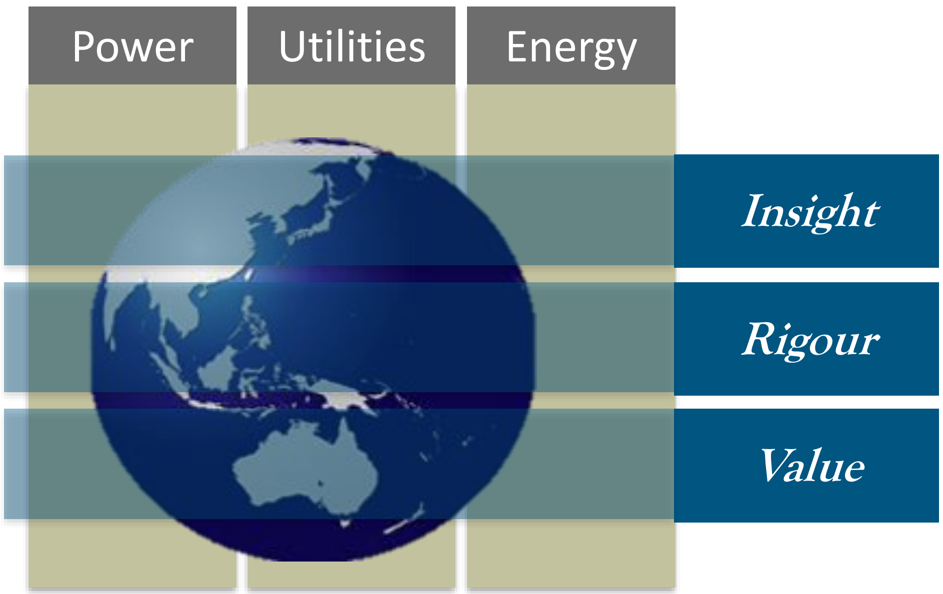
It’s not the smartest benefit unless it links to an underlying smart value proposition

- How to improve the use of the physical infrastructure capabilities
  - Identify and monetise opportunities for new technologies (storage)
  - Increase efficiency (reduce fuel use)
  - Reduce maintenance costs
- How to create more value for customers
  - Reduce waste – don’t use or pay for what you don’t need (buy in vs self-supply vs do-without)
  - Develop pricing and service programmes that match customer needs
  - Easier and faster connect/disconnect/repair transactions
  - Provide enablement technology and capability to integrate customers with the big data world
- How to enhance environmental outcomes
  - Reduce emissions through smarter dispatch and increased efficiency across plant mix
  - Provide platform to support emissions markets and more flexible / cost-effective emissions regulations

Conclusion

- Solar no longer needs subsidies but rather needs to transition into its correct place in the electricity supply industry.
- Avoidance of network charges is a distortion which was negligible when solar was expensive – but now that it is becoming cost competitive, capacity has the potential to explode.
- When it comes, it will be quick – solar panels are easy to install, taking no more than a few months or less (as compared to conventional generation, which takes a much longer time).
- It is necessary to put renewables on a level playing field – renewable business models are more robust if their business models will not be unravel if distortions are unwound.
- At the system-level, it is better to iron out the distortions early than to ‘grandfather’ a large legacy base of solar generation.
- Maximising the benefits of renewables requires a holistic approach
  - Avoiding distortions
  - Enhancing environmental regulations (and externality pricing)
  - Improving system-wide dispatch capabilities and protocols
  - Reducing ancillary services cost
  - Facilitating business models that maximise consumer benefit

Thank You



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