



New technologies + old tariffs  
= Problem!



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**8 March 2017**

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# The same technologies have dominated electricity for decades

Centralised, economies of scale  
generation and transport



Simple meters



'Dumb' appliances



# Now, many new technologies are converging to disrupt this picture



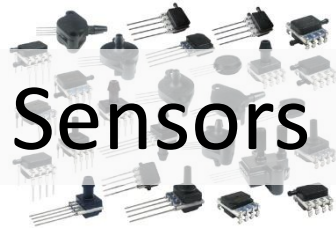
Advanced metering



Electric vehicles



Computing



Sensors



Communications



Photovoltaics



Smart appliances



Batteries

# These technologies represent a huge opportunity...



Cheaper, cleaner transport



Cheaper, more reliable networks



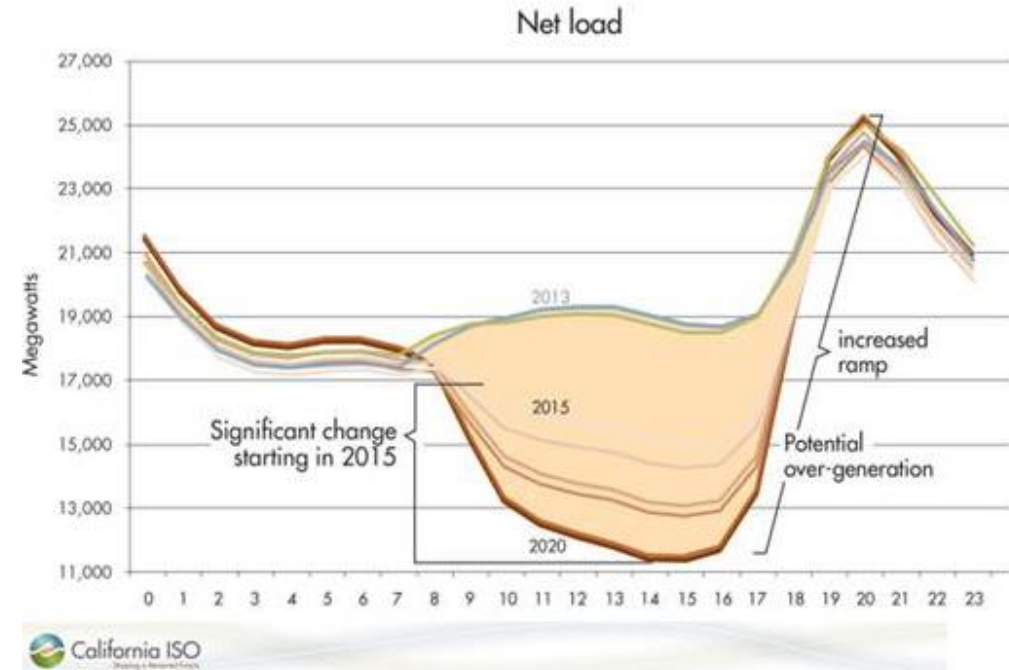
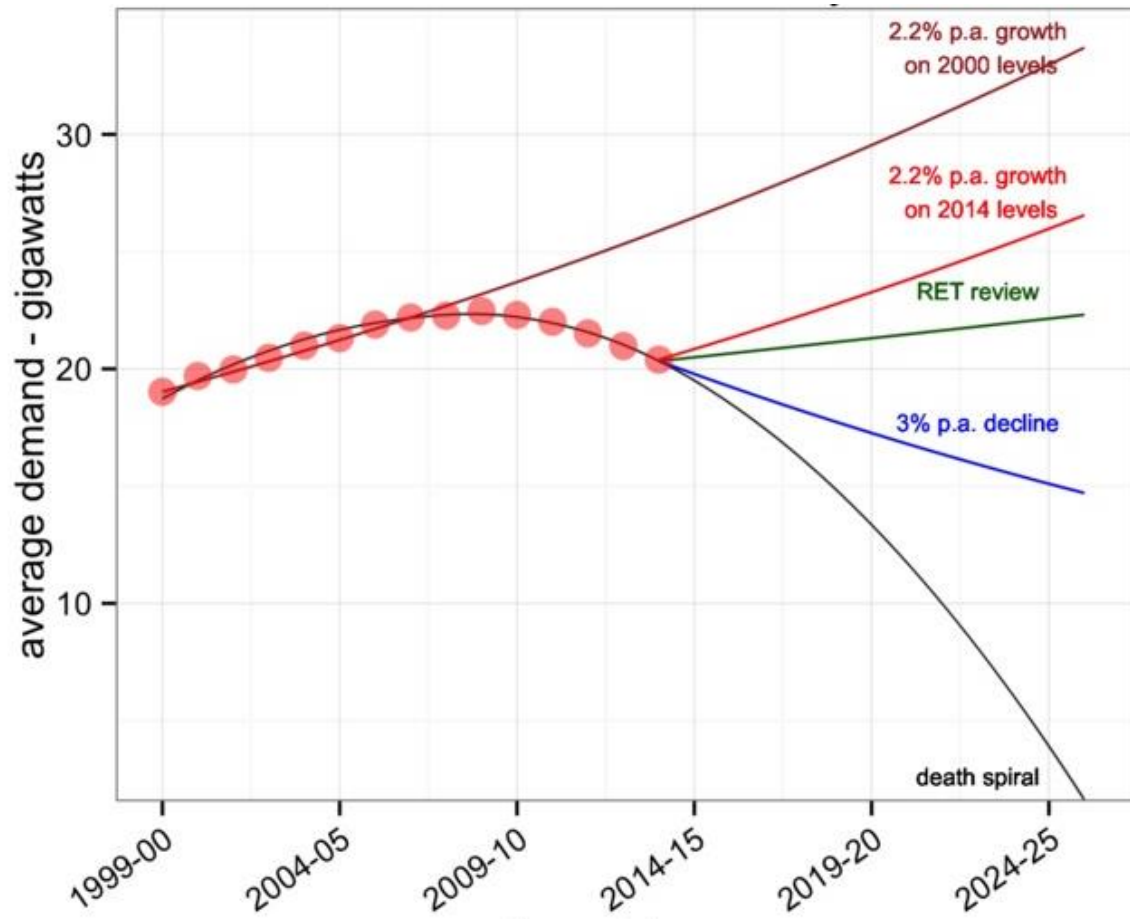
Cheaper, cleaner energy



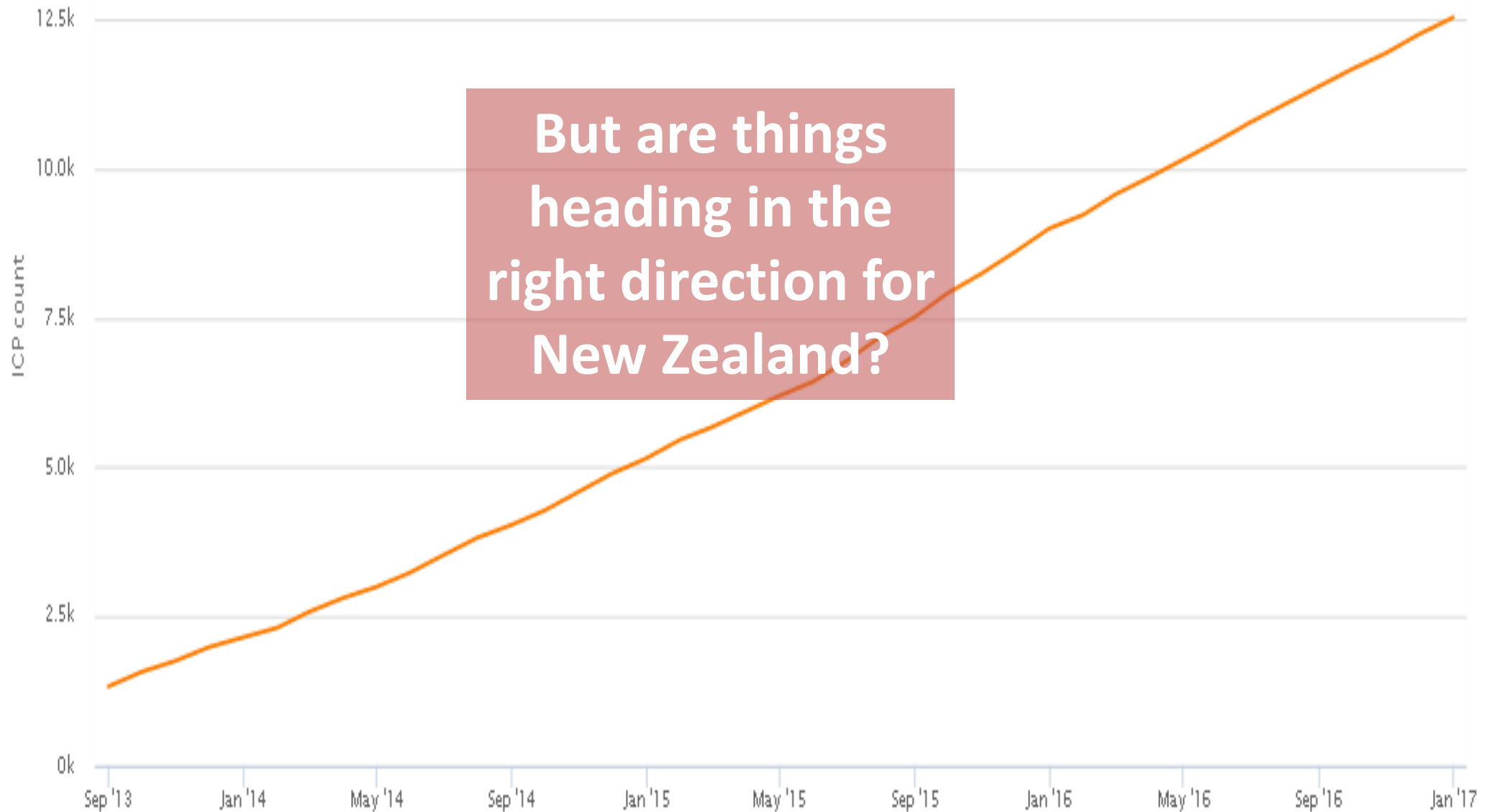
Lower retail cost-to-serve

# ... and are fundamentally challenging grid generation

## NEM grid demand



# Uptake of some technologies is growing fast (e.g. solar PV)



# “Democratisation of energy”

Decision making is moving  
from the boardroom...



... to the living room



- Good outcomes will only emerge if the new decision-makers – i.e. consumers – have the right incentives and information
- This currently doesn't appear to be the case

# The structure of most consumers' tariffs has changed little for a century

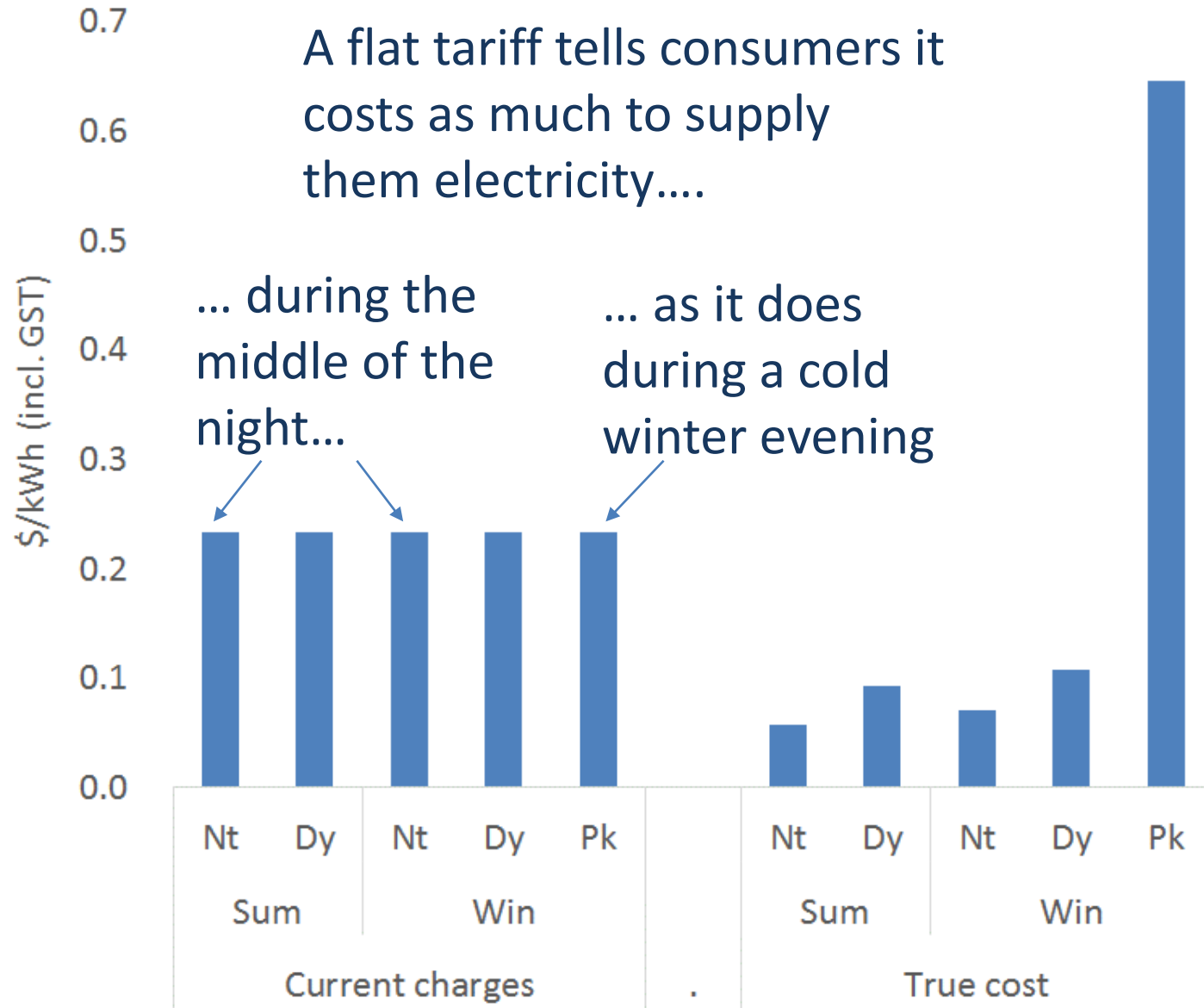
- Two-part tariff
  - \$/kWh 'flat' **variable** charge
  - \$/day **fixed** charge
- Simple structure driven by last century's metering and billing technology



Customers like simplicity, so does having such a simple structure matter?



# Flat tariffs send consumers the wrong messages



But the reality is very different

This matters, because consumers have to make energy choices

# Until recently, consumers' energy technology choices were limited

What type of heater?



Whether / how much to insulate your home?



Limited choices

- Not too many opportunities to get it 'wrong'
- Outcomes not too grossly inefficient or inequitable

# Now, consumers' energy choices have exploded



New types of heating (and cooling)



New types of lighting

New types of 'smart' appliance



But are today's tariffs resulting in consumers making the wrong choices?

New types of vehicle



Consumers can even build their own power station...



... and operate their own storage facility

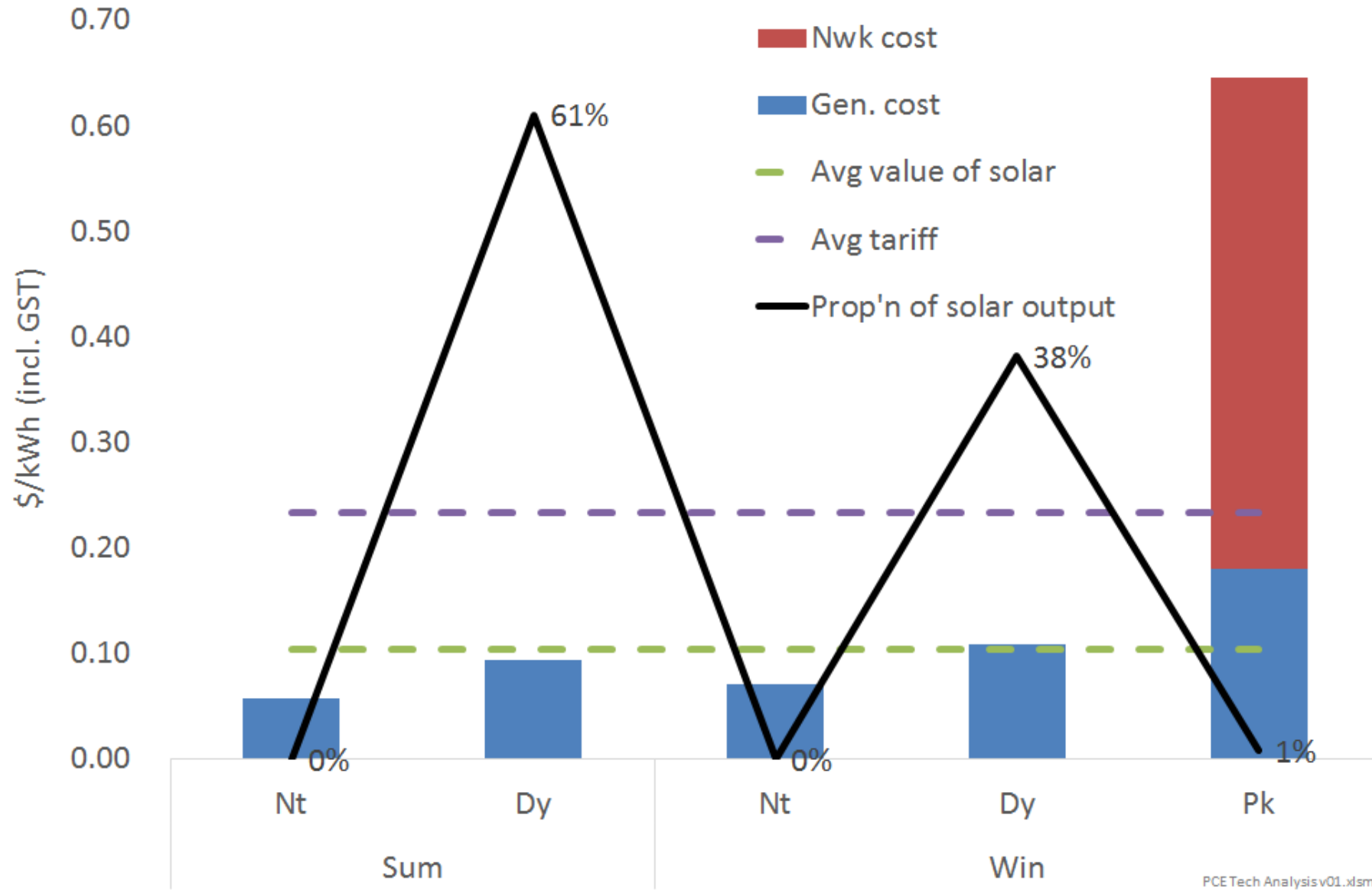


- 1) Environmental outcomes
- 2) Economic consequences
- 3) Social consequences
  - ‘Cost-shifting’ from technology uptake
  - Bill impacts from move to new tariff structures

**First, let's consider solar**

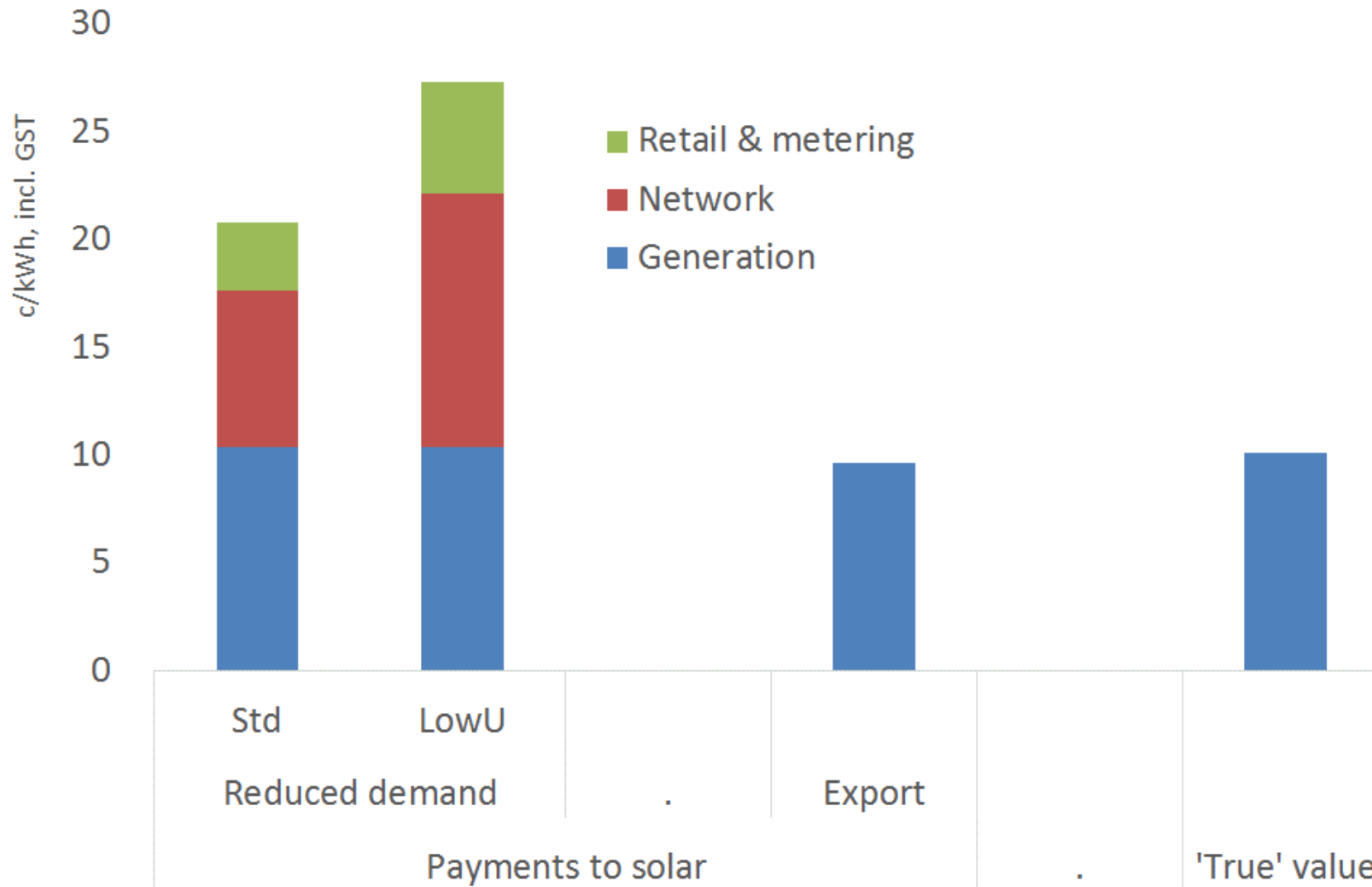


# A flat tariff over-rewards solar for reducing consumer demand



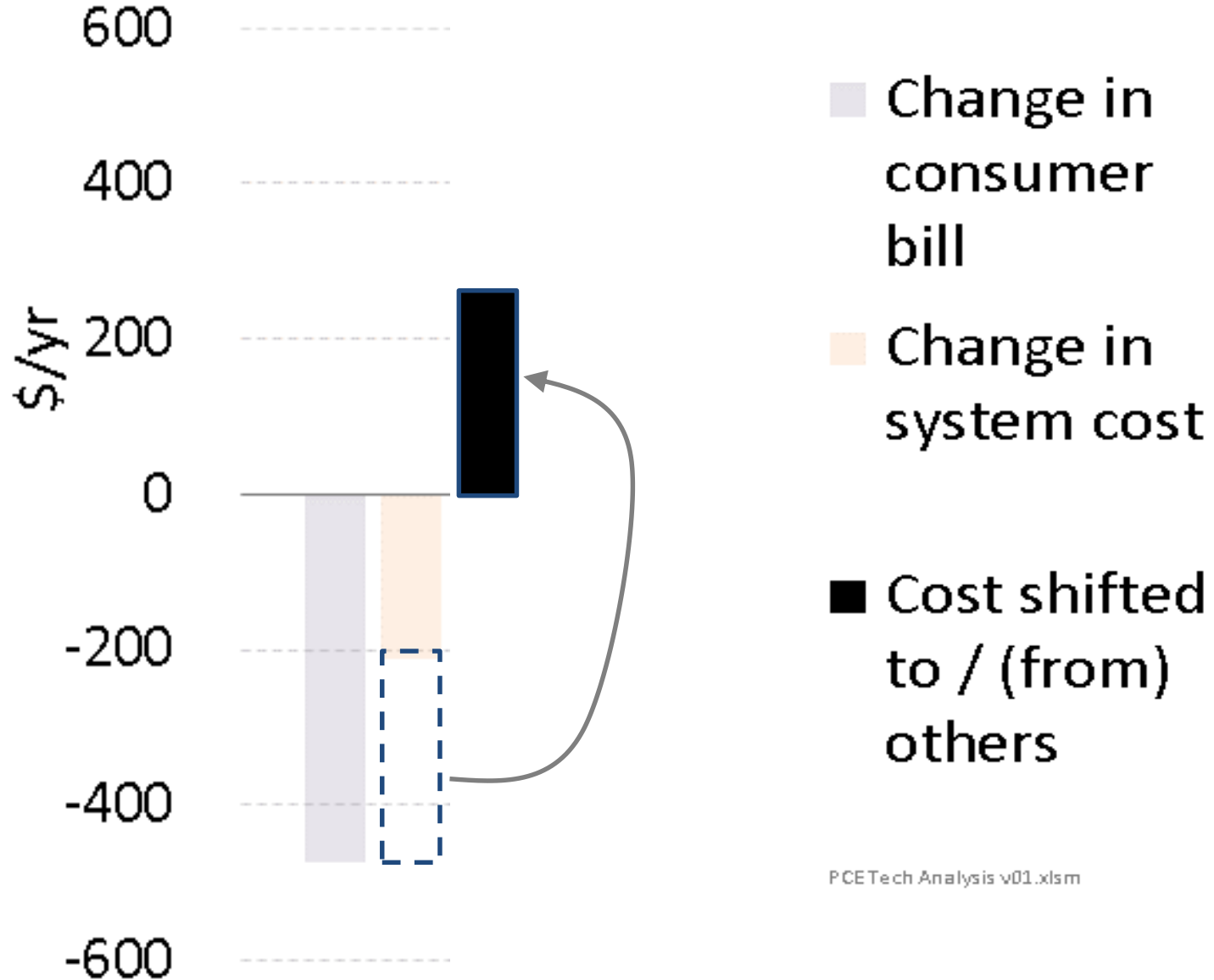
- Consumer benefit of solar is avoiding residential tariff when it is generating
- However, value to NZ, is a lot lower

# Solar PV is being paid for a service it is not providing



- Solar paid as if it were reducing network and retail costs
  - (Even more so for ‘low-users’)
- But such costs are not reduced.
  - (Indeed, solar may *increase* both network & retail CTS costs)

# Solar + flat tariffs → cost-shifting

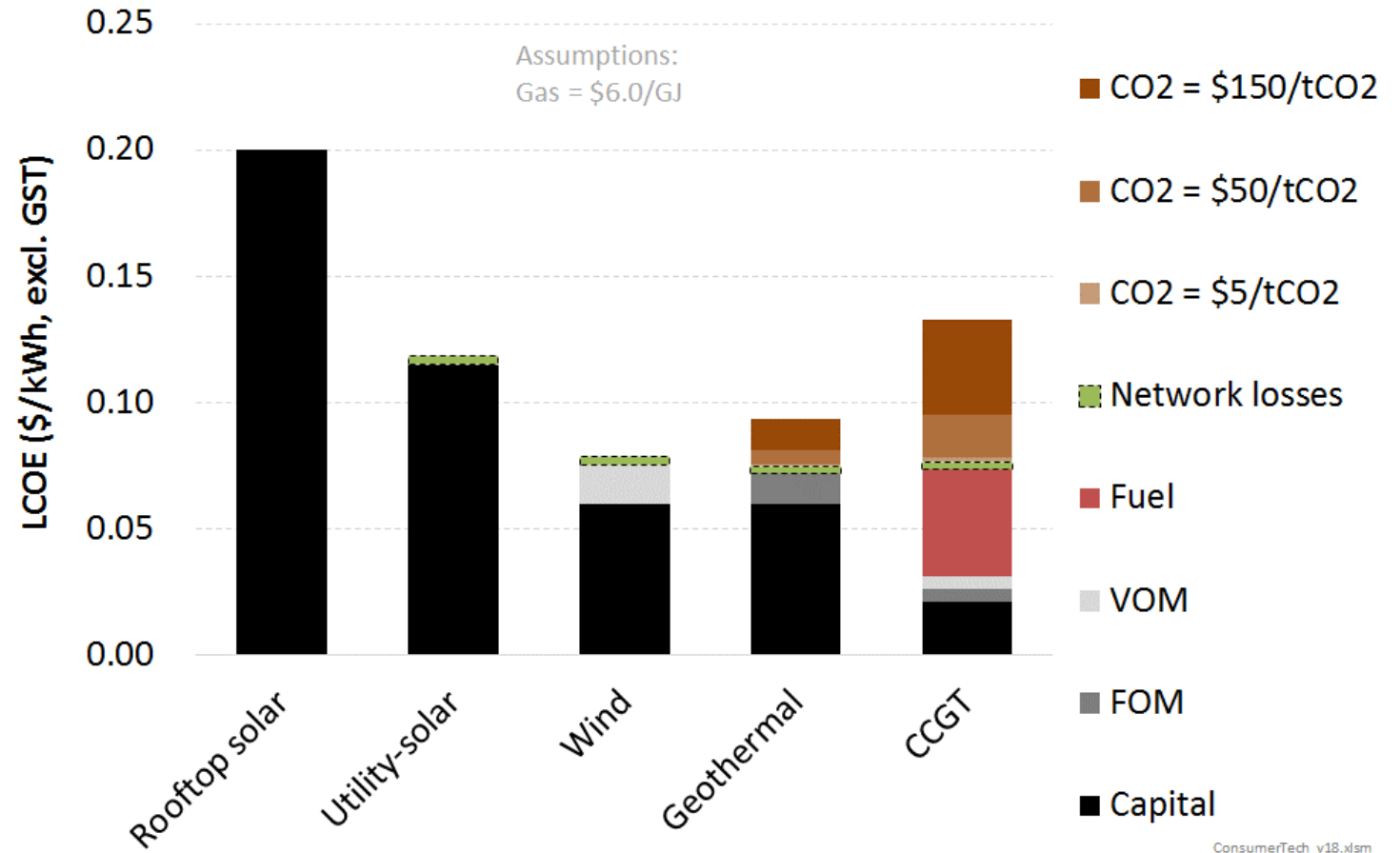


PCE Tech Analysis v01.xlsm

- Under-recovered network & retail costs will be 'shifted' onto other consumers through higher tariffs

# This will cost NZ

- Rooftop solar much more expensive than other generation, but flat tariffs encourage uptake
- Potential inefficient cost of \$1.2-2.6 bn



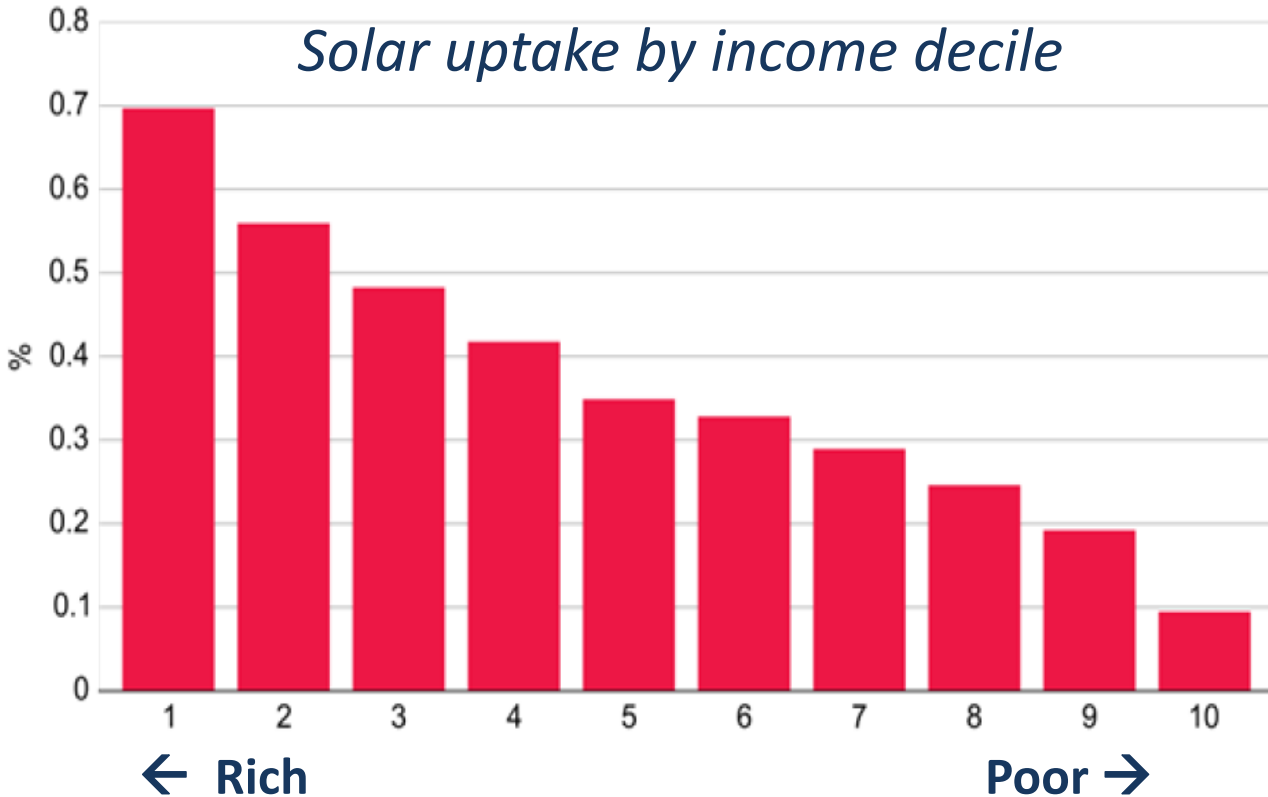
Note: None of these technologies avoid the need to build the grid

# Solar cost-shifting will particularly hurt the poor

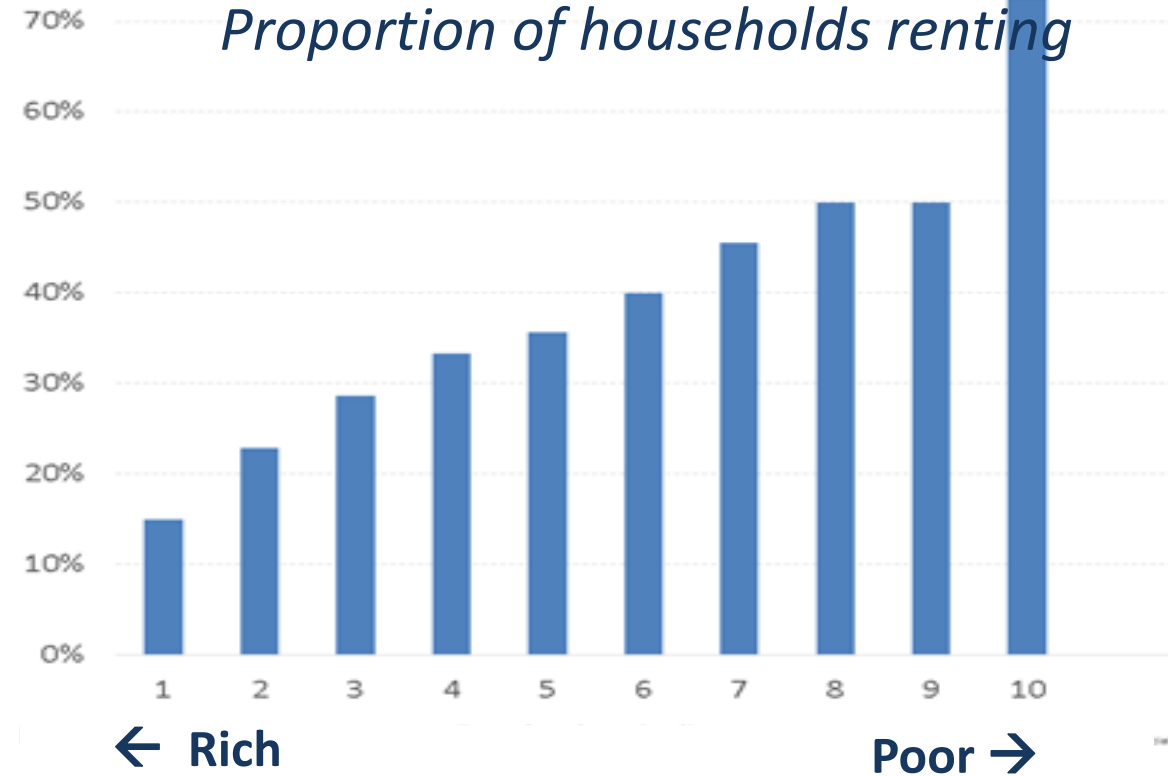
The poorest are most likely to be solar 'have nots'.

Due to: - Lack of income  
- Not owning own home

*Solar uptake by income decile*



*Proportion of households renting*



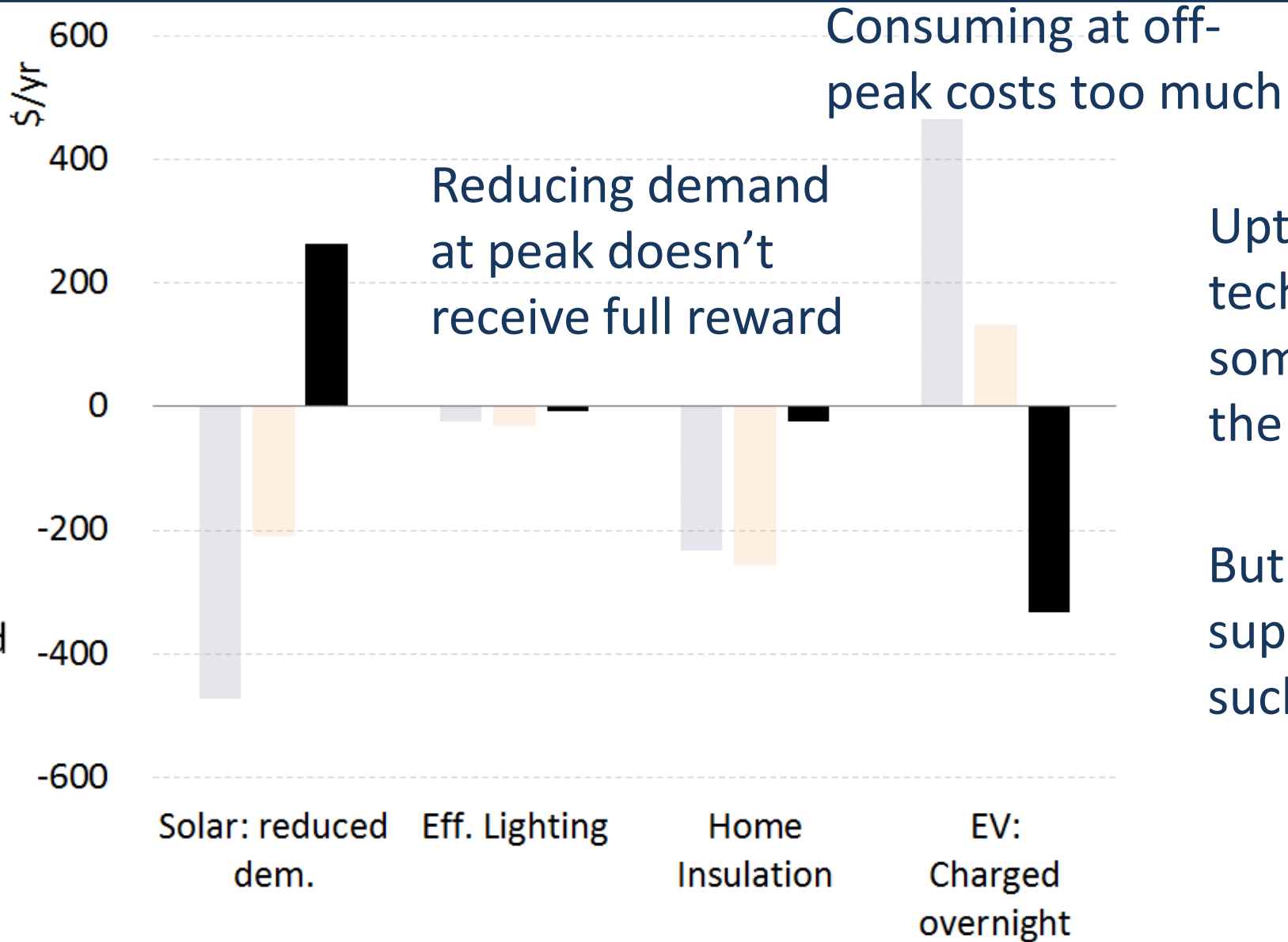
Uptake of solar by 50% of households  
→ average \$150/yr bill increase for poorest consumers



**But hang on, are we demonising solar?  
What about other technologies?**



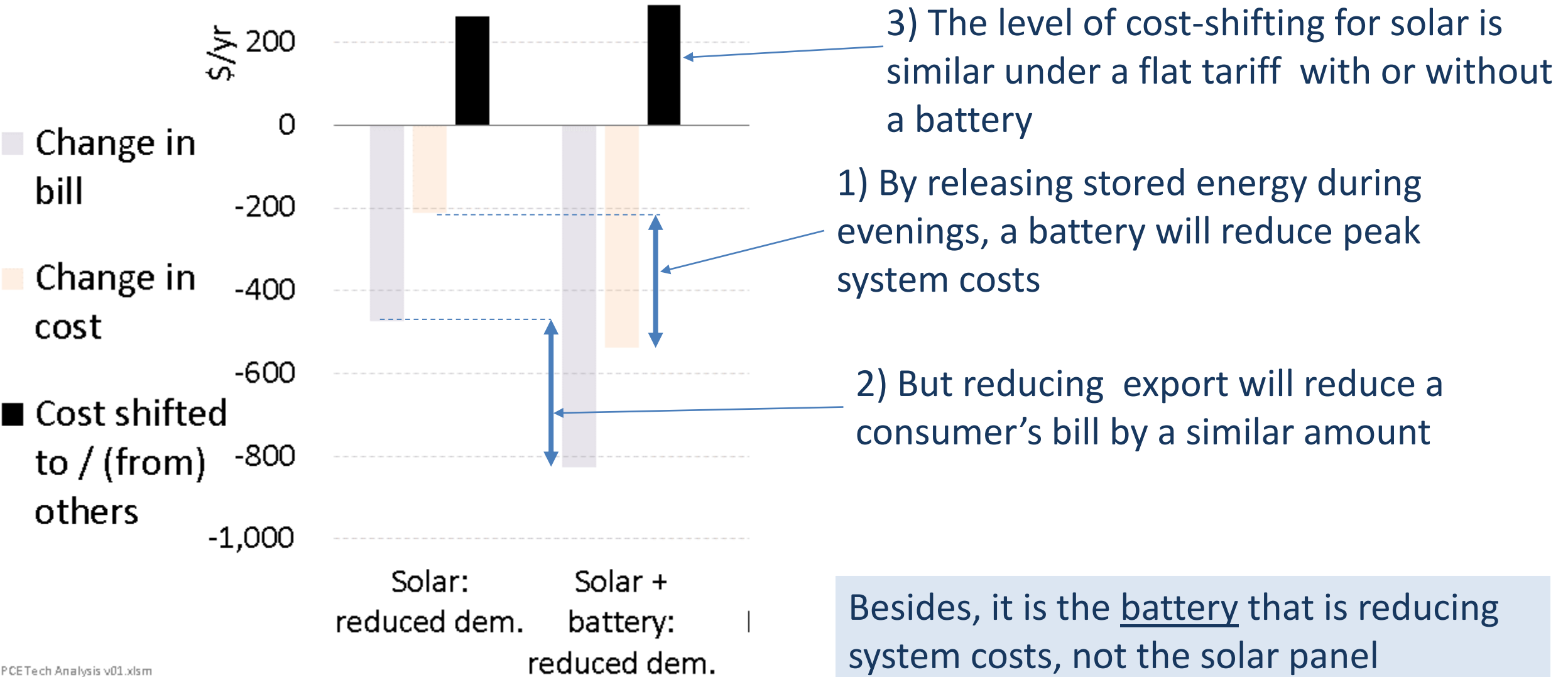
# Solar stands-out for the cost-shifting it causes under flat tariffs



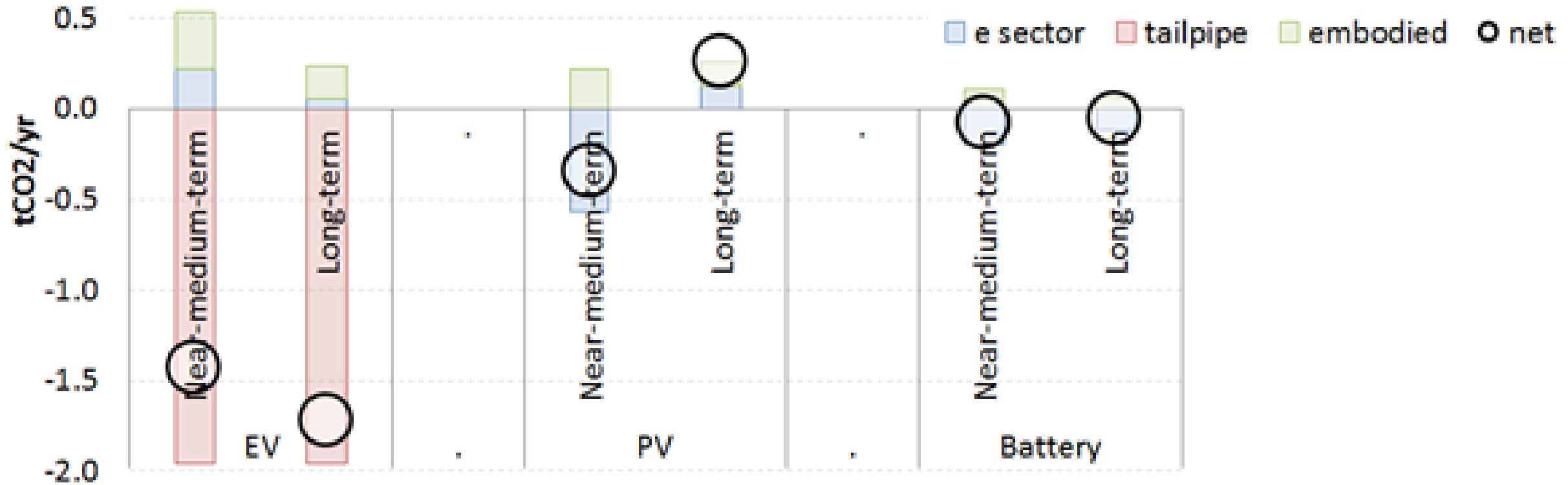
# Suppressing EVs and peak-focussed efficiency will be costly

Suppressed tech.	Alternative tech.	Economic cost
EVs	Petrol vehicles	Hundreds of \$millions
Peak-focussed measures (e.g. LEDs, insulation, log-burners, smart appliances, etc.)	Peaking gen. & network capacity	Hundreds of \$millions

# But surely solar plus batteries will be good, even under a flat tariff?



# What are the emissions impacts in NZ?



- EVs represent the biggest de-carbonising opportunity for NZ (petrol displaced by wind)
- PVs neutral (displacing other renewables) ...ish (increased winter fossil gen.)
- Batteries, and peak efficiency, are good (reduce need for peak fossil gen.)

- Current flat tariffs over-encourage some technologies, and suppress others  
→ Poor economic, social, and environmental outcomes
- Effect is magnified by the low-fixed charge regulations

**If current tariffs are the problem,  
will moving to cost-reflective tariffs cause new problems?**

- Two dimensions to current lack of cost-reflectivity
    - Flat tariffs
    - Variablising fixed costs (esp. through low-fixed charge)
  - Different consumers will win / lose through unwinding these cross-subsidies
- 
- What are likely range of impacts?
  - Will short-term 'pain' be outweighed by long-term 'gain' from encouraging the right technologies?
  - Will the poorest consumers be more likely to be 'winners' or 'losers'?

- Over 100,000 ICPs, with a year's worth of half-hourly meter readings (> 2billion data points!)
- Looked at bill impact of move to cost-reflective tariffs
  - Initial bill impact
  - Longer-term impact from altered rates of technology uptake and cost-shifting
- Linking with census data allows examination of social dimension

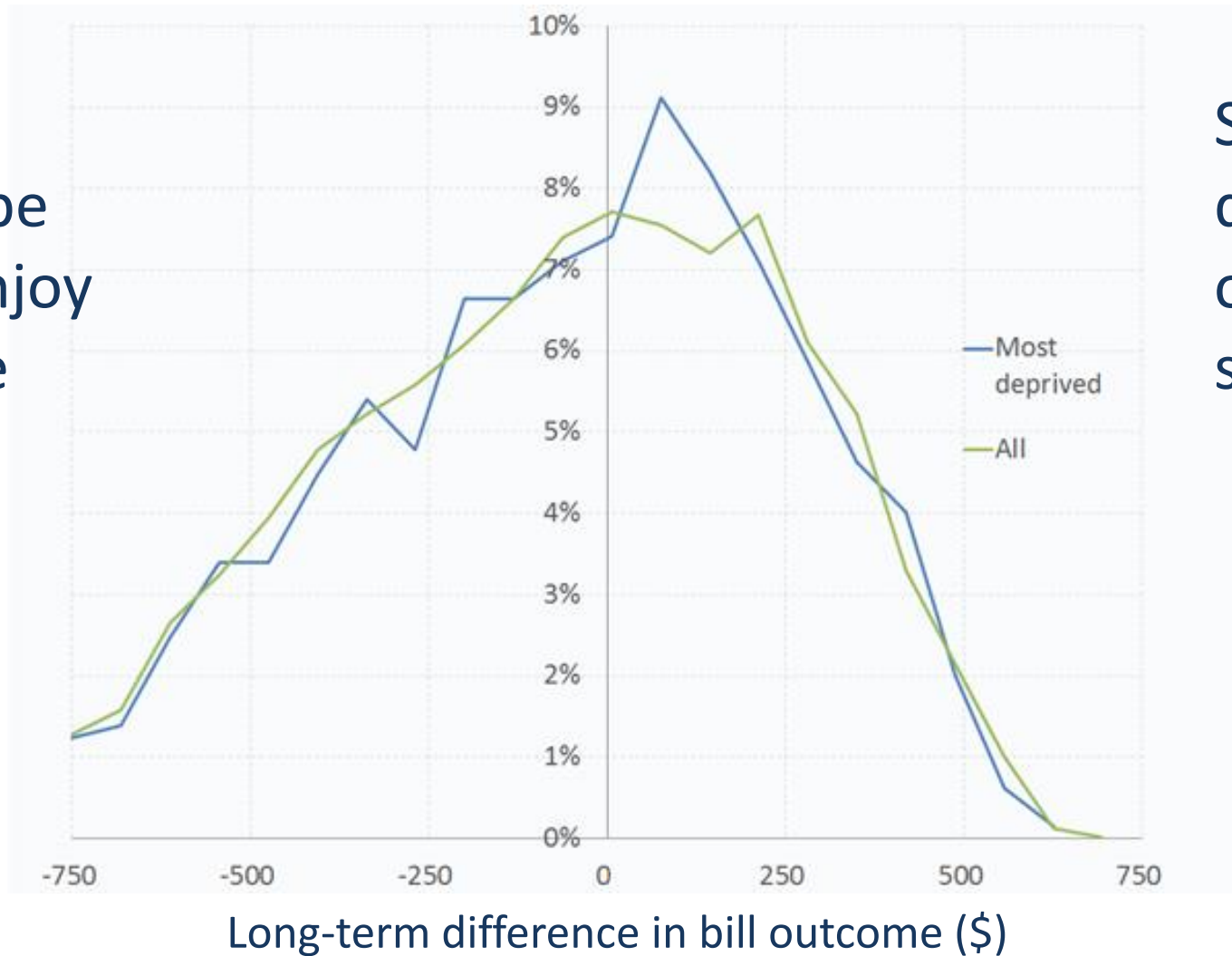
# Cost-reflective tariffs will be good for most customers, particularly low-income, in the long-term

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- Approx. \$120/yr lower bill in the long-term
- Poorest consumers will particularly benefit from not having costs shifted onto them
- Plus NZ will benefit from the economic and environmental gains
- But ...

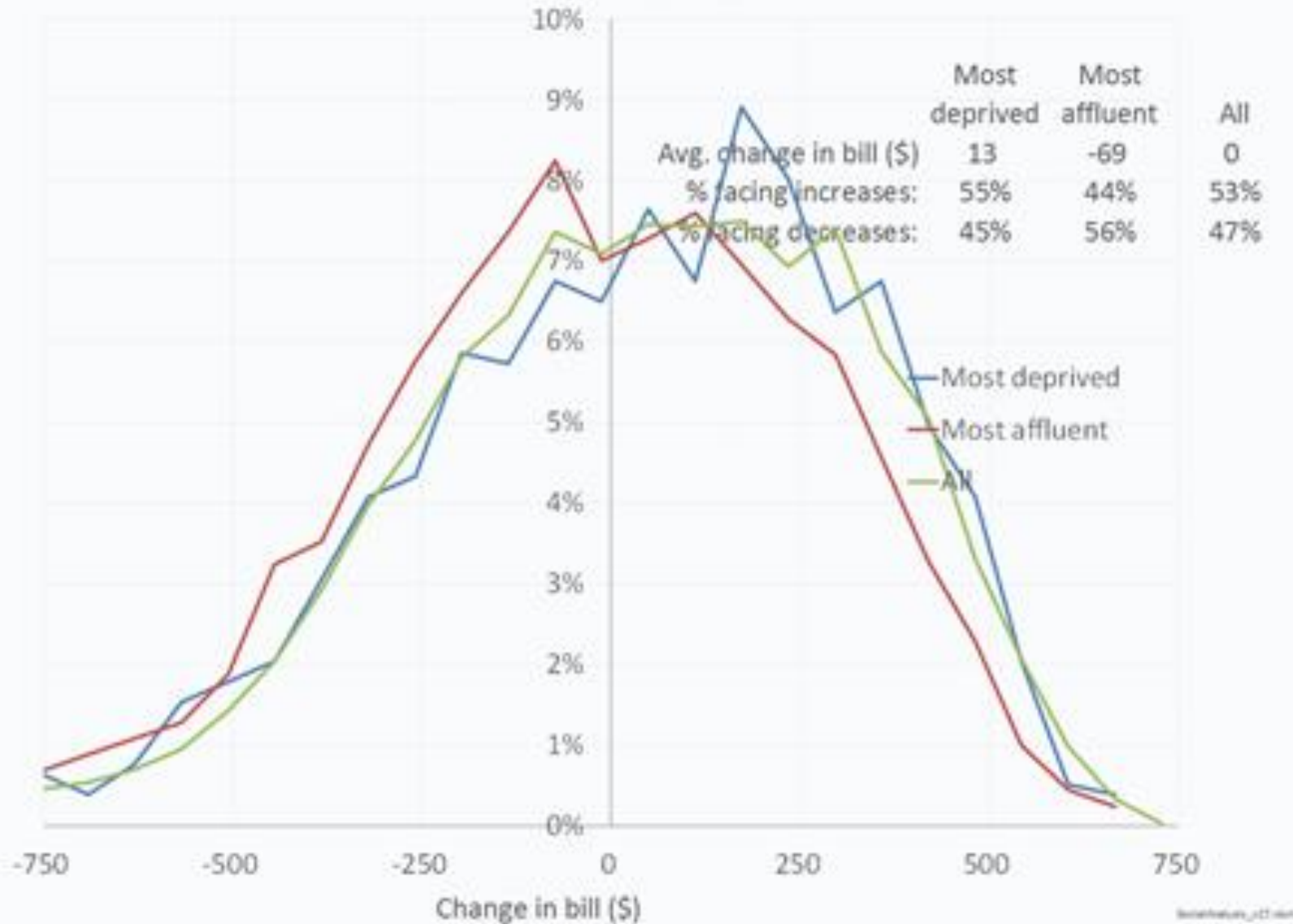
# Not everyone will be a winner

Although most consumers will be 'winners' and enjoy lower bills in the long-term...



Some will be 'losers' due to the unwinding of current cross-subsidies

# A rapid move to cost-reflective tariffs would result in some significant initial bill impacts



- Unwinding of significant cross-subsidies between customers
- Even though the average bill impact will be zero



What are the regulatory / policy implications?



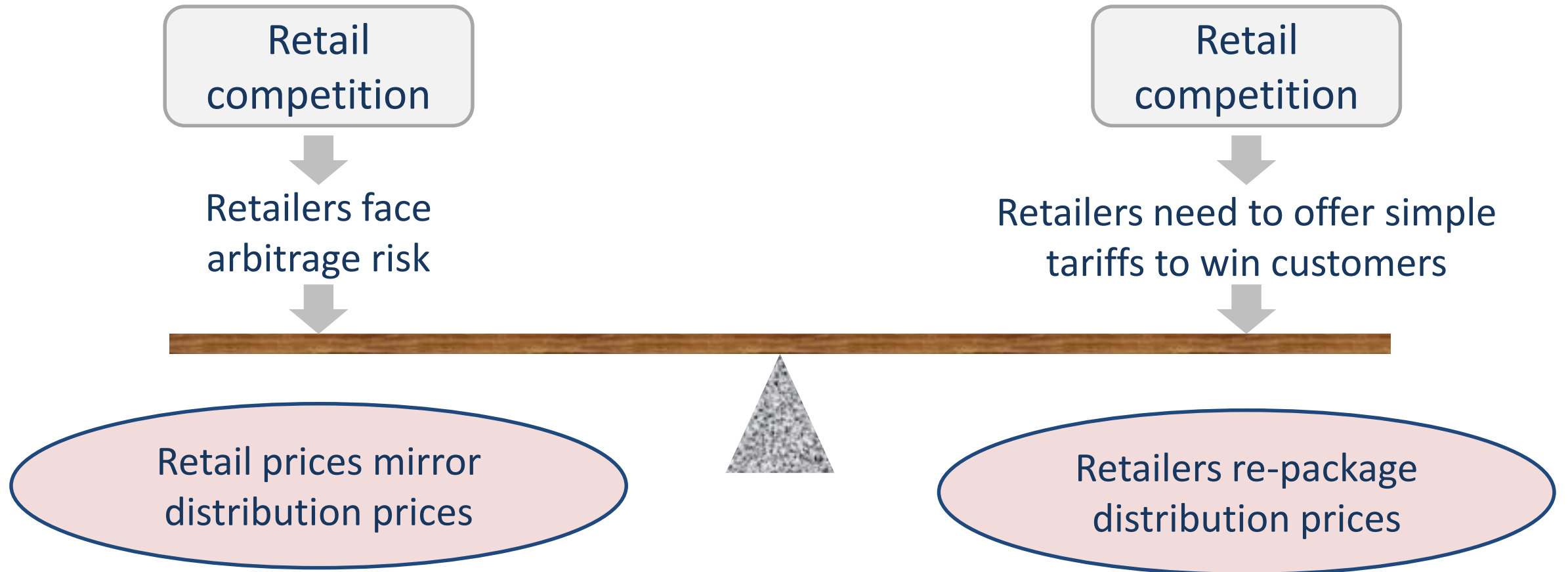
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HIKINA WHAKATUTUKI



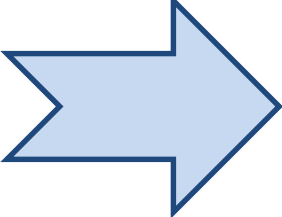
# Is regulatory prescription required for cost-reflective network pricing?

- Some networks think they are incentivised to implement efficient pricing
- Other stakeholders highlight potential barriers
  - Revenue cap *coupled with no real stranding risk* → no commercial incentive to re-structure tariffs
    - Concern in Australia about this effect
  - Some NZ networks selling consumer technology (PV) whose value proposition relies on current pricing structures
  - Different ownership could affect incentives

# Will retailers pass through network price signals?



# Will retailers offer cost-reflective 'energy' (gen + retail) charges?

- Customers don't like:
    - Complexity
    - High fixed charges
  - Retailers offer
    - Flat tariffs for generation cost recovery
    - Variable tariffs for recovery of fixed retail costs
- A large, light blue arrow with a black outline, pointing from the left-hand list of customer dislikes towards the right-hand list of retailer offerings.
- Competition alone seems unlikely to force retailers to only offer cost-reflective tariffs
    - Requires customers to want to move to more complex tariffs
    - Adverse selection – e.g. choosing solar plus flat tariffs – may frustrate this

- Some network tariff structures (e.g. TOU) less likely to be re-packaged than others (e.g. peak-demand-based)
- TOU network structure may also make a TOU generation structure more likely
- Preventing advanced meter readings from being submitted to the wholesale market in aggregate form
- Getting rid of the low-fixed charge...

# Low-fixed charge: A problem if it stays, a problem getting rid of it

- Poorly targeted social assistance.
  - Poorest:  $\approx 60\%$  benefit  $\approx \$200/\text{yr}$   
 $\approx 40\%$  worse off  $\approx \$180/\text{yr}$
  - Wealthiest:  $\approx 45\%$  benefit  $\approx \$195/\text{yr}$
- Now also driving general bill increases for poorest (i.e. exacerbating solar cost-shifting)
- Plus increasing cost-to-serve, and frustrating EV uptake
- However, getting rid of low-fixed charge will be painful
  - Another cross-subsidy to be unwound with associated pain for ‘losers’, even though there will be just as many ‘winners’

# What measures may help the transition to cost-reflective tariffs?

- Phasing their introduction? ✓
- Making them voluntary? ✗
- Making them mandatory for some customers?
  - Customers with certain technologies (e.g. PVs or EVs) ✓
  - New properties or moving house ✓
- Targeted assistance for the most vulnerable? ✓

# Summary

# Getting price signals right is critically important.

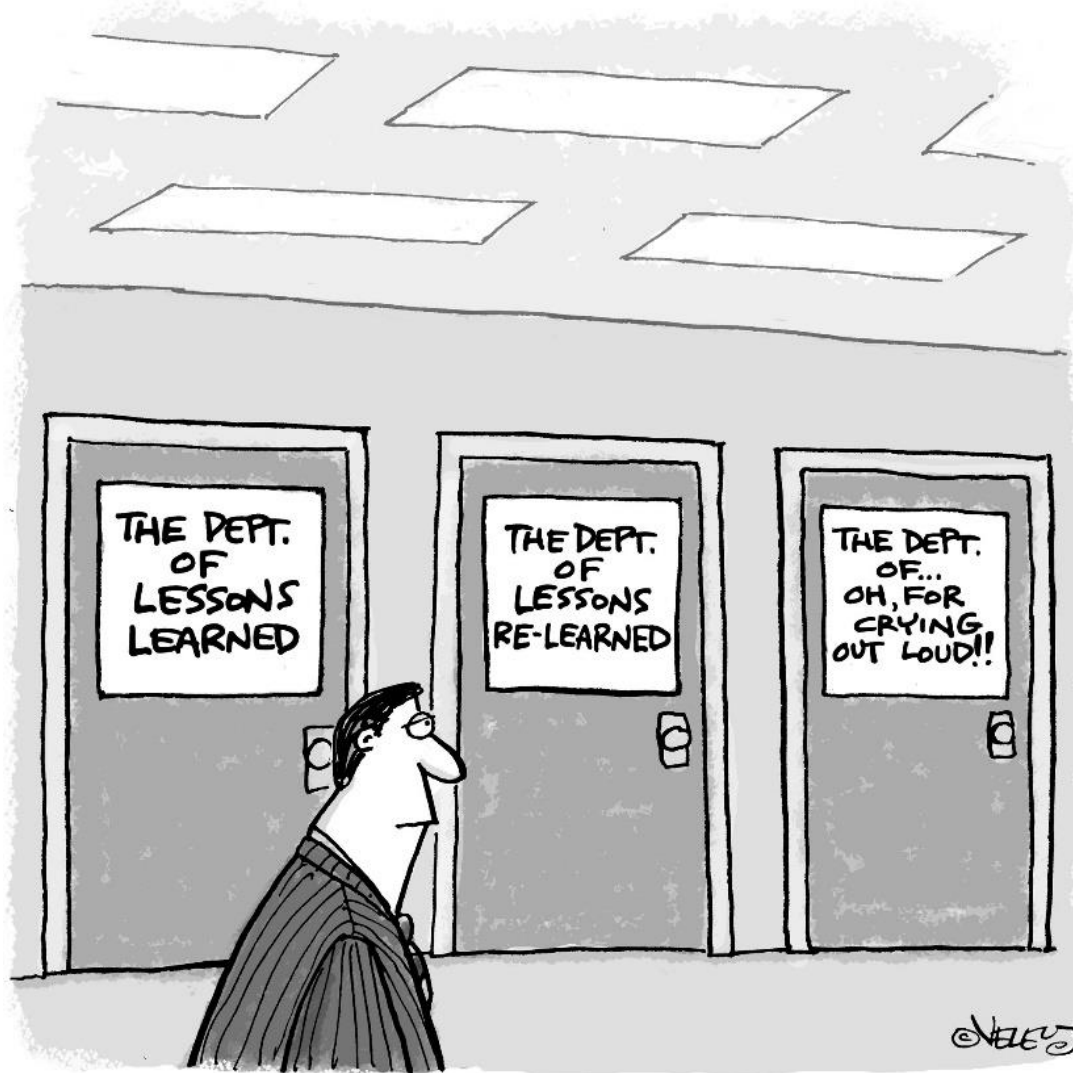
## But challenging!

- Wrong prices to consumers →
  - Worse environmental, economic & social outcomes
- Transitioning to the 'right' prices won't be easy
  - Inevitably winners & losers
  - No strong commercial dynamic on suppliers to move to cost-reflective tariffs
- Need:
  - Appropriate regulatory incentives
  - Broader political & consumer buy-in



H. Brown

"I CAN'T READ THEIR SMOKE SIGNAL. IT'S ENCRYPTED."



Get things  
right before it  
is too late!

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**Thank you**

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